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Research Paper

Obstructive sleep apnea syndrome and parodontium in children

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ABSTRACT

Obstructive Sleep Apnea Syndrome (OSAS) in children is characterized by a prolonged partial obstruction of the upper airway or a complete and intermittent obstruction, which disturbs the ventilation during sleep and / or its normal course. Its prevalence in children is 1 to 4% in the general population and 30 to 50% of these children present a gingival inflammation. The objective of this work is to highlight a possible link between these two pathologies by a review of literature. We consulted the Cochrane, PubMed and Scopus databases. Only article studying the link between OSA and periodontal health in children confirms this. Children in the study group (with SAOS) had fewer cavities, plaque, gingival inflammation and better hygiene. The link between OSAS and periodontal health in children could not be demonstrated by that review of literature. The bibliographic study allowed us to proof show that the symptomatology of OSAS (oral ventilation, xerostomia) is related to the gingival inflammatory factor.

Keywords: Obstructive apnea, periodontal, children.

INTRODUCTION

This work aimed at discovering a possible relationship between two inflammatory pathologies: OSAS and gingivitis / periodontitis in children and to analyze it. OSAS in children causes systemic inflammation with associated cognitive, neurocognitive and cardiovascular problems (Cohen-Gogo et al., 2009).

Periodontal diseases corresponding to local inflammation in the oral cavity may also lead to an increase in pro-inflammatory mediators IL-1, IL-6 and TNF-alpha, reflecting systemic inflammation. These inflammatory mediators play a role in various systemic diseases such as diabetes, cardiovascular problems and hyperlipidemia (Gozal et al., 2008).

In the study of these two pathologies, similarities are found both at the level of inflammatory mediators and risk factors. Did this fact suggest that a potential SAOS-periodontal pathology association existed? In this work, we sought through a literature review to analyze a possible link between these two pathologies in children.

MATERIALS AND METHODS

On Scopus and PubMed

We started the search by crossing the following keywords:

1) "Obstructive sleep apnea" and "sleep disorder breathing" and "gingiva" and "children".
2) "Oral breathing" and "periodontics".
3) "Sleep disorders" and "oral diseases".

These searches gave no result.

By crossing: "obstructive sleep apnea" and "children" and "oral health":

Pubmed: 30 articles suggested.
Scopus: 9 articles suggested.

These articles cover the period from 1998 to 2016. A pre-

selection of three studies was conducted based on titles and abstracts to eliminate off-topics. The study of these articles led us to select only one study dating from 2015 that assesses the link between OSAS and periodontium in children. These primary studies gave very little elements of the study. Then, we decided to continue by using other keywords, corresponding to the symptomatology of OSAS in children:

By crossing the keywords: "gingival inflammation" and "breathing" and "children":

Pubmed: 2 articles.
Scopus: 6 articles (including the two previous articles collected on PubMed).

These results extend over the period from 1973 to 2013 and include data on oral health of children with asthma, muscular dystrophy (Duchenne), oral ventilation. Among these 6 articles, two were selected for the review after titles, abstracts and content analysis.

The use of the keyword "gingivitis" instead of "gingival inflammation" enabled us to broaden the search results and select two additional articles.

By crossing "adenotonsillar hypertrophy" and "periodontal health" and "children":

Only one study selected was proposed. The bibliographic search supplemented by the use of other synonyms keywords and by keywords in reference to OSAS symptomatology and the associated pathologies did not enable us to select other articles for the review.

- “periodontal health" / "periodontal diseases" / "oral diseases" / "oral breathing" / "plaque index".
- "xerostomia", "saliva", "lipseal", "Down syndrome".

These researches were supplemented by the bibliographies’ study of the studied articles and consultation of the International Journal of Pediatric Dentistry (by crossing mainly "gingival inflammation" and "breathing").

In view of the small number of appropriate articles, we decided not to filter according to the date of publication. The results were therefore limited only to studies on children / adolescents.

FILTER = 0-18 years.

Cochrane's consultation gave no review on this subject.

RESULTS

Despite a detailed literature search, we found only one article in 2015 directly studying the link between OSAS and periodontal health in children (Al-Hammad 2015). This study evaluates carious experience, hygiene, plaque deposition and gum health in children with OSAS and snoring. The results showed that children in the study group (with OSAS) had fewer cavities, plaque, gingival inflammation and better hygiene.

The authors note that more than one-third of the children in the study group have good oral hygiene as compared to only one case (3%) in the control group. Oral hygiene was strongly associated with the carious level and the presence of inflammation. There is therefore in the established group an imbalance in oral hygiene, of which origin is not mentioned. It is further emphasized in the article that on the date of publication in 2015, there were no further studies on a possible association between OSAS and gum health in children.

OSAS presents its peak of incidence between 2 and 8 years with as main risk factor, vegetations and tonsils hypertrophy. A 2013 study evaluates adenotonsillary hypertrophy impact on children's periodontal health.

The analysis involved 30 children, of whom 20 had chronic oral ventilation, snoring and adenotonsillary obstruction. These patients had undergone adenoidectomy (with or without tonsillectomy) during the study. The study of periodontal health by measurement of gingival index, plaque index and pocket depth was performed for each group before and after surgery.

The finding is that adenotonsillar obstruction has a harmful effect on periodontal health and that surgery improves the clinical situation. Oral ventilation is a symptom (nocturnal or nocturnal and diurnal) of OSAS in children and has long been described and analyzed as a risk factor of gingival inflammation (Table 1). However, we cannot extrapolate these results to OSAS until several randomized studies have been conducted on samples of children with diagnosed OSAS. Throughout the research, the positive association that emerges is one of oral ventilation and gingival inflammation (Cortellazzi et al., 2008; Jacobson, 1973). To the hypothesis of our study: *OSAS* has an influence on the periodontal health of children: we cannot answer because of the lack of studies to date to establish a link by a literature review.

DISCUSSION

Despite a detailed literature search, we were surprised not to find enough articles to set up a literature review. The question of the subject choice was thus posed: is it interesting? Is it a difficult relationship to highlight? Would OSAS have little impact on the oral health of the child, hence, the lack of interest explaining the works scarcity? In adults, there are consistent number of studies exploring the link between OSAS and periodontium, of which a systematic review of 2015 revealed an association between the two pathologies. In children, severe periodontal diseases are certainly rarer, but several studies have

Table 1: Presentation of the selected bibliography.

Article	Authors	Publication	Study	Subjects number	Studied variables	Conclusion
The impacts of adenotonsillar hypertrophy on periodontal health in children: A prospective controlled pilot study	(Demir et al., 2013)	American journal of otolaryngology (IF: 0.933) 2013	Prospective	Studied group: 20 children with oral ventilators and snorers with adeno-tonsillar obstruction Control group: 15 children	- Plate index (PI) - Pocket depth (PD) - Gingival index (GI)	Adeno-tonsillar obstruction periodontal disease risk. VAS release surgery and improved periodontal status.
Oral health status of children with obstructive sleep apnea and snoring	(Al-Hammad et al., 2015)	Pediatric dentistry (IF: 0.55) 2015	Case-control	Studied group: 30 children with OSAS Control group: 30 children	-Plate index - Gingival index (by Nanda)	Children with OSAS: less plaque and less gingival inflammation.
Risk indicators of Gingivitis in 5-year-old Brazilian Children	(Cortellazzi et al., 2008)	Oral Health and Preventive Dentistry (IF: 0.690)2008	Descriptive	728 children of 5 years	Gingival bleeding	Children oral respirators: no more gingival inflammation.
Caries Prevalence, levels of mutans Streptococci, and Gingival and plaque indices in 3.0- to 5.0-year-old mouth breathing children	(Nascimento et al., 2004)	Caries Research (IF: 2.278) 2004	Case-control	60 children of 3 to 5 years: Studied group: 30 oral respirators Control group: 30 without ventilatory problem	-Plate index - Gingival index	Children oral respirators: more risk of developing periodontal disease.
Mouth breathing, lip seal and upper lip coverage and their relationship with gingival inflammation in 11-14 year-old schoolchildren	(Wagaiyu and Ashley, 1991)	J Clinical Periodontology (IF: 3.915) 1991	Descriptive	201 children from 11 to 14 years.	-Presence of plate -Redness -Bleeding on poll	Oral respiratory children: more plaque and more gingival inflammation, and even more so if labial in occlusion.

highlighted the influence of periodontal health in children on the future periodontal state.

In pediatric odontology, during consultation or care for children with disabilities, there is always an associated gingival inflammation. In these children, hygiene and plaque control are complicated, but the influence of ventilatory disorders is to be considered by lack of maturation of the functions (the prevalence is 30 to 50% in children with trisomy(http://www.hassante.fr/portail/upload/docs/application/pdf/Parodontopathies_rap.pdf 2016). Dry mouth (xerostomia) observed in children with OSAS seems to be one of the risk factors for a periodontal problem. Saliva, which has a role in digestion, ensures, under some physiological conditions, maintenance of gingival and dental health by its antibacterial actions, lubrication, dilution and its buffer power (Lal et al., 2015).

A publication on the study of saliva in oral respirators vs nasal respirators shows that there is no significant difference between salivary flow, buffer power, and levels of bound and total sialic acid whether saliva is stimulated or not. On the other hand, sialic acid levels are higher in unstimulated saliva in oral respirators, that is to say, under the usual conditions of life (Weiler et al., 2006). Yet, Sialic acid is a biomarker of oxidative stress of periodontal tissues: it reveals the increase of salivary bacteria, which can cause periodontal inflammation. Therefore, oral breathing would have an influence on periodontal health by promoting bacterial deposition.

Conclusion

The link between OSAS and periodontal health in children could not be demonstrated by a literature review. The bibliographic study enabled us to highlight that OSAS symptomatology (oral ventilation and xerostomia) is linked to gingival inflammatory factor. Even if OSAS prevalence in children is relatively low (1 to 4%), it can reach 50% in people with disabilities.

Sleep approach should be included in the daily practice of the dental surgeon to meet the demands of the patient and his relatives (from snoring to OSAS) in order to refer for organizing a multidisciplinary approach (diagnosis by a sleep specialist doctor, full medical assessment, ENT, orthodontist).

The main role of the dental surgeon is to identify a targeted interrogation, supplemented by a clinical examination, the various symptoms that can evoke a sleep disorder in order to refer the patient if needed to appropriate care centers.

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