Biopsychosocial aspects of sleep bruxism in children

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9 Chapter Summary

The general aim of the present thesis was to obtain a deeper insight into the mutual interactions of the biopsychological aspects of sleep bruxism (SB) in children. The specific aims were: 1) to systematically review the literature on the prevalence of SB in children (Chapter 2); 2) to investigate the correlation of parental-reported SB and of masticatory muscle activity (MMA) recorded with portable electromyography (EMG) as compared to a polysomnography (PSG) assessment of SB in children (Chapter 3 and 4); 3) to study the correlation of Quality of Life (QoL) and sleep behaviors with parental-reported SB in children (Chapter 5 and 6); and finally 4) to determine the association of dietary habits and parental-reported SB with tooth wear in children with mixed dentition (Chapter 7). Overall, this thesis intended to increase the internal validity and reliability of the results, by using validated instruments and calibrated devices for the assessment of SB in children.

The literature on the prevalence of SB in children (Chapter 2) retrieved only studies that used single-item questions to assess the presence of SB in children. A very high variability of findings was found, with a prevalence range of 3.5–40.6%, which is conditioned by the different age groups under investigation and by the different frequencies of self-reported SB. This prevented from supporting any reliable estimates of the prevalence of SB in children. Despite these shortcomings, a trend for a decline with age and a lack of gender differences in SB prevalence were common findings that require to be further explored with future studies.

In Chapter 3, as part of ongoing strategies to define the relationship between different approaches to assess SB, the correlation between proxy-reported SB and a "definite" SB diagnosis via PSG was explored. The study required parents of forty- six 8–12 years old children (40.5% females; mean age 9.2 _ 1.9 years) to fill the Children's Sleep Habits Questionnaire (CSHQ). A questionnaire item assessing a single-observation report of SB with a No/Yes answer and five frequency-related ordinal answers was also filled out. In addition, a 5-day diary reporting the presence/absence of SB (multiple-observation report) was completed as well. All questionnaire/diary data were put into correlation with findings of a single-night PSG, interpreted by using the existing adult criteria for SB as the reference standard. Even though the multiple-observation report achieved better agreement than the single-observation report, the results failed to support the correlation of both strategies with PSG, so that parental-reported approaches cannot be considered an equivalent of PSG/SB diagnosis, as based on the available adult criteria. As a remark, it was suggested that there is a need of information on more extensive PSG data about the full spectrum of MMA during sleep in children.

The technical and economic concerns regarding strategies adopted to measure SB in PSG in children were the reasons to perform the study contained

in Chapter 4. In addition to the high economical costs and technical requirements, the gold standard PSG requires the exam to be performed in a sleep laboratory, which affects the natural environment of sleep. This issue may be particularly critical in children. Since some devices for portable EMG have shown an acceptable agreement with PSG in adults, the study aim was to assess the correlation between measurements of MMA, using a portable single-channel EMG device and PSG in children. Measurements of EMG activity were made with the Grindcare Measure (GCM) in 47 children (21 female and 26 males; mean age: 9.2, SD: 1.7 years). Each participant underwent five consecutive nights of GCM, the last of which also provided a concurrent PSG recording. The GCM was found to be not accurate to detect PSG/SB in children. Furthermore, there was no advantage of the multiple assessment, in terms of reducing the impact of night-to-night EMG episodes' variability on the GCM/PSG correlation. In conclusion, a need emerged to run new projects on alternatives to PSG for measuring the frequency and intensity of MMA in the natural sleep environment of children. Strategies should be based on the search for EMG normality values for MMA in children and the development of a new algorithm for portable EMG devices, which could be used in children.

The importance of evaluating the associated factors to SB, which could help achieving a better depiction of its role as a risk factor or comorbid phenomenon with other conditions, has recently emerged. A study assessing 1556 children (752 girls and 804 boys, with a mean age of 9.8 ± 1.6 years; range 6–13), evaluated the association of socioeconomic status and QoL with SB in children. Based on the results of the investigation presented in Chapter 5, such an association cannot be supported (correlation coefficients ranging from 0.092 to 0.119). Despite the identification of a few significant associations related with the children's emotional and school functioning and the emerging differences between the various social layers, the correlation values were low. Concerning the socioeconomic layers, no correlations between possible SB and QoL were found in children belonging to the lowest social layers, along with an increasing number of correlations with the higher socioeconomic status.

Chapter 6 explored the relationship between parental-reported SB and sleep behaviors in 1475 Colombian children, aged 9.8 ± 1.6 years, belonging to three different social layers. Parents filled out the Children´s Sleep Habits Questionnaire (CSHQ). The results showed that some sleep patterns as well as daytime sleepiness were similar for children with different frequencies of proxy-reported SB, without differences among socioeconomic layers, whilst sleep disorders and parasomnias increased with the frequency of parental-reported SB, independently on the socioeconomic layer (Bonferroni post-hoc<0.001).

The final investigation tried to get deeper into the relationship of SB with its commonly-believed purported consequences, viz., tooth wear. Tooth wear is included as a suggested clinical criterion for determining the presence of probable bruxism, but it should be remarked that SB is not the only factor implied in the occurrence of tooth wear. Thus, in Chapter 7, the association of dietary habits and parental-reported SB with tooth wear in 121 children with mixed dentition (mean age 9.6 years) was explored. A cross-sectional study, in which 1637 teeth were evaluated using the screening module of the Tooth Wear Evaluation System (TWES), was performed. Parental-reported SB was evaluated by means of the CSHQ, whilst dietary habits were investigated by means of the Health Behaviour in School-Aged Children Food-Frequency Questionnaire (HBSC-FFQ). The analysis of data with the Spearman correlation test and ordinal-multiple-variable regression analyses showed a lack of correlation of dietary habits and sleep tooth grinding with tooth wear in the mixed dentition. Only dietary habits showed to have effects in terms of increase-to-increase severity.

In conclusion, there are not enough elements to suggest that SB itself is related to any particular biological, psychological, and social aspects in children. However, limitations for the assessment of MMA and quantification of psychological aspects, should be taken into account when discussing these findings.