

The association between parent education level, oral health, and oral-related sleep disturbance. An observational cross-sectional study



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Abstract

Introduction Prevention of oral diseases in children is important for their long-term health. Parents play a crucial role in the health and wellness of their children. As such, it is important for parents to be well-informed about the importance of their children's oral health, as well as the steps they can take to ensure that their children receive the best possible care.

Objective To explore the relationship between parents' education levels, children obesity, children oral health and oral-related sleep disorders.

Methods Observational cross-sectional study. At the time of enrollment data regarding parents' employment status and parents' education level were collected. We also collected BMI and anamnestic data regarding the presence or not of oral-related sleep disorders in the last 3 months: snoring, chronic mouth breathing, sleep bruxism. Oral health was also evaluated for each subject through the DMFT (decayed, missing and filled teeth) index.

Results We enrolled 183 subjects and their respective parents (181 mothers and 180). Using the Poisson regression models, we found that a higher DMFT index was associated with the unemployed status for both parents (father: coeff. 0.2929; $p=0.007$; IC 95%: 0.080 – 0.505; mother: coeff. 0.256; $p=0.014$; 95% IC: 0.0515785 - 0.461.) and with a lower education status for both parents (father: coeff. -0.279; $p<0.001$; IC 95%: -0.396 to -0.162. mother: coeff. -0.312; $p<0.001$; IC 95%: -0.4275607 to -0.19687). Concerning BMI, we found that a lower education level of the father was associated with a higher BMI of his children (coeff.: -1.13; $p=0.029$; 95% IC: -2.15 to -0.11). The unemployed status of the mother was associated with a higher BMI of her children (coeff. 1.93; 95% IC: 0.16-3.71; $p=0.033$). In addition, we found that a higher BMI of the children was associated with a higher likelihood of snoring (OR:1.11; $p=0.004$; 95% IC: 1.03 - 1.19) and chronic oral breathing (OR: 1.10; $p=0.014$; 95% IC:1.01 - 1.19).

Conclusion Parents' education levels influence several health outcomes, including oral health and the risk of obesity. In turn, obesity can represent a risk factor for oral-related sleep disturbances. Parents play a crucial role in the health and wellness of their children. As such, it is important for parents to be knowledgeable about the importance of their children's health, as well as the steps they can take to ensure that their children receive the best possible care.

KEYWORDS education level, oral health, sleep disturbance, bruxism, obesity, osas, temporomandibular disorders

Introduction

Oral diseases are a significant health problem for children. They are the most common chronic childhood diseases, and yet are largely preventable [Petersen et al., 2005; Watt et al., 2018]. One of the most common disease worldwide is dental caries [Aiuto et al., 2020; Colombo et al., 2019; Paglia, 2021], although it is almost entirely preventable. It affects people of all age groups and socioeconomic status, with serious burdens for those affected. It represents a serious public health problem, with 75% of schoolchildren affected by tooth decay worldwide [Selwitz et al., 2007; ten Cate & Featherstone, 1991; World Health Organization; 2015] with repercussions on the psychological, functional and social dimensions of a child's well-being [Pitts et al., 2017; Madalli et al., 2014; di Stasio, Lauritano et al., 2018].

Gum disease is another common finding in children. It is caused by plaque, a sticky film of bacteria that forms on teeth able to irritate and inflame the gums, leading to gingivitis, the early stage of gum disease [Chapple, 2014]. If not treated, gingivitis can progress to periodontitis, a more serious form of gum disease that can damage the gums, bones, and connective tissue that support the teeth [Tonetti et al., 2017].

Oral thrush is a fungal infection that can occur in young children. It is caused by the overgrowth of a type of yeast called Candida. Oral thrush can cause white patches on the tongue or the inner cheek and can make it difficult for a child to eat or drink [Singh et al., 2014]. Prevention of oral diseases in children is important for their long-term health.

Good oral hygiene habits, such as brushing and flossing teeth daily, and eating a balanced diet, can help to reduce the risk of developing oral diseases. Regular dental visits are also important for prevention and timely treatment in children [Peres et al., 2019].

Oral-related sleep disorders encompass a range of conditions that can make it difficult to get a good night's sleep [Huynh et al., 2014; Fagundes et al., 2022; Storari et al., 2021]. While some people may only experience occasional difficulty sleeping, others may deal with chronic sleep problems that significantly affect their quality of life [Huynh et al., 2014]. There are many different oral-related sleep disorders, but some of the most common include bruxism (teeth grinding), sleep apnoea, and temporomandibular joint (TMJ) disorders [Huynh et al., 2014; Fagundes et al., 2022; Minervini, Mariani et al., 2022]. Each of these conditions can cause symptoms, such as loud snoring, teeth grinding, headaches, and daytime fatigue.

Bruxism is a common oral-related sleep disorder that involves involuntary clenching and grinding of the teeth [Beddis et al., 2018]. This can occur during the day or at night, and it can make it difficult to get a restful night's sleep. In addition to causing sleep problems, bruxism can also lead to teeth damage and jaw pain [Beddis et al., 2018]. Sleep apnea is another oral-related sleep disorder that can be very serious. It occurs when a person's airway becomes blocked during sleep, causing them to snore loudly and repeatedly stop breathing [Tuomilehto et al., 2013]. This can cause oxygen levels to drop and lead to daytime fatigue.

Sleep apnoea can also increase the risk of high blood pressure, heart disease, and stroke [Tuomilehto et al., 2013]. TMJ disorders are a group of conditions that affect the temporomandibular joint, which is the joint that connects the mandible to the skull. TMJ disorders can cause a variety of symptoms, including pain, clicking or popping sounds when opening the mouth, and difficulty chewing. These disorders can also make it difficult to get a good night's sleep [Wu et al., 2020].

As said, parents play a crucial role in the health and wellness of their children. The first is ensuring that parents have a basic understanding of the importance of oral hygiene and how to properly care for their children's teeth. They should also be aware of the types of foods and drinks that can damage the teeth and what habits can lead to tooth decay. Additionally, it is important that parents understand the importance of regular dental checkups and how to identify signs of dental problems.

In recent years, there has been a growing body of research that links parents' education level to the development of obesity in their children. Studies have shown that higher parental education is associated with lower obesity in children and adolescents, while lower parental education may be associated with higher obesity in this age group.

Obesity is a well-known risk factor for several chronic diseases, including heart disease, stroke, and diabetes. It can also contribute to oral health problems. Being overweight or obese can put extra strain on the gums and teeth and can also lead to inflammation of the gums (gingivitis), which can in turn lead to gum disease [Huynh et al., 2014; Marchetti et al., 2022].

In addition, excess weight can also contribute to mouth dryness, which can promote the growth of bacteria. Aside from the direct effects on the mouth, obesity can also indirectly affect oral health. For example, obese subjects are more likely to suffer from sleep apnoea, which can also lead to dry mouth and an increased risk of tooth decay and gum disease [Tuomilehto et al., 2013].

Based on these premises we explored the relationship between parents' education levels, children obesity, children

oral health and oral-related sleep disorders.

Methods

This is a cross-sectional descriptive-analytic study conducted on subjects aged 5–20 years and their parents, enrolled consecutively at the Dental Clinic of the University of Campania "L. Vanvitelli". This work was approved by the Ethics Committee of the University of Campania "L. Vanvitelli" [Protocol number: #555/2017; Date: 05/10/2017].

Data were collected using a questionnaire and clinical examinations of the enrolled subjects.

At the time of enrollment data regarding parents' employment status and parents' education level were collected. We also collected BMI and anamnestic data regarding the presence or absence of oral-related sleep disorders in the last 3 months: snoring, chronic mouth breathing, sleep bruxism.

We assessed the presence of these symptoms/signs through self-reported information gathered from the patients and their parents, which were then carefully reviewed. The presence/absence of each symptom or sign was then treated as a dichotomous variable, with subjects answering only Yes or No. In addition, to minimise these limitations, we trained our research staff to ask clear and concise questions that accurately capture the presence of these symptoms/signs.

The oral health status of each subject was assessed using the DMFT (decayed, missing and filled teeth) index [Sarita et al., 2004; Vallés et al., 2022]. This index is a measure of the general oral health of a person and can be used to evaluate the effectiveness of preventive dental care. It was considered as an oral health indicator and caries experience index and was calculated for all the involved subjects.

Inclusion criteria

Subjects aged between 0–16 years, availability to fill the questionnaire by children and their parents.

Exclusion criteria

Concomitant disease of any kind.

Sample size

An initial statistical evaluation of sample size was performed considering (I) a power of 95%,

(II) two-tailed analysis and a significance level of 5% (to correct for multiple comparisons),

(III) the mean DMFT scored by children with employed father (2.46 ± 1.9) and the mean of the total ECHOIS scored by children with unemployed father (3.45) obtained from a population of 41 patients (our preliminary results). This analysis suggested a minimum sample size of 77 individuals per group.

Statistical analysis

Continuous variables were expressed as the mean $\pm$ standard deviation (SD) or median with range. The prevalence of categorical variables was expressed as a number and percentage.

The outcomes were the score at the DMFT index and the presence of oral-related sleep disturbances: snoring, chronic mouth breathing, sleep bruxism. The DMFT score was treated as continuous variable whereas snoring,

chronic mouth breathing, sleep bruxism as dummy variables (absence or presence).

Parent employment and parent education level were used as predictors. Employment was treated as a binary variable (presence or absence of employee at the time of questionnaire administration). Education level was treated as an ordinal variable: 1, elementary school license; 2, middle school diploma; 3, diploma; 4, degree.

BMI was used as outcome in relation to parent education level and as predictor in relation to sleep disturbances. It was treated as a continuous variable.

Mann-Whitney test was used to compare mean BMI levels and mean DMFT between children with employed or unemployed parents. Poisson regression models, adjusted for age and sex, were used to explore the association between parents' employment or education level and the DMFT scores.

Linear regression models, adjusted for age and sex, was used to explore the association between parent employment or education level and children BMI.

Logistic regression models, adjusted for age and sex, were used to explore the association between BMI and sleep disturbances. We used the logistic regression analyses to evaluate the correlation between sleep disorders and the dmft score, using each sleep disorder as a dependent variable and dmft score, age, and sex as independent variables.

Statistical analyses were performed using Stata. Statistical Software: Release 16 (StataCorp LLC, College Station, TX, USA). Statistical significance was accepted when p value < 0.05.

Results

We enrolled 183 subjects and their respective parents (181 mothers and 180 fathers).

The mean age of the enrolled subjects was 12.8 ± 3.31 ; of the, 53.5% were female. The mean BMI was 20.07 ± 5.5 . The mean DMFT was 2.72 ± 3.08 . Of the 183 enrolled subjects, 56 (30.6%) reported snoring, 30 (16.36%) reported chronic mouth breathing, and 16 (8.74%) sleep bruxism.

Concerning parent employment and education level, 17.8% of the fathers reported to be unemployed whereas

	Children (183)	Fathers (180)	Mothers (181)
Age (mean, SD)	12.8±3.31	-	-
Female sex (n, %)	53.5%	-	-
BMI	20.07±5.545	-	-
Unemployed (n, %)	-	17.8%	68.8%
Educational level, years (n, %)	Elementary school	-	5.03%
	Middle school	-	50.84%
	High school	-	29.61%
	College degree	-	14.53%
DMFT (mean, SD)	2.72±3.08	-	-
Snoring (n, %)	30.6%	-	-
Chronic mouth breathing (n, %)	16.36%	-	-
Sleep bruxism (n, %)	8.74%	-	-

TABLE 1 Main results

68% of the mothers referred to be unemployed. However, the education level was similar between the mothers and fathers (more details in Table 1).

At the regression models, we found that a higher DMFT index was associated with the unemployed status for both parents (father: coeff. 0.2929; $p = 0.007$; IC 95%: 0.080 – 0.505; mother: coeff. 0.256; $p = 0.014$; 95% IC: 0.0515785 – 0.461) and with a lower education status for both parents (father: coeff. -0.279; $p < 0.001$; IC 95%: from -0.396 to -0.162. mother: coeff. -0.312; $p < 0.001$; IC 95%: from -0.4275607 to -0.19687). Poisson regression model results are depicted in Figure 1 and Figure 2.

Concerning the BMI, we found that a lower education

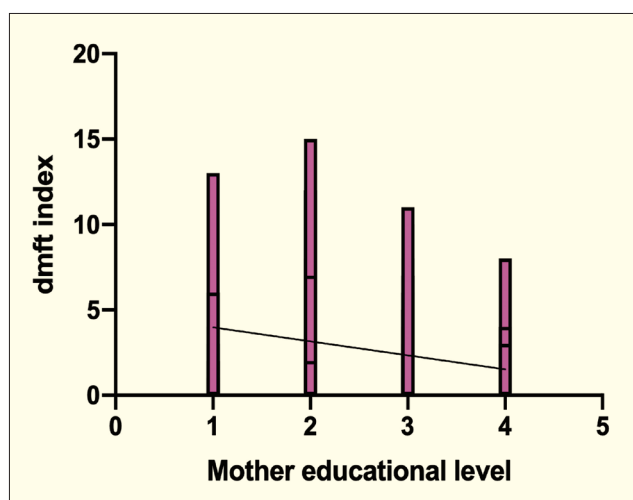


FIG. 1 Poisson regression model results (DMFT index/ mother's education level)

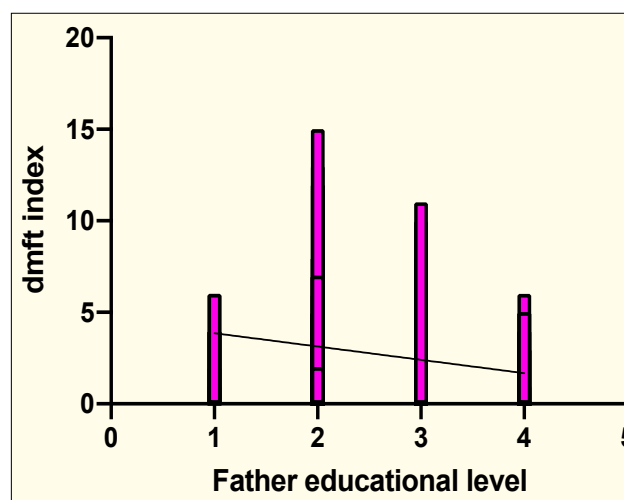


FIG. 2 Poisson regression model results (DMFT index/ father's education level)

level of the father was associated with a higher BMI of his children (coeff.: -1.13; $p=0.029$; 95% IC: from -2.15 to -0.11). Further, the unemployed status of the mother was associated with a higher BMI of her children (coeff. 1.93; 95% IC: 0.16-3.71; $p=0.033$). In addition, we found that a higher BMI of the children was associated with a higher likelihood of snoring (OR:1.11; $p=0.004$; 95% IC: 1.03 - 1.19) and chronic oral breathing (OR: 1.10; $p=0.014$; 95% IC: 1.01 - 1.19).

Finally, we did not find any statistically significant association between DMFT score and the presence of the sleep disorders investigated.

Discussion

In this study we evaluated the relationships between parents' education level/employment status and obesity, oral health and oral-related sleep disorders. Previous studies have evaluated the effects of socioeconomic status of parents on dental caries prevalence and oral health behaviour of children. Mother's education seems to have a more relevant role compared to father's education level; indeed, the socioeconomic status was measured by mother's education level and household income [Pieper et al., 2012; Kumar et al., 2016; Boyce et al., 2010; Veerasamy et al., 2016; Pizzo et al., 2010; van der Tas et al., 2017].

A survey study of 8,446 family in Wuhan explored the relationship between children's oral health behaviours [Chen et al., 2020], parental oral health knowledge, parental choices of pit and fissure sealants, and parents' education levels. The authors observed that parental education levels influence oral health issues.

Children of parents with a higher education level were more likely to practice oral hygiene. Children from well-educated families brush teeth more often and have regular dental checkups. To evaluate this relationship, the authors used 5 indicators of oral health and found that mother's education level affected 4 out of 5 indicators, whereas father's education levels only 3 out of 5 [Chen et al., 2020]. Therefore, the education level of both parents affects children oral health, with mothers' education background that may play a more relevant role than that of fathers in the development of family's oral health behaviours.

In line with the above, study findings in a group of Latinos showed that mothers were primarily responsible for overseeing the child's diet, seeking dental care of their children and for brushing children's teeth, while fathers are primarily responsible for providing financial support for family health care [Walker et al., 2017].

Other authors proved that mother's education level is a key determinant of their children oral health behaviours [Folayan et al., 2014].

In our study we found that the unemployed status of both parents as well as a lower education level of both parents were associated with a higher likelihood of low oral health, measured as DMFT. We did not explore the behaviours but the outcome (teeth health).

Based on the previous studies, mother's education level influence health behaviours whereas father's education level and employment status are of relevance for providing financial support for family health care. Therefore, not is surprisingly that both parents' education levels predict their children oral health status.

In recent years, there has been a growing body of research

that links parents' education level to the development of obesity in their children [Hsieh et al., 2020]. Studies have shown that higher parental education is associated with lower obesity in children and adolescents, while lower parental education may be associated with higher obesity in this age group [Hsieh et al., 2020].

The link between parental education and obesity in children is thought to be related to the fact that more educated parents tend to be more knowledgeable about health and nutrition and may be more likely to provide their children with healthier food choices [Hsieh et al., 2020]. Additionally, higher educated parents may be more likely to engage in physical activity with their children and emphasise the importance of physical activity. In addition to providing healthier food options and promoting physical activity, higher educated parents may be in a better financial position to provide their children with access to nutritious foods and physical activities.

Lower educated parents may not have the resources to purchase healthy foods or the knowledge to identify nutritious food choices, leading to the consumption of higher calorie, nutrient-poor foods. Lower educated parents may also be more likely to live in communities with fewer places to be physically active, such as playgrounds or parks, which can further contribute to the development of obesity in their children. It is important to recognise that parental education is only one of the factors associated with the development of obesity in children and adolescents.

However, the evidence does suggest that higher parental education is associated with a lower risk of obesity in children and adolescents, and efforts should be made to improve the education of parents in order to help reduce the prevalence of obesity in this age group [Hsieh et al., 2020].

We found that a lower father's education level and the mother unemployed status were associated with a higher BMI. In line, Schwendicke et al. [2015] found that people with lower parental education levels would have low health literacy and unhealthy dietary habits. In a Belgian study it was found that children whose mothers have high education levels were less likely to consume sugary drinks and more likely to have dental visits.

It is well known that obesity is associated to oral-related sleep problems. We found an association between higher BMI and higher likelihood of reporting snoring and chronic oral breathing.

Our findings suggest that parents' education levels affect numerous health outcomes and among them, oral health and the risk of obesity. In turn, obesity can influence oral-related sleep disturbances.

Given that parents play a crucial role in the health and wellness of their children, having a basic understanding of the importance of oral hygiene and how to properly care for their children's teeth is crucial.

Parents should also be aware of the types of foods and drinks that can damage the teeth and what types of habits can lead to tooth decay, ensuring that their children are consuming a balanced, healthy diet and limiting sugary snacks and beverages. Parents should encourage their children to brush and floss their teeth twice a day and to visit the dentist regularly and understand the importance of regular dental checkups and how to identify the early signs of dental issues, in order to seek prompt treatment if needed. To help parents in this efforts, there are many resources available. Parents can consult with their paediatrician, dentist,

or health care provider to gain access to pertinent information.

Additionally, the Internet has a plethora of websites, blogs, and articles devoted to the topic of oral health. By educating themselves and taking the necessary steps, parents can help ensure that their children maintain healthy teeth and gums for years to come.

Conclusion

Parents' education levels influence several health outcomes and among them, oral health and the risk of obesity. In turn, obesity can represent a risk factor for oral-related sleep disturbances.

Parents play a crucial role in the health and wellness of their children. As such, it is important for parents to be knowledgeable about the importance of their children's health, as well as the steps they can take to ensure that their children receive the best possible care.

Questionnaire

1. What is your child's age?
2. What is your child's gender?
3. Are you currently employed?
4. What is your highest level of education completed?
5. What is your child's BMI? (Body Mass Index)
6. Does your child snore at night (in the last three months)? (a) Yes (b) No
7. Does your child grind their teeth (bruxism) at night (in the last three months)? (a) Yes (b) No
8. Has your child had a problem with oral breathing during sleep (in the last three months)? (a) Yes (b) No
9. If your child has ever had a problem with oral breathing during sleep, please describe the nature of the problem.

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