

Some Aspects Of The Pathogenesis And Diagnosis Of Teething In Newborns

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ABSTRACT

The aim of this study was to evaluate some aspects of the pathogenesis and diagnosis of teething in newborns based on the study of the dynamics of estrone in breast milk and the saliva of a newborn. 78 practically healthy lactating women with obesity-38 and 30 who were not obese were examined, as well as their newborns. Object of study, saliva and blood plasma. It was revealed that the hormonal profile of a newborn in saliva with a change in metabolism in lactating women can undergo certain changes. As lactation develops in women with excess body weight, hormone estrone undergo intensive elimination from milk, which leads to a decrease in its content in breast milk, which can affect metabolic processes in the newborn's dentofacial system.

KEY WORDS: obesity, newborns, breast milk, estrone, teething

I. INTRODUCTION

Teething is its axial movement from a non-functional position in the jaw bone to a functional occlusion. The dynamics of this process depends on the degree of formation of the root, periodontium and is closely related to the development and growth of the craniofacial complex. Teething is one of the links in a complex chain of processes of the physiological development of the child, which begins in the prenatal period and lasts for several years. Teething is characterized by quantitative and qualitative indicators (1-13). Teething is an important factor in assessing the development and formation of the baby's dentition. Various factors influence teething. A number of researchers believe that the genotype of a person, his constitution, is of primary importance in the process of teething, although the role of various

external environmental factors cannot be ruled out (17-26) By the time of teething, the portion of the bone covering the tooth crown is resorbed. The same processes are noted in the gum. During the growth of the tooth root, there is also a bone remodeling and a gradual deepening of the dental alveoli. At the same time, morphological changes in the tissues surrounding the tooth occur: increased blood flow, changes in vascular permeability, increased production of the main substance of the pulp and periodontium (14-45). Since teeth, like bone, are highly mineralized tissues, the development of teeth and the surrounding bone tissue occurs in a constant relationship. 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 to be an inexplicable process. Therefore, such theories of teething as root, alveolar, pulpar, bone tissue remodeling were created and until recently remained in the educational literature [8, 32, 43, 45, 46].

T.E. Zueva [2003] believes that the influence of the nervous and endocrine systems, metabolism and alveolar bone in the embryo, malnutrition, heredity, and geographical conditions play an important role in dentition. Recognizing the regulatory role of the nervous and endocrine systems in teething, I.V. Gayvaronsky (2003) notes that “differentiation of tooth tissues, accompanied by an increase in volume and the creation of a certain pressure (strain) inside the germ, is important. The restructuring of the bone tissue in front and behind the embryo is of great importance, determines its movement.”

The effect of hormones on the growth and development of the human body is of great interest not only to pediatricians, hygienists, endocrinologists, but also to dentists. In the hormonal growth system, L. Wilkins calls growth hormones, the thyroid gland, as the main hormones that control growth and development. sex hormones present in the body in a strictly defined ratio for each stage of development (39). It is widely believed that the main stimulator of histogenesis of cartilage, bone and dental tissues is the pituitary somatotrophic hormone, and the thyroid hormone controls tissue differentiation (22,38,39). It has become known that growth hormone cannot manifest its growth action without thyroxine, insulin, glucocorticoids, sex hormones (38).

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. After birth and in early childhood, the amount of sex hormones is small, but with age it increases [7, 9-11, 30]. 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 in their biological orientation on the creative processes in bone tissue is somewhat different. The final sizes of growth and various growth rates of boys and girls are considered as manifestations of dimorphism, which is determined by the influence of sex hormones (5,15,17). The most active was synestrol tooth growth under its influence increased by 22-41% compared with indicators in intact animals and by 11-29% in castrated animals. Testosterone increased tooth growth by 10-23 and 1-13%. Differences in the biological effects of female and male sex hormones were also expressed in the fact that the greatest increase in teeth (by 29-41%) caused synestrol when a small dose (300 µg) was administered, and testosterone (by 13-23%) when a high dose of the drug (1000 µg) (19,21,24). By exerting

a pronounced anabolic effect and contributing to the calcification of highly mineralized tissues, synesterol and testosterone accelerated tooth growth and bone formation. Progesterone led to a greater increase in teeth (by 22.7%).

Thus, it is established that the developing tissues of the tooth are sensitive to hormonal changes, and the degree of change depends on the dose and type of hormone. Acceleration and deceleration of the growth and development of teeth under the influence of hormonal changes (castration, the introduction of sex hormones) should be interpreted as a hormone-dependent process.

Taking into account the foregoing, it can be assumed that teething delay (ZPZ) is a hormone-dependent process and can affect the formation of the jaws and facial part of the skull. Often, ZPZ is the primary, and sometimes a single manifestation of a local or systemic pathology. Such features of growth and development may be the motive for a thorough history and an additional examination of the patient. ZPZ, being a reflection of regional and systemic deviations from the norm, requires close attention from specialists in collecting anamnesis and assessing the clinical situation, making a diagnosis, choosing treatment methods and predicting treatment results (7.8). The information presented to a certain extent will facilitate the construction of a "diagnostic tree" when working with ZPZ.

A study conducted by numerous researchers indicates that the critical time for growth and teething is from 8 pm to 1 hour after midnight. In the morning and during the day of growth, almost no growth is observed, which indicates the circadian rhythm of growth rhythms associated with hormonal peaks during the day. The literature contains information on the content of hormones in female milk, as well as hormonal relationships between mother and child during the lactation period. The foregoing was the prerequisite for an in-depth and comprehensive study of the hormonal composition of human milk in the dynamics of lactation.

Obesity is one of the most common chronic diseases in the world. According to modern data, every fourth inhabitant of our planet suffers from some degree of obesity or is overweight (9). According to 2014 WHO, more than 1.9 billion adults over 18 years of age are overweight (10). Of this number, over 600 million people are obese. Fat cells secrete a number of hormones, cytokines, which provoke the development of inflammatory diseases that have common pathophysiological bases with obesity. Numerous studies have traced the relationship between the pathology of endocrine organs and tooth growth. Growth retardation and delayed teething are described after removal of the pituitary gland (21,22,40), with cerebrohypophysial dwarfism and hypogenitalism, congenital atyroidism and hypothyroidism, adipozogenital dystrophy (22).

Based on the foregoing, the purpose of this study was to evaluate some aspects of the pathogenesis and diagnosis of teething in newborns.

II. MATERIALS AND METHODS

The object of the study was 78 practically healthy lactating women aged 20-27 years living in the city of Tashkent. In accordance with the objectives of the study, patients were divided into 2 groups: group 1, patients with obesity-38 and group 2 of patients without obesity -30

puerperas. The main group of studies consisted of patients with criteria suitable for the diagnosis of obesity. The diagnosis was made using the data of anthropometric studies of patients, determination of body mass index (BMI) > 30.0 (kg / m²) and overweight (> 25.0 kg / m²).

Exclusion criteria from the study: chronic renal failure, type 1 diabetes mellitus, severe anemia, pregnancy and lactation, cancer, respiratory failure, medications that affect bone level, resorption and gingival hypertrophy.

A copy of the data from the history of childbirth showed that pregnancy and childbirth in all examined women were characterized by a physiological course. The postpartum period was uneventful. Nursing mothers of the studied group did not have severe somatic diseases, endocrine disorders and did not receive treatment with hormonal drugs. The volume of lactation in 48 (82%) women with infants was sufficient and was determined by summing the sucked and expressed milk during the day. In the colostrum, 27 (47%) women had sufficient lactation. Breast milk samples were taken in lactating women in the morning (from 9 a.m. to 12 p.m.). Before analysis, the milk was degreased by centrifugation for 15 minutes at 3000 rpm.

We also observed 78 full-term babies born from satisfactory pregnancy and childbirth. The early neonatal period was uneventful. All children were breastfed. Mixed saliva was taken from lactating women and their newborns in the morning. Selected aliquots of milk and saliva were stored at a temperature of 20 ° C until analysis. The concentration of estrone in breast milk and saliva milk was determined by the enzyme immunoassay using kits of the DBG company represented by BioChemMak LLC (Russia). Processing of the obtained material was carried out using the MS Office 2010 software package. To determine the size of the sample population of the contingent survey, the formula AM was used. Merkova and L.E. Polyakova. Using the statistical method, the obtained data were grouped, relative indicators, arithmetic mean and their errors, Student's confidence criterion (t-criterion) were calculated.

III. RESULTS

As you know, sex hormones due to the anabolic effect affect the structure of the main substance of the bone, accelerate the growth and differentiation of the skeleton, and also have a significant effect on the mineralization of calcified tissues. Acceleration and deceleration of the growth and development of teeth under the influence of hormonal rearrangements should be interpreted as a hormone-dependent process (E.I. Goncharova, 1976). For oxytocin, prolactin, estradiol, and estrone, various mechanisms to different degrees can occur. The prevalence of any of them apparently reflects the degree of participation of this maternal hormone in the regulation of certain functions in the infant. In this regard, it is necessary to study and concretize the metabolic pathways of these hormones and having this kind of information, you can determine which hormone and at what concentration should be introduced into the composition of artificial nutritional mixtures. Unfortunately, the experimental data on the fate of "milk" hormones in the body of newborns is extremely small, which is associated with methodological difficulties. However, our results of studies on the

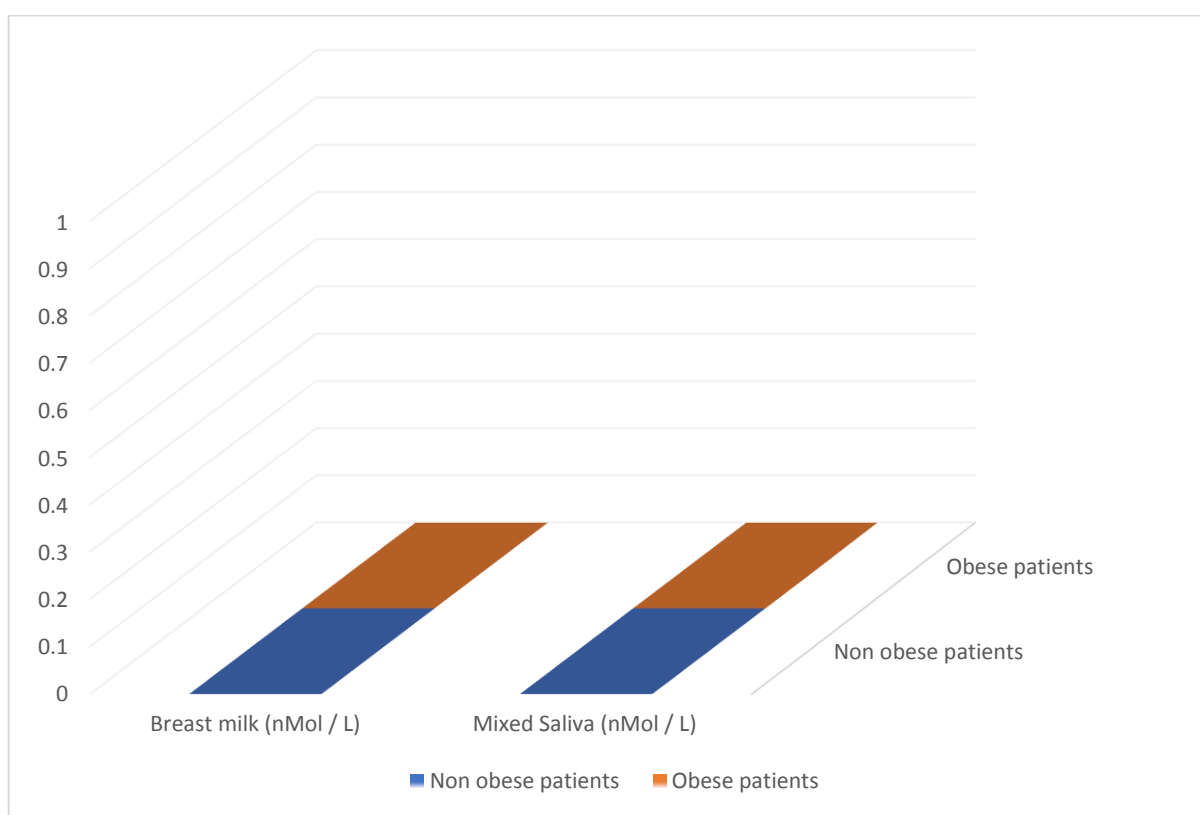
hormonal composition of human milk, mixed saliva of a newborn in comparison with the hormonal status of lactating women with obesity will allow us to determine the role of the hormone aspiring for a priority study. In this paper, we examined the dynamics of one estrone hormone in various substrates in lactating women with normal and overweight. It is known that biotransformation of estradiol or conversion to a less active estrone occurs with the participation of the enzyme 17 β -hydroxysteroid dehydrogenase (17 β -HSD) (the process is reversible). Enhanced capture of estrone from the circulation, and to a lesser extent estradiol, as can be seen from the presented research results, the table is accompanied by an increase in the concentration of estrone in breast milk in lactating women with normal body weight, where the concentration of estrone was 5.97 ± 0.54 nmol / l An interesting fact was noted in lactating women with overweight. In this situation, the level of estrone in breast milk averaged 2.04 ± 0.12 nmol / L, which is 2.9 times lower than the rates of women with normal body weight. Thus, an interesting fact, a change in the level of estrone in breast milk in dynamics, lactation, which, in our opinion, is associated with postpartum hormonal changes in the mother's body, is noted. But these changes have a peculiar dynamics regarding the fat metabolism of puerperas. T.V. Chepurnoy (1992), studying the content of estradiol in breast milk and in the blood plasma of newborn babies, showed that in the first week after childbirth there is a regular elimination of this hormone from the body of both mother and baby. As for estrone, its level in human milk was high enough and did not show a tendency to decrease in the dynamics of the postpartum period, as is the case for other estrogens. A similar dynamics was noted in our studies, but in contrast to its results, different dynamics were observed in women with excess body weight. Therefore, depending on the physiological state of the lactating woman, the newborn receives estrone in various concentrations in a biologically active form. The further fate of maternal hormone in the body of a newborn can theoretically be presented from at least three perspectives: inactivation of the hormone in the intestine due to enzymatic cleavage, the effect on the maturation of the receptor apparatus of enterocents, cells of the diffuse endocrine system of the intestine and epithelium of the oral mucosa for the development of the dentition.

Table 1. The content of estrone in various fluids of lactating women and their newborns

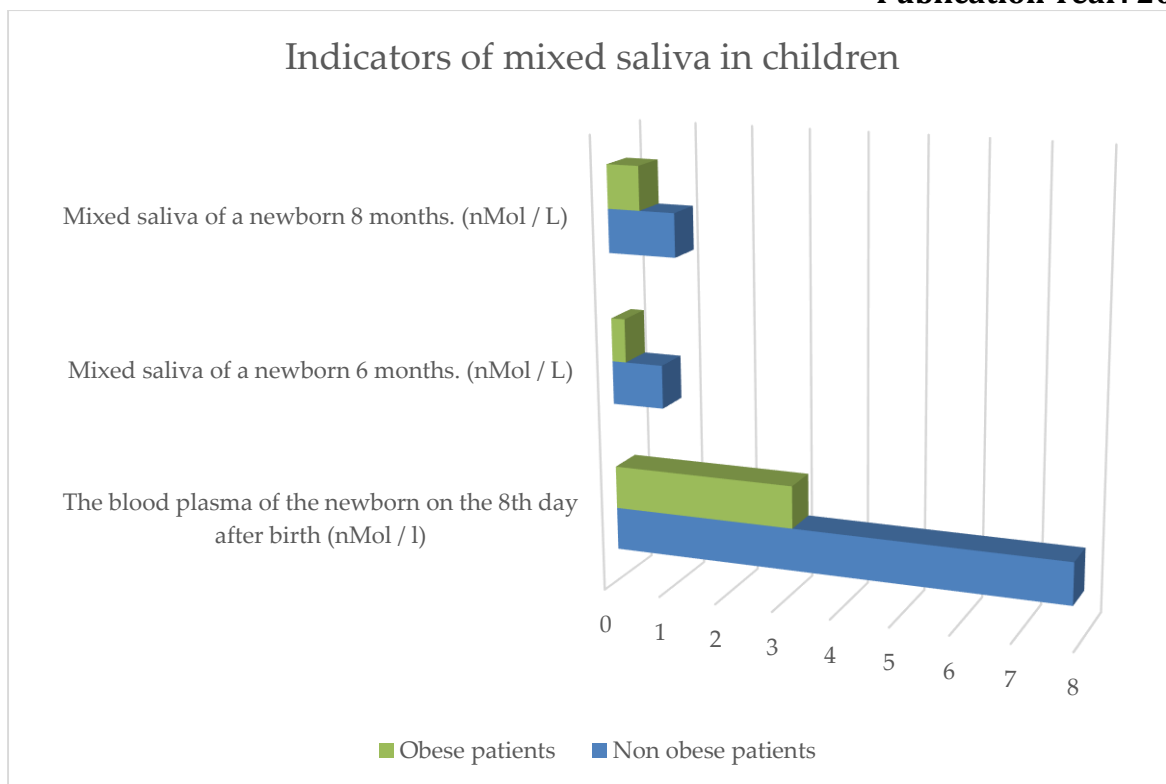
Indicators	Lactating women	
	Non obese patients Overweight (<25 kg / m2.) Body mass index <30.0 kg / m2	Obese patients Overweight (> 25.0 kg / m2.) Body Mass Index > 30.0 kg / m2
Breast milk (nMol / L)	5,97±0,54	2,04±0,12*
Mixed Saliva (nMol / L)	642,05±11,23	327,01±10,54 *

The blood plasma of the newborn on the 8th day after birth (nMol / l)	7,84± 0,61	3,15± 0,24*
Mixed saliva of a newborn 6 months (nMol / L)	0,89±0,07	0,24±0,02*
Mixed saliva of a newborn 8 months (nMol / L)	1,17±0,12	0,56±0,09*
Mixed saliva of a newborn 10 months (nMol / L)	2,01±0,23	0,98±0,11*

Note: * - significance of differences P <0.05



The content of estrone in breast milk and mixed saliva of lactating women



The content of estrone in the mixed saliva of newborns.

Studies by E.I. Goncharova (1978) and Zueva T.E. (2003) indicated that the acceleration and deceleration of tooth growth and development under the influence of hormonal changes should be interpreted as a hormone-dependent process. It was found that the developing tissues of the tooth are sensitive to hormonal changes, and the degree of change depended on the dose and type of hormone.

As you know, the concentration of steroid hormones in saliva reflect unconjugated, which means biologically active fractions of hormones. At the same time, collecting samples of saliva in this case is not difficult, which causes great interest of researchers in salivodiagnosics. However, clinical studies of the prognostic value of hormones in saliva are contradictory. Based on the foregoing, at the next stage of research, we analyzed the features of the hormonal status in saliva in lactating women. As can be seen from the presented research results, in women without obesity, the estrone content in mixed saliva was 2 times higher than the level of women with overweight. It is not excluded that high estrone in mixed saliva of lactating women is associated with the loss of the hormone not only in blood but also in saliva. On the other hand, this condition can be explained by a change not only in the hormonal state, but also in the state of the dentofacial system, on which hormones have a direct effect. As indicated above, in the early stages after childbirth, there is a natural elimination of hormones from the body of both the mother and the baby. It is with this that the high values of the hormone in the blood plasma of the newborn are probably connected, as indicated in the table. But at the same time, an interesting fact is that in children from women with overweight there is a decrease in the level of estrone in blood plasma by an average of 2.5 times.

Our next task was to study the estrone content in the saliva of a newborn at different times of teething. The reason for this was the fact that sex hormones, due to the anabolic effect, can affect the structure of the main substance of the bone, accelerate the growth and differentiation of the skeleton, and also have a significant effect on the mineralization of calcified tissues. As can be seen from the presented research results, an increase in the concentration of estrone in the saliva of newborns at various times of the neonatal period was noted. So, if by the 6th month of breastfeeding, the concentration of estrone in saliva was 0.89 ± 0.07 nmol / L, then by the 8th month of the study it increased to 2.01 ± 0.23 nmol / L, which is 2.3 times above the original values. The same dynamics could be observed in the saliva of newborn babies from lactating women with excess body weight, but at a lower level. The low levels of estrone in saliva in children who are fed excess weight by mothers are apparently due to the ratio of positive and negative effects, which is determined by age, type of distribution of fatty tissue, severity of obesity, etc. Thus, a comparative study of the concentration of hormones in blood plasma and saliva of newborns and in breast milk showed that a child with mother's milk receives high estrone subsidies, which plays an important role in the development of the newborn's dentition.

IV. DISCUSSION

Thus, in newborns in the neonatal period, changes occur in the hormonal system, which is closely interconnected with the dynamics of the hormonal status of lactating women. At the same time, the process of lactation and the dynamics of steroid hormones in blood plasma and saliva are closely related to the state of metabolic processes in the puerperas, i.e. associated with the restructuring of the entire complex hormonal system with its feedbacks.

It was found that the developing tissues of the tooth are sensitive to hormonal changes, and the degree of change depends on the dose and type of hormone, in particular estrone. Slowing of teething is accompanied by a certain morphological rearrangement, or an increase in the cartilage zone with a slowdown in the bone formation process, or a decrease in the size of the cartilage plate with significant activation of bone formation. At the same time, acceleration and deceleration of the growth and development of teeth in a newborn under the influence of hormonal changes occurring in lactating women should be interpreted as a hormone-dependent process.

Obesity, of course, is associated with a weakening of methylation reactions due to the development of liver steatosis and possibly through a violation of the adipokine regulation of the enzyme catechol-O-methyltransferase (COMT) activity, the synthesis and activity of which is encoded by the COMT gene located on chromosome 22q11 (28). that estrogens, along with other steroids, are modulators of lipolysis processes through various types of estrogen receptors ($ER\alpha$, $ER\beta1 - ER\beta5$). Estrogens selectively affect the activity of hormone-sensitive lipase by regulating the density of adrenergic receptors in fat depots of various topographical affiliations. An increase in the total mass of adipose tissue always entails a change in the body's need for the expression of the COMT gene. In lactating women with obesity in the event of COMT failure and incomplete estrone synthesis, there is a risk of an additional increase in the occurrence of dentoalveolar anomalies. Therefore, the question of

the role of COMT gene expression in the presence of obesity in lactating women as a predictor of teething disorders in a newborn remains open.

Adipose tissue is one of the main "targets" of steroid hormones; at the same time, adipocytes are able to accumulate, metabolize and synthesize these hormones. The postpartum period in women, especially overweight, is accompanied, in our opinion, by a change in fat and carbohydrate balance with the development of resistance to insulin and leptin. Estrone deficiency causes a reduction in the energy needs of the body as a whole, and creates an additional risk of negative metabolic effects.

It should be noted that the results of this study can be used in the development of new adapted milk mixtures for artificial feeding with the inclusion of a number of hormones in their composition. Correction of milk nutrient mixtures with biologically active hormonal additives will allow for more rational artificial feeding of infants due to the maximum approximation of the formula of the mixtures to the composition and properties of human milk.

V. CONCLUSION

1. In healthy lactating women, breast milk contains hormone-estrone in fairly high concentrations. Meanwhile, the hormonal profile in a newborn in saliva with metabolism in lactating women may undergo certain changes.
2. As lactation develops in women with excess body weight, hormone estrone undergo intensive elimination from milk, which leads to a decrease in its content in breast milk and can be reflected in the metabolic processes of the newborn's dentofacial system.

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