






Mouth-breathing Pattern in Preschool Children: Knowledge of Preschool Teacher

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ABSTRACT

Introduction: Mouth breathing is prevalent in children, but the long-term ramifications and preschool teachers' awareness of this topic are not thoroughly addressed. Excessive mouth breathing might cause facial and oral growth problems.

Objectives: This study was carried out to determine the knowledge, attitudes and needs of information of preschool teachers toward mouth breathing pattern in children.

Methodology: Using a cross-sectional design, the researchers combined qualitative, quantitative and descriptive methods. A self-report online survey was given to thirty preschool teachers. The questionnaire assessed the teachers' knowledge of the consequences of mouth breathing on preschoolers, their methods for recognizing this condition in the classroom, and their desire for more information. Using SPSS version 26.0, descriptive statistics and a Spearman's correlational analysis between variables were used to statistically analyze the acquired data.

Results: Twenty preschool teachers (67%) said they knew about mouth breathing pattern. Twenty preschool teachers (67%) reported having knowledge about mouth breathing pattern. Forty percent stated that their knowledge about this condition was obtained through a speech-language therapist. The most outcomes of mouth breathing that were identified were snoring articulation disorders, and open mouth posture. All participants reported informing the family about the existence of a mouth breathing pattern detected in children. Most preschool teachers considered very important to receive more information about this theme.

Conclusion: Child's development and health can be greatly impacted by oral breathing.

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RESUMO

Introdução: A respiração oral é predominante nas crianças, mas as ramificações a longo prazo e a sensibilização dos educadores de infância para este tópico não são abordadas em pormenor. A respiração oral em excesso pode causar alterações no desenvolvimento facial e oral.

Objetivos: Este estudo avaliou a compreensão dos educadores de infância portugueses sobre os padrões de respiração oral das crianças e as consequências associadas.

Metodologia: Os investigadores utilizaram um desenho transversal, combinando métodos descritivos, qualitativos e quantitativos. Foi aplicado um questionário online de autopreenchimento a 30 educadores de infância. O questionário avaliou o conhecimento dos educadores de infância sobre os efeitos da respiração oral em crianças em idade pré-escolar, os seus métodos para reconhecer esta condição na sala de aula e a sua necessidade de informação adicional sobre o tema. Os dados recolhidos foram analisados estatisticamente com recurso ao SPSS versão 26.0, utilizando estatística descritiva e análise de correlação de Spearman entre variáveis.

Resultados: 67% (20) dos educadores de infância referiram ter conhecimentos sobre o padrão de respiração oral. 40% afirmaram que o seu conhecimento sobre esta condição fora obtido através de um terapeuta da fala. As consequências mais frequentemente reconhecidas do padrão de respiração oral incluíram postura de boca aberta, perturbações de articulação e ressonar. Todos os participantes salientaram a importância de informar a família quando observassem um padrão de respiração oral numa criança. A esmagadora maioria dos educadores de infância considerou muito importante receber mais informação sobre este tema.

Conclusões: O desenvolvimento e a saúde da criança podem ser grandemente afetados pela respiração oral.

Introduction

Mouth breathing has been under research to identify how it may affect craniofacial development.¹ It is known that establishing an adequate nasal breathing is necessary to allow a harmonious development of the stomatognathic system and skeletal structures and allow the upper airway.² However, mouth breathing is also associated to other clinical problems, such as attention difficulties associated with sleeping disorders,³ postural disorders,⁴ cognitive deficits⁵ and decline in quality of life.⁶ Chronic mouth breathing pattern in children is typically connected to tonsils hypertrophy and its occurrence is more common in preschoolers.⁷ Mouth breathing is considered a possible etiological factor for the occurrence of occlusion alterations, as it interferes with a typical craniofacial development.⁸ Lima et al,⁹ stated that children with mouth breathing pattern showed alterations on postural and morphological features of the stomatognathic system, such as long face, narrow maxilla, skeletal Class II or Class III profiles, open bite, crossbite, shortened upper lip, everted lower lip and forward head posture.¹⁰ Research indicates that mouth breathing impacts a considerable portion of children, with figures varying from 25% to 57%. Because of this high

prevalence, it is essential to receive an early diagnosis and be referred to a specialist to stop the development of orofacial deviations and any potential consequences.¹¹

A preschool teacher is a professional who works with children from infancy to age 5 and that has the major responsibility to educate children and has also an important role in children emotional, social, physical and academical development.¹² Early childhood teachers face insurmountable challenges in meeting their professional obligations.¹³ Apart from these responsibilities, in many situations preschool teachers have also the additional responsibility to work as a health care specialist¹⁴ since they are the firsts to detect and refer health conditions to parents.¹⁵ Kosicka et al,¹⁶ stated that it is important that teachers can be capable of noticing difficulties in speech as well as detecting other conditions such as mouth breathing patterns.

Learning disorders have multifactorial causes, such as cognitive, social, behavioral, and sensorial difficulties, as well as others. One of the reasons reported for school difficulties may be associated to a mouth breathing pattern. This pattern can affect not only school learning process, but also the quality of sleep.³ Mouth breathing is also related to obstructive sleep disordered breathing that causes fatigability, lethargy, behavior problems and difficulty in concentrating and

maintaining attention, which in turn, may affect learning and academic achievement.³ For these reasons, preschool teachers should be conscious of the consequences of mouth breathing pattern, to be able to help parents identify and refer these children to professionals that can intervene and prevent the consequences of this condition. Although there are some studies regarding preschool teachers' knowledge about oral health and oral habits,¹⁷ studies regarding teacher's knowledge about mouth breathing pattern were scarce. The aim of this investigation was to explore the knowledge of preschool teachers about the consequences of mouth breathing in children. It also analyzed if preschool teachers require information about mouth breathing from speech-language therapists (SLT), and to whom preschool teachers refer these children to.

This study also aimed to answer the following questions: Do preschool teachers know the consequences of mouth breathing pattern in preschool children? Do they receive information about mouth breathing consequences from SLT? Do preschool teachers inform parents about their concerns on mouth breathing pattern and to which professional do they refer these children to be diagnosed and receive intervention?

Methodology

This study was granted with ethics approval by the Fernando Pessoa Research Ethics Committee (process 174/21) and was carried out in accordance with the guidelines of the Declaration of Helsinki on human studies. Participants' confidentiality and privacy of personal data were ensured.

Study Design

A total of 30 Preschool teachers were involved in this cross-sectional study. Data was collected from the participants' questionnaire.

Participants

Participants were included in this study if they were: (1) Educators must be employed in a program serving children across Mainland Portugal and the Islands; (2) European Portuguese as their native language; and (3) Preschool teachers who are actively working with children who meet the mouth breathing pattern for early childhood education in Portugal.

Exclusion criteria comprised participants who had: (1) Preschool teachers not currently working with children; (2) Preschool teachers working outside Portugal; and (3) Preschool teachers who are planning to leave their current position within the study timeframe.

Data Collection

The questionnaire was developed using Google Forms and distributed online through social media. Informed consent

was collected from all preschool teachers prior to any data collection. The questionnaire (see Appendix) was available online between May and June 2021 and fulfilled a self-report questionnaire online about their knowledge about mouth breathing consequences on preschool children and their necessity of more information regarding this theme. The questionnaire developed by the authors was based on currently available literature on children orofacial development and mouth breathing. It was analyzed by a group of specialists composed by two SLT (specialized in the fields). After the first version, it was applied to a target group consisting of three preschool teachers to assess the content adequacy of items through think-aloud technique.

The questionnaire consisted of five main sections of questions, namely: Section I - that addresses issues related to sociodemographic characterization (e.g. age, professional experience) with ten questions to indicate the most appropriate option and short open and closed answers; Section II - with one question with five items related to mouth breathing and its alterations with 19 items in a 5 points Likert scale (1 "Very Frequent" to 5 "Never"); Section III - that addresses the consequences of mouth breathing; Section IV - about prevention with two questions; and Section V - about preschool teacher need of formation in this domain, with two questions.

Data analysis employed descriptive statistics to summarize the characteristics of the variables. Subsequently, Spearman's correlation was calculated to assess the strength and direction of linear relationships between the variables. IBM SPSS Statistics version 26.0 was used for all statistical analyses..

Results

The sample was composed of 3% male and 97% female preschool teachers. Mean age was 46.93 years old (SD=8.98), ranging from 30 years to 62 years. Regarding geographic regions, 60% of participants worked in north of Portugal, 30% in Center region, 10% in Madeira Island. Regarding the type of preschool establishments in which these professionals worked, 46.7% worked in public institutions, 46.7% in solidarity institutions and 6.7% worked in private institutions. Preschool teachers that participate in this study have worked in the teaching profession for 22 years on average (SD=7.98). The work experience ranged from 4 years to 36 years.

Once the socio-demographic data had been completed, participants were asked about their knowledge of mouth breathing patterns. It was found that 33% of participants had no knowledge of this subject, while 67% reported having some knowledge of mouth breathing patterns. In terms of knowledge about mouth breathing patterns, 40% of respondents indicated that they had acquired this knowledge through SLT, 34% through internet research, 12% through

a college degree, 11% through books and research articles, and 3% through postgraduate courses.

Regarding the presence of children with mouth breathing patterns in classrooms, 63% of participants reported that they did not have any children with this pattern in their classrooms.

Association between preschool teacher knowledge about mouth breathing pattern and the having children on classroom with mouth breathing pattern: This association was analyzed, and the results of Spearman's coefficient revealed a strong relationship ($r_s = 0.538$, $p < 0.01$).¹⁸ Figure 1 shows the responses of the participants regarding stomatognathic functions.

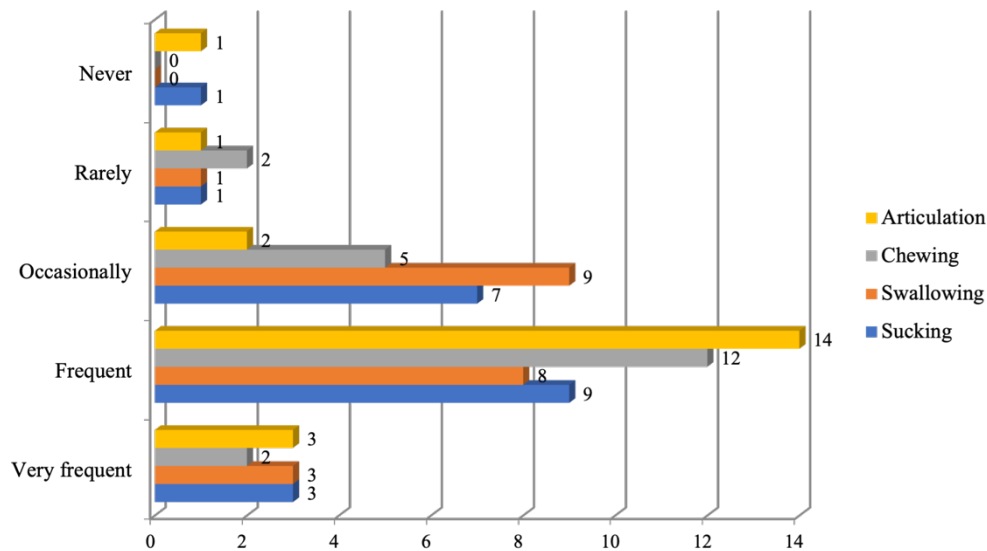


Figure 1. Stomatognathic functions

Regarding the consequences associated with a mouth breathing pattern, the preschool teachers respond can be observed in Figure 2.

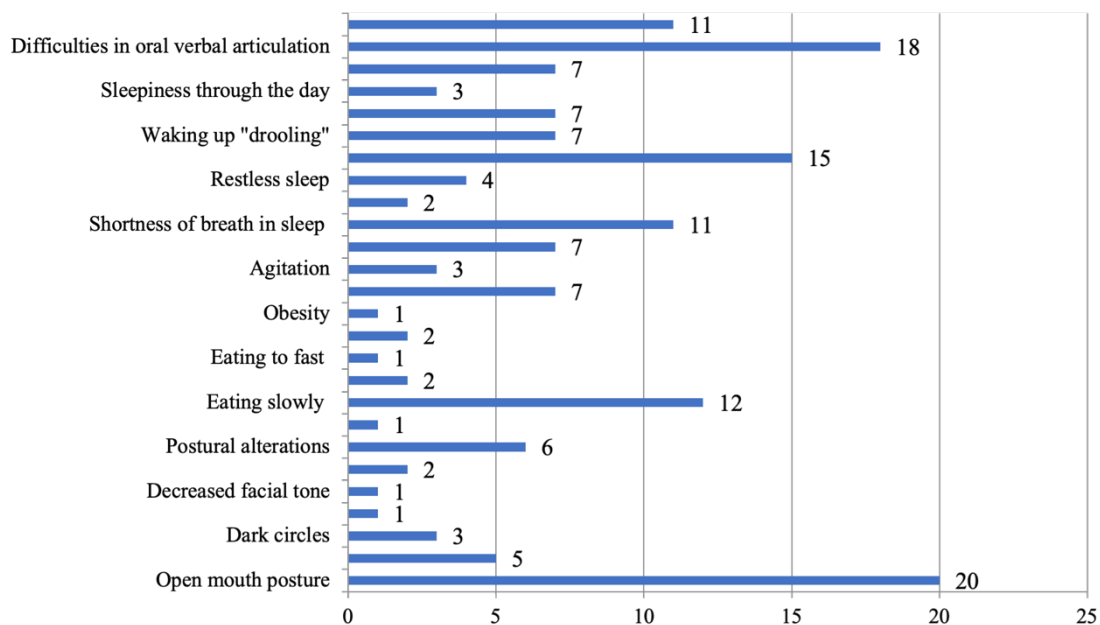


Figure 2. Consequences associated with mouth breathing pattern

Preschool teacher's action when detecting a mouth breathing pattern in children: 100% of participants reported that they informed the family regarding the possible consequences of this breathing pattern.

Opinion regarding the early identification of the mouth breathing pattern in children: 85.7% of participants thought it was crucial to do so.

Referral procedures for preschoolers: 57.1% of participants sent their children to see an otolaryngologist (ENT); 29% sent them to a SLT; and 14% sent them to a pediatrician. Views on the importance of learning more about mouth breathing patterns in children: 81% considered very important to receive more information about this theme; 67% reported that they preferred to receive this knowledge through an online or presential course; 19% stated that they preferred a workshop with case studies; 9% chose a webinar and 5% flyers with information on mouth breathing pattern on children.

Discussion

It was reported by the majority (20) of participants that they had knowledge about mouth breathing pattern. This percentage is higher than the one found in Borges study,¹⁹ but similar to Machado et al. results,²⁰ where teachers also responded to surveys about their knowledge about mouth breathing pattern. However, in Kosicka et al. study,¹⁶ all teachers reported to have knowledge that a permanent breathing through the mouth was abnormal.

Considering the source from their knowledge the preschool teachers and SLT often work together since teachers can have a crucial part in the early intervention and prevention of speech and language disorders. Preschool teachers are in a good position to identify mouth breathing symptoms since they engage with students on a regular basis. Together with SLT, preschool teachers may make a significant difference in children's overall development and learning results by making sure children receive assistance in a timely manner.²¹

On the question about having children with mouth breathing pattern on their classroom, most participants reported not having children with this condition. Although the participants in this study reported having knowledge about this theme, it is possible that they could had difficulties identifying children with this condition, especially if we consider the studies of prevalence of mouth breathing that show values between 25% and 57%.¹¹ This becomes more apparent when analyzing this study results about the positive relation between preschool teacher knowledge about mouth breathing pattern and the fact of having children on classroom with mouth breathing pattern. According to the study of Guimarães et al.,²² teachers identified fewer students with mouth breathing patterns before receiving more information's on the speech therapy orientation program.

In relation to the effects of mouth breathing patters on stomatognathic functions, it was verified that speech (articulation) (66.7%), chewing (57.1%) and sucking (42.9%) were the alterations indicated by the participants as the most frequent. In Kosicka study¹⁶ only one teacher (in a sample of 30 teachers) chose mouth breathing as an activity that "definitely do not affect articulation disorders". When observing the results of Guimarães et al.²² study, it was evident that about consequences on speech, most teachers responded that mouth breathing could cause speech difficulties, and in the post-program questionnaire the percentage of teachers raised to 98%. The stomatognathic system, orofacial structures, and craniofacial development may all be impacted by long-term mouth breathing due to changes in orofacial motor function¹⁰ Research suggests that mouth breathing in children can affect speech sound production (e.g. phonetic aspects and lingual interposition) and may also negatively impact chewing efficiency.²³ This highlights the importance of nasal breathing for proper orofacial development and function.

When asked about the consequences of mouth breathing pattern, the responses that were more frequent chosen by the preschool teachers were related to "open mouth posture" (95.2%), "articulation disorders" (85.7%), "snoring" (71.4%), "eating slowly" (57.1%), "apnea during sleep" (52.4%) and "vocal changes" (52.4%). In Borges survey,¹⁹ 45.1 % of instructors reported "eating slowly", 96.7% reported "snoring", and 93.5% of teachers classified "open mouth" as a sign or symptom of mouth breathing. Additionally, in Machado study,^{19,20} 66.6% of teachers linked "open mouth" to mouth breathing, while 83.3% reported "snoring". According to teachers in the Guimarães et al. study,²² mouth breathers may experience fatigue as a result of disturbed sleep patterns, including apnea during sleep and other issues.

All participants reported taking actions of reporting to the family a mouth breathing pattern detected in children. It is fundamental that this professional be able to identify and report parents about the need to see an SLT or another specialist. Preschool teachers may be the first to notice issues with children's orofacial structures at an early age, advise parents of these ramifications of these dysfunctions, and motivate them to seek out appropriate professional care.²¹

The study viewed at how children who were suspected of mouth breathing were referred.¹⁹ ENTs were found to be the most often selected medical specialists for diagnosis, which is consistent with earlier studies. SLT were also mentioned as possibilities for referrals; it is important to note that research^{20,21} indicate that both experts are equally preferred. This result empathizes the possible need for more clarification on the functions of SLT and ENTs in mouth breathing interventions.

It is important to keep in mind that mouth breathing can affect speech and language development in addition to being a medical issue. Consequently, it is likely that ENT and SLT working together will optimize intervention strategies.

Children can receive efficient care if we recognize the complex nature of mouth breathing and encourage communication amongst medical experts.²¹ The fact that preschool teachers are already referring children to specialists is a step in the right direction. Nonetheless, encouraging interdisciplinary cooperation can provide the treatment given to children with mouth breathing.

Regarding the need expressed for more knowledge about mouth breathing pattern on children, most of preschool teachers considered very important to receive more information about this theme and a majority of participants considered that they preferred to receive this knowledge through an online or presentational course. Given how common mouth breathing is in children and the potential consequences it might do to their growth and education, this is alarming.²⁴ Such programs could give preschool teachers the know-how and abilities they need to identify children who are mouth breathers.²⁵ This could involve being aware of the warning signs and symptoms of this condition, comprehending the potential consequences, and being familiar with suitable referral practices.²⁶

Conclusion

Mouth breathing can cause numerous health consequences. Therefore, it is crucial that preschool teachers play an important role on early diagnosis of oral breathing pattern, reducing the possible difficulties and harmful consequences of this condition. This study has been successful in analyzing preschool teachers' knowledge about the topic in question and allowed us to reflect on what could be done to improve the knowledge of these professionals. Most preschool teachers were found to have prior knowledge regarding mouth breathing pattern. Nevertheless, they expressed the need to upgrade their knowledge about this theme. Further studies in different countries and with larger samples are needed to investigate the knowledge and attitude of teachers towards mouth breathing pattern in children.

Some limitations that need to be taken into consideration while analyzing the findings. One limitation was the brief, one-month online recruitment period. This resulted in a reduced sample size, thereby increasing the possibility of study inconsistency, and impacting the validity of this article's conclusions regarding the knowledge of Portuguese preschool teachers about mouth breathing pattern.

Furthermore, the study made no mention of using validated questionnaires to assess the preschool teachers' knowledge. Without validation, the accuracy and reliability of the collected data are questionable. Subsequent studies may include impartial evaluations of teacher's identification and

knowledge abilities. It would be beneficial to look at how well different teacher training programs are at teaching mouth breathing.

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