QUALITY IMPROVEMENT IN DENTAL AND MEDICAL KNOWLEDGE, RESEARCH, SKILLS AND ETHICS FACING GLOBAL CHALLENGES

Edited by
Armelia Sari Widyarman, Muhammad Ihsan Rizal,
Moehammad Orliando Roeslan & Carolina Damayanti Marpaung

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The proceedings of FORIL XIII 2022 Scientific Forum Usakti conjunction with International Conference on Technology of Dental and Medical Sciences (ICTDMS) include selected full papers that have been peer-reviewed and satisfy the conference's criteria. All studies on health, ethics, and social issues in the field of dentistry and medicine have been presented at the conference alongside clinical and technical presentations. The twelve primary themes that make up its framework include the following: behavioral epidemiologic, and health services, conservative dentistry, dental materials, dento-maxillofacial radiology, medical sciences and technology, oral and maxillofacial surgery, oral biology, oral medicine and pathology, orthodontics, pediatrics dentistry, periodontology, and prosthodontics. This proceeding will be beneficial in keeping dental and medical professionals apprised of the most recent scientific developments.

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Quality Improvement in Dental and Medical Knowledge, Research, Skills and Ethics Facing Global Challenges

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Armelia Sari Widyarman, Muhammad Ihsan Rizal, Moehammad Orliando Roeslan and Carolina Damayanti Marpaung
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Preface

Faculty of Dentistry Universitas Trisakti (Usakti) presents FORIL XIII 2022 Scientific Forum Usakti conjunction with International Conference on Technology of Dental and Medical Sciences (ICTDMS) on December 8th–10th 2022. The theme of the conference is "Quality Improvement in Dental and Medical Knowledge, Research, Skills and Ethics Facing Global Challenges".

The triennial conference has served as a meeting place for technical and clinical studies on health, ethical, and social issues in field medical and dentistry. It is organized around 12 major themes, including behavioral, epidemiologic, and health services, conservative dentistry, dental materials, dento-maxillofacial radiology, medical sciences and technology, oral and maxillofacial surgery, oral biology, oral medicine and pathology, orthodontics, pediatrics dentistry, periodontology, and prosthodontics.

The most recent findings in fundamental and clinical sciences related to medical and dental research will be presented in the conference that will be published as part of the conference proceeding. This proceeding will be useful for keeping dental and medical professionals up to date on the latest scientific developments.

Dr. Aryadi Subrata
Chairman FORIL XIII conjunction with ICTDMS

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Prevalence and risk indicators of bruxism in Indonesian children

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ABSTRACT: Background: Bruxism is a common activity among adults and children. In children, the activity is indicated to be related to airway and mandible growth and development. Objective: To assess the prevalence rates and associated factors of sleep and awake bruxism in the Indonesian young population. Methods: Screening for bruxism activity was done in schools on students aged 7–18 years of age. Parental and self-report was utilized to collect the data. Descriptive data analysis was done to assess the prevalence rates, and logistic regression analysis was carried out to analyze the contributing factors of bruxism activity. Results: The prevalence of self-reported sleep bruxism in children was 23.5%, while 11.3% in adolescents. Self-reported awake bruxism had a prevalence of 20.3% in adolescents. Psychological factors, orofacial complaints, TMJ sounds, and increasing age were among the contributing factors in bruxism activity. Conclusions: This study confirms the high prevalence of bruxism activity reports in the young population. The relation between bruxism and orofacial pain reports in older children might show a negative effect of bruxism which developed with an increasing age.

1 INTRODUCTION

Bruxism is "a repetitive jaw-muscle activity characterized by clenching or grinding of the teeth and/or by bracing or thrusting of the mandible which is not a movement disorder in otherwise healthy individuals" (Lobbezoo *et al.* 2018). It is often associated with clinical problems such as orofacial pain, failing dental restorations, and tooth wear (Kato *et al.* 2013; Lobbezoo *et al.* 2018; Svensson & Kumar 2016). However, it is also hypothesized to have a role in the reinstatement of airway patency following an obstructive respiratory event and in sustaining salivary lubrication of the nutritive tract during sleep (Lavigne & Montplaisir 1994; Murray & Sanson 1998). Based on its circadian manifestations, bruxism is divided into sleep and awake-bruxism. Both have been observed to have different characteristics, and risk factors, and possibly are two different entities (Lavigne *et al.* 2008; Manfredini *et al.* 2017; van Selms *et al.* 2013). Sleep bruxism has mainly teeth-grinding activities and is regarded as a form of movement disorder, while awake bruxism has more clenching activities and presumably is a response to emotional pressure.

Based on an international consensus, bruxism diagnosis has been differentiated into possible bruxism from self-report; probable bruxism from self-report and findings of clinical examinations; and definite bruxism when the former two grades are electro-physiologically confirmed (Lobbezoo *et al.* 2018; Marpaung *et al.* 2022). Bruxism studies in the young population have been mostly on possible bruxism by means of self or parental reports, which yielded a prevalence of sleep bruxism from 15% to 38%, and 8% to 19.2% for awake bruxism (Carra *et al.* 2011; van Selms *et al.* 2019).

So far, most of the studies on bruxism in young population have been performed in Western countries. Even though Indonesia is one of the highest populated countries, no studies have been conducted on bruxism in its young population. Therefore, the goal of this study was to evaluate the prevalence rates and associated factors of sleep and awake bruxism in the Indonesian young population.

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2 MATERIAL AND METHODS

Ethical clearance of this study was given by the ethics committee of Universitas Trisakti Faculty of Dentistry. The questionnaire used in this study was the Indonesian translation of the Dutch questionnaire (van Selms *et al.* 2013) used in bruxism studies in children and adolescents which has a fair to excellent ICC score in the pilot study. The inclusion criteria were students from national schools in greater Jakarta area who speak Indonesian language as their first language, are aged 7–18 years old by the time of data collection with normal general health, and can communicate well and thus understand all instructions. The demographic variance of this study was acquired from age, gender, living areas, and socio-economic levels. Details of the data collection procedure are stated in other publications (Marpaung *et al.* 2018).

2.1 *Data analysis*

Descriptive analysis was done to identify the prevalence and distribution of both sleep and awake bruxism. Collinearity test was then done to make sure there were no correlations among the predictor variables. All the tolerance values were greater than 0.1 and variance inflation factor (VIF) values were much less than 10, which gave an indication that there was no problem with collinearity in the data set. The linearity of the ordinal predictor variables to the dependent variables was checked using dummy variables analyses. When the regression coefficients of the dummy variables did not consistently increase or decrease, variables were then dichotomized.

Before building a logistic regression model, a single regression analysis was done to assess the relation of the dependent variable to the predictors. When the relation or dependency was strong enough (P-value < 0.10), those predictors then be incorporated into the logistic regression analysis. Predictors with the weakest association with orofacial pain were removed using backward stepwise manner, and the p-to-exit was reported. The predictors in the logistic regression model were the ones with p-value < 0.05. All analysis was performed with IBM SPSS statistics for Windows version 25.0 (SPSS, Armonk, NY, USA).

3 RESULTS

Data collection was done in the span of 5 months with 546 children (mean age: 9.6 ± 1.9 years) and 812 adolescents (mean age: 15 ± 1.6 years) participating in the study. Out of the total number of subjects, 8 children and 136 adolescents stated that the presence of bruxism was unknown to them. The prevalence of self-reported sleep bruxism in children was 23.5%, while 11.3% in adolescents. Self-reported awake bruxism had a prevalence of 20.3% in adolescents. The detailed prevalence of sleep bruxism reports in each predictor is shown in Table 1, while the prevalence of predictors in awake bruxism is shown in Table 2.

Table 1. Descriptive statistics of the predictor variables stratified by the presence of self-reported sleep bruxism. All variables are presented as absolute numbers (n).

	Outcome variables			
	CHILDREN (n = 545)		ADOLESCENTS (n = 812)	
Predictor variables	No Sleep Bruxism n	Sleep Bruxism n	No Sleep Bruxism n	Sleep Bruxism n
Gender				
Male	159	59	280	47
Female	241	69	304	45
School social level				
Low social	246	74	222	37

(*continued*)

Table 1. Continued

Predictor variables	Outcome variables			
	CHILDREN (n = 545)		ADOLESCENTS (n = 812)	
	No Sleep Bruxism n	Sleep Bruxism n	No Sleep Bruxism n	Sleep Bruxism n
High social	154	54	362	55
Living area				
Rural	136	51	218	30
Urban	264	77	366	62
Sleep problem				
No	319	96	145	20
Yes	81	32	439	72
Orofacial pain				
No	309	89	319	36
Yes	80	36	155	38
TMJ sound				
No	363	114	472	68
Yes	37	14	112	24
Psychological factors				
Worries				
No	171	43	167	20
Yes	229	85	417	72
Tension at home				
No	345	98	377	49
Yes	55	30	207	43
Tension from school				
No	316	95	298	36
Yes	84	33	286	56
Easily scared				
No	171	52	233	26
Yes	229	76	351	66

Table 2. Descriptive statistics of the predictor variables stratified by the presence of self-reported awake bruxism. All variables are presented as absolute numbers (n).

Predictor variables	Outcome variable	
	ADOLESCENTS (n = 812)	
	No Awake Bruxism n (%)	Awake Bruxism n (%)
Gender		
Male	305	84
Female	315	81
School social level		
Low social	254	69
High social	366	96
Living area		
Rural	229	60

(*continued*)

Table 2. Continued

Predictor variables	Outcome variable: ADOLESCENTS (n = 812)	
	No Awake Bruxism n (%)	Awake Bruxism n (%)
Urban	391	105
Orofacial pain		
No	335	66
Yes	162	68
TMJ sounds		
No	511	119
Yes	109	46
Psychological factors		
Worries		
No	195	30
Yes	425	135
Tension at home		
No	409	91
Yes	211	74
Tension from school		
No	326	65
Yes	294	100
Easily scared		
No	243	56
Yes	377	109

Assessment of dummy variables regression coefficient was done for psychological factors which have ordinal scale. It was found that there was no linear relationship between any of the ordinal variables to either self-reported sleep or awake bruxism; therefore, dichotomization was performed. Logistic regression analysis showed that age, orofacial pain, and psychological problems were associated with self-reported sleep bruxism in children (Table 3); while only orofacial pain was associated with self-reported bruxism in adolescents (Table 4). The analysis also found that orofacial pain and psychological problems were associated with awake bruxism in adolescents (Table 5).

Table 3. Single and multiple logistic regression models for the prediction of sleep bruxism among children. For each factor included in the single regression, the number of cases (n) included in the analysis is shown.

		Single regression				Multiple regression (n = 545)		
	n	p value	OR	95% CI	p-to-exit	p value	OR	95% CI
Gender (female)	319	0.205	0.77	0.52–1.15				
Age	545	0.032	0.88	0.78–0.99		0.027	0.87	0.77–0.99
High SES	209	0.458	1.17	0.78–1.75				
Living area (Urban)	348	0.229	0.78	0.52–1.17				
Sleep problem (yes)	117	0.255	1.31	0.82–2.10				
Orofacial pain (yes)	124	0.057	1.56	0.99–2.47	0.130			

(*continued*)

Table 3. Continued

		Single regression				Multiple regression (n = 545)		
	n	p value	OR	95% CI	p-to-exit	p value	OR	95% CI
TMJ sounds (yes)	55	0.574	1.21	0.63–2.31				
Psychological factors:								
Worries (yes)	328	0.067	1.48	0.97–2.24	0.226			
Tension at home (yes)	90	0.010	1.92	1.17–3.16		0.017	1.88	1.12–3.14
Tension from school (yes)	122	0.258	1.31	0.82–2.08				
Easily scared (yes)	318	0.672	1.09	0.73–1.64				

Table 4. Single and multiple logistic regression models for the prediction of sleep bruxism among adolescents. For each factor included in the single regression, the number of cases (n) included in the analysis is shown.

		Single regression				Multiple regression (n = 812)		
	n	p-value	OR	95% CI	p-to-exit	p-value	OR	95% CI
Gender (female)	410	0.575	0.88	0.57–1.40				
Age	812	0.613	0.96	0.83–1.11				
High SES	481	0.686	0.91	0.58–1.43				
Living area (Urban)	514	0.383	1.23	0.77–1.96				
Sleep problem (yes)	621	0.522	1.19	0.70–2.02				
Orofacial pain (yes)	240	0.002	2.17	1.33–3.56		0.008	1.99	1.20–3.29
TMJ sounds (yes)	163	0.126	1.49	0.89–2.47				
Psychological factors:								
Worries (yes)	581	0.174	1.44	0.85–2.44				
Tension at home (yes)	297	0.038	1.60	1.03–2.49	0.067			
Tension from school (yes)	408	0.035	1.62	1.03–2.54	0.143			
Easily scared (yes)	505	0.034	1.69	1.04–2.73	0.255			

Table 5. Single and multiple logistic regression models for the prediction of awake bruxism among adolescents. For each factor included in the single regression, the number of cases (n) included in the analysis is shown.

		Single regression				Multiple regression (n = 812)		
	n	p-value	OR	95% CI	p-to-exit	p-value	OR	95% CI
Gender (female)	410	0.695	0.93	0.66–1.32				
Age	812	0.802	0.99	0.88–1.10				
High SES	481	0.844	0.97	0.68–1.37				
Living area (Urban)	514	0.892	1.03	0.72–1.46				
Orofacial pain (yes)	240	>0.001	2.13	1.45–3.14		0.005	1.77	1.19–2.65
TMJ sounds (yes)	163	0.003	1.81	1.22–2.70		0.045	1.58	1.00–2.48
Psychological factors:								
Worries (yes)	581	0.001	2.07	1.34–3.18		0.024	1.83	1.08–3.07
Tension at home (yes)	297	0.011	1.58	1.11–2.23	0.337			
Tension from school (yes)	408	0.003	1.71	1.20–2.42	0.096			
Easily scared (yes)	505	0.217	1.26	0.88–1.80				

4 DISCUSSION

This questionnaire study aimed to assess the prevalence rates of bruxism and its risk indicators among children (aged 7–12) and adolescents (aged 13–18) living in Indonesia. The overall prevalence of self-reported sleep bruxism in the child population was 24.2%, whereas it was 11.3% in the adolescent population. Self-reported awake bruxism had a prevalence of 20.3% in adolescents. In adolescents, orofacial pain was the strongest predictor of both sleep and awake bruxism next to the reports of psychological factors for awake bruxism. In the child population, psychological factors and age were associated with self-reported sleep bruxism.

Several studies have stated that self-report bruxism is not reliable diagnostically and does not specifically show current bruxism activity (Manfredini & Lobbezoo 2009; Marbach *et al.* 2003). In fact, a reliable diagnostic requires electromyography recording analysis. This issue, however, has been resolved by a bruxism diagnosis consensus of probable, possible, and definite diagnosis (Lobbezoo *et al.* 2013). Thus, self-report can be used to screen bruxism habits and awareness. The option "don't know" to the bruxism answer was intended to minimize bias since habit unawareness is common. It was found to be as high as 17% in an adolescent study (van Selms *et al.* 2013), which was similar to our observation. The question on awake bruxism in children was removed from the analysis since most children spent their daily activity at school, beyond their parents' close observation.

Sleep and awake bruxism was analyzed separately in this study since they are considered two different disorders (Lobbezoo *et al.* 2013). Many studies have suggested that sleep and awake bruxism have different etiology, characteristics, and risk factors. Emotional and situational factors are important in awake bruxism etiology, which did not consistently apply to sleep bruxism (Manfredini & Lobbezoo 2009). On the activity characteristics, awake bruxism is generally characterized by a clenching activity, while sleep bruxism is by a combination of clenching and grinding activity.

The study showed an indication of decreasing prevalence rates of sleep bruxism from childhood to adolescence. The association between age and sleep bruxism in children was also found to be decreasing with age (0R:0.86). This finding coincides with the existing studies which show that sleep bruxism declines from childhood to old age (Laberge *et al.* 2000; van Selms *et al.* 2019). Within the limitation of a cross-sectional observation, this finding supports the common belief that sleep bruxism activities recede at the end of the childhood period.

As in this study, both sleep and awake bruxism has been associated with orofacial pain both in adults and in children studies (Carlsson *et al.* 2002; Marpaung *et al.* 2018; Yap *et al.* 2022). A significant odds ratio of orofacial pain to bruxism in adolescents was also evident in other studies (Marpaung *et al.* 2018; Marpaung *et al.* 2018; Marpaung *et al.* 2021). However, they do not necessarily show true cause-effect relationship between the two variables. The complexity of their relations may be best explained by the stochastic variation between their risk factors (Svensson & Kumar 2016). Depending on each person, risk factors can have different contributions to the relationship and can generate varied responses both in intensity and duration.

In the present study, psychological factors have a somewhat consistent relationship to bruxism in both children and adolescents. This is in concordance with other studies which use questionnaires to detect both variables (Kampe *et al.* 1991; Winocur *et al.* 2019; Yap *et al.* 2021). The association was also shown by a study that detected elevated levels of urine catecholamines, a hormone related closely to emotional conditions, in subjects with bruxism (Vanderas *et al.* 1999). It is interesting to observe that while the relation is apparent in questionnaire-based studies, it is not so in EMG and sleep laboratory investigations (Pierce *et al.* 1995; Watanabe *et al.* 2003). The perpetual complexity of bruxism activity might cause the difference in results depicted by the two data collection methods. One or two questions used in the questionnaire might not be specific enough to capture bruxism activity, although it is the most convenient way for large-scale studies. On the other hand, generalization of clinical study results might not be possible due to studies' paucity. The use of the ecological momentary assessment (EMA) method to capture 'real-time' awake bruxism activity and multiple observations for sleep bruxism are currently being developed to overcome these issues.

5 CONCLUSION

Bruxism, both sleep and awake, are common in children and adolescent population. Its prevalence recedes with age and relates on different levels with orofacial pain and psychological factors.

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Prevalence and risk indicators of bruxism in Indonesian children

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Prevalence and risk indicators of bruxism in Indonesian children

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Bruxism is a repetitive jaw-muscle activity characterized by clenching or grinding of the teeth and/or by bracing or thrusting of the mandible which is not a movement disorder in otherwise healthy individual (Lobbezoo et al. 2018). It is often associated with clinical problems such as orofacial pain, failing dental restorations and tooth wear (Svensson 2013; Lobbezoo et al. 2013; Kato et al. 2013). However, it is also hypothesized to have a role in reinstatement of airway patency following an obstructive respiratory event and maintaining salivary lubrication of the alimentary tract during sleep (Murray et al. 1998; Lavigne & Introduction 2003; Bracha et al. 2005). Based on its circadian manifestations, bruxism is divided into sleep and awake- bruxism. Both has been observed to have different characteristics, risk factors, and possibly are two different entities (Lavigne et al. 2008; Manfredini & Lobbezoo 2009; Lobbezoo et al. 2013; Van Selms et al. 2013; Svensson 2013) Sleep bruxism has mainly grinding activities, and is regarded as a form of movement disorders, while awake bruxism has more clenching activities and presumably is a response of emotional pressure (Manfredini & Lobbezoo 2009).

Based on an international consensus, bruxism diagnosis has been differentiated into possible bruxism from self-report; probable bruxism from self-report and findings of clinical examinations; and definite bruxism when the former two grades are electro-physiologically confirmed (Lobbezoo et al. 2013). Bruxism studies in young population have been mostly on possible bruxism by means of self or parental reports, which yielded a prevalence of sleep bruxism from 15% to 38% , and 8% to 19.2% for awake bruxism (Carra et al. 2011; Serra-Negra et al. 2012a; Van Selms et al. 2013; a. Emodi-Perlman et al. 2012).

So far, most of the studies on bruxism in children and adolescents have been in performed in western countries. Even though Indonesia is one of the highest populated countries, no studies have been performed on bruxism in its young population. Therefore, the aim of this study was to

assess the prevalence rates and associated factors of sleep and awake bruxism in Indonesian young population.

MATERIAL AND METHODS

Ethical clearance of this study was given by the ethics committee of Trisakti University-School of Dentistry. The questionnaire used in this study was the Indonesian translation of Dutch questionnaire (Van Selms et al. 2013) used in bruxism studies in children and adolescents which has fair to excellent ICC score in the pilot study.

The inclusion criteria were students from national schools in Jakarta and its satellite cities who speak Indonesian language as their first language, aged 7-18 years old by the time of data collection with normal general health, and can communicate well thus understand all instructions. The demographic variance of this study was acquired from age, gender, living areas, and socio-economic levels. Details of the data collection procedure are stated in earlier publication (Marpaung, van Selms, and Lobbezoo 2018).

Data analysis

Descriptive analysis was done to identify the prevalence and distribution of both sleep and awake bruxism. Collinearity test was then done to make sure there was no correlations among the predictor variables. All the tolerance values were greater than 0.1 and variance inflation factor (VIF) values were much less than 10, which gave an indication that there was no problem with collinearity in the data set. Linearity of the ordinal predictor variables to the dependant variables was checked by analysis of dummy variables. When the regression coefficients of the dummy variables did not consistently increased or decreased, dichotomization of the variables was conducted.

Before building a logistic regression model, single regression analysis was done to assess the relation of dependent variable to the predictors. When the relation or dependency was strong enough (P-value < 0.10), those predictors then be incorporated into the logistic regression analysis. Predictors with the weakest association with orofacial pain were removed using backward stepwise manner, and the p-to-exit were reported. The predictors in the logistic regression model were the

ones with p value <0.05. All analysis was conducted using IBM SPSS statistics for windows version 20.0 (SPSS, Armonk, NY, USA).

RESULTS

Data collection was done in the span of 5 months with 546 children (mean age:9.6±1.9 years) and 812 adolescents (mean age: 15±1.6 years) participated in the study. Out of the total number of subjects, 8 children and 136 adolescents stated that the presence of bruxism was unknown to them. Prevalence of self-reported sleep bruxism in children was 23.5%, while 11.3% in adolescents. Self-reported awake bruxism had a prevalence of 20.3% in adolescents. The detail prevalence of sleep bruxism reports in each predictor is shown in table 2, while the prevalence of predictors in awake bruxism is shown in table 3.

Assessment of dummy variables regression coefficient was done for psychological factors which has ordinal scale. It was found that there was no linear relationship between any of the ordinal variables to either self-reported sleep or awake bruxism, therefore dichotomization was performed. Logistic regression analysis showed that age, orofacial pain, and psychological problems were associated with self-reported sleep bruxism in children (table 4); while only orofacial pain were associated with self-reported bruxism in adolescents (table 5). The analysis also found that orofacial pain and psychological problems were associated with awake bruxism in adolescents (table 6).

DISCUSSION

The aims of this questionnaire study were to assess the prevalence rates of bruxism and its risk indicators among children (aged 7-12) and adolescents (aged 13-18) living in Indonesia. The overall prevalence of self-reported sleep bruxism in the child population was 24.2%, whereas it was 11.3% in the adolescent population. Self-reported awake bruxism had a prevalence of 20.3% in adolescents. In adolescents, orofacial pain was strongest predictor of both sleep and awake bruxism next to the reports of psychological factor for awake bruxism. In child population, psychological factor and age were associated to self-reported sleep bruxism.

Several studies have stated that self-report bruxism is not reliable diagnostically and do not specifically show current bruxism activity (Marbach et al. 2003; Manfredini & Lobbezoo 2009). In fact, a reliable diagnostic require electromyography recording analysis. This issue, however, has been resolved by a bruxism diagnosis consensus of probable, possible and definite diagnosis (Lobbezoo et al. 2013). Thus, self-report can be used to screen bruxism habit and awareness. The option "don't know" to bruxism answer was intended to minimize bias, since habit unawareness is common. It was found to be as high as 17% in an adolescents study (Van Selms et al. 2013), which was similar in our observation. Question on awake-bruxism in children was removed from the analysis since most children spent their daily activity at school, beyond their parents' close observation.

Sleep and awake bruxism was analyzed separately in this study since they are considered two different disorders (Lobbezoo et al. 2013). Many studies have suggested that sleep and awake bruxism have different etiology, characteristic and risk factors. Emotional and situational factors are important in awake bruxism etiology, which did not consistently apply in sleep bruxism (Manfredini & Lobbezoo n.d.). On the activity characteristics, awake bruxism is generally characterized by a clenching activity, while sleep bruxism by a combination of clenching and grinding activity.

The study showed an indication of decreasing prevalence rates of sleep bruxism from childhood to adolescence. The association between age and sleep bruxism in children was also found to be decreasing with age (0R:0.86). This finding coincides with the existing studies which show that sleep bruxism declines from childhood to old age (Lavigne and Montplaisir 1994, Laberge et al. 2000). Within the limitation of a cross-sectional observation, this finding supports the common belief that sleep bruxism activities recede at the end of childhood period (Manfredini et al. 2013).

As in this study, both sleep and awake bruxism has been associated with orofacial pain both in adults (Carlsson, Egermark, and Magnusson 2002, Chen et al. 2007) and in children studies (Vanderas 1987; Cortese et al. 2013). Significant odds ratio of orofacial pain to bruxism in adolescents was also evident in other studies (…..). However, they do not necessarily show true cause-effect relationship between the two variables. The complexity of their relations may be best explained with the stochastic variation between their risk factors (Svensson and Kumar 2016).

Depending on each person, risk factors can have different contribution to the relation and can generate varied response both in intensities and duration.

In the present study, psychological factors have a somewhat consistent relationship to bruxism in both children and adolescents. This is in concordance with other studies which use questionnaires to detect both variables (Kampe, Edman, and Hannerz 1991, Ferreira-Bacci Ado, Cardoso, and Diaz-Serrano 2012, Winocur et al. 2019). The association was also shown by a study which detected an elevated levels of urine catecholamines, a hormone related closely with emotional conditions, in subjects with bruxism (Vanderas et al. 1999). It is interesting to observe that while the relation is apparent in questionnaire-based studies, it is not so in EMG and sleep laboratory investigations (Pierce et al. 1995, Watanabe, Ichikawa, and Clark 2003, van Selms et al. 2004). The perpetual complexity of bruxism activity might cause the difference result depicted by the two sampling methods. One or two questions used in the questionnaire might not be specific enough to capture bruxism activity, although it is the most convenient way for large-scale studies. On the other hand, generalization of clinical study results might not be possible due to studies' paucity (Manfredini on Paesani's book). The use of ecological momentary assessment (EMA) method to capture 'real-time' awake bruxism activity and multiple observations for sleep bruxism are currently being developed to overcome these issues.

Commented [ER1]: Is it sampling? Not sure.. one group is by questionnaire, and the other is by emg et al.

Conclusion

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	Parental report (children 6-11 years)	Self report (Adolescents 12-18)
Demographical data	- Age - Gender - Living area - Social-economic level	
Sleep bruxism	- Does your child grind his/her teeth while sleeping? - Does your child clench his/her teeth while sleeping?	- Have you been told, or did you notice yourself that you grind your teeth when you sleep? - Have you been told, or did you notice yourself that you clench your jaws when you sleep?
Awake bruxism		- Have you been told, or did you notice yourself that you grind your teeth during the day? - Have you been told, or did you notice yourself that you clench your jaws during the day?
Sleep problem	- Does your child have trouble falling asleep?	- Do you have trouble falling asleep?
Orofacial pain	Does your child have pain at the location of his/her temples, face, in front of the ear, or in the ear?	Have you had pain in the face, jaw, temple, in front of the ear, or in the ear?
Psychological problems	- Does your child worry about things? - Does your child experience pressure and/or tension from the home situation? - Is your child easily scared? - Do you think your child is in a state of mental tension when he/she gets home from school?	- Do you worry about things? - Do you experience pressure and/or tension from the home situation? - Are you easily scared? Do you think you're in a state of mental tension when you get home from school?

Table 2. Descriptive statistics of the predictor variables stratified by the presence of self-reported sleep bruxism. All variables are presented as absolute numbers (n) and percentages (%)

Predictor variables	Outcome variables CHILDREN (n=545)		ADOLESCENTS (n=812)	
	No Sleep Bruxism n (%)	Sleep Bruxism n (%)	No Sleep Bruxism n (%)	Sleep Bruxism n (%)
Gender				
Male	159	59	280	47
Female	241	69	304	45
School social level				
Low social	246	74	222	37
High social	154	54	362	55
Living area				
Rural	136	51	218	30
Urban	264	77	366	62
Sleep problem				
No	319 ()	96 ()	145	20
Yes	81 ()	32 ()	439	72
Orofacial pain				
No	309 ()	89 ()	319	36
Yes	80 ()	36 ()	155	38
TMJ sound				
No	363 ()	114 ()	472	68
Yes	37 ()	14 ()	112	24
Psychological factors				
Worries				
No	171 ()	43	167	20
Yes	229 ()	85	417	72
Tension at home				
No	345	98	377	49
Yes	55	30	207	43
Tension from school				
No	316	95	298	36
Yes	84	33	286	56
Easily scared				
No	171	52	233	26
Yes	229	76	351	66

Table 3. Descriptive statistics of the predictor variables stratified by the presence of self-reported awake bruxism. All variables are presented as absolute numbers (n) and percentages (%)

Predictor variables	Outcome variable ADOLESCENTS (n=812)	
	No Awake Bruxism n (%)	Awake Bruxism n (%)
Gender		
Male	305	84
Female	315	81
School social level		
Low social	254	69
High social	366	96
Living area		
Rural	229	60
Urban	391	105
Orofacial pain		
No	335	66
Yes	162	68
TMJ sounds		
No	511	119
Yes	109	46
Psychological factors		
Worries		
No	195	30
Yes	425	135
Tension at home		
No	409	91
Yes	211	74
Tension from school		
No	326	65
Yes	294	100
Easily scared		
No	243	56
Yes	377	109

Table 4. Single and multiple logistic regression models for the prediction of sleep bruxism among children. For each factor included in the single regression, the number of cases (n) included in the analysis is shown.

	Single regression					Multiple regression (n=545)		
	n	**p value**	**OR**	**95% CI**	**p -to-exit**	**p value**	**OR**	**95% CI**
Gender (female)	319	0.205	0.77	0.52-1.15				
Age	545	0.032	0.88	0.78-0.99		0.027	0.87	0.77-0.99
High SES	209	0.458	1.17	0.78-1.75				
Living area (Urban)	348	0.229	0.78	0.52-1.17				
Sleep problem (yes)	117	0.255	1.31	0.82-2.10				
Orofacial pain (yes)	124	0.057	1.56	0.99-2.47	0.130			
TMJ sounds (yes)	55	0.574	1.21	0.63-2.31				
Psychological factors:								
- Worries (yes)	328	0.067	1.48	0.97-2.24	0.226			
- Tension at home (yes)	90	0.010	1.92	1.17-3.16		0.017	1.88	1.12-3.14
- Tension from school (yes)	122	0.258	1.31	0.82-2.08				
- Easily scared (yes)	318	0.672	1.09	0.73-1.64				

Table 5. Single and multiple logistic regression models for the prediction of sleep bruxism among adolescents. For each factor included in the single regression, the number of cases (n) included in the analysis is shown.

	Single regression					Multiple regression (n=812)		
	n	**p value**	**OR**	**95% CI**	**p -to-exit**	**p value**	**OR**	**95% CI**
Gender (female)	410	0.575	0.88	0.57-1.40				
Age	812	0.613	0.96	0.83-1.11				
High SES	481	0.686	0.91	0.58-1.43				
Living area (Urban)	514	0.383	1.23	0.77-1.96				
Sleep problem (yes)	621	0.522	1.19	0.70-2.02				
Orofacial pain (yes)	240	0.002	2.17	1.33-3.56		0.008	1.99	1.20-3.29
TMJ sounds (yes)	163	0.126	1.49	0.89-2.47				
Psychological factors:								
- Worries (yes)	581	0.174	1.44	0.85-2.44				
- Tension at home (yes)	297	0.038	1.60	1.03-2.49	0.067			
- Tension from school (yes)	408	0.035	1.62	1.03-2.54	0.143			
- Easily scared (yes)	505	0.034	1.69	1.04-2.73	0.255			

Table 6. Single and multiple logistic regression models for the prediction of awake bruxism among adolescents. For each factor included in the single regression, the number of cases (n) included in the analysis is shown.

	Single regression					Multiple regression (n=812)		
	n	**p value**	**OR**	**95% CI**	**p -to-exit**	**p value**	**OR**	**95% CI**
Gender (female)	410	0.695	0.93	0.66-1.32				
Age	812	0.802	0.99	0.88-1.10				
High SES	481	0.844	0.97	0.68-1.37				
Living area (Urban)	514	0.892	1.03	0.72-1.46				
Orofacial pain (yes)	240	>0.001	2.13	1.45-3.14		0.005	1.77	1.19-2.65
TMJ sounds (yes)	163	0.003	1.81	1.22-2.70		0.045	1.58	1.00-2.48
Psychological factors:								
- Worries (yes)	581	0.001	2.07	1.34-3.18		0.024	1.83	1.08-3.07
- Tension at home (yes)	297	0.011	1.58	1.11-2.23	0.337			
- Tension from school (yes)	408	0.003	1.71	1.20-2.42	0.096			
- Easily scared (yes)	505	0.217	1.26	0.88-1.80				

Prevalence and risk indicators of bruxism in Indonesian children

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