SUMMARY:

Purpose: The research aimed to study children's physical activity during their free time and their attitude towards sports as well as to analyze their nutrition habits in relation to the determination of adolescents' BMI (body mass index).

Materials and methods: A direct anonymous group questionnaire has been used for the children's PA and eating habits. Sociological and statistical methods have been used to provide the data. The students' BMI was estimated through the index method. The results have been processed with the program package IBM SPSS Statistics 21. The method of classification and regression trees (CART) has been applied to define the factors influencing BMI. Our results have been compared with WHO standards, valid also for EU. The research objects have been 275 students from 5th, 6th, 7th, and 8th grade from secondary schools in Plovdiv.

Results: The share of those who have breakfast in the morning (50,2 %) was almost the same as those who had more than two main meals per day (53,8 %). From all respondents, almost a quarter was not interested in sports, which was also confirmed by the fact that (39,3 %) of the respondents did not practice sports after school. The BMI estimation (according to the WHO standards) provided the following results: (60 %) of the adolescents had normal weights, and (38,5 %) had weight over the norm.

Conclusion: Unhealthy and not-balanced nutrition habits were found at almost half of the examined students. This nutrition was accompanied by insufficient physical activity - the share of 11-12 years old students with overweight is bigger than those of 13-14 years old.

Key words: Adolescents' health, physical activity, nutrition, Body mass index

INTRODUCTION:

The unprecedented growth of the spread of children's overweight and obesity has an urgent need for effective physical activity programs for reducing the frequency of overweight and obesity. The latest systematic reviews of the efficiency of young people's physical activity are basically focused on the school environment [1]. The spread of overweight among children and adolescents is wide, and it is related to bad health results in short and long-term plan. The lifestyle factors can interact with each other to influence the overweight [2]. The young people's health choice, including their nutrition habits, physical activity, and drug abuse, almost change during the adolescence. The health determinants appear or worsen during this phase; thus, they are transformed into continuous health problems and inequality during their maturity [3; 4]. The model for a healthy lifestyle at schools should be developed in some important directions: 1) psycho-hygiene in the labor and the students' communication; 2) physical activity and hardening; 3) rational nutrition; 4) denial of socially harmful habits (smoking, drinking alcohol, chemical and medicine substances); 5) hygienic use of the free time for strengths recovery and self-enhancing; 6) optimization of the factors and conditions of the school life; 7) health education and control over the adolescents’ health and physical development [5]. The low physical activity in Bulgaria was widely spread factor stated in the 80s during a series of examinations among children, adolescents, and workers. An examination of the National Statistical Institute (NSI) for the period 1996 – 2001 showed that the share of low physical activity increased. The greatest decrease of physical activity was among 15-24 years old people – 9,1 % and a bit smaller among the 7-14 years old children – 5,4 % [6]. The promotion of healthy nutrition and physical activity is a priority for health prevention not only for the people of the 27 member - states but for all people around the world [7]. The more physical activity, the merrier health benefits [8]. On the other hand, low physical activity is associated with a number of diseases: at children’s age, the low physical activity slows down the normal physical and psychical development, it leads to obesity and other conditions; at middle age and above it, the low physical activity cooperates for the development of a number of chronic diseases: cardiovascular, metabolic, cancer, diabetes, type 2 and others. It also increases the health costs [9 - 16].

Aim:

The research aimed to study children's physical activity during their free time and their attitude towards sports...
as well as to analyze of their nutrition habits in relation to the determination of adolescents’ BMI (body mass index).

**MATERIALS AND METHODS:**
The adolescents’ basic nutrition habits were outlined through an author’s questionnaire filled by them and measurements were done. They were represented in an original card (developed for the purpose) for their physical activity. Sociological and statistical methods were used. The students’ BMI was estimated through the index method. The results were processed with the program package IBM SPSS Statistics 21. The method of classification and regression trees (CART) was applied to define the nutrition factors influencing BMI.

**RESULTS:**
The research objects were 275 students from 5th, 6th, 7th, and 8th grade from secondary schools in Plovdiv – 52,4 % boys and 47,6 % girls. From all grades, the 5th graders were the most (33,1 %), followed by the 6th graders (29,8 %), 7th graders – 20,0 %, and 8th graders – 17,1 %. Most of them (90,5 %) of the children live in the city. The greatest share was for the 11 and 12 years old students (30,2 % and 32,7 %). At the moment of the questionnaire filling up, some of the children weren’t 11 years old – they were 2 (0,7 %), and other 9 students were 15 years old (3,3 %). From all respondents, a quarter was not interested in sports (25,5 %), and 28,7 % were interested only in certain sports. This was confirmed by the fact that 39,3 % of the respondents did not practise any sports after school. From those who have been practised some sport in their free time, 28,4 % practised irregularly or less than three times per week (Fig. 1). The analysis of the physical activity showed the adolescents preferred to practice non-organized sports (58,5 %), but the team sports were predominant (65,8 %). Almost half of the respondents (47,4 %) started doing some sports in their free time a year or two ago. One third (30, 5 %) did not visit any sporting event, and almost the same number (33,8 %) were not fans of any sports player and did not watch any sports events.

**Fig. 1.** Weekly frequency of the additional PA in the adolescents’ free time

![Weekly frequency of the additional PA in the adolescents’ free time](image)

About 54,7 % of the respondents considered the sports classes at school were insufficient, and 30,2 % of the students defined the classes as boring. 55,6 % approved the compulsory normative, and 27 % did not want them. The rest of the respondents were not able to judge, but 72,4 % of all respondents considered the number of sports classes should be increased.

The research of the adolescents’ nutrition habits showed that only half of them (50,2 %) had breakfast in the morning and almost the same number of students had three main meals daily (53,8 %). Only 14,5 % declared they consumed meat and fish every day, and 53,5 % stated they ate bakery products more than twice a day. At the same time, only 52,7 of the respondents said they consumed fruits and vegetables more than once or twice a week. Also, it was seen that 25,8 % or a quarter of the respondents, did not put additional salt in their food. The rest of the students did it always or almost always.

The BMI estimation (according to WHO standards) provided the following results: 60 % of the measured students had normal weight, 38,54 % had overweight – the bigger share with overweight was for the 11-12 years old students in comparison to the 13-14 years old ones (Table 1). 1,45 % had a weight below the normal – these were 13-15 years old boys. From the boys’ group (52,4 % from all respondents) almost half of them were overweight (46,4 % of all boys), as of them (63,1 % from the overweight boy’s group) had overweight, and (36,9 % of the overweight boys’ group) had obesity. At the girls’ group (who were 47,6 % of all respondents) 31,1 % had overweight. From them (23,7 % of the girls’ group) had overweight and (7,6 % of the girls’ group) had obesity. The following factors were the most im-
important for the overweight according to the applied CART analysis over the children’s groups with normal weight, overweight, and obesity: the main category was “age”, followed by the daily consumption of meat and fish, and the number of main meals per day. When comparing the boys’ and girls’ nutrition, the CART analysis of boys with overweight and obesity defined the following important factors: daily consumption of bakery products; consumption of meat and fish, and additional salt in the food (Fig. 2). The model properly classified approximately 69.2% of the boys. In contrast, the main factor for the girls was the “age”, followed by the additional salt in the food, and the daily consumption of dairy products (Fig. 3). The model properly classified 77% of the girls.

Table 1. Category BMI towards the respondents’ two age groups

<table>
<thead>
<tr>
<th>BMI</th>
<th>Category_age</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10-12</td>
<td>13-15</td>
</tr>
<tr>
<td>underweight</td>
<td>% within Category_BMI 100.0%</td>
<td>4.0%</td>
</tr>
<tr>
<td></td>
<td>% within Category_age 1.5%</td>
<td>1.5%</td>
</tr>
<tr>
<td>normal weight</td>
<td>% within Category_BMI 58.8%</td>
<td>41.2%</td>
</tr>
<tr>
<td></td>
<td>% within Category_age 55.4%</td>
<td>68.0%</td>
</tr>
<tr>
<td></td>
<td>% of Total 35.3%</td>
<td>24.7%</td>
</tr>
<tr>
<td>overweight</td>
<td>% within Category_BMI 72.2%</td>
<td>27.8%</td>
</tr>
<tr>
<td></td>
<td>% within Category_age 29.7%</td>
<td>20.0%</td>
</tr>
<tr>
<td></td>
<td>% of Total 18.9%</td>
<td>7.3%</td>
</tr>
<tr>
<td>obesity</td>
<td>% within Category_BMI 76.5%</td>
<td>23.5%</td>
</tr>
<tr>
<td></td>
<td>% within Category_age 14.9%</td>
<td>8.0%</td>
</tr>
<tr>
<td></td>
<td>% of Total 9.5%</td>
<td>2.9%</td>
</tr>
<tr>
<td>% within Category_BMI 63.6%</td>
<td>36.4%</td>
<td>100.0%</td>
</tr>
<tr>
<td>% within Category_age 100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Fig. 2. The factors with the greatest influence over the presence of overweight in the boys’ group with weight over the normal
DISCUSSION:
It was found the adolescents had a low interest in sports and respectively a bigger share of the students who did not play any sport in their free time. From those who practicing some sports, one third practice sports rarely than three times per week, which is insufficient to provide any health profits. Bad attitude towards the sports was declared by almost half of the students who did not approve the compulsory normative or other criteria which should be satisfied at the sports classes. Besides the low physical activity, unhealthy and non-balanced nutrition were found at the greater part of the respondents – they missed some of the main meals and ate a lot of bakery products but not meat, fish, fruits, and vegetables. The BMI research showed that more than a third had overweight which was related to increased risk of development of non-infectious diseases such as diabetes, arterial hypertension, and others. The main part of this group was consisted of the 11-12 years old.

CONCLUSION:
It is necessary to produce and apply more flexible programs for promoting the adolescent to more regular physical activity and sports in their free time, and more adequate to their expectations school schedules for the sports classes.

Unfortunately, in a great range, the students’ unhealthy nutrition is defined by the way their family and friends eat. This fact can be changed through mutual collaboration between the different institutions: school, general practitioners, and the family.

At this age, the family is still the main factor which defines the adolescents’ attitude and wishes for sport and physical activity as well as the young people’s overall behavior towards the factors with negative influence over the health.

Abbreviation list:
BMI - body mass index
CART - method of classification and regression trees
EU – European Union
PA – Physical Activity
WHO – World Health Organization

ACKNOWLEDGEMENTS:
All students included in the research had an author’s form “An informed consent” signed by their parents where the research and its purpose were described in details. Recognition to all parents, who let their children participate in the research as well as the Minister of Education, the school headmasters, and the class head teachers. Recognition to The Dean of the Medical faculty - Prof. Dr Nikolay Boyadjiev, PhD. The previous Dean of Faculty of Public Health (2010–2017) - Prof. Dr Rumen Stefanov, PhD at Medical University of Plovdiv regarding the collaboration for preparation and all tools included in the whole scientific work.
Conflicts of interest: There is no conflict of interest! The scientific work has been presented to Scientific Ethics Committee on September 21, 2017, which gave its opinion with an order of The Rector of Medical University - Plovdiv No. P-2550 / 12. 10. 2017. This scientific study has been conducted under the project NO-12/2019 of the Medical University of Plovdiv on the topic: Physical development and health behavior of adolescents (11-14 years old) from different ethnic groups in the Municipality of Plovdiv.

REFERENCES:
5. Koleva N. [Healthy lifestyle at school Education.] Education. 1992; 5:33. [in Bulgarian] [Crossref]
12. UK and US guidelines on kids’ physical activity levels need rethinking. (e) Science News. in Health & Medicine. June 30, 2008. [Internet]

Please cite this article as: Merdzhanova E, Petrova G, Kulina H, Lalova V. A Research of Adolescents Physical Activity and Eating Habits During Their Free Time in City of Plovdiv, Bulgaria. J of IMAB. 2019 Oct-Dec;25(4):2713-2717. DOI: https://doi.org/10.5272/jimab.2019254.2713

Received: 27/02/2019; Published online: 02/10/2019

Address for correspondence:
Assoc. Prof. Gergana Petrova, PhD
Department of Nursing, Faculty of Public Health, Medical University – Plovdiv 15A, Vasil Aprilov, Plovdiv 4002, Bulgaria.
E-mail: gkg21@yahoo.com