Detection and Management of Sleep Bruxism with Automated Mandibular Movement

2021 Grants

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FollowUp Form

Award Information

In an attempt to make things a little easier for the reviewer who will read this report, please consider these two questions before this is sent for review:

- *Is this an example of your very best work, in that it provides sufficient explanation and justification, and is something otherwise worthy of publication? (We do publish the Final Report on our website, so this does need to be complete and polished.)*

- *Does this Final Report provide the level of detail, etc. that you would expect, if you were the reviewer?*

Title of Project*
Detection and Management of Sleep Bruxism with Automated Mandibular Movement

Award Type
Biomedical Research Award (BRA)

Period of AAOF Support
July 1, 2021 through June 30, 2023

Institution
University at Buffalo

Names of principal advisor(s) / mentor(s), co-investigator(s) and consultant(s)
Dr. Covell

Amount of Funding
$30,000.00

Abstract
(add specific directions for each type here)

Respond to the following questions:

Detailed results and inferences:*

If the work has been published, please attach a pdf of manuscript below by clicking "Upload a file".
<u>OR</u>
Use the text box below to describe in detail the results of your study. The intent is to share the knowledge you have generated with the AAOF and orthodontic community specifically and other who may benefit from your study. Table, Figures, Statistical Analysis, and interpretation of results should also be attached by clicking "Upload a file".

Objectives: The objective of this study was to determine the prevalence and risks of sleep bruxism (SB) among children and adolescents presenting for orthodontic treatment. Methods: This was a cross-sectional study of males and females aged 7-16 years who were pursuing orthodontic treatment for the first time. The presence/absence of SB was determined using overnight sleep mandibular movement (MM) monitoring. A disposable self-adhesive inertial measurement sensor was worn by each participant for two consecutive nights. Data from the sensor were extrapolated, then processed and analyzed to automatically identifying rhythmic masticatory muscle activity for SB detection. SB risks were evaluated from previously validated questionnaires, clinical examinations, lateral cephalometric radiographs, and digital study models. Results: A total of 87 subjects (43.7% male and 56.3% female) with a mean age of 12.82yrs ± 2.24 participated in the study. The mean BMI for this group was 21.45 ± 5.49. The prevalence of SB was 60.7%. Univariate analysis showed that academic performance over the last year, nasolabial angle, nyctophobia (fear of sleeping in the dark), and objective sleep variables were significant risks for SB. Multivariate logistic regression analysis with stepwise forward selection revealed that SB had statistically significant association with microarousals events per hour (OR = 1.81, 95% CI = 1.37-2.72, P = 0.001), and deep sleep percentage (OR = 1.17, 95% CI = 1.03-1.39, P = 0.029). A second model excluding microarousals showed that SB had statistically significant association with sleep efficiency percentage (OR = 0.74, 95% CI = 0.55-0.93, P = 0.022) and obstructive respiratory disturbance index (OR = 1.43, 95% CI = 1.07-2.09, P = 0.033). None of the orthodontic or dental variables were significant. Conclusions: In a growing orthodontic population, SB is very common / frequent. In this study, SB is related to microarousals, deep sleep percentage, sleep efficiency percentage, and ORDI. MM monitoring is a simple tool for identifying SB.

Were the original, specific aims of the proposal realized?*

Yes, all original and primary aims and objectives of this proposal were realized. The secondary aims are still underway.

Were the results published?*

No

Have the results of this proposal been presented?*

Yes

To what extent have you used, or how do you intend to use, AAOF funding to further your career?*

The invaluable support of AAOF funding played a crucial role in facilitating the successful completion of this research project and has significantly contributed to the advancement of my career as mid-career educator and now Chair of orthodontics.

Accounting: Were there any leftover funds?

Not Published

Are there plans to publish? If not, why not?*

Yes, the manuscript is currently being prepared for publication. In the manuscript, the AAOF support will be acknowledged.

Presented

Please list titles, author or co-authors of these presentation/s, year and locations:*

Preliminary data was presented at the 2023 AADR annual meeting in Portland, OR, and the support received from AAOF was acknowledged in the abstract presentation.

Title: Prevalence and Risks of Sleep Bruxism by Mandibular Movement Monitoring
Abstract: Objectives: To determine prevalence and risks of SB among children and adolescents presenting for orthodontic treatment. Methods: This was a cross-sectional study of males and females aged 7-16 years who were pursuing orthodontic treatment for the first time. The presence/absence of SB was determined using overnight sleep mandibular movement (MM) monitoring. A disposable self-adhesive inertial measurement sensor was worn by each participant for two consecutive nights. Data from the sensor were extrapolated, then processed and analyzed to automatically identifying rhythmic masticatory muscle activity for SB detection. SB risks were evaluated from previously validated questionnaires, clinical examinations, lateral cephalometric radiographs, and digital study models. Results: A total of 69 subjects (57% male and 43% female) with a mean age of 12.86yrs±2.16 participated in the study. The mean BMI for this group was 21.78±5.92. The prevalence of SB was 41.03%. Logistic regression analysis showed that SB had statistically significant (alpha = 0.05) association with microarousals (OR = 1.665, 95% CI = (1.232, 2.718), P = 0.008) and mandibular retrognathism (OR = 1.367, 95% CI = (1.055, 1.991), P = 0.048). Conclusions: In an adolescent orthodontic population, SB is very common / frequent. In this study, SB is related to microarousals and malocclusion. MM monitoring is a simple tool for identifying SB.
Meeting: 2023 AADOCR/CADR Annual Meeting (Portland, Oregon)
Location: Portland, Oregon
Year: 2023
Final Presentation ID: 1207
Abstract Category|Abstract Category(s): Orthodontics Research
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Support Funding Agency/Grant Number: American Association of Orthodontists Foundation, FP00004818

Was AAOF support acknowledged?

If so, please describe:

Yes, AAOF support was acknowledged.

Internal Review

Reviewer Comments

Reviewer Status*

File Attachment Summary

Applicant File Uploads
No files were uploaded