EVALUATION OF FACTORS FOR ORAL HEALTH IN RELATION TO PYELONEPHRITIS IN CHILDHOOD

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ABSTRACT:

Purpose: The aim of this study is to be evaluated factors related to oral health in children with diagnosed pyelonephritis.

Material/Methods: A number of 92 children suffering from pyelonephritis and 41 healthy children participate in the research. A combination of clinical, statistical and sociological methods is implemented into the study.

Results: The average value of the number of carious lesions in children with pyelonephritis amounts to 5,59, and the maximal value of the same indicator equals to 20. In comparison, the average value of the number of carious lesions among healthy children is 4,85 and the maximal value of that parameter is 13. The maximal value of GI Löe-Silness is 2,00 in the group of participants with pyelonephritis, compared to 1,68 in healthy children. Almost ½ of the participants with the diagnosis pyelonephritis, namely 45,65%, performed dental visits only in an emergency. More than ½ of the healthy children, namely 65,85%, took part in regular dental visits on every six months. In the group of children suffering from pyelonephritis predominated the total ratio of parents with primary and basic education and illiterate parents. More than 2/3 of the parents of healthy children were characterized by higher education.

Conclusions: The renal disease of pyelonephritis afflicts oral-dental health in childhood. Precise control of the common health disorder parallel to a thorough evaluation and adequate management of the oral-dental status of the individual determine the specific principles of optimization and performance of primary, secondary and tertiary prophylactic cares in the context of personalized medicine.

Keywords: oral health, pyelonephritis, children, clinical factors, environmental factors,

INTRODUCTION

Nowadays, the conversance of physicians and dentists with the interrelations between common health disorders and oral-dental status of patients of different age groups is not totally corresponding to the necessity of performance of the individualized prophylactic and thera-

peutic approach. There is a tendency of accentuation on doctors' awareness of the clinical traits of disorders affecting hard teeth structures and soft tissues into the oral cavity, as well as of the opposite impacts of oral health diseases' affliction upon common health [1]. Based on investigation performed by M. Rashkova, M. Peneva, L. Doychinova among the most considerable risk factors for the onset and progression of tooth decay have been determined incessant and uncontrolled carbohydrates' consumption, viscosity, pH and buffer capacity of saliva, level of oral hygiene, caries susceptibility and distribution in parents, social-economic status of families [2]. The attitude of parents to the proper maintenance of oral-dental health of their children is conceptually associated with cultural and social-economic factors. In some minor social groups there have been ascertained deficiencies of dental cares, especially provided for primary dentition. The negligence of the problem of oral-dental health deterioration correlates to the lack of essential healthcare knowledge, insufficiency of initiatives for healthcare promotion, and a considerable variety of other environmental traits, including common health disorders [3].

The predominant predisposing factors for the onset of one of the most widely distributed common disorders of pyelonephritis are the excretory system anomalies in more than 50 % of all the clinical cases. It has been established that one of the most frequent anomalies is the vesicular-urethral reflux, with prevailing clinical manifestation during the period of early childhood. This anomaly sustains the advance of infection towards pyelon and kidney parenchyma tissue. Conditions of obstructive uropathology, nephrolithiasis and nephrocalcinosis also facilitate the initiation and progression of urinary tract infections [4]. The process of optimization of quality and duration of life of children suffering from pyelonephritis outlines an explicit contemporary policy of collaboration between medicine and dental medicine doctors and nurses [5]. In the context of profound investigations and thorough analysis of interactions and interrelationship between oral-dental state and different deviations from proper common health, we have also been motivated to seek for mutual impacts between oral and systemic health disorders. Related to no abundant scientific literature sources devoted to interrelations between pyelonephritis and oral-dental

state in the period of childhood, we compared the oral-dental condition of children with the established disease of the urinary tract with others without systemic disorders. The aim of this study is to be evaluated factors related to oral health in children with diagnosed pyelonephritis.

MATERIALS & METHODS

Into the study take part 92 children with diagnosed excretory system disorder of pyelonephritis. A control group of 41 participants of child's age is also included in the investigation. This study has received ethics approval from the Human Ethics Committee of the Medical University-Varna, city of Varna, Bulgaria (fig. 1).

Fig. 1. Participants in the study

A combination of clinical, statistical and sociological methods is implemented into the study (fig. 2).

Fig. 2. Methods implemented in the study

Sociological method The application of an enquiry individually addressed to a parent or guardian of each of the children included into the study provides essential information about the common health status of children, frequency of dental visits performed by children and their parents, oral-dental status of brothers and/or sisters of participants, educational qualification of parents, social-economic status of families.

Clinical method Clinical manifested findings of cavitated caries lesions were recorded for each of the representatives of the research. Parallel to the individual registration of the state of hard teeth tissues was evaluated the gingival health status of all the participants by the implementation of the Gingival Index GI Løe-Silness. With figures from 0 to 3 was assessed the degree of gingival inflammation based on records of the gingival tissue-contacting to the vestibular, palatal/lingual, medial and distal surfaces of all the representative teeth, namely: 16, 22, 24, 36, 42, 44. The figure of 0 corresponds to healthy gingiva, with no clinical findings of edema and bleeding. The figure of 1 is used for registration of a slight degree of gingival inflammation, clinically manifested with edema, without bleeding. The figure of 2 is equivalent to a moderate extent of gingivitis, characterized by edematous marginal gingiva and interdental papillae and provoked bleeding. The figure of 3 is indicative of the severe degree of gingival inflammation accompanied by edematous marginal gingiva and interdental papillae and spontaneous bleeding. Concerning each participant, the sum of all the figures is divided into the number of all the examined surfaces, namely 24. As a result, it is obtained the individual average value of the gingival index GI Løe-Silness.

Statistical method. Descriptive analysis. The average value of n number of values is determined as the sum of all the values is divided into their number n . The parameter of the average value is the most popular measure of central tendency. The median is the value situated in the middle of the statistical order. It can also be the value of the case that divides the cases organized according to the basic criterion to two equal parts. Similar to the indicator of average value, the median always exists and is unique for each aggregate of data. The standard deviation is calculated as the square root of the average value of the squared deviations of all the values from the middle one and is evaluated in the same metrics as the original measurements. Position of definite values closer to the middle one correlates to smaller standard deviation. Standard deviation, similar to the average value, is sensitive to extreme values. Therefore, the parameter of standard deviation is applicable in symmetric distributions with only one peak. Principally, the average value is calculated first, followed by the determination of the standard deviation. The last variable is implemented for the purpose of quantitative evaluation of variations into the population [6].

RESULTS

The average value of the number of carious lesions in children with pyelonephritis amounts to 5,59, and the maximal value of the same indicator equals to 20. In comparison, the average value of the number of carious lesions among healthy children is 4,85, and the maximal value of that parameter is 13. The maximal value of GI Løe-Silness is 2,00 in the group of participants with pyelonephritis, compared to 1,68 in healthy children (table 1).

Table 1. Descriptive Analysis of Clinical Indicators for Oral Health

indicator	average value	standard deviation	median	minimal value	maximal value
number of cavitated caries lesions in children with pyelonephritis	5,59	4,548	5,00	0,00	20,00
number of cavitated caries lesions in healthy children	4,85	3,844	6,00	0,00	13,00
GI Le-Silness in children with pyelonephritis	0,9299	0,61624	1,1000	0,00	2,00
GI Le-Silness in healthy children	0,9080	0,53213	1,0900	0,00	1,68

The lowest value of the indicator GI, equal to GI=0,00, has been registered among 20,7% of the representatives in the group of patients with pyelonephritis. In 1,1% of the participants of that group, there have been recorded maximal value of GI=2,00. Among the predominant ratio of the patients in the group, the value of GI is fluctuating between 0,99 and 2,00. It has been registered a tendency of the right-oriented (positive) distribution of the data (Graph 1).

Graph 1. Histogram of the index of GI Løe-Silness in children with diagnosed pyelonephritis

Among 12,2% of all the healthy participants included in the investigation was recorded the minimal level of GI=0,00. A ratio of 2,4% of the representatives of the group is characterized by the maximal value of GI=1,68. The greatest number of healthy controls, namely 14,6% of the children in the group, are characterized by the value of GI equal to 1,18. There has been outlined a tendency of the left (negative) oriented distribution of the data (Graph 2).

Graph 2. Histogram of the index of GI Løe-Silness in healthy children

Almost 1/2 of the participants with the diagnosis pyelonephritis, namely 45,65%, perform dental visits only in an emergency. More than 1/2 of the healthy children, namely 65,85%, perform regular dental visits on every six months (Graph 3).

Graph 3. Frequency of Dental Visits of Children

More than 2/3 of the parents of children with pyelonephritis perform dental visits only in an emergency. More than 2/3 of the parents of healthy children perform dental visits on every six months or once per year (Graph 4).

Graph 4. Frequency of Dental Visits of Parents

More than 1/5 of brothers or sisters of all the patients with pyelonephritis are characterized by poor oral-dental status. More than 1/3 of brothers or sisters of all the healthy children are characterized with good oral-dental status (Graph 5).

Graph 5. Oral-Dental Status of Brothers/Sisters of Children

In the group of children suffering from pyelonephritis predominates the total ratio of parents with primary and basic education and illiterate parents. More than 2/3 of the parents of healthy children are characterized by higher education (Graph 6).

Graph 6. Educational Qualification of Parents

Approximately 1/3 of the families of children with pyelonephritis are with low social-economic status. The ratio of families of healthy children with high social-economic status is almost three times higher compared to families of children with pyelonephritis (Graph 7).

Graph 7. Social-Economic Status of the Families of Children

DISCUSSION

In the context of a study devoted to specifics of oral-dental status among children from 5 to 18 years of age suffering from chronic renal failure was accentuated on interrelations between the common health disorder and susceptibility to oral diseases. Approximately 1/3 of these children were characterized by a total lack of cavitated caries lesions. Simultaneously, all of the patients were affected by gingival inflammation. There was established 5-fold increase of the frequency of moderate and severe degree of gingivitis in comparison to the slight degree among children going through hemodialysis procedures for a period longer than one year [7]. Another scientific team also emphasized on considerable alterations of the dental-alveolar complex

among patients of child's age with diagnosed chronic kidney disorder [8]. In parallel, we ascertained that the condition of excretory system disorder of pyelonephritis in childhood is associated with greater susceptibility to moderate, with inclination to severe degree of gingivitis. In comparison, into the control group of healthy children is predominantly recorded a slight degree of inflammatory reactions of the gingival tissue.

Based on the obtained results in the context of her dissertation for the scientific degree of DSC M. Dencheva accentuates on the investigation of fields of disturbance into the maxilla-facial region in patients going through hemodialysis and renal transplantation. Both of these groups of patients with renal disorders have been compared to

healthy controls. Approximately among one half (1/2) of the patients are recorded clinical findings of devitalized non-treated teeth. Among hemodialysis patients has been diagnosed severe deterioration of the periodontal status, as well as reduced secretion of stimulated and non-stimulated saliva in comparison to these with kidney transplantation and representatives of the control group [9]. In the course of an investigation conducted among hemodialysis patients and a control group of healthy participants are registered clinical findings of xerostomia and parotitis affecting the representatives with a renal disorder, but not the healthy people. In the group of patients is ascertained increased intensity of formation of calculus, related to elevated levels of salivary urea. Simultaneously, salivary urea is characterized with definite capacity for stimulation and maintenance of the process of re-mineralization of reversible, non-cavitated caries lesions. The restorative potentials of saliva are induced and sustained by the relevantly increased level of pH and elevated buffer capacity [10]. Another team of researchers also accentuates on the problem of the predominance of gingival and periodontal diseases in patients on hemodialysis [11]. A recent longitudinal study was organized and performed for comparison of the oral health status of patients suffering from chronic kidney disease at the pre-dialysis and post-transplantation stages. The investigators established that at the pre-dialysis period, the patients were affected by high intensity of calculus deposition and deep periodontal pockets. During the post-transplantation period, the patients with concomitant diabetic nephropathy were afflicted with considerable *Candida* growth, respectively, the infection of oral candidiasis. Besides the abnormal plaque accumulation, these patients were under the impact of the depressed flow of stimulated saliva. That study ascertains the role of preventive cares directed to elimination of the foci of oral infections preceding the procedure of kidney transplantation in order to be prevented postoperative complications [12].

In parallel, we establish that children with diagnosed pyelonephritis are with disturbed oral-dental health status. These children are characterized with definite susceptibility to initiation and progression of caries lesions to multifocal cavitated ones. The maximal value of 20 cavitated caries lesions affecting the child's dentition is recorded. Children suffering from pyelonephritis are also predisposed to gingival inflammation. Among the prevailing ratio of these patients of child's age is registered moderate degree of gingivitis.

A profound contemporary investigation emphasizes on the systemic consequences of poor oral health in patients suffering from chronic kidney failure. The authors of the study confirm that oral health can be considerably affected in the condition of severe renal system disorder, associated to definite risk of initiation and progression of inflammatory processes, infections, atherosclerotic complications and circulation system-related incidents. All of these factors have to be taken into consideration regarding the performance of proper, optimum dental cares carefully coordinated with the traits of the organism's common health state. The maintenance of healthy and functional dentition in these patients is a matter of great priority and requires the implementation

of professional efforts of dental medicine doctors in collaboration with nephrologists. Among the most essential prerogatives emerge the principles for strict and regular daily individual oral hygiene cares and a definite awareness of the significance of oral health on personal and social level [13]. The results obtained in the context of our study ascertain the importance of these requirements.

A considerable number of studies are devoted to the investigation of the inverse interrelation between the environmental indicator of the social-economic status of families and the rate of caries distribution at the different periods of childhood. Anamnestic data for carious lesions and complicated carious lesions in parents often take the role of a predisposing factor for the persistent, definite necessity of performance of dental treatment procedures in the period of the early childhood of their children. The precise evaluation of caries risk on individual level serves for the proper determination of the required frequency of dental visits [14].

At the same time, we established that patients of child's age with diagnosed urinary tract infections also need the adequate professional attitude and interdisciplinary complex medicine and dental medicine cares for improvement of their common and oral health. From one side, there are close interactions between the excretory system and other organs and tissues into the body. On the other hand, renal disorders correlate to definite impacts and considerable deterioration of morphology, physiology and function on systemic and local level. Specialists in the scope of Medicine and Dental medicine do not have to neglect the issue of affliction of the excretory system disorder upon oral-dental structures not only in patients suffering from chronic kidney disease. Researchers accentuate on the role of integrated, multi-aspect approach of prophylaxis and therapy addressed to patients on renal dialysis or after renal transplant. The professional experience, efforts and collaboration between the teams of nephrologists and dental medicine specialists are essential for the improvement of patient's common and oral health status. In order to avoid considerable risk for dental infections, unfavorable interactions and adverse effects of drugs and uncontrolled bleeding during dental procedures dentists have to coordinate the forthcoming dental cares with patient's nephrologist [15]. In the course of our study has been established that the environmental factors frequency of dental visits performed by children and their parents, oral-dental status of brothers and/or sisters of the participants, social-economic status of the family and educational qualification of parents are indicative and with explicit significance for differentiation between children with diagnosed pyelonephritis from healthy controls. Caries risk assessment corresponds to the organization and performance of prophylaxis- and therapy-related protocol associated to the postulates of personalized dental medicine [15]. A considerable number of basic risk-determining factors is accentuated in the context, namely: attitude of family members towards oral health cares; social-economic status of the family; behavioral patterns in dental office; common health status [16]. A significant number of studies has been conducted till the moment related to evaluation of skills, knowledge, behavioral patterns of medicine specialists in the form

of interdisciplinary contribution to their dental medicine colleagues in the context of common health disorders of patients in child's age [17].

Nowadays there is an urgent necessity of training of general practitioners and pediatricians for active seeking of collaboration from their dental medicine colleagues, and vice versa, for the purposes of adequate complex health cares, respectively optimization of the quality and duration of life of children suffering from excretory system disorders, including pyelonephritis. It has been established that the level of awareness of nurses for the interrelations between oral-dental status and clinical findings of diseases affecting oral cavity structures, from one side, and common health status of the individual, from the other side, is very low[18].

The most frequently occurring barrier inhibiting the process of collaboration between medicine and dental medi-

cine specialists and nurses occurs to be the lack of target training of all the representatives of the health care system [19]. At the same time, there are doctors practicing in various scopes of medicine who are in full consciousness of the definite correlation between oral and common health status of patients, but totally ignoring the need of taking concrete measures for them [20].

CONCLUSIONS:

The renal disease of pyelonephritis afflicts the oral-dental health in childhood. Precise control of the common health disorder parallel to thorough evaluation and adequate management of the oral-dental status of the individual determine the specific principles of optimization and performance of primary, secondary and tertiary prophylactic cares in the context of personalized medicine.

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