Diagnosis of Bruxism in Adults: A Systematic Review

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ABSTRACT

Bruxism is a centrally mediated neurological para-functional movement disorder encompassing clenching, and grinding of teeth, or thrusting and bracing of mandible, which may be performed without conscious awareness. Diagnosis of bruxism can be done with instrumental and non-instrumental tools. Non-instrumental tools include self-reporting, questionnaires, history, and clinical diagnostic criteria. Instrumental tools include the use of intra-oral bite appliances, electromyography, and polysomnography. Polysomnography is considered as the gold standard to diagnose bruxism requiring the presence of special equipment and / or access to a sleep laboratory. The purpose of this study was to evaluate the evidence available for the validity (ability to identify those who have the disease *versus* those who do not) of non-instrumental tools in the diagnosis of bruxism. The research question for this study was whether non-instrumental tools are sufficient for confirmatory diagnosis of bruxism. PICO was described as 'P'opulation = adults, 'I'ntervention = diagnostic tools, 'Comparison' = non-instrumental tools compared with instrumental tools, and 'O'utcome as results of the intervention. The study was conducted from May 2020 to November 2021. Out of 3,687 reviewed articles, eight articles were selected for final review and reviewed for quality appraisal. It was found that non-instrumental tools or questionnaires are not sufficient for confirmatory diagnosing of bruxism independently. Correlating instrumental recordings with non-instrumental tools such as clinical findings may be a good practice to diagnose bruxism definitely and precisely.

Key Words: Diagnosis, Bruxism, History, Electromyography, Polysomnography.

How to cite this article: Raja HZ, Saleem MN, Mumtaz M, Tahir F, Iqbal MU, Naeem A. Diagnosis of Bruxism in Adults: A Systematic Review. *J Coll Physicians Surg Pak* 2024; **34(10)**:1221-1228.

INTRODUCTION

Bruxism is a centrally mediated, repetitive, para-functional masticatory muscle activity. It presents as spasmodic involuntary clenching or grinding of teeth associated with thrusting or bracing of mandible.[1] Primary bruxism may be of idiopathic origin, while secondary bruxism can be a consequence of extrapyramidal movement disorder,[2] side effects of medicines or chemicals,[3] or central dopaminergic system disturbances.[4] Stress is shown to be directly linked with bruxism. An emotional situation, fear or anxiety send signals through motor neurons to activate muscle tension, i.e. cardio-trigeminal reflex.[5] This activates the parasympathetic nervous system which inhibits cardiac, respiratory, and masticatory muscle activities and activates stress relief system.[6] Dietary habits may also have an effect on bruxism. A strong link has been demonstrated particularly between bruxism and vitamin D deficiency, with 60% of diagnosed bruxism patients exhibiting this deficiency in a study.[3,5]

Bruxism may present with a variable circadian rhythm presenting as sleep bruxism and awake bruxism. Prevalence of bruxism ranges from 6-95%, affecting 14-20% of children, 8% of adults under the age of 60 years, and 3% of adults over the age of 60 years.[7] Effects of bruxism can range from no harm to oral structures, to tooth wear, occlusal trauma, hypertrophy of masticatory muscles, temporomandibular joint dysfunction, and temporal headaches.[1,8] Sleep bruxism can cause insomnia, cervicodyania, vertigo, congestion of facial sinuses, and morning muscle stiffness.[9] It may also act as a protective reflex in patients with sleep apnoea, xerostomia or gastro-oesophageal reflux disease, by improving the patency of the upper airway and by increasing the salivation, respectively.[8] Bruxism can co-exist with obstructive sleep apnoea, restless leg syndrome, REM sleep disorder, and parasomnia.[10] The release of neurotransmitters in brain, increased blood cortisol, and suppression of immune system are its consequences which can present in perfectionist individuals with mood swings and depression.[11] While peripheral factors such as change in occlusion or articulation may not cause bruxism.[11]

History and examination can help in identification in symptomatic / asymptomatic individuals. Current diagnostic techniques including instrumental and non-instrumental tools do not discriminate clenching from grinding and / or bracing from thrusting of mandible.[12] A modified diagnostic system was developed, which categorised possible bruxism as a positive self report, probable bruxism as positive clinical inspection with

or without positive self report, definitive bruxism as positive instrumental assessment, with or without a positive self report and / or with or without positive clinical inspection.[12] This system was challenged as stackable, with lack of sensitivity and specificity of a non-instrumental approach.[13]

Self-reporting of clenching or grinding during sleep or awakening signifies the possibility and frequency of a bruxer. Patient's detailed history can record a past experience or a present situation but does not explain the severity and duration of masticatory muscle activity.[14] A proforma can record the type of tooth wear, adjacent signs and symptoms *i.e.*, dryness of mouth, and condition / medications affecting salivary flow with no specific objective evaluation. Anxiety scales such as the perceived stress scale (PSS) can assess severity through the patient's awareness of the weekly record of non-masticatory tooth contacts.[15] A bed partner or a family member can specify the number of episodes. Clinical examination reveals hypersensitivity to cold,[16] number of missing teeth, presence of torus mandibularis,[17] attrition (sleep bruxism), heavily restored / fractured teeth, tongue indentation, cheek indentation, and masticatory muscle hypertrophy etc.[18] Study casts and photographs are also a reliable baseline for confirmatory diagnosis of bruxism.

Vacuum-pressed sheets can be utilised to analyse the grinding pattern through wear facets, absence of microdots on bruxocore plate,[19] or elimination of colour from a vacuum-formed intra-oral plate.[20]

Electromyographic recording records altered masticatory muscle activity during premature occlusal contacts,[21] mastications of solid food,[22] or presence of skeletal malocclusion.[23] A clenching episode activates motor activity at the unilateral interference and motor inhibition occurs on the contralateral side.[21] Portable wireless devices can measure electromyographic readings at home. This eliminates sleeping bias, extra cost, and time during polysomnography. Polysomnography with audiovisual (AV) recordings of bruxing during sleep along with brain waves, muscle activity, electrocardiogram, pulse oximetry, nasal cannula transducers, and oral temperature. Cardiac activity increases seconds before the onset of sleep bruxism, making polysomnography a gold standard for diagnosis of bruxism.[24]

Sleep bruxism can be diagnosed with a sensitivity and specificity of >80% with following presentations.[25] Thirty bruxism episodes per night or at least four episodes per hour of sleep, six electromyographic bursts per bruxism episode and / or 25 electromyographic bursts per hour of sleep, and at least two of the above episodes accompanied by AV-detected tooth grinding.

A grouping of moderate bruxers is also included in the literature, which is considered when the episodes are more than two and less than 4 per hour.[26]

Diagnostic accuracy of polysomnographic studies presents with low internal validity.[27] Diagnosis of bruxism can be achieved *via* the use of just one tool or by merging various tools, depending upon the severity of the clinical condition. Non-avail-able diagnostic instrument or instrument affecting patient's behaviour affects the outcome of accurate assessment.[12]

The research question of this systematic review was whether the non-instrumental tools alone are valid for confirmatory diagnosis of bruxism or not. The aim of this review was to assess the validity of non-instrumental tools in diagnosis of bruxism. It can be hypothesised that non-instrumental assessment tools are valid for diagnosing bruxism.

METHODOLOGY

PICO of the present study was observed as population of adults, intervention as non-instrumental tools for the diagnosis of bruxism, comparison with instrumental tools (Polysomnography) and outcome as validity of non-instrumental tools. The study duration was 18 months, from May 2020 to November 2021.

The search strategy included searching for studies on databases such as Medline, Pubmed, Embase, Scopus, Web of Science, SciELO, King's College London Library, Cochrane Oral Health Group's Trial Register, Cochrane Register of controlled Trials, and Bibliographies of selected journals. Hand searching was also done for studies published in previous six months. The inclusion criteria consisted of articles written in the English language, randomised clinical trials, controlled clinical trials (CCTs), cohort studies, cross-sectional studies, case-control studies, and good-quality systematic reviews. Those studies which did not have standardised measures for bruxism evaluation or effective statistical analysis were excluded. Case reports, studies older than the past 10 years, abstracts, and author debates were also excluded.

The searching keywords were bruxism diagnosis, bruxism analysis, and sleep bruxism, with PRISMA guidelines. Two reviewers performed the initial screening of titles and abstracts. Out of 3,687 references, 306 were initially scrutinised (Figure 1). Online bibliographic programme (endnote X9) was used to manage the electronic database. Duplicate hits were removed. Reviewers resolved the confusion *via* sessions of mutual discourse. In the next step, a total of 26 articles were assessed by six authors deducting eight articles for inclusion.

Out of the eight studies that were selected, there were four observational studies, one systematic review, one cross-sectional study, one correlational study, and one randomised clinical trial (Table I).

RESULTS

The present study focused on the role of non-instrumental tools in the diagnosis of bruxism. Eight articles were selected from a total of 3,687 articles. Studies utilised variable criteria to recruit individuals with possible bruxism.[28,29] Studies depicted the accuracy, sensitivity, and specificity of instrumental tools as well as the utilisation of non-instrumental tools. One study evaluated the validity of a cordless bruxism measurement system (BMS) for sleep bruxism in comparison to polysomnography (PSG). No significant difference was found between the two instruments. BMS was considered suitable for recording sleep bruxism. Bite strip demonstrated a sensitivity of 71–84.2%. EMG telemetry

demonstrated a sensitivity of 98.8%. The accuracy of diagnosis of sleep bruxism with Bruxoff was significant and very similar to the results with polysomnography. However, the study did not use non-instrumental tools for confirming the diagnosis of bruxism.
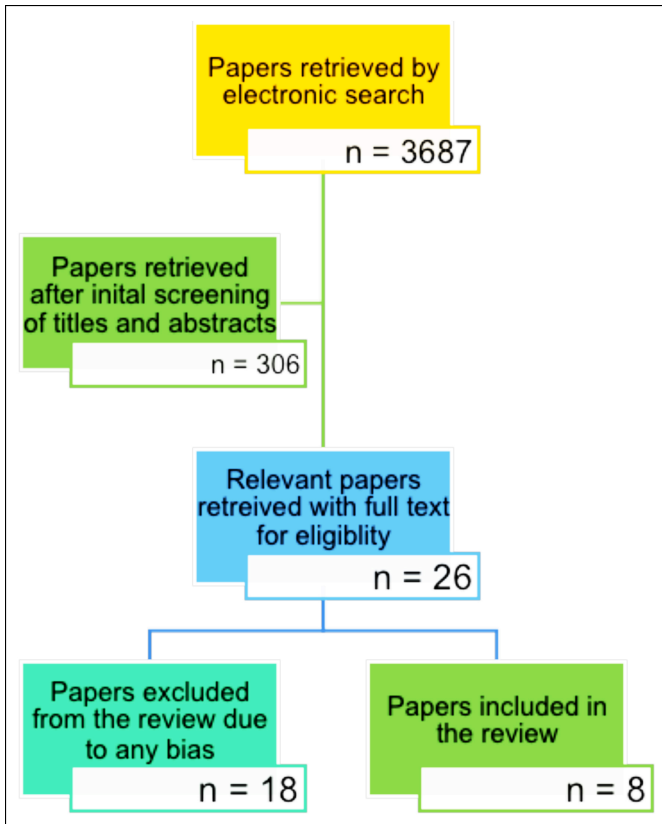

Figure 1: Articles retrieved from various search engines.

Figure 2: Brux checker.

A study evaluated small self-contained electromyography analyser to analyse the night to night variability of sleep bruxism.[30] According to the results there was no significant difference found in sleep bruxism between the first night and the subsequent five or six nights.[30] There was no utilisation of non-instrumental tools in sample recruitment of this study.

A study recruited patients with random selection based on clinical diagnosis with TMD symptoms. Patterns of tooth contact were evaluated with a brux-checker cephalogram and a condylograph to conclude a definitive diagnosis of bruxism.[31] During occlusal analysis, it was cited that during mediotrusive mandibular movement due to sleep bruxism, there was increased tooth contact and flattening of anterior occlusal plane. This depicted a relative role of clinical diagnosis in sleep bruxism.[31] However, the remaining diagnostic features were not recordable.[31]

A study assessed the accuracy of a portable Bruxoff EMG / ECG recorder to assess the accuracy of polysomnography diagnosis on patients with self-reported clenching.[32] Increased activity of the oral musculature was documented in patients with sleep bruxism. The portable Brux off EMG / ECG was accurate in the diagnosis of sleep bruxism.

One study compared prevalence of bruxism with a questionnaire-based analysis to a polysomnography record.[33] This study found a 12.5% over-diagnosis for bruxism through questionnaire.[33] This is an important finding since it indicates that questionnaires alone may not be reliable for the diagnosis of bruxism. AV polysomnography reflected a significant association of sleep bruxism with insomnia. In addition, the prevalence of sleep bruxism was also evident in overweight patients, those with normal weight, and highly educated patients.[33]

In another study, patients with TMD pain were assessed with self-reporting questionnaires as well as self-reporting and clinical examination for definitive bruxism diagnosis.[27] The strength of association between the two assessment methods (Phi-value) was found only in partners who reported grinding and awake clenching. Weak association was recorded in self-reporting for sleep bruxism, sleep clenching, and awake grinding.[27]

The validity of different portable diagnostic devices with accuracy of polysomnography was observed in a systematic review.[34] Four shortlisted studies compared bite-strip, EMG device, and Bruxoff with PSG criteria. The studies lacked generalisability owing to a single night PSG in a portable device with a focus on EMG without AV aid. Heart rate was considered with Bruxoff record only. Inconclusive evidence was found due to detection bias in all studies. EMG study had a selection bias due to varied EMG machines and 10% maximal volumetric contraction of masseter muscle was considered in the study which was less than the optimum level that was required (20% MVC). The sensitivity (ability to diagnose disease) of bite strip device was 71-84%, while with EMG it was 98.8%. The highest diagnostic accuracy was reported with the Bruxoff device with a receiver operating characteristic curve (ROC) of 0.98 and greater coincidence with PSG records. Bite strips showed reduced diagnostic accuracy as the intensity of bruxism was not discriminated.[18,35] Absence of AV records can also lead to over-diagnosis of sleep bruxism by 23% through these devices.[36]

Another study compared the diagnostic capability of clinical presentation through AASM criteria[37] and grading system[1] for sleep bruxism with one-night polysomnography record.[39] Muscle fatigue and temporal headaches were the only clinical symptoms suggesting good sensitivity.

Table I: Review of studies.

Author's name	Year	Sample selection	Tool	Conclusion
Mikam et al.[40]	2009	Non-instrumental tool	Ultraminiature cordless bruxism measurement system	No significant difference between BMS and PSG
Minakuchi et al.[30]	2012	Non instrumental tool	Self-contained EMG analyzer	No significant first-night effect recorded
Faujisawa et al.[41]	2013	Self-reported clenching	Portable EMG recorder with hearing aid	Self-report – reliable indicator- increased number of parafunctional events recorded
Maluly et al.[33]	2013	Questionnaire selection	Single night PSG	12% overestimation of bruxism with questionnaire.
Paesani et al.[27]	2013	Self-reported	Clinical examination	Correlation is present for awake bruxism
Manfredini et al.[34]	2014	Systematic review on validity of portable instruments	PSG – gold standard	None of the non-PSG devices depicted validity except the Bruxoff device – which needs exploration
Castrofrolio et al.[32]	2014	Self-report with clinical diagnosis on AASM criteria	Bruxoff	No significant correlation was found between clinical diagnosis and Bruxoff findings
Tago et al.[31]	2018	Random selection clinical diagnosis with TMD symptoms	Bruxchecker	Patients with TMD symptoms showed greater tooth contact ISPM with mesial grinding.

No diagnostic criteria[1] signified adequate sensitivity and specificity, with a maximum of 58% sensitivity achieved with AASM criteria.[25] Authors recommended sequential investigation regarding muscle fatigue, temporal headaches, or to look for AASM criteria.[25,37,38]

Another study utilised intra-oral device, Brux-checker[31] red colour coated 0.1mm thick vacuum pressed polyvinyl sheet, and recorded the bruxing pattern.[31] Localised regions of tooth contacts during laterotrusive and mediotrusive mandibular manoeuvers were evaluated.[31] Lateral cephalograms, maxillary and mandibular diagnostic casts, and condylographic documentation showed that there was an increased contact present in incisors to a molar area with a flattened anterior occlusal plane, corresponding with increased masticatory muscle activity in electromyography records, thus depicting bruxism.[32] Another study showed increased TMD problems with mediotrusive contact and mediotrusive grinding and brought attention to the fact that tooth contact must be managed via occlusal therapy to minimise the deleterious effects of bruxism.[39]

The results of the review revealed inconclusive evidence for the role of history, clinical signs, and symptoms in the confirmatory diagnosis of bruxism. These findings imply that clinicians should not rely on non-instrumental tools only for diagnosing sleep bruxism.

DISCUSSION

The present study focused on validity of non-instrumental tools for confirmatory diagnosis of bruxism. Out of 3,687 articles, eight articles were selected. The AASM diagnostic criteria require the co-existence of two or more clinical findings and validation for the general application of a diagnostic tool.[37]

A study utilised ultra-miniature cordless BMS on healthy volunteers.[40] The instrument proved to be valid for awake bruxism in concordance with audiovisual record of polygraph for clenching episodes, but no data were available for sleep bruxism. Close proximity (within 100 cm) of cordless system reduced the recording artefact due to motion at a specific frequency. No non-instrumental tool was used to recruit individuals, thus requiring further exploration of this tool.

Another study recruited healthy volunteers without utilisation of non-instrumental tool.[30] All volunteers were categorised as mild and moderate bruxers according to rhythmic masseter muscle activity (RMMA) lasting for less than 2.3 to 5.3 seconds, recorded on EMG.[30] The EMG device was preset for a specific time period to detect muscle hyperactivity for six consecutive nights. The device had the capacity to record EMG only, with no ECG or EEG record, as performed in audiovisual polysomnography. No significant first night effect (FNE) was recorded, unlike polysomnography, as electromyography was arranged at low-resolution recorders, thus requiring a deeper evaluation with these devices. Such devices can be utilised in case of non-availability of polysomnography, but with caution, since EMG devices may overestimate the diagnosis of bruxism. One reason for this is that EMG devices, with no ECG / EEG record, may not be able to differentiate between bruxism or other muscle activities such as snoring and talking. The use of non-instrumental tool was not visible in this study.[30]

The third study evaluated the validity of self-reporting about daytime clenching through surface electromyography.[41] True or false positive EMG activity was classified as per the number and duration of EMG episodes, with its correlation with the patients' self-awareness of clenching episodes. Parafunctional events were statistically significantly recorded in clenching patients than in control groups. The movements were of longer duration with 10% MVC, signifying parafunctional activity.[41,42] The study depicted that the duration and intensity of EMG activity can be used to discriminate the functional and parafunctional activities. However, a biofeedback through daytime clenching recognition can be used as a calibration of nocturnal and daytime clenching episodes, thus signifying self-report valid for screening for awake bruxism.[41] These findings suggest that clinicians may combine a non-instrumental tool such as a questionnaire to diagnose bruxism, with an instrumental tool such as EMG device to confirm the diagnosis.[41,42]

In another study, patients with TMD pain were assessed with self-reporting questionnaires as well as self-reporting and clinical examination for definitive bruxism diagnosis.[27] The strength of association between the two assessment methods (Phi-value) was found only in partners who reported grinding and awake clenching. A weak association was recorded in self-

reporting for sleep bruxism, sleep clenching, and awake grinding. Differences in patient's perception, origin of pain,[34] clinician's evaluation[43] can affect the probability of confirmatory diagnosis for bruxism, thus questioning the chance of possible to probable bruxism, making these approaches non-specific. Sleep grinding item correlated with wear on examination, report by a bed partner for three times a week. Presence of linea alba, masseter muscle hypertrophy on palpation or tongue scalloping, awake clenching, and mandible jaw thrusting were confirmed by patient on waking up. Thus, these findings can be used to improve the clinical diagnostic criteria mentioned by AASM.[27]

Prevalence of bruxism was recorded in a large sample population, selected through questionnaire.[33] AASM evaluation was performed. Electromyography, temporal polysomnography, and one night non-invasive polysomnography were executed in ample muscle mass i.e. on masseters bilaterally and temporal muscles.[37] EEG arousals documented with 30 seconds of an EMG episodes were viewed as significant with sleep bruxism. No significant difference between bruxers and non-bruxers for several parameters of sleep, except for wake-up time after sleep onset (WASO), was found. However, insomnia occurring within the second phase of sleep, affects the sleep quality. Prevalence of sleep bruxism recorded with self-reporting questionnaire *versus* polysomnography was 5.5% and 7.4%, respectively. The outcome percentage of polysomnography coincided with the previous studies.[44-46] A subjective assessment tool was used in those studies, but such questionnaires may lead to overestimation of the diagnosis of sleep bruxism prevalence of up to 12.5%.[34] Conclusively, self-report may signify the presence of bruxism than in non-reporting individuals. Sleep bruxers exhibited phasic bruxism events with sensitivity to stress.[45,46] Sleep bruxism was commonly found in patients with normal body mass index or rotund but not in obese and educated patients. Reduced prevalence was found in aged individuals, might be due to absence of grinding sounds with existing dentures, while other studies reported high prevalence in older individuals.[47] Use of a psychiatry-oriented questionnaire and polysomnography with visual recording for consecutive nights may further inquire the true association of anxiety and depression.

A portable device, bruxoff with record of muscular contraction and cardiac activity can depict sensitivity and specificity, in reference to polysomnography to 94.6% and 84.6%, respectively.[32] Bruxoff depicted good reproducibility (reliability) on three different nights in three weeks. No statistically significant difference in a number of sleep bruxism episodes per night or in masseter muscle contractions was recorded.[32,48] It showed the relative utility of self-reporting for bruxism diagnosis.

The validity of different portable diagnostic devices was observed in a systematic review.[35] American Sleep Disorder Association (ASDA) diagnostic criteria of four bruxism episodes per hour of sleep with two AV recordings and the presence of shiny spots on teeth or restorations were utilised, while EMG threshold values utilised in these studies were not in accordance with ASDA guidelines, thus the results were not generalisable.[25] (PSG >20% MVC, Bite-strip 30% MVC, EMG more than 2 x baseline values MVC, Bruxoff 10% MVC).[43] Bite strips showed reduced diagnostic accuracy, so the intensity of bruxism was not discriminated.[18,35] The varied response from all diagnostic instruments indicates relevant inclusion of history and examination, especially for patients with comorbidities. However, Bruxoff device showed good reproducibility, sensitivity, and specificity, except for the lack of AV recording, thus not following AASM criteria Bruxoff device records ECG with EMG.[32]

The questionnaire was used to recruit patients with TMDs.[28] Bruxoff device aids in diagnosis through the record of AV arousals at varied times.[32] On the contrary, polysomnography may pose cost and feasibility issues. Software for AV-polysomnography seems to predictably document sleep bruxism when judged against manual operation of AV-polysomnography apparatus.[32] To abolish the likelihood of false positive or false negative results, it was postulated to match up and correspond clinical evidence with instrumental registrations for a definitive diagnosis of sleep bruxism, as many bruxers may exhibit co-existing contributory risk factors.[36]

A research compared the diagnostic capability of non-instrumental tools i.e. clinical presentation, AASM criteria[37] and grading system[1] for sleep bruxism with one night polysomnography record.[38] Muscle fatigue and temporal headaches were the only clinical symptoms suggesting good sensitivity, while the absence of grinding sounds and tooth wear may identify individuals without sleep bruxism. No diagnostic criteria[1] signified adequate sensitivity and specificity, with a maximum of 58% sensitivity achieved with AASM criteria.[25] Authors recommend sequentially investigating about muscle fatigue, temporal headaches or looking for AASM criteria.[25,38]

In another study, patients with TMD pain were assessed with self-reporting questionnaires and clinical examination for definitive bruxism diagnosis.[27] The strength of association between the two assessment methods was found only in partner reported grinding and awake clenching. Weak association was recorded in self-reporting for sleep bruxism, sleep clenching, and awake grinding. Differences in the patient's perception, origin of pain,[49] and clinician's evaluation[50] can affect the probability of confirmatory diagnosis for bruxism, thus questioning the chance of possible to probable bruxism and making these approaches non-specific.[50]

An intra-oral device, Brux-checker was used to register the bruxing pattern, (Figure 2).[31] The pattern was photographed and uploaded on Image J 1.46r software with 1:3 magnifications. Localised regions of tooth contacts during laterotrusive and mediotrusive mandibular manoeuvers, were registered and classified as intercanine (IC), premolar (P), and molar (M)

areas.[51] Posterior molar contact was lessened with an increase in overbite during bruxing activity. Transverse condylar deviation was seen with increased posterior tooth contacts. Mediotrusive movements were associated with increased pain and discomfort in the temporomandibular region, clicking and transverse condylar deviations.[51] In this research, actual tooth contacts were documented and assessed which may not be possible with shim stock or articulating papers.[51] Although previously, it was reflected that mediotrusive contacts are protective for the ipsilateral TMJ, this research observed increased TMD problems with mediotrusive contact and mediotrusive grinding.[39] This study brought attention to the findings that tooth contact must be controlled through occlusal therapy to retard the destructive effects of bruxism.[51]

In this review, low diagnostic accuracy for sleep bruxism was observed, with a dire necessity to improve the diagnostic criterion. Two articles did not utilise non-instrumental tools for recruitment of volunteers, while such tools may be used carefully. Diagnostic criteria based on polysomnography (PSG) recordings have not, as yet, been implemented in epidemiological studies of the general population.[25,47] Portable EMG recorders may overestimate the diagnosis of sleep bruxism, as they may not register autonomic signs during bruxing activity.[11,32,33] It is thus recommended to collectively utilise non-instrumental tools with instrumental tools. Initial utilisation of non-instrumental tools may not only enhance the diagnostic accuracy, but may also compensate for a lack of access to sleep laboratories and modern equipments. However, this necessitates further study and research in the field with better research methodologies to come to a reliable conclusion. Future research should be directed towards developing more accurate and reliable non-invasive tools for bruxism, which are non-complex to use in daily clinical practice and have good validity.

This study had a few limitations such as only articles published in the English language were selected. Due to limited scientific evidence, all assessment tools were considered collectively. Individual standardisation, sensitivity, and specificity of each assessment tool would generate a definitive conclusion for diagnosis of bruxism, although the complexity of such a review since studies evaluating these tools mostly use different methods and populations. Since the study duration was capped at November 2021, there is a possibility of new evidence published later, which may not be included in this systematic review. A systematic review analysed for this study had limitations such as lack of generalisability, and selection and detection bias of the studies included. More research is needed to evaluate the diagnostic accuracy of non-instrumental tools in different populations.

CONCLUSION

There is insufficient evidence for the role of history, clinical signs, and symptoms in the confirmatory diagnosis of bruxism. Most of the instrumental tools may be utilised cautiously for bruxism diagnosis. Diagnostic accuracy of these tools varies depending on the tool and the study population. Portable EMG devices may overestimate the diagnosis of sleep bruxism. Bruxoff device, with ECG recordings and polysomnography can diagnose bruxism with good sensitivity and specificity. It may be a good practice to correlate instrumental recordings with clinical findings.

COMPETING INTEREST:
The authors declared no conflict of interest.

AUTHORS' CONTRIBUTION:
HZR, MNS, MM, FT, MUI, AN: Contributed to conception, design, data acquisition and interpretation, drafting and critical revision of the manuscript.

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