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Mapping the Scientific Landscape of Bruxism: A Comprehensive Bibliometric Analysis

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Review Article

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ABSTRACT

Objectives: Bruxism is a jaw muscle activity defined as teeth clenching or grinding that can be seen both while awake and asleep. The central nervous system, autonomic nervous system, genetic factors and comorbidities play a role in its etiology. In recent years, a great deal of research has been conducted on bruxism.
Materials and Methods: In this study, 1,278 articles searched with the keyword "bruxism" in the Web of Science (WoS) database were subjected to bibliometric analysis. Publication trends, citation analyses and keyword clusters were examined using VOSviewer software.
Results: Bruxism research has increased since the 2000s and accelerated after 2013. By 2024, the annual number of publications reached 125. The Most Cited Study Lobbezoo et al. (2013, 2018) – International consensus reports on the definition and classification of bruxism. Thematic Clusters; Blue Cluster: Neurophysiological mechanisms and sleep bruxism, Yellow Cluster: Terminology and classification (Lobbezoo's consensus studies), Red Cluster: Pediatric bruxism and upper airway obstruction (snoring, mouth breathing), Green Cluster: Studies addressing ethical and legal dimensions.
Conclusions: Bruxism is a disorder that requires a multidisciplinary approach (neurology, dentistry, sleep medicine, pediatrics). Both the causes and effects of bruxism impact many individuals. A detailed analysis of the top ten most cited publications reveals a primary focus on three main themes: (1) diagnostic and classification systems, (2) neurophysiological foundations and diagnostic methods, and (3) epidemiological risk factors and prevalence studies. Future studies should focus on interdisciplinary collaboration and digital diagnostic methods.The identification of dominant themes in the literature and the identification of subfields that are not yet sufficiently represented make our study original. This study provides a quantitative map of the bruxism literature and provides a guiding resource for future research.

Keywords: Bruxism*, Bibliometric Analysis, VOSviewer, Scientific Literature Mapping, Thematic Clustering.*

Bruksizmin Bilimsel Görünümünün Haritalanması: Kapsamlı Bibliyometrik Analiz

Araştırma Makalesi

Süreç

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ÖZET

Amaç: Bruksizm, diş sıkma veya gıcırdatma olarak tanımlanan hem uyanıkken hem de uykuda görülebilen bir çene kası aktivitesidir. Etiyolojisinde merkezi sinir sistemi, otonom sinir sistemi, genetik faktörler ve komorbiditeler rol oynar. Son yıllarda bruksizm hakkında oldukça fazla araştırma yapılmaktadır.
Gereç ve Yöntemler: Bu çalışmada, Web of Science (WoS) veri tabanında "bruxism" anahtar kelimesiyle taranan 1.278 makale bibliyometrik analize tabi tutulmuştur. VOSviewer yazılımı kullanılarak yayın eğilimleri, atıf analizleri ve anahtar kelime kümelenmeleri incelenmiştir.
Bulgular: Bruksizm araştırmaları 2000'lerden itibaren artış göstermiş, 2013 sonrasında hızlanmıştır. 2024'e kadar yıllık yayın sayısı 125'e ulaşmıştır. En Çok Atıf Alan Çalışma Lobbezoo ve ark. (2013, 2018) – Bruksizmin tanımı ve sınıflandırılmasına dair uluslararası uzlaşı raporları olmuştur. Bruksizm ile ilgili yazılar her yıl düzenli bir şekilde artış göstermiş ve 2024 yılında 125 makale ile zirve yapmıştır. Tematik Kümelenmeler de Mavi Küme: Nörofizyolojik mekanizmalar ve uyku bruksizmi, Sarı Küme: Terminoloji ve sınıflandırma (Lobbezoo'nun uzlaşı çalışmaları), Kırmızı Küme: Pediatrik bruksizm ve üst solunum yolu tıkanıklığı (horlama, ağız solunumu), Yeşil Küme: Etik ve hukuki boyutları ele alan çalışmalardan oluşmaktadır.
Sonuçlar: Bruksizm multidisipliner bir yaklaşım gerektiren (nöroloji, diş hekimliği, uyku tıbbı, pediatri) bir rahatsızlıktır. Sebepleri gibi sonuçları da birçok insanı etkilemektedir. En çok atıf alan ilk on yayın detaylı analizi edildiğinde; (1) tanı ve sınıflandırma sistemleri, (2) nörofizyolojik temeller ve tanı yöntemleri, (3) epidemiyolojik risk faktörleri ve prevalans çalışmaları gibi temel olarak üç ana temaya yoğunlaşmaktadır. Gelecek çalışmalar, disiplinler arası iş birliği ve dijital tanı yöntemleri üzerine odaklanmalıdır. Literatürde hâkim olan temaların belirlenmesi ve henüz yeterince temsil edilmeyen alt alanların tespit edilmesi, bizim çalışmamızı özgün kılmaktadır. Bu çalışma, bruksizm literatürünün niceliksel bir haritasını sunarak gelecek araştırmalara yol gösterici bir kaynak sağlamaktadır.

Anahtar Kelimeler: Bruksizm, Bibliyometrik Analiz, VOSviewer, Bilimsel Literatür Haritalama, Tematik Kümeleme.

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Introduction

Bruxism is a jaw muscle activity that can be seen both in wakefulness and sleep, characterized by involuntary clenching or grinding of the teeth. There are many factors that trigger bruxism. In recent years, significant research has been conducted on the neurophysiological basis of sleep bruxism, its etiological factors in childhood and related to the upper respiratory tract, its conceptual framework and ethical-legal dimensions. Bruxism is defined as the clenching, grinding or pushing/stretching of the lower jaw with repetitive jaw muscle activity. Sleep and wake bruxism are considered as two separate conditions with different pathophysiologies; however, they may overlap in some individuals. The definition and causes of sleep bruxism have changed over time, and rather than peripheral factors (e.g. dental occlusion), the central nervous system and autonomic nervous system, genetics and comorbidities have come to the fore. There is strong evidence that dental occlusion is not the main cause of bruxism.[1-3]

Sleep bruxism is closely related to the central nervous system and the autonomic nervous system. In particular, structures such as the mesencephalic trigeminal nucleus (MTN) and ARAS (ascending reticular activating system) in the brainstem play a role. Bruxism during sleep is accompanied by activation in brain, heart and respiratory functions. It is suggested that bruxism is not a parafunction but a function that activates the ARAS nuclei.[1,4,5]

The prevalence of bruxism in children varies between 5% and 50%. Sleep disorders have been associated with snoring, headache, jaw muscle fatigue, and tooth wear. Sleep-related breathing disorders (e.g., obstructive sleep apnea, mouth breathing, allergies) are important risk factors. A significant relationship has been shown between bruxism and sleep-disordered breathing in children, but causality is not clear.[6-10]

Ethical and legal responsibilities are important in the diagnosis and treatment of bruxism. Especially in children, correct diagnosis, parental information, determination of possible comorbidities, and selection of appropriate treatment approaches are necessary. It is recommended that clinical guidelines be developed and ethical principles be observed in treatment processes.[7]

Bruxism is a multifactorial and complex condition and is associated with the central nervous system and autonomic mechanisms. Dental problems are one of the most important causes of bruxism. Upper respiratory tract disorders are important risk factors in children. Ethical and legal responsibilities should be taken into consideration in diagnosis, treatment and management. Research on the conceptual framework and mechanisms of bruxism is ongoing. In this publication, we have created a bibliometric map of publications on bruxism. We believe that past publications can guide future publications.

Materials and Methods

Bibliometric analysis is a quantitative research method that enables the systematic examination of the structural characteristics, developmental trends, and knowledge flow within scientific literature.[11-13] In this study, a comprehensive bibliometric analysis was conducted to map the current landscape of scholarly publications on bruxism, identify leading contributors in the field, and reveal the thematic structure of the related literature.

The analysis followed a structured process in accordance with standard procedures typically employed in bibliometric research. In the initial stage, the primary research question guiding this study was formulated as follows: *"What is the current state of academic research on bruxism, and how are the thematic trends distributed across the literature?"* To address this question, a systematic review of the relevant scientific literature was performed.

The Web of Science (WoS) database was selected as the primary source for data collection due to its comprehensive coverage and high-quality indexing, particularly in fields such as health sciences and dentistry.[14] A focused search strategy was then developed: the keyword "bruxism" was used exclusively within the title field, and filters were applied to include only articles, exclude publications from the year 2025, and limit results to those written in English. As a result, a total of 1,278 articles were included in the final dataset.

During the data extraction phase, bibliographic records obtained from WoS were imported into the EndNote reference management software, and duplicate entries were removed to ensure data consistency. Subsequently, key bibliometric variables such as author name(s), year of publication, journal title, number of citations, document type, and author keywords were extracted and organized for analysis.

For data visualization, the software VOSviewer—a widely used tool in bibliometric research—was employed. VOSviewer facilitates the creation of visual maps that depict relationships among authors, publications, and keywords, thereby offering valuable insights into the structural dynamics and thematic clustering within the field.[15]

In the final stage, the findings were systematically interpreted to identify not only the prevailing research trends but also gaps in the literature and promising directions for future inquiry. Accordingly, the bibliometric analysis presented in this study not only provides a quantitative overview of the bruxism literature but also contributes foundational knowledge to guide subsequent research strategies and agenda-setting in the field.

Results

This section presents the findings of the bibliometric analysis conducted in the field of bruxism. The primary aim of the analysis is to quantitatively assess the current state of scientific output within this domain, identify the most influential publications and authors, uncover

thematic clusters, and map the structural characteristics of the literature. The findings are organized under several key subheadings, including annual publication trends, most-cited articles, keyword co-occurrence analysis, and thematic clustering.

During the data collection phase, a focused search was conducted in the Web of Science (WoS) database using the keyword "bruxism" within the title field. The search was refined to include only article-type publications, exclude those published in the year 2025, and limit the results to those written in English. Following this filtering process, a total of 1,278 articles published between 1971 and 2024 were included in the analysis.

The bibliometric evaluation of this dataset yielded insights into the historical trajectory of research in the field, the degree of interdisciplinary collaboration, and the evolving priorities within bruxism scholarship. Examining the annual distribution of academic output is particularly critical for understanding the developmental dynamics of the field.

Accordingly, the number of publications on bruxism was analyzed by year, offering a quantitative overview of the field's scientific evolution. The corresponding results are presented in Figure 1.

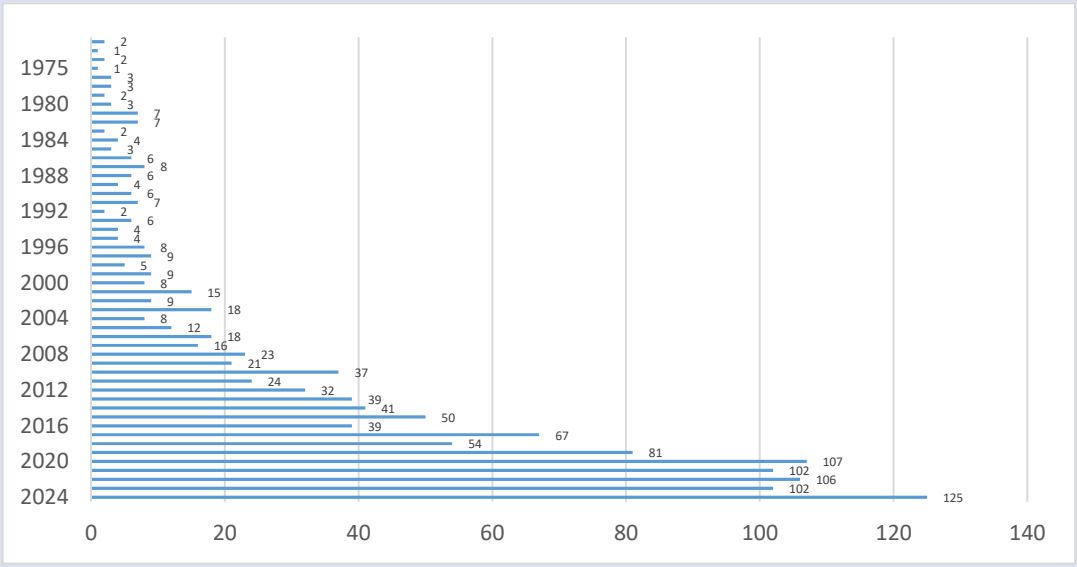

Figure 1. *Annual distribution of publications on bruxism (1971–2024)*

As part of the study, a total of 1,278 articles retrieved from the Web of Science (WoS) database—filtered to include only those containing the keyword *"bruxism"* in the title field and classified strictly as article-type publications—were analyzed in terms of their annual distribution. This time series analysis, covering the period from 1971 to 2024, illustrates the historical progression of scholarly interest in the topic of bruxism.

The earliest identified publication dates back to 1971, with a notably low volume of research output throughout the 1970s and 1980s. During this early period, the number of annual publications generally ranged between 1 and 8, suggesting that bruxism had not yet emerged as a prominent topic of academic inquiry. Until the late 1990s, the field experienced little growth in research activity. However, beginning in the early 2000s, there was a gradual increase in scholarly attention. By 2001, the number of publications reached 15 and continued to rise at a steady pace in the subsequent years.

A more pronounced upward trend became evident starting around 2010, with a particularly significant turning point observed in 2013—coinciding with the publication of an influential international consensus report on the definition and classification of bruxism led by Lobbezoo[16,17] and colleagues. Following this milestone, the number of publications increased consistently, reaching 81 in 2019 and 107 in 2020.

In the post-pandemic period (2021–2024), publication output remained elevated, culminating in an all-time high of 125 articles in 2024. This trend indicates that research interest in bruxism has expanded beyond clinical aspects to encompass psychosocial dimensions and lifestyle-related factors. In particular, the growing attention to bruxism's associations with sleep disorders, stress-induced behavioral responses, and digital lifestyle patterns may account for the increased volume of scholarly output.

The data derived from the time series analysis clearly demonstrate that, although bruxism research was historically limited in scope, the past decade has witnessed a significant surge in interdisciplinary engagement. The findings suggest that the field is still in an upward trajectory of scholarly development, with substantial potential for future research.

In the next stage of analysis, the top ten most cited publications within the WoS dataset were identified, as shown in Table 1.

Table 1. *Top ten most cited publications in the bruxism literature*

Rank	Author(s)	Publication title	Journal	Citations
1	Lobbezoo, F., Ahlberg, J., & Winocur, E. (2013)[16]	Bruxism defined and graded: An international consensus	Journal of Oral Rehabilitation	796
2	Lobbezoo, F., Ahlberg, J., & Manfredini, D. (2018)[17]	International consensus on the assessment of bruxism: Report of a work in progress	Journal of Oral Rehabilitation	773
3	Lavigne, G. J., Rompre, P. H., & Montplaisir, J. Y. (1996)[18]	Sleep bruxism: Validity of clinical research diagnostic criteria in a controlled polysomnographic study	Journal of Dental Research	532
4	Lavigne, G. J., & Montplaisir, J. Y. (1994)[19]	Restless legs syndrome and sleep bruxism: Prevalence and association among Canadians	Sleep	515
5	Ohayon, M. M., Li, K. K., & Guilleminault, C. (2001)[20]	Risk factors for sleep bruxism in the general population	Chest	342
6	Nishigawa, K., Bando, E., & Nakano, M. (2001)[21]	Quantitative study of bite force during sleep-associated bruxism	Journal of Oral Rehabilitation	238
7	Macaluso, G. M., Guerra, P., & Terzano, M. G. (1998)[22]	Sleep bruxism is a disorder related to periodic arousals during sleep	Journal of Dental Research	231
8	Rompré, P. H., Daigle-Landry, D., & Lavigne, G. J. (2007)[23]	Identification of a sleep bruxism subgroup with a higher risk of pain	Journal of Dental Research	224
9	Kato, T., Rompré, P., & Lavigne, G. J. (2001)[24]	Sleep bruxism: An oromotor activity secondary to micro-arousal	Journal of Dental Research	198
10	Maluly, M., Andersen, M. L., & Tufik, S. (2013)[25]	Polysomnographic study of the prevalence of sleep bruxism in a population sample	Journal of Dental Research	164

The bibliometric analysis identified the top ten most cited publications within the field of bruxism, as presented in Table 1. Collectively, these studies offer foundational insights into both the diagnostic criteria and the pathophysiological mechanisms associated with bruxism. Leading this list is the highly influential consensus paper by Lobbezoo, Ahlberg, and Winocur[16], which proposed a widely accepted definition and grading system for bruxism. With 796 citations, this publication stands as a landmark reference in the literature.

Ranked second is another consensus report authored by the same research group in 2018, which outlines a methodological framework for the assessment of bruxism. This publication has received 773 citations, further underscoring the central role of standardized definitions and diagnostic approaches in the scholarly discourse on bruxism. Together, these two studies highlight the field's strong emphasis on classification and the need for uniform diagnostic guidelines.

The third most cited study, conducted by Lavigne, Rompré, and Montplaisir[18], is a controlled polysomnographic investigation assessing the validity of clinical diagnostic criteria for sleep bruxism. With 532 citations, it reflects the scholarly focus on objective measurement techniques. Similarly, the fourth-ranked study by Lavigne and Montplaisir[18] evaluated the prevalence and association between restless legs syndrome and sleep bruxism within a Canadian sample. This interdisciplinary work has garnered 515 citations, emphasizing the interconnected nature of bruxism with broader sleep disorders.

Fifth on the list is the study by Ohayon, Li, and Guilleminault[20], which explores risk factors associated with sleep bruxism in the general population. With 342 citations, it brings attention to the epidemiological dimensions of the disorder and contributes to filling significant gaps in prevalence data.

The sixth and seventh most cited studies, by Nishigawa et al.[21] and Macaluso et al.[22] respectively, delve into the quantitative measurement of bite force and the physiological mechanisms underlying bruxism. These studies, with 238 and 231 citations respectively, underscore sustained academic interest in the biomechanical and neurophysiological foundations of the condition.

The eighth and ninth studies—Rompré et al.[23] and Kato et al.[24]—focus on the identification of high-risk subgroups and the analysis of oromotor activities secondary to micro-arousals, receiving 224 and 198 citations respectively. These findings advance the nuanced understanding of bruxism's clinical subtypes and underlying triggers.

Finally, the tenth publication by Maluly et al.[25] represents one of the earliest large-scale polysomnographic prevalence studies, offering valuable epidemiological evidence and contributing 164 citations. This study has been instrumental in validating diagnostic accuracy in population-based research.

A consistent pattern across the top ten publications is the recurrent presence of authors such as Lobbezoo and Lavigne[17-19], whose contributions have significantly shaped the field. Furthermore, the fact that most of these highly cited studies were published in prominent journals such as the *Journal of Dental Research* and the *Journal of Oral Rehabilitation* confirms the centrality of bruxism within the dental and orofacial sciences.

Taken together, these findings demonstrate that the most impactful research on bruxism has predominantly focused on diagnostic criteria, pathophysiology, and epidemiology. The high citation rates associated with methodologically rigorous studies further reflect the field's prioritization of empirical validation and clinical relevance.

Another important finding of the present study is the bibliometric analysis of author keywords used in the bruxism literature. This analysis aimed to uncover dominant thematic trends, primary research foci, and interdisciplinary connections. The most frequently used keywords across the dataset were identified and clustered based on their co-occurrence patterns. The resulting co-occurrence map is presented in Figure 1, providing a visual representation of the thematic organization of the literature.

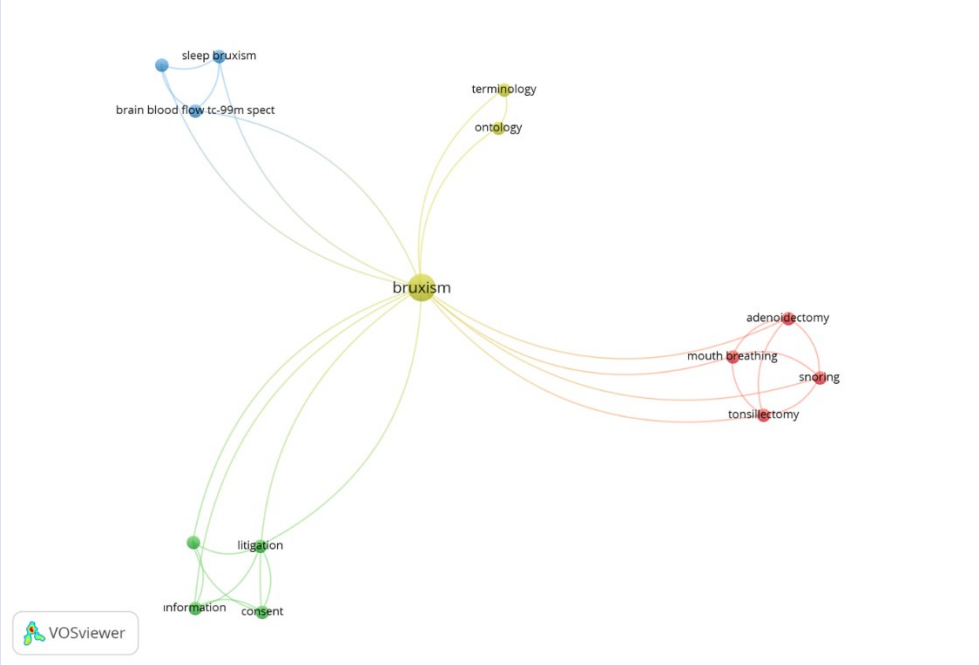

Figure 2. *Co-occurrence map of the most frequently used keywords in bruxism research*

The keyword co-occurrence network analysis revealed four distinct thematic clusters organized around the core concept of *bruxism*. Each of these clusters represents a different subdomain within the bruxism literature, encompassing clinical, diagnostic, ethical, and pediatric dimensions (see Figure 1).

The first cluster (blue) is composed of keywords related to *sleep bruxism* and neurophysiological mechanisms. Terms such as *"sleep bruxism"* and *"brain blood flow Tc-99m SPECT"* characterize this cluster, indicating the presence of studies that utilize nuclear medicine techniques (e.g., Tc-99m single-photon emission computed tomography) to objectively diagnose bruxism. This thematic area frames bruxism not merely as a behavioral condition but as a physiological phenomenon rooted in neurobiological processes. The convergence of neuroscience and nuclear imaging in these studies highlights the field's growing multidisciplinarity.

The second cluster (yellow) represents publications focused on the conceptual and terminological framework of bruxism. The presence of keywords such as *"terminology"* and *"ontology"* points to scholarly efforts aimed at defining, classifying, and categorizing subtypes of bruxism. This cluster is closely linked with the international consensus reports published in 2013 and 2018, which underscore the necessity of establishing a shared scientific vocabulary and diagnostic framework for advancing standardized research and clinical practice.

The third cluster (red) encompasses etiological factors related to pediatric bruxism and upper airway obstruction. Keywords such as *"adenoidectomy"*, *"mouth breathing"*, *"snoring"*, and *"tonsillectomy"* signify the relevance of sleep-disordered breathing and anatomical impairments in the development of bruxism during childhood. This cluster illustrates that bruxism is not confined to the stomatognathic system alone but intersects significantly with pediatric otolaryngology. The increasing evidence supporting correlations between bruxism and systemic health conditions further emphasizes the need for cross-disciplinary research approaches.

The fourth cluster (green) addresses the ethical and legal dimensions of bruxism diagnosis and treatment. Terms such as *"litigation"*, *"consent"*, and *"information"* indicate a research focus on informed consent, patient rights, and potential medico-legal implications. This cluster highlights the growing importance of ethical awareness and legal responsibility in dental practice. Furthermore, it reflects emerging scholarly interest in the ethical management of patient data and communication within the context of bruxism-related interventions.

Taken together, the resulting keyword co-occurrence map clearly demonstrates that bruxism is a multidimensional phenomenon, extending beyond its dental origins to incorporate neurological, pediatric, conceptual, and ethical dimensions. The diversity of these clusters reinforces the continued interdisciplinary expansion of the field and suggests that future research will benefit from the integration of varied disciplinary perspectives.

The insights derived from the co-occurrence analysis not only reflect frequently used terms within the literature but also reveal how these terms aggregate into distinct thematic structures. These thematic orientations showcase the breadth of scholarly inquiry and underline the diversity of conceptual frameworks used to investigate bruxism. The table below presents a detailed thematic classification of these clusters, along with representative keywords and illustrative publications drawn from the literature.

Table 2. *Thematic clusters derived from the keyword co-occurrence analysis in the bruxism literature, including key concepts and representative publications*

Cluster Color	Thematic Area	Keywords	Representative Publications
Blue Cluster 1	Neurophysiological Mechanisms and Sleep Bruxism	['sleep bruxism', 'brain blood flow tc-99m spect']	Lavigne et al. (1996)[18]; Huynh et al. (2006)[26]; Kato et al. (2001)[24]
Yellow Cluster 2	Conceptualization and Diagnostic Terminology	['terminology', 'ontology']	Lobbezoo et al. (2013)[16]; Lobbezoo et al. (2018)[17]
Red Cluster 3	Pediatric Bruxism and Upper Airway Association	['adenoidectomy', 'mouth breathing', 'snoring', 'tonsillectomy']	Ohayon et al. (2001)[20]; Raphael et al. (2012)[27]
Green Cluster 4	Ethical, Legal, and Informational Processes	['litigation', 'consent', 'information']	Winocur et al. (2011)[28]; Manfredini et al. (2014)[29].

In accordance with the aforementioned thematic classification, each cluster is examined below in detail with respect to its key concepts, representative studies, and prevailing research orientations within the bruxism literature.

The Neurophysiological Mechanisms and Sleep Bruxism Cluster (Blue Cluster) is characterized by the keywords *"sleep bruxism"* and *"brain blood flow Tc-99m SPECT"*, suggesting that bruxism is increasingly conceptualized as a physiological dysfunction occurring primarily during sleep. Studies within this cluster employ objective diagnostic tools such as polysomnography, electroencephalography (EEG), and nuclear imaging techniques to explore the neurological underpinnings of bruxism. Notably, Lavigne et al.[18] experimentally validated diagnostic criteria for sleep bruxism, while Huynh et al.[26] and Kato et al.[24] provided in-depth analyses of jaw muscle activity triggered by micro-arousals and autonomic cardiac fluctuations. This cluster reflects the growing interest in the neurobiological dimension of bruxism and its relevance to multidisciplinary research across neurology, sleep medicine, and oral health.

The Conceptualization and Diagnostic Terminology Cluster (Yellow Cluster) centers on the development of a standardized framework for defining and classifying bruxism. Keywords such as *"terminology"* and *"ontology"* dominate this cluster, reflecting a focus on methodological and theoretical contributions. A key study by Lobbezoo et al.[16] proposed an international consensus for grading bruxism across clinical, research, and public health contexts. This was followed by further refinement of assessment standards in a subsequent consensus report by Lobbezoo et al.[17] This cluster makes a significant contribution to resolving terminological inconsistencies and promoting a shared scientific language across disciplines.

The Pediatric Bruxism and Upper Airway Association Cluster (Red Cluster) includes terms such as *"snoring"*, *"mouth breathing"*, *"adenoidectomy"*, and *"tonsillectomy"*, highlighting the link between childhood bruxism and upper airway disorders. Physiological stressors such as mouth breathing and snoring during sleep are considered potential triggers for bruxism in children. Supporting this, Ohayon et al.[20] explored environmental and physiological risk factors, while Raphael et al.[27] examined upper airway obstructions in pediatric samples with temporomandibular disorders. This cluster resides at the intersection of pediatrics, otolaryngology, and dentistry, underscoring the importance of interdisciplinary perspectives in understanding the multifactorial etiology of bruxism.

The Ethical, Legal, and Informational Processes Cluster (Green Cluster) is defined by the presence of keywords such as *"litigation"*, *"consent"*, and *"information"*. It points to the ethical and legal implications of diagnosing and treating bruxism, particularly in dental practice. Key concerns in this cluster include obtaining informed consent, transparently communicating treatment risks, and managing complications with professional accountability. Winocur et al.[28] discussed the associations between bruxism, stress, anxiety, and patient behavior, while Manfredini et al.[29] addressed the ethical and legal considerations surrounding dental implant failures potentially linked to bruxism. As such, this cluster represents a unique and growing research domain focused on safeguarding ethical responsibility and legal compliance in clinical care.

Collectively, these thematic insights reinforce the view that bruxism is not merely a localized dental issue but a complex, multidimensional phenomenon. The clusters reflect a broadening of the academic scope, with interdisciplinary collaboration proving essential to advancing the understanding and management of bruxism in both clinical and research settings.

Discussion and Conclusions

This study provides a comprehensive bibliometric analysis of the bruxism literature, aiming to systematically uncover the structural characteristics, historical development, thematic orientations, and prominent scientific contributions within the field. The findings offer valuable insights into both the quantitative progression of research output and the thematic evolution of content.

An analysis of publication trends over time indicates that scholarly output on bruxism began to accelerate in the early 2000s, with a marked increase in momentum observed after 2010. This trend reflects a shift in scholarly interest, positioning bruxism not only as a dental health concern but also as a multidisciplinary phenomenon involving sleep disorders, neurophysiological mechanisms, stress-related behavioral responses, and lifestyle-related factors. Particularly noteworthy is the publication of the international consensus report by Lobbezoo et al.[16], which marked a turning point by establishing standardized definitions and classifications for bruxism, thereby catalyzing sustained growth in the volume of literature in subsequent years.

A closer examination of the ten most highly cited publications reveals three dominant thematic areas in the literature: (1) diagnostic and classification frameworks, (2) neurophysiological foundations and diagnostic methodologies, and (3) epidemiological risk factors and prevalence studies. Researchers such as Lobbezoo[16,17] and Lavigne[18,19] clearly emerge as leaders in the field. The prevalence of these publications in high-impact journals such as *Journal of Oral Rehabilitation* and *Journal of Dental Research* further demonstrates that bruxism is primarily situated within the dental research domain. However, growing linkages with sleep science, neurology, psychology, and pediatrics reflect the field's expansion into broader academic territories.

The keyword co-occurrence analysis revealed four primary thematic clusters, further highlighting the interdisciplinary nature and methodological diversity of bruxism research. The first cluster—*Neurophysiological Mechanisms and Sleep Bruxism* (Blue Cluster)—is characterized by studies treating bruxism as a neurological motor disorder that manifests during sleep. Research in this cluster often utilizes objective diagnostic tools such as polysomnography, electroencephalography (EEG), and Tc-99m SPECT imaging. Seminal works by Lavigne et al.[18] and Kato et al.[24] have laid the scientific foundation in this domain, reinforcing the notion that bruxism should be understood not merely as a behavioral condition but as a neurologically driven dysfunction.

The second cluster—*Conceptualization and Diagnostic Terminology* (Yellow Cluster)—encompasses efforts to define and standardize bruxism-related terminology. The consensus reports published by Lobbezoo et al.[16,17] advocate for separate diagnostic criteria for sleep and awake bruxism, emphasizing the importance of standardization across studies and disciplines. This cluster plays a pivotal role in reducing terminological inconsistencies and promoting a shared scientific lexicon.

The third cluster—*Pediatric Bruxism and Upper Airway Associations* (Red Cluster)—focuses on the relationship between pediatric bruxism and physiological stressors such as upper airway obstructions. Research suggests that factors like adenoid hypertrophy, enlarged tonsils, and mouth breathing may contribute to the development of bruxism in children. Ohayon et al.[20] and Raphael et al.[27] have drawn attention to this association, highlighting the significance of anatomical and physiological variables in understanding pediatric cases. This cluster resides at the intersection of pediatrics, otolaryngology, and dentistry, emphasizing the need for interdisciplinary collaboration.

The fourth and final cluster—*Ethical, Legal, and Informational Processes* (Green Cluster)—addresses the ethical and legal dimensions of bruxism diagnosis and treatment. Key themes include informed consent, patient communication, and professional accountability in clinical practice. Winocur et al.[28] examined the relationship between bruxism, psychological factors, and patient behavior, while Manfredini et al.[29] explored the legal implications of treatment failures, particularly in the context of dental implants. This cluster underscores the growing importance of ethical sensitivity and legal compliance in patient-centered care.

While this bibliometric analysis identifies well-established areas of research within the bruxism literature, it also reveals notable gaps that warrant further investigation. Specifically, the relationship between psychosocial variables—such as stress, anxiety, and personality traits—and bruxism remains insufficiently explored in a causal framework. Although these factors have been examined in previous studies, few have employed experimental or longitudinal designs capable of establishing robust causal links. Future research would benefit from methodologically rigorous studies that address these limitations.

Additionally, as digitalization increasingly shapes modern lifestyles, the potential link between bruxism and digital behaviors is emerging as a timely research avenue. Factors such as screen time, late-night use of electronic devices, and poor sleep hygiene have been hypothesized to contribute to bruxism yet remain underrepresented in the literature. This gap suggests a need for multi-center studies, particularly among adolescents and young adults, to assess the impact of digital habits on bruxism prevalence and severity.

Furthermore, the integration of emerging technologies in diagnostic practices remains at an early stage. Wearable sensor technologies, mobile health (mHealth) applications, and AI-assisted assessment tools offer promising innovations for improving diagnostic accuracy and clinical decision-making. However, empirical studies validating these technologies in bruxism diagnosis are limited. High-quality experimental research is urgently needed to evaluate their reliability, clinical applicability, and user acceptability.

Another key finding is the limited prevalence of interdisciplinary methodological frameworks in the existing literature. Collaborative research designs that combine neuroscience, sleep medicine, artificial intelligence, behavioral sciences, and dentistry hold great potential to advance both theoretical and practical understanding of bruxism. Such integrative approaches can offer a more comprehensive perspective on the biopsychosocial dimensions of the disorder and contribute to the development of innovative interventions.

In conclusion, this study offers a systematic overview of the bruxism literature through a bibliometric lens, mapping the field's historical development, publication density, and evolving research orientations. The analysis covered annual publication trends, the most cited studies, and thematic clustering based on keyword co-occurrence, thereby elucidating the structural and content dynamics of the domain. Beyond merely cataloging the current academic landscape, the findings provide a strategic foundation for shaping future research directions.

Identifying dominant research themes alongside underexplored subdomains is among the study's most valuable contributions. The in-depth analysis of core themes—diagnostic criteria, sleep-related pathophysiology, pediatric factors, and ethical-legal contexts—underscores the multidimensional nature of bruxism and the necessity for interdisciplinary engagement. Supporting cross-disciplinary collaborations across neuroscience, behavioral science, sleep medicine, dentistry, ethics, and digital health technologies will foster a more holistic and applied research agenda.

Moreover, the integration of digital health innovations and AI-based diagnostic systems promises to enhance diagnostic sensitivity and facilitate personalized care approaches. Coupled with ethically grounded, evidence-based, patient-centered research, such advances will contribute not only to

academic knowledge production but also to the improvement of healthcare quality.

Taken together, this bibliometric analysis offers a comprehensive snapshot of the current state of bruxism research and outlines a forward-looking framework for its future evolution. The findings are expected to serve as a valuable reference for researchers and practitioners aiming to design new studies and address critical gaps in the literature.

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Conflicts of Interest statement

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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