

Analysis of the Treatment Effect of Awake Bruxism with New Technologies on Sleep Bruxism: A Systematic Review

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Abstract

Objectives: The aim of the study was to analyze if the deprogramming of Awake Bruxism (AB) with New Technologies (Biofeedback-Electromyography and E-health or M-health) might have an effect on Sleep Bruxism (SB)

Materials and Methods: Systematic Review of the Literature on the Topic of Bruxism, New Technologies, Biofeedback and Electromyogram (BF-EMG), with interventions on AB and its effect on SB with the following search terms : (((“BRUXISM”) OR (“SLEEP BRUXISM”) OR (“AWAKE BRUXISM”)) AND (((“EHEALTH”) OR (“MHEALTH”) OR (“SMARTPHONE”) OR (“ECOLOGICAL MOMENTARY ASSESSMENT”) OR (“DESENCOSTE OS SEUS DENTES”) OR (“BRUXAPP”) OR (“BIOFEEDBACK”) OR (“ELECTROMYOGRAPHY”))) An exhaustive Search of Randomized Controlled Trials (RCTs) in the Bibliographic databases PubMed, EBSCO, Scopus, Web of Science, Ovid and Google Scholar was performed from September 2020 to april 2022.). The population of this SR were randomized clinical trials (RCTs) that respected the research question, with adults with AB and / or SB subjected to tests for EMG, Biofeedback or use of mobile applications for smartphones (Apps). The exclusion criteria were animal studies, bruxism study in children and adolescents. Bruxism treatment techniques that included botulinum toxin, relaxation orthosis (without biofeedback) medications such as treatment, laser, music, physiotherapy, muscle stretching, music, cognitive therapy and other therapies that do not respect the initial question of this review.

Results: We could only include 2 RCTs with BF-EMG intervention in AB and its effect on SB. RCTs show that there are studies of BF-EMG acting on AB and that BF-EMG may have an effect on SB. (1,2)

Although Mobile Apps for Smartphones can be useful to determine the Prevalence and Deprogramming of AB, there are no RCTs with Mobile Apps to be able to confirm that AB Deprogramming might be useful in the management of SB. (3,4)

Conclusions: According to the results of the Systematic Review it seems possible to partially deprogram SB with BF-EM Deprogramming of AB, but the scarcity of RCTs does allow to unequivocally confirm this assumption.

Keywords: Bruxism; Sleep bruxism; Awake Bruxism; E-health; M-health; Smartphone; Momentary Ecological Assessment; Bruxapp; Biofeedback; Electromyography.

2 RCT

1. Daytime Masticatory Muscle Electromyography Biofeedback Regulates the Phasic Component of Sleep Bruxism, de Masayuki Sato, Konatsu Murakami, Masanori Fujisaway Nobuyuki Terada de 2020
2. Electromyogram biofeedback training for daytime clenching and its effect on sleep bruxism. Sato M, Iizuka T, Watanabe A, Iwase N, Otsuka H, Terada N, et al., de 2015

	Daytime masticatory muscle electromyography biofeedback regulates the phasic component of sleep bruxism	Electromyogram biofeedback training for daytime clenching and its effect on sleep bruxism
Random sequence generation	low	low
assignment hiding	uncertain	uncertain
blinding of participants and staff	high	high
blinding of outcome assessors	high	high
incomplete result data	low	low
selective notification	low	low
other bias	low	low

Table 2- Risk of Bias - Cochrane

Definition



◦ Repetitive masticatory muscle activity characterised by clenching or grinding of the teeth and/or by bracing or thrusting of the mandible. (5)

- Prevalence
- SB 8-31% and 14-20% (6)
- AB 23,6% (7)

Fig.2 – Definition of Bruxism and Prevalence

? BV Y BS ?



- Correlates and genetics of self-reported sleep and awake bruxism in a nationwide twin cohort, [Jan Ahlberg et al, 7/2020 \(8\)](#)
- 11766 Questionnaires, n=8410, 29.5% BV/BS, Monozygotic + similar than heterozygotics
- Winocur et al. 2011.....AB/SB.... OR 4,98 (9)
- Winocur et al.2019.....AB/SB OR 8,14 (10)

Fig.3- Justification of the study

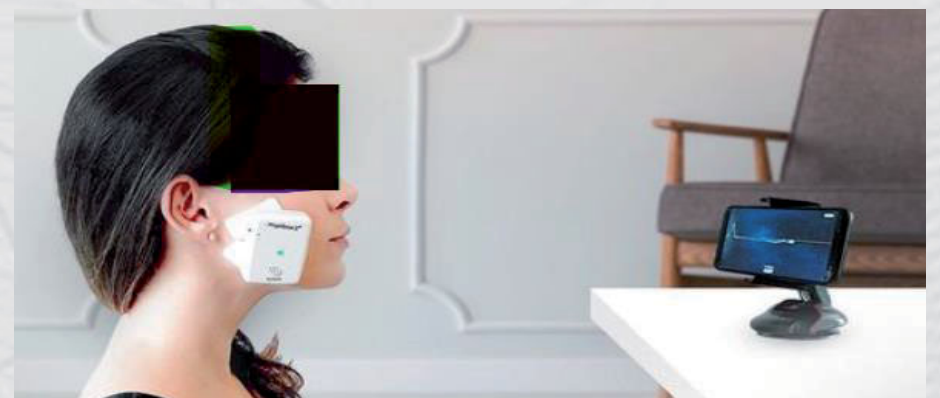


Fig.4- Application of Biofeedback in AB

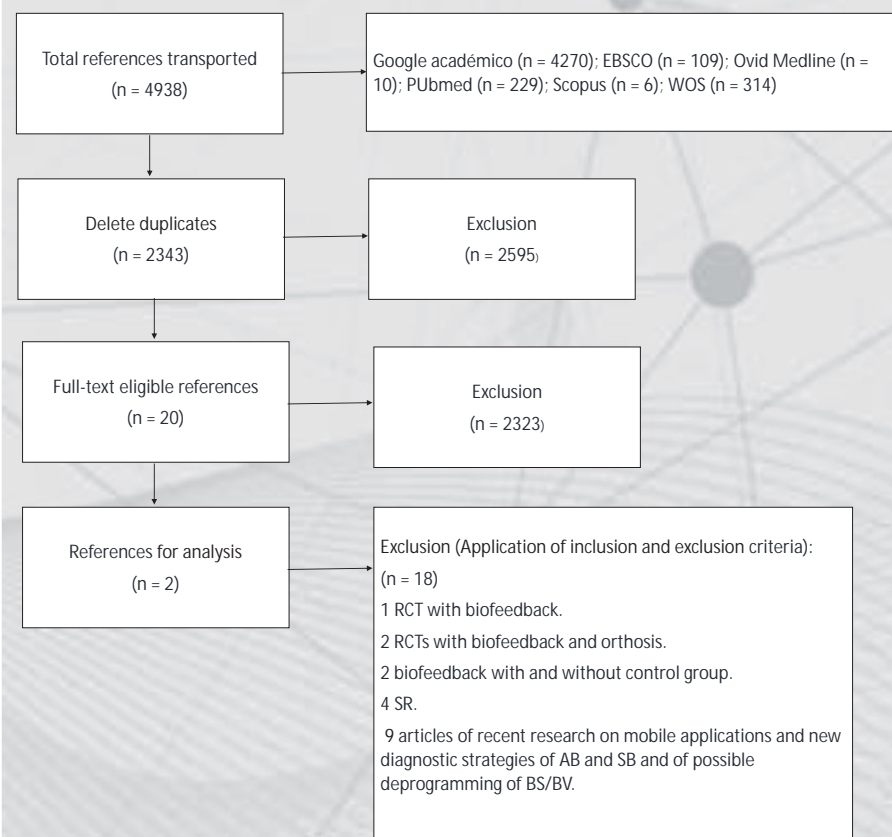


Fig. 1 – Flowchart

RCT	Masayuki Sato, 4,2020	Sato M, 2015
Intervention	n= 17. BF EMG= 10, CO = 7. 3 weeks. EMG BF. For BV, EMG during sleep 5 hours of data to assess BS phasic EMG events.	n=13. BF EMG=7. CO = 6 Week EMG data for both groups for 1 day to establish a baseline. Week 2, group BF, auditory warning signals were generated to remind subjects of squeezing only for two consecutive days. Week 3, EMGs were recorded to assess the learned short-term effect of BF on the regulation of squeezing activity. In contrast, no subject in group CO received such signals. They studied tonic events.
Results	analysis of variance of bidirectional repeated measures (ANOVA) followed by Tukey's HSD, post hoc test (p<.05), n of the RCT is somewhat small. Training EMG BF for BV as a cognitive-behavioral therapy may be effective in regulating BS in terms of phasic muscle activities.	tonic events of BV and BS under BF EMG at week 3 pela Scheffé test has a reduction with a p value <0.05. Scatter plot, correlation coefficient: r = 0753. between BV and BS. It indicates a positive linear association between the two variables.



Fig.5 - Evaluation of Biofeedback results

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