

Presence of bruxism according to the type of cerebral palsy

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ABSTRACT

Purpose: to determine the presence of bruxism, according to the type of cerebral palsy.

Methods: a descriptive, cross-sectional, quantitative study with a non-experimental design. A total of 55 children with cerebral palsy were evaluated, using an oral observation sheet, and data were analyzed by non-parametric tests of frequencies, percentages, arithmetic mean and descriptive statistics.

Results: there was a majority of male children, with mean age 10.56 years. Sleep bruxism and daytime tooth clenching prevailed in the spastic cerebral palsy with 75% and 55.6% respectively, compared to the other types of cerebral palsy ($p=0.034$). In the characteristics of oral cavity, the presence of wear facets was observed, associated with all types of bruxism ($p<0.05$).

Conclusion: there was a high prevalence of bruxism in spastic cerebral palsy, evidencing the need to implement treatment options for this pathology in people presented with cerebral palsy, requiring more studies, with standardized diagnostic protocols and representative samples to evaluate the factors that influence the presence of several types of bruxism.

Keywords: Cerebral Palsy; Bruxism; Sleep Bruxism

A study conducted at Hogar Clínica San Juan de Dios, Chiclayo, Peru.

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INTRODUCTION

Bruxism is defined as a parafunctional act that includes clenching and grinding, which can manifest during sleep or at daytime¹. The term bruxism is derived from the Greek (brychein) meaning “teeth grinding” and the word mania, meaning compulsion. The term originated in 1907, when Marie Pietkiewicz first used the term *bruxomanie* (bruxomania)².

The etiology of this parafunctional activity is quite diverse and may involve local, systemic, psychological, occupational or hereditary origins or even be associated with sleep disorders³. This habit can occur at all ages, causing various damages to the stomatognathic system⁴. The consequences of this dysfunction include changes in dentition, damage to the periodontium, discomfort in the masticatory muscles and temporomandibular joint, headache and behavioral and psychological changes⁵. Bruxism can also have a negative impact on the quality of life of children and their families⁶.

The prevalence of bruxism in childhood is variable in the literature due to the different age groups involved and the limitations of criteria for clinical diagnosis^{6,7}, with reported values ranging between 7% and 88%⁴.

The classification, according to habit, characterizes tooth clenching during the day and at night or sleep bruxism. Daytime tooth clenching consists of clenching the teeth and occurs as a semi-voluntary activity of the mandible, not causing damage to the periodontium or tooth wear, being related to a present vicious habit. In sleep bruxism, hardening occurs in lateral or transverse direction, occurring as an unconscious activity, with noise production while the individual sleeps, with possible damage affecting, among others, the teeth and periodontium⁸.

In childhood, this parafunction is generally identified by pediatric dentists, who may collect the necessary information to determine an individualized treatment for each patient⁹; however, it requires a multidisciplinary team for treatment and survey with the parents or caretakers about the child's nocturnal oral habits, general medical history, complaints of atypical headaches or mandible pain upon waking, as well as the psychological profile².

Monitoring the wear caused by bruxism is essential to follow the possible progression and plan an intervention to improve the quality of life of children suffering from this dysfunction¹⁰.

Cerebral palsy (CP) is defined as a group of developmental disorders of posture and movement that

induces a limitation in activity, resulting from disorders that occur in the brain during fetal development and in childhood¹¹. Motor disorders are usually accompanied by disorders or comorbidities associated with sensitivity, cognition, communication, perception, behavioral disorders and/or seizures.

With regard to orofacial functions, children with infantile cerebral palsy present alterations in the masticatory muscles that perform sucking, chewing, swallowing, speaking, mouth breathing the mouth and also facial expressions¹². These muscular activities are divided into parafunctional activities, which involve movements of the mandible and tongue that are not associated with any specific function. These activities have different implications for affected people and are controlled by different mechanisms¹³. Parafunctional activities occur especially in individuals with a decreased protective reflex and are characterized by excessive occlusal contacts¹⁴.

These pathological effects of parafunctions occur when the habit exceeds the physiological limits of mandibular movements, either in intensity or frequency¹². Several studies report that individuals with CP have a higher prevalence of bruxism, with several characteristics that may be at the origin of this parafunctional activity. These characteristics include different muscle tones, oral myofunctional disturbances, dysfunctions in posterior cranial bones, which project anteriorly, altering tooth contact and predisposing the individual to hyperactivity of the main masticatory muscles (temporalis and masseter), decreased control of mandible posture which may worsen during periods of emotional stress, sleep disorders, use of neuroleptics, and malocclusion¹⁵.

This study aimed at determining the presence of bruxism, according to the type of cerebral palsy.

METHODS

Study design and type

The present study had an observational, quantitative, descriptive, cross-sectional, and non-experimental design. Likewise, the method used in this study was analytical, with data treatment and a quantitative approach.

The study was conducted in accordance with the national health research formats and regulations of Peru by Ministerial Resolution number 233-2020-MINSA, which approves the technical document on ethical considerations for health research on

humans. Furthermore, the purposes and methods of data collection were conducted in accordance with the regulations of the university institution for the presentation of thesis, provided by the Universidad Nacional Federico Villarreal, cited with resolution R. No-7189-2020-CU-UNFV, which resolves to approve the Dissemination Plan of the code of ethics and the regulations of the code of ethics for research of the UNFV. Prior information was provided to the parents of each patient, upon request to sign the informed consent, with Official Letter number 0424-2021-OGGE-FTM-UNFV; as well as the corresponding director report number 0424-2021-OGGE-FTM-UNFV, who provided the permission to conduct the study at the aforementioned institution.

Participants

The study population consisted of 55 individuals with cerebral palsy aged 6 to 18 years from the San Juan de Dios Hospital Clinic in Chiclayo, Peru.

Inclusion and exclusion criteria

To perform this study, the selected sample had to meet certain inclusion criteria: 1) Individuals aged 6 to 18 years diagnosed with bruxism and daytime tooth clenching referred to the physical medicine and rehabilitation service, 2) Individuals with cerebral palsy as the main disability, who may or may not have associated intellectual or sensory disabilities, 3) Individuals who attend language therapy sessions at the Clínica Hogar Clínica San Juan de Dios in Chiclayo, 4) Children with informed consent signed by their parents / caretakers. The exclusion criteria were: 1) Individuals with associated craniofacial alterations, 2) Individuals with severe developmental pathologies, 3) Individuals with multiple associated sensory alterations.

Procedures

The researchers performed the evaluations and observations using, as a data collection technique, observation of the oral cavity that allowed them to obtain data related to their oral health, such as assessment of malocclusion, tooth wear facets, and confirmation of the presence of bruxism and daytime tooth clenching. For this purpose, the Angle classification was used to

describe the relationship between upper and lower molars in occlusion, determining different types of posterior or anterior crossbite. Reassessment of the presence of bruxism diagnosed by the doctor in a dichotomous manner was considered, given the presence or absence of parafunctional habits during daytime (use of pacifier, digital sucking, biting or gnawing on objects, tongue biting, lip biting, anterior tongue thrust). Besides, the presence or absence of wear facets on teeth was also evaluated dichotomously. Finally, the Spasticity Classification - Ashworth Scale modified by Bohannon was used to classify muscle spasticity in the study sample.

Subsequently, the observation technique was applied by a systematic, valid and reliable record of observable behaviors and situations, through a set of categories and subcategories. The observation technique allowed to collect all necessary information by application of the proposed evaluations to the patients according to the selection criteria, followed by elimination of the registration data.

Statistical analysis

The analysis and treatment of collected data were conducted on the statistical package SPSS® (Statistical Package for Social Sciences) version 25. In the first phase, descriptive statistics of all variables was performed. In the second phase, inferential analysis was conducted to associate the study variables related to oral observation with the characteristics presented by the children. For the analysis of nominal variables, the chi-square test of independence was used. In the third phase, a multivariate analysis was applied, using binary logistic regression, with the variables under study dichotomized as “yes” and “no”. For data analysis, some variables were recoded, transforming them into dichotomous variables (presence of wear facets, bruxism), creating intervals (age) or grouped for a better understanding of results (Angle classification).

RESULTS

The presence of sleep bruxism was more frequent in females with 62.5%, and in males daytime tooth clenching during and sleep bruxism had prevalences of 55.6% and 58.3% respectively (Figure 1).

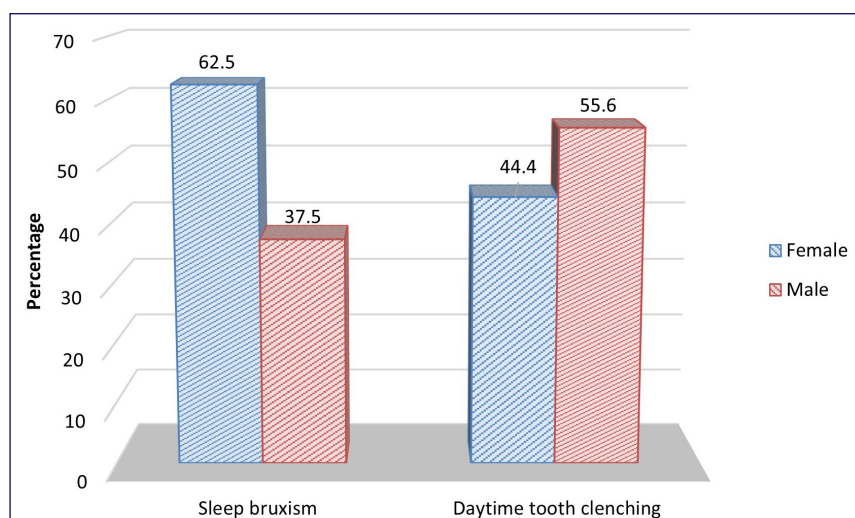


Figure 1. Results regarding sleep bruxism and daytime tooth clenching, according to gender in individuals presented with cerebral palsy

The most prevalent age groups of children with sleep bruxism were 6-8, 9-11 and 12-14 years with 25%, respectively; and in daytime tooth clenching 6-8, 9-11, 12-14 and 15-18 with 22.2%, respectively. For

both variables, gender and age group, no significant differences were found concerning the type of bruxism (Figure 2).

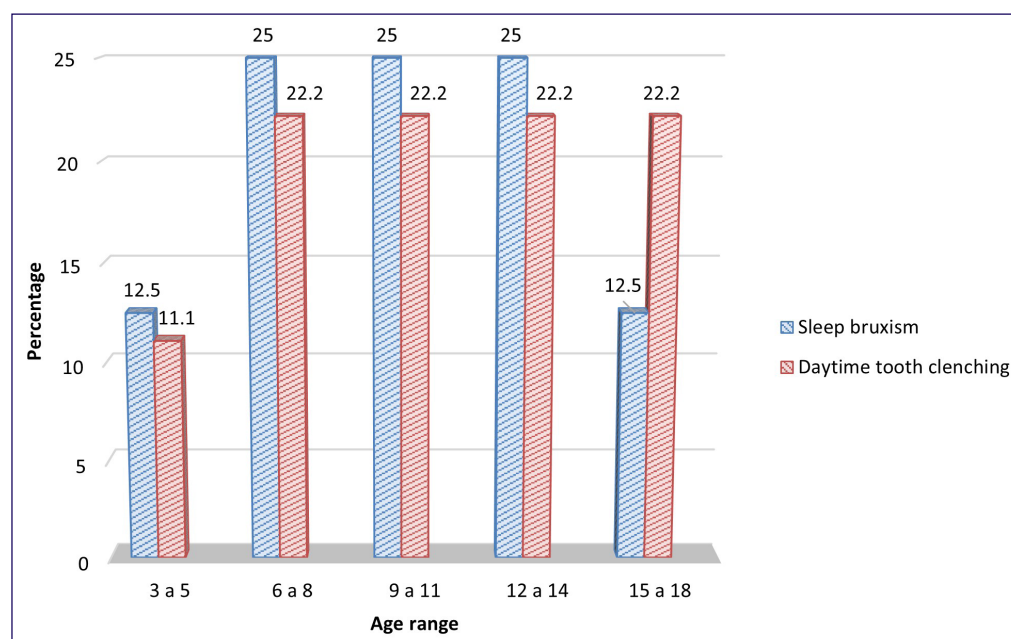


Figure 2. Results regarding age characteristics, according to sleep bruxism and daytime tooth clenching in individuals presented with cerebral palsy.

It can be observed that, from the total number of individuals evaluated according to the association of bruxism with the type of cerebral palsy, spastic cerebral palsy was the most common and the vast majority in

the types of bruxism, without statistically significant differences, with 75% for sleep bruxism being, followed by daytime tooth clenching with 55.6% (Figure 3).

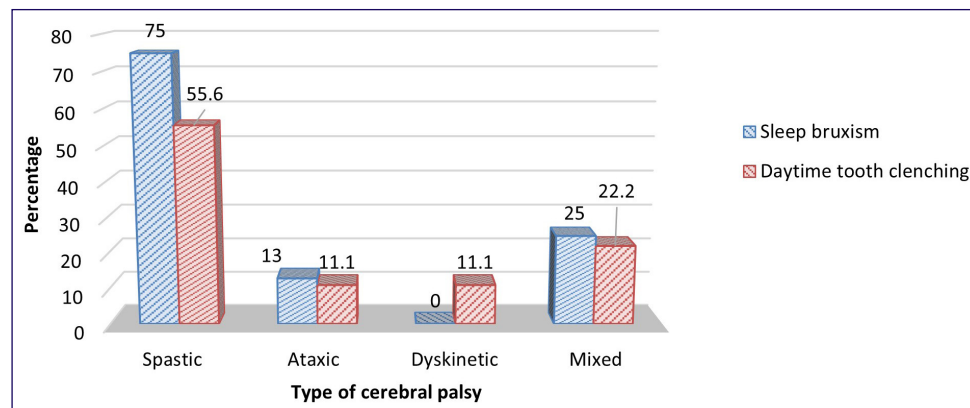


Figure 3. Results regarding sleep bruxism and daytime tooth clenching, according to type of cerebral palsy

It can be observed that, when associated with the presence of characteristics of the oral cavity according to tooth wear facets with bruxism, significant differences

were found between the types of bruxism and daytime tooth clenching (Figure 4).

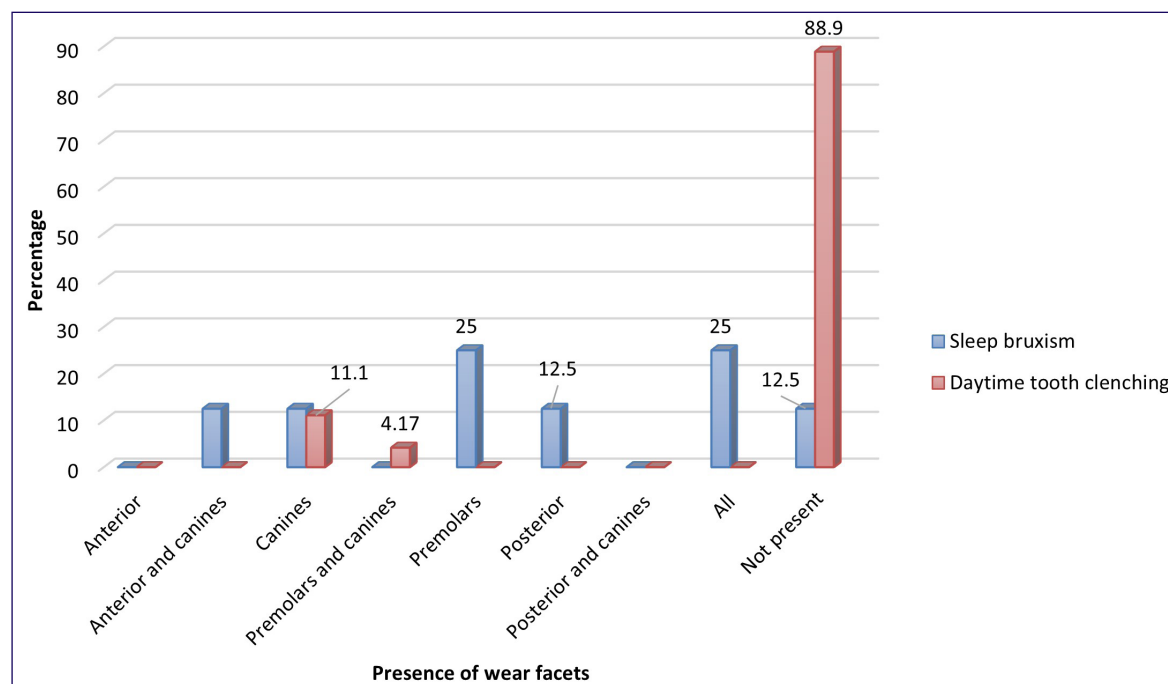


Figure 4. Results regarding the characteristics of dental wear facets associated with sleep bruxism and daytime tooth clenching

DISCUSSION

Regarding the type of cerebral palsy, the present study revealed that the majority, 54.4%, had spastic quadriplegia, while a study conducted in children by Da Rocha et al.¹⁶ in Brazil observed that spastic diplegia was the most prevalent (37.2%), as well as in another conducted in Sweden by Andersson and Mattsson (2001) in an adult population (35%). The literature describes spastic CP as the most prevalent^{12,17}.

The prevalence of bruxism in the present study, regardless of the type, was 74.5%, higher than reported by Abanto et al.¹¹, Paiva et al.³, Santos et al.¹⁸, who report it between 36.3-70.8%. Several factors have been mentioned to justify the high prevalence of bruxism and daytime tooth clenching in this population, such as myofunctional disorder, hyperactivity of the masticatory muscles, inherent neurological changes and even alterations in dopaminergic function¹⁸.

In the present sample 43.6% of individuals had mixed bruxism, higher than reported in Brazil by Cahlin et al.¹², with 39.4% in a similar population.

Daytime tooth clenching includes parafunctional daytime oromandibular activities, which may be independent or concomitant: tooth clenching, tooth grinding (usually only when a neurological disorder is present), buccal, lip or tongue mucosa biting, tongue thrusting, biting objects, incorrect mandibular posture, among others³. In the present study, the prevalence of daytime tooth clenching was 16.4%, with no description of what type of parafunctional activities involved. The lowest results were reported by Pirobani et al.¹⁹ and Bracci²⁰, (6%) and by Dutt et al.²² (5.3%).

Sleep bruxism had a prevalence of 14.5% in this study, lower than the results of Beltramin et al.¹⁵ (23.3%), Garde et al.²² (17.5%) and Bracci²⁰ (28.8%). One of the possible rationales for the differences found between the present study and the studies conducted in Brazil^{15,23} may be the fact that they included a convenience sample, different from the present study.

After statistical analysis, no statistically significant differences were found between the type of CP and sleep bruxism, or daytime tooth clenching. The most prevalent type of CP in this sample was spastic (54.5%), alike the sample reported in another study in Brazil (90.3%)¹². Comparing each type of bruxism evaluated, the most prevalent type of CP was spastic (sleep bruxism = 75%, and daytime tooth clenching = 55.6%). In these individuals, when the head and neck are affected, they present postural defects, which leads to greater muscular spasticity of the neck muscles

with consequent retracted inclination of the head and downward inclination of the mandible, leading to a greater risk of developing parafunctional habits²². In a study conducted by Guaré et al.²⁴, tongue thrusting was the most prevalent parafunctional habit (19.8%), with a majority of 70.6% having spastic CP. Cahlin et al.¹² also mentioned that the most prevalent parafunctional habit during daytime was tongue thrusting (41.50%). A limitation of the present study was the failure to distinguish the various parafunctional habits observed, which suggests this distinction in future studies.

Regarding the tooth wear facets, simply evaluating their presence, there is a risk that they are no longer active or, conversely, the parafunction may be recent, and it is not yet possible to detect wear²⁵. In the present study, a positive association was found between sleep bruxism and daytime tooth clenching with presence of wear facets ($p < 0.05$).

CONCLUSION

It is concluded that both sleep bruxism and daytime tooth clenching are more prevalent in spastic CP, with sleep bruxism in 75%, followed by daytime tooth clenching with 55.6%. Regarding the characteristics of the oral cavity, the presence of wear facets was evaluated, which was associated with sleep bruxism and daytime tooth clenching ($p < 0.05$).

It was also observed that the majority of the population included male individuals, with a mean age of 10.56 years, who presented spastic quadriplegia type with 54.5% of individuals, and half of the sample presented obvious intellectual disability.

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Author contributions:

OLYA: Conceptualization; Formal analysis; Methodology; Project administration; Writing – Original draft; Writing – Review & editing.

BDP-R: Conceptualization; Formal analysis; Methodology; Project administration; Supervision; Visualization; Writing – Original draft; Writing – Review & editing.

Data sharing statement:

Individual data of unidentified participants will not be shared. The applied methodology, statistics and analysis plan used will be available immediately after publication and will be available indefinitely with no end date to anyone who wants to access the data. For any additional information, please contact the corresponding author at davidparrare@gmail.com