

Analysis of modern literature data on the improvement of the clinic, treatment, diagnosis and prognosis of dental pathologies in children and adolescents with cerebral palsy

Sunnatullo Amrulloevich Gafforov¹, Nodira Samandarovna Madaminova², Makhfuza Olimjon kizi Shamsieva³

¹Center for the development of professional qualifications of medical workers under the Ministry of Health of the Republic of Uzbekistan.

^{2,3}Tashkent State Dental Institute.

Email: sunnatullogafforov@mail.ru

DOI: 10.47750/pnr.2022.13.S06.003

Abstract

The article presents an analysis of scientific publications of scientists conducted in recent years, devoted to the clinic, diagnosis, methods of diagnosis and prediction of the pathological condition in children and adolescents with cerebral palsy. In the process of studying the literature, the authors emphasized the fact that in recent years there has been an increase in congenital cerebral palsy among children, problems in providing them with dental care, difficulties in the etiology, course and diagnosis of stomatitis and diseases of the maxillofacial region, they emphasized the need to improve scientific research in this direction.

Keywords: Dentistry, cerebral palsy, mineral disorders of the body, pathology of the dentition, caries, periodontal tissues.

INTRODUCTION

Relevance.

Cerebral palsy (CP) is a term used to refer to a group of non-progressive disorders of body posture and movement caused by damage to the central nervous system (CNS) occurring in the antenatal, intranatal or neonatal period. Cerebral palsy is the most common cause of childhood disability. According to WHO, the number of children born with a diagnosis of cerebral palsy is 3-4 cases per 1000 newborns [1, 3, 7].

It is known that today, according to the 10th revision of the International Classification of Disease (ICD-10), the following types of cerebral palsy are approved: - G80.0 - spastic cerebral palsy: - G80.1 - spastic diplegia: - G80.2 - children's hemiplegia: - G80.3 Dyskinetic cerebral palsy G80.4 Ataxic cerebral palsy - G80.8 - Other type (mixed type) of cerebral palsy: - G80.9 - Cerebral palsy, unspecified [22]. At the same time, according to statistics, spastic cerebral palsy is the most common, and accounts for 80% of all cases, that is, clinical manifestations are characteristic: muscle tone is increased, they are constantly in a state of contraction, which complicates the activity of organs; one arm and one leg on one side of the body, or both legs (diplegia or paraplegia) are also mostly affected.

In Uzbekistan, up to 800 new cases of cerebral palsy pathology are registered annually, and today the total number of patients under 18 years of age reaches about 40,000. At the same time, with the development of technologies for nursing very premature babies and their introduction into practice in Uzbekistan, it contributed to an increase in the incidence of cerebral palsy up to 5-7 cases per 1000 newborns [4].

In recent years, it has often been argued that, in most cases of cerebral palsy, the initial brain damage occurs during the early development of the fetal brain; intracerebral hemorrhage or various injuries of still underdeveloped brain tissue are the main pathological manifestations found in premature babies who develop cerebral palsy (CP) [5, 17].

A number of studies often note the accompanying diseases such as pathology of hard tissues of the tooth, periodontal tissues, oral mucosa (OM), traumatic dental lesions, bruxism, disorders of the temporomandibular system (TMJS), impaired function of chewing, swallowing and speech with CP children [4, 5, 6]. At the same time, the dental status of such children is most often burdened. This indicates the lack of scientific materials, including effective methods of medical care and organizational issues in this area, on the basis of this, such children and adolescents are in dire need of dental care, and the problem of preventing and treating dental diseases in such contingents is particularly relevant.

The authors argue that the most common cause of perinatal CNS damage is hypoxic-ischemic brain damage, the consequences of which occupy a leading place in the structure of morbidity in children of the neonatal period and early age. The main damaging factor in premature babies is hypoxia, which leads to both hypoxemia and cerebral ischemia (47%), while another author found that 60-80% of children with cerebral palsy have a change in the psyche and speech [12], also in children with cerebral palsy there are problems with salivation control, so food particles get stuck between the teeth, which often causes caries and other oral diseases (OD) [21].

Modern scientific views on the etiopathogenesis of neuropsychiatric diseases indicate the leading participation of oxidative stress (OS) in the formation and development of this pathology, and the accumulation of free radicals is detected at all levels of the macroorganism, including in the oral cavity [5, 6]. A number of studies have revealed obvious defects in the functioning of the pro-/antioxidant system at the level of the oral cavity in children with neuropsychiatric diseases (PND), which can be qualified as oxidative stress in the oral cavity [9, 10,]. Separate studies show a decrease in antioxidant protection and uncontrolled lipid peroxidation are recognized as the most important components of the pathogenesis of PND, diabetes mellitus, diseases of the joints, gastrointestinal tract (GIT) and dental pathology. Against this background, systemic and local (including the oral cavity) disorders occur, and dental pathology probably enhances the functional disorders of the antioxidant system, resulting in a “vicious circle” [19].

Studies have been conducted on the identification of probable genetic factors contributing to the formation of congenital malformations of the central nervous system (CNS), while it has been established that genetic and environmental factors contribute to the formation and development of neural tube defects, also, for the first time, a relationship has been revealed between the laying of NTD and I/D polymorphism (45-bp) in the 3'-UTR of the UCP2 gene, which encodes uncoupling protein 2 and is a variant of the family of mitochondrial “anion carrier proteins” [20].

It is also known that in the direction of the search for molecular genetic markers of caries using the most modern methods, including both population association studies and family analysis using triad analysis: father-mother-child, as well as genome-wide association studies (GWAS), while a range of caries markers, including genes associated with the formation of a tooth, dentin, the formation of tooth enamel, and immunity [1, 14]. Researchers argue that the process of tooth development at all stages is combined with the growth and development of certain organs and systems, that is, the skull, jaw, ears, fingers and toes, the cardiovascular and central nervous systems. Therefore, the ability to control the work of such genes will allow the use of prevention and treatment of a number of dental diseases [13, 17].

Dental morbidity is due to the presence of the underlying pathology, in which functions important for a person (movement, psyche, speech) are impaired. At the same time, children and adolescents cannot rationally take care of their oral cavity (OC), and some children have no self-care skills at all. And all this is accompanied by a lack of attention from parents. The results of studies by many scientists substantiate that among children with cerebral palsy there is a high prevalence of dental diseases [2]. For example, the author in his long-term scientific research revealed that among children and adolescents suffering from cerebral palsy, the prevalence of caries was up to 98.0%, periodontal disease up to 80.0%, while the remineralizing functions of saliva were reduced in 84.0% of cases. Also, in the saliva of these children, an increased concentration of bacteria of the *Streptococcus mutans* group was found in 85.0% and *Lactobacillus* in 92.0% of children. In addition, a significant part of researchers tend to consider periodontal disease as a common pathology in children with PND [9,10]. According to another author [3], among children and adolescents with cerebral palsy at the age of 7-18 years, the prevalence of periodontal diseases was noted -94.4% of cases, most of them proceeded in the form of chronic catarrhal gingivitis.

Manageable risk factors for the development of dental diseases in children with PND are extremely difficult to “manage” due to the characteristics of comorbid pathology, the socioeconomic status of patients and their families, and the specifics of current

standards for providing dental care to children. [7, 16]. At the same time, the group of neuropsychiatric disorders is not completely homogeneous either in terms of etiology or priority of damage to certain areas of nervous activity, however, a number of pathogenetic mechanisms and the commonality of clinical manifestations make it possible to combine these diseases for research into common dental problems for this cohort and search for pathogenetic justifications. the need to create other, special standards for the provision of dental care to children and adolescents with PND [8, 19]. Thus, the author considers dental pathology in children with PND to be a link in the pathogenesis of perinatal pathology of the nervous system. Children with severe forms of cerebral palsy are characterized by a high intensity of carious lesions. With a high degree of probability, it is believed that the reason for this is in “damaging” factors that cause disturbances in histoorganogenesis and tooth mineralization processes acting at different stages of prenatal development [9].

Also, there is scientific evidence for the most common anomalies associated with autism, mental retardation and Down syndrome, these are variations in the number of teeth and morphology: conical lateral incisors, spade-shaped incisors and taurodontism are often observed. According to the authors, in such children, teething is delayed or occurs in an unusual order, and the activity and prevalence of the carious process does not differ from those in the group of children without comorbid pathology [20]. However, it has been established that dental anomalies are very common among both temporary and permanent teeth, and in patients with Down syndrome [15]. Some researchers note that adequate OC hygiene in congenital PND does not save from the formation of dental pathology [10]. In other works, the results of the effectiveness of the use of a chewing herbal remedy with medicinal sage based on beeswax in the complex prevention and treatment of dental diseases in children with cerebral palsy are noted [11]. Also, the author developed a scheme of etiopathogenetic therapy of chronic catarrhal gingivitis in children suffering from cerebral palsy, while the researcher draws attention to the fact that children with this pathology cannot effectively use modern OC hygiene items (electric toothbrush, floss and toothpick) due to motor violations. Consistently conducted research aimed at improving the provision of dental care, a school method of medical and hygienic education for children and adolescents with cerebral palsy was proposed, the effectiveness of which was proven by increasing the level of hygiene knowledge, improving the hygienic state of the OC, reducing the intensity of dental caries, and also studied the features dental admission of children with cerebral palsy, on the basis of which practical recommendations for the management of children with this pathology have been developed [5].

The American Dental Association (ADA) suggests that children begin treatment for OC before they have teeth by wiping their gums with a warm cloth [11]. This not only cleans their mouth, but also helps them get used to brushing their mouths, which some children with cerebral palsy have difficulty with as they get older. After teething, regular brushing twice a day with a non-fluoridated toothpaste is recommended. When children are old enough to spit, fluoridated toothpaste is recommended. Between the ages of 18 months and 2 years, the child should visit a professional dentist for the first time. A dentist will typically check a child's teeth for oral problems and teach parents how to help their child take care of their teeth at home.

The analysis of literary sources in terms of the growing dental morbidity in children with PND indicates the ineffectiveness of the proposed methods: hygiene lessons, educational games, "fairy tale therapy" and others do not change the situation for the better, because such methods of working with such children are not paid for by local medical organizations and government agencies, the working time of a pediatric dentist is not intended by the classifier of services for such methods of communication, and irrigators for OC, which have the right to operate in the Republic, are not available to most of the children of this contingent due to their high cost, and sanitation of children with PND under general anesthesia has a number of contraindications and cannot be the method of choice [18]. At the same time, other studies suggest conducting a methodical, large-scale survey of family members of patients with PND for the effective organization of dental care for children with PND [10, 18]. Analysis of information from research and practical materials on the clinical manifestations of the main dental diseases in children and adolescents with PND, the mechanisms of their occurrence and development, specific clinical course and effective medical care for the contingent are still formulated at the level of hypotheses and assumptions.

Conclusion.

Based on the above data, the following problems that arise in OC can be listed - problems with chewing and swallowing; - lack of control when using a toothbrush and floss; - malocclusion of the upper and lower teeth; - excessive vomiting; - gingivitis caused by anticonvulsants; - the presence of food in the mouth for a long time; - biting of lips, tongue and cheeks; - and, finally, the main problem of the nature of the clinical course of dental pathology in congenital cerebral palsy. That is why, an effective response to this need requires the development of diagnostic algorithms, the prediction of dental pathologies, preventive measures, and an increase in the effectiveness of the treatment of pathology of the oral cavity in patients with cerebral palsy. Taking into account all of the above, we can conclude that the study of the mechanisms of the formation of dental pathology in

children with PND is relevant and the pathogenetic substantiation of new approaches to prevention, dental treatment and subsequent lifelong medical and social rehabilitation of this contingent, including the development of innovative non-invasive diagnostic methods and an alternative standard of care Dental care for children with PND is also needed today.

REFERENCES

1. Gafforov S.A., Yarieva O.A., Belenova I. A. «Ranee vyavlenie stomatologicheskix bolezney u detey i podrostkov kak predikatsiya kariesa». Proceedings of the 12th International Scientific and Practical Conference "Dentistry of the Slavic State" 105-107 p. Belgorod-2019.
2. Gafforov S.A., Xamroev F.Sh., Kuldasheva V.B. «Stomatologicheskie i nevrologicheskie patologii u detey: etiopatogeneticheskie aspekty ix vzaimosvyazi i diagnostika» Dentistry No. 4 (81). 55-59 p. Tashkent-2020.
3. Yertzina S.V. Kompleksnaya etiopatogeneticheskaya terapiya xronicheskogo kataralnogo gingivita u detey, bolnyx detskim serebralnym paralichom. 2005.
4. Isakova G.S., Majidova Yo.N. Otsenka primeneniya ergoterapii v reabilitatsii detey s detskim serebralnym paralichom. Relevance of scientific research in the modern world: Public organization "Institute for Social Transformation" ISSN: 2524-0986. 2020 №11-4 (67).
5. Kuruptursunov, A.A. Osobennosti vedeniya stomatologicheskogo ambulatornogo priema u detey s detskim serebralnym paralichom // Bulletin of medical Internet conferences. -2014. - T. 4. - No. 4. - p. 371-372.
6. Ozornin, A.S. Izmenenie protsessov lipoperoksidatsii i soderzaniya jirnyx kislot v eritrotsitarnyx membranax u bolnyx paranoidnoy shizofreniy /A.S. Ozornin, N.V. Ozornina, N.V. Govorin // Russian psychiatric journal. - 2017. - No. 2. - P. 47-53.
7. Petersen, P.E. Rasprostranennost stomatologicheskix zabolevaniy. Faktory riska i zdorove polosti rta. Osnovnye problemy obshestvennogo zdavooxraneniya /P.E. Petersen, E.M. Kuzmina //Dental Forum. – 2017. – No. 1. – P. 2-11.
8. Semina V.I. et al., 2015; Smaga, I. Oxidative stress as an etiological factor and a potential treatment target of psychiatric disorders. Part 2. Depression, anxiety, schizophrenia and autism.
9. Faraponova Ye.A. Bioximicheskie pokazateli rotovoy jidkosti pri zabolevaniyax parodonta u detey s psixonevrologicheskimi rasstroystvami: abstract of the dissertation of a candidate of medical sciences / E.A. Faraponov. – Krasnodar, 2017. – 24 p.;
10. Xagurova, S.B. Osobennosti mineralnogo obmena, antibakterialnoy i antioksidantnoy zashity v rotovoy polosti pri kariese zubov u detey s psixonevrologicheskimi rasstroystvami: abstract of the dissertation of a candidate of medical sciences / S.B. Khagurova. - Krasnodar, 2018. - 24 p.
11. American Academy of Pediatric Dentistry. Definition of special health care needs // *Pediatr Dent.* – 2012. – № 34. – P. 16.
12. A.N. Dos Santos, C.S. da Costa, M.T. Golineleo, N.A. Rocha // *Dev. Neurorehab.* – 2013.
13. Association of oxidative stress with psychiatric disorders /W. Hassan, H. Noreen, V. Castro-Gomes, et al. // *Curr Pharm Des.* –2016. Vol. 22. – P. 2960.
14. Enamelin is critical for ameloblast integrity and enamel ultrastructure formation /J.C. Hu, Y. Hu, Y. Lu, et al. // *PLoS One.* –2014. Vol. 9 (3). P. e89303.
15. J. Torales, I. Barrios, I. González // *Medwave.* –2017. Vol. 17 (8). – P. 7045.; Ghaith, B. Review of the Oral and Dental Characteristics //B. Ghaith, M. Al Halabi, M. Kowash // *Dental Implications of Down syndrome.* – 2017. – Vol. 5 (2). – P. 1087.
16. Meier, T. Global burden of sugar-related dental diseases in 168 countries and corresponding health care costs /T. Meier, P. Deumelandt, O. Christen, G.I. Stangi, K. Riedel, M. Langer // *J Dent Res.* – 2017. Vol. 96. –P. 845-854.
17. «Morphometric features of the formation of organs of the dentition in children with chronic pathologies of the respiratory system» *Jurnal of critical reviews* vol 7. ISSUE 18.20. 892-898. Gafforov S.A., Durdiev J.I.
18. Oral health status and reasons for not attending dental care among 12- to 16-year-old children with Down syndrome in special needs centres in Jordan / R. Al Habashneh, S. Al Jundi, Y. Khader, et al. // *Int J Dent Hygiene.* – 2012. – Vol. 10. – P. 259-264)
19. Salim, S. Oxidative Stress and Psychological Disorders / S. Salim // *Curr Neuropharmacol.* – 2014. – Vol. 12 (2). – P. 140-147.
20. Trovó de Marqui, A.B. Síndrome de Turner e polimorfismo genético: uma revisão sistemática / *Rev Paul Pediatr.* – 2015. Vol. 33 (3). – P. 364-371. 36
21. Yuan, M. Acute sialadenitis secondary to submandibular calculi after botulinum neurotoxin injection for sialorrhea in a child with cerebral palsy /M. Yuan, J. Shelton // *Am. J. Phys. Med. Rehab.* – 2011
22. <https://www.who.int/ru>