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DEVELOPMENT OF INDIVIDUAL PREVENTIVE MEASURES USING ARTIFICIAL INTELLIGENCE TECHNOLOGIES IN CHILDREN WITH ENAMEL HYPOPLASIA.

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ABSTRACT

This article studies the direct relationship between dental hard tissue, periodontal and oral cavity diseases in the formation of oral cavity diseases, changes in the assimilation process of diseases in the body in children with enamel hypoplasia, and the intensity of dental hard tissue diseases in these groups.

Keywords: hypoplasia, enamel, erosive hypoplasia, sulcular hypoplasia, mixed hypoplasia, oral cavity, encephalopathy, nephropathy

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“EMAL GIPOPLAZIYASI MAVJUD BOLALARDA SUN’IY INTELLEKT TEXNOLOGIYALARI YORDAMIDA INDIVIDUAL PROFILAKTIK CHORA-TADBIRLARINI ISHLAB CHIQISH”

ANNOTATSIYA

Ushbu maqolada emal gipoplaziyasi mavjud bolalarda kasalliklarining organizmdagi assimilyatsiya jarayoni o‘zgarishlarining og‘iz bo‘shlig‘i kasalliklari shakllanishida tish qattiq to‘qimasi, parodont va og‘iz bo‘shlig‘i kasalliklarining bevosita bog‘liqligi o‘rganilgan bo‘lib, ushbu kontingentlarda tish qattiq to‘qimasi kasalliklari intensivligi keltirilgan.

Kalit so‘zlar: gipoplaziya, emal, eroziv gipoplaziya, sulkulyar gipoplaziya, aralash gipoplaziya, og'iz bo'shlig'i, ensefalopatiya, nefropatiya.

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«РАЗРАБОТКА ИНДИВИДУАЛЬНЫХ ПРОФИЛАКТИЧЕСКИХ МЕР С ИСПОЛЬЗОВАНИЕМ ТЕХНОЛОГИЙ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА У ДЕТЕЙ С ГИПОПЛАЗИЕЙ ЭМАЛИ»

АННОТАЦИЯ

В данной статье исследуется прямая взаимосвязь между заболеваниями твердых тканей зубов, пародонта и полости рта при формировании заболеваний полости рта, изменениями в процессе ассимиляции заболеваний в организме у детей с гипоплазией эмали, а также интенсивностью заболеваний твердых тканей зубов в этих группах.

Ключевые слова: гипоплазия, эмал, эрозивная гипоплазия, бороздчатая гипоплазия, смешанная гипоплазия, полости рта, энцефалопатии, нефропатия.

In recent years, the use of artificial intelligence technologies has been widely developed among the population. According to the latest data, the prevalence of dental hard tissue damage among the population is 98%, which causes medical, social, and economic problems. In particular, the development of this pathology is of particular importance due to the complexity of its diagnosis and treatment. It was found that studies conducted over the past 5 years have shown that in children with enamel hypoplasia, dental hard tissue diseases are observed in up to 42%, and their combination with various dental diseases is observed in up to 80%. At the same time, the prevalence of enamel hypoplasia in patients with dental hard tissue diseases and the prevalence of 25.3% to 32.4% indicates the high prevalence of the pathology. This is explained by the fact that the initial stages of the pathology proceed without clear clinical signs, the inability to obtain sufficient information about changes in both clinical and laboratory examinations, and the lack of a single etiological view among specialists. The reasons given indicate the need to improve the methods of treatment and prevention of this medical problem[1,5].

Tasks of the research:

to determine clinical-stomatological changes and manifestations of complications in tooth hard tissue in children with enamel hypoplasia;

development of an innovative dental diagnostic system based on artificial intelligence technologies for children with enamel hypoplasia;

creation of an individual treatment system and evaluation of its effectiveness using artificial intelligence technologies in children with enamel hypoplasia;

development of individual preventive measures in children with enamel hypoplasia using artificial intelligence technologies.

As the object of the study, 120 children with enamel hypoplasia, 8-18 years old, and adolescents, who applied to the Bukhara Regional Center for Specialized Pediatric Dentistry, will be the main group and 45 healthy children will be taken as the control group.

During pregnancy: poor nutrition and alcohol consumption by the mother during pregnancy; endocrine pathologies; calcium metabolism disorders; infections during pregnancy: toxoplasmosis, rubella, acute respiratory viral infections, influenza; severe pathologies: encephalopathy, nephropathy, and others; Rhesus incompatibility between mother and child. During and after childbirth: prematurity; asphyxia or trauma during birth; hemolytic disease of the newborn; perinatal infection; blood transfusion in the first days of life[6].

In the first years of life: poor nutrition; artificial feeding; chronic renal failure; severe infections; allergies; gastrointestinal pathologies; congenital diseases (hypothyroidism, metabolic disorders, cardiac and vascular pathologies); iron deficiency anemia. If the causes of the disease lie in intrauterine development, then the manifestation of symptoms is possible already in the first months after the eruption of baby teeth. By the age of 2, enamel underdevelopment can be observed in the cervical area (closer to the gum) of the central and lateral incisors, as well as on the chewing

surfaces of the first molars. By the age of 4, signs of the disease become visible on the canines and second molars [8]

If the disease begins in the first years of life, the first symptoms most often appear after 6-7 years of age, during the eruption of permanent teeth. The problem can be identified by whitish spots on the teeth. Most often, the tooth already erupts with these spots. In some cases, longitudinal lines (from the gum to the tip of the tooth) or transverse waves (from the left edge of the tooth to the right) may be present instead of spots. These defects may decrease in size over time, which is associated with the continued formation of enamel [12].

In more severe cases, areas with characteristic depressions resembling erosion are visible on the surface. The tooth enamel in these areas is thin, and sometimes completely absent. The surface of the teeth is rough to the touch. The most severe manifestation of this pathology is the complete absence of enamel (aplasia). In this case, the teeth are extremely sensitive to hot, cold, and acidic substances. The hard tissues are brittle and prone to destruction [1,4].

Since enamel is underdeveloped in problem areas, it does not perform its protective function. Caries-causing bacteria easily attack it, penetrating through it into the dentin. Therefore, caries develops rapidly in young patients. This manifests as spots on the enamel—at first yellowish, then darker. Areas severely affected by caries have a brownish tint and the presence of cavities.

Based on the location of the problem, the following are distinguished:

systemic enamel hypoplasia—observed on all teeth, most often manifesting in the primary dentition;

localized enamel hypoplasia—defects in the form of spots are observed on individual teeth (usually 1-2), a problem typical of the permanent dentition;

focal—significant damage to primary or permanent teeth, their size smaller than normal, and the surface covered with rough spots and erosions.

Based on the defect form, hyperplasia can be of the following types.

Spotted. The simplest form of the disease, characterized by enamel clouding. The spots are smooth to the touch, and their color is most often whitish or light brown. They are clearly defined and easily visible under bright frontal light. They are most often detected by a dentist during a routine examination[7].

Erosive (cup-shaped). Pits with thin or absent enamel can be seen on the surface. Teeth are sensitive to cold and hot. And areas of erosion are most susceptible to caries.

Wavy. The defects take the form of small, wave-like depressions that extend from the roots to the edges of the teeth.

Sulcular. One or more grooves, in which the enamel is thin or absent, run from one edge of the tooth to the other.

Combined. A severe form in which two or three types of defects are present on the tooth surface. Most often, this is a combination of erosions and sulcular depressions.

Aplasia. A complete absence of enamel due to its underdevelopment. Patients suffer from dental hypersensitivity. Exposed dentin becomes easy prey for bacteria. Due to caries, teeth become weak, and multiple chips are observed.

This disease is characterized by symmetrical defects on the left and right sides. We listed the risk factors that can trigger these disorders above. The cause of the disease is a disruption in the child's metabolism responsible for enamel formation [5].

Teeth buds appear in the fetus in the fourth month of pregnancy. Dentin, the main dental tissue, forms first, followed by enamel, the surface layer. Important components of enamel formation are the processes of mineralization and calcification. At the initial stage of development, enamel is soft and resembles cartilage. It contains up to 30% organic matter, which is gradually replaced by mineral salts. Before teeth eruption, enamel goes through two stages of maturation. The third occurs after

eruption. Mature enamel is 95% mineral salts. It is the hardest, acellular tissue in the body, and contains no blood vessels or nerves[3,5,9].

Material and methods. The formation of the dental bud begins at 6-7 weeks of embryogenesis and passes through several key stages: kidneys, caps and bells. At each of these stages, there is an active interaction between ectodermal and mesenchymal cells, which in turn leads to the laying of the main dental structures. Finally, the periodontal ligament connects the tooth cement to the bone, performing both supporting and trophic functions. Thus, all these processes are strictly regulated by genetic and molecular mechanisms, which guarantees the full and consistent development of teeth [5,6,7].

Dental defects can affect both individual teeth and their totality, and can also be localized or generalized. In the context of enamel, pathologies such as enamel hypoplasia and amelogenesis imperfecta are distinguished, in which various types of defects are observed [8].

Dentine defects include dentine dysplasia and dentinogenesis imperfecta. In addition, cement pathologies such as hypercementosis, hypocementosis and acementosis are also considered. Some defects may cover all tooth structures, for example, aplasia or regional odontodysplasia (odontogenesis imperfecta). Segmental odontodysplasia also deserves attention, especially due to its frequent localization in the alveolar process of the maxilla. Each type of defect has unique characteristics and can lead to various problems related to dental development and health, which highlights the need for a thorough diagnostic approach and comprehensive treatment [9,10].

The size and number of teeth can vary from the norm, and this can be classified as macrodontics (teeth larger than normal), microdontics (teeth smaller than normal) and short roots (roots do not reach the norm) [11]. Hyperdontia (excessive number of teeth) and hypodontia (insufficient number of teeth) are often observed in different peoples and are often associated with syndromes. Tooth discoloration can have different variations, including chalky white, snowy white, gray, black, brown, blue, yellow, and red. These color changes can be caused by various factors such as food, vitamins, minerals, excess fluoride, systemic diseases, cystic fibrosis, fever, jaundice, dehydration, medications, dental injuries and infections, as well as birth defects of enamel and dentin. In recent years, the number of cases of tooth discoloration caused by tetracycline has decreased significantly [12,13].

The etiology and stages of tooth development determine the outcome of a tissue defect. Genetic defects affect the entire tissue because they are continuous, while defects caused by the environment are determined by the time and duration of exposure to environmental factors. Any disruption in the processes of tooth development can lead to defects proportional to the severity and time of the injury. Violations of the number of teeth can cause anomalies of occlusion, function and aesthetics. Hyperdontia is when the number of teeth exceeds the norm, and hypodontia reduces the normal number [1,5].

Hypodontia can manifest as missing or multiple missing teeth. Cases of hypodontia and oligodontia are most often associated with syndromes in which other organs are affected. An example of such a syndrome is ectodermal dysplasia, in which affected patients have a small number of deformed teeth. In most cases, these teeth are located in the anterior part, while teeth in the premolar and molar regions are absent [13]. The various types of additional teeth and their location in the upper or lower jaw are of considerable interest in dental practice. Some of these teeth have an excess number, including conical, tuberculous, or additional teeth, which are often found singly or in pairs on the palatine side of the upper incisors[3].

These anomalies may interfere with the proper placement of primary teeth and in some cases require their removal. Accurate diagnosis is necessary to identify the cause of delayed eruption of permanent teeth, and the optimal time for surgery avoids damage to developing permanent teeth. In situations where an additional tooth erupts near the molars, the decision to remove it is based on the prediction of the most favorable orthodontic result. In particular, paramolar teeth can be considered

as a possible replacement for destroyed molars[2,4]. Radiography often plays a key role in detecting and evaluating the presence of such teeth, which contributes to accurate treatment planning and minimizing complications [3,7].

They can sometimes accompany a person from birth until death. One such condition is systemic hypoplasia. The number of patients with non-carious dental lesions is growing every year, but another problem is that many people hesitate to see a dentist until more serious symptoms appear [12].

With systemic hypoplasia, a child may require treatment as early as the first tooth appears. Various medical methods exist for combating this condition. However, treatment is typically a lengthy process, requiring significant effort, time, and financial investment from the child and their parents [10]. Despite all the advances in medicine, prevention remains the best way to combat disease. By following simple rules, many problems can be avoided in the future, including the development of systemic hypoplasia[2,8].

The research data for this paper were drawn from numerous scientific works on systemic hypoplasia in children. Publications devoted to the prevention of this dental pathology were analyzed. Research conducted in this area was reviewed. Analysis and synthesis were the methods used in this paper[3,7].

Signs depend on the extent of the enamel damage. In a mild form, white, sometimes yellow, spots with clear boundaries are observed. They are uniform in size and usually located on the labial side of the teeth. With this form of hypoplasia, normal enamel thickness is maintained[2,8,10].

A more severe form of the disease manifests as waves or pinpoint depressions on white, matte or yellowed enamel. Defects are located on the cusps and cutting edges. The tooth surface can be rough or smooth, dull or retain a healthy shine. In severe forms, areas of aplasia are found on one or several teeth at once. The environment is deteriorating every year, which directly impacts human health [10,11]. Various genetic abnormalities are being identified in people, and the number of patients is increasing. For example, one of the factors in the development of systemic hypoplasia is heredity. Various illnesses suffered during pregnancy can also affect the child [12].

Conclusions. Based on the factors contributing to the development of systemic hypoplasia, it is possible to determine the main areas of prevention. During pregnancy, every woman must be very attentive to her health. She should visit her doctor regularly, follow all his or her instructions, and also give up bad habits and switch to a healthy diet. At the first symptoms of illness, it is necessary to immediately contact a doctor; medications should be taken only as prescribed. The mother should also pay close attention to her own oral hygiene [4]. After the birth of the child, it is necessary to closely monitor his or her health. It is necessary to attend preventive examinations, contact a doctor at the first symptoms of illness, and avoid self-medication. Women's clinics and children's clinics should hold lectures where everyone can learn about disease prevention methods, the consequences of not following doctor's recommendations, and what to do if a child is diagnosed with systemic hypoplasia [1,5].

Children are the most vulnerable group; they are unable to care for themselves and their health. Parents must fulfill all these responsibilities. A mother-to-be should pay close attention to her health even before the baby is born. Illnesses, stress, and vitamin deficiencies all impact the health of the unborn child. A child should have regular checkups with a doctor. Early detection is the first step to recovery[1,4].

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