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Attitudes towards circular migration among Bulgarian health professionals

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Abstract

Circular migration has been discussed in political, expert, and scientific discourse as a “triple-win” solution that benefits all parties involved. The aim of this study is to examine the attitudes towards circular migration among Bulgarian health professionals. A cross-sectional survey was conducted between May and June 2022 using a self-administered online questionnaire with a sample of 447 health workers. The multivariable logistic regression revealed an association between age, profession, work experience, residence, and the outcome of willingness to engage in circular movements. The comparatively new concept is gaining popularity among younger physicians and other health professionals with less professional experience, as well as practitioners working in smaller communities. Both higher income and upskilling opportunities can be considered as drivers of circular migration.

Keywords: circular migration, health professionals, health system, Bulgaria

Introduction

Health professional migration is a global health issue that has a significant impact on health systems. Recent studies have discussed the potential of the circular migration to transform the “brain drain” into “brain circulation”. In general, it has been defined as a repeated back-and-forth movement between a country of origin and one or more destination countries [1]. The phenomenon draws researchers’, policymakers’ and professionals’ attention for its potential to provide benefits for both countries and for migrant workers, a so-called triple-win situation [2]. The destination countries benefit from the enhanced health workforce supply; the origin countries receive remittances and benefits from the transfer of expertise; the migrants gain skills and knowledge and higher income abroad. The European Commission and the World Health Organisation have recommended circular migration as a potential solution to mitigate the negative and boost the positive effects of health professionals’ migration [3, 4].

The current study aims at examining the attitudes towards circular migration among Bulgarian health professionals and the determinants of their willingness to engage in such mobility.

Materials and Methods

A cross-sectional survey was carried out between May and June 2022 by a poll agency in Bulgaria. The representative sample consisted of 447 health workers stratified by profession (physicians, dentists, nurses and midwives) and location of residence (capital, big city, small town and village). Data were collected via a self-administered online questionnaire tapping migration attitudes, perceived benefits of circular migration, driving factors and obstacles. The Research Ethics Committee of Medical University - Varna granted ethical approval for the survey.

The respondents’ willingness to participate in circular migration was measured on a four-point scale and later transformed into a binary variable. Descriptives were reported, and the differences between the subgroups were examined. The associations between sociodemographic and professional determinants and the willingness to engage in circular migration was assessed using multivariable statistical analysis (binomial logistic regression). Differences were considered significant at $p \leq 0.05$. Statistical analyses were performed using *jamovi*, version 2.2.5.

Results

Over half of respondents (54.6%) indicated a willingness to engage in circular migration, compared to 45.4% who would prefer not to engage in such mobility. The multivariable regression model demonstrated an association between age, profession, work experience, residence, and willingness to engage in circular migration (Table 1).

Table 1. Regression model assessing the likelihood of circular migration

Predictor	OR	95% CI	p	
<i>Age</i>	22-35	1		
	36-45	2.63	1.02-6.76	0.045
	46-55	2.04	0.71-5.84	0.184
	56-65	1.34	0.43-4.14	0.612
	65+	1.32	0.38-4.59	0.664
<i>Profession</i>	physician with specialty	1.67	1.05-2.67	0.031
	resident physician	0.77	0.18-3.36	0.727
	dentist	2.20	0.95-5.10	0.066
	nursing professional	1		
<i>Work experience</i>	up to 3 years	4.27	1.23-14.86	0.023
	3-10 years	1.95	0.79-4.83	0.149
	11-20 years	0.99	0.56-1.75	0.970
	over 20 years	1		
<i>Type of facility</i>	primary care practice	1		
	specialised outpatient facility	1.29	0.62-2.66	0.497
	multiprofile hospital	1.82	0.87-3.81	0.111
	specialised hospital	2.17	0.92-5.11	0.077
	other facilities	3.10	0.47-20.47	0.239
<i>Ownership of facility</i>	state	1		
	municipal	1.12	0.60-2.09	0.721
	private	0.96	0.57-1.61	0.870
<i>Family status</i>	married	1		

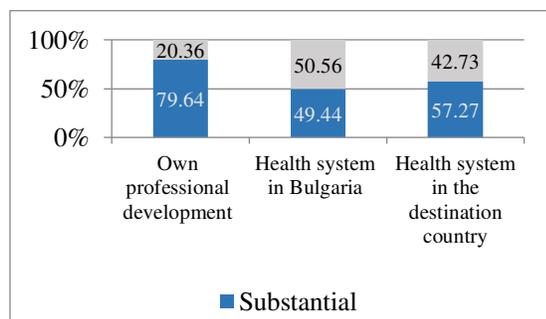
	single	1.51	0.75-3.01	0.247
	living with a partner	1.77	0.98-3.18	0.058
	divorced	1.49	0.75-2.96	0.255
<i>Children</i>	under 18 years	1		
	over 18 years	0.97	0.53-1.77	0.923
	no children	0.58	0.29-1.16	0.125
<i>Residence</i>	capital	1		
	big city	0.89	0.56-1.43	0.631
	small town	3.19	1.68-6.07	<.001
	village	2.36	0.71-7.77	0.160

Notes. OR – odds ratio; CI – confidence interval. Log odds of “willing to circulate” vs. “not willing”.

According to the logistic regression’s results, the profession was a significant predictor of circular migration, with attending physicians being 1.67 times more likely to circulate than nursing professionals ($p=0.045$). The odds of circular migration readiness increased for younger health professionals with less experience, who were more willing to circulate between countries compared to more experienced medical specialists ($OR=4.27$, $p=0.023$). The likelihood of circular movement was 3.19 times greater ($p<.001$) for respondents living and practising in smaller towns vs. those living in the capital. Age also influenced the propensity to participate in circular migration, with health professionals between the ages of 36 and 45 being more willing to participate in such mobility. Factors such as healthcare facility, family status and children did not show significant associations with the willingness to engage in circular migration.

Nearly 80% of the respondents ($p<.001$) believed that the skills, knowledge, and experience they gain from circular migration would positively affect their professional development (Figure 1). In addition, around 64% ($p<.001$) considered circular migration as an additional source of income and savings that might be invested in Bulgaria upon return.

Regarding the impact of circular migration on the origin country, the results were not so explicit and statistically significant differences could not be established ($p=0.850$). Over 57% of the respondents ($p=0.002$) stated that health systems in the destination countries would benefit from the circular migration (Fig. 1). Figure 1. The impact of circular migration as seen by Bulgarian health professionals



Discussion

The comparatively new trend of circular migration is gaining popularity among younger physicians and other health professionals with less professional experience, as well as practitioners in smaller settlements. Our findings were consistent with prior research on the topic, which also found a relatively high interest in this type of mobility. When studying sub-Saharan African health workers in Belgium and Austria, Poppe et al. (2016) highlighted the potential of brain circulation. The authors reported that circular migration was seen as an alternative to permanent return due to its numerous advantages, including upgrading skills and experience, building professional networks, and contributing to the development of the health sector in the country of origin [5]. Other studies have also concluded that circular migration is a viable solution to the problem of understaffing, mainly by retaining young doctors who prefer to specialise abroad [6, 7]. Circular migration allows for mitigating the adverse effects of permanent migration if retention strategies cannot be effectively implemented.

The study's findings underscore the advantages of circularity associated with the career development of certain type of participants. Circular migration allows early-career health professionals to acquire skills and knowledge that benefit their professional development. Additionally, a substantial proportion of respondents anticipated additional savings that could be invested in Bulgaria after return. Circular migration can be driven by both higher incomes and opportunity for skill development.

Conclusion

This study identified specific factors associated with the willingness of Bulgarian health professionals to participate in circular migration, as well as some incentives for such engagement. The transfer of knowledge, skills, and expertise by circular migrants may have a significant impact on the development of the health system in the origin country. Thus, health authorities should employ various tools, such as bilateral agreements, programs, and initiatives, to implement circular migration policy and facilitate circularity.

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Medico social rehabilitation through labor therapeutic activities in children, social service users

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Abstract

The purpose of the present study is to determine the influence of occupational therapy activities in the process of medico-social rehabilitation in organizing the free time of children raised and educated in social service. 31 children using a social service between the ages of 12 and 18 were included in the study. Functional, sociological and statistical methods were applied. A significant impact on children's creative activity and their desire to learn unfamiliar techniques for working with various materials and tools was reported. The data from the conducted survey show significant positive results on the test scale, which is most likely due to the favorable impact of the applied occupational therapy program among children who are users of the social service. The diverse and meaningful activities provided to children in an unequal social situation give meaning to their free time and create conditions for it to be organized and purposeful.

Keywords: children at risk, independent life, social service, labour therapy activities

Introduction

In relation with the work on a scientific project was studied the need to organize and conduct purposeful activities with a variety of work activities, affecting the formation of the skills for independent living and social inclusion of children in an unequal social situation [1]. Within free time, the activities of the program are divided into two groups [2]:

- for girls, activities such as: sewing, knitting and making decorations; household activities, including food preparation; flower care;
- for boys – constructive activities; working with different materials; working with different tools, sports activities. The planning and implementation of the activities is related to the available materials, tools and consumables.

The purpose of the present study is to determine the influence of occupational therapy activities in the process of medico-social rehabilitation in organizing the free time of children raised and educated in social service.

Material and methods

Scope of the study

Children using the "Family Accommodation Center" social service on the territory of Pleven Municipality are included in the research. 31 users between the ages of 12 and 18 were studied, of which 18 were boys and 13 were girls (gender matters in the selection of suitable work and household activities).

Research methods and tools

- ❖ Functional tests (according to the age characteristics of the children), which include: „Skills for independent living” test; „Health care” test and „Leisure management” test, taking into account the results at the end and the beginning of the observed period on a 3-point scale: 1 – low level, 2 – medium level, 3 – high level. The signs (+) and (–) are placed at an incomplete whole degree.
- ❖ Sociological methods – (survey): on a voluntary basis, a face-to-face survey was conducted among children - users of a social service to evaluate the applied activities of the occupational therapy program in their free time. A semi-standardized questionnaire with 3 sections was developed. The evaluations of the closed questions are determined on a 3-point scale: 1 – no (negative answer); 2 – I cannot answer; 3 – yes (positive answer).
- ❖ Statistical methods – the obtained results were processed with statistical program SPSS, Wilcoxon rank test, t-test of Student. Significance of results for inferences and conclusions was determined at $p < 0.05$.

Results

The developed and approved occupational therapy program is tailored to the age and individual characteristics of the users of the social service [3]. For the purpose of this communication, only the results of the "Leisure Management" test are reported and analyzed, which shows interest in working with various materials and tools from the field of applied arts and crafts, and has 3 sections:

- interest in working with different materials in the field of applied arts;
- showing interest in working on various techniques and artistic crafts;
- applicability of the acquired skills in practical activities for social inclusion.

The data obtained from the beginning and the end (before and after the implementation of the occupational therapy program) and the difference from the end and the beginning of the studied period (the improvement) were subjected to statistical processing. It is used the arithmetic mean value (\bar{X}) of the numerical image from the corresponding test scale.

Table 1 presents the data from the statistical processing of the obtained results of the "Leisure Management" test from the beginning, the end and the difference (improvement) from the conducted observation

Sections of the test	n	Beginning of the study			End of the study			Difference			t-test
		\bar{X}	S	CI	\bar{X}	S	CI	\bar{X}	S	CI	
1 section	31	1,73	0,38	±0,13	2,55	0,41	±0,14	0,85	0,34	±0,04	6,92
2 section	31	1,51	0,35	±0,12	2,46	0,43	±0,15	0,94	0,41	±0,14	1,95
3 section	31	1,38	0,42	±0,14	2,28	0,45	±0,16	0,92	0,38	±0,14	7,53
Total test	31	1,54	0,38	±0,14	2,43	0,44	±0,15	0,90	0,38	±0,11	1,86

Figure 1. presents the Wilcoxon curve of the results of all sections of the test and the subjects at the beginning and the end of the study, from which it is clear that it shifts to the right. This shows an improvement in the organization of the free time of social service users. A significant impact on

children's creative activity and their desire to learn unfamiliar techniques for working with various materials and tools was reported.

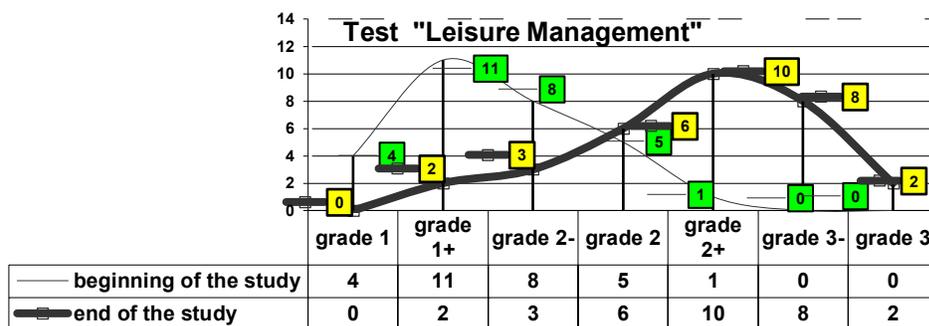


Figure 1 Wilcoxon curve of the results of the "Leisure Management" test before and after the occupational therapy program of all the subjects

The positive impact of the occupational activities in the examined users is significant in all sections of the test and proves the effectiveness of the applied occupational therapy program in the Family Accommodation Centers. The assimilation and improvement of new knowledge and skills create conditions for purposeful, organized and varied content free time [4].

Table 2. Results of the survey conducted among children, users of social services, total by sections in percentage ratio

Section	Rate		
	1	2	3
1. Interest in working with different materials in the field of applied arts.	3,23	9,69	87,08
2. Expression of interest in working on various techniques and artistic crafts.	6,45	12,91	80,64
3. Applicability of the acquired skills in practical activities for social inclusion.	6,45	9,69	83,86

The data show significant positive results on the test scale, which is most likely due to the beneficial impact of the applied occupational therapy program among the children who are users of the social service.

Discussion

Studies on the problems of children raised and educated in the conditions of social services show that, to varying degrees, they are at risk of falling behind and insufficiently forming skills for independent living [5]. The policy aimed at these children requires a strategy for protection, social security and support for their successful implementation, based on development forecasting. Preparation for an independent and self-sufficient life is part of the overall process of working with children receiving social support [6]. Planning the transition to an independent life is a process of change management related to their personal growth and supports easier adaptation to the new realities associated with increasing responsibility and strengthening the independence of the

personality [7]. The implementation of a complex of activities for the formation of skills from everyday life is a priority goal in the work of the responsible institutions and specialists to increase the quality of care for children [8]. This goal is on the basis of the legislative framework guaranteeing the rights of the child, as well as in national strategies, plans and programs for their implementation in social practice.

Conclusion

The proposed and approved appropriate occupational therapy program, tailored to the age, gender, individual characteristics, abilities and preferences of the children, facilitates and supports overcoming their social isolation. First and foremost, it appears the need to carry out entertaining activities in the free time, which are expressed in working with various materials, tools and techniques from the applied arts and artistic crafts in social institutions.

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Effects of the COVID-19 pandemic on Public Health in Bulgaria

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Introduction: The newly identified infectious coronavirus (SARS-CoV-2) was discovered in Wuhan and has spread rapidly since December 2019 around the globe [1]. The COVID-19 pandemic represents the biggest threat to lives, livelihoods and economies since the Second World War (WWII) and has led to a dramatic loss of human life worldwide and presents an unprecedented challenge to public health, food systems and the world of work [2].

During the early months of the pandemic, a dichotomy emerged between countries in Western and Eastern Europe (with the possible exception of Russia). Western Europe was heavily affected—by June 2020 official COVID mortality reached 600 to 800 deaths per million (DPM) in countries such as Spain, Italy, the UK, Belgium, France, and Sweden, with excess mortality rates even higher. In contrast, most Eastern European countries registered relatively few deaths, possibly because of much earlier implementation of social distancing measures relative to the development of the outbreak [3–7].

Two more major waves followed in 2021, followed by another one in early 2022 were observed.

After initially having low levels of SARS-CoV-2 infections for much of the year, Bulgaria experienced a major epidemic surge at the end of 2020, which caused the highest recorded excess mortality in Europe, among the highest in the world (Excess Mortality Rate, or EMR $\sim 0.25\%$) [8]. The Bulgarian population is very strongly affected by COVID - 19 pandemic [9].

Purpose

The aim of the article is to analyse the negative effects of COVID-19 pandemic on population health in Bulgaria.

Material and Methods

In September 2022nd, a documentary approach was applied and negative effects of COVID-19 pandemic on population health in Bulgaria was analysed. The data from National Centre of Public Health and Analyses [10] and National Statistical Institute [11] was used. All-cause mortality and country-level population data for Bulgaria, was obtained from Eurostat [12,13]. Life expectancy (LE) values at different ages were obtained from country's National Statistical Institute [11] and from the World Health Organization's [14] open data platform.

Results

The figure 1 shows the excess number of deaths in Bulgaria in years of 2020, 2021 and 2022 comparing with previous three years.



Fig. 1 Deaths in Bulgaria by week (2017 - 2021, in number

In the figure 2 the structure of causes of death in Bulgaria for 2020th and 2021st is shown.

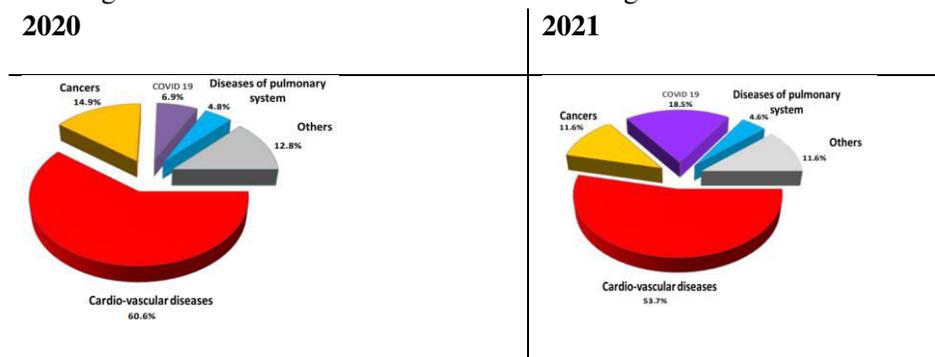


Fig. 2 Leading causes of death in Bulgaria (2020, 2021, in %)

Table 1 shows the trend in LE in Bulgaria before and in time of COVID-19 pandemic.

Table. 1 Life expectancy in Bulgaria (2000 – 2021, in years)

Periods	Total	Men	Women
2000 – 2002	71.87	68.54	75.37
2010 – 2012	74.02	70.62	77.55
2016 – 2018	74.83	71.37	78.39
2017 – 2019	74.90	71.46	78.45
2018 – 2020	74.64	71.11	78.22
2019 – 2021	73.60	70.05	74.40

Table 2 presents the hospitals' case-fatality rates in Bulgaria before and in time of COVID-19 pandemic.

Table. 2 Hospitals' case-fatality rates in Bulgaria (2000 – 2021, in %)

Years	Total
2000	1.7
2010	1.4
2016	1.3
2017	1.3
2018	1.2
2019	1.3
2020	2.0
2021	2.9

Discussion

The COVID-19 pandemic has had a devastating impact on the world over the past two years (2020-2021). After initially having low levels of SARS-CoV-2 infections for much of the year, Bulgaria experienced a major epidemic surge at the end of 2020, which caused the highest recorded excess mortality in Europe, among the highest in the world (Excess Mortality Rate, or EMR ~0.25%). Two more major waves followed in 2021, followed by another one in early 2022. Bulgaria has continued to exhibit the previous pattern of extremely high excess mortality, as measured both by crude mortality metrics (an EMR of ~1.05%, up to the end of March 2022) and by standardized Potential Years of Life Lost (PYLL) and Aged-Standardized Years of life lost Rate (ASYR) [15]. Excess mortality for a given time period is defined as the number died more than expected (normal) for the time period in question. Excess mortality is the most accurate indicator of the victims of the pandemic (direct and indirect), since apart from officially the registered death from COVID-19, it also includes the deaths from COVID-19 who are not were officially registered due to lack of testing or reporting irregularities of the cause of death, as well as those who died as a result of the untimely treatment of other diseases caused by the overload of the health care system. The figure 1 shows the excess number of deaths in Bulgaria in years of 2020, 2021 and 2022 comparing with previous three years.

As a result of this situation for 2021st Bulgaria is a country with highest level of crude death rate of 21.7‰ in the world and the increasing of 6.2% for the period of COVID was found [10, 11].

COVID-19 ranks third in the structure of causes of death in Bulgaria for 2020th with a relative share of 6,9% and 2021st with 18.5% respectively (fig. 2). At the same time the proportion of cardiovascular diseases decreased to 60.6% and 53.7% [10].

By the official statistics of the Ministry of Health [16, 17] the average age of a deceased male and female from COVID-19 are 69 and 71, respectively. The leading comorbidity is cardiovascular disease (55%), followed by diabetes (17%), pulmonary disease (12%), obesity (3%), and 30% are listed with no known comorbidity

Life expectancy (LE) is one of the most informative indicator for assessment of the level of population health. LE at a given age is the average number of years which a person (or a generation) of that age may expect to live if the age-specific mortality rates would remain the same [18]. LE across the European Union as a whole and in nearly all other countries has been steadily increasing for decades. Declines in life expectancy are rare, but that is indeed what happened in many countries in Europe during the pandemic of COVID-19. For the period of pandemic, the decreasing of LE for total population in Bulgaria from 74.90 to 73.60 was found, respectively for men from 71.46 to 70.05 and for women from 78.39 to 74.40. Such a decreasing was never seen after socio-economic transition in the country.

Case fatality rate, also called case fatality risk or case fatality ratio, is the proportion of people who die from a specified disease among all individuals diagnosed with the disease over a certain period of time [18]. Case-fatality rates from COVID-19 (5,545 per 1M pop.) [19] ranks Bulgaria in the second position in the world. Hospitals' case-fatality rates were doubled to 2.9% for 2021st in comparison of around 1.5% for the last decades.

The damage caused by the COVID-19 pandemic in Bulgaria is significantly more severe than those in Europe and most likely a global plan. The largest excess deaths were registered in Bulgaria mortality during the pandemic, exceeding 1% of the country's population.

The contributing causes of these extremely severe results observed in Bulgaria are probably combination of unfavourable demographic structure of the population, lack of adequate control over the spread of viral

transmission, poorly prepared health system and low vaccination coverage, social and socioeconomic factors etc.

Conclusion

Governments, policymakers, and stakeholders around the world and in Bulgaria need to take necessary steps, such as ensuring healthcare services for all citizens and focusing on building a sustainable future. It is also recommended that more investment is required in research and development to overcome this pandemic and prevent any similar crisis in the future.

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Training of Employers and Employees in Workplace Health Promotion in Bulgaria: 7-year Experience

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Abstract:

Introduction: Workplace Health Promotion (WHP) become increasingly relevant field of action for public health improvement. According to the Bulgarian legislation annual trainings on health and safety at work are obligatory for employers and employees. The **aim** of this paper is to share 7-year experience in training of employers and employees in WHP.

Materials and Methods: Generally, 9 employers/organizations and 120 employees in three focus groups were included in the training, organized by Occupational Health Service in collaboration with health promotion experts of Medical University – Pleven.

Results: At the beginning (2014), about 2/3 of the participants distrust of the proposed approaches. To adapt the training to needs of the audience, a study on the barriers and difficulties in carrying out health promotion activities at workplace was made. Participants were also asked about aspects of WHP that they interested in. During the following meetings (every year from 2014 until now), interest to the WHP and approaches of its implementation have been increasing. Participants improved their activity in discussions, interactive teaching and training approaches get preferable.

Conclusion: Lack of knowledge about health promotion concept and its principles predispose to distrust of its potential for public health improvement. Positive attitude to the concept could be established by increasing knowledge and skills in this area and by examples of good practices and results.

Key words: health and safety at work, workplace health promotion

Introduction

Sustainable socio-economic development can only be achieved with a healthy, skilled and motivated workforce [1]. During the last two decades, there have been intense changes in the age, qualification and health of workers. They are related to a number of processes taking place in modern society [2, 3, 4]: globalization in all spheres of life (including the labor market); technology development, followed by the emergence of new productions, respectively new (not well studied) and growing professional risks, as well as increased requirements for the professional qualification of workers; reforms in the systems of retirement, usually related to raising the retirement age, which leads to a change in the demographic characteristics of employees; population aging; changes in morbidity profile, etc. All this makes care for health of working population of paramount importance and priority of health and social policy in each country [4, 5, 6]. The issue is especially relevant in our country because Bulgaria is severely affected by the processes of population aging, changes in age structure of the labor force, widespread prevalence of socially significant diseases and behavioral risk factors [7]. In this regard, any effort directed to improvement of health of active age people are important [8].

WHP becoming increasingly important as an activity for public health improvement worldwide. It was defined as a “combined efforts of employers, employees and society to improve the health and well-being of people at work”. States' actions in this direction include improving the assessment and management of occupational risks, adopting regulations and standards to ensure that all workplaces meet the minimum requirements for the protection of health and safety at work [9, 10, 11]. Capacity is being built to promote

health, develop healthy workplaces and raise awareness of occupational, behavioral and environmental risks [12, 13]. Legislation in each country requires the employer to ensure safe and healthy working conditions for workers and introduces general principles for prevention and measures to stimulate improvements in this direction [14, 15]. According to the Bulgarian legislation the annual trainings of workers and employers on health and safety at work are obligatory.

The **purpose** of this article is to describe 7 years of experience in conducting PPM trainings and to analyze their effectiveness and appropriateness.

Materials and Methods

In the period 2014 - 2020, annual trainings were conducted by three Occupational health services in collaboration with Health promotion experts from the Medical University - Pleven. Nine employers/organizations and 120 employees in three focus groups were included in the training. Issues related to the project are: how to improve the ability of employers to plan and conduct health promotion programs; how to increase the interest in active participation in these programs.

Results

At the beginning of the project (2014), about 2/3 of the participants distrusted the proposed approaches. In order to adapt the trainings to the needs of the audience, a study was conducted on the barriers and difficulties in carrying out health promotion activities in the workplace. Such are the insufficient knowledge of the concept of health promotion and the related lack of awareness of its potential for improving the health of people in active age. In order to increase the interest of workers in health education activities, their needs for health information and the most appropriate ways of providing it were studied and there were found the following results: 9 out of 10 workers would like to receive more information about the potential effects of factors in their work environment; 4/5 of the individuals need comprehensive information on the determinants of health; 65.6% share the need for clarification on the effectiveness of preventive examinations, and 48.9% are interested in behavioral change approaches, their stages and their potential positive effect.

Lack of collaboration between employers and employees in organizing and complying with health promotion measures was established (Fig. 1).

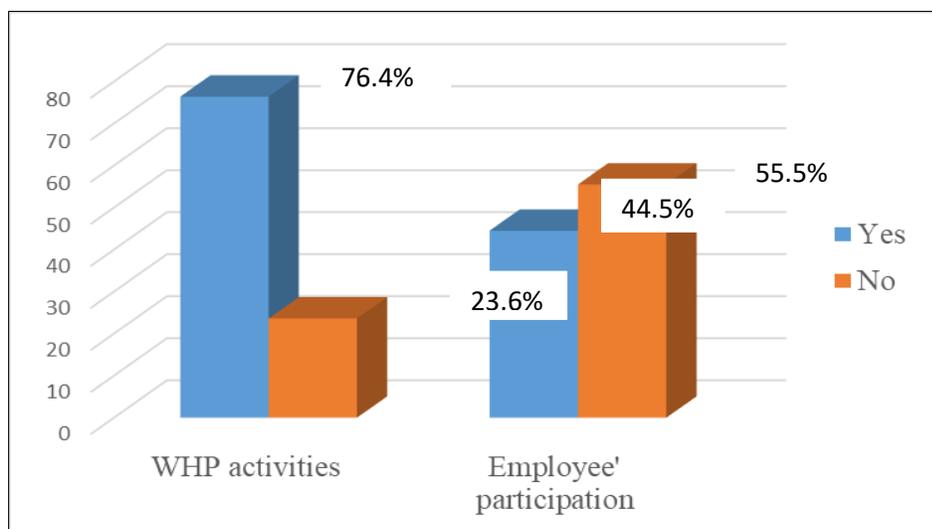


Fig. 1: Availability of workplace health promotion activities and employee participation in their planning

During the following trainings (every year from 2014 until now), interest to the WHP and approaches of its implementation have been increasing. Participants improved their activity in discussions. Interactive approaches for teaching and training get preferable (Fig. 2).

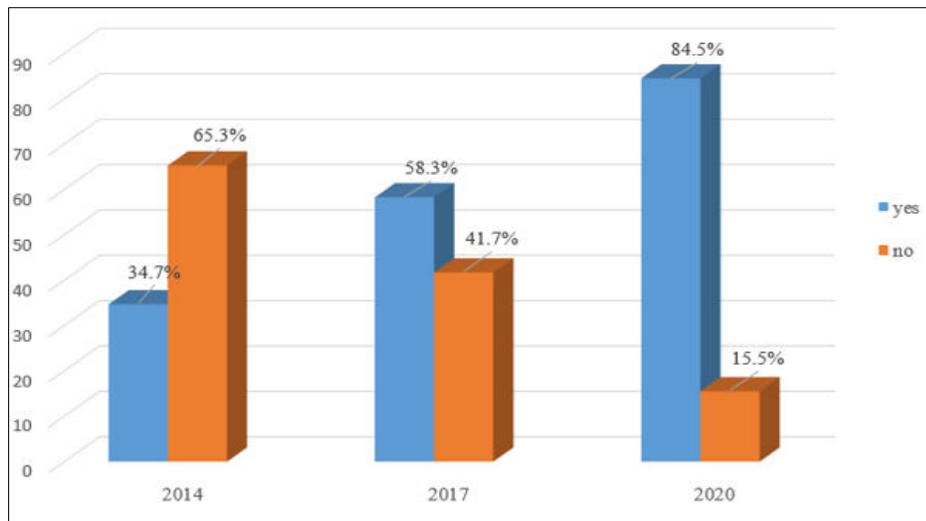


Fig. 2: Positive attitude of the participants to the trainings at the beginning and end of the period

Conclusion

Workplace health promotion is becoming increasingly important for improving the health of people of active age, but it encounters some barriers and difficulties in its implementation. Limited knowledge of the concept and its principles implies distrust of its potential to improve public health and is a prerequisite for a lack of active attitude towards health and unhealthy behavior. A positive attitude towards the concept can be achieved by improving knowledge and skills in this area, improving collaboration between employers and employees in creating a healthy work environment and through examples of good practice and results achieved.

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Establishment of a therapeutic relationship nurse – patient at patients with oncology diseases

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Abstract:

Introduction: Care for patients with oncology diseases is a specific area of competence in nursing. The nurse, as part of an interdisciplinary team, has an essential role in organizing, planning, implementing and evaluating the results of patient clinical care. The **aim** of the study was to investigate patients' and nurses' opinion on the role of nurse - patient relationship for improving quality of care.

Material and methods: Data were collected by direct individual self-administered questionnaire among 49 nurses and a “face to face” semi-structured interview with 67 patients in five departments. Data were processed with statistical program Microsoft Office Excel 2015 и SPSS v.21.

Results: The idea about the therapeutic relationship “nurse-patient” was examined from a view point of both patients and nurses. More than a half of the patients (53,7%) arrange as particularly important nurse' skills to relieve physical pain, followed by 40,3% to inspire confidence and hope and 35,8% - the ability to listen and give advices. One of 10 patients expect to be included as decision-making partner in planning care, every fifth patient expect information by the nurse according to her competence. Professional ethics and relationship “nurse-patient” was evaluated by 55,2% patients as excellent. All nurses (100%) underlies principles of the therapeutic relationship regardless of the length of the contact are respect, genuineness, empathy, active listening, trust, and confidentiality.

Conclusion: The nurse-patient relationship is a common responsibility of both: nurses and patients. Both groups evaluated the importance of its components for mutual satisfaction in such communication.

Keywords: nurse-patient relationship, nursing oncology care

Introduction

Oncology diseases are among leading causes of death worldwide [1]. Cancer is a chronic disease and patients need constant, timely and continuous care. Care for patients with oncology diseases is a specific area of competence in nursing and the role of the oncology nurse fast transforms from leading comfort and hygiene care to advanced practice oncology nurse with more responsibilities and roles [2, 3, 4]. The nurse, as part of an interdisciplinary team, has an essential role in organizing, planning, implementing and evaluating the results of patient clinical care [5]. Good communication skills play a key role in establishment of a therapeutic relationship between the nurse and oncology patients throughout the spectrum of health, illness, recovery and along the cancer continuum [6]. In this professional relationship the nurse must know ways to show respect, genuineness, empathy, facilitating trust, confidentiality [7]. Nurses caring for these patients must possess not only excellent professional skills, but also to exhibit purely human qualities - compassion, commiseration, patience and tact, empathic attitude towards patient and moral support [8].

Communicating with patients is one of the most important skills that nurses **must have** to be effective nursing care. The **aim** of the study was to investigate the opinion of patients with oncology diseases and nurses caring for them at Hospital UMBAL „D-r G. Stransky“ - Pleven on the role of nurse - patient relationship for improving quality of care.

Material and Methods

Data were collected in the period from 01.06 - 01.09.2022 by direct individual self-administered questionnaire among 49 nurses and a “face to face” semi-structured interview with 67 patients in five departments. Data were processed with statistical program Microsoft Office Excel 2015 и SPSS v.21.

Results

The idea about the therapeutic relationship “nurse-patient” was examined from a view point of both patients and nurses.

Social and health characteristics of the patients: In patients group men prevail over women. The individuals aged 60+ dominated. The highest was the proportion of patients with secondary special education followed by persons with higher education. Most frequent localisation of oncology process is breast cancer (32,8%), followed by colon cancer, rectum, stomach (29,9%) and cancer utery, cervix and ovaries (22,4%).

Social and professional characteristics of nurses: The majority of them are in the age group of < 30 followed by the age 60 +. The largest proportion of nurses includes the group of more than 20 years of professional experience, and the lowest - from 11 to 15 years of experience. The highest proportion of respondents are with higher education – bachelor degree.

Analysis of patients’ opinion found that more than a half of the patients (53,7%) arrange as particularly important nurse’ skills to relieve physical pain, followed by 40,3% to inspire confidence and hope and 35,8% - the ability to listen and give advices. One of 10 patients expect to be included as decision-making partner in planning care, every fifth patient expect information by the nurse according to her competence (fig. 1).

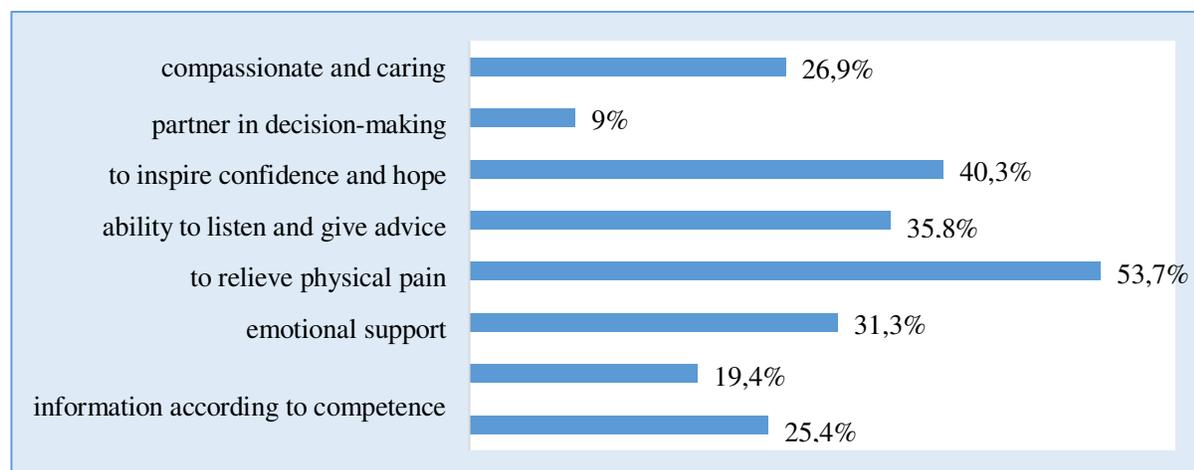


Fig. 1: Patients’ expectations toward oncology nurses’ skills at hospital environment

Professional ethics and relationship “nurse-patient” was evaluated by 55,2% patients as excellent. Patients assess nurses’ attitude to them and nursing care as excellent in 64,2% of cases. More than

a half of the patients arrange as particularly important oncology nurse skills to relieve physical pain, to inspire confidence and hope is very important nurse' skill according to 40,3%. However, should any questions arise patients would refer for advice to the attending physician specialist (76,1), to the general practitioner (20,9%), just one patient would ask a nurse for advice (1,5%) and one of them doesn't know who to turn to (1,5%). Regardless of that the variety and benefits of post-hospital nursing care according to the patients are shown at fig. 2

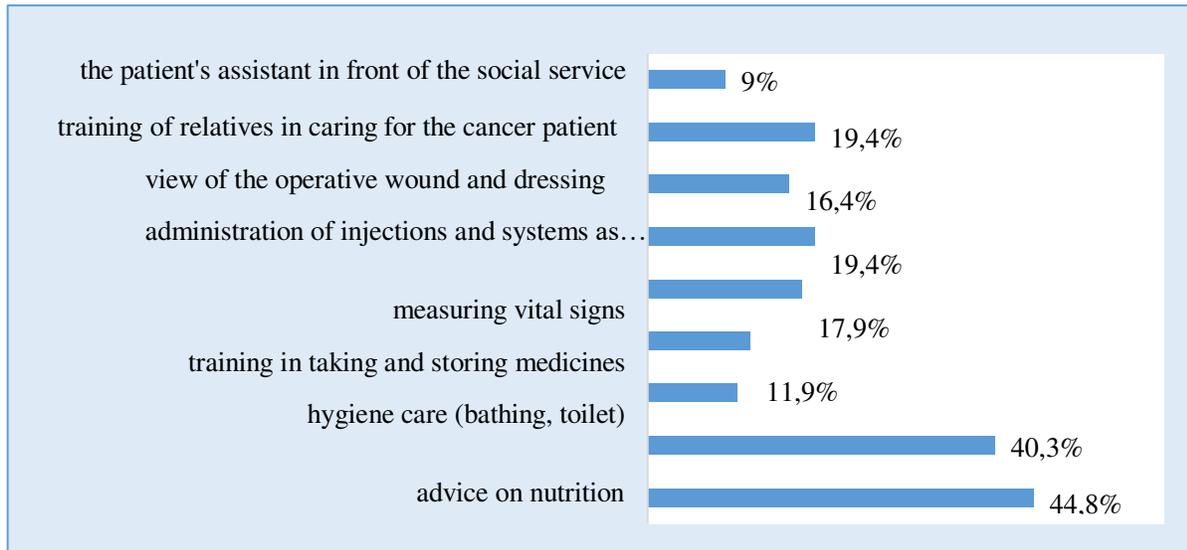


Fig. 2: Distribution of patients according their opinion about the benefit of post-hospital nursing care

All nurses (100%) underlies principles of the therapeutic relationship regardless of the length of the contact are respect, genuineness, empathy, active listening, trust, and confidentiality.

All nurses 100% believe that communicating with patients in the treatment process and recovery is very important. The underlying principles of the therapeutic relationship regardless of the length of the contact are: respect, genuineness, empathy, active listening, trust, and confidentiality (Fig. 3).

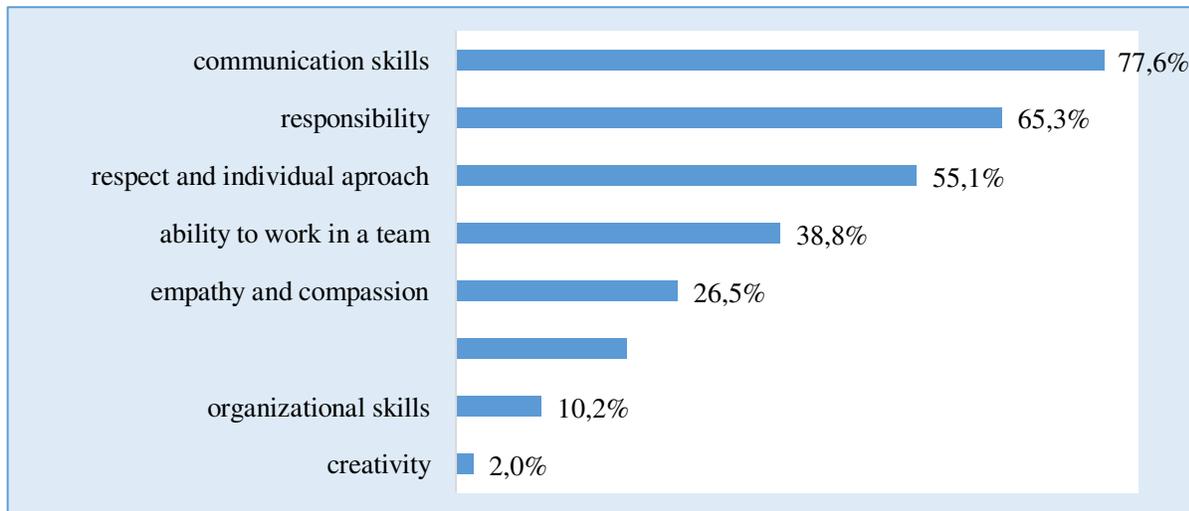


Fig. 3: Distribution of nurses according to their opinion about the most important social skills and competencies in the care of oncology patients

Distribution of respondents according to their opinion on ways of improvement of nurse – patient interaction shows a variety of activities. The majority of nurses recommend increasing the number of the nurses (85,7%) and support staff (51%), just a small part of them suggest an standart of oncology nursing care or protocols (6,1%) (Fig. 4). A significant part of nurses (67.5%) assess their communication skills as „very good”. It was found that oftenest the nurses talk with patients about the plan of care at time (40%); the needs of the patient (30%) and provide health tips (12.5%).

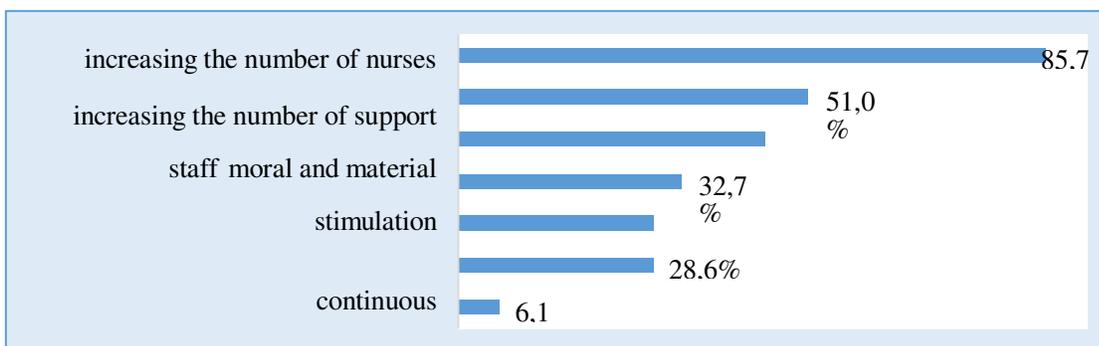


Fig. 4: Respondents' views on ways to improve care

Conclusion

The role of the nurse in the nurse-patient relationship continues and will always retains its uniqueness. The establishment of this relationship is facilitated by the nurse and is patient-centered and goal oriented. Awareness of the nurse’s role sets the boundaries of the relationship, but within these bounds are restricted possibilities for communication that may be both therapeutic and enriching for both parties – oncology nurses and patients.

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Reasons for honey bee colony losses in Bulgaria

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Abstract

The uncontrolled introduction of foreign genes into the adapted local populations, the stress from the changing environment and its pollution, new pathogens and the global climate changes are the main risk factors for the genetic richness among honey bee populations.

Purpose: The current study aims to investigate possible factors for the increasing honey bee colony losses in Bulgaria.

Material and methods: A standardized international COLOSS questionnaire has been used in order to study the rate of the honey bee colony losses in Bulgaria. The pesticides presence has investigated by a chromatographic analysis.

Results: The colony losses in Bulgaria have increased from 2.04% to over 19% during the period 2017 – 2022. The highest percentage of losses over the years was due to the death or reducing in beesnumber to a few hundred in the colony. The chemical analyses indicated the presence of a total of 27 pesticides in the tested samples from the locations with high level of honey bee mortality.

Conclusions: Based on the results obtained, it could be concluded that there is a clear relation between the various agrochemicals used for different purposes and the increasing losses of honey bee colonies in Bulgaria, as well as the need for future detailed studies of risk factors for the health and viability of honey bees.

Keywords: *Apis mellifera*, pesticides, honey bee colony losses

Introduction:

Among the main reasons for the honey bee colony losses are Varroa, Nosema, various viruses, pesticides used in agriculture and different additional factors, such as nutrition, starvation, theft, untypical weather conditions, new pathogens [1], [2], [3], [4]. The international organization COLOSS (<http://coloss.org>) conducts annual monitoring of the condition of honey bee colonies around the world through its network of researchers and Bulgaria is a part of its. Many scientists all over the world are in agreement with the opinion for the negative impact of the pesticides on the honey bee populations [5], [6]. Some information concerning dynamics of this problem in Bulgaria during the years could be found in the articles of Ivanova & Petrov, 2010 [7]; Ilieva et al., 2020 [8] and Ilieva et al., 2021 [9]. The current study aims to investigate possible factors for the increasing honey bee colony losses in Bulgaria during 5-year long period of 2017 – 2022.

Material and Methods:

A standardized international COLOSS questionnaire has been used in order to study the rate of the honey bee colony losses in all regions of Bulgaria. Samples of worker bee bodies, as well as of food stocks (honey, pollen and wax) have been investigated for pesticide contents by a chromatographic analysis.

Results:

The results of the study reveal that during the period 2017 – 2022 the honey bee colony losses in Bulgaria have increased from 2.04% to 19% (Figure 1) and as well more in some locations. Concerning the studied

criteria – a) unsolvable queen problems; b) natural disaster; 3) death or reducing in number to a few hundred bees, the research data show the highest loss according to the criteria "c" for the 2021-2022 (Figure 2).

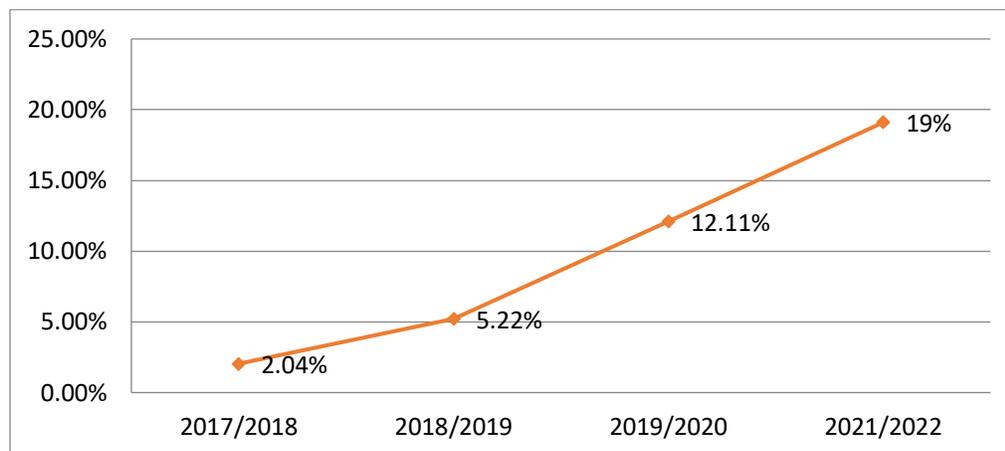


Figure 1. Honey bee colony losses in Bulgaria for the period 2017 – 2022

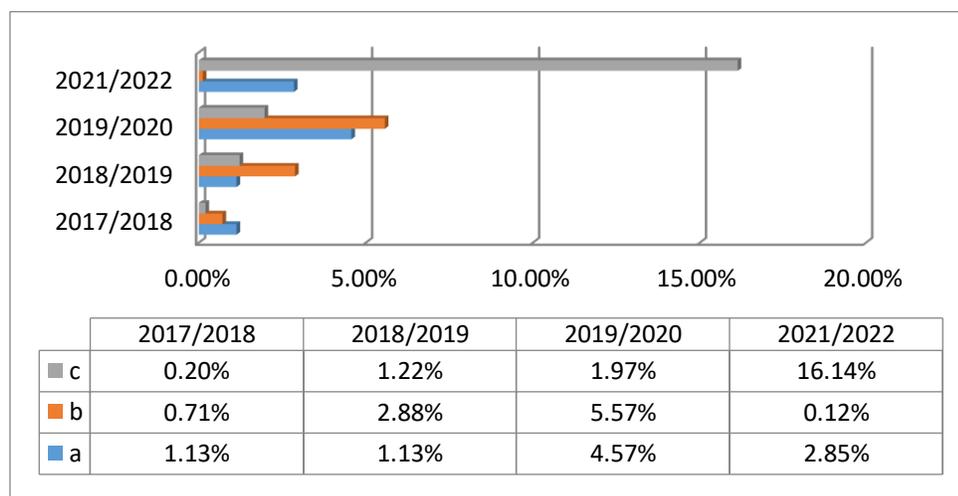


Figure 2. Honey bee colony losses in Bulgaria for the studied period based on the criteria according to the standardized international COLOSS questionnaire: a) unsolvable queen problems; b) natural disaster; 3) death or reducing in bee number to a few hundred

The detected types and amounts over than 0.01 (mg/kg) of pesticides in honey bee bodies and in food stock samples (honey, wax and pollen) are as follows: Tiofanate-metil (0.149); Coumaphos (0.93); Cyhalothrin (0.39); Flumetralin (0.26); Cyprodinil (0.05); Carbendazim (0.035); Chlorpyrifos-ethyl (0.03); Metholachlor + Meth S (0.015); Tau-fluvalinate (0.015); Difenconazole (0.014); Imidacloprid (0.013). The followed pesticides, but in the lower amounts (less than 0.01) are found in the tested samples, too: Flonicamid; Clothianidin; Dimetoat; Fenamidone; Fenoxycarb; Tebuconazole; Prosulfocarb; Hexitiazox; Amitraz; Fenbutatin oxide; Linuron; Methoxyfenozid; Pyrimethanil; Aldicarb; Ametocradin and Carbaril.

Discussion:

Various environmental factors that negatively affect the viability of honey bees are: intensive farming with long-term use of pesticides, food shortages, habitat loss, new pathogens and pests [10], [11], [12], [13]. This is supported by the results of the present study in the context of the relation between the pesticides and the increasing honey bee colony losses in Bulgaria during the period 2017 – 2022. The study is in agreement with Ullah et al., 2021 [14] who express their vision for a unified health approach worldwide in support of beekeeping and its management in the future.

Conclusions:

The established data is a signal for the great danger connected with the high honey bee mortality and severe weakening of bee colonies. It could be concluded that a clear relation exists between the various agrochemicals used for different purposes and the increasing losses of honey bee colonies.

The presented results reveal the need to conduct activities for detailed studies of the risk factors for the health and viability of honey bees, including the various agrochemicals and their mechanism of action in nature in order to protect the national genetic resource of the local for the Bulgaria honey bee *Apis mellifera rodopica*.

Acknowledgments:

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Effect of capacitive and resistive electric transfer for patients with non-specific low back pain

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Abstract: Low back pain (LBP) is a highly prevalent condition worldwide and it is the leading cause of years lived with disability. **Aim:** The objective of this study is to evaluate the effect of tecar therapy for patients with non-specific LBP. **Methodology:** The study included 41 patients with a persistent LBP, randomly divided in two groups– experimental (EG) (n = 21) and control (CG) (n = 21). Mean age 50.9 ± 4.91 years for the EG and 54.9 ± 0.88 for the CG. Visual Analog Pain Scale (VAS), assessment of the lumbar spine mobility and the quality of life questionnaire was applied for all participants. **Results:** The results show improvement of the pain level and increasing lumbar spine mobility for the EG patients. **Conclusions:** The strong reduction of pain and muscle spasm in EG leads to improvement of the range of movement and the function of the spine.

Key words: chronic pain, tecar, lumbar spine

Introduction: Various studies conducted up to the moment prove the therapeutic effect of resistive and capacitive electrical transfer in various pathological conditions related to the musculoskeletal system (Yokota et al., 2018; Paolucci et al., 2019; Wachi, 2022) The application of diathermy leads to the generation of internal heat of the tissues at a different level. This endogenous heat leads to increased blood supply to the area and easier elimination of catabolites accumulated by the inflammation (Paoluci et al, 2019). Although tecar therapy has been increasingly used in the last 10-15 years, studies regarding its effect are not many. A large part of them is made with cadavers, of various types of digestive and chronic pathologies (Rodriguez-Sanz et al., 2020; Lopez-de-Celis et al., 2020; Lopez de Celis et al., 2021). However, most report optimizing results in terms of symptomatology and demonstrate changes at the level of tissues and structures. One of the most common musculoskeletal pathologies is pain in the lumbar region of the spine. In a large percentage of cases - 80%, it is of unspecified origin. For this reason, the term non-specific low back pain is used in the literature (Stoyanov et al., 2020). The study objective is to determine the effect of resistive and capacitive electric transfer in patients with chronic non-specific LBP.

Material and Methods: *Participants:* A sample of 55 participants were evaluated. 41 of them met the inclusion criteria and were randomly divided in two groups: experimental (EG) and control (CG). All participants (n=41) have proven chronic non-specific LBP. The EG consists 21 participants mean age ($\bar{X} \pm SD$) 50.9 ± 4.91 years. The CG was formed of 20 participants, mean age 54.2 ± 0.88 years. *Test protocol and Instruments:* Visual Analogue Scale was used to assess the pain threshold. For the assessment of the lumbar spine mobility, we used goniometry and Schober test. The Roland-Morris Questionnaire was applied to assess the quality of life of the participants. *Procedure:* The duration of kinesitherapy procedures for patients in both groups was 25-30 minutes, four times a week, for a period of 4 weeks. Patients in the EG were given a specialized

tecar procedure every other day for the entire treatment period with a duration of the procedure of 20-25 minutes. Tecar therapy (GIMA CR – 200, I-TECH) was done using the protocol program for LBP – resistive electric transfer – 15 minutes and capacitive electric transfer – 10 min. The CG received soft tissue mobilization and electrotherapy for the same lumbar region. *Statistical analysis:* We used the primary statistics variables: arithmetic mean (\pm), standard deviation (Sd). In term to calculate statistically, significant differences we use Mann-Whitney posttest to compare independent quantitative variables.

Results: Mean values obtained of VAS for the EG before and 4 weeks after specialized therapy were as follows: 7.24 ± 0.7 mm, and 2.48 ± 0.75 mm (Mann Whitney, $p < 0, 001$). For the CG mean values obtained for the CG before and after the administered complex therapy were as follows: 7.4 ± 0.89 mm and 4.6 ± 0.5 mm after therapy, without statistically significant differences. The pain intensity decrease more in patients of EG, so this proves the positive effect of tecar therapy for the pain (Table. 1.).

Table 1. Dynamic of the results of VAS; Goniometry (trunk flexion); Schober test and Roland and Morris Questionnaire for the Experimental and Control groups

Assessment	EG - pre	EG - post	CG - pre	CG - post
VAS	7.24 ± 0.7	$2.48 \pm 0.75^{***}$	7.4 ± 0.89	4.6 ± 0.5
Goniometry	29.52 ± 6.1	$49.52 \pm 5.9^{***}$	25.75 ± 4.67	33.75 ± 4.83
Schober test	1.54 ± 0.51	$3.69 \pm 0.43^*$	1.65 ± 0.49	3.3 ± 0.47
Roland-Morris				
Q	13.86 ± 2.08	$5 \pm 1.26^{**}$	13.55 ± 1.32	6.5 ± 1.7

SSD: Mann-Whitney post test: * $p < 0.05$ ($p = 0.021$); ** $p < 0.01$ ($p = 0.0021$); *** $p < 0.001$ ($p = 0.0001$)

Mean values of the Goniometry (flexion of the lumbar spine) for the EG, measured before after administered therapy were 29.52 ± 6.1 and 49.52 ± 5.9 . For the CG obtained data before and after therapy were respectively: 25.75 ± 4.67 before and 33.75 ± 4.83 after therapy (Mann Whitney, $p < 0, 001$). The results of the Schober test before procedures for EG were 1.54 ± 0.51 and 3.69 ± 0.43 at the end. For the CG data shows 1.65 ± 0.49 before and 3.3 ± 0.47 , 4 weeks after therapy (Mann Whitney, $p < 0.05$). Mean values of the Roland-Morris Questionnaire for the EG before and after therapy was respectively 13.86 ± 2.08 and 5 ± 1.26 . For the CG before and after therapy was respectively 13.55 ± 1.32 and 6.5 ± 1.7 . (Mann Whitney, $p < 0.02$) (Table 1.).

Discussion: This study aimed to determine the effectiveness of tecar therapy in patients with persistent non-specific LBP. Despite increasingly advanced methods of assessment and treatment in recent years, this complaint continues to be one of the leading problems and causes of disability (Mitova et al., 2020; Andreev et al., 2020). Existing studies prove the positive effect on the symptoms of patients with LBP (Sousa de-Sousa et al., 2021; Wachi et al., 2022). Our results support this and confirm the significant therapeutic effect of tecar therapy on pain and muscle stiffness. Lumbar mobility is improved on the one hand because of reduced pain, and on the other hand, tecar therapy affects the muscle fibers on a structural level, improving muscle flexibility (Yokota et al., 2018; Yaste-Fabregat et al., 2021). Capacitive and resistive electrical transfer leads to an endogenous increase of the temperature of the treated structures (Clijssen et al., 2020;

Tomazoni et al., 2020). This leads to an increase in their blood supply, vasodilation and cell proliferation. This physiological reaction helps the removal of inflammatory catabolites and drain the swelling. The rapid therapeutic effect, the improvement of the functionality of the lumbar spine and the reduction of the patients' fear of relapses lead to an improvement in their quality of life. This is also confirmed by the results of the Roland Morris questionnaire. Overall, the obtained results are encouraging but for greater credibility, it is necessary to conduct a larger-scale study and the follow-up of patients in a longer-term plan.

Conclusion: Strong reduction of the pain and muscle spasm in EG leads to improvement of lumbar mobility and function of the spine. Presented data demonstrates the effectiveness of tecar therapy for patients with chronic non – specific low back pain.

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The Role of Kinesitherapy in Polytraumatism: Presentation of Clinical Case

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Abstract

Aim: to implement and evaluate the holistic kinesitherapeutic approach in a polymorbid patient with fractures. **Contingent and Methods:** we present the clinical case of a 76 year old woman with fractures in the distal forearm region of the left upper extremity and fractura colli femoris of the left lower extremity with accompanying diseases, such as ischaemic heart disease and experienced myocardial infarction, rhythmic and conductive disorders of the heart, absolute arrhythmia with atrial fibrillation, complicated hypertensive disease, mixed anxiety-depressive disorder. A holistic approach was implemented in the treatment of the patient in order to improve her quality of life and social adaptation. **Methods:** *Functional methods:* anglemetry and manual muscle testing (MMT); *Sociological method* (questionnaire survey): WHOQOL–BREF (WHO generic questionnaire) - 26 questions; four-domain structure: Physical health, Psychological health, Social relationships, Environment; *Statistical methods:* descriptive method, Cronbach’s test, correlation analysis. **Results and discussion:** The comparative analysis of the results from the change in quality of life shows an improvement of the overall assessment in the “physical” and “psychological” domains. The optimisation of the somatic component of health is directly related to the restoration of the affected extremities’ range of motion and muscle strength. **Conclusion:** the holistic kinesitherapeutic approach in polymorbid patients enables a change in their quality of life and improves their social interaction.

Keywords: quality of life, kinesitherapy, polymorbidity

Introduction

The biopsychosocial definition of health (WHO, 1948), although rather generic, creates a new behaviour in medicine with an emphasis on the patient. The application of the biopsychosocial approach to health and illness implies that any person who claims to have changes in their health (a health problem) requires their characteristics to be determined in three domains: somatic – changes in the structure and function of the human body; psychological – changes in mental processes and psycho-emotional conditions; social – changes in social behaviour, role and functions in society (family, work group, social community, etc.). The establishment of the biopsychosocial concept of man, according to which he represents a unity of soma (body), psyche (soul), and social role (position), lead to the creation and application of a specific behavioural approach in science and practice known as “holistic”. [1]. The application of the holistic approach implies that not only the somatic manifestations of the disease are taken into account while recovering the patient’s functioning, but also its impact on his mental health and social well-being [2, 3]. For several decades the medical experience has developed the holistic approach’s inexhaustible resources while performing medical activities for the achievement of high efficiency and effectiveness, incl. in kinesitherapy [4, 5]. With the introduction of the biopsychosocial paradigm, based on Selye’s concept of adaptation, the problem of change in the quality of life, as a measure for success after treatment and rehabilitation, is becoming more and more relevant. Despite the fact that the exact origin of the concept of quality of life is unknown, this term has evolved in the post-war years, reflecting the increase in quality of life, accompanied by economic prosperity in Western society after the end of World War II (A. G. Awad et al., 1997). The wide usage of the category “Health related quality of life” began after the 1990s with WHO’s definition: “Quality of life

is defined as an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns.”. This assessment is affected in a complex way by the person’s physical health, psychological state, level of independence, social relationship and their relationship to salient features of their environment” (WHOQOL group, 1993). In the last decade quality of life as a concept has received increasing attention in the area of Public Health and other health related services [6]. The research tool WHOQOL–BREF (WHO generic questionnaire) is a validated version for Bulgaria (V. Petkov, 1999) [7, 8]. WHOQOL-BREF presents data as a profile, assessing each one of the domains separately and giving overall evaluation of quality of life (separate domains have equal gravity). All questions refer to the last two weeks preceding the study. It consists of 26 questions, grouped into the domains “physical”, “psychological”, “relationships” and “environment”. WHO’s generic questionnaire (WHOQOL-BREF) was used to study the quality of life among the polymorbid contingent in numerous surveys, incl. by P. Mancheva in 2005-2006 and 2010-2012 in General TEMC, UMHAT “St. Marina” - Varna [9].

Clinical Case

We present the clinical case of a 76 year old woman who fell from her own height after feeling sick. After transportation to a medical facility by an emergency team the examination and imaging tests reveal fractures in the distal forearm region of the left upper extremity and fractura colli femoris of the left lower extremity. The patient reports an experienced myocardial infarction 3 years prior after a fall with no suffered fractures. After this incident the patient develops mixed anxiety-depressive disorder and fear of falling, which significantly limit her social activities. The cardiology consult confirms the prolonged hypertension, ischaemic heart disease and absolute arrhythmia with atrial fibrillation, for which the patient receives a systemic treatment. She underwent surgical treatment in two stages: first on the upper extremity and a total hip replacement two days later. A radial plate and a gypsum cast were placed in the timeframe of 4 weeks due to the complex radial fracture in loco typico. Given this and the accompanying diseases the patient was assessed as polymorbid, which imposed the preparation of an individual kinesitherapeutic program, conformed to her cardiovascular system’s functional capacity and mental state. The tasks of the applied holistic kinesitherapeutic approach are in two directions, regarding:

-functional recovery after the fractures: improvement of the psycho-emotional state; restoration of the range of motion in the joints of the affected extremities and their muscle strength; training in correct posture and walking; improvement of postural control; training in self-service and performing everyday activities;

-functional recovery of the cardiovascular system: normalisation of central nervous system processes; elimination of the stagnant excitatory focus in the vasomotor centres; restoration of the dynamic equilibrium, of the autonomic nervous system, cortico-visceral relations, endocrine and humoral regulation of the vascular tone; improvement of heart function, blood and lymphatic circulation and to eliminate stagnant occurrences.

During the implementation of the kinesitherapeutic program the kinesitherapist included communicative skills for the development of a trustful relationship between patient and kinesitherapist in order to overcome the patient’s psychological barriers and to achieve a faster recovery. The ultimate goal of the holistic kinesitherapeutic approach in this polymorbid patient with fractures is to improve the quality of life in its three domains, according to WHO’s definition of health (1948).

Results and Discussion

The recovery went through two phases - for the lower and for the upper extremity, conformed to the functional capacity of the cardiovascular system because of the existing heart failure due to the ischaemic heart disease. On the second postoperative day, regarding the total hip replacement surgery and after a correction of the therapy by the supervising cardiologist, the patient performed a complex of exercises and was verticalized with the help of one walking aid on the healthy side. After dehospitalisation the patient performed the kinesitherapy program at home every day for three weeks after the surgical intervention on the lower extremity. During this period the kinesitherapy program for the upper extremity included exercises for every joint outside of mobilisation, isometric contractions of the forearm musculature and contralateral training. Concerning the operation of the lower extremity the complex included exercises for joint range of motion and restoration of muscle strength, conformed with the limitations for this period because of the total hip arthroplasty. After the third week the patient started visiting a kinesitherapy office, since rehabilitation at home does not provide conditions for expanding the exercise complex, both in terms of equipment and the stress on the cardiovascular system. After the fourth week the patient started ambulating without a walking aid and the kinesitherapy program was targeted towards exercises for muscle strength, coordination, balance and postural control. After a follow-up examination by the treating orthopaedist the gypsum cast was removed and the kinesitherapy program changed focus towards restoration of range of motion and muscle strength in the wrist joint. The implemented treatment methods are cryotherapy, massage, passive and active assisted and active kinesitherapy, exercises with devices for fine motor skill and grip improvement. The criteria for dosage of physical exertion - pulse rate, frequency and rhythm of breathing, as well as dynamics of arterial pressure were monitored before, during and at the end of physical exertion for each kinesitherapeutic procedure. The choice and dosage of the kinesitherapeutic methods were determined by the kinesitherapist after assessing the above-mentioned criteria for control of the functioning of the cardiovascular system. In order to report the achieved results with the applied holistic kinesitherapeutic approach we implemented a questionnaire on the quality of life in the domains: "physical", "psychological", "relationships" and "environment". The patient answered the questions with the help of the kinesitherapist before starting the kinesitherapeutic program and four months after its completion. The results are shown in table. 1:

Table 1. Results from the applied WHOQOL-BREF

Indicator	Before beginning the kinesitherapeutic program	Four months after the completion of the kinesitherapeutic program
General assessment of QL	46	89
Domain "physical"	8	23
Domain "psychological"	7	26
Domain "relationships"	7	9

Domain “environment”	24	31
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The comparative analysis of the results from the change in quality of life shows significant improvement of the overall assessment at the expense of the “physical” and “psychological” domains. The increase in the assessment of the somatic component of health (8 out of 23 points) is directly related to the restoration of the affected extremities’ range of motion and muscle strength (table 2 and 3):

Table 2. Anglemetry results

Range of motion	Wrist joint (before)	Wrist joint (after)	Hip joint (before)	Hip joint (after)
Flexion	0°	75°	30°	100°
Extension	0°	60°	0°	15°
Abduction	0°	35°	25°	45°
Adduction	0°	15°	0°	15°
Internal rotation	-	-	0°	35°
External rotation	-	-	15°	45°

The anglemetry data shows significant increase in the range of flexion in the wrist and hip joints, improvement of extension, as well as abduction and adduction. The internal and external rotation of the hip joint underwent a change from 0° before the kinesitherapeutic program to 35°, and from 15° to 45°. The restoration of the range of motion of the affected joints is sufficient for normal everyday life activities. The change in muscle strength in the upper extremity does not achieve the maximum capabilities unlike the lower extremity, where it is fully restored (table 3):

Table 3. Manual muscle testing results

Muscle strength	Upper extremity (wrist joint)	Lower extremity (hip joint)
Before the program	2	3
After the program	3	5

After the completion of the kinesitherapeutic program the central nervous system processes were normalized, the heart’s function, blood and lymphatic circulation were improved and the development of stagnant occurrences in the lungs was overcome. The patient received training in correct posture and walking as well as in self-service and everyday life activities performance.

Conclusions

With WHO's definition for health (1948) the scientific knowledge overcomes the biological orientation for the first time, which was fundamental in medicine for many years. When diagnosing the disease we use the so-called "triple diagnosis" (nosological, psychological and social). The effectiveness of the holistic approach toward the illness in its three domains can be assessed via the quality of life. The latter allows us to understand the impact of polymorbidity on everyday life activities, incl. social, emotional, physical and professional complications. The application of the holistic method in medicine, as well as in the kinesitherapeutic practice gives the opportunity to put the biopsychosocial concept to use.

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Kinesitherapeutic Approach in Patient with Myasthenia Gravis – Presentation of a Clinical Case

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Abstract

Purpose: the aim of the research is to offer an individually kinesitherapy program to overcome functional deficit and improve quality of life in a patient diagnosed with Myasthenia gravis.

Material and methods: a 69-year-old woman was admitted to the hospital “Saint Marine” – Varna – second clinic for nervous diseases due to complaints of muscle weakness, impaired gait, swallowing disorders and eyelid ptosis. An individual kinesitherapy program was prepared and applied to the patient after the attack was controlled, which was conducted daily for a period of 30 days.

Results: the conducted research proved that after individual kinesitherapy program muscle weakness was affected, the gait was normalized, the general condition of the patient improved, the expectoration of secretions from the lungs was supported, which increased their respiratory function.

Conclusion: the study showed that the appropriate selection of kinesitherapeutic methods and means in patients diagnosed with Myasthenia gravis has a positive impact during the recovery period both in terms of the functional deficit in these patients and in terms of improving their quality of life.

Keywords: kinesitherapy, Myasthenia gravis, individual approach

Introduction

Recently, there has been an increase in the frequency of autoimmune diseases of the nervous system. One of the classic representatives of this group of diseases is Myasthenia gravis, which can be with or without genetic predisposition and/or involvement of the thymus gland. The disease is characterized by the presence of abnormal muscle weakness and fatigue, after repeated muscle activity, as a result of impaired neuromuscular transmission. Clinical manifestations are determined by the form of the disease and its severity, distinguishing between congenital, neonatal and acquired myasthenia. The clinical picture characteristic of the acquired form of the disease (the subject of our study) is expressed with an inconspicuous beginning and gradual development, manifested by rapid fatigue of the transverse striated muscles, increasing during exertion and decreasing at rest, with the facial muscles being the most affected and the proximal muscle groups of the limbs. Ptosis, diplopia, a violation in the closing of the eye slit are typical, as well as that as the day progresses, muscle fatigue intensifies. As the disease progresses, all active movements of the body suffer, the diaphragmatic, abdominal, and intercostal muscles are also affected, leading to respiratory disorders and sometimes the need for respiratory resuscitation [1, 2, 3, 4, 5, 6].

The aim of the study is to offer an individually kinesitherapy program to overcome functional deficit and improve quality of life in a patient diagnosed with Myasthenia gravis.

Material and methods:

A 69-year-old woman was admitted to the hospital "Saint Marine" - Varna - second clinic for nervous diseases and a department for the treatment of acute cerebral strokes due to complaints of muscle weakness, mainly in the upper limbs, impaired gait, swallowing disorders and ptosis of the eyelids. The study was conducted for a period of 30 days, and functional tests were performed at the beginning and at the end of the applied kinesitherapy program (Manual muscle testing, test to assess the physical ability to perform activities of daily living-physical performance test). Before being included in the kinesitherapy program, the patient was consulted by a specialist neurologist.

The conducted kinesitherapy aims to maintain the general vital tone and functional capabilities of the patient, by favorably influencing the exchange processes in the muscles. The tasks we set ourselves and needed to solve are: positive impact on the psycho-physical condition of the patient; maintenance of the

cardio-respiratory activity and trophic of the muscles; improvement of neuromuscular conduction; prevention and fight against muscle imbalance and joint contractures; gradual verticalization of the patient, training in walking, going up and down stairs; learning how to spend energy sparingly when performing daily motor activities. The means we used to achieve the tasks we set are: therapeutic massage, percussive drainage, general development and breathing exercises, active-assisted and analytical exercises, balance and coordination exercises, dosed walking. We applied the kinesitherapy complex once a day, lasting about 15-30 minutes, as the patient performing each exercise in 5-7 repetitions. In the afternoon we practiced verticalization and walking training. The exercises were performed at a moderate pace, with a small number of repetitions, with more frequent rest between them and considered with breathing.

Results:

The survey of the world and Bulgarian literature, the insufficient information about the effectiveness of physical exercises on the faster recovery and return to daily activities in patients with Myasthenia gravis, provoked us to do the present study. In order to track the effectiveness of our individual kinesitherapy program tailored to the patient's condition, we researched how the values of the functional assessment tests we applied changed at the beginning and end of the study (Table 1. and Table 2.):

Table 1. A test to assess physical ability in activities of daily living

Tasks	Results before/after KT	Scores before/after KT
Writing a sentence	> 20 sec /10.1-15 sec	1 / 3
Simulated eating	15.1-20 sec / 10.1-15 sec	2 / 3
Lift a book and put it on a shelf	Unable / > 6 sec	0 / 1
Put on and remove a jacket	> 20 sec / 15.1-20 sec	1 / 2
Pick up a penny from floor	> 6 sec / 2.1-4 sec	1 / 3
Turn 360 degrees	Unable to move/ Smoothly	0 / 2
Turn 360 degrees	Unsteady / Steady	0 / 2
50-foot walk test	>25 sec/ 15.1-20 sec	1 / 3
Climb one flight of stairs	Unable /10.1-15 sec	0 / 2
Climbing several floors	Unable / goes up and down a floor	0 / 2
		Total scores before/after KT: 6 points / 23 points

Табл. 2. Manual muscle testing

	Shoulder joint		Elbow joint		Hip joint		Knee joint	
At the begging of the study	Flexion	2+	Flexion	3	Flexion	2	Flexion	3
	Extension	2+	Extension	3	Extension	2	Extension	3
	Abduction	2+			Abduction	2+		

	Adduction	2+			Adduction	2+		
At the end of the study	Flexion	3+	Flexion	4-	Flexion	3+	Flexion	4-
	Extension	3+	Extension	4-	Extension	3+	Extension	4-
	Abduction	3+			Abduction	3+		
	Adduction	3+			Adduction	3+		

Analyzing the results of the study revealed better final values in both tests applied by us. The test for assessing the physical ability in activities of daily living (Table 1.) shows positive results, as the total number of points at the beginning of its application was 6, and at the end of our study - 23, which shows that the patient is acquired considerable independence. We applied the test to find out how the patient will cope with solving practical tasks, which give us information about his functional possibilities and the improvement in his quality of life. При ММТ също се отчита The results of the manual muscle testing show an improvement in muscle strength, and at the end of the test, the patient performs one part of the movements independently against gravity or against light resistance (Table 2.).

Discussion

Zhelev V (2015) suggests following certain guidelines for patients with Myasthenia gravis, taking into account the onset of myasthenia gravis disturbances after physical exertion and in the evening hours. Based on this, the author suggests that the exercises should be done at a moderate pace and amplitude, with a smaller number of repetitions and a frequent pause between them. The means that he recommends to be included in the kinesitherapy program are: therapeutic massage, general strengthening exercises, breathing and relaxation exercises, anatomical exercises, balance and coordination exercises and exercises for improve activities of daily life. According to him, some preformed physical factors such as ultraviolet radiation, electrophoresis in the neck area and both hands, stimulating sinusoidal-modulated currents are also suitable [7].

Westerberg E, et al. (2018) conducted a 12-week study on the effect of exercise on neuromuscular function in 11 patients with Myasthenia Gravis. The authors tracked the functional parameters of the skeletal muscles before and after conducting a controlled regimen including aerobic and resistance strength training. After completing the training program, they reported improvement in functional muscle measures, including isometric muscle strength, muscle thickness, clinical fatigue in proximal lower limb muscles, and body posture, but did not report significant improvement in proximal upper limb muscle strength. In conclusion, the authors point out the need for physical activity in patients with Myasthenia gravis according to the general recommendations for healthy people, and in their opinion any other approach would be untenable [8].

Conclusion

Based on the results obtained after our research and the literature data we received, we came to the conclusion that the appropriate selection of methods and means making up the individual kinesitherapy program for patients with Myasthenia gravis improves muscle strength, gait, supports the overall functioning and quality of patient's life. As a recommendation, we would direct the attention of patients to lead a healthy lifestyle by maintaining a good level of physical activity according to their individual condition.

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Anti-inflammatory activity of a cream containing snail mucus, caviar and quantitative evaluation of the CD68 expression in inflammatory cells at purulent wound

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Purpose: The search for new antiseptic preparations against resistant strains is a topical issue of modern medicine. The research conducted in recent years is aimed at the discovery of new antimicrobial substances, with natural genesis such as plant extracts, essential oils and antimicrobial peptides isolated from various animals. Caviar and mucus from a garden snail *Helix aspersa* are rich in allantoin, vitamins, minerals, glycolic acid, glycoproteins, essential amino acids, omega-6 and omega-9 fatty acids, which reduce inflammatory reactions and have a beneficial effect on the regeneration processes. The aim of the present study was to determine the potential effect of a cream containing caviar and mucus from the garden snail *Helix aspersa* on CD68 immune cell infiltration (macrophages) at experimental model of purulent acute wound in rats.

Materials and methods: A wound defect was modeled on 20 female rats weighing 120 g, on a template 1.0 × 1.5 cm and infected with bacteria *S. aureus*, *E. coli* and *P. aeruginosa* at a concentration of 5 × 10⁹ CFU / mL for 72 hours. The treatment lasted 21 days with the use of the regenerating cream on Cantareus Total Recovery of „Kantareus R“ LTD (RC) in the following groups: Group 1 (G1) - 14 animals treated with RC and Group 2 (G2) - 6 animals, without treatment. Histological and immunohistochemical methods were used to assess the effect of the treatment, with a biopsy taken at days 3, 7, 14 and 21. CD68 expression was evaluated under a microscope.

Results: The results of the present study showed that the RC revealed moderate presence of CD68 positive immune cells (macrophages) in the wound healing.

Conclusions: According to the obtained results, we can suggest that RC can participate in wound healing. Although morphometrically and macroscopically, the preparation seemingly accelerated the process of tissue regeneration, it is not suitable for application on acut complicated surgical wounds.

Key words: *Helix aspersa*, Inflammation, Purulent Wound.

Introduction: The uncontrolled use of antibiotics led to the search for new alternative antiseptic preparations against resistant strains [1]. The caviar and mucus of a garden snail are rich in allantoin, vitamins, minerals, glycolic acid, glycoproteins, essential amino acids, omega-6 and omega-9 fatty acids, which reduce inflammatory reaction [2, 3]. A number of research teams have reported that the caviar and mucus of *Helix aspersa* have antimicrobial properties and beneficial effects in the regeneration processes [4]. Accordingly, the use of snails and products derived from snails would help in the treatment and prevention of dermatological inflammatory processes of different localization [5]. Wound healing is a dynamic process that is divided into three phases: inflammatory, proliferative and remodeling. Macrophages

here have a key role in removing devitalized tissue, preventing the penetration of infections, stimulating innate and cell-mediated immunity, supporting cell proliferation and tissue repair after injury [6]. CD68 is used for identifying a population of cells being of a mononuclear phagocyte origin, assessing the number of macrophages infiltrating a wound healing area [7].

Objective: The aim of the present study was to determine the potential effect of a cream containing caviar and mucus of the garden snail *Helix aspersa* on CD68 immune cell infiltration (macrophages) at experimental model of purulent acute wound in rats.

Materials and methods: This research was approved by the Scientific Ethics Committee of MU-Pleven, Bulgaria (permit no. 231 / 09.04.2019). A wound defect was modeled on 20 female Wistar rats weighing 120 g, on a template 1.0×1.5 cm and infected with bacteria *S. aureus*, *E. coli* and *P. aeruginosa* at a concentration of 5×10^9 CFU / mL for 72 hours. The treatment lasted 21 days with the use of the regenerating cream from Cantareus Total Recovery of „Kantareus R“ LTD (RC), that contains caviar and mucus from the garden snail, in the following groups: Group 1 (G1) - 14 animals treated with RC and Group 2 (G2) - 6 animals, without treatment (control group). The wound was treated twice a day at 08.00 am and 18.00 pm until day 21. Histological and immunohistochemical methods were used to assess the effect of the treatment, with a biopsy taken at days 3, 7, 14 and 21. Histochemical analysis included Gomorr staining to visualize collagen fibers. Using an immunohistochemical method, we followed the expression of CD68, marker expressed in macrophages, monocytes, neutrophils, dendritic cells, etc. [8]. We used the CD68 polyclonal rabbit antibody 2-CD247-13 (Quartett/Germany). CD68 was evaluated, as described by Caffo et al. [9].

Results: Morphometry showed that on day 3, 7 and 14 demonstrate progressive healing in both groups. To investigate the effect of RC on inflammatory response, the CD68 macrophages at the wound site were describe (Fig.1). Our result showed that the skins wound of rats covered by RC cream had a mild to moderate immune reaction measured by CD68 expression in inflammatory cells. On day 3 the CD68 positive cells were detected everywhere, but especially in perivascular area. On day 7 post-surgery, the high number of CD68-positive macrophages were present in both groups but were decreased in the G1. The density and distribution of CD68 positive cells (macrophages) in particular is demonstrated on Fig. 1. The macrofagial infiltration corresponded to the following wound healing features. In G1, cell proliferation was noticeable on day 3, by day 7 a moderately hyperplastic epithelial proliferation was observed, incompletely covering the wound defect. On day 14 the wound was covered with epithelium. The same changes were observed in G2, but with slight delay. Post-surgery, the collagen regeneration was present in both groups, but prevalent in G1, especially at 14 and 21 days. The formation and maturation of fibrotic scar is presented on Fig. 2.

Figure 1. Immunohistochemical expression of SD 68 in rat acute wound.

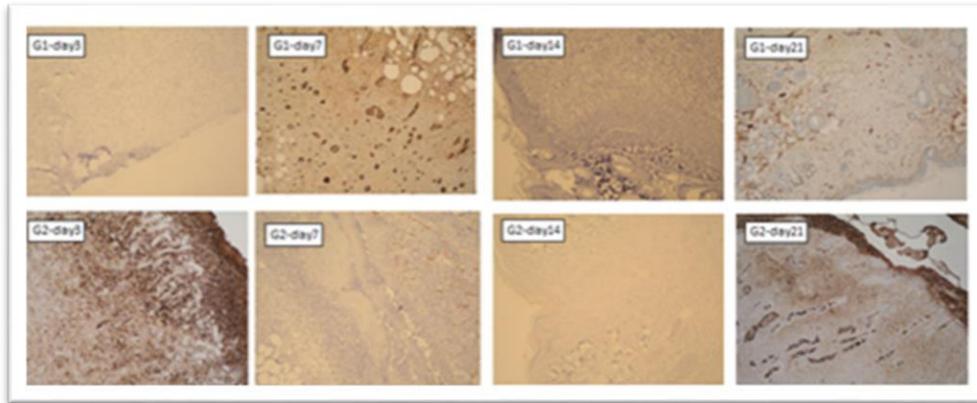


Fig. 1 An immunohistochemical method for monitoring the expression of the marker CD68 in macrophages. CD68 positive cells at each group that marked the brown color. In group G1, intense immunoreactivity (Grade 3) was observed on day 3, moderate (Grade 2) on day 7, and weak (Grade 1) on days 14 and 21. In group G2, intense immunoreactivity (Grade 3) was observed on days 3, 7 and 14, moderate (Grade 2) on day 21. The intensity of staining is more pronounced in G2 compared to G1 and increases from 3 to 14 days as purulent complications lead to an increase in the presence of CD 68 cells on the wound surface in G2 (despite seemingly negative in the detriment material, Mag. x 100).

Figure 2. Gomori staining.

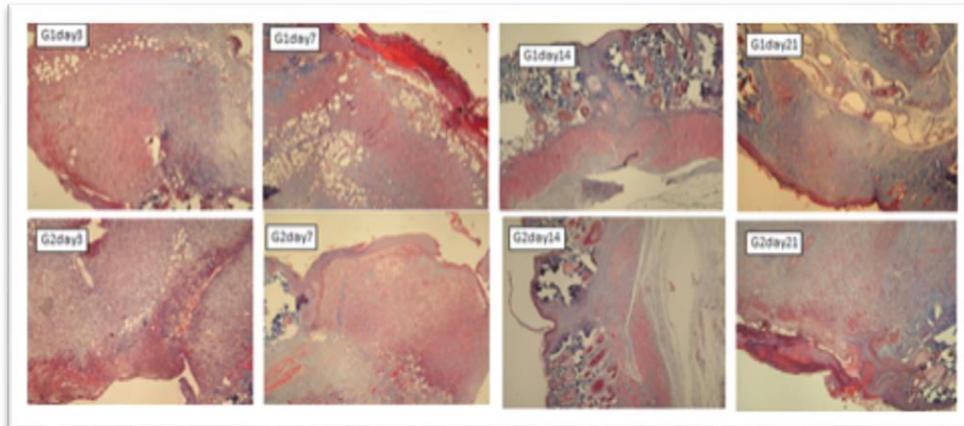


Fig. 2 Gomori staining. Gomori trichrome for evaluation of the collagen deposition deposited in newly formed dermal layer, (blue staining). Sections (5 μ m) of biopsies at 3-day, 7-day, 14-day and 21-day in G1 and G2. Mag. x 100. 14 days post-surgery, the collagen fibers in the G1 group deposited massively and arranged regularly. The collagen regeneration area in the G1 group was noticeably larger compared with the G2.

Discussion

Macrophage activity determines the rate of wound healing [10]. Routine histological examination together with immunohistochemical examination of CD68 macrophages provides extremely important information regarding the stage of wound healing. The CD68 protein belongs to a family of lysosomal glycoproteins and is expressed by tissue macrophages [11]. In our experiment, we found that Macrophages are present mainly in the dermis in variable numbers in both groups. It is difficult to separate the role of macrophages

in terms of purulent inflammation changes and tissue repair. Any interpretation of macrophage counts alone in this context might be speculative. The results of the present study showed that the RC revealed a mild to moderate immune reaction (presence of macrophages) to CD68 on wound healing, and this was accompanied by slightly more prominent tissue repair (scar formation and epithelialization). This suggests the positive influence of the cream on the regeneration processes.

Conclusions:

According to the obtained results, we can suggest that RC can participate in wound healing. Although morphometrically and macroscopically, the preparation seemingly accelerated the process of tissue regeneration, it is not suitable for application on acutely complicated surgical wounds.

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Expressional Changes of Osteonectin and Collagen type-1 in Female Wistar Rats with Osteoporosis

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Abstract

Purpose: Osteonectin (SPARC) is a multifunctional protein involved in the bone remodeling by regulating cell proliferation and cell-matrix interactions. In the bone tissue, osteonectin binds minerals and collagen, and presumably thus initiates mineralization. SPARC plays a key role in the regulation of bone remodeling and maintenance of bone mass by stimulating osteoblastic differentiation and suppressing adipogenesis. The aim of our study is to determine the changes in the expression of osteonectin and collagen type 1 (COL-1) in estrogen deficiency.

Materials and Methods: We used 20 female Wistar rats at a reproductive age - 2 months, divided into 2 groups: group 1 (G1) - 10 animals were ovariectomized and group 2 (G2) - 10 animals were sham-operated.

Results: We found that the SPARC and COL-1 in the bone trabeculae was reduced in the group with osteoporosis (G1 – ovariectomized rats), compared to the sham-operated control group G2 ($p < 0.05$). Histomorphological analysis of femur from G1 animals indicated reduced areas of mineralized tissue and bone marrow fatty degeneration.

Conclusions: The lack of estrogens blocks osteoblastic differentiation and proliferation, which reduces their secretory capabilities.

Keywords: estrogen deficiency, osteonectin, collagen type 1, osteoporosis.

Introduction: Osteonectin (SPARC) is a multifunctional protein involved in bone remodeling by regulating cell proliferation and cell-matrix interactions [1]. In the bone tissue, SPARC is localized near mineralized trabeculae and is present in greater amounts in immature bones than in mature ones. SPARC is expressed by active osteoblasts, osteoclasts, bone marrow progenitor cells, chondrocytes and also by other cell types present in mineralized tissues including endothelial cells and fibroblasts [2]. Research shows that in the bone tissue, osteonectin binds minerals and collagen and possibly thus initiates mineralization [3, 4]. SPARC plays a key role in the regulation of bone remodeling and maintenance of bone mass by stimulating osteoblastic differentiation and suppressing adipogenesis [5]. The aim of our study is to determine the changes in the expression of osteonectin and collagen type 1 (COL-1) in estrogen deficiency.

Materials and methods: The experimental study was approved by the Scientific Ethics Committee of Medical University-Pleven, Bulgaria (certificate no. 556/ 07.05.2019). The experiment was performed on 20 female Wistar rats at a reproductive age of two months, with an initial weight of 150 ± 20 grams, which were divided into two groups: group 1 (G1) – 10 animals with bilateral ovariectomy (ovx), and group 2 (G2) – 10 animals sham-operated (SHAM). All rats grew in standard rules of work with laboratory animals adopted from Medical University-Pleven, Bulgaria. The animals were prepared for the experiment by acclimating to the conditions for one week prior to the experiment. They were accommodated in an air-conditioned room (relative humidity 45–65%) over a 12-hour light/dark cycle, at $22 \pm 2^\circ\text{C}$, with free access

to food and water. The model of osteoporosis was created according to the method of Kharode et al. [6]. SPARC antibody (H-90) rabbit polyclonal IgG and COL-1A antibody (COL-1) mouse monoclonal IgG were used for immunohistochemical study (IHH), according to the manufacturer's instructions (Santa Cruz USA and Scytek kits). SPARK and COL-1 were evaluated, as described by Laçin, N. et al. [7]. All statistical analyses were performed using the SPSS 20 software (SPSS, Inc., Chicago, IL, USA). For the IHC study the nonparametric test – Mann Whitney was used, by comparing the median values. Data were presented as mean \pm standard deviation, with a p-value < 0.05 as the limit for statistical significance.

Results: Immunohistochemical study of SPARC expression

SPARC expression was found to be significantly downregulated in estrogen deficiency, which was observed in G1 (OVX) compared to G2 (SHAM), ($p < 0.05$), Figure 1.

Figure 1. Immunohistochemical reaction of SPARC.

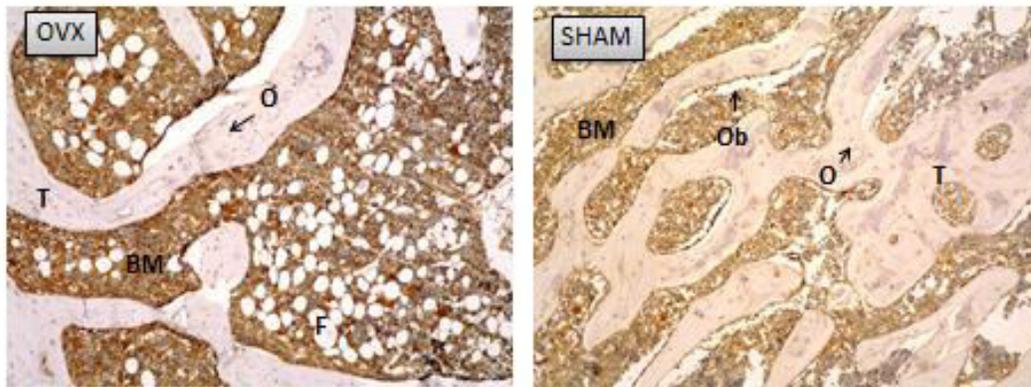


Fig.1. An immunohistochemical method for monitoring the expression of the SPARC in femur preparations. Weak and strong expression of SPARC is shown in the osteoblasts on the surface of trabecule and in the osteocytes (brown staining). Mag. x 100. (Ob-osteoblasts, O-osteocytes, BM-bone marrow, T-trabeculae, F-fatty degeneration).

Immunohistochemical study of COL-1

During the study, COL-1 expression was also found to be significantly decreased in estrogen deficiency, which was observed in G1(OVX) osteoporosis group compared to G2(SHAM), ($p < 0.05$), Figure 2.

Figure 2. . Immunohistochemical reaction of COL-1.

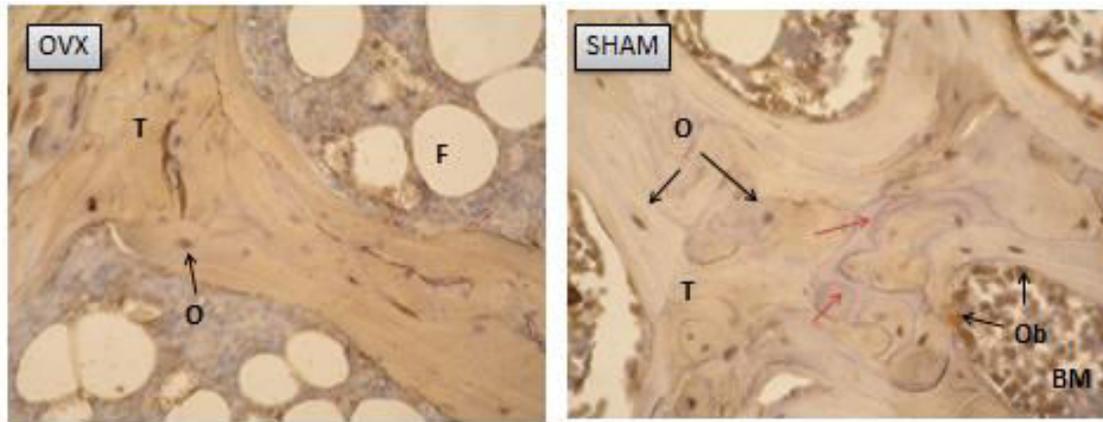


Fig. 2. An immunohistochemical method for monitoring the expression of the COL-1 in femur preparations. IHH of COL-1 in osteocytes and osteoblasts in the bone matrix is shown with brown staining (arrows). In G1(OVX) group, IHH staining of COL-1 is weakly expressed in single O and absent in Ob. In control group G2 (SHAM), IHH staining of COL-1 is uniform and strongly expressed in Ob and in O. Presence of collagen in the matrix (red arrows). Mag. x 400. (Ob-osteoblasts, O-osteocytes, BM-bone marrow, T-trabeculae, F-fatty degeneration).

In G1, there was a high positive correlation of IXX expression between SPARC and COL-1 ($p=0.005$; $r=0.802^{**}$). In G2, there is a high positive correlation of IXX expression between SPARC and COL-1 ($p=0.006$; $r=0.799^{**}$).

Discussion: The process of mineralization takes place continuously between the collagen fibers in the bone tissue, and SPARC is one of the non-collagen proteins that actively participates in this process [8]. SPARC plays a key role in the regulation of bone remodeling and maintenance of bone mass. It also enhances osteoblastic differentiation and suppresses adipogenesis. The destruction of collagen fibers is an integral part of bone remodeling, which under normal conditions is rapidly replaced by newly synthesized collagen. With estrogen deficiency, the activity of osteoblasts and, accordingly, the production of collagen type I slows down, which leads to a reduced and, more importantly, inhomogeneous distribution of collagen [9]. Osteoblasts and adipocytes differentiate from a common mesenchymal precursor, which explains fatty degeneration with low SPARC values [10, 4].

Conclusion: We found that the expression of SPARC and COL-1 were significantly decreased after estrogen deficiency in the osteoporosis group (OVX) compared to the SHAM group. The result was expected because the lack of estrogens blocks osteoblast differentiation and proliferation, which reduces their secretory capabilities.

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ERGON Technique for the therapy of a Plica syndrome

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Abstract

Purpose: The etiology of knee pain can be associated with various causes. One of the causes is synovial Plica syndrome. **Material and Methods:** We have included 5 athletes from the national taekwondo ITF team of the of Bulgaria. We made the following measurements: centimetry, pain assessment and specialized tests. We apply Ergon technique in the treatment of synovial plica of the knee. **Results.** The mean degree of pain on the visual analogue pain scale before therapy was 3.8 ± 0.84 , and after that athletes did not report pain. The measured mean centimeters before Ergon therapy were: above the patella was 40.40 ± 3.77 cm, in the midpatella were 37.7 ± 2.73 cm, and below the patella was 35.2 ± 3.21 cm. After the applied therapy, the average values are the same as in a healthy leg, with a difference of up to 0.5 cm. We applied four specialized tests for the detection of Plica Syndrome, which before the therapy were positive, and after it - negative. **Conclusion.** The use of Ergon technique is effective and improves the opportunities of sports therapists for adequate and timely impact of athletes' injuries by helping them return to active competitive activity.

Keywords: - knee pain, taekwondo athletes, treatment, synovial plica

Introduction

The knee joint, together with the hip and ankle joint, is anatomically adapted to ensure the mobility and stability of the lower limb [1, 2]. The etiology of anterior knee pain is multifactorial and can be related to various different diagnoses. A common, yet not well understood, cause of anterior knee pain is synovial plica syndrome [3]. A plica is a band of thick, fibrotic tissue that extends from the synovial capsule of a joint. When the plica becomes inflamed or irritated, it can cause plica syndrome, which is anterior knee pain due to the plica [4].

Gramatikova (2015) points out that it is necessary that the rehabilitation approach be tailored to all pathofactors by planning and carrying out complex treatment aimed at controlling and reducing them. One of the tasks of kinesitherapy is to restore lymphatic circulation and eliminate edema [5].

The Ergon IASTM technique is an innovative approach that enriches kinesitherapy practice and is successfully used in the treatment of various musculoskeletal dysfunctions [6]. Valchev et al. (2021) share that the ERGON® technique combines static and dynamic manipulations of the body's soft tissues with tools to treat neuromuscular and skeletal pathologies [7].

The purpose of the study was to monitor the influence of a Plica Syndrome with the ERGON technique.

Materials and methods

The study was conducted during the preparatory camp for the European Taekwondo ITF Championship. We have included 5 athletes from the national taekwondo ITF team of Bulgaria. We applied the following studies: pain assessment- visual analog scale (VAS); Specialized tests for the Plica syndrome: Stutter test, Hughston's Plica Test, Active extension test and Flexion test.

We treat the tissues on the front, lateral and medial part of the knee. We emphasize the application of Ergon techniques for direct impact on the synovial plica of the knee - medial, lateral, suprapatellar and infrapatellar. We use the following techniques: rub, wave, cyriax, s-globe, sculpt, split. The procedure lasts 5-10 minutes. It is applied twice a day for 4-5 days. During this time, the athletes train in a relaxed mode.

The evaluation of research results were realized by statistical and mathematical methods and procedures using Graph Pad Prism 3.0.

Results

The mean age of the study participants was 20.60 ± 1.52 years. We measured the degree of pain in the affected persons with the help of the VAS. The mean pain was 3.8 ± 0.84 . After Ergon therapy, taekwondo athletes did not report pain.

We measured the knee with a centimeter above the patella, midpatella and below the patella to determine the presence of edema. The mean above the patella are 40.40 ± 3.77 cm. The calculated mean values of the centimeter in the midpatella are 37.7 ± 2.73 cm, and below the patella 35.2 ± 3.21 cm. After the applied therapy the average values are as on a healthy leg, with a difference of up to 0.5 cm. The measured average values in the area above the patella are 39.4 ± 3.07 cm, through the patella - 36.5 ± 2.4 , and below the patella - 34.16 ± 2.6 cm. There are statistical differences in the Wilcoxon test at $p < 0.05$

We applied four specialized tests for the detection of Plica Syndrome - Stutter test, Hughston's test, extension and flexion test, which before the therapy were positive, and after it - negative.

Dicussion

All taekwondo study athletes in our study were women. Thus, we confirm the opinion of many authors that women are more prone to the development of knee pain. Plica syndrome is generally found in youths and is more frequently encountered in females [8]. Tsvetkova-Gaberska and Pencheva, based on other studies in the literature and analysis their own results, found that females have larger deviations in variable error, which makes them more susceptible to intra-articular trauma and injury than men [9].

We are of the opinion that the epidemic situation has affected the training form of the athletes, as some of them have elaborated the visit to the taekwondo halls. In addition, some athletes have changed the city in which they train because of their education. This is the first training camp for a major championship since the pandemic began. From the data from the anamnesis and the measurement performed with a centimeter in the knee in the affected taekwondo athletes, we can conclude that they have Medial Plica Syndrome. The edema was not seen in one of the affected taekwondo athletes. In two of the taekwondo athletes, edema was visible only in the middle of the patella. In the other two athletes examined, the edema was on the whole knee. The lack or minimal edema that was observed in the affected taekwondo athletes of the national team of Bulgaria, we explain with early diagnosis and timely measures. The therapeutic effect of the Ergon technique should not be belittled.

Some authors point to circumstances such as a history of blunt trauma or more frequent overuse of the knee as the cause of the symptomatic plica [10]. We find that the reason for the studied athletes is the intensity of training during the training camp, after previously, due to the pandemic situation, they reduced their training. We can note that from our previous practice as therapists of the national taekwondo ITF team of Bulgaria we have not established the presence of Plica syndrome with such a frequency. Indoor and artificial training increases the injuries of athletes. It has been proven by a number of scientists that outdoor sports in a natural environment stimulate proprioception and neuromuscular control, which leads to a lower frequency of injuries. That is why we recommend taekwondo athletes to play sports outdoors along with the typical indoor training.

Conclusions

The development of pathological plica syndrome is common in sports practice. The real challenge for therapists is to recover the affected athletes for a competition. In the present study, we shared our experience in the treatment of plica syndrome in athletes from the Bulgarian national taekwondo ITF team. From our

practice we can conclude that the early detection and treatment of inflamed synovial plica does not allow the problem to worsen. The use of Ergon technique is effective and improves the opportunities of sports therapists for adequate and timely impact of injuries in affected athletes by helping them to return faster to active competitive activity.

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Methodology of kinesitherapy for disc protrusions in the cervical region

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Abstract

Purpose: Neck pain is common in the modern world. One of the causes of neck pain is disc protrusion. The purpose of the study is to create a methodology for conservative therapy in patients with cervical disc protrusion and to track the effect of its application. **Material and Methods:** The study included 10 patients with cervical disc protrusions. Before and after the treatment we applied the following tests: visual analogue scale (VAS), Neck disability index and Specialized tests (Spurling test, Distraction test, Abduction test). **Results:** We report an improvement in both the specialized cervical radiculopathy tests performed, as well as the visual analog scale and the NDI. **Conclusion:** The methodology of kinesitherapy for disc protrusions in the cervical vertebrae developed by us is effective and reliable. It is easy to apply and leads to long-lasting results. From the presented results, it is clear that after the therapy, the patients have no pain and the symptoms characteristic of disc protrusions subside.

Keyword: kinesitherapy, cervical disc protrusions, specialized cervical tests

Introduction

A cervical disc herniation (CDH) is a frequently encountered pathology in primary care medicine. It may give rise to a compression of a nerve root (a radiculopathy, with or without sensory-motor deficit) or of the spinal cord (myelopathy). The majority of CDHs can be supported by means of a conservative treatment [1]. According to Popova et al. (2017) cervical disc herniations are 8% of all cases of disc herniation [2]. Metzger summarizes the symptoms of cervical radicular pain in disc herniations in this area as numbness, burning, stabbing, presence of sensory, motor and reflex deficits [3]. Sharrak & Khilili (2022) share that physical therapy is usually prescribed after a short period of rest and immobilization. The authors recommend that therapy include a range of motion exercises, strengthening exercises, ice, heat, ultrasound, and electrical stimulation therapy [4].

The purpose of the study is to create a methodology for conservative therapy in patients with cervical disc protrusion and to track the effect of its application.

Materials and methods

We conducted the survey in the period 09.2020-04.2022. We studied 10 patients with cervical disc protrusions. At the beginning, the essence of the methodology was explained to each patient, and after obtaining informed consent, we proceeded to the therapy itself. Before and after the treatment we applied the following tests: visual analogue scale (VAS), Neck disability index (NDI) and Specialized tests (Spurling test, Distraction test, Abduction test). The kinesitherapy methodology we created can be applied both in the acute period and in the chronic period.

The kinesitherapy methodology developed by us during the acute period has been conditionally divided into 3 stages - immobilization with a neck collar, neck muscle stretching and muscle strengthening. During the first stage, we immobilize the patient for a period of 1 month with a cervical collar. On day 12-14, we notice that their pain is reduced. During this period, we monitor the condition of the patients every day by giving them massage and treatment of trigger points. In the second stage, we correct cervical lordosis, treat trigger points and stretch shortened muscles. To correct the cervical lordosis we use the McKenzie roller. We treat the trigger points of the muscles: supscapularis, splenius cervicis and capitis, multifidi, romboidei. We

applied stretching for the stiffness muscles such as m. trapezius and m. levator scapulae. During the third stage, we apply an exercise to improve the range of motion and restore muscle strength.

In the chronic period we do not immobilize patients. We used the same means and exercises as in the second and third stages of the kinesitherapy methodology in the acute period.

Data were analyzed by using Graph Pad Prism 3.0. We calculated means with standard deviations (SD) and the statistical differences with Wilcoxon sign rank test at $p \leq 0.05$.

Results

We have applied the methodology to 10 patients (7 men and 3 women) with a mean age of 50.9 ± 2.6 years. The mean degree of pain according to the VAS before the therapy is 5.2 ± 1.4 , and after it - no pain. The mean sum of points on the Neck disability index before the therapy is 22.5 ± 3.75 and after it 1.6 ± 1.9 . The specialized tests (Spurling test, Distraction test, Abduction test) performed before the therapy were positive, and after it - negative.

Discussion

Hornung et al. (2022) note that conservative treatment relies on the body's natural ability to spontaneously "resorb" the herniated disc as part of the "self-healing" phenomenon. The authors note that spontaneous resorption after lumbar disc herniation occurs in 67% of cases within 1 year [5].

MacDowell et al. (2017) note that the visual analog scale (VAS) is frequently used to measure treatment outcome in patients with cervical spine disorders [6]. We also used the VAS in pain assessment in our patients. We noticed that the degree of pain in patients disappears on day 12-14. We attribute this to the placement of a cervical collar and immobilization in that area, resulting in the formation of collagen fibers around the protruding disc.

McDermid et al. (2009) conducted a systematic review of clinical measurements of NDI. The authors concluded that the NDI had acceptable reliability [7]. Vernon and Mior (1991) suggested the following interpretation of NDI scores: 0 to 4, no impairment; 5 to 14, mild disability; 15 to 24, moderate disability; 25 to 34, severe disability; and greater than 35, total disability [8]. Based on these results and the average values obtained in our patients, we determine that before the therapy they correspond to a moderate disability, and after it - no disability.

Jones and Miller (2022) reported that the Spurling test had a sensitivity of 95% with a specificity of 94% [9]. Therefore, the authors recommend that it be used in combination with other specialized research tests. That is why we used it in combination with the Abduction Test and the Distraction Test. Eubanks reported that the Distraction test was positive for cervical radiculopathy. If the pain is relieved by force of distraction it indicates that the pressure on the nerve roots has been relieved. The test has been shown to have a sensitivity of 44 % and a specificity of 90 % [10]. Malanga et al. (2003) performed a retrospective analysis of tests used in cervical radiculopathy and concluded that the abduction test is indicative of nerve root compression. The authors suggest that reduced nerve root tension is the most likely reason for the relief of symptoms when performing the test. The authors cite Viikari-Juntura et al., who investigated the validity of the test in 22 patients and concluded that the test was highly specific for cervical radiculopathy with low sensitivity [11].

Conclusions

Neck pain is common in the modern world. They are often associated with a sedentary lifestyle, working in a prolonged incorrect posture with prolonged head and shoulders. We have developed a kinesitherapy methodology that successfully deals with this problem. The methodology of kinesitherapy for disc protrusions in the cervical vertebrae developed by us is effective and reliable. It is easy to apply and leads

to long-lasting results. From the presented results, it is clear that after the therapy, the patients have no pain and the symptoms characteristic of disc protrusions subside.

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Effect of the Ergon Tehnique on static strength endurance in patients with bimalleolar fracture

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SUMMARY

Purpose: The aim of the present study was to follow the effectiveness of Ergon Tehnique, on static power endurance, in patients after surgical treatment of bimalleolar ankle fracture.

Material/Methods: 30 patients with bimalleolar fracture in the subacute postoperative period were studied, distributed as follows: control group (CG) - 15 patients and experimental group (EG) - 15 patients. A test was conducted to investigate the status and changes of the static strength endurance of the operated leg, measured in seconds, before the start, after one month, two months and after three months of kinesitherapy. The patient stands on his toes and the time (in seconds) in which he manages to stay in the set position is recorded. The test assesses the patient's ability to stand on tiptoes on the operated lower limb. A traditional model of kinesitherapy was applied in a control group, and Ergon Tehnique was applied in an experimental group.

Results: The mean values ($\bar{x} \pm SD$) after one month of kinesitherapy were as follows: in the control group 0.333 ± 0.488 and 1.067 ± 0.798 in the experimental group. After three months of treatment, the results were as follows: static strength endurance in the control group was 1.333 ± 1.234 and 7.267 ± 3.615 in the experimental group. The values of P show that the established difference in the mean values of the indicator in the two groups after three months of kinesitherapy is statistically significant and proves a higher efficiency of the experimental model compared to the traditional one applied in the control group, at $P < 0.05$.

Conclusion: In the conducted study, we found that there were statistically significant differences in both groups, in EG we found that Ergon Tehnique had a better effect on static strength endurance in patients with bimalleolar ankle fracture, compared to the applied traditional model of kinesitherapy in CG.

Keywords: physiotherapy, Ergon Technique, ankle fractures, kinesitherapy

Introduction:

Ankle fractures are common, recovery is slow, and they most often affect the young age of the population, which is why they are of great social importance. Injuries to the ankle joint lead to serious and often permanent disruption of the mechanics of the foot and lower limb. The ankle joint is the most loaded joint and one of the joints with the most frequent injuries. Hippocrates first diagnosed and fixed an ankle fracture in the 5th century BC.

According to data from "Pirogov", fractures in the area of the ankle joint account for 17% of all fractures of the musculoskeletal system, and according to data from Prof. Ganchev from 1997, fractures of the bones of the lower leg occupy from 13% to 25% of all fractures of the musculoskeletal system [1].

In recent years, the study and treatment of myofascial pathologies has become an essential element of the rehabilitation and kinesitherapy of musculoskeletal and neurological pathologies. On this basis, many

techniques and methods for myofascial therapy of soft tissues have been developed, with the aim of a more comprehensive assessment and more effective treatment of dysfunctions and pathologies [2]. The theoretical basis of most of these techniques is based on the development of Thomas Myers, who defined 12 myofascial meridians, interconnected, covering almost all surfaces of the human body at all levels [3].

One of the newest techniques - Instrument Assisted Soft Tissue Mobilization (IASTM) is the Ergon® IASTM Technique, which is a manual therapy approach combining static and dynamic soft tissue manipulation with specialized clinical equipment tools aimed at treating shortened, restrictive soft tissues, improving their flexibility and laxity, the range of motion of the joints and the functional abilities of the patient [2].

The Ergon® IASTM technique involves the application of specialized IASTM moves, movements that are linear (**Rub, Wave, Snake, Cyriax, Switch**), semi-circular or circular (**Razor, Globe, Small Globes, Excav**) applied to specific points of myofascial restrictions. Also included in this technique are special movements for separating myofascial structures (**Sep, Split**) and techniques for treating areas with fascial adhesions (**Cyriax, Switch**) [4].

The Ergon IASTM technique is an innovative approach that enriches kinesitherapy practice and is successfully used in the treatment of various musculoskeletal dysfunctions [5].

Material and Methods:

30 patients with bimalleolar fracture in the subacute postoperative period were studied, distributed as follows: (CG) – 15 patients and (EG) – 15 patients. Persons included in the CG and EG meet the following requirements: - presence of a diagnosed fracture; - prescribed surgical treatment by an orthopedist-traumatologist and treated by means of metal osteosynthesis, by means of implants; - patients should be in a subacute period of recovery; - availability of written informed consent. The functional tests and kinesitherapeutic procedures were carried out in a multidisciplinary hospital for active treatment - Blagoevgrad, Department of Orthopedics and Traumatology.

Methodology of Physiotherapy

Goal: The aim of the present study was to follow the effectiveness of Ergon Tehnique, on static strength endurance, in patients after surgical treatment of bimalleolar ankle fracture.

Functional study: A test was conducted to investigate the status and changes of the static strength endurance of the operated leg, measured in seconds, before the start, after one month, two months and after three months of kinesitherapy. The patient stands on his toes and the time (in seconds) in which he manages to stay in the set position is recorded. The test assesses the patient's ability to stand on tiptoes on the operated lower limb.

In CG, a traditional model of kinesitherapy is applied, and in EG, an experimental model is applied, which includes twice a week and Ergon Tehnique. In the experimental methodology of kinesitherapy, the following specialized means are applied: 1. *Joint mobilization techniques*. 2. *Soft tissue mobilization with Ergon Tehnique*. 3. *Techniques from PNF*. 4. *Massage*. 5. *Exercises with equipment*. 6. *Kinesio taping*.

The Ergon technique is applied twice a week. The Ergon technique is applied to every procedure with grips: *rub, wave, excav, ciryax, sculpt, sep, switch, split* [4]. By means of Ergon instruments, the region of

the lower leg and the foot is processed, and in the first period of the experimental methodology of kinesiotherapy, the cicatrixes around the malleoli are not processed due to the increased sensitivity. Initial procedures are performed in an open kinetic circuit with light pressure and passive soft tissue treatment.

Gradually, we move to actively assisted treatment, such as during the intervention with Ergon - the tools, the patient supports his movements by means of elastic resistance bands, thus managing to reach the maximum range of motion that the ankle joint allows him.

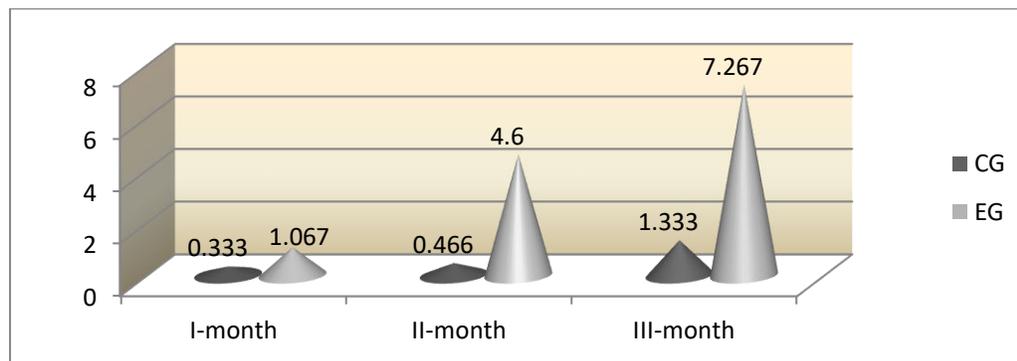
In the course of the therapy, the pressure force is gradually increased and it goes from an open to a loaded kinetic circuit, with the patients performing active or passive movement while the therapist works on the lower leg region, the pressure force is strictly subjective depending on the tissue response and pain tolerance of each patient. Manipulation of the cicatrix helps to reduce the growth of the underlying connective tissue and improves elasticity, reduces pain symptoms and improves revascularization in the region.

Results and Analysis

The results of the testing showed that due to muscle weakness and pain until the **first month**, patients were unable to perform static strength endurance. The results after the 1st month of kinesiotherapy in the CG of patients showed average values of 0.3333 sec., in the EG better results were found (1.067 sec.). The values of P show ($P=0.0032$) a higher efficiency of the experimental model of kinesiotherapy compared to the routine applied to patients in the CG ($P<0.05$).

At the end of the **second month**, 0.4667 seconds were recorded in the CG, in the EG there was an increase in the values of the indicator to 4.6 seconds, which is a sign of an improvement in the static strength endurance of the patients and a higher efficiency of the experimental model kinesiotherapy (Fig. 1).

Fig. 1. Static strength endurance after 1 month, 2 and 3 months of therapy in the CG and EG



At the end of the **third month** in the CG, a slight improvement in static power endurance up to 1.333 seconds was observed, in the same period in the EG an improvement in the studied indicator was observed up to 7.267 seconds, which was significant (Fig. 2). P-values ($P=0.001$) show that there is a statistically significant difference between the results in the control and EG according to the studied indicator. Therefore, the better results found in the patients in the experimental group attest to the higher efficiency of the applied experimental model of kinesiotherapy.

Discussion

The results of the testing showed that due to reflex muscle inhibition and pain until the first month, the patients were unable to exhibit static strength endurance, despite the application of kinesiotherapy. It

appeared only at the end of the first month and gradually progressed in the second and third months, with the results in EG being better compared to CG, in all measurements.

No data were found in the literature on the impact of the Ergon technique on peak static strength endurance in patients with a bimalleolar fracture. The applied experimental methodology of kinesitherapy with Ergon-manipulations is more effective than the traditional one.

Conclusion

In the conducted study, we found that there were statistically significant differences in both groups. In EG, we found that Ergon Tehnique has a better effect on static strength endurance in patients with bimalleolar ankle fracture, compared to the applied traditional model of kinesitherapy in CG.

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Redistributive Effect of the Household Health Expenditure in Bulgaria

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Abstract

Purpose and objectives. The purpose of the study is to assess and analyze the effect of household health expenditure on income inequality. The objective is expressed with the implementation of graphical and analytical instruments for the determination and explanation of the influence of household health expenditure on income distribution.

Data and methods. The data is collected from the annual statistical books 'Household Budgets in the Republic of Bulgaria' issued by the National Statistical Institute of Bulgaria. The observed variables are 'household health expenditure by decile groups of income – the average per capita' and 'total gross household income – the average per capita'. The data cover the period from 2000 to 2021. The study uses the methods like Lorenz and concentration curves of income and costs, Kakwani index (K), Gini index (G) and coefficient of redistributive effect (RE).

Results. The RE has got an increasing power with negative values for each year (RE2000 = -0.001; RE2019 = -0.007; RE2021 = -0.024). The Kakwani indices are negative and with growing absolute values (K2000 = -0,035; K2019 = -0,11; K2021 = -0,179). These results indicate a relatively growing burden of health costs on poorer households. The process of concentration of the expenses to the lower incomes group is particularly well expressed during the pandemic years 2020 and 2021.

Conclusions. The main conclusion is that the redistributive effect of a household's health expenditure has got an increasing power in the condition of regressivity impact on the income distribution.

Key words: household health expenditure, household income, income inequality.

Introduction

A number of studies are known, aiming to establish the redistributive effect of health costs on income, regardless of the source and method of their financing. They are a relatively new area in the theory of health finance and economics, with some of the first research on the subject described in two closely related sources, Eddy van Doorslaer et al. and Adam Wagstaff et al. Both studies were published in 1999 in the Journal of Health Economics [1,2]. The prerequisite for attention to the relationship between health expenditure and income inequality is mainly the maintenance of the permanent goal related to ensuring financial accessibility to the benefits of the system.

The research methodology in this direction is complex and with continuous evolution. Modern methods of measuring the redistributive power of health expenditure, regardless of the source and method of their financing, are based on the wealth concentration curves proposed by Max Lorenz at the beginning of the 20th century [3].

Not long after, the literature was enriched with the introduction of a method for quantitative representation of income inequality, which became the so-called income concentration index by K. Gini [4].

From here, scientific interest turns to determine the direction and strength of the redistributive potential of taxation, new methods are based on the Lorenz curve (LC) and the Gini coefficient (G).

Musgrave and Thin [5] propose the following relationship to measure the redistribution caused by personal income taxation:

$$MT = \frac{1-G_N}{1-G_X}, \text{ where:}$$

G_N – Gini index of gross income;

G_X - Gini index of net income.

(1)

At $MT > 1$, the corresponding tax has a progressive effect, i.e., the poor pay relatively less tax than the richer relative to their income levels. On the contrary, when $MT < 1$ tax is degressive, the poorer pay relatively more taxes than the richer, accordingly to their income.

Much later, some progress on the problem was achieved by N. Kakwani, who proposed a dependence for measuring the progressivity of taxation, referring to the concentration index (CI_T) of tax payments [6]. The index has the following analytical form:

$$K = CI_T - G_X. \tag{2}$$

When $K > 0$ a taxation progressivity exists, and at $K < 0$ - tax is regressive.

In addition to the indices of progressivity of taxation, coefficients measuring its redistributive effect (RE) are presented, which, applied by Verbist & Figari (2013) [7], have the following form:

$$RE = G_X - G_N. \tag{3}$$

Materials and Methods

The present study is based on aggregated data from the annual representative studies of the National Statistical Institute of the Republic of Bulgaria (NSI) on household budgets. Each one includes more the 3 000 randomly selected households and represents a study of the absolute sum and relative share of their annual average income and expenses by decile groups. Health costs are a separate part of the household budget's expenditure.

To analyze the effect of health expenditure on individual income and to identify the trends, the period following the transition from budget to fund financing of the country's healthcare system has been encompassed-namely, the years between 2000 and 2021. Thus, in practice, the data and results from a definite number of cross-sectional studies, presenting a time sequence of twenty-two years (no data was found for three years - 2007, 2008 and 2011), were subject to comparison. The observable variables are "household health expenditure by decile groups of income – the average per capita" and "total gross household income – the average per capita".

Gini indices of the gross income distribution are defined as the area between the line of perfect equality and the concentration curve of gross income multiplied by two. Indices of health expenditure concentration are determined in an analogous manner by multiplying the area between the line of perfect equality and the expenditure concentration curve by two. The concentration curves and their adjacent indices were constructed and determined using MS Excel from Office 365 package.

To determine the levels of the Kakwani indices (equation 2) by year, the concentration coefficients of health expenditure per household member and the Gini index of total income are applied. Coefficients of the total redistributive effect (RE) are also presented (equation 3), as well as its per cent share of the Gini coefficient of gross income.

Results

The degree of inequality in terms of total household income fluctuates within narrow limits, with Gini coefficients ranging between 0.28 (2009) and 0.34 (2004) (Fig. 1).

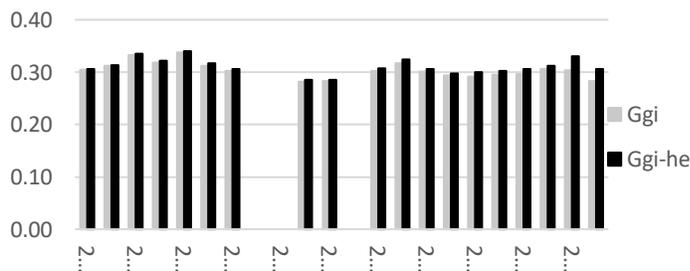


Figure 1. Gini indices of gross income (G_{gi}) and the income after health expenditure (G_{gi-he}).

Gini indices of income after deducting health costs are higher than those of income, following their pattern of development over the years. Higher levels of the Gini index based on adjusted with health costs income indicate a trend toward increasing inequality. If conditionally dividing the period into two decades from 2000 to 2010 and beyond, we find that within the first decade the average Gini index is one percentage point higher than after ($G_{\text{first decade}} = 30.9\%$, $G_{\text{second decade}} = 29.9\%$).

Figure 2 presents the absolute size of the redistributive power of household health spending.

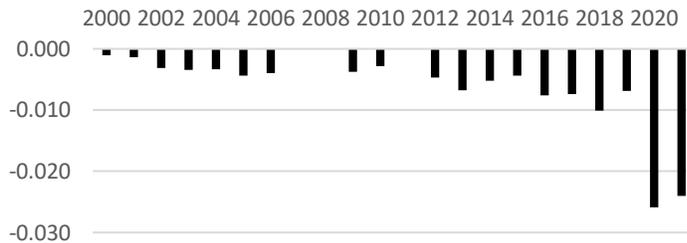


Figure 2. Coefficients of redistributive effect of household health expenditure.

The redistributive effect of health household expenses is negative for the entire observed period, and its absolute values follow an increasing trend. The growth of the absolute size of RE in the last two years, which was marked by the Covid-19 pandemic is particularly noticeable. Over the last ten years, a smooth process of increasing the redistributive power of health costs has been formed, which is highly pronounced in a pandemic environment. The rate of RE as a percentage of G_{gi} follows the similar trend confirming the process of strengthening the income inequality caused by the payments for health ($RE_{2000} = -0,35\%$; $RE_{2019} = -2,24\%$ and $RE_{2021} = -8,49\%$).

The Kakwani indices are negative for all years of the period, while at the same time their absolute values are growing, which reveals a time-increasing degressive effect of household health expenditure on income distribution (Fig. 3).

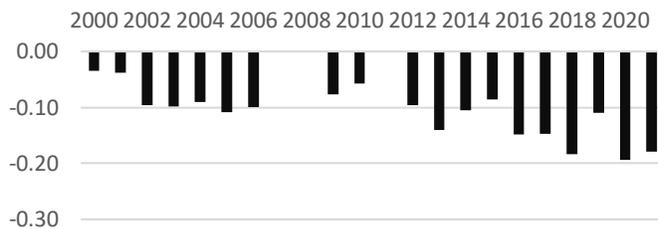


Figure 3. Kakwani indices of household health expenditure.

Fig. 4 presents Lorenz curve of gross income and concentration curve of health care costs. Kakwani indices can also be obtained by multiplying the area between the two types of curves by two. The same area in 2021 is much larger than that of 2000.

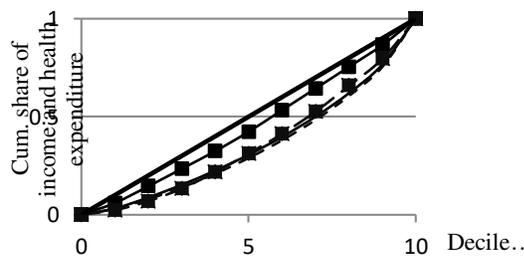


Figure 4. Lorenz curves of gross income and concentration curves of health expenditure in the beginning and in the end of the period.

The location of the curves illustrates the process of gradual increase in the burden of health expenditure on poorer households relative to their income.

Discussion

The obtained results can be discussed in the context of other similar studies conducted in other countries. A modification of the Kakwani index is proposed in a study on the redistributive effect of health care payments in Japan. In the period 2000-2010, negative values of the index are obtained, but they have a downward trend and illustrate the reduction of the regressive effect of direct payment and the improvement of financial access for the consumption of health services [8].

An in-depth study from the late 1990s of income inequality, which is driven by elements of the financial mix of total health expenditure of OECD member countries, produces comparable results. For all member countries, the Kakwani index values for direct payments are negative. This also applies to indirect taxes and private insurance payments, but not as strongly [1-2]. As a rule, direct taxes and, in most cases, social health insurance tend to have a progressive effect on the redistribution of income. In this sense, the results obtained in the present study are confirmed by other authors for a wide group of countries.

Particularly interesting are the results of a methodologically similar study on the financing of the health system in Ireland [9]. What is striking in three of the household budgets surveys - 1987-1988, 1999-2000 and 2004-2005 - is the gradual increase in the absolute value of the index of progressivity of direct payments - from 0.06 to -0.11. However, total systemic financing has a weakly pronounced progressive effect on household income, with indices having values between 0.03 and 0.04. This is a result which is due to the increased progressivity of direct taxes in Ireland and their significant share of total health care funding.

Conclusion

Given the significant share of private healthcare spending in our country, and although the public resource for the system has been growing over the past few years, the results obtained are generally expected. Based on them, several more important conclusions can be formulated.

Private health care expenditure, which can be estimated to a certain extent with household health costs indicated by the NSI, is characterized by a definite redistributive effect. The negative values of the Kakwani indices, as well as of the redistributive effect, are an indication of a process of bearing a relatively greater cost burden by the poorer households compared to the richer ones according to their income. This process has been deepening in the pandemic years – 2020 and 2021.

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Prevention of Musculoskeletal Disorders among Outpatient Care Workers

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Abstract: Ergonomic risk factors among health workers are common. An awkward and static postures lead to a variety of symptoms such as discomfort in the neck, pain in the shoulders, lower back, elbows, hands, fingers, hips and knees. Our study proved once again that health workers are at high risk of ergonomic factors and arising from them musculoskeletal disorders. It is necessary urgent measures to limit them.

Introduction: The Healthy Workplaces campaigns are a flagship activity of the European Agency for Health and Safety at Work to raise awareness. The 2020-2022 campaign focuses on the prevention of work-related musculoskeletal disorders which are among the most common work-related diseases[1]. They affect millions of workers in Europe and cost employers billions of euros and workers from all sectors are affected [2]. Work-related MSD's are reportedly the most common occupational health problem in the healthcare sector [3,4,5].

Postural hazards, monotonous movements or tiring and painful body positions, carrying or moving heavy loads — any one of these common workplace risk factors can lead to MSDs. The prevalence of work-related MSDs is a sign that more efforts are needed to raise awareness of ways of prevention [1].

Work-related MSDs affect the back, neck, shoulders, upper and lower extremities and develop over a long period of time [6,7]. There is usually no single cause of MSD. They cover any damage or disorder of the musculoskeletal system. Health problems range from minor discomfort and pain to more serious illnesses requiring rest or medical treatment. In most chronic conditions, the result can be permanent disability and loss of work. Different risk factors often act in combination, including physical and biomechanical factors, organizational and psychosocial factors, and individual factors.

In 2021 European Agency for Safety and Health at Work proved the connection between MSDs a psychosocial risk factors, which prevail among health workers [8, 9].

Materials and methods: A documentary method was used. The study was conducted on the basis of a data of health analyzes for temporary incapacity for work - from hospital sheets for the period of 2 years – 2019 and 2020 from State Psychiatric Hospital-Tsarev Brod which have 221 workers for 2019 and 190 workers for 2020.

The distribution by age and by work experience show that the workers with work experience over 10 years and aged over 45 years are prevalence for both years. The distribution by position is as follows the most are nurses followed by medical orderlies, doctors, social workers, drivers, psychologist, occupational therapist and pharmacist.

Results and discussion: The results of the health analyses show that the frequency of MSDs is very big for both of years. The largest share of hospital sheets is with reason respiratory system and viral infections and after that are MSDs for both years. The duration of the hospital sheet from MSDs also is very long. For both years the duration of the hospital sheet is in the second place after oncologic diseases. The frequency with temporary incapacity for 2019 is 23.98 and for 2020 is 34.12. The table 1 shows the frequency of cases with

temporary incapacity, the number of labor loss days and the average duration of the hospital sheet for all hospital sheets for 2019 and 2020 (table 1). Table 2 shows the same but for MSDs (table 2).

Table 1. Results from health analyses for all hospital sheets for 2019 and 2020

	Frequency of cases with temporary incapacity	Labor Loss Days (Number of Days)	Average Duration
2019	37,1	528,51	14,24
2020	52,49	635,17	12,1

Table 2. Results from health analyses for hospital sheets with MSDs for 2019 and 2020

	Frequency of cases with temporary incapacity (MSD)	Labor Loss Days MSD (Number of Days)	Average Duration of MSD
2019	7,69	168,33	22,93
2020	9,97	185,2	10,35

The results of health analyses from temporary incapacity at work show the following:

- For 2019 year – 82 hospital sheets – 36 are with MSDs, the average length of the hospital sheet is 14,24 days, the average length of the hospital sheet from MSDs is 22,93 days;
- For 2020 year - 100 hospital sheets – 19 are with MSDs, the average length of the hospital sheet is 12,1 days, the average length of the hospital sheet from MSDs is 10,38 days;

The hospital sheets with MSDs for 2020 year are less than 2019 year but it makes strong impression that the hospital sheets with reason linked with respiratory’ system and viral infections are 63 which means that the percent of MSDs and for this year are very big. May be there are so many hospital sheets with infection diseases because then the COVID 19 pandemic broke out. In 2020 the average number of the employees is smaller compared to 2019 from which we can conclude that the share of MSDs is bigger than 2019.

Neck pain, shoulder pain, and lower back pain have been the most reported symptoms in our study. A number of studies from around the world confirm these disabilities as the most common [4,8,9]. MSDs can also result in workers needing a leave of absence from work, becoming unable to continue work, and presenteeism [4]. The results of our study fully confirm these data.

The everyday work in the State Psychiatric Hospital-Tsarev Brod is related with stressful work days and psychosocial risk factor have a big impact on the health of workers there. The COVID 19 pandemic added extra stress to everyone’s daily and work stress. The European Agency for Safety and Health at Work proved the relationship between psychosocial risk factor and MSDs [8, 9]. A number of previous studies have indicated that the occurrence of MSDs is frequently complex and affected by individual characteristics and physical and psychosocial risk factors [4]. The results of our research confirm this relationship.

Our results show very big share of hospital sheets with MSDs. Many other studies confirm our data. In Japan, work-related MSDs account for more than 62% of the causes of sick leaves longer than four days [7, 10]. Many studies have shown that the prevalence of MSDs in China remains high, including various environments and reaching over 85.7% in some industries [7].

Conclusions: It makes strong impression that the frequency of MSDs is the second after the diseases of respiratory system. The duration of the hospital sheet also is in second place - after the oncologic diseases. These facts once again confirm the connection between the psychosocial risk factors and MSDs. It is extremely necessary to take urgent prevent measures against MSDs at work among health workers.

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Concerning the genotoxic potential of pesticides applied in agriculture

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Abstract

Pesticides, which are widely used in the cultivation of agricultural crops, cause adverse effects on non-target organisms, including human health. These compounds are easily absorbed by different routes and due to their high stability they can be metabolized and stored in different organs. The *Allium* test enables the study of the mutagenic effect of pesticides, based on microscopic recording of chromosomal aberrations and mitotic disorders in onion root meristem cells.

Purpose: This investigation aims to evaluate the mutagenic effect of the pesticides Nuprid, Calypso, Chlorpyrifos, Aktara, Actellic, Rival, Verita and Raundup on the of *Allium cepa* L. root meristem cells as a model system.

Material and methods: The mutagenic effect of the pesticides has been investigated by the usage of anaphase and a micronucleus tests.

Results: Analysis of the data from the present study shows that the tested pesticides Nuprid, Calypso, Chlorpyrifos, Aktara, Actellic, Rival, Verita and Raundup have a pronounced genotoxic effect on the root meristem of *Allium cepa*, as evidenced by the significantly higher frequency of chromosomal aberrations, reported in the experimental variants compared to the control. A positive correlation was found between the concentration of the studied pesticides and the frequency of chromosomal disorders.

Conclusions: The presence of a large number of chromosomal aberrations and mitotic abnormalities found in the *Allium cepa* model system after treating with the studied pesticides is a clear evidence for their high genotoxic potential, for the significant risk of environmental pollution after their applying in the agriculture as well as for the human health.

Keywords: pesticides, genotoxicity, *Allium cepa* model system

Introduction

Pesticides are used to control pests in agriculture, but they could also adversely affect other organisms. A number of studies show that chronic exposure to low levels of pesticides could cause mutations and carcinogenicity in experimental plant and animal organisms. Globally, this has an influence on the increasing honey bee death rate, as well as on the biodiversity decrease in nature [1, 2, 3, 4, 5, 6, 7]. Pesticide toxicity is associated with the human health quality. A number of human diseases such as cancer, hypertension, neurodegenerative disorders and diabetes are considered in their possible connection with increasing usage of pesticides and other chemicals in the agriculture [8, 9]. In this sense, studies on the toxic potential of such substances are extremely important. One of the possibilities for studying the genotoxic effect of pesticides is the use of plants as test objects. They are recognized as excellent genetic models in the detection of mutagenic environmental agents and are often used for biomonitoring studies [10, 11]. In this investigation, the mutagenic effect of the pesticides Nuprid, Calypso, Chlorpyrifos, Aktara, Actellic, Rival, Verita and Raundup on the cells of the root meristem of *Allium cepa* L has been evaluate.

Materials and Methods

Solutions of the pesticides Nuprid, Calypso, Chlorpyrifos, Aktara, Actellic, Rival, Verita and Raundup have been prepared in different concentrations, the highest being the maximum permissible concentration (MPC),

according to the Regulation on environmental quality standards for Priority substances and some other pollutants [12].

The mutagenic effect of the pesticides has been investigated by the usage of the *Allium* test [13, 14] and a light microscope Leica DM2000 LED at magnification 400x. A digital camera Leica MC170 HD has been used for microphotography. Genotoxicity has been assessed by determining the frequency of chromosomal aberrations in *Allium cepa* meristem cells using an anaphase method and a micronucleus test.

Results

The present study ascertained of the tested pesticides Nuprid, Calypso, Chlorpyrifos, Aktara, Actellic, Rival, Verita and Raundup caused a variety of genetic abnormalities as: C-mitoses and chromosome bridges (Fig. 1), 'vagrant' chromosomes (Fig. 2), fragments, lagging chromosomes, diagonal anaphase, disturbed prophases and micronuclei were reported. The frequencies of observed anomalies in the experimental and control samples treated for 72 hours with the studied pesticides are presented in Table 1.

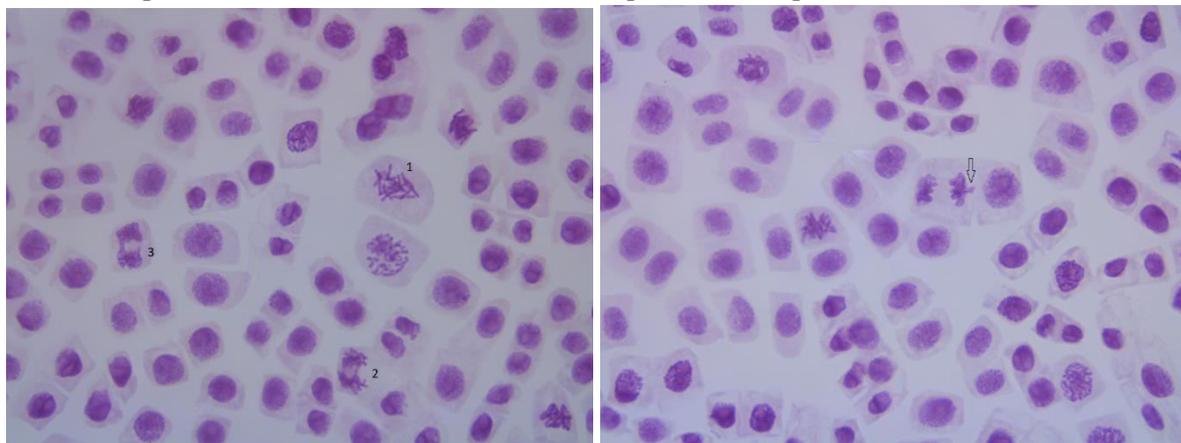


Figure 1. Different types of chromosomal aberration in cells of *Allium cepa*, treated with pesticides: C-mitoses (1), anaphase bridge (2) and telophase bridge (3), magnification 400x.

Figure 2. 'Vargant' chromosomes (with arrow) in cells of *Allium cepa*, treated with pesticides, magnification 400x.

Discussion

The analysis of the types and frequencies of disorders found in the course of cell division and in chromatin material structure allows interpretation of the mutagenic effects of the tested chemical compounds. The obtained results show a significant increase in the frequencies of chromosomal aberrations in the *Allium cepa* meristem cells (Table 1). All of the included in the study pesticides cause a higher frequency of aberrations than that observed in the control. A characteristic relationship between the type of aberrations that occurred and the different pesticides studied has established. Disorders related to the formation and function of the division spindle, are the most common type. A high percentage of cells with C-mitosis and 'vagrant' chromosomes are found at all tested pesticides. Cells with chromosomal bridges, fragments and disturbed prophases are also observed. A high incidence of cells with micronuclei is found too, which is the additional clear evidence for the genotoxic potential of the studied pesticides. A positive correlation is found between the percentage of chromosomal aberrations and the concentration of the tested pesticides.

Table 1. Frequencies of chromosome aberrations caused by the studied pesticides

Pesticide	Concentration (MPC)	Total frequency of chromosomal aberrations as % relative to the total number of cells (N)	Total frequency of chromosomal aberrations as % relative to the number of dividing cells (N')
Nuprid (imidacloprid), neonicotinoid insecticide	100 mg.l ⁻¹ imidacloprid	0.70	1.49
Calypso (thiacloprid), neonicotinoid insecticide	96 mg.l ⁻¹ thiacloprid	1.07	2.29
Chlorpyrifos, insecticide	0.1 μg.ml ⁻¹ chlorpyrifos	0.84	2.50
Aktara (thiamethoxam), insecticide	0.5 mg.l ⁻¹ thiamethoxam	1.83	2.54
Actellic, insecticide acaricide	60 μl.l ⁻¹ actellic	1.26	2.96
Rival, fungicide	80 μl.l ⁻¹ rival	1.32	2.94
Verita (fenamidone), fungicide	0.67 mg.l ⁻¹ fenamidone	0.97	2.24
Raundup (glyphosate), herbicide	0.072 g.l ⁻¹ glyphosate	0.61	1.33
Control	dH ₂ O	0.27	0.53

Conclusions

The direct toxic effect of the pesticides to the environment requires assessment of their long-term effects on the ecosystems. The presence of a large number of chromosomal aberrations and mitotic abnormalities in *Allium cepa* cells after treating with the pesticides Nuprid, Calypso, Chlorpyrifos, Aktara, Actellic, Rival, Verita and Raundup is a clear evidence for their high genotoxic potential and the significant risk of environmental pollution after their applying in the agriculture.

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Soft tissue mobilization after surgical treatment of "O'Donoghue's Triad"

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Abstract

Material and Methods: 70 patients were studied with "O'Donoghue's triad", with rupture ACL reconstructed by the BPTB method, with a rupture of the medial meniscus treated with a partial meniscectomy and with an injury to the MCL, treated conservatively, as 1 month before the operation the knee was immobilized. The studied 70 persons (62 men and 8 women) were divided into two groups: control group - 35 persons and experimental group - 35 persons, all of them are in the subacute postoperative period. Ten days of physiotherapy was administered. In the EG, soft tissue mobilization was additionally applied. **The aim of the study** to investigate the effectiveness of soft tissue mobilization on passive extension of the knee joint, in patients after surgical treatment of "O'Donoghue's Triad".

Results: It was found that: in 50% of the patients in EG there was a complete recovery of the passive extension of the damaged knee joint and no difference was noted between the healthy and damaged leg (in 47.4% in the CG); in 12.5% of the EG the difference was at least 5 degrees (in 21.2% in the CG); in 37.5% of the EG patients the difference in the passive extension of the joint was 10 degrees (in 15.8% in the CG). Differences of 15 degrees and more were not found in any of the patients from the EG (at 15.8% in CG).

Conclusions: Applied experimental physiotherapy including manual soft tissue mobilization is effective in restoring passive extension in patients after surgical treatment of "O'Donoghue's triad". The results show the higher efficiency of the experimental model of physiotherapy compared to applications of patients in the CG.

Key words: knee, the unhappy triad, the terrible triad, ACL, MCL, meniscus

Introduction:

The term "Unhappy triad" was coined by O'Donoghue, who described it as: MCL tear, medial meniscus injury, and ACL tear [1]. The treatment is surgical.

In the moderate-protective and minimally protective period in soft-tissue dysfunctions of the knee, good results are achieved with the manipulatory massage (Terrier massage). This method combines the effects of massage with the effect of passive movements and is mainly applied in the field of periarticular tissues with friction techniques on the principle of transversal massage [2].

Manipulating massage is a good way to reduce pain and improve physiological and transitive movements of the knee joint [3].

Material and Methods:

Organization of the study: The study was conducted in the period from 2013 to 2020 in the city of Sofia, in the Multispecialty Hospital for Active Treatment "Sveta Sofia", Military Medical Academy and in a physiotherapy office in the city of Bansko.

It was preceded by individual informed consent of the patients.

Study contingent. 70 patients with "O'Donoghue's triad" with total ACL rupture reconstructed by the Bone-Patellar Tendon-Bone method were studied, with a rupture of the medial meniscus treated with a partial meniscectomy and with an injury to the MCL, treated conservatively, as 1 month before the operation the knee was immobilized. The studied 70 persons (62 men and 8 women) were divided into two groups: control group (CG) - 35 persons and experimental group (EG) - 35 persons, all of them are in the subacute postoperative period.

The aim of the study to investigate the effectiveness of soft tissue mobilization on passive extension of the knee joint, in patients after surgical treatment of "O'Donoghue's Triad".

For this purpose, the mobility of the knee joint was tested, by assessing the condition and the changes of the passive extension of patients - before and after the ten-day manual-soft-tissue mobilization applied in the EG as an element of the physiotherapy program. In the CG, traditional physiotherapy was applied.

The tasks of the research are:

1. Conducting a functional study - goniometry of the passive extension of the knee joint, before and after applying 10 days of physiotherapy in CG and in EG. Establishing the state of passive extension of the damaged and healthy knee of patients before applying manual soft-tissue mobilization.

3. In CG, convectional physiotherapy is applied, and in EG, soft tissue mobilization of the knee joint is also applied.

4. Study of the intensity of the healing process in the control and experimental group.

5. Establishing the effectiveness of the applied manual-soft tissue mobilization of the damaged knee and statistical verification of the credibility of the scientific statements.

The empirical material was statistically processed.

Methodology of Physiotherapy

Manual-soft-tissue mobilizations by J.C.Terrier. Mobilizing soft tissue techniques according to J.C. Terrier are combined with passive movements along the physiological axes of the joint in the possible range of motion. The reflexogenic areas of the periarticular structures (insertions of muscles, tendons, ligaments) are mainly massaged. The damaged joint is mobilized in the direction of the physiological axis and the possible range of motion, combined with stretching and relaxation of the massaged soft tissue structures.

Each technique is performed for 1-2 minutes, the tempo being slow and rhythmic and gradually increasing. No more than 4-5 techniques selected from the total 11 are applied to each patient, depending on individual functional dysfunctions and pathologies. Soft tissue mobilization is applied with a total duration of 10 min. Apply every day

The massage line is short and the physiotherapist distinguishes the changes in the peri-articular tissues, thus adeptly doses the pressure upon impact. The massaging hand is next to the joint space, supporting the joint and assisting passive movements.

Contraindications for soft tissue mobilization: hypermobility of the joint, static joint instability, inflammatory reaction of the joint, unrestored joint stability after distortion or luxation.

From J.C.Terrier's methodology for manual soft tissue mobilization of the knee joint, 11 techniques are applied, which are tailored to the characteristic dysfunctions of the periarticular structures and disturbed arthrokinematics of the knee joint.

The choice of the types of manipulations is guided by the characteristic muscle imbalance; hypertonic and shortened - *m.rectus femoris*, *lig. patellae*, *retinaculae patellae*, *m.biceps femoris*, *m.semitandinosus*, *m.semimembranosus*, *m.gracilis*, *m.gastrocnemius*, on the other hand reflexly inhibited, hypotonic - *m.vastus medialis*, *m.vastus lateralis*. Cicatrix of *lig. patellae* due to donation for ACL transplant and growing fibrous tissue in this region.

Restriction of the dorsal joint capsule and its capsuloligamentous structures; *LCM*, *LCL*, *superficialis* and *profundus*, *m. popliteus*, *m. plantaris*.

The treatment region of group A is the ventral region of the knee. Subject of the massage: successively massage the lateral edges of the *lig. patellae* and the lateral edges of the tendon of *m.quadriceps femoris* and *retinaculae patellae*.

Group B techniques: Region of treatment is the ventral, medial and lateral regions of the knee. Subject of the massage are *lig. patellae*, *pes anserinus*, *lig. collaterale mediale*, *lig. collaterale laterale*, *m. adductor magnus*, *m. vastus medialis*, *m. biceps femoris*.

From the techniques of group C, are applied: treatment area: medial surface of the knee area: *m.semitandinosus*, *m.semimembranosus*, *m.gracilis*, *m.sartorius*, *m.adductor magnus*, *m.gastrocnemius caput mediale*; *LCL*, and the tendons of the *tractus iliotibialis*, *m.biceps femoris*.

From group E is applied. Area of treatment: dorsal area of the knee complex lateral to the popliteal and ischiocrural muscles: *m.biceps femoris*, *pes anserinus*, *superficialis* and *profundus*, *m.gastrocnemius caput mediale* and *caput laterale*, *m.popliteus*, *m.plantaris*

Basic starting position for manipulation of the knee joint: the patient is in the supine position. The couch is at the height of the therapist's knee, who stands next to it, on the side of the operated knee, and steps on it with the foot that is towards the distal part of the patient's lower limb. The patient's manipulated lower limb is flexed 90° in hip and knee, with the distal part of the lower leg resting on the therapist's thigh (above the knee joint). The patient's treated lower limb is completely relaxed and passive. Through movements in hip (abduction - adduction) of the therapist, the knee joint of the patient is brought into extension - flexion respectively.

Any soft tissue mobilization (manipulation) is combined with these movements, being performed from flexion to extension and vice versa - from extension to flexion. The rhythm is even, slow, and may gradually increase.

Results and analysis

To achieve the goal and tasks of our research, the collected empirical material from the first and second testing in the CG and EG, subjected to statistical processing. A variational analysis of the differences in passive extension (in degrees) of the healthy and conditioned leg before and after ten days of physiotherapy.

Changes in passive knee extension of patients with Donoghue's triad after physiotherapy. In order to analyze the results of the conducted study of the passive extension in the knee joint, the primary data were examined for the differences between the observed values of healthy and injured leg on the first and tenth day.

The results in the control group show that on the 1st day - before the course of physiotherapy, the difference in the passive extension of the knee of both legs varied from 0 to 20 degrees. 26.3% of the patients have equal values of the indicator; in 15.8% of CG patients, a difference of 5 degrees was found; in 26.3 % the difference was 10 degrees between the two knee joints; in a significant part of the examined persons (21.1%) the difference is 15 degrees; in 10,5 % a large difference of 20 degrees is found.

The nature of the distribution of the results in the CG, according to which a significant part of the patients are in a relatively good condition with regard to the studied indicator on the 1st day of the study. However, a significant range of variation in individual patient outcomes was found, as a consequence of the severity of knee joint damage after the triad.

It was established that the ten-day physiotherapy in the CG caused changes in the studied indicator causing an increase in the relative share of patients with fully restored passive extension.

The results in the experimental group on the 1st day show a distribution of the differences in the passive extension of the knee as follows: 25% of the patients have no difference in the indicator (0 degrees) in which the passive extension of the injured leg is restored; 31.3% of patients have a difference of 5 degrees; 31.3% the difference is 10 degrees; 6.3% of the cases in the experimental group on the first day had a healthy-injured leg difference of 15 degrees; 6.3% of patients had a 20-degree difference.

After ten days of physiotherapy according to the experimental methodology, the results show a significant improvement in the indicator. It was found that: - in 50% of the patients there was a complete recovery of the passive extension of the damaged knee joint and no difference was noted between the healthy and damaged leg; - in 12.5% of the experimental group the difference was at least 5 degrees (in 21.2% in the CG); - in 37.5% of the EG patients the difference in the passive extension of the joint was 10 degrees (in 15.8% in the CG). Differences of 15 degrees and more were not found in any of the patients from the EG (at 15.8% in CG).

Discussion

"O'Donoghue's triad" is considered a severe multiligamentous sports injury. It is also called the "unfortunate triad" because a large percentage of athletes do not return to the sport. Recovery from subsequent surgical treatment takes about a year [4].

Conclusion

Applied experimental physiotherapy methodology including Terrier manual soft tissue mobilization is effective in restoring passive extension in patients after surgical treatment of "O'Donoghue's triad". The

results show the higher efficiency of the experimental model of physiotherapy compared to applications of patients in the control group.

The high differences in the healing process of the studied patients show the individual intensity of their recovery, which necessitates a differentiated approach in the selection and application of physiotherapy means.

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Cognitive Avoidance and Fighting Spirit in Cancer Patients

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Abstract:

Contemporary treatment of cancer diseases includes even more convincingly the holistic care of patients. The holistic treatment depends on the manner that the patient accepts and adapts to the diagnosis. On this grounds the patient's attitude can show rejection, cooperation, understanding, desperation, apathy or obstruction to the therapy.

Purpose: The target of this study is to establish applied strategies in the process of cancer adaptability/perception.

Materials and Methods: We applied the questionnaire Mini Mental Adjustment to Cancer Scale (Mini-MAC), that identifies the patients' adaptability level to cancer. A total of 62 cancer patients were subject of this study – 28 male patients and 34 female patients treated with cytostatics or by radiotherapy.

Results: Results demonstrate that reorientation towards new aims and activities, as well as the perceptions of the "strong person" image are one of the distinctive behavioural models in patients diagnosed with cancer.

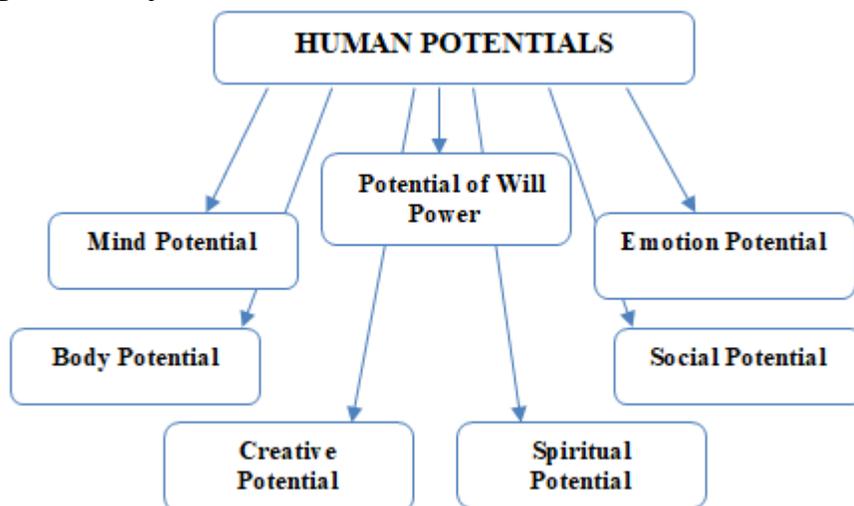
Conclusion: The results of the Mini-MAC serve as a starting point in the interpretation of the patient's personality strengths and weaknesses.

Key words: cancer patients, adaptability, „cognitive avoidance“, „fighting spirit“

Introduction

Psycho-oncologists who consult and participate in the therapy of cancer patients during their hospital treatment become increasingly active in the clinical oncology in Bulgaria. Conducting this study we focused on the question of the individual strategies for management of the emotional problems connected with cancer dynamics and its treatment. The results' analysis is based on interconnected potentials in man, which reflect the different aspects of somatic, spiritual and social health [3] (fig.1).

Fig. 1. Human potentials



The selection, application, and effectiveness of different coping strategies are related to both the objective characteristics of the stressor and the cognitive level of the stress experienced, as well as the assessment of the control exercised over it [6].

Barlow et al. [1] define self-management as a person's ability to manage the symptoms and consequences of living with a chronic illness, including treatment, physical, social and lifestyle changes. For chronic disease patients and cancer survivors, self-management is a "life sentence". Lorig and Holman [4] define the goal of self-management as maintaining health in psychological terms. To achieve the goal, the patient faces three tasks:

- Management of the medical aspects of the disease
- Managing life roles, including role changes brought about by illness
- Management of the psychological consequences of chronic illness

The complex and multidisciplinary approach is one of the most important modern principles set in the concept of personalized therapy and long-term care for patients with oncological diseases.

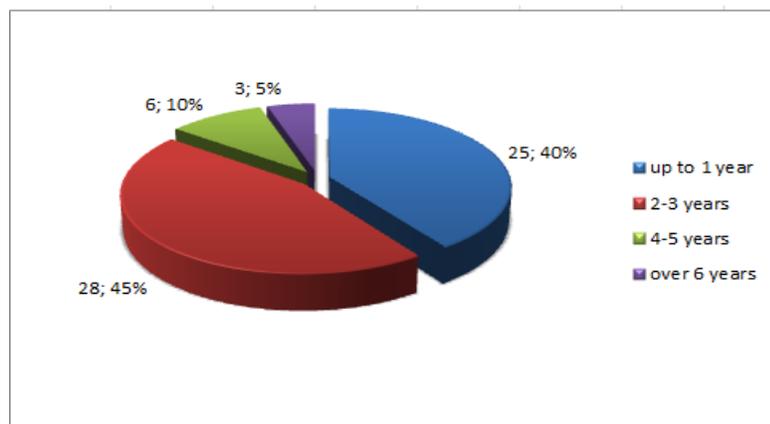
Materials and Methods

The target of this study is to establish the manifested levels of strategies for cancer adaptability and coping. We applied the questionnaire Mini Mental Adjustment to Cancer Scale (Mini-MAC), that identifies the patients' adaptability level to cancer [5]. It is composed of 29 items divided into five scales: helplessness, anxious preoccupation, fighting spirit, cognitive avoidance and fatalism. Cronbach's alpha - от 0.56 до 0.74. The results into scales „cognitive aviodance“ and „fighting spirit“ were analyzed. A total of 62 cancer patients were subject of this study – 28 male patients and 34 female patients treated with cytostatics or by radiotherapy. The StatGraf program was used for statistical processing. The principles of confidentiality, volunteering and objectivity were strictly complied with.

Results

Patients have been diagnosed with malignant disease and are being adequately treated. Figure 2 demonstrates the length of the disease. The patients whose disease has been diagnosed before one and two years are 53(83%) total.

Fig.2. Distribution of the results as per indicator duration of the disease



Each of both scales „cognitive avoidance“ and „fighting spirit“ comprises four questions from Mini-MAC. Table 1 and Table 2 demonstrate how the results are distributed in the five levels of every indicator.

Table 1. Distribution of the results as per indicator „cognitive aviodance“

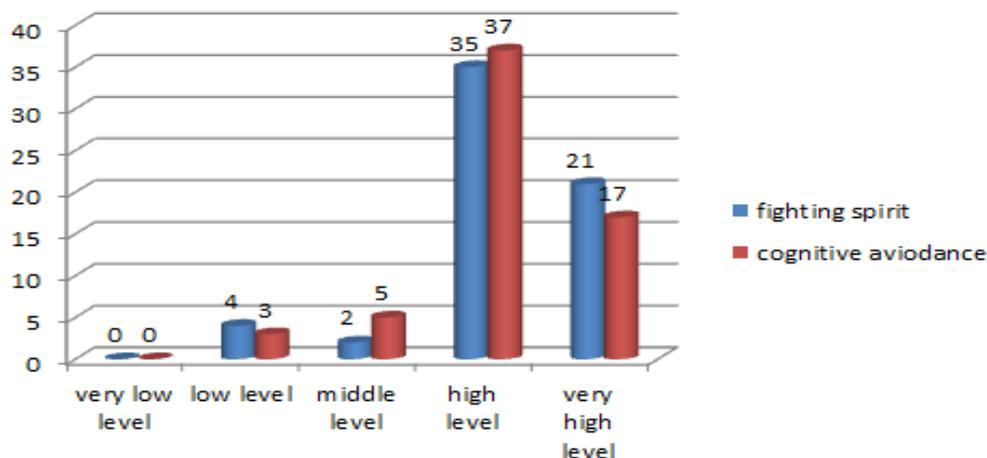
Class	Value	Frequency	Relative Frequency	Cumulative Frequency	Cum. Rel. Frequency
1	2	3	0,0484	3	0,0484
2	3	5	0,0806	8	0,1290
3	4	37	0,5968	45	0,7258
4	5	17	0,2742	62	1,0000

Table 2. Distribution of the results as per indicator „fighting spirit“

Class	Value	Frequency	Relative Frequency	Cumulative Frequency	Cum. Rel. Frequency
1	2	4	0,0645	4	0,0645
2	3	2	0,0323	6	0,0968
3	4	35	0,5645	41	0,6613
4	5	21	0,3387	62	1,0000

Figure 3 compares the resulting levels of the scales „cognitive aviodance“ and „fighting spirit“. Both groups demonstrate high values in the right – to high and very high level.

Fig. 3. Levels' comparison of the raw results for both indicators



Discussion

Each of both scales „cognitive aviodance“ and „fighting spirit“ comprises four questions from Mini-MAC. The patients with high results for „cognitive aviodance“ are 37 (60%), while these with extremely high results are 17 (27%). Total of 54 patients (87%) make serious efforts not to think about the disease thus managing to cope; they find distraction with different issues when the negative thoughts attack. High results in compliance with the scale „fighting spirit“ demonstrate 35 patients (56%), and very high results – 21 (34%). Total for this scale – 56 patients (90%).

Between both scales was found positive correlation $r=0.39$, $p=0.002$. The patients treated for a shorter time showed stronger orientation to cognitive avoidance, compared to the patients undergoing longer treatment (chemotherapy and radiotherapy) ($r=0.34$, $p=0.003$).

The cognitive avoidance and fighting spirit can be considered as protective mechanisms that allows the patient to escape deliberately the traumatizing thoughts connected with the disease. In women the coping strategy “cognitive avoidance” is monitored more frequently compared to men.

Conclusion

The cognitive avoidance and fighting spirit are studied as adaptive social-psychological mechanisms that are typical for persons with healthy psychic. And in the meantime as protective mechanisms used selectively by the patients to deviate traumatic thoughts imminent to the disease. Using this inter-psychic mechanism is avoided the psychic content corresponding to the fears, anxiety, distress, social status loss and deprivation [2].

High levels for the scale “fighting spirit” are connected also with culture and inter-generations messages as “be strong”, “keep on managing” and “be courageous”. In the meantime are suppressed the vulnerability, dependence, weakness and helplessness that are found during the psycho-therapeutic process.

The long-term treatment and monitoring continuum is a useful paradigm for planning and testing interventions that improve clinical outcomes and improve patient quality of life.

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Saturnism as a medical term – origin, etymology and early definition

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Abstract:

An intriguing group of medical terms is named after deities and mythological personages. Such a term is *saturnism*, known as lead intoxication. The present study attempts to answer the questions – was lead poisoning known in Antiquity, and when was the term *saturnism* applied as a medical diagnosis. In order to answer these questions the article offers citations from selected ancient sources, referring to the usage of lead-based products, acknowledgement of the lead poisoning, and use of the term as a medical diagnosis.

Key words:

Saturnism, lead poisoning, eponyms, medical terminology

Background:

Saturnism is known as lead poisoning. It causes a variety of symptoms. Once lead enters the body, it is distributed to organs such as the brain, kidneys, liver and bones. According to the World health organization there is no safe blood lead concentration. The neurological and behavioural effects are believed to be irreversible. Even the lowest levels may result in decreased intellectual abilities and educational difficulties.

Lead appeared in few features in antiquity. The sources of the metal were extracted from the primary galena ore – lead sulfide (PbS) which was called *plumbum*, and lead oxide – *litharguros* or *spuma argenti* (PbO). They also appeared as a secondary cerussite – lead carbonite (PbCO₃) and anglesite – lead sulphate (PbSO₄), called *cerussa*, and the red coloured lead tetroxide - *minium* (Pb₃O₄). Tony Waldron states that “*Romans used lead on a massive scale and on a per capita basis probably as much as modern Americans*” [1]. Lead and litharge (literally “silver stone”) were used for water installations. Workers, called *plumbarii* were fabricating water pipes from the smelted lead ores. Lead compounds were widely used in medicines and cosmetics. As an ingredient for medical preparations it was mentioned by both Dioscorides and Pliny the Elder in 1st century AD. In his *Materia Medica* Dioscorides states that it acts as an astringent and causes adherence. “*It has properties that are astringent, emollient, that cool, that are capable of stopping the pores, of filling up hollows, of controlling fleshy excrescences, and of healing*”. A single sentence in the next chapter warns that “*it is also one of the poisonous substances*” [2]. In *Naturalis Historiae* Pliny also talks about *scoria*, pointing similar effects and qualities.

As other contemporary authors, Lloyd Tepper also states that lead acetate “*was widely added to wine to improve its perceived quality*” [3] – due to its sweet taste it “improved” the taste of the wine, and being an enzyme inhibitor worked for its adulteration, slowing the process of wine turning into vinegar. If we turn to the ancient sources, the use of lead acetate as a separate ingredient seems less probable. Many ancient authors give directions for the preparation of *sapa* – Romans’ favourite syrup. *Defrutum* or *sapa* was a thick grape syrup, widely used as a sweetener and preservative for wine and other dishes. It was made by prolonged boiling and stirring of a grape juice - *mustum* (must), until it reduces to one half (*defrutum*) or one third (*sapa*) of its volume. Most of the authors namely recommend lead vessels for its preparation. Among the main sources we cannot find any instructions for adding lead subtracts as a particular ingredient.

As mentioned above Collumela, Pliny, and Cato agree that the must should be boiled in lead vessels. In all probability the lead acetate soaked into the must as a result of the reaction with the acetic acid. We can presume that its use as a separate ingredient was practiced later.

Review results:

The effects on health were certainly known in ancient times. On this matter a number of authors begin with the statement that Hippocrates was first to describe lead poisoning. This statement, however, is typically left with no reference to the original source whatsoever. As Tony Waldron [4] says, the assumption that Hippocrates was “*the father of lead poisoning*” lies namely on the fact that the described case is of a man from the mines. The original source gives no clue what kind of mine [5]. Something more – this is only one of many cases. Book IV of Epidemics, where we can find the occurrence in question, is a collection of similar cases, especially bilious patients with pale, chlorotic appearance. Naming the occupation of the patient is rather rare. What we can be certain about is that there is no conclusion, and lead or lead poisoning is not mentioned in the text. Regarding the question who was the first to describe lead poisoning, we can be more certain that was Nicander of Colophon (2nd century BC). In his didactic poem *Alexipharmaca* he describes poisons, their antidotes, and treating intoxications. He clearly describes the symptoms of lead poisoning, noting the typical gray lines on gums, the devastations on the central nervous system and the brain, and the fatigue - specific manifestation of the anemic syndrome. He mentions severe abdominal pain, ischuria, edema of the limbs, leaden color of the skin [6].

The Roman architect and engineer Marcus Vitruvius Pollio leaves no doubt that he was aware of lead poisoning. He noted the pale appearance of the workers’ bodies, and the better taste of the water, transferred through earthen pipes [7]. Few centuries later the Greek physician Galen also warns that water derived from lead tubes must be avoided, because it causes intestinal disorders: “*ea, quae per plumbeos canales derivatur, fugienda erit.*”[8]

As we see, ancient Romans were aware of the dangers; lead poisoning was recognized, but at that time there was no diagnosis in the modern connotation of the word, moreover there was nothing to link Saturn with it and to answer our question why his name was employed for the intoxication. The cult of Saturn is one of the oldest in Roman religion. Saying that Saturn was god of agriculture, of abundance, wealth, time and renewal, may give us a superficial and insufficient understanding of the many features and functions of this deity. His figure is one of the most complex in Roman religion. Saturn’s cult is authentically Roman, however later the Greek god Kronos was adapted and associated with him. In our attempt to understand the relation between the lead, lead poisoning and the figure of Saturn, we must pay attention to the major religious festival *Saturnalia*. It was celebrated from December 17-23, during the winter solstice. It was a time when the cosmic order turned over – the end of the chaos and darkness, and the beginning of the order and light. It was a time celebrated with parties and gift-giving. One may associate it with madness. We owe to note the suggestion that the term may be associated with the encephalopathy, and thus related in a way with the madness of *Saturnalia*, however such a suggestion is less probable. The usual explanation of the term is that the graphical symbol, used in astronomy and astrology to represent the planet Saturn, was also used in alchemy to represent the metal. Romans recognized seven planets along with the Sun and the Moon. In the 1st century BC Cicero associates the planet with the deity “*For planet called Saturn's... which is the farthest away from the earth...* Still, during the Antiquity there was no relation between the god, nor the planet or the metal. The first written evidence on such a relation appears much later. One of the greatest astrologers and an influential authority in Medieval Europe was Abu Ma’shar al Bakhi (787-886 AD). In

the 1489 Ausburg edition of his astrology manual we can see the depiction of the planet as a man with covered head, holding a scythe – manifestation typical for the god. Next to his figure we see the sign, used in Alchemy for both - the planet and the lead [9]. The Medieval European science was strongly influenced by alchemy. The seven known planets were associated with metals and alchemists called the metals by their planetary names. The exact correlations varied over time, however, the gold, silver and lead had been always associated with the Sun, Moon and Saturn. Used as a kind of cryptic language in the beginning, in 17th century the alchemical names and symbols were employed in the official science. In 1675 the French chemist Nicolas Lemery published his *Cours de chymie* with the “*privilege du Roy*”. There he talks about *salt* and *spirits of Saturn*, *salt of Jupiter*, *crystals of Venus*, etc. Another textbook from 1677 – *The compleat chymist*, written in French by Cristopher Gaser, and translated in English, has an entire chapter called “*Lead or Saturn*” where he also describes *salt* and *sugar of Saturn*. The aetiology of the disease was fully acknowledged in 17th century, and the diagnosis *saturnism* was applied for the first time at the end of 17th or the beginning of the 18th century. This period was still strongly influenced by the alchemy and alchemical symbols were used to denote the elements. During the Renaissance there was an interest in metals [10]. By that time the intoxication was acknowledged. The Saxon physician Georgius Bauer in “*De re metallica*” (1556) studied the health problems among the miners [11]. In 1656 the German physician Samuel Stockhausen advised the miners to avoid the fumes of litharge [11]. In 1700 in his “*De morbis artificum diatriba*” Bernardo Ramazzini (1633-1714) identified all lead processing techniques as dangerous. About the potters working with lead he stated that “*they suffer from palsied hands, abdominal colic, fatigue, cachexia, and lose their teeth...*” [12] The use of wine preservatives derived from *sapa* persisted until the 17th century and it was the cause of poisoning occurrences in Europe. An epidemic of so called *colica Pictonum*, was described by Francis Citois (1572-1652) in 1639 [13]. It is named after the French region of Poitou. Some decades later in the city of Ulm – the largest wine-trading centre in Germany there was an epidemic of the same *colica Pictonum* [13]. Despite that the cause of *colica Pictonum* was identified, the so called *Devonshire colic* occurred much later and lasted for many years before eventually being recognized as lead poisoning by Sir Baker in 1767 [14].

Most modern sources agree that the first to describe the symptoms and manifestations of lead poisoning, and use the name “*saturnism*” was Louis Tanquerel des Planches (1810-62) in his *Traite des Maladies de Plomb ou Saturnine* in 1839 [3]. Over a period of 8 years he recorded his observations on 1200 patients with lead poisoning and summarized the details. Tanquerel des Planches also introduced the term “*encephalopathie saturnine*”. In 19th century his observations were confirmed, and at the beginning of the 20th century were identified and described the effects on pregnancy and kidney failure.

Conclusion:

The people in Antiquity, or at least a limited group of well educated people, were aware of the danger. The written evidence clearly shows that there was no diagnosis at that time, even more – during the Antiquity there was no relation between lead and the name of Saturn whatsoever. It appears that the usage of many mythological eponyms began sometime between the Late Middle Ages and the period of the Enlightenment – an epoch with fluctuant and not very definite borders, known as the Renaissance. Although we can find some mythonyms in ancient texts, the Renaissance is the time when the foundation of contemporary medical terminology was laid, and our sources prove that the *saturnism* is not an exemption.

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Application of Biomedical Technologies – Challenges and Solutions

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Abstract:

Purpose: The purpose of the scientific research is to analyze the main ethical and legal problems and challenges that arise in connection with the application of modern biomedical technologies in healthcare.

Materials and methods: The authors systematically and comprehensively research and analyze international studies in which ethical and legal issues have been discussed in connection with application of biotechnology in healthcare from the PubMed, Scopus, Google Scholar and Science Direct databases, using the following keywords: biomedical technologies, opportunities, systematic review, ethical and legal aspects, healthcare.

Results: As a result of the research conducted and the analysis of scientific data, the following examples of the application of biotechnology in health care were established: in genetic engineering, in which many therapeutic products are developed through recombinant DNA technologies, including vaccines, monoclonal antibodies, antibiotics, human proteins, new drugs with significantly reduced toxicity, etc.; in genetic studies, which can be used to confirm a clinical diagnosis and to detect genetic diseases and mutations, mainly applied in prenatal diagnosis; in gene therapy, in which permanent benefits to human health are provided by modifying a person's genes for therapeutic use; in regenerative and reproductive medicine, as well as in the biopharmaceutical industry.

Conclusion: For the purposes of guarantee to the highest degree the fundamental rights of patients, doctors, medical and health professionals it is necessary all challenges from an ethical and legal aspect, accompanying the application of biomedical technologies in modern medicine, should find adequate and effective solutions.

Keywords: biomedical technology, healthcare, ethical and legal aspects

Introduction

The revolutionary progress that humanity has achieved in recent decades with the implementation of biomedical technologies has led to a number of positive changes in the treatment, prevention and diagnosis of various types of diseases. In addition to providing the stated benefits to society, the use of biomedical technologies also raises a number of important ethical and legal issues that should be resolved in order to guarantee the fundamental rights of citizens. Modern medical biotechnology, with its included independent scientific directions, such as cell and gene therapy, regenerative medicine, DNA profiling and others, successfully use innovative biotechnologies in conducting medical activities. Biotechnologies in medicine are increasingly used in the pharmaceutical industry, being implemented in the development of new medicinal products. Undoubtedly, the application of biomedical technologies is a step forward in the development of humanity, which contributes to the provision of good health and increases the quality of health care for the population. However, in the application of this type of technology, adequate guarantees should be introduced to comply with the decades-established ethical and legal principles and norms for the protection of the rights of patients, doctors, medical and health professionals.

Material and Methods

The authors systematically and comprehensively research and analyze international studies in which ethical and legal issues have been discussed in connection with application of biotechnology in healthcare from the PubMed, Scopus, Google Scholar and Science Direct databases, using the following keywords: biomedical technologies, opportunities, systematic review, ethical and legal aspects, healthcare.

Results

As a result of the conducted research and analysis of the scientific literary sources, the following examples of the application of biotechnology in health care were established:

Genetic engineering: using recombinant DNA technologies, many therapeutic products are being developed, including vaccines, monoclonal antibodies, antibiotics, human proteins, new drugs with significantly reduced toxicity, etc. [13].

Genetic testing: can be used to confirm clinical diagnosis and to detect genetic diseases and mutations, applied mostly in prenatal diagnosis [3,10].

Gene therapy: modifying a person's genes for therapeutic use, providing lasting benefits to human health justifies the high costs of introducing them as part of personalized disease treatment [3,12].

Regenerative medicine: production of living, functional tissues for the purpose of restoring tissues or organs that have lost their functions. Biomedical approaches may include the use of stem cells, antibody therapy, tissue engineering, biomechanical prostheses, and more. which restore normal human health [11,17].

Reproductive medicine: biomedical interventions involving the manipulation of ova or sperm to achieve pregnancy in the treatment of infertility. They include classic in vitro fertilization (In Vitro Fertilization - IVF), in vitro maturation (In vitro maturation - IVM), fertilization by injection of single sperm (Intracytoplasmic sperm injection - ICSI), co-cultivation, assisted hatching (hatching), transfer of embryos (embryo transfer - ET), placement of gametes and zygotes in the Fallopian tubes transabdominally under laparoscopic or transcervical under ultrasound control (zygote intrafallopian transfer - ZIFT, gamete intrafallopian transfer - GIFT) donation of sperm and eggs, surrogate motherhood, artificial insemination, cryopreservation [1,18].

Biopharmaceutical industry: Biotechnologies have a key role in the creation of new and qualitative changes of medicinal products already available in practice [5,6].

Discussion

The main questions that arise in the application of biomedical technologies in health care are:

In an ethical aspect:

- the most frequently discussed issues are about genetic engineering, transplantation of organs and cells for therapeutic purposes, as well as the research and application of human embryonic stem cells and their cloning [2,3,4,12,15,16].
- a key issue is the determination of the permissible limits of interference in the natural processes of human development, the modification of the human genome, the use of scientific and technical progress for the artificial creation of human life, etc. [2,3,4,12,15,16].
- special emphasis is also placed on confidentiality, informed consent, safety, dignity, rights, well-being and confidentiality of patient [2,3,4,12,15,16].

In a legal aspect:

- issues regarding the realization of the legal (civil/criminal) responsibility of the entities that participate in the processes of creation, maintenance and application of the new biomedical technologies are of great importance [10].

- in the application of biomedical technologies huge amounts of personal data sets are processed and analyzed, which is why higher guarantees for their protection should be provided [7, 14, 16].
- legal questions arise regarding the application of genetic engineering and reproductive medicine, where there is a risk of affecting human dignity and a number of basic human rights, example: in the use of stem cells, which are related to determining the legal status of the embryo, etc. [8,15].

Recommendations

The identified challenges in the application of biomedical technologies require improvement and adaptation of established ethical and legal rules. In this sense, the following recommendations can be made:

1. Improvement of the established legal framework at the international, European and national level and, if necessary, adoption of new legal norms, which sets the application of biomedical technologies.
2. Regulation of explicit legal guarantees to protect the fundamental rights of citizens in the implementation of biomedical technologies.
3. Regulation of a clear legal framework regarding the legal responsibility of the entities that participate in the processes of creation, implementation and application of new biotechnologies.
4. Improvement of the established legal framework regarding the conduct of experimental research and, if necessary, creation of new legal regulation.
5. Improvement of the established ethical standards and principles, and if necessary - adoption of new ones, according to the specifics of modern trends in medicine.
6. Establishment of specialized bodies for the analysis and assessment of emerging medical scientific achievements and technologies in the context of their potential consequences for people's lives and health.
7. Establishment of specialized jurisdictions to control entities involved in the process of creation and application of new and existing biomedical technologies.

Conclusions

The application of biomedical technologies is a step forward in the development of humanity, which contributes to providing better medical assistance and patient care. Biomedical technologies provide new products, processes or services that improve the quality and accessibility of healthcare. It is obvious that the progress of science is outpacing the ethical and legal regulation of new biotechnologies [9]. All challenges from an ethical and legal aspect, accompanying the application of biomedical technologies in modern medicine, must find adequate and effective solutions in order to guarantee to the highest degree the basic rights of all subjects in the field of health care.

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Dynamics in Motivational Orientation and Professional Values in Medical Professional

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Abstract:

The material contains information about relationships between motivational orientations and professional values revealed by analyzing the age dynamics in 89 medical employees. The study has been done in a non-pandemic situation; thus, the results are not compromised by exceptional factors' influences in the hospital environment.

Purpose. Materials and Methods: The goal is to ascertain the specificity and dynamics in manifestation of professional and ethic characteristics and motivational typology in different age groups of medical employees. The Methodology WIS/SVP – a Scale for Appraising Professional Values (63 statements) and TOM (Test for Motivational orientation) were used for 89 medical doctors and healthcare professionals (nurses and midwives).

Results. Conclusion: The observed psychometric personality's characteristics describe/trace some specificities in the presented professional values in the different age groups. The motivational profiles are also characterized by age varieties. The results are a base for drawing practice-orientated conclusions.

Key words: motivational orientation, professional values, medical professionals

Introduction

In our country the scientific publication activity is more significant when related to the research of patients' satisfaction from received medical services, conditions, and organization of hospital care. Relatively few are the scientific studies aimed for the medical staff in the hospital units. Personality has a significant effect on organizational behavior by influencing organizational tolerance, work environment, and work ethics [1]. Personality is an important topic that should be considered by management as they strive to improving motivation of workers and optimising organisational behaviour at the workplace. Perceptions and values of care professionals are critical in successfully implementing technology in health care [2].

Materials and Methods

The Methodology WIS/SVP – a Scale for Appraising Professional Values (63 statements) [3] and TOM (Test for Motivational orientation) [4] were used for 89 medical doctors and healthcare professionals (nurses and midwives) working in Obstetrics and Gynecology clinics, Clinic of Surgical Oncology, Chemotherapy, Pathology and two Units for Intensive Care at the University Hospital of Pleven. Demographic indicators used in the comments are: age group, education, clinical unit. SPSS is used for statistical processing.

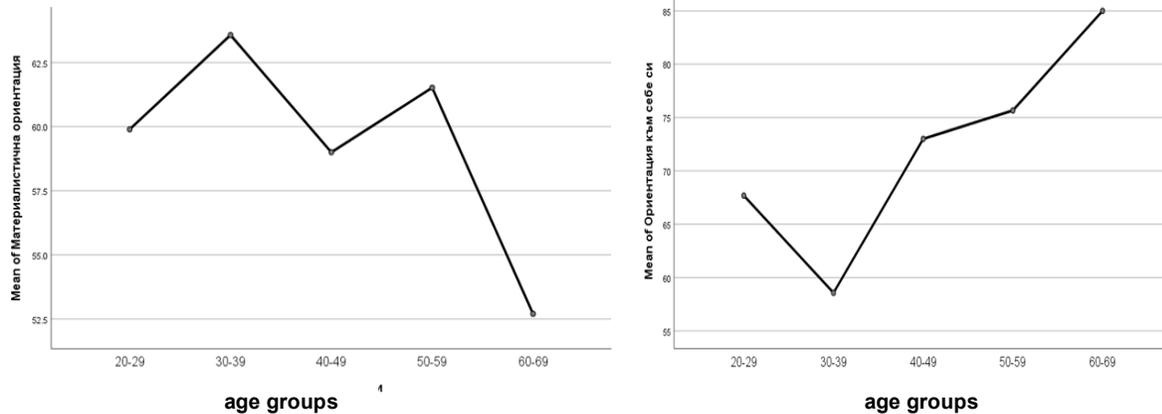
In the Methodology WIS five value profiles are differentiated: MATER (materialistic), SELFO (self-orientated), OTHER (others-orientated), INDEP (independence-orientated) and CHALL (challenges-orientated). In TOM-methodology are created four types of basic motivational orientations: toward achievements, innovations, leadership and relationships.

Results

The interviewed people according to their professional status have been separated into two groups (Two groups were established according the interviewed people' professional status) – medical doctors - 37 (42%) and healthcare professionals – 52 (58%). 1 % of them have a secondary specialized education, 11 (12%) have a secondary education/college, 24 (27%) have a bachelor's degree, a master's degree - 43 (48%), with a second master's degree are 3 (4%). With a scientific degree are 7 individuals (8%).

Materialistic orientation (WIS) have people from the age group of 30-39 and after them come the 50-59 years old (fig.1). The less materialistic orientated are the aged 60-69 who, at the end of their professional career, as expected, have satisfied this need.

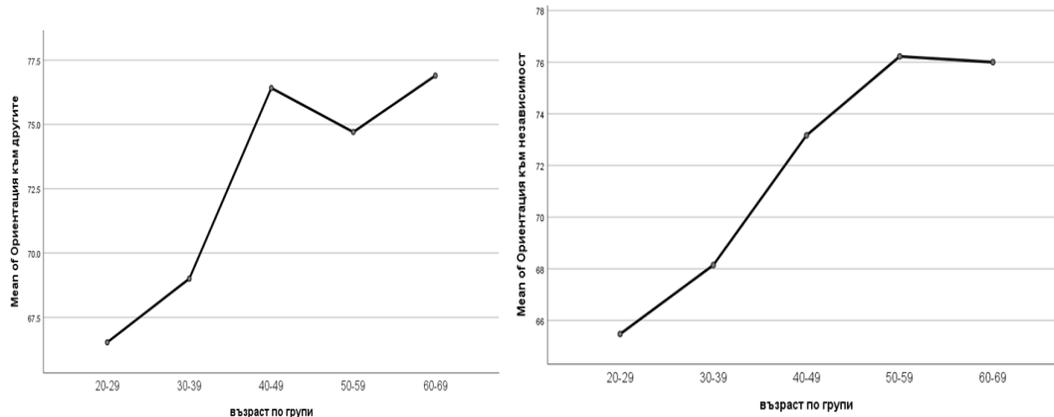
Fig.1. MATER results–distribution by age groups **Fig.2. SELFO–distribution by age groups**



From the Figure 2 we can assume that the most self-orientated people from the age group 60-69, after them come the aged 50-59. The least self-orientated are those from the age group 30-39.

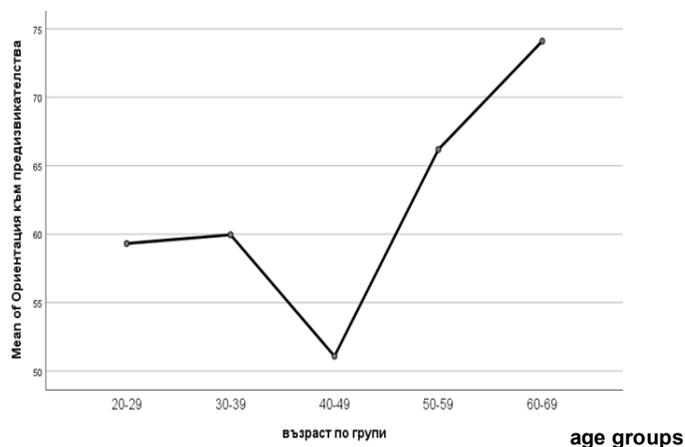
Orientation towards others (OTHER) is registered in high levels in the aged 60-69 and 40-49 (fig.3). The least orientated towards social interactions are the people aged 20-29.

Fig.3. OTHER results–distribution by age groups **Fig.4. INDEPINDEPENDENCE–distribution by age**



The age dynamic of “orientation towards independence” shows a tendency in the interviewed medical employees’ system of values – with the increasing age are increasing the self-dependence and independence of the person and circumstances. The age dynamics according to the indicator “orientation towards challenges” is quite interesting – the aged 40-49 have the lowest results but the highest are in the age group of 60-69.

Fig.5. CHALL results – distribution by age groups



The average levels of expression dominate, and the score “orientation towards relationships” is an exception because of its inclination to the higher values. The age dynamics by motivational types shows that the age group of 40-49 are medium to highly orientated towards making achievements, after them comes the age group of 60 and above. Strongly orientated towards innovations are the medical employees after their 50s and this tendency is kept in the next age group. The people from the age group of 30-39 are the least orientated towards introducing and using innovation in their work (under the average score of 45 points). The medical employees in their 50-59 age range expressly show their leadership qualities and are motivationally orientated towards leadership positions. We can assume that it is related to the acquirement of a higher educational qualification – it is valid for a significant number of interviewed people (master’s degree – 43 people/48%).

Fig.6. Orientations to leadership

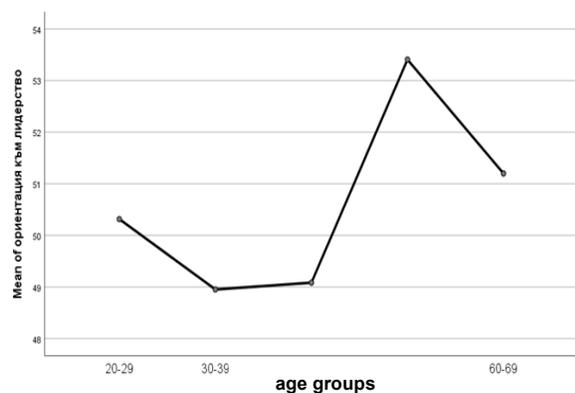


Fig.7. Orientations to toward achievements

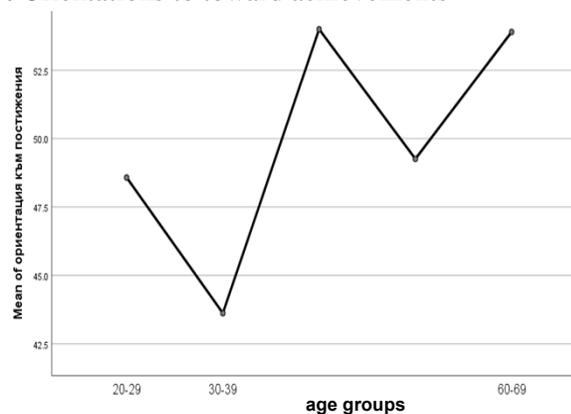


Fig.8. Orientations to innovations

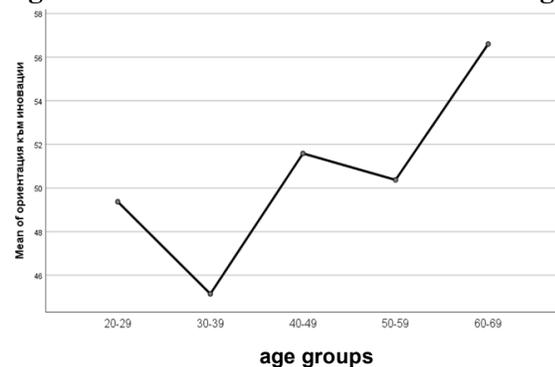
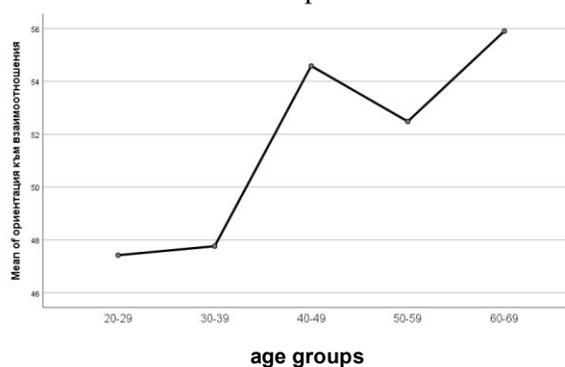


Fig.9. Orientations to relationships



The results of the WIS methodology are illustrated by figures 6 to 9. The dynamics of value types according to age groups are presented.

Discussion

Being orientated towards high efficiency at work the individuals aged 40-49 are less oriented to establishing an authority through positions of power unlike the aged 50-59 and 60-69 – for them the main value is orientation towards leadership (TOM).

The medical employees aged 50-59 significantly show the value “autonomy” and to be followed by the aged 30-39. After the 59th year this characteristic is decreasing because of the individual’s personal development and success.

The healthcare specialists from the age group 40-49 start to implement at work their own abilities in more fulfilling mode than aged 30-39. They are significantly orientated towards the achievement of results; orientation towards authority and autonomy are presented in a minimal extent; they adopt the personal development as an important value.

Orientated towards relationships are the interviewed individuals from the age group of 40-49 and 60 and above.

One-way Analysis of Variance (ANOVA) shows a statistical difference by age on categories “creative type” (WIS) and “orientation towards relationship” (TOM). The data in the table are presented in raw scores.

Conclusion

There exists a difference by the indicated criteria between the results from instruments TOM and WIS in the different age groups. The young medical employees who have just started their professional way are less dialogical and less orientated towards coactivity. Significantly orientated towards the work and its efficiency are the aged 40-49. The aged 30-39 do not only prioritize material security; they do not demonstrate results higher than average by the remaining criteria; rather, they correspond to the profile of people in a professional crisis. Thus a future object of analyses and a realization of trainings in a work environment are the medical employees from the age group of 20-39.

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Monitoring of motor and respiratory functions in patients with DMD with and without corticosteroid treatment and kinesitherapy

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Abstract

Duchenne muscular dystrophy (DMD) is a rare neuromuscular disease caused by mutations in the DMD gene. DMD is a progressive disorder, affecting skeletal muscles, respiratory and cardiac muscles leading to loss of ambulation, respiratory failure and eventually early mortality.

Material and methods: Eight subjects were recruited from a single centre and divided equally into 2 groups. Group-I (control) was treated with kinesitherapy (KT) and Group-II (experimental) was treated with KT and CS (corticosteroids). The effects of interventions were measured using 6minute walk test (6MWT) and the Brooke upper extremity scale. Respiratory function were assessed by forced vital capacity (FVC).

Results: Group-II (experimental) performed better when compared to Group-I (control) in all matrix – upper 100% and lower limb 100% functions and respiratory functions (100%) for the duration of the study.

Discussion: Our findings to show that KT alone has short-term and temporary effect on the natural course of DMD, while the timely combination of KT and CS is more potent in slowing down the disorder, preserving the muscle strength and gait, thus delaying the development of secondary complications.

Key words:

Duchenne muscular dystrophy, motor and respiratory functions, kinesitherapy and corticosteroids

Introduction

Duchenne muscular dystrophy (DMD) is a rare, X-linked recessive neuromuscular disease onset during childhood. DMD affects 1:3600-6000 live birth boys. The disorder is caused by mutations in the gene, encoding the protein dystrophin [1]. The lack of the cytoskeletal protein dystrophin leads to the membrane instability, degeneration and necrosis of muscle fibres [2]. DMD is a multisystem progressive disorder affecting skeletal, respiratory and cardiac muscles [3]. Clinically it is manifested by delayed motor development, clumsy gait, difficulty running, climbing stairs and a positive Gower's sign before the age of 3 years. Involvement of the pretibial musculature and the development of severe contractures in the ankle joints and Achilles tendons occur between the ages of 6 and 12 years[4]. Independant ambulation is lost before the age of 13 years[5]. The involvement of paraspinal and respiratory muscles accelerate the development of clinically significant kyphoscoliosis and restrictive type respiratory disorders, observed after the loss of ambulation. Cumulatively, the loss of mobility and respiratory function together with cardiac involvement later in the disease course lead to progressive poor quality of life and early mortality [6].

The treatment options for DMD encompass kinesitherapy and pharmacologic agents. These therapeutic approaches are designed to improve clinical symptoms, slow down the progression of the disease, and increase patients' life expectancy [3, 7, 8].

Currently there is no research that compares and evaluates the therapeutic effect of KT and CS. Therefore, this study aims to evaluate and compare the therapeutic effects of KT and CS on motor and respiratory function in subjects with DMD.

Material and methods

We conducted a single centre, prospective study. The inclusion criteria included: genetically confirmed diagnosis of DMD, age between 5-15 years and delay in motor development or muscle weakness. Eight subjects were recruited and divided equally into two groups. Group-I (control) was treated with Kinesitherapy (KT) and Group-II (experimental) was treated with both and CS. Treatment with KT was initiated upon diagnosis, three sessions per week with each session lasting 40 minutes. CS (Prednisolone/Deflazacort) treatment in dosage 0.75 mg/kg/day for Prednisolone or 0.9 mg/kg/day for Deflazacort was initiated in Group-II. The subjects were followed up for a period of 2.6 to 3 years, monitoring motor functions with 6MWT, The Brooke upper extremity scale (score 1- normal to 6 - lost of useful function) and respiratory function as measured as measured by FVC.

Results

	Group-I: Treatment with kinesitherapy (Control)				Group-II: Treatment with kinesitherapy and corticosteroid (Experimental)			
Subjects	DI, 12y	GN,14.6y	LP, 8.4y	NA, 9.5y	NY, 13y	DP, 13.1y	HB, 8.6y	AD, 8.11y
Age: symptoms onset	3	7,5	1,4	1,5	3	3,5	2,5	4
Age of diagnosis	4	8	3	4	5	3	5	4
Result of genetic tests	del.18-19	del.20-25	del.46-52	c.8027+G>A	del.45-52	del.44	del.45	del.50
Age: initiation of CS therapy	-	-	-	-	6	4	5,5	6,5
Age: loss of mobility	10,8	-	-	8,8	-	-	-	-
Age: reduction of upper limb	12	13	-	7,5	-	-	-	-
Age: last measurement	12	14,6	8,4	9,5	13	13,1	8,6	8,11

Table 1. Clinical and genetic characteristics of studied subjects.

The mean age at onset in our group was 3.3 years (SD 0.07), varying between 1.4 and 7.5 years, while the mean age of diagnosis was 4.55 years (SD 0.80), varying between 3 and 8 years. The mean age of initiation of corticosteroid therapy was between 4 and 6.5 years (table 1).

The lower limb motor function was assessed in all subjects using the 6MWT (figure 1). Group-I showed progressive decline in motor functions and loss of mobility in half of the patients at age 10.8 and 8.8 years, one patient (14.6 years old) mobility was preserved, but strong limited at 84m and other patient (8.4 years old) stabilised around 440m. All subjects from group-II reported stabilisation (3/4) or improvement (1/4) of motor functions - 9 years old patient showed increase in distance, walked for 6 minutes, from 426m to 527m (37.79%).

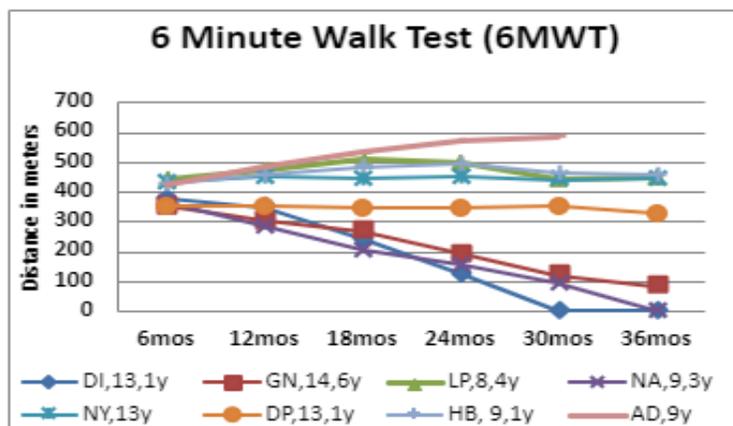


Figure 1. Follow up of 6 minute walking test in the DMD group

The upper limb motor functions were assessed in all patients using the Brooke upper extremity scale as shown in figure 2. 75% of subjects in Group-I showed proximal muscle weakness and limitation in the range of motion (score 2) by 30 months. Furthermore, by the 36 months 50% of the patients indicating loss of muscle strength and limitation in function (score 3), these subjects were also non-ambulatory by 30 and 36 months, respectively. Group-II however, showed preserved and unrestricted motor function in all tested subjects.

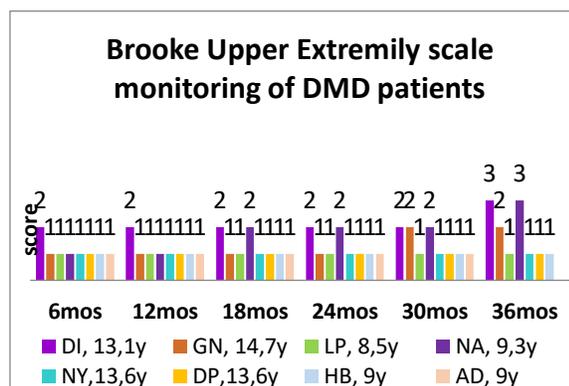


Figure 2. Brooke upper extremity scale

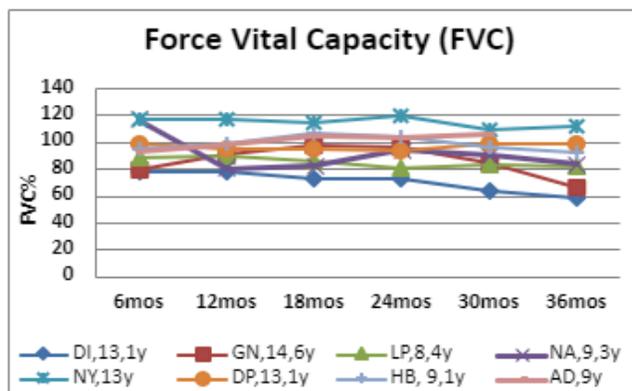


Figure 3. Forced vital capacity

The effect of treatment on respiratory function as measured by FVC is shown in figure 3. The patients from Group-I showed a variable decline in respiratory function (9.3 years old patient with 20% loss of function and 8.5 years old had the smallest decrease of 7.43%). Conversely, Group-II collectively showed preserved respiratory function with AD, 9y demonstrating even a small increase, from 93% at 6 months to 106% at 30 months, an improvement in FVC by 13.98%.

Discussion

In comparison to the natural course of the disease, KT alone appeared to slow down the disorder by reducing the rate of contractures and deformities both in the upper and lower limb and thus prolonging independent gait and halting respiratory decline.

While on the other hand, the combination of KT and CS demonstrated a significant preservation of function in both motor and respiratory functions in all subjects for the duration of the study and therefore enabling subject to maintain relative good quality of life and independence.

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Health Risk of Developing Musculoskeletal Diseases in IT Industry Workers

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Abstract:

Musculoskeletal disorders continue to represent a significant health, social and economic problem among those working in the IT industry. To identify and assess musculoskeletal risks, 72 IT specialists working in Bulgaria were surveyed with the Nordic Musculoskeletal Questionnaire modified by Y. P. Prodanova and T. G. Kundurzhiev in December 2022. The tendency to increase the relative share of complaints and disabilities related to repetitive activity and work posture, characteristic of video display workers, is also observed among the study contingent. The data showed that in the last 12 months, 56.9% of respondents had a complaint in the back and lower back, followed by pain in the base of the neck (43.1%) and upper neck (37.5%). Managing the ergonomic factors of the work environment and improving work posture and movements in modern forms will prevent the development of work-related musculoskeletal disorders.

Key words:

musculoskeletal disorders (MSD), working with a videodisplay, Scandinavian musculoskeletal questionnaire, IT industry.

Introduction:

According to the European Agency for Safety and Health at Work, musculoskeletal disorders are the most common work-related complaints. According to the agency's data, 25% of workers in the EU complain of back pain, 23% - of muscle pain, 62% are exposed to repetitive hand movements for more than a quarter of their working time, and 46% - of painful or tiring position of the body. Working with videodisplays in the IT industry has resulted in a significant workload associated with forced fixed sitting work posture, strain on the visual analyzer, repetitive movements and monotony. A number of studies have noted that video display workers most often report complaints of pain in the neck, shoulders, upper limbs and back. In the scientific literature, MSD disorders in computer-using populations have been reported to range from 6.6% to 70%. Working with a video display has become a characteristic part of various activities not only in economically developed countries, but practically throughout the world. It is important to emphasize that changing computer technology does not in itself lead to increased comfort at work, well health and working capacity of workers, if measures are not taken for ergonomic organization of the workplace and the work process.

Purpose:

Optimizing work environment ergonomic factors causing musculoskeletal disorders among video display workers

Materials and methods:

The modified by Y. P. Prodanova and T. G. Kundurzhiev Nordic Musculoskeletal Questionnaire serves to assess problems with the musculoskeletal system, assesses the severity of symptoms and contains 2 sections.

Section 1: one general question to identify areas of the body with musculoskeletal problems. Completion is aided by a body map to pinpoint twenty-seven areas of potential problems. Respondents answer whether

they have had musculoskeletal problems in the last 12 months. This question is mandatory. Participants must answer yes or no to the screening question, and those who answered yes are asked to indicate one or more locations of pain.

Section 2: with four questions, completed in case of musculoskeletal problems in the last 12 months. Includes a question specifying the presence of difficulties that have prevented normal activities (at work, at home) due to problems in the last 12 months, 4 weeks and the last 7 days, and additional questions about any incidents/accidents affecting any area, assessed by health professional in the last 12 months, duration of the problem in the last 7, 30, >30 days and every day.

The static analysis was done using the Statistical Package for Social Sciences (SPSS) version 20.

Results:

72 IT specialists working in the city of Varna, Bulgaria participated in the present study (43.1% men and 56.9% women), of which 41.3% have a master's degree and 45.8% have a bachelor's degree. During the survey, 73.6% of respondents reported that they usually work from home. At the moment, 43.1% of the respondents rate their physical activity as low. Data show a high incidence of musculoskeletal injuries when working with video displays, closely related to ergonomic inconsistencies in the workplace. In the past 12 months, 56.9% of respondents reported back and low back complaints, followed by neck pain (43.1%) and upper neck pain (37.5%), as well as complaints from the upper part of the buttock (37.5%) and the right shoulder (34.7%). As a reason for difficulty in doing their work in the last year, 15.9% indicated back pain, for the last week of the survey 13% reported back pain, and 8.7% back and upper neck pain.

Table 1. Ranking of registered complaints by body area and time.

District	Have you had difficulty doing your normal work due to problems in the past:					
	7 days		4 weeks		12 months	
	N	%	N	%	N	%
Upper neck	6	8,7	3	4,3	8	11,6
Base of the neck	4	5,8	4	5,8	9	13,0
Back	6	8,7	5	7,2	9	13,0
Cross	9	13,0	5	7,2	11	15,9
Upper part of the seat	2	2,9	2	2,9	4	5,8

Discussion:

In confirmation of our results, Sweta Panchal et al. [1], surveyed 184 IT professionals again using the modified Scandinavian questionnaire and reported a high incidence of MSDs (66.8%), with the highest prevalence reported for the lower back (32.6%), the neck (32, 1%) and upper back (29.9%). Talwar R et al. [2] reported neck pain/stiffness (48.6%), shoulder pain/stiffness (15.7%), lower back pain/stiffness (35.6%), and wrist pain/stiffness, the hand or fingers (23.1%). Musculoskeletal symptoms were present in (70%) of

respondents in a study by N. B., Swetha et al. [3] conducted among IT professionals. As the reason for the high proportion of MSU - (66.66%), the authors indicate that 90.83% (109) worked with a computer for 7-9 hours daily and were not trained in the correct working posture when working on a computer. A Finnish study reported that the annual incidence of neck pain among computer workers was 34%. A study by Sharan D et al. [4], found that work-related musculoskeletal disorders in computer specialists are due to work style (insufficient physiological rest) which is a mediating factor for musculoskeletal pain, discomfort and loss of productivity. Examining the relationship between computer work risk factors, work style and work-related musculoskeletal disorders, the following results were obtained: the lower back (20%) was the most affected, followed by the upper back (16%) and the shoulders (14%). Evidence of a relationship between musculoskeletal pain and factors related to computer work was also found in a study by Kaliniene G. [5], among 513 workers in Lithuania. The prevalence of shoulder, elbow, wrist/hand, upper and lower back pain was as follows: 50.5%, 20.3%, 26.3%, 44.8% and 56.1%. Individual factors such as gender, age, computer experience and body mass index have been found to be significant for musculoskeletal pain in different musculoskeletal areas. The duration of computer work has been found to be an important factor in shoulder pain.

Conclusions:

Data show a high incidence of musculoskeletal injuries when working with video displays, closely related to ergonomic inconsistencies in the workplace. The dimensions of the workplace are an important determinant of the working postures adopted when working with a video display. In order to ensure ergonomic workplaces, it is necessary to have possibilities to adjust the parameters of the work furniture. Work chairs should be adjustable in terms of seat height, height and inclination of the backrest and height of the armrests. Work tables and countertops should offer the possibility of height adjustment. The spatial arrangement of the work furniture can be adjusted easily by using modular constructions. Increasing age, high body mass index, long working hours, unfavorable work postures, static load, unfavorable work style were positively associated with the presence of work-related MSDs in video display workers.

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Legal Aspects of Telemedicine

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Abstract:

Purpose: The purpose of the scientific research is to analyze the application of telemedicine in the modern development of society and the related legal aspects.

Materials and methods:

The authors systematically and comprehensively research and analyze international, European and national scientific publications that analyze the nature and development of telemedicine, the types of telemedical services, as well as the legal aspects related to their application.

Results: The application of telemedicine and the wide range of telemedicine services covered by it provide a number of benefits to society. Such are, for example, increasing the quality of medical care and health care; ensuring better and equal access to health services; improving the quality of life of chronically ill patients; facilitating the prevention and diagnosis of various types of diseases; reduction of financial resources for treatment. The application of telemedicine undoubtedly brings a number of benefits to society and EU member states, but it is accompanied by a number of legal problems and challenges that require the adaptation of European and national rules in the analyzed area.

Conclusion: Telemedicine contributes to improving the health status of the population and to sustainable economic development of the EU and its member state. However, the application of telemedicine in modern medicine requires the adoption of an adequate legal framework that guarantees the rights of all subjects in the field of health care.

Keywords: telemedicine, healthcare, legal aspects, human rights

Introduction

The progressive development of information and communication technologies (ICT) in recent decades has greatly increased the application of telemedicine worldwide. Other key factors that determine the indicated trend are the shortage of medical and health professionals, unequal access to health services for certain groups of the population, the imbalance of growing health needs and insufficient financial resources in health care, the growing rate of chronic diseases worldwide, the mobility of patients and medical professionals [1]. The stated objective circumstances, which have a significant impact on the efficiency of health systems and the quality of medical care, require a rethinking of the policies of the member states and the EU in the field of health care. A new toolkit is needed, which includes innovative means and mechanisms to overcome existing problems and adequately respond to modern challenges in healthcare. Telemedicine, i.e. remote provision of health services, is one of the means that can significantly contribute to improving the efficiency of national health systems and the provision of affordable, quality and timely medical assistance and health care to patients. The application of telemedicine, however, requires the creation of a clear legal regulation that guarantees strict observance of basic human rights.

Materials and methods

The authors systematically and comprehensively research and analyze international, European and national scientific publications, in which the essence and development of telemedicine, the types of telemedicine services, as well as the legal aspects related to their application are discussed.

Results

As a result of the conducted research and analysis of the scientific literary sources, the following conclusions about telemedicine can be formed:

Telemedicine is defined in European acts and doctrine as the provision of health services through the use of ICT in situations where the health professional and the patient (or two health professionals) are not in the

same place [1,8]. Telemedicine includes reliable transmission of medical data and information through text, sound, images or other forms necessary for prevention, diagnosis, treatment and follow-up care of patients [1,8]. The term "telemedicine" is complex and includes in its content a wide range of services, namely: teleradiology; telepathology; teledermatology; teleconsultation; telemonitoring; telesurgery (teleintervention); teleophthalmology and other [1,3,4,5,6,7,8,10]. The application of the listed telemedicine services and telemedicine in general provides a number of benefits to society. Such are, for example: increasing the quality of medical assistance and health care; ensuring better and equal access to health services; improving the quality of life of chronically ill patients; facilitating the prevention and diagnosis of various types of diseases; reduction of financial resources for treatment, etc.[1].

Discussion

The application of telemedicine undoubtedly brings a number of benefits to society and EU member states, however, it is accompanied by a number of legal issues and challenges to their legal systems, the most important of which are [1,2,4,6,8,9]:

1. The lack of a comprehensive legal framework for telemedicine at the national and European level, which would regulate all aspects of its application, for example: classification of medical activities that fall within the scope of telemedicine; legal definitions of these activities; basic rights and obligations of doctors and patients; legal liability, etc.
2. An important legal issue related to the application of telemedicine is ensuring a sufficiently high level of protection of patients' rights. Such are, for example: the right to privacy; the right to protection of patients' personal data; the right to equal access to medical assistance and health care; the right to reimbursement of costs; the right to an opportunity to check the evaluation of services [7]. For example, some patients are not inclined to have consultations about their health status recorded by doctors, as they fear that the actions of collecting, storing and using their health data are not secured at a sufficiently high level.
3. Another important legal issue that arises in connection with the application of telemedicine is regarding the realization of legal responsibility in case of causing harm to the patient. This type of liability may arise in connection with the actions or omissions of the medical professionals (ie of a professional nature) or in connection with deficiencies, damages or defects of the equipment used in the provision of the relevant telemedicine service [2,8,9].
4. The question related to the reimbursement of costs incurred by medical facilities, medical professionals and patients in connection with the provision and use of telemedicine services (for example, for the purchase of hardware, software, equipment, etc. n.), should also be regulated by law [9].

Recommendations

The identified challenges in the application of telemedicine require improvement and adaptation of established legal rules. In this sense, the following recommendations can be made:

1. Creation of a comprehensive and clear regulatory framework at the European and national level to regulate all legal issues related to the application of telemedicine.
2. Introducing clear legal definitions of the medical actions that fall within the scope of telemedicine and their content.
3. Improvement of the established European legal framework, as well as of the relevant national normative acts, for the protection of personal data of individuals, according to the specifics of telemedicine.
4. Introduction of explicit legal guarantees to protect the basic rights of patients in the context of telemedicine application.
5. Introduction of clear rules regarding the legal responsibility of entities that participate in the process of implementing telemedicine services (doctors and health professionals; manufacturers of hardware, software and technical equipment for telemedicine services, etc.).
6. Establishment of specialized bodies at the European and national level to monitor compliance with the regulatory rules governing the application of telemedicine.
7. Increasing public awareness of the benefits and risks of telemedicine and services, with a view to ensuring the full exercise of citizens' rights, including the right to informed consent.

8. Ensuring regular training for doctors and health professionals who apply telemedicine in their practice, as well as for all legal entities whose activity is related to telemedicine services.

Conclusions

Telemedicine and the wide range of services included in it are an effective means of overcoming the shortcomings of modern health systems, especially in the context of key global problems, the main ones of which are: the increase in chronic diseases and the percentage of the aging population; the increase in health care costs; unequal access to health services for part of the population. The benefits of telemedicine were felt in the context of the COVID-19 pandemic, when one of the widespread means of providing healthcare to patients was teleconsultation. The EU and the member states realize the advantages of telemedicine both for improving the health status of the population and for their sustainable economic development. Precisely for this reason, the development of telemedicine is an increasingly frequently discussed topic in the EU. However, a clear legal framework governing all legal aspects of telemedicine must be adopted before proceeding with the wider application of telemedicine. It is necessary to create adequate guarantees for the protection of the basic rights of subjects in health care (patients, doctors, medical and health professionals, etc.)

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Our experience in training students to provide health care for the elderly

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Abstract: Despite the growth of care services for the elderly in recent years, the development of informal care (services provided in the community of the elderly and in a family environment) and the increase in the number of beneficiaries, the scope of this care is still insufficient. The latter refers to the aging of the population. In recent years, many people of working age have remained out of the labor market because they are caring for sick or elderly family members. Many people take the care for their loved ones because they cannot afford to pay for rest homes or hospices, or there are no vacancies for those in need. The challenges facing the healthcare system and, in particular, the universities training health care specialists in Bulgaria are increasing with the aging of the population. Bulgaria is among the countries with the most aging population both in the European Union and in the world. There is a growing trend in the demand for competent professionals providing quality and long-term health care and social support for the elderly.

Aim of the report The purpose of the report is to summarize the experience of the Medical College at Trakia University in the training of specialists providing health care for the elderly.

Keywords: education, geriatric care, elderly and old people

Introduction

All European countries are faced with the problem of the increasing number of adults and especially increasing the oldest populations in a society. The elderly population is characterized by the predominance of chronic diseases. This inevitably affects the demand for medical assistance and long-term care. The continuously growing number of old and very old people implies a greater need for health care and continuous social support. Unfortunately, in almost all European countries there is a serious shortage of qualified health care and appropriately trained personnel. This problem may worsen, if urgent measures are not taken to adapt the health and social system to the specific needs of the elderly. ^(1,4)

Despite the growth of health services provided, services for the elderly have fallen short in recent years. The growth of informal care - services provided in a family environment - is increasing. In recent years, a considerable percentage of persons of working age remain outside the labor market because they have to take care of a sick or elderly family member. Many people take care for their loved ones because they cannot afford to pay for the expensive services offered by nursing homes or hospices, or because there are no vacancies for those in need. ⁽⁷⁾

The challenges facing the healthcare system and, in particular, the universities training health care specialists in Bulgaria are increasing with the growing age of the population. Bulgaria is among the countries with the most aging population, both in the European Union and in the world. This fact imposes the growing demand for competent professionals providing quality and long-term health care and social support for the elderly and old people, and these professionals should be trained in universities specialized in educating health personnel and medical specialists.

Education in response to societal needs

The quality of education in the field of health care has been an ever-present issue in the context of ongoing health care reforms. The new realities and needs in the rapidly developing medical science and practice under the circumstances of health reform, constantly increase the requirements towards the theoretical and practical training of health professionals. The mission of Stara Zagora Medical College is the implementation and control of different procedures and mechanisms to ensure and maintain high quality education for students from the "Health Care" professional field. The educational goal of the Medical College at Trakia University Stara Zagora is to strive to comply with European standards and national

specifics in the education and preparation of highly qualified health professionals, possessing the necessary key competencies to work in all structures of health care and social sphere and in the conditions of highly competitive environment where quality is a decisive factor for success. ⁽²⁾

Education is an extremely important pedagogical and social phenomenon related to the development not only of the individual, but also of the entire society. Education has an eternal function and a permanent character. However, it is a dynamic phenomenon, because it is closely related to socio-historical development and to the specific needs of a given society and/ or people, which are also changeable. ^(3,5)

The education and training of health professionals must be rethought in order to improve the alignment between the priorities of the education and health system on the one hand, and the health needs of the population, on the other. It is necessary to improve the mechanism for planning the training needs of health professionals in order to ensure a more optimal ratio between the individual categories of educated medical personnel, as well as to change the training programs and adapt them to the changing requirements and needs. The education and training of health professionals now is not keeping pace with the challenges facing the health care system, resulting in a mismatch between the competences of graduates and the needs of consumers and the general population. In the new millennium, modern professional education has permanently moved towards European standards. Available knowledge, skills and experience quickly become obsolete and unsuitable for dynamic changes in medical technique and technology. The ability to update their knowledge and skills and to respond to new challenges is a necessary prerequisite for providing successful healthcare professionals of the future. ⁽⁶⁾

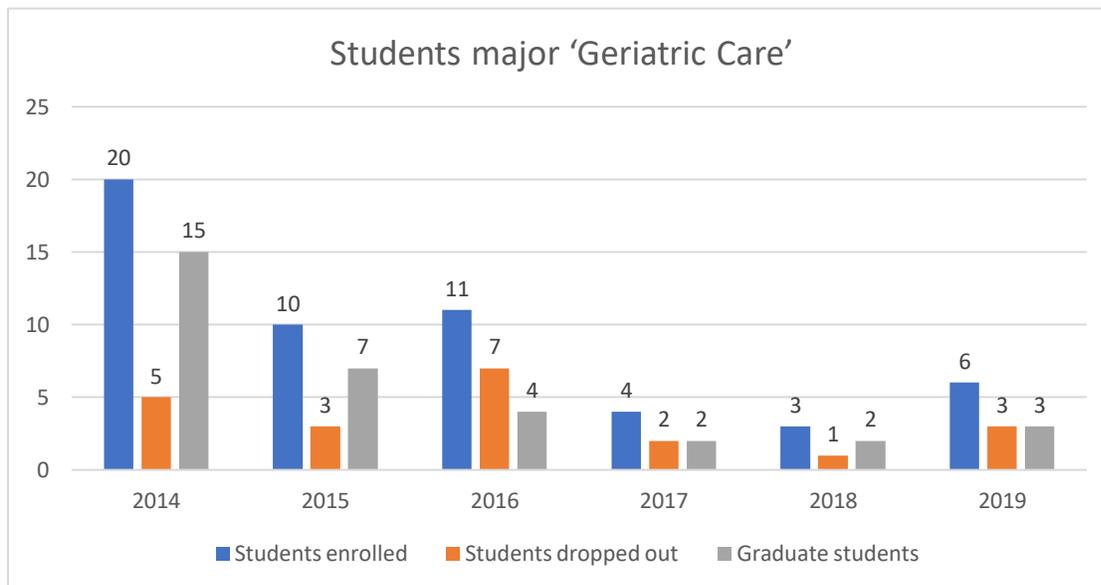
A new beginning - a new specialty at Stara Zagora Medical College

The shortage of health professionals and the current demographic processes in Bulgaria are prerequisites for the implementation of flexible strategies and measures aimed at providing more professionally trained medical specialists. In 2013, the Medical College at Trakia University, Stara Zagora, created a new for the country accredited specialty - "Geriatric Care", in view of the demographic situation in Bulgaria. ⁽²⁾ The purpose of the opening of this new specialty was to ensure adequate and long-term care for the growing relative share of elderly and old people in Bulgaria. The training was aimed at health protection, treatment and prevention of diseases, communication with the patient and his family, provision of health care and social support, both for sick and healthy elderly persons. The last accreditation of the specialty was received under the Decision of the National Agency for Evaluation and Accreditation of the Council of Ministers dated June 3rd 2016 with a capacity of 60 students. Contracts were signed with a number of institutions for the practical training of students majoring in Geriatric Care. Lecturers' and students' mobility under the 'Erasmus+' sector program was implemented. A large number of students had the opportunity to carry out social and clinical practice as well as pre-graduate internships in geriatric institutions in Germany. In 2014 the first 20 students of the "Geriatric care" specialty were accepted. During the classes in the first semester four of the students interrupted and did not continue their studies, in the fifth semester, another student left the program.

In order to popularize the new specialty and strengthen public interest, as well as attract future potential students, a scientific conference with international participation "Aging, Health and Geriatric Care" was held on May 18-19, 2017. In 2017, the first 15 students of the "Geriatric Care" specialty graduated. After graduation, three of the geriatric specialists started working in the geriatric institutions in Germany that they visited earlier during their pre-graduate internship. Another two of the graduates started in rehabilitation centers, one in an aesthetic medicine clinic, one in a hospital treatment facility, another two of them work in a private doctor's office and only one of them started working in an institution for providing health and social care for the elderly in Bulgaria. The remaining five of the students did not seek realization in the field of health care for the elderly at all. The situation is similar in the next 5 years. */Table 1/*

Table 1 Students major 'Geriatric Care'

Year of admission	Students enrolled	Students dropped out	Graduate students
2014	20	5	15
2015	10	3	7
2016	11	7	4
2017	4	2	2
2018	3	1	2
2019	6	3	3
Total	54	21	33



For the period from 2014 to 2019, 54 students were admitted, of which 21 discontinued their studies of their own will, 16 of them in the first semester, and only 33 students graduated. From the indicated data it is clear that the capacity of the specialty since the last accreditation was not reached in any of the above-mentioned years. For the specified period, there were not enough students willing to study in the new specialty. 39% of all students enrolled drop out of Medical College. As the main reason for their decision to leave, they indicate the nature of the work and their possible future realization. It turns out that out of all the graduates, only 6 practice their professional competences in nursing homes, another two of them continue their stay in Germany and work in geriatric institutions there. Or in other words, for the whole period of 6 years, all the hopes, efforts and desire of the team of the Medical College - Stara Zagora to prepare health care professionals ready to respond to the needs of society to provide quality health care to the elderly were limited resulting in only 4 geriatric specialists practicing their profession in Bulgaria.

Conclusion

Unfortunately, the initiative of the Medical College at the Trakia University Stara Zagora, to open a new for the country specialty, "Geriatric care" in support of the growing need of specialists caring for the elderly, did not receive the necessary support. In view of the expected results and the above-presented data from 2020, the admission of students majoring in "Geriatric Care" is suspended. We are still looking for the right "formula" to provide quality health care for this age group, corresponding to the economic, health and social situation in our country. An investment in the training of health care professionals with a specific focus on the elderly is an asset in our own future, because we are all getting older, unfortunately. We are the future consumers of geriatric care and it is up to us now how we will be cared for in the future.

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Role and Realization of Medical Laboratory Technician

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Abstract

The medical laboratory technician is a part of the diagnostic process, who performs professional responsibility by compliance with specific tasks. He works in collaboration with other medical specialists, performing medical activities in various sectors of health care both in our country and in the countries of Europe.

Aim: The aim of the present article is to investigate the role and the opportunity for laboratory technician realization in European countries.

Material and methods: An inquiry survey for the realization opportunities of the medical laboratory technician was conducted among 100 students studying in Medical Colleges from Varna city and Stara Zagora city and 79 working medical laboratory workers in Varna Region by using both documentary and statistical method for analyzing the data. A literature review of scientific publications, websites of professional organizations and various job posting platforms was made.

Results and conclusion: The role of the medical laboratory assistant in the interdisciplinary team, both in our country and in Europe, is to assist other medical specialists in the diagnostic and treatment process by performing various tests prescribed by a doctor. The main activities of medical laboratory technicians in the countries reviewed are similar and include: sampling, sample preparation and analysis; preparing the equipment, devices, samples for testing, etc. From the results obtained for the attitudes among students, 8% of them intend to study in European countries ($\chi^2=70.560$, $p<0.05$) [1].

Key words: role, realization, medical laboratory technician

Introduction

The medical laboratory technician is a main performer of a wide variety of activities in specialized laboratories (clinical, microbiological, histological, parasitological, etc.) which are one of the main units in health facilities, research institutes and other laboratories requiring such qualification [2]. The medical laboratory technician obtains professional training, knowledge, competences and skills for independent work in the pre-analytical, analytical and post-analytical stages of laboratory research. In collaboration with other health specialists, the medical laboratory technician takes part in the diagnostic, treatment, preventive and scientific research activities in the relevant health facilities and scientific institutes [3]. The role of the medical laboratory technician in the interdisciplinary team is to assist other medical specialists in the diagnostic and treatment process by performing various tests prescribed by a doctor, both in our country and in European countries. The main activities of medical laboratory technicians in the countries reviewed are similar and include the following: sampling, sample preparation and analysis, preparing the equipment, devices, samples for testing, etc. [4]. The information reveals that the specifics of training and professional activity of the medical laboratory technician in our country and other European countries are similar [5,6]. Specialists are usually employed in hospital, outpatient or research laboratories of various profiles, both in the public and private sectors [7,8]. During the research, we visited various job announcement platforms (bg.jooble.org, jobsagents.com, etc.), where there are published ads from different countries looking for medical laboratory technicians to work in healthcare facilities and offering excellent working conditions [9,10]. This gives us the proof to conclude that there are good opportunities for realization in European countries from the review and the sources considered.

Aim: The aim of the present article is to investigate the role and the opportunity for laboratory technician realization in European countries.

Material and methods: An inquiry survey for the realization opportunities of the medical laboratory technician was conducted among 100 students studying in Medical Colleges from Varna city and Stara Zagora city and 79 working medical laboratory workers in Varna Region by using both documentary and statistical method for analyzing the data. A literature review of scientific publications, websites of professional organizations and various job posting platforms was made.

Results and Discussion

More than half of the working medical laboratory technicians (52,00%, n=52) believe that the training and qualification they acquire at the Medical Colleges in the Republic of Bulgaria makes them competitive with their colleagues who received the same or similar education in member countries of the European Union or outside it, according to data from the survey. On the other hand, 18% (n=18) of the respondents are of the opposite opinion, and the rest of them (30,00%, n=30) cannot define whether to some extent their education affects their competitiveness compared to their colleagues who obtained their education abroad ($\chi^2=17,840$, $p<0,01$) (Fig. 1).

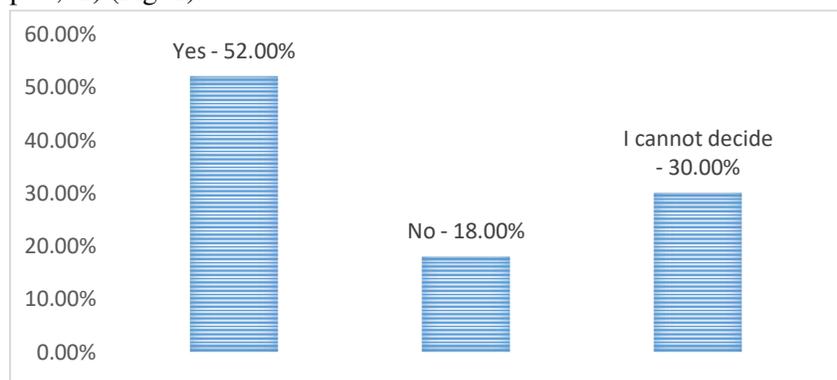


Figure 1. A sense of competitiveness among working medical laboratory technicians.

We can announce as a positive fact that more than half of the students express the opinion that the education they receive in Bulgaria makes them competitive compared to their colleagues who graduated abroad, which confirms the already expressed opinion of the students about satisfaction with both practical and theoretical training in their specialty. We could define the trend we found as a strong positive as 92,00% (n=92) of the respondents in the group of medical laboratory technicians, after graduation in the specialty “Medical laboratory technician” share that after completing their education they are willing to work in their preferred specialty in the Republic of Bulgaria, and those who want to practice laboratory work abroad are 8,00% (n=8) of the students ($\chi^2=70,560$, $p<0.05$) (Fig. 2).



Figure 2. Decision to work in the chosen specialty after graduation of the students from the Medical laboratory technician specialty.

The students who are currently studying the specialty “Medical Laboratory Technician” in the medical colleges of the Republic of Bulgaria are motivated to realize themselves both at home and abroad as medical laboratory technicians and are strongly convinced of their choice of specialty. This confirms their motivation for successful future professional realization.

Conclusion

The medical laboratory technician participates in the diagnostic, treatment, preventive and scientific research activities in the relevant health facilities and scientific institutes, in collaboration with other health specialists. Their role in the interdisciplinary team is to support the other medical specialists, both in our country and Europe. The main activities of medical laboratory technicians in the countries reviewed are similar and include: sampling, sample preparation and analysis; preparing the equipment, devices, samples for testing, etc.

The medical laboratory technician specialty gives good opportunities for realization in health facilities and offers excellent working conditions from the reference made in the various platforms for job announcements with published ads from different European countries looking for this kind of specialists.

Only 8% (n=8) from the respondents claim that they have a desire to practice laboratory activity abroad after their graduation in the specialty “Medical Laboratory Technician” ($\chi^2=70,560$, $p<0.05$).

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Impact of physical modalities on pain and physical function in patients with knee osteoarthritis

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Abstract

The aim of the study is to assess pain at rest and during movement and physical function three months after rehabilitation with Medium frequency current (Nemec's current) and therapeutic exercises in patients with osteoarthritis of the knee. **Material and methods:** The study included 54 patients at 65.4(9.9) mean age, with second and third X-ray degree of the knee osteoarthritis. Patients receive a ten-day course of treatment with Medium frequency current (Nemec's current) and therapeutic exercises. The results were assessed before, after treatment at 1st and 3rd months, by manual muscle testing (MMT), measuring the circumference of the knee with centimeter, range of motion test (goniometry), pain (VAS) at rest and during movement and WOMAC Osteoarthritis Index. Level of statistical significance ($p < 0.05$). **Results:** Statistically significant decrease in swelling ($p < 0.001$) one month after therapy, reduction of muscle weakness m. Quadriceps (MMT)($p < 0.001$), increased knee flexion ($p < 0.001$), reduced pain (Visual Analog scale (VAS)) at rest, going down and upstairs, walking ($p < 0.001$), and decreased WOMAC Index ($p < 0.001$) three months after therapy were observed. **Conclusion:** The applied rehabilitation program effectively reduces pain at rest and movement, WOMAC Index and muscle weakness (m. Quadriceps) and increases the knee joint flexion for at least three months after treatment, while the swelling is significantly reduced one month after rehabilitation.

Key words: knee osteoarthritis, electrotherapy, therapeutic exercises, muscle weakness, physical function.

Introduction

Osteoarthritis (OA) of the knee joint is a common disease in the elderly under the age of 65. (1) It is most often characterized by progressive pain, stiffness and swelling of the knee, leading to disability, (2) which reduces functional and social activity. (3) Chronic pain is consistently reported as one of the most frequent complaints driving patients to seek medical attention. (4) The aim of the study is to assess pain at rest and during movement and physical function three months after rehabilitation with Medium frequency current (Nemec's current) and therapeutic exercises in patients with osteoarthritis of the knee.

Materials and Methods

The study included 54 patients (37 women and 17 men, mean age 65.4(9.9)) with symptomatic knee osteoarthritis, with no evidence of active synovitis. (Table 1) **Criteria for including:** age over 38 years, OA 2nd and 3rd X- rays Kellgren-Lawrence degree, pain in knee joint (KJ), crepitations during active movements in KJ, morning stiffness lasting 30 minutes or less. **Criteria for excluding:** age under 38, radiological data for OA 1st and 4th degree, acute KJ trauma, reflected pain of hip, active synovial inflammation and patients who are treated with NSAIDs and/or analgesics, or have had intra-articular manipulations up to 6 months before physiotherapy with hyaluronic acid or corticosteroids, as well as general contraindications for electrotherapy.

Table 1 Characteristics of the patients

Indicators	Therapeutic group (n=33)
Age (Mean±(SD)Range)	65.4±9.9(40-85)
Sex	37 women 66.7±9.2(51-85), 17 men 65.9 ± 11.7 (42-85)
Duration of the disease (Me(Range)) years	7(1-20) years
Duration of the current exacerbation period (Me(Range)) weeks	5.89±1.67(3-9) weeks
X-ray degree of Kellgren-Lawrence scale:	With II-38 patients (70.4%), with III -16 patients (29.6%);
Reason for visiting a doctor	Pain 100% , difficulties while walking 83.0%, stiffness 39.0% , limited daily activity 28.0%.

The Rehabilitation program was carried out in accordance with the Declaration of Helsinki, after informed consent. Rehabilitation interventions includes ten-day treatment with medium frequency current (Nemec's currents) and therapeutic exercises.

Medium frequency current is applied by means of 4 electrodes, contact, locally around KJ. Therapeutic parameters - analgesic, trophic and stimulating (90-100 Hz, 5min and 0-100 Hz 15min.). The current is individually dosed, sufficient to obtain vibration in the depth of the muscles located under the electrodes.

The therapeutic exercises are performed immediately after electrotherapy. The therapeutic complex includes: Aerobic exercise; Analytical exercises with emphasis on Vastus medialis et lateralis m. Quadriceps femoris; Relaxing techniques for shortened muscles; Resistance exercises; Exercises to increase the range of motion. Exercises for walking.

Results

The results were assessed by: Pain (VAS) at rest, walking, descent, and ascent of stairs, WOMAC Osteoarthritis Index, Knee joint circumference measurement (to evaluate swelling of the joint), Manual muscle testing (MMT) to assess muscle weakness of the muscle Quadriceps femoris, Goniometry (to assess the range of KJ motion), before, after rehabilitation, 1st and 3rd months after therapy. Level of statistical significance (p<0.05).

Table 2. Dynamics of pain (VAS) at rest and physical activity

Pain Mean ± SD Period	Pain - at rest	Pain - walking	Pain - Descending	Pain - Climbing
Before Therapy	2.70±0.84	4.02±0.92	6.63±1.05	5.57±1.08
After Therapy	0.69±0.75 (p<0.001)	1.76±0.67 (p<0.001)	3.37±0.98 (p<0.001)	2.59±0.98 (p<0.001)
After 1- st month	0.26.2±0.56 (p<0.001)	1.35±0.71 (p<0.001)	3.26±0.96 (p<0.001)	2.59±0.98 (p<0.001)
After 3-rd months	1.02±0.63 (p=0.001)	2.20±0.63 (p<0.001)	4.15±0.86 (p<0.001)	3.17±0.98 (p<0.001)

We observed a statistically significant reduction in pain (VAS) at rest, walking, going down and upstairs, (p<0.001), and decreased WOMAC Osteoarthritis Index(p<0.001) 3rd months after therapy. (Table 2) Decreased swelling (p<0.001) after 1st month after therapy, reduction of muscle weakness m. quadriceps (MMT) (p<0.001), increased range of flexion (p<0.001), after the third month of therapy were observed. (Table 3)

Table 3. Dynamics of Knee joint circumference measurement, degree of muscle weakness per m. Quadriceps femoris, range of flexion and WOMAC Osteoarthritis Index.

Period (Mean±SD)	Circumference Knee joint	Test MMT	Range of flexion°	WOMAC Index
Before Therapy	41.6±2.1	2.75 (2.25-4.00)	113.2±6.2	62.0±6.5
After Therapy	40.9±3.1 (p<0.001)	3.75 (2.75-4.25) (p<0.001)	119.6±5.5 (p<0.001)	50.5±5.3 (p<0.001)
After 1-st month	41.2±2.0 (p<0.001)	4.00 (3.00-4.25) (p<0.001)	120.7±4.6 (p<0.001)	48.2±5.8 (p<0.001)
After 12 months	41.6±2.0 (p=0.001)	3.75 (3.00-4.75) (p<0.001)	119.4±5.2 (p<0.001)	53.7±5.4 (p<0.001)

Discussion

Clinically, symptomatic osteoarthritis is manifested by pain, swelling, stiffness, crepitations in the joint, muscle weakness, and reduced range of motion. All these clinical symptoms of OA cause severe persistent pain, limitation of daily activities and reduced quality of life. (5-7)

The established by us swelling in the affected joint and muscle imbalance, cause high levels of pain and limited functional activity. Reducing pain and increasing physical function can lead to a potential increase in functional and social activity. (3)

A statistically significant reduction in pain at rest and during physical activity after the complex rehabilitation program was observed by the study. Probably the rehabilitation, which includes appropriate selection of electrical procedures to reduce pain, improve tissue and periarticular muscle trophism and therapeutic exercises that are consistent with the degree of muscle weakness leads to increased daily functional activity and reduced values of total WOMAC Index and the three subscales Pain, Stiffness, and Function.

The analgesic effect of Medium frequency current (Nemec's currents) probably is realized by several different mechanisms: inhibition of nociceptive type C fibers in connection with the "Pain gate" theory of "Malzack and Wall". (8-10) Improved blood circulation and, subsequently, increased export of body fluids and pain-producing substances from the area of the pathological focus, lead to a reduction in pain. (11) On the other hand, another mechanism is probably responsible for the reduction of pain by involving a "descending mechanism of pain suppression". It is also associated with the endogenous release of opioid substances. (12-14) In addition to analgesia, taken with Interferential current at stimulating frequencies, it can lead to 50% higher activation of the m. quadriceps femoris compared to maximal voluntary contraction. (15)

Muscle weakness is defined as one of the earliest and most common symptoms of knee osteoarthritis. Reduced muscle strength is believed to be a better predictor than joint space narrowing and pain. (16) Muscle function is more closely related to joint pain than joint space narrowing. Improving muscle function is a potential therapeutic target because it is more susceptible to change. (17) The application of appropriate, tailored to correspond to the functional state of the joint therapeutic exercises could reduce pain and improve the function of the affected joint.

Conclusion

The results of the conducted study show a significant improvement in the functional activity and WOMAC Osteoarthritis Index after rehabilitation. The applied rehabilitation program can effectively reduce pain at rest and movement, muscle weakness and total WOMAC Index and can increase flexion in the knee joint for at least three months after treatment, while the swelling is significantly reduced within one month after rehabilitation. Medium frequency current (Nemec's current) and therapeutic exercises can be a potentially effective therapy in the treatment and rehabilitation of patients with osteoarthritis of the knee joint. In the future, the study could be expanded with the goal to objectify better the results obtained.

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Effect of Postural disorders during the childhood on the quality of life at older age

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Abstract

Postural deformities are degenerative alterations of the locomotor apparatus, whose origin dates back to childhood and which become more serious with ageing. These deformities provoke a misbalance of the structural support of spine and comprise scoliosis, sagittal deviation, kyphosis, spondylolisthesis, rotational subluxation and axial plane deformities.

The aim of the present work is to summarise the most important factors associated with the quality of life of patients with postural disorders and back pain, predominantly originating during the childhood.

Material and methods. The survey was conducted with 85 patients with postural disorders and back pain, examined in a rehabilitation center over a 6-month period.

Patients were distributed into five age groups: 38.2% between 20–30 years of age; 21.2% between 30–40 years of age; 27.1% between 40–50 years of age, 29.4% between 50–60 years of age and 14.1% over 60 years of age. Of them 37 (43.5%) were men and the other 56.5% - women. Almost half of surveyed patients had a history of spinal problems, even partially. The information was gathered by filling a questionnaire, designed specially for the survey.

Results and discussion. The results from the survey showed that 47.1% of respondents had a history of back pain in the childhood, but only 25.9% have practiced corrective gymnastics. In 7.1%, the duration of complaints was 6 years and longer. Another 12.1% reported back pain of 3-year duration, whereas in 47% it began 6 months to year ago.

Conclusion. At a global scale, back pain are among the most important problems making people seeking medical help. Regular physical activity combined with preventative physical therapy and rehabilitation of acute back pain episodes would guarantee a better quality of life at older age.

Key words: postural disorders, back pain, physical activity, preventative physical therapy, rehabilitation

Introduction

Postural deformities in elderly people are characterised by a series of progressive, asymmetric, degenerative changes that may cause neural compression. This degeneration results in pathologic changes and load-bearing abnormalities through asymmetric collapse of the motion segments [1, 2, 3].

Additionally, the condition can lead to back pain or cause neurological symptoms and progressive deformity, each of which causing imbalance in spine's structural support. Specific deformities include scoliosis, sagittal deviation, kyphosis, spondylolisthesis, rotational subluxation, and axial plane deformity. In adults over 60 years of age, a high prevalence of 68% is reported [1, 2, 4].

If Cobb's angle by the end of growth exceeds the critical threshold, people are at higher risk from health problems at older age, e.g. worse quality of life, cosmetic body deformities, altered postural balance, pain and functional disorders. The curvature of thoracic spine has an adverse effect on patients' respiratory function. In patients with scoliosis, pain syndrome occurs more commonly at the age of 20-30 years, whereas at 40 years, the chronic back pain syndromes are three time more common [5].

Specific diagnoses of these spinal deformities include primary degenerative sagittal imbalance, iatrogenic spinal deformity, and adult spinal scoliosis [6]. The incidence and prevalence of spinal deformities is continuously increasing due to improved medical care, increased life expectancy, and greater share of healthy adults [1, 2, 3].

Back pain in adult scoliosis patients may emerge from spinal imbalance, arthropathy, muscle weakness, central stenosis [7,8]. Asymmetric loading of discs compromises one or more spinal segments and leads to instability in the sagittal plane (spondylolisthesis), in the frontal plane (lateral listhesis), or three-dimensional rotational subluxation. The increased curvature is associated with stronger pain, as well as the degree of degenerative changes at the curvature apex [7].

In the latest study covering 50 years period of follow-up [9], patients with scoliosis reported more frequently back pain and radicular symptoms, although they remained capable to work and perform activities of daily living. As life expectancy increases, the impact of scoliosis on quality of life at adult age will become increasingly important.

The heterogeneous spectrum of abnormalities of the lumbar or thoracolumbar spine encountered in elderly patients is referred to as adult spinal deformity.

The aim of the present work is to summarise the most important factors associated with the quality of life of patients with back pain, a significant part of which with history of juvenile postural disorders.

Material and methods

The survey was conducted with 85 patients with postural disorders and back pain, examined in a rehabilitation center over a 6-month period and distributed into five age groups: 38.2% between 20–30 years of age; 21.2% between 30–40 years of age; 27.1% between 40–50 years of age, 29.4% between 50–60 years of age and 14.1% over 60 years of age. Of them 37 (43.5%) were men and the other 56.5% - women. Almost half of surveyed patients had a history of spinal problems, even partially. The information was gathered by filling a questionnaire, designed specially for the survey.

The survey was designed as an attempt to throw more light on the quality of patients suffering from back pain, a significant part of which with history of postural disorders dating back to childhood.

Results and discussion

Based on numerous studies by a number of authors and our experience, the most important factors related to the locomotor activity of children and adults, contributing to the development of postural disorders were summarised:

- *minimisation of physical activity and reduction of natural loads* on human musculoskeletal system;
- *active utilisation of vehicles* in daily life and increasingly rare muscle movements;
- *remote means of communication*, associated with minimum necessity of locomotion;
- *overweight and obesity*;
- *spending long periods of time in static postures* at work and at school;
- *the effects of various harmful factors*, including smoking;
- *high level of psycho-emotional instability*, combined with acute or chronic stress on human body, contributing to development of musculoskeletal disorders [10].

Almost half of all respondents experienced, though partially, spinal problems (Fig. 1) Long periods of sitting (especially during bone growth, in childhood and adolescence), can change muscle tone, resulting in posture disorders, changes in the physiological spine curves (scoliosis, lordosis, kyphosis, kyphoscoliosis, flat back, etc.).

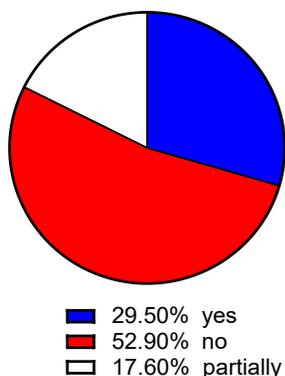


Fig. 1. Prevalence of spinal problems among the participants in the survey

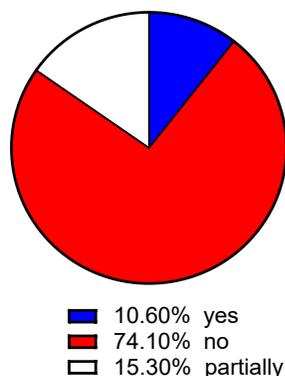


Fig. 2. Spinal problems in the childhood among the participants in the survey

Although 47.1% of respondents experienced back pain in childhood, the percentage of those attending corrective gymnastics was quite low – 15.30% partially and only 10.60% on a regular basis (Fig. 2). Pain is the commonest sign of spinal scoliosis in adults. Additionally, muscle fatigue following compensatory imbalances can cause pain to spread. Disc rupture or facet hypertrophy, degenerative narrowing in the lateral recess can induce adjacent nerve root compression and radiculopathy [11].

According to Edgar (1987), thoracolumbar and lumbar spine deformities are mostly responsible for back pain at adult age. Cordover et al (1997) examined 34 adult patients with similar deformities from 20° to 55°. For an average of 22 years, 65% reported back pain vs 32% of control peers. Although they did not need operative intervention on the occasion of back pain, their average age was only 36 years.

The results from the present survey (Fig. 3) confirmed this thesis, as more than half of respondents reported presence of morning discomfort due to back pain – 33% permanently and 23.50% – partially.

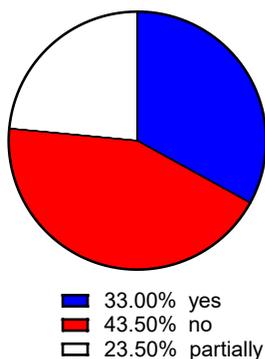


Fig. 3. Prevalence of morning discomfort due to back pain among the participants in the survey

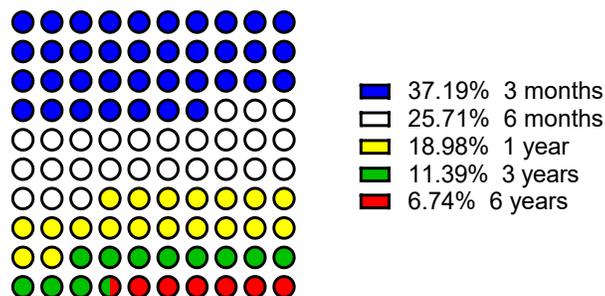


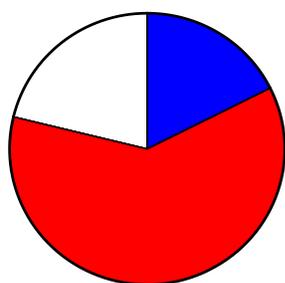
Fig. 4. Duration of back pain complaints among the participants in the survey

In the majority of cases (60%), patients experienced back pain relatively recently - within a year. In only 7.1% of the examined people, the duration of complaints was 6 years or more (Fig. 4). Another 12% reported a 3-year history of back problems, and 47% had back problems for 6-12 months. Other authors [14] found that pain in adult patients with postural disorders correlated negatively with the flexibility of the spinal

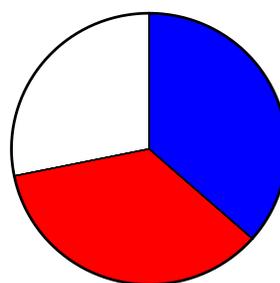
deformity. Factors related to pain included regional imbalance, instability and pathological mechanical loads on vertebral elements [15].

The results of most clinical studies demonstrated that during the early adulthood, most patients with postural problems experienced pain [16,17]. To date, only one large controlled survey has been conducted [18]. In this survey, 1,178 young adults were interviewed 10 years after being diagnosed with spinal problems in adolescence. They reported a significantly higher frequency of pain than 1,217 control subjects. Among scoliosis patients reporting pain, 23% (147/650) described it as “terrible, terrible, worrying” compared with 1% (6/416) of control subjects reporting pain.

The daily reflection of permanent back pain, according to the respondents, was manifested as exhaustion during daily activities - marked in 17.6% and periodic - in 21.2% (Fig. 5). In addition, 7 of the patients admitted that the constant pain affected also their thinking, and in another 13, this was partially true.



17.60% yes
61.20% no
21.20% partially



36.50% yes
35.30% no
28.20% partially

Fig. 3. Back pain effect on the physical condition of participants in the survey

Fig. 4. Healthy nutrition among the participants in the survey

Similar results have been reported in a > 44-year follow-up [9]. In a subset of 69 patients from an original population of 444, which were treated in adolescence, twice as many patients with scoliosis (77% vs. 35%) suffered from pain compared to a population of adults of comparable age (> 55 years).

The prevalence of chronic pain was almost three times higher in patients with scoliosis (61%) than in non-scoliosis controls (22%) despite the fact that the “control” population was selected from hospital clinics, nursing homes and centers for elderly people, where the incidence of disability is extremely high [19, 20].

The most important information on the lifestyle of the respondents included a fairly great share of patients who definitely paid attention to their diet (Fig. 6) and tried to maintain a recommended frequency of sports or outdoor activities to stimulate the functions of the respiratory and cardiovascular systems (Fig. 7).

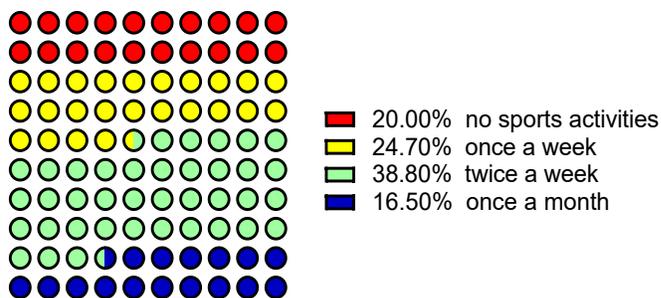


Fig. 8. Frequency of sport activities among the participants in the survey

This is a very correct approach, because as age advances, juvenile postural problems induce the characteristic signs of discomfort and even impair lung function, reduce vital capacity and impair the ability to exercise [21, 22]. Chest wall mobility deteriorates with age, lung function also worsens according to the magnitude of the deformity, even when the deformity itself progresses no more [23]. In severe cases, death occurs from respiratory failure.

Conclusions

In conclusion, our survey, although limited by the small number of patients, provided proofs of an alarming picture of back pain at adult age. Our results showed a certain influence of postural problems from childhood, aggravated by prolonged static loads at the workplace.

Treatment of juvenile postural deformities is therefore essential, with efforts aimed at cessation or prevention of deformity progression, reduction of pain and lifelong pulmonary dysfunction.

At a global scale, back pain is one of the leading health issues problems causing people to seek medical help. Regular physical activity combined with preventative physical therapy and rehabilitation of aggravated back pain episodes will guarantee a higher quality of life at older age.

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Alcohol consumption in adolescence: the role of parents and adolescent gender

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Abstract:

Purpose: To investigate the gender-specific impact of social copying on alcohol drinking in adolescence. **Material and methods:** A cross-sectional study was carried out on 903 students aged 15-19 via a self-assessment questionnaire. Parental couples were grouped by their drinking models and abstaining parental couples were used as a control group in order to study the drinking patterns of their offspring. **Results:** Adolescent drinking is significantly influenced by parental drinking but unlike boys, girls tend to exhibit social drinking regardless of the drinking model of their parents. **Conclusions:** Parental drinking manifests differently in children depending on their gender. Therefore adolescent gender should be taken into account in the design of preventative interventions for alcohol drinking in adolescents.

Keywords: gender, alcohol, parental modelling, drinking

Introduction

There are two relevant theories that try to explain risk behaviour. According to the Social-cognitive theory (SCT) behaviour is acquired through observation and imitation in the context of self-efficacy and expected positive rewards [1]. The Theory of Planned Behaviour (TPB) [2] suggests that intentions, motivated by attitudes, subjective norms and perceived behavioural control are the most important determinant of behaviour. Both theories receive empirical support in studying alcohol drinking in adolescence [3, 4]. Alcohol consumption is also theorized to be a part of the gender role expectations [5] and women, who endorse traditionally feminine traits are less likely to drink at all [6] and report less quantity and frequency of alcohol use [7]. We decided to investigate how exposure to different parental drinking models impacts drinking models in adolescents depending on gender.

Material and Methods:

A cross-sectional study was conducted among students from three high schools in the city of Stara Zagora, Bulgaria. A self-assessment questionnaire about drinking models in respondents and their parents was completed by 903 students aged 15-19 (50.06% males and 49.94% females; response rate: 83.8%). Models of alcohol drinking were categorized into: no drinking (ND); social drinking (SD - drinking on special and rare occasions only) and regular drinking (RD - no need of special occasions to drink). The parental couple's drinking pattern was categorized as: consistent (both parents drink in the same way - RD parental couple; SD parental couple); mixed (MD - one RD and one SD parent) and incomplete drinking pattern (one drinking and one abstaining parent). The control group was comprised of ND parental couples only. Descriptive statistics and OR (95%CI) calculation were applied for comparison between groups of parents to reveal the corresponding models of drinking in their offspring. Statistical analysis was performed via the statistical packages found in Microsoft Office Excel 2010 and SPSS v. 19.

Results and Discussion:

We found that alcohol drinking in girls was 8.59 times more likely (95%CI 4.94÷14.94) when both parents drink and 2.64 times more likely (95%CI 1.54÷4.50) when only one parent drinks in comparison to ND parental couples. Alcohol drinking in boys is respectively 5.61 (95%CI 3.19÷9.88) and 2.34 (95%CI 1.41÷3.89) times more likely. These data reveal that the more consistent the drinking models of the parents were the more probable the drinking in adolescents was.

When we tried to analyze how parental drinking models affect regular drinking in children, we found out that RD couples were 9.96 times (95%CI 4.45÷22.25) more likely to have RD boys and 5.24 times (95%CI 2.56÷10.7) more likely to have SD girls. MD couples were 3.20 times (95%CI 1.48÷6.92) more likely to “produce” RD boys and 4.25 times (95%CI 2.23÷8.11) more likely to have SD girls. SD parental couples were not associated with a significant increase of RD in both boys and girls but they were 6.62 times (95%CI 3.38÷12.95) more likely to have SD girls and 3.54 times (95%CI 1.97÷6.36) more likely to have SD boys.

Although drinking in parents is a risk factor for drinking in adolescents, SCT becomes an irrelevant explanation in inconsistently drinking couples. No matter the parental drinking patterns, girls tend to be SD but not RD, while boys tend to become RD but not SD. We confirmed in principle the theory of gender identification [5] but in the context of TPB. It seems that in the motivational mix the most important determinant is the final calculus about the sum of benefits. Perhaps for adolescents drinking is a socializing factor that reduces social inhibitions and facilitates sexual intercourse. Although both genders are interested in sexual interactions, consequences for girls could be much more unfavourable in comparison to boys. The concern about potential consequences may act as a mechanism through which parental drinking models are adopted.

Conclusion: None of the existing theories can explain independently the gender specificity of adolescent drinking and our study confirms the need for a mixed theoretical model. We suppose that decisions are made on the basis of multiple considerations for the best outcomes for the actor. Further study may be needed to determine whether girls could be the primary target for preventative programs of sexual education that could have an additional effect on alcohol drinking in adolescence.

Abbreviations:

SCT - Social-cognitive theory

TPB - Theory of Planned Behavior

ND - no drinking

SD - social drinking

RD - regular drinking

MD - mixed model of parental drinking

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Factors and conditions affecting children's immunity - a survey among parents

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Abstract

The purpose of the study is to investigate parents' awareness of different methods of immunostimulation in children and their impact on the health status of their children. An anonymous survey was conducted among 353 parents of children in the age group 3 - 7 years, whose children attend kindergarten or preschool groups in primary school. The questionnaire was designed to identify factors influencing the development of immunity in preschool children based on their lifestyle and health status and the role of the parent regarding the development of immunity in their children. Adequate combined application of immunostimulating agents and methods, increasing the knowledge of parents regarding their application, the role of doctors, pharmacists and other medical specialists, the attitude of teachers or educators towards correct compliance with their application, are key moments for improving both general health and mental health status and the quality of life of the children.

Introduction

There are certain groups of factors that have a major impact on children's health, as they affect children's incompletely developed immunity. The main groups of intermediate determinants of health are: material circumstances (housing quality, exposure to pollution, financial means to purchase quality food); psychosocial circumstances (stress levels and social support); behavioral factors (diet and physical activity), biological factors (genetic susceptibility to disease in different population groups), and the health system (access to quality care in populations). Evidence from the scientific literature considers an increasingly wide range of influencing material circumstances, such as the availability of safe water and sanitation, agricultural policies and food security, access to health and social services, unemployment, underemployment and working conditions, access to housing, environment of living, access to education and availability of transport (Jayasinghe, 2015).

Parents are the people who mainly take care of children. For this reason, they are responsible for the health and well-being of their children (Boshoff K et al, 2016). A growing number of studies worldwide confirm the role of parents in teaching preschool children to eat and exercise. Positive role models could have a huge impact on the overall formation of both children's eating and exercise habits.

The upbringing of children from the earliest childhood about the way of life is extremely important, and this is best done first in the family through good parental example, then in kindergarten and school.

The purpose of the study is to investigate parents' awareness of different methods of immunostimulation in children and their impact on the health status of their children; study of the factors influencing the choice of immunostimulants for children and the role of the parents.

Material and Methods

Direct anonymous individual questionnaire was performed, created in the web application Google Forms, which were distributed online through the use of various platforms and social networks to collect data from respondents. The survey was conducted among 353 parents of children in the age group 3 - 7 years, whose children attend kindergarten or preschool groups in primary school from different regions of Bulgaria (from big cities to small villages). The questionnaire was designed to identify factors influencing the development of immunity in preschool children based on their lifestyle and health status and the role of the parent regarding the development of immunity in their children. The questions are about researching the health status of children, quality of life, frequency of morbidity, medicinal use (OTC, nutritional supplements, vitamins, phytoproducts and others), measurement of factors predisposing to the development of morbidity

and the need for immunostimulating methods and the influence of parental behavior. Statistical data processing was performed using the software product SPSS ver. 22.

Results and Discussion

From the survey conducted among 353 parents of children in the age group 3-7 years, 88% are from regional cities, 8% from small towns and 4% of participants are from villages. 94% of the respondents indicate that their children attend a public kindergarten, and 6% of the children attend a private kindergarten. Of all the children, 21% attend a study hall, additionally, and the remaining 79% do not attend a study hall. 83% of the parents participating in the survey indicate that they raise their children alone during the time outside kindergarten or school and during the weekend, 15% of the children are raised by grandparents, during this time, 2% of the children are raised by a babysitter.

The children's health complaints ranged from general malaise to the need for home treatment, most commonly including cough, runny nose, headache, abdominal pain, back pain, pallor, cold hands, etc.

From the presented results, we distinguish cough and runny nose as complaints with the highest frequency. The probable reason for this is the meeting of a large number of children in one place, spending a significant part of the day in a closed room, which is a prerequisite for the exchange of viruses and bacteria between them. In second place in terms of frequency are abdominal pains and headaches, symptoms that we can associate with the stress of starting kindergarten or school, the new environment, the unfamiliar environment, the need to contact new people. The adaptation time is an important moment in the transition of getting used to and is strictly individual for each child. Children perceive their meeting with the childcare facility in a different way, and while for some the transition is imperceptible, for some children it is a difficult period and is expressed in various forms of relapse. The reasons for this are most often stress and lowered immunity as a result of placing the child in a stressful environment. The most common diseases that children suffer from when they start their visits to kindergarten and school participating in our study are flu, angina, bronchitis, upper respiratory tract infection, otitis, diarrhea, gastrointestinal infection, conjunctivitis and wounds.

There are other factors affecting children's immunity that are part of the style provided by parents to children. This includes eating, exercise, sleep, extracurricular activities, screen time, and other daily activities.

Regarding activities in front of a computer screen or watching television, the survey data show that children spend in this environment on average about 30 minutes a day for 30% of them and from 1 to 4 hours a day for more than 40% of the participants.

In the children's health and immunity panel of the survey, nearly 40% of the respondents define their children as healthy and almost the same number of respondents indicate that their children are rarely sick. However, 17.8% of the participants indicate that their children are often sick, and 3.4% cannot determine what their children's health is. This is less than a fifth of the participants who identify their children as frequently ill, which in turn necessitates absences and requires treatment and prevention.

When asked in the survey about taking medication prescribed by a doctor, 81% of parents cited a current health problem as the reason. More than half (61% of parents) give immunostimulating agents to their children as a preventive measure to increase immunity, as well as at the first symptoms of illness. The means and methods chosen by parents to increase the immunity of their children are: Vitamins (233) 66.0%; Homeopathy (95) 26.9%; Active movement (169) 47.9%; Physical strengthening procedures (135) 38.2%; Natural remedies (113) 32.0%; Medicinal plants (113) 32.0%; Healthy nutrition (76) 21.5%.

From the presented results regarding means and methods applied by parents to increase their children's immunity, we can summarize that vitamins are the first choice of 66% of parents, followed by active movement and hardening procedures. Homeopathy is less known, and the need for a specialized consultation makes it less attractive for the respondents (26.9%). An equal choice for natural remedies and medicinal plants, one third of parents (32%) prefer these means for immunoprophylaxis.

The knowledge and choice of natural remedies that the respondents prefer to offer to their children in the form of various combined products. Vitamin C contributes to immune defense by supporting various cellular functions of both the innate and acquired immune systems, and over 90% of parents indicated it as the most

preferred means of immune stimulation in their children. It is followed by the choice of black elder, as an anti-inflammatory agent in the treatment of minor diseases of the upper respiratory tract and reducing the duration of flu symptoms, indicated by 80.2% of respondents, and propolis with its antimicrobial and anti-inflammatory properties, as a modulator of non-specific immunity, indicated by 75.4% of parents. Colostrum, which provides basic immunological protection, is the choice of 68% of parents. The immunostimulating effect of echinacea was chosen by 51.6% of parents, and only 36% of respondents indicated the use of beta glucan, as a natural immunomodulator that is not so well known. Favorites among parents include a vitamin, a medicinal plant, and a natural remedy, suggesting they are most likely to be combined in a children's immunostimulation approach.

Parents' knowledge about the use of immunostimulants is an important factor that has an impact on the management of children's immunity. The results of our study regarding the influence of other factors on the choice of means and methods of immunostimulation and the sources of information are interesting. The main influencing factors are doctors according to 41.4% of participants and pharmacists according to 38.8%, with their competent recommendation, which in turn determines adequate health and pharmaceutical care. 10.8% of parents rely on "Personal opinion" and 4.8% on "Recommendation from other parents".

Table 1. Sources of information about immunostimulating agents and methods for children

Sources of information on immunostimulation	Number	Percent
Doctor	233	66.0
Pharmacist	164	46.5
Other parents	161	45.6
Close friends / relatives	148	41.9
Internet	106	30.0
Mass media /TV, newspapers, magazines/	31	8.8
Scientific articles	12	3.4
Personal experience	12	3.4

Sources of information about immunostimulating agents and methods for children are another important factor playing a role in protecting children's health. The results confirm again doctor (66%) and pharmacist (46.5%) as the main sources, but here also include other parents (45.6%) and relatives (41.9%), who play an important role, such as are the first consultants after the medical specialists. The influence of the Internet, mass media and social networks is quite prevalent (38.8%), but the nature of the materials, the sites and the credibility of the sources are important.

The need to increase the health culture and expand the knowledge of parents in the field of children's health was touched upon in our survey, by examining the attitudes to participate in educational health campaigns and 68% (240 participants) gave a positive answer and wish to participate in similar initiatives.

In order to be able to fully participate in the protection of children's health or in the recovery processes in case of illness, it is desirable for parents to have a certain level of health literacy. This, in turn, facilitates communication between parents and health professionals, as well as supporting parents in making healthy lifestyle choices for their children. (Möreljus et al. 2021) The lack or low level of health literacy leads to poor knowledge about the child's health condition, which in turn causes a number of problems - late

diagnosis, misunderstanding of medical guidelines, neglectful attitude towards the medication regimen, as well and increased use of emergency care. (Berkman et al. 2011, Yin et al. 2007)

Conclusions

Adequate combined application of immunostimulating agents and methods, increasing the knowledge of parents regarding their application, the role of doctors, pharmacists and other medical specialists, the attitude of teachers or educators towards correct compliance with their application, are key moments for improving both general health and mental health status and the quality of life of the children.

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