



Original Article

Evaluation of electromyographic signals in children with bruxism before and after therapy with *Melissa Officinalis L*—a randomized controlled clinical trial

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Abstract. [Purpose] Bruxism is a repetitive muscle activity involving the clenching or grinding of one's teeth during sleep or waking hours. *Melissa officinalis L.* may be employed as a natural therapy due to the sedative, anxiolytic, anti-inflammatory, and anti-spasm properties of the chemical constituents of the essential oil obtained from its leaves. The aim of the present study was to evaluate electromyographic signals in the temporal muscle using the BiteStrip® test on children with sleep bruxism before and after therapy with *Melissa officinalis L.* [Subjects and Methods] The subjects were randomly allocated to two groups. Group 1 (n = 12) ingested a tincture containing *Melissa officinalis L.* for 30 days. Group 2 (n = 12) received a placebo solution with the same dose and frequency as Group 1. The Wilcoxon and Mann-Whitney tests were employed for statistical analysis. [Results] The sample was made up of 24 children aged 6 to 10 years. No statistically significant differences were found between initial and final muscle activity in either group or in an intergroup comparison. [Conclusion] Use of the *Melissa officinalis L.* tincture at the dose employed did not lead to a reduction in muscle activity in children with bruxism.

Key words: Bruxism, Electromyographic, *Melissa officinalis*

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INTRODUCTION

Bruxism is a repetitive muscle activity involving the clenching or grinding of one's teeth during sleep or waking hours¹⁾. It is often found in children and adolescents. This habit can have harmful effects on the teeth, periodontium, masticatory muscles, and temporomandibular joint²⁻⁴⁾.

The prevalence of this condition among children ranges from 13.5 to 33.0%⁵⁻⁷⁾. Treatment should be directed at reducing the habit through awareness of the problem and mechanical prevention to avoid wear of the permanent dentition⁸⁻¹⁰⁾. There is no consensus in the literature regarding the treatment of bruxism in children^{10, 11)}. Clinical management ranges from the use

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of a bite plate¹²⁾ to provision of information the patient and guardian, psychological techniques, and medication¹³⁾. Due to the divergences found in the success rate of different therapeutic methods, there is a need for further studies to offer assistance to healthcare professionals regarding the proper choice of treatment^{14–17)}.

Drugs such as type a botulinum toxin, benzodiazepine, anticonvulsants, beta blockers, dopamine, antidepressants, and muscle relaxers may help control bruxism, but the use of these agents in children is restricted^{15–18)}. Herbal products have been used since antiquity by humans as a way to improve or recover health. Since the Declaration of Alma-Ata in 1978, the World Health Organization (WHO) has expressed the need to appreciate the use of medicinal plants in public health systems, as some studies have indicated that almost 80% of the world population uses these plants in primary care^{18–20)}.

According to Druss et al., the majority of people use medicinal plants in therapies in conjunction with conventional medical treatment²¹⁾. The search for alternative products continues, and natural phytochemicals isolated from plants used as traditional medicines are considered good alternatives^{21, 22)}. From the results of these investigations, it would appear that phytotherapy is a matter of great importance to the world's population, and is of interest in different areas of health.

The use of these practices has also been incorporated into dentistry and numerous studies have been conducted to evaluate vegetable species as natural agents that are economically feasible and provide effective alternatives for treating oral diseases^{22–24)}.

Lemon balm (*Melissa officinalis L.*) may be employed as a natural therapy due to the sedative, anxiolytic, anti-inflammatory, and anti-spasm properties of the chemical constituents of the essential oil obtained from its leaves^{25, 26)}. No previous study has employed this substance as a complementary therapeutic method for the treatment of bruxism. The choice of *Melissa officinalis L.* was related to its properties reported in the literature as well as the scarcity of studies on it in the field of dentistry^{21, 27–30)}.

Electromyographic evaluation of the masticatory muscles is currently the most widely employed method for measuring muscle hyperactivity^{31, 32)}. The BiteStrip[®] allows this evaluation to be performed by the patient himself/herself through proper positioning of the device on the muscle of choice. Studies have demonstrated the efficacy of the BiteStrip[®] in detecting the presence/absence of bruxism³³⁾. Thus, the aim of the present study was to evaluate electromyographic signals in the temporal muscle using the BiteStrip[®] test in children with sleep bruxism before and after therapy with *Melissa officinalis L.*

SUBJECTS AND METHODS

A randomized controlled clinical trial was carried out involving 24 children with a diagnosis of bruxism. All parents/guardians received information on the objectives and procedures of the study and signed a statement of informed consent in compliance with Resolution 196/96 of the Brazilian National Board of Health. This study received approval from the Human Research Ethics Committee of Nove de Julho University (Brazil) under process no. 361299.

Bruxism was determined using the criteria established by the American Academy of Sleep Medicine³³⁾: 1) parent's/guardian's report of the occurrence of teeth clenching and/or grinding and 2) incisal and/or occlusal tooth wear. The subjects were randomly allocated to two groups. Group 1 (n = 12) ingested a tincture containing *Melissa officinalis L.* 20% in the form of 15 drops twice a day (1 hour after lunch and 1 hour after dinner) for 30 days. Group 2 (n = 12) received a placebo solution (water with food dye) with the same dose and frequency as Group 1 (Fig. 1).

All volunteers were instructed to use a BiteStrip[®] throughout a night of sleep prior to the therapy and one night following the completion of therapy. For this, the caregiver was instructed on the location of the left temporal muscle and how to use the device according to the manufacturer's instructions. This device records the number of contractions above 30% of the maximum voluntary contraction, which is calibrated at the time of positioning. The score is classified based on the number of events in a five-hour period (0 = less than 30 events, 1 = 31 to 60 events, 2 = 61 to 100 events, and 3 = more than 100 events).

RESULTS

The sample was made up of 24 children aged 6 to 10 years (7.67± 1.17 years). Boys accounted for 54.2% of the sample (n = 13), and girls accounted for 45.8% of the sample (n = 11). There was a predominance of scores of 3 for the muscle event index (more than 100 events) in both genders and both groups. However, no statistically significant association was found between these variables and bruxism (Table 1). The Wilcoxon and Mann-Whitney tests were employed for statistical analysis of the data (p < 0.05).

A reduction in muscle events was found after both therapies. However, the Wilcoxon test revealed no statistically significant differences between initial and final muscle activity in either group (Group 1, p = 0.157; Group 2, p = 0.414). The Mann-Whitney test revealed no statistically significant differences in intergroup comparisons at either evaluation (initial, p = 1.00; final, p = 0.551) (Table 2).

DISCUSSION

In the past, pharmaceutical companies have been interested in investigating plants as sources for new phototherapeutic agents with proven efficacy, safety, and quality. Groppo et al.^{23, 35, 36)} reported the increasing use of phytotherapy in dentistry.

However, further studies are needed to evaluate the safety and efficacy of this type of therapy in clinical practice.

The present findings demonstrate that use of *Melissa officinalis* does not alter the muscle activity in children with bruxism. Moreover, no significant difference was found in bruxism by age or gender.

Although various studies have evaluated the reasons for and individual factors associated with the use of herbal remedies by primary care patients, the characteristics of the population that use herbal medicines for oral health problems are relatively unknown. Thus, studies such as that of Tomazzoni et al.³⁷⁾ are encouraged in dentistry because they support the inclusion of phytotherapies in the Brazilian public healthcare system.

The present investigation is a pioneering study regarding the possible effect of *Melissa officinalis L* on bruxism. This substance is reported to have a sedative effect and has been used as a phytotherapy in the field of dentistry³⁴⁾. Studies have also investigated its effects on the inhibition of dental plaque³⁸⁾ and the control of anxiety. In general, the literature has demonstrated that *Melissa officinalis L* may have an effect on muscle contractions in certain organs. Thus, this phytotherapeutic agent was employed with the aim of promoting muscle relaxation and controlling anxiety in children with bruxism. In the present study, no significant difference in muscle activity was found between the lemon balm group and placebo group. As this was a pilot study, investigations with a larger sample size should be conducted to confirm these preliminary results.

Because studies with *Melissa officinalis L* involving children are scarce, the decision was made to use the minimum dose indicated, which may have limited the action of the agent. Further studies with different doses are needed to determine whether *Melissa officinalis L* should be indicated for the control of this habit. Moreover, the lack of investigations into other

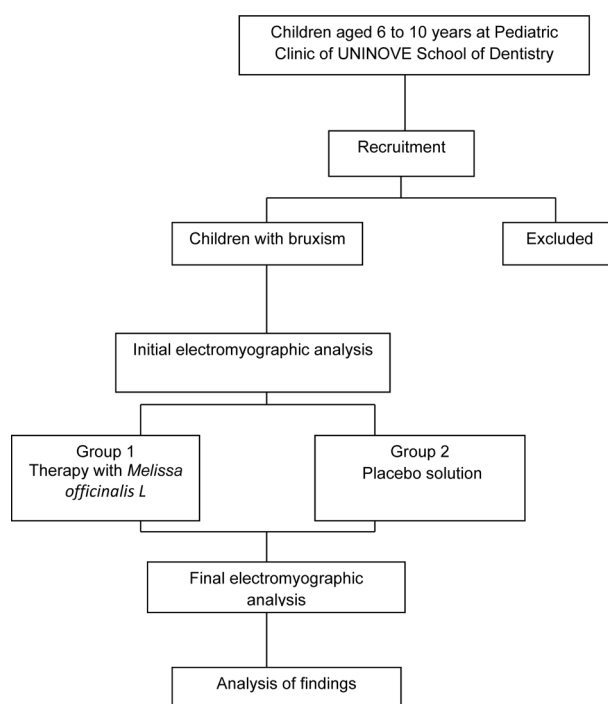


Fig. 1. Flow chart of study

Table 1. Analysis of muscle activity using the BiteStrip® according to gender and group

		BiteStrip® Score		
		2	3	Total
Gender	Male	5	6	11
	Female	5	8	13
Group	1	5	7	12
	2	5	7	12
χ^2 test				

Table 2. Analysis of muscle activity using the BiteStrip® before and after therapy with *Melissa officinalis L*

		BiteStrip® Score		
		1	2	3
Group 1	Initial	0	5	7
	Final	1	7	4
	p-value	0.157		
Group 2	Initial	0	5	7
	Final	1	5	6
	p-value	414		
Intergroup	Initial	-		
	Final	-		

variables that could confirm the effectiveness of this substance may have been a limitation of the present study. As there is no consensus on the proper dosage, the dose employed in this study may have exerted an influence on the results. Thus, further studies that investigate anxiety and sleep quality are needed to confirm the present findings.

There are no effective treatments for bruxism-only therapies aimed at controlling signs and symptoms of it, such as bite plate usage, relaxation techniques, occlusal equilibrium, physical therapy, and prosthetic rehabilitation. A number of therapies are described in the literature for sleep disorders, including the use of natural drugs^{14, 15, 27}. As bruxism can occur during sleep, there is a need for studies on extracts from this plant, because such agents do not cause dependence, unlike other drugs used for the control of bruxism, such as benzodiazepine²⁶).

A limitation of the present study was not having evaluated the presence of pain in the subjects, which was not the objective of the investigation. However, the literature reports that *Melissa officinalis* L extract has antinociceptive action through cholinergic systems, such as nicotinic and muscarinic acetylcholine receptors¹⁴. Thus, further studies are needed to determine the mechanisms of action of this phytotherapeutic agent with regard to orofacial pain.

Based on the present finding, use of the *Melissa officinalis* L. tincture at the dose employed did not lead to a reduction in muscle activity in children with bruxism. Further studies are necessary to provide scientific evidence concerning the efficacy and safety of *Melissa officinalis* in order for it to become an accessible alternative in public health services for the prevention and treatment of oral health problems.

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