



# The Effect of Hormonal Status on The Formation and Development of Dental Hard Tissue

**Akhmedov Alibek  
Bahodirovich**

Bukhara state medical institute

## ABSTRACT

Pathologies of the maxillofacial area is one of the most common types of pathology in dentistry and has a widespread prevalence regardless of gender and age. Violations in the dental system lead to a number of negative consequences, accompanied by changes in the functioning of many body systems. The review is devoted to the analysis of hormonal factors, identifying the mechanisms of their occurrence in violation of the body's hormonal background. The information presented in the article broadens the understanding of the causes of various pathologies of hard dental tissues.

## Keywords:

Sex hormones, oral organs, mineralization, demineralization, clinical observation, bone tissue, oral cavity, erupted teeth, endocrine system.

## I. Introduction

In modern dentistry, there are several stages of growth and development of teeth and the corresponding timing of tooth laying, differentiation and calcification of dental tissues, eruption of temporary and permanent teeth, root formation.

The authors distinguish three periods of growth and development of permanent teeth: inside the jaw formation, eruption, root growth and periodontal formation. Numerous studies have been devoted to this period of growth and development of teeth as visually controlled and accessible for clinical observation. The study was mainly reduced to the statement of the timeliness of teething, pairing, symmetry of their appearance in the oral cavity, as well as the identification of malformations of teeth, anomalies of the position of teeth and bite. Most researchers provide data on the timing of teething in a certain climatogeographic zone, so the indicators vary slightly from one author to another. The early, middle and late periods of

teething have been determined, which pediatricians and dentists use to judge the physiological status of the body. The concept of "dental age" is introduced, which is compared with the "bone" age, i.e. with the degree of calcification of highly mineralized tissues [10, 14, 23].

## II. Analysis

The relationship between the growth and development of teeth with the growth and development of the body, i.e. the parallelism of growth processes, is confirmed by an increase in human growth and the number of erupted teeth with increasing age [8, 10, 14, 20, 23]. Since teeth, like bone, belong to highly mineralized tissues, the development of teeth and the surrounding bone tissue occurs in a constant relationship. By X-ray observations, the authors found that there are several periods of growth arrest in the development of the rudiments of milk and permanent teeth, coinciding with a slowdown in the rate of jaw development.

Teething is a complex process that has no analogues in other body systems, when the growth and development of an organ occurs inside another tissue. The movement of the tooth to the alveolar edge, overcoming the barriers of bone tissue and mucous membrane and its appearance in the oral cavity is considered a difficult-to-explain process. Therefore, such theories of teething as root, alveolar, bone tissue rearrangements were created and until recently preserved in the educational literature. Some authors believe that when the pulp volume increases due to the differentiation of the mesenchyme and an increase in the volume of the base substance, the pressure inside the dental rudiment is created, which forces it to move towards the free edge. At the same time, they drew attention to the fact that the deposition of newly formed bone tissue at the bottom of the dental alveoli at the base of the dental rudiment begins long before the appearance of the tooth crown on the surface of the oral mucosa and continues throughout the entire period of eruption [4, 18].

According to the authors, there is no isolated tooth movement. Its growth and development are associated with the development of the alveolar bone, while an important role in teething is played by the influence of the nervous and endocrine systems, metabolism in the tissues of the alveolar bone in the embryo, malnutrition, heredity, geographical conditions. Recognizing the regulatory role of the nervous and endocrine systems in teething [3].

Another author notes that "in this case, the differentiation of tooth tissues is important, accompanied by an increase in volume and the creation of a certain pressure inside the rudiment, while the restructuring of bone tissue in front and behind the rudiment is of great importance, which causes its movement" Growth and development are closely interrelated processes characterized by an increase in tissue mass due to an increase in the number and size of cells, and their differentiation. The overall management of the growth process is complex and, according to the author, is subject to three main factors: genetic, endocrine, trophic [4].

Judging by the modern publications cited above, some authors continue to adhere to the idea of the influence of the prevailing force due to the increase in tissue volume on teething, which was expressed in the last century, repeatedly published, but not confirmed by experiment.

Insufficient development of the biological direction in the study of this issue allows us to maintain long-established views on the process of teething. To explain the growth and development of any tissues and organs, there is no term "growth mechanism" in the scientific literature, but there is information about morphological changes occurring during periods of acceleration and deceleration of growth, as well as data on the influence of biological and other factors on growth and development. However, the term "mechanism" of teething has been used in dentistry for the past two centuries, although there is no mechanism as such, but there is a natural genetically determined process of growth and development of teeth, accompanied by a rather complex morphological restructuring of dental and near dental tissues with simultaneous growth of the jaws. The growth and development of a complex of tissues occur under the influence of neuro-endocrine regulation and other factors affecting the growth process of the whole organism.

The effect of hormones on the growth and development of the human body is of great interest not only for pediatricians, hygienists, endocrinologists, but also for dentists. For example, in the hormonal growth system, the main hormones controlling growth and development, N. Shabalova calls growth hormones, thyroid glands, sex hormones present in the body in a strictly defined ratio for each stage of development [5].

Another author believes that the growth process is influenced by environmental and socio-economic factors; growth hormones, thyroid glands,

Studying the process of tooth growth and protein metabolism in teeth and bone tissue after pituitary ectomy in rats, the author found a progressive slowdown in the growth and eruption of incisors with the cessation of

amylogenesis, a decrease in the level of inclusion of methionine (S35) in the proteins of teeth and bones. The introduction of pituitary somatotropin hormone to pituitectomized rats normalized the inclusion of methionine in the proteins of teeth and bones with the restoration of the growth of the cartilaginous plate of the tibia, but did not affect the rate of incisor eruption, which the author explains by the low value of somatotropin hormone in the regulation of tooth growth, suggesting the leading role of thyroid hormones [20].

It became known that the somatotropin hormone cannot manifest its growth effect without thyroxine, insulin, glucocorticoids, sex hormones [9].

Under experimental conditions, it is important to simultaneously study various highly mineralized tissues. However, in some cases, the effect of hormones on tooth growth was carried out without comparison with the growth of other calcified tissues [1], other researchers have established a relationship between the growth and development of the tooth and the surrounding bone, as well as the state of the skeleton [20].

In the process of growth, sex hormones are actively involved, which are in a certain relationship with the activity of the central and peripheral endocrine glands. It has been established that sex hormones begin to be produced in the embryo and cause sexual dimorphism in the development of the skeleton. After birth and in early childhood, the amount of sex hormones is small, but it increases with age [12, 15, 19, 21]. Due to the anabolic effect, sex hormones affect the structure of the basic substance of the bone, accelerate the growth and differentiation of the skeleton, and also have a significant effect on the mineralization of calcified tissues. The influence of female and male sex hormones on their biological orientation on the creative processes in the bone tissue is somewhat different. The final growth sizes and different growth rates of boys and girls are considered as manifestations of dimorphism, which is determined by the influence of sex hormones [13, 16, 17, 22, 24].

One of the manifestations of morphological maturity of the organism, closely

related to the laws of physical development, are the processes of ossification of skeletal bones. According to the time of the appearance of ossification centers, their number and the stage of development of each of them, girls are ahead of boys [6]. Girls had been seen earlier eruption of permanent teeth [2].

The effect of sex hormones on the growth and development of teeth in experimental conditions has not been studied, although sex differences in the eruption of permanent teeth in children are well known.

Sex hormone preparations (synestrol, testosterone) are biological stimulators of the growth and development of teeth and bones. In an animal experiment, differences in the formation of highly mineralized tissues in animals of different sexes were demonstrated, which should be considered as manifestations of sexual dimorphism.

The presence of general patterns of growth and development of highly mineralized tissues should be regarded as a phenomenon governed by general biological laws, as well as the growth of the organism as a whole.

### III. Conclusion

Thus, the above literature data indicate that the hormonal system of the body, to one degree or another, regulates the formation, growth and development of bone tissues, including teeth and jaws. According to a number of authors who have previously conducted scientific research on this problem, the degree of study in this direction is insufficient, and therefore, we believe that the study of the role of internal hormones in the development of the dental system needs to be continued, which in the future will make it possible to develop new methods for diagnosing the function of endocrine organs, predicting their disorders, which will allow for treatment and prevention in a timely manner.

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