



## ***Malocclusion and prematurity at birth.***

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### *ARTIGO DE REVISÃO*

#### Abstract

Newborns birth prematurely correspond to births with less than 37 weeks of gestation. There are some characteristics intrinsic to the premature ones that act in the Stomatognathic System, triggering the malocclusion. The objective of this article was to investigate the influences that prematurity at birth can generate in a dental environment, more specifically, triggering malocclusion. We searched the databases: Google Scholar and PubMed. In Google Scholar we used the search term: premature birth and malocclusion and dentistry and 2014 and 2015 and 2016 and 2017 and 2018. In PubMed we used the search expression: malocclusion and dentistry and born preterm. It was concluded that, in order to avoid malocclusion, methods of preventive approach in preterm births are necessary to enable adequate growth and development of the stomatognathic system. The encouragement of breastfeeding is related to the influence of breastfeeding, since if it does not occur it can lead to changes in the stomatognathic system.

**Keywords:** Malloclusion; Stomatognathic System; Infant, Premature; Respiration, Artificial; Intubation.



## Manutenção da higiene oral de pacientes internados em unidades de terapia intensiva de hospitais.

### Resumo

Recém-nascidos nascidos prematuramente correspondem aos nascimentos com menos de 37 semanas de gestação. Existem algumas características intrínsecas aos prematuros que atuam no Sistema Estomatognático, desencadeando a má oclusão. O objetivo deste artigo foi averiguar as influências que a prematuridade ao nascimento pode gerar em âmbito odontológico, mais especificamente, desencadeando a má oclusão. Realizou-se busca nas bases de dados: Google Acadêmico e PubMed. No Google Acadêmico empregou-se a expressão de busca: nascimento prematuro and má oclusão and odontologia and 2014 and 2015 and 2016 and 2017 and 2018. No PubMed empregou-se a expressão de busca: malocclusion and dentistry and born preterm. Concluiu-se que para que não conviva-se com má oclusão são necessários métodos de abordagem preventiva nos nascidos prematuros para possibilitar crescimento e desenvolvimento adequados do sistema estomatognático. O incentivo ao aleitamento materno está relacionado a influência da amamentação no peito, uma vez que caso ela não ocorra pode gerar alterações no sistema estomatognático.

**Palavras-chave:** Má Oclusão; Sistema Estomatognático; Recém-nascido Prematuro; Respiração artificial; Intubação.

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## **INTRODUÇÃO**

According to the World Health Organization (WHO), (2012) (1), about 15 million premature babies are born each year. The concept of prematurity, according to the World Health Organization (WHO), (1961) (2), includes births that occur with less than 37 weeks of gestation. Newborns (NBs) with gestational age between 34 and 36 weeks are called late preterm infants and those born between 22 to 31 weeks and six days of pregnancy are called extreme preterm infants (3-9).

Premature babies may have their growth modified due to the influence of some factors, such as: gestational age, birth weight, caloric food intake, present diseases, heredity and environmental factors (9).

Premature birth will cause both short- and long-term consequences that will act, possibly influencing the growth and development of children (9). Several medical complications in the neonatal period in premature NBs can affect the development of oral structures (10,11).

Premature infants have minimal conditions for extra-uterine life, in addition complications occur in almost all organs, such as: changes in the respiratory, cardiovascular, renal, gastro-intestinal system, stomatognathic system (SE), metabolic, hematological, immunological and brain (10).

Premature birth alone causes changes in tissues and organs throughout the body; facial bones and dentition can also be affected (12-14).

Due to some repercussions that were manifested at the oral level, it is advisable to adopt preventive methods in premature births, aiming to obtain growth and development of the ES in an appropriate way (15).

The study by Stein, (1936) apud Seow, (1997), (12), was the precursor in the analysis of oral complications in premature babies, he had inherent research content focused on possible changes in the oral environment, possibly triggered by prematurity at birth.

The SE includes static and dynamic oral structures, including the hard parts pertaining to the dental arches and the active parts represented by the muscles, which are responsible for the functions of chewing, sucking, swallowing, breathing, phonation and facial expression. All of these structures mentioned are shown to be interconnected and in the event of a disturbance, we will have some established level of disorganization or imbalance (16).

It is known that dental occlusion is made up of the temporomandibular joint (TMJ), upper and lower jaws and jaw elevating and depressing muscles (17).

Malocclusion involves any occlusion with structural features that are distant from



those pertinent to a theoretically ideal occlusion, including: anterior open bite; crossbite; deep bite; mandibular protrusion and retrusion mandibular (18).

The objective of this article was to investigate the influences that prematurity at birth can generate in the dental field, more specifically, triggering malocclusion.

## **MATERIAS E MÉTODOS**

A bibliographic review study was carried out with consultation of the following databases: Google Scholar and PubMed. In Google Scholar, the search term: premature birth and malocclusion and dentistry and 2014 and 2015 and 2016 and 2017 and 2018 was used and approximately 34 records were found. In PubMed, the search expression: malocclusion and dentistry and born preterm was used and 08 results were obtained.

Studies and articles published in national and international journals in English and Portuguese were included, with content aimed at the possible repercussions caused by prematurity at birth in dental occlusion, possibly resulting in dental malocclusion.

This study also included considerations of books, monographs, dissertations and theses that had the same theme.

Studies that did not have content concerning the subject after excluding selective and analytical reading and that had an exclusively medical basis about the manifestations of prematurity were excluded.

## **REVISÃO DA LITERATURA**

Among the morbidities and comorbidities present in preterm infants, there are: asphyxia, respiratory disorders, apnea, cardiovascular disorders, renal immaturity, metabolic disorders, gastrointestinal intolerance and susceptibility to infections (19,20).

According to Seow (1997), in the neonatal period we will have repercussions of some form of these comorbidities in the development of the SE and its structures (12). According to Lai et al., (1997), premature birth generates complications, such as: perinatal anoxia, breathing difficulties and cardiac complications, which can lead to local interventions that will cause trauma located in the oral cavity. Local complications are: use of a laryngoscope; orotracheal intubation; mandibular fractures and surgical trauma (21).

There are cross-sectional and longitudinal studies that demonstrate the manifestations of these changes in the malformation of the dental enamel and palate. These malformations are related to prematurity and orotracheal intubation (10,12,13,22), and can affect aesthetics, make teeth vulnerable to painful and pathological carious processes such as lacerations and, ultimately, favor malocclusion.

Structural changes in skeletal development can occur due to local trauma,



resulting from laryngoscopy and orotracheal intubation (10).

Related to intubation itself, there are some options to be followed, regarding the intubation route, however, generally the orotracheal intubation route is preferred, as it is easy and quick to perform. It happens that this type of intubation is unfavorable due to the repercussions they cause in the oral cavity, tending to generate the formation of a groove in the palate caused by the continuous pressure of the cannula in position, in addition we may have the occurrence of other problems, such as the injury of the dental alveoli (10).

There may be repercussions at the oral level caused by the use of orotracheal intubation, in this situation the pressure applied in the act of intubation acts, which may prevent normal growth of the maxilla; causing deviations in the eruption of teeth due to lack of space, in addition to causing dental tearing, causing changes in the palate and the occurrence of malocclusion (21,23-25).

In the literature, many studies corroborate these statements, a study carried out by Paulsson et al., (2004), through the systematic review of complications occurring in oral structures, resulting from premature birth, found evidence that palatal morphological changes occur, concluding that orotracheal intubation, which is often used in preterm infants, acts as a predisposing factor (13). Some other authors also stressed that there may be similar structural changes due to trauma caused by the use of laryngoscopy and orotracheal intubation (23,24,26).

On the other hand, it is known that breathing is essential for the organism and that it acts in the SE since the birth period, mediating the control of orofacial functions and promoting harmonious skeletal growth. Nasal breathing, which occurs physiologically normally, if it is altered, may cause damage to development (27).

Breathing functionality is crucial for satisfactory performance of the organism, since it plays a prominent role, since it acts from the moment of birth, still lingering in the maintenance of the structure of the SE skeleton; it also includes the muscular and dental structure of the same, thus making it possible for the development of orofacial functions to occur correctly, as well as for us to have harmony in skeletal growth (28,29).

In the presence of some type of obstruction capable of preventing nasal breathing from proceeding normally during the development period, we may have the installation of several harmful changes to the ES (28,29). In this context, it is important to highlight that in the event of deficiency, difficulty or respiratory disorders in premature newborns, we will have, in addition to the problems triggered by changes in breathing alone, the losses caused when there is a need to institute mechanical ventilation with orotracheal intubation . These two situations can cause malocclusion to occur (30).

The term malocclusion under an epidemiological approach has some derivations or synonyms, including the terms malocclusion and malocclusion (31-33).

Malocclusion consists of morphological deviations from normality that are present in the upper and lower dental arches and in the facial skeleton, or consists of possible



deviations that occur at the same time, both in the dental arches and in the facial skeleton, which will cause changes in the functions of the SE ( 34.35).

The deciduous denture when affected by some of these deviations promotes the maintenance of this inconvenience in mixed and permanent dentures. A preventive approach, starting from an early diagnosis, is necessary, therefore, when deciduous and mixed dentures, aiming at the interception of the problem (36). Under the focus, still of the development and growth of the SE, breastfeeding is important because it promotes physiological stimuli, which make them viable (36).

Breastfeeding in the context of craniofacial development, acts beneficially, strengthening the facial musculature and favoring the functions of breathing, chewing, swallowing and phonation. The suction of breast milk carried out through movements of mandibular advancement and retraction provides adequate facial muscle and skeletal development, with facial harmony, which over the years will allow a satisfactory occlusion (37-40).

In preterm infants, breastfeeding is still a challenge to be achieved in the face of the weather conditions that are present and that are directly related to prematurity itself, among these factors are: immaturity of the neurological system and impaired sucking / swallowing reflex . These unfavorable mechanisms act as a barrier so that it is possible to make breastfeeding possible early, this fact can cause inefficiency in breastfeeding in premature infants (41-43).

In this context, for effectiveness to occur, there are some aspects that are taken into account and that must be positively interrelated, they are: breastfeeding provided to premature babies and maternal self-efficacy in terms of breastfeeding capacity. Analyzing these aspects, it is possible to trace parameters, aiming to detect the reality of the problem in question, seeking subsequently, subsidies regarding the formulation of strategies, in order to make feasible, both the promotion and the maintenance of breastfeeding, given that it is extremely important in the case of premature births (41-43).

The lower the family income pertaining to the mother of preterm infants who are breastfeeding, the lower the effectiveness provided by the act of breastfeeding, which will constitute a negative result. On the other hand, the higher the family income, the better performance we will have in breastfeeding self-efficacy (41-43).

Newborn (NB) is considered to be the child after birth in the first 28 days of life. Gestational age around 31 to 34 weeks, birth weight below 1500 grams and small NB for gestational age (SGA), translate into unfavorable points regarding the effectiveness of breastfeeding. There is no effect, however, of disorders of prematurity and size at birth on the duration of breastfeeding (9,30).

For the breastfeeding mechanism to proceed satisfactorily, there must be rhythmic coordination in the movements of sucking, swallowing and breathing. In preterm infants, however, there will be some different manifestations, with no firm and vigorous suction and rapid suction. Weak suction is found after birth in premature babies,



in addition mothers generally have little knowledge regarding signs of behavior of these babies in the act of breastfeeding, which can add up, causing little efficacy in terms of achieving success in breastfeeding ( 44,45).

According to Rocha et al., (2002), breastfeeding in premature infants is more difficult to initiate and maintain, compared to the breastfeeding practiced for those born at term (46). In short, there are some characteristics intrinsic to premature infants that should be mentioned, because they are implicit in the dental context, they are: reduction of gastric capacity and weak suction, mainly. In these premature circumstances, they tire easily. Feedings are very short, favoring a higher frequency of breastfeeding periods (47,48).

It is known that preterm infants need a greater amount of food, due to their more intense growth, however, given their characteristics of weak suction and imperfect swallowing, resulting from weak reflexes, there is a picture of nutritional deficiency installed. Nutritional deficiency will occur due to weak suction and imperfect swallowing, deficient absorption of fats and fat-soluble vitamins (47,48).

As for feeding preterm infants, it can be said that, on the other hand, these NBs require a higher percentage of food, due to their more intense growth, but that their sucking and swallowing reflexes are weak or absent, their gastric capacity is limited and their digestive physiology is deficient. Thus, the average needs of premature infants must be met gradually (47,48).

Due to the fact, some non-nutritive oral habits or non-nutritive sucking (SNN) can be instituted early, for therapeutic purposes, among which we have: use of a bottle, pacifier and gloved finger. These habits can be designated as parafunctional habits, concomitantly, we will have some deleterious effects on the oral health of premature newborns, such as: altered palate morphology and changes in dental positioning, effects that can act as predisposing to the installation of malocclusion (47, 48).

According to Neiva and Leone, (2007), stimulation of the SNN with the gloved finger was more effective than with the pacifier, being recommended in order to strengthen the suction of preterm infants (49). Occlusal functions include bruxism, biting the lips, sucking the finger, abnormal protruding jaw posture and dental clenching. These parafunctions occur, in contrast to the functional behaviors of chewing, swallowing and speech. Parafunctional habits in some cases are highly harmful and can cause malocclusion (50,51).

It is found that commonly, children have bone and structural changes triggered by harmful habits (pacifier and bottle), sipped since birth. These habits alter the child's facial development and can cause bone malformation, which can cause structural, functional and even psychological problems. Oral changes caused by prolonged use of pacifiers and bottles can lead to deformities in the dental arches, which will impair the functions of phonation, swallowing and chewing, in addition to allowing pain caused by poor occlusion (52,53).

The use of pacifiers and bottles can cause anterior open bite, cross bite, ogival



palate, mouth breathing and phonation changes (18). Preterm NBs may have immaturity in the ES, making it difficult to perform the suction function and, consequently, oral feeding. Because of this, a gastric tube is used. In such cases, the use of SNN stimulation may be recommended to minimize this sensory deprivation and enable the newborn to feed orally as early as possible (49).

This immature SE will present no or minimization of the fat pads (sucking pads), causing exaggerated jaw excursions and instability; occurrence of incomplete oral reflexes; ineffective lip sealing, with decreased intraoral pressure; hypofunctional tongue; absence of suction rhythm and difficulties in swallowing-breathing suction coordination (49,54,55).

## DISCUSSÃO

According to Neiva and Leone, (2007), stimulation of the SNN with the gloved finger was more effective than with the pacifier, being recommended in order to strengthen the suction of preterm infants (49). Occlusal functions include bruxism, biting the lips, sucking the finger, abnormal protruding jaw posture and dental clenching. These parafunctions occur, in contrast to the functional behaviors of chewing, swallowing and speech. Parafunctional habits in some cases are highly harmful and can cause malocclusion (50,51).

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The occurrence of perinatal diseases can be increased due to low birth weight (LBW). Birth weight is an excellent indicator of health. BPN can be an impacting public health problem (9,57).

Preterm newborns, especially those with very low birth weight, are commonly





submitted to procedures for invasive and non-invasive respiratory care during their stay in the Intensive Care Unit (ICU) (30). Respiratory assistance is usually performed through invasive mechanical ventilation with orotracheal intubation and Continuous Positive Airway Pressure (CPAP), when premature newborns are admitted to the neonatal ICU (30).

The lower the gestational age and birth weight, the greater the tendency to use procedures and interventions, involving invasive mechanical ventilation and orotracheal intubation, which is capable of generating greater damage in terms of oral health and malocclusion (30). In the hospital environment, in these circumstances, the presence of the dental surgeon in a multidisciplinary team, together with other health professionals, is extremely important to assess the functionality of the ES and intervene in a timely manner, contributing to the maintenance of health in these high-risk neonates (30).

It is important to emphasize that we will not have breastfeeding performed satisfactorily, in premature babies, which generates bad weather. Natural breastfeeding in other circumstances generates well-designed physiological stimuli and is responsible for the baby's craniofacial development in an appropriate manner with adequate muscle movements of the oral musculature, which will tend to prevent the occurrence of malocclusion and joint problems, allowing for normal occlusion. Many advantages are caused by breastfeeding, involving the well-being of newborns (58).

Over time, due to the act of breastfeeding bringing certain benefits with better accuracy in the medium, long term, there have been transformations regarding the adoption of breastfeeding as a social practice. In the case of the Public Health scenario, breastfeeding allows it to be effective in terms of its adoption as measures inherent to public policies that make it feasible. It is also known that in this way, influence is promoted within the family and related to aspects of a physical, biological, psychological, cultural and social character, while allowing action with a strong impact on child growth and development, enabling them to proceed normally (58).

On the other hand, the lack of breastfeeding or early weaning can lead to disorders, due to inadequate facial growth, tending to cause malocclusion, among other obstacles (38).

It should be noted that oral motor skills are related to the type of feeding of the newborn. It is based on oral reflexes and especially sucking, performed in the first months of life, that these skills are improved (47).

Breast milk is the best food for newborns and infants regardless of the gestational age at which they were born. Natural breastfeeding also promotes the baby's craniofacial development through the proper movements of the oral musculature, contributing to the physiological circuit of correct suction, breathing and swallowing, preventing changes in underdevelopment, malocclusion and joint problems (59).

Studies on the relationship between functional pattern and the prevalence of malocclusions reflect an aspect of the relationship between form and function, taking into account that premature babies have difficulties in establishing the feeding function (60).



Long-term parafunctional sucking habits can lead to anterior open bite, posterior crossbite, protrusion of the upper incisors, ogival palate, underdevelopment of the mandible and maxilla, dental malocclusion, absence of lip sealing, inadequate tongue rest, alteration in the pattern chewing and swallowing, alteration in phonation, alteration in the pattern of suction and mouth breathing (61).

According to a study by Harila et al., (2007), where there was an analysis of 328 premature children and 1804 children born by normal delivery, there was a higher prevalence of anterior open bite in addition to the sucking habit in premature children (62).

It is found in the literature, usually some craniofacial alterations, which have a higher prevalence, due to the manifestations of prematurity at birth, they are: facial asymmetry, cleft palate, cross bite, deep bite, palate in the nose, among others (14,15 ). Related to the craniofacial morphology parameters found comparatively between full-term and preterm infants, in premature infants, there are: smaller anterior cranial base, less convex skeletal profile, reduced maxillary length and more retroinclined and retracted lower incisors (63).

A study carried out in premature adolescents, using cephalometric analysis, in order to detect possible changes in craniofacial morphology found that there were different parameters when analyzing the results obtained for preterm infants, comparing them with those obtained for term infants. In preterm infants, there was a reduced anterior cranial base, skeletal profile with less convexity, shorter maxillary length and lower incisors with greater retroinclination and retracted (63).

## **CONCLUSÃO**

It was concluded that, in order not to live with malocclusion, preventive approach methods in premature births are necessary to enable adequate growth and development of the stomatognathic system. The encouragement of breastfeeding is related to the influence of breastfeeding, since if it does not occur it can generate changes in the stomatognathic system.

**THE AUTHORS DECLARE NO CONFLICTS OF INTEREST.**

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