Effects of Oral Breathing on the Nutritional Status: Why does it Happen?

Repercussões da Respiração Oral no Estado Nutricional: Por Que Acontece?

Daniele Andrade da Cunha*, Giselia Alves Pontes da Silva**, Hilton Justino da Silva.***

* Master in Nutrition University Professor at Integrated College of Recife's Phonoaudiology Course
** Doctor in Medicine from EPM/UNIFESP. Professor of Pediatrics – Federal University of Pernambuco.
*** Doctor in Nutrition. Professor at Federal University of Pernambuco's Phonoaudiology Department.

Institution: Federal University of Pernambuco.
Recife / PE - Brazil.
Mailing address: Rua São Salvador, 105 - Apt. 1002 - Espinheiro - Recife / PE - Brazil – ZIP Code: 52020-200 - Email: hdfono@yahoo.com.br
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SUMMARY

Introduction: Some children who breathe through the mouth and present nocturnal obstructive apnea can present a delay in the pondero-statural growth.

Objective: The objective of this article is to analyze the orofacial myofunctional alterations found in oral breathers and the effects on their nutritional status. It focuses on the importance of the interdisciplinary team following up with the overall oral breathing alterations.

Method: The used method was a literature's revision based on articles published in indexed scientific magazines, books and post-graduation works. Most articles were identified on LILACS, MEDLINE, and SCIELO databases.

Results: A relation between oral breathing and an alteration in the general feeding process is noticeable and associated with difficulties in smelling, tasting, and orofacial myofunctional disorders, what comes to have an effect on the nutritional status.

Final commentaries: The wide range of causes involved in oral breathing requires an interdisciplinary team trained to identify such alterations, enabling preventive measures to be undertaken, in order to avoid alterations in the general health, regular development of the face, as well as in the nutritional status in these individuals' relevant growth stages.

Keywords: nutritional status, oral breathing, phonoaudiology.

RESUMO

Introdução: Algumas crianças que respiram pela boca e apresentam apneias obstrutivas noturnas podem apresentar retardo do crescimento pôndero-estatural.

Objetivo: O objetivo deste artigo é analisar as alterações miofuncionais orofaciais presentes no indivíduo respirador oral e as repercussões sobre o estado nutricional. Enfoca a importância da equipe interdisciplinar no acompanhamento das alterações globais presentes na respiração oral.

Método: O método utilizado foi uma revisão da literatura, a partir de artigos publicados em revistas cientificas indexadas, livros e trabalhos de pós-graduação. A maioria dos artigos foi identificada a partir das bases de dados, LILACS, MEDLINE e SCIELO.

Resultados: Percebe-se relação da respiração oral com a modificação no processo geral de alimentação, associada às dificuldades no olfato, paladar e distúrbios miofuncionais orofaciais, repercutindo assim no estado nutricional.

Comentários Finais: A diversidade de causas envolvidas na respiração oral requer uma equipe interdisciplinar treinada para identificar estas alterações, possibilitando a implementação de medidas preventivas, que evitem alterações na saúde geral, no desenvolvimento normal da face e no estado nutricional em importantes fases do crescimento desses indivíduos.

Palavras-chave: estado nutricional, respiração bucal, fonoaudiologia.

Introduction

Any obstacle found in the upper airway, especially in the nasal and/or pharyngeal area, prevents air from freely passing through, making the individual breathe through their mouth by using their oral cavity as a passive conduit during breathing (1). These obstacles in upper airways are normally caused by structural abnormalities, nasosinusal diseases, among others (2).

Some children who breathe through the mouth and present nocturnal obstructive apnea can show a delay in the pondero-statural growth, since sleep abnormality can cause the growth hormone to have its nocturnal release reduced (3). An alteration in the sleep process leads to a frequent tiredness, daytime somnolence, adynamia, bedwetting, as well as learning disorders (4).

When opening the mouth to breathe, some adaptations to structures and disequilibrium in orofacial functions may occur. Such alterations impact on chewing and swallowing functions, which subsequently leads to difficulties in the feeding process. Accordingly, oral-breathing children's general growth and their nutritional status can be endangered.

Although scientific researches suggest a correlation between oral-breathing and feeding standards, there is in national literature a scarcity of studies analyzing whether this way of breathing interferes with the nutritional status. On account of a wide range of signs and symptoms found in the oral breather, professionals of diverse working fields have increasingly dealt with these patients, by way of an interdisciplinary intervention (5).

The purpose of this article is, therefore, to introduce a literature's revision with regard to the issue of how orofacial myofunctional alterations found in the oral-breather can have an effect on their nutritional status. It is also intended to focus on the importance of the interdisciplinary team following up with the overall oral breathing alterations.

Literature's revision

The present revision has been performed by referring to articles published in indexed scientific magazines, books and post-graduation works. Most articles were identified on LILACS, MEDLINE, and SCIELO databases. Based on the 40 works found, the relations between oral breathing and its most ordinary causes have been presented and discussed, as well as its effects on school learning process, postural and orofacial functions, on smelling and tasting, and, eventually, on the nutritional status.

Discussion

Oral breathing: Frequent causes

Chronic oral breathing can be defined as a usual mouth-breathing rather than nasal breathing (6).

The obstacles in upper airways are usually caused by structural abnormalities, nasosinusal diseases or hypertrophy of Waldeyer's lymphatic ring (comprised of pharyngeal tonsils/adenoids, palatines/amygdalas, tubal and lingual). The infectious processes, septum deformations, nasal fractures, rhinitis medicamentosa, nasal tumors and narrow nasal fossa (2) have been cited to frequently occur.

Other causes can occur less frequently, such as tumors, nasal polyps, choanal atresia, and congenital deformations of the nasal cavity (7). Whilst there are situations, which, however, do not lead to nasal obstruction, they are responsible for oral breathing, as follows: hypopharyngeal obstruction, macroglossus and labial insufficiency (2).

Oral breathing can occur as a result of habit, i.e., continuing to orally breathe even after starting a treatment to ensure the permeability of the upper airways (UA) (1).

For purposes of identifying the main causes of children's oral breathing, a study has surveyed 104 children submitted to Phonoaudiology Clinics, complaining about chronic oral breathing, out of which 48 (46.15) were female and 56 (53.85%) were male, aged between 3 and 10. A comprehensive otorhinolaryngological evaluation, phonoaudiological evaluation (visual observation and palpation of the stomatognathic system elements), as well as supplementary examinations, such as cavum radiography, pure-tone audiometry and immitance audiometry were performed. The results showed that the main causes of oral breathing were allergic rhinitis, in 34 (32.69%), adenoid hypertrophy, in 12 (11.54%), amygdala hypertrophy, in 4(3.85%), joint adenoid and amygdala hypertrophy, in 7 (6.73%), by habit, in 8 (7.69%) and associated diseases, in 39 (37.5%) children (2).

A study was carried out with 30 patients with the intention of evaluating the most common types of craniofacial deformations found in patients having chronic nasal obstruction, by performing cephalometric analysis and otorhinolaryngological examination, in comparison with a control group without nasal alterations. Among these children, the ones between 7 and 12 years of age were selected, since the craniofacial manifestations arising from oral breathing become more evident through the years.

Patients older than 12 were excluded, considering that complaints about nasal obstruction are greatly reduced after such an age. Regarding respiratory obstruction, it was observed that 5 (16.67%) patients showed an isolated adenoid hypertrophy, 5 (16.67%) showed an isolated lower turbinate hypertrophy (as a consequence of perennial allergic rhinopathy), 5 (16.67%) had an isolated septum deviation, 2 (6.66%) had oral breathing by habit and none of the patients showed amygdala hypertrophy as an isolated cause of nasal obstruction (8).

One of the causes leading to oral breathing is early weaning. The latent during breast feeding keeps a relaxation posture of occluded lips and nasal breathing, but when an early weaning occurs, the baby will more frequently keep his/her lips half-opened, which allows for oral breathing. Nursing bottles, rubber nipples and the thumb-sucking habit can come to impair the adequate motor-oral development, by inducing alterations in the posture and strength of the phonoarticulatory organs, such as lips, tongue and cheeks, which impact the functions of chewing, deglutition, breathing and articulation of speech sounds. As a result, the lack of proper physiological and breast suction can interfere with the motor-oral development, allowing for bad occlusion, motor-oral alteration and oral breathing (9).

To observe the facial morphology alterations found in the oral-breathing group and compare them with a group of children at the same age with predominantly nasal breathing, some authors have performed a cephalometric and myofunctional evaluation in 35 oral-breathing children aged between 7 and 10. The most common cepahalometric alterations found in oral breathers, in comparison with nasal breathers, were maxillary and mandibular hypoplasia and an augmentation of the gonial angle, with a posteroinferior rotation of the mandible. The most common myofunctional alterations in oral breathers were half-opened lips and tongue posture in mouth floor, hypotonic lips, tongue and cheeks, as well as the lingual interposition between the arcades during deglutition and phonation. With respect to the 14 oral-breathing children's habits, 11 (78.57%) used nursing bottles, 6 (42.85%) used rubber nipples and 1 (7.14%) had the habit of digital sucking for more than two years. Only 2 (14.28%) children did not have any habit for a long term (10).

The most important issue is to emphasize that, regardless of the cause, oral breathing during childhood can result in both progressive organic alterations and assorted consequences (8).

Alterations in form and/or function treated by an interdisciplinary team can be solved or not, since the problem solutions also depend on the disease time. Occasionally, although jointly working, these problems can be but minimized (11).

Oral breathing: Effects on school learning process

Together with physical characteristics, as a result of the symptoms related to his/her clinical chart, the oral-breathing child can have his/her social and cognitive development impaired. The child is usually required to have a task routine he/she is not always capable of responding due to the alterations caused by oral breathing (12).

With the intention of comparing the outcomes of a daytime somnolence, cephalea, nocturnal agitation, bedwetting, school problems and bruxism in oral breathers, a research was performed with 142 patients of both genders aged between 2 and 16, from April 2001 to December 2002. Volunteers were ranked in three etiology groups of oral breathing: allergic rhinitis, isolated adenoid hyperplasia, and adenoid-amygdaline hyperplasia. It has been found that the attention deficit disorder and poor school development were more frequent in the group having hyperplasia of pharyngeal and palatine tonsils associated with apnea (13).

Literature reveals that oral breathers are usually active, restless and intolerant; they are always tired and sleepy. It happens as a result of a lower cerebral oxygenation, because their sleep is tense and split, what can have an effect on school development (14).

To discover whether poor school development was caused by oral breathing or not, it has been performed an observation of students' respiratory characteristics in a classroom once a week, one hour in each room, during 6-8 weeks. Teachers have been interviewed to verify which students show poor school development. The results showed that out of the 237 (100%) of the inspected children, 43 (18.14%) have oral breathing. Out of the 43 oral-breathing children, 32 (13.5%) also showed difficulties in the learning process, according to their teachers. Based on this, the authors concluded that oral breathing can lead to disorders, such as learning difficulties.

Oral breathing: Effects on posture and orofacial functions

Changing the way to breathe makes the patient to open his/her mouth, so as to compensate the lack of air breathed and try to increase the nasal-air-pharyngeal space (16). This way, the compliance of facial muscles is altered (17).

For such respiratory posture, the individual keeps his/her mouth open nearly all the time and stretches his/her head towards the cervical column (18), modifies the muscular stimuli, which leads to bone-modeling disturbances during their growth. All the morphological and structural equilibrium is modified (19).

For purposes of verifying the influence of varied etiologies in the oral breather's typical posture, 176 postural evaluations were performed on 5 to 12-year-old children, out of whom 99 were male and 77 were female. Etiology of oral breathing was determined by a comprehensive otorhinolaryngological evaluation, comprising of a nasofiberscopic examination of the nasal cavity and rhinopharynx, as well as allergic tests. The children were divided into groups in accordance with the different etiologies of oral breathing: group 1 (56 with allergic rhinitis), group 2 (69 with adenoid and/or amygdala hypertrophy), group 3 (allergic rhinitis associated with adenoid and/or amygdala hypertrophy) (20).

Evaluations revealed that posture is influenced by the fact that the child is an oral breather, and the most relevant data show that the anterior projection of the head was 80% in the groups by habit and adenoid and/or amygdala hypertrophy, and 77% in the rhinitic cases. Shoulder protrusion was seen in 100% of the oral-breathing children by habit, 64% with lumbar hyperlordosis in allergic cases, 74% of valgus deformity in the knees (x-shaped legs) in the group with adenoid and/or amygdala hypertrophy, and feet prevailed in 48%, in the group with children having allergic rhinitis associated with hypertrophies (20).

When there is a change in mandible posture, there starts to be an adaptation of all the facial muscles, inducing modifications in the dental arcades and positioning, which lead to structural changes in osteoskeletal parts of the face as a whole, giving rise to a disequilibrium in such structures as lips, tongue, palate and mandible, which are moved downwards and backwards in order to adapt themselves to the new respiratory standard (21). Henceforth, the oral-breathing child can be identified by facial characteristics and typical consequences (4), which can interfere with the growth of both mandible and teeth.

Some of the intraoral alterations are bad positioning of the tongue, maxillary narrowing, protrusion of anterior teeth, open and cross bites, and the narrow and deep V-shaped hard palate (23). The oral breather's palate becomes profound as a result of the absence of labial sealing, preventing a negative pressure from occurring and the palate will not go downwards and will consequently become profound.

To verify the possible influence of oral breathing on the depth of the palate, 60 9 to 14 year-old male and female children and teenagers were evaluated, out of whom 30 were oral breathers and 30 were nasal breathers. It has been observed that the index average of palatine height was bigger in the oral-breathing group, but the difference was not statistically significant (25).

These changes in the shape of the hard palate shall cause speech problems, because the tongue shall have difficulties in touching it to pronounce some phonemes, such as the weakening of the phonemes (/k/, /g/) (26).

Obstruction of the upper airways creates a neuromuscular response by adapting the tongue, mandible and facial muscles, causing, accordingly, improper muscular stimuli with modifications of dental arcades, and leading to skeletal and muscular alterations (27).

Hypofunction of the muscles elevating the mandible is usually associated with hypofunction of the lips and cheeks, which may alter chewing by making it inefficient. The individual can show poor occlusions that will interfere with chewing efficiency (28).

Failure to coordinate breathing with chewing can cause choking due to the fact that the alimentary bolus was not triturated. As a result of bad chewing, deglutition shall be altered and adapted and can show an anterior projection of the tongue, exaggerated contraction of the orbicular muscle of the lips, compensating movements from head and noises (26).

By reason of improperly chewing the food and tiredness during the process, feeding shall be impaired. Due to the need to orally breathe, the individual swallows the alimentary bolus poorly insalivated in addition to swallowing air and taking intervals to open the mouth to breathe, what will impair digestion and can lead to inappetence (29).

Oral breathing: Effects on smell and taste

In the oral-breathing individual, smell can be impaired by reason of improperly using the upper airways (30). Hyposmias (reduction of smell) or anosmia (absence of smell) arises from alterations in air flow, when the olfactory current does not reach the tectum of the nasal fossa. In this item, hypertrophies of medium turbinate hypertrophy, septum deviations, polyps and big nasal pyramid deformations were included. In such cases, the patient usually complains about hypogeusia, i.e., reduction of taste (31).

Some authors indicate that nasal obstruction leads to a reduction of smell, consequently diminishing appetite.

In a study to evaluate nasal and smell obstruction in 78 children, out of whom 65 had nasal obstruction and 13 did not have an obstruction, with a suggestion of adenoidectomia by pharyngeal amygdala hypertrophy, it has been noticed the reduction of smell associated with nasal obstruction, as well as that after adenoidectomia there was an improvement of both olfactory obstruction and sensibility (32).

Smell and taste are closely associated and the smell mechanism arouses the taste receptors, placing a big influence on the latter, probably explaining why the oral-breathing individuals show deviations of the nutritional status (33).

When breathing through the mouth, it cannot be detected the taste and aroma of the food; therefore, a choice for food is not made by appetite but by the food consistency and easiness to swallow it (34).

Reduction of smell can impact the patient's quality of life, because not only can it affect his/her respiratory function but it can also damage the oral breather's taste and nutrition (35).

Oral breathing: Effects on nutritional status

All the consequences caused by oral breathing can impact the consistency of the food taken and in the ingested quantity. When breathing through the mouth, the child establishes an improper airway for the air and through this way he/she starts breathing and developing other functions, such as chewing. Therefore, he/she starts choosing more fluid foods, which are less consistent, do not require any strength to be chewed, and they can be swallowed quickly so they can breathe (28).

Oral breathers' complaints about difficulty in nutrition are usually more frequent when the patient has hyperplasia of palatine amygdales. The mothers report that their child eats but a little, rather slowly, they choke, prefer pasta and have difficulty in chewing. These children show a lack of space to swallow and can have modified movements of the head when swallowing. This can happen because amygdales are bulky in the bottom of the mouth, nearly closing the passage of oropharynx, block the physiological process of swallowing (11).

Oral-breathing children usually cannot eat with their mouth closed, they do not chew sufficiently and swallow almost the entire food (36). To enable this food to pass through, the individual starts drinking a lot of liquids (37), these compensatory modifications in the chewing and breathing process can lead to nutritional alterations. Since they cannot keep their mouth closed, the oral-breathing child can associate nutrition with suffocation. Accordingly, there is a reduction of the quantity of ingested food, which can make these children very thin (36).

To verify whether there is an improvement in the nutritional status in the post-operatory period in oral-breathing children, 87 children aged between 2 and 10 were evaluated. The children were divided into 4 groups: 24 children with a diagnosis of palatine and pharyngeal amygdala hypertrophy, with a scheduled surgery (group I), 15 with a diagnosis of pharyngeal amygdala hypertrophy (adenoid) with scheduled surgery (group II), 33 with a diagnosis of palatine and pharyngeal amygdala hypertrophy, in the waiting list for (group III), and 15 with a diagnosis of pharyngeal amygdala hypertrophy, in the waiting list for surgery (group V). Anamneses, otorhinological examinations (otoscopy, oroscopy and anterior rhinoscopy) and nasofiberscopy were performed. They were also weighed and measured during a 4-month period and submitted to dietary evaluation carried out by a 24-hour recording (38).

The results showed that in the pondero-statural evaluation, only 8.8% of the children with palatine and pharyngeal amygdala hypertrophy (groups I and III), and 10.0% of those with pharyngeal amygdala hypertrophy (groups II and IV) proved to be malnutrited, and that only the patients with palatine and pharyngeal amygdala hypertrophy (group I) submitted to adenoamygdalectomy showed a post-surgical growth beyond the expectations. Nutritional evaluation did not show any statistically significant difference with regard to caloric ingestion before and after the surgery in children with both palatine and pharyngeal amygdala hypertrophy and isolated pharyngeal amygdala hypertrophy (38).

Mouth opening can lead to a reduction of the taste sensitivity, which causes inappetence and a likely loss of weight (11). In association with the alteration of weight, there is a hypothesis that the sleep disorder arising from hypoxemia, provoked by the obstruction of the upper airways, leads to a deficit of the secretion of the growth hormone (39).

Some researchers evaluated 1136 children aged between 7 and 12 with the intention of verifying a relation between the size of amygdales and the child's height and weight. Their results proved that there was a reduction of weight in these children, but they did not find any alteration in swallowing, what could be an important factor in the genesis of growth deficit, but they related the gain of post-operatory weight to the size of palatine amygdales (the bigger the palatine amygdales, the bigger the gain of post-operatory weight) (40).

There are several theories to justify this change in the alteration of these individuals' growth and body weight, among which are alteration in swallowing caused by the amygdala hypertrophy and oral breathing, alteration in smell by chronic nasal obstruction, leading to an alteration in taste and subsequently reduction of appetite, sleep disorder causing an alteration in the secretion of the growth hormone, as well as the augmentation of the nocturnal respiratory effort, inducing a rise in the caloric waste during breathing (38).

Accordingly, the surplus of disequilibrium between the ingested quantity and the nutritional needs of each individual causes severe nutritional disorders and end up being the etiology of a great number of diseases placing an effect on the physical, intellectual, sport and growth activities, making it difficult to completely fulfill the potentials and purposes of the human being's life.

Final Commentaries

The wide range of causes involved in oral breathing, as well as its occurrence in important stages of the children's growth, suggests the need to implement preventive measures, thus preventing alterations in general health, normal development of the face and that of the nutritional status.

The relation between oral breathing and modification in the overall nutrition process, frequently associated with an impairment of structures such as dental arcade, the changes in chewing process, difficulties in smelling, tasting, orofacial myofunctional disorders, can have a direct impact on the nutritional status.

Early attention to these symptoms can avoid complications in the nutritional process and the effect on the children's general nutritional status. A team composed of professionals of different expertise fields to deal with oral breathers can be the key to a change in the clinical outlook of the alterations in an early stage yet.

The associations between alteration in the nutritional status and oral breathing are not totally clarified by the literature, especially with regard to overweight/obesity, but some associations stress that the hypothesis of the change in the breathing way and improper nutritional conditions can lead the individual to a pondero-statural deficit most times.

It has been concluded that despite there are strong theoretical arguments trying to explain a likely influence of oral breathing over the nutritional status, the studies carried out so far have not achieved to confirm such a hypothesis. Therefore, it becomes relevant to perform new researches about such relations.

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