



REVISÃO

Os 100 artigos mais citados sobre bruxismo do sono: Uma análise bibliométrica

The 100 Most Cited Articles on Sleep Bruxism: A bibliometric analysis

Los 100 artículos más citados sobre bruxismo del sueño: Un análisis bibliométrico

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RESUMO

Objetivo: Analisar as características bibliométricas dos 100 artigos mais citados sobre bruxismo do sono (BS). **Metodologia:** Foi realizada uma busca bibliométrica na Web of Science Core Collection (WoS-CC) para selecionar os 100 artigos mais citados sobre BS. Os dados de importância bibliométrica foram extraídos de cada artigo. Correlação de Spearman e regressão de Poisson foram realizadas. Um valor de $p < 0,05$ foi considerado estatisticamente significativo. **Resultados:** Os 100 artigos sobre BS foram citados um total de 14.900 vezes. A maioria dos artigos foi escrita na América Anglo-Saxônica (39%). Estudos observacionais (52%) e os tópicos de etiologia, prevalência e fatores associados (67%) foram os mais frequentes. Gilles Lavigne foi o autor com o maior número de artigos e o mais citado (33 artigos; 6.698 citações). A combinação de abordagens instrumentais e/ou questionários e/ou exame clínico foram os critérios diagnósticos mais utilizados (58%). Estudos sobre etiologia, prevalência e fatores associados (RR=1,38; IC 95% 1,06-1,79), métodos diagnósticos e revisão de BS (RR=2,06; IC 95% 1,23-3,46) e artigos publicados por autores da América Anglo-Saxônica (RR=1,44; IC 95% 1,05-1,09) apresentaram taxas de citação mais elevadas na WoS-CC. **Conclusão:** Os 100 artigos mais citados sobre BS foram publicados por autores da América Anglo-Saxônica, com delineamento observacional, abordando os temas de etiologia, prevalência e fatores associados. **Palavras-chave:** bibliometria; bruxismo; revisão; sono; bruxismo do sono.

ABSTRACT

Objective: To analyse the bibliometric characteristics of the 100 most cited articles on sleep bruxism (SB). **Methodology:** A bibliometric search was performed in the Web of Science Core Collection (WoS-CC) to select the 100 most cited articles on SB. Bibliometric importance data were extracted from each article. Spearman correlation and Poisson regression were performed. A p -value < 0.05 was considered statistically significant. **Results:** The 100 articles on SB were cited a total of 14,900 times. Most articles were written in Anglo-Saxon America (39%). Observational studies (52%) and the topics of etiology, prevalence and associated factors (67%) were the most frequent. Gilles Lavigne was the author with the most and most cited articles (33 articles; 6,698 citations). The combination of instrumental approaches and/or questionnaires and/or clinical examination were the most used diagnostic criteria (58%). Studies on etiology, prevalence and associated factors (RR=1.38; 95%CI 1.06-1.79), SB diagnostic methods and review (RR=2.06; 95%CI 1.23-3.46) and articles published by authors in Anglo-Saxon America (RR=1.44; 95%CI 1.05-1.09) showed higher citation rates in WoS-

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RESUMEN

Objetivo: Analizar las características bibliométricas de los 100 artículos más citados sobre bruxismo del sueño (BS). Metodología: Se realizó una búsqueda bibliométrica en la Web of Science Core Collection (WoS-CC) para seleccionar los 100 artículos más citados sobre BS. Se extrajeron datos de importancia bibliométrica de cada artículo. Se calcularon la correlación de Spearman y la regresión de Poisson. Se consideró estadísticamente significativo un valor $p < 0,05$. Resultados: Los 100 artículos sobre BS recibieron un total de 14 900 citas. La mayoría de los artículos fueron escritos en inglés anglosajón (39 %). Los estudios observacionales (52 %) y los temas de etiología, prevalencia y factores asociados (67 %) fueron los más frecuentes. Gilles Lavigne fue el autor con mayor número de artículos publicados y citados (33 artículos; 6698 citas). La combinación de métodos instrumentales, cuestionarios y/o exploración clínica fue el criterio diagnóstico más utilizado (58 %). Los estudios sobre etiología, prevalencia y factores asociados ($RR=1,38$; IC del 95%: 1,06-1,79), los métodos diagnósticos y la revisión de la BS ($RR=2,06$; IC del 95%: 1,23-3,46) y los artículos publicados por autores de la América anglosajona ($RR=1,44$; IC del 95%: 1,05-1,09) mostraron mayores tasas de citación en WoS-CC. Conclusión: Los 100 artículos más citados sobre BS fueron publicados por autores de la América anglosajona, con un diseño observacional, y abarcaron los temas de etiología, prevalencia y factores asociados.

Palabras clave: bibliometría; bruxismo; revisión; sueño; bruxismo del sueño.

INTRODUCTION

Sleep bruxism (SB) is a masticatory muscle activity during sleep that can be rhythmic or non-rhythmic (Lobbezoo et al, 2018). The prevalence of the condition in adults varies from 1% to 15% (Melo et al, 2019), and in children and adolescents it varies between 3.5% and 49.6% (Manfredini et al, 2013). This variation occurs due to different diagnostic criteria and samples studied (Melo et al, 2019; Brancher et al, 2020).

The aetiology of SB is multifactorial, with regulation in the central nervous system (Lobbezoo et al, 2018). The condition is associated with exogenous factors (alcohol consumption, medication use, caffeine intake) (Melo et al, 2019), sleep-related disorders (Kuang et al, 2022), behavioural, pharmacological (Rintakoski, Kaprio, 2013), psychosocial factors (anxiety, stress, being an only child, nervousness) (Polmann et al, 2019; Ramos et al, 2021), respiratory problems (Ramos et al, 2021; Drumond et al, 2017), and environmental and genetic factors (Ahlberg et al, 2020).

Bibliometric studies describe the evidence published on a given topic, analysing and evaluating trends and the development of research focuses using qualitative and quantitative methods (Celeste et al, 2016; Adnan et al, 2022). Bibliometric rankings of the 100 most cited articles are used because they focus on the articles that have had the

most influence over time on research and clinical practices, unlike global bibliometric analyses in which the results found are different and do not focus on the most cited and influential articles. Knowledge of such topics and study designs investigating SB can help policy makers, health professionals and/or researchers to select evidence for their decision making (Mattos et al, 2021).

A bibliometric study on SB will allow a better understanding of the interest of scientific communities in the process of learning and dental practice on SB, in addition to identifying gaps in the literature on the topic. The objective of this study was to qualitatively and quantitatively analyse the bibliometric characteristics of the 100 most cited articles on sleep bruxism físico.

METHODOLOGY

Search strategy

The search was carried out on April 23, 2022, and updated on January 08, 2025, by two previously trained researchers (G.A.S.N.P. and C.C.B.L.) on all documents from the Core Collection of Web of Science (WoS-CC) database (Clarivate Analytics®). The search was performed in a comprehensive manner without filters, language restrictions, or specific year of publication.

The search strategy used was: TS=(“Adult Sleep Bruxisms” OR “Adult Sleep Bruxism” OR bruxism OR bruxisms OR “Childhood Sleep Bruxisms” OR “Childhood Sleep Bruxism” OR “dental clenching” OR “Nocturnal Bruxism” OR “Nocturnal Bruxisms” OR “Nocturnal Teeth Grinding Disorder” OR “sleep bruxism” OR “Sleep Bruxisms” OR “Sleep Related Bruxism” OR “Sleep-Related Bruxism” OR “Teeth clenching” OR “Teeth Grinding Disorder” OR “Teeth grinding” OR “Tooth clenching” OR “bracing the mandible”).

The list of articles retrieved was organised by number of citations in descending order. The researchers evaluated the title, abstract and, when necessary for inclusion of the article, the full text of the articles was read. The articles were positioned in the list based on the number of citations in WoS-CC. When there was a numerical tie in citations, the citation density (number of citations per year) was considered. To compare the number of citations, a search was carried out in the WoS All Databases (WoS-AD), Scopus, Google Scholar, and MEDLINE/PubMed databases on the same day as the WoS-CC search.

Studies of the following types were included: randomised or non-randomised clinical trial, systematic review with/without meta-analysis, literature review, observational studies, laboratory studies, series and case reports, and bibliometric studies whose main focus was on topics related to SB. Documents were excluded in which: bruxism was addressed in a general way, without differentiating between SB and awake bruxism (AB), or bruxism induced by therapies or medications; SB found in studies of parasomnias or focus on sleep disorders in general; conference articles; and editorials.

Disagreements regarding the inclusion of an article were resolved through consensus. A third researcher (P.A.M.J.) was consulted when disagreements regarding inclusion remained.

Data extraction and bibliometric parameters

The selected articles were organised in an Excel® spreadsheet. After selection, the following information was extracted: position, total number

of citations, citation density (number of citations per year), article title, authors, institutions, country, year of publication, sample age range, journal title, study design, SB diagnostic criteria, main theme, and keywords. Institutions, countries, and continents were considered according to the institutional affiliation of the corresponding author. Data were double checked to minimise errors.

The study designs were classified based on the Cochrane Collaboration glossary into literature review, cross-sectional study, case-control study, cohort study, clinical trial, and systematic review or meta-analysis.

Data analysis

Tables, graphs, and maps for analysing the relationships between citations and data were constructed from data tabulated in Excel®. The Visualisation of Similarities (VOSviewer) software (Centre for Science and Technology Studies, Leiden University, Leiden, The Netherlands) was used to design and generate bibliometric networks.

This data was organised into conglomerates or groups to facilitate visualisation and understanding. Colours were assigned to each conglomerate in order to identify them. Collaborative density maps were constructed, in which the most relevant terms were included using more expressive schematic drawings and interconnected terms were positioned closer together. Lines were also drawn to indicate relationships between conglomerates.

The world map of the association of studies and citations in countries and continents was generated using the MapChart website (<https://mapchart.net/>).

Statistical analysis

For data analysis, the Statistical Package for the Social Sciences software (SPSS for Windows, version 24.0, IBM Corp, Armonk, NY, USA) was used. The Kolmogorov-Smirnov test was performed to verify the normality of data distribution. The data had a non-normal distribution, and Spearman’s rank

correlation was therefore used to relate the number of citations between the databases. Poisson regression was used to determine associations between the total number of citations in WoS-CC and bibliometric data (study design, continents, main theme, open access and publication period). For all tests, a p-value of less than 0.05 was considered to be statistically significant.

RESULTS

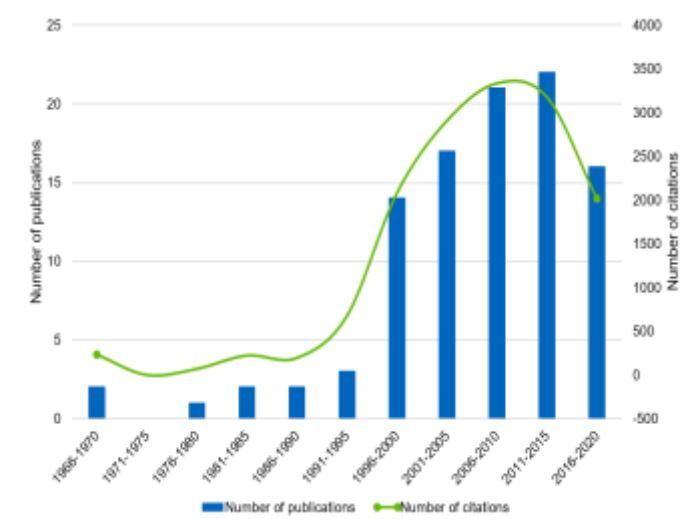
Citation analysis

The search in the WoS-CC database retrieved a total of 4.254 documents, which were listed in descending order of number of citations. The title and summary of 290 articles were read until the 100 most cited articles on SB had been reviewed.

The 100 articles were cited a total 14.900 times in WoS-CC, between 66 and 770 citations per article. This was lower than the number of citations in the Google Scholar (35.120), Scopus (16.961) and WoS-AD (16.373) databases, and above the number on MEDLINE/PubMed (4.618). The six most cited articles had more than 400 citations each (Lobbezoo et al, 2018; Lobbezoo et al, 2013; Lavigne, Montplaisir, 1994; Lavigne et al, 1996; Lavigne et al, 2008; Manfredini, Winocur, Guarda-Nardini et al, 2013).

The most cited article, with 770 citations (citation density per year 70), “Bruxism defined and graded: an international consensus”, was a consensus on SB published in the Journal of Oral Rehabilitation in 2013 (Lobbezoo et al, 2013). The article with the highest citation density (119 per year) was published in 2018 and was the second international consensus of experts on bruxism (Lobbezoo et al, 2018). Articles from all decades were identified in the list of most cited, starting from the 1960s. The majority (76%) of articles were published in the last two decades (Figure 1).

Figure 1. Distribution of the number of publications over the years of the 100 most cited articles on sleep bruxism.



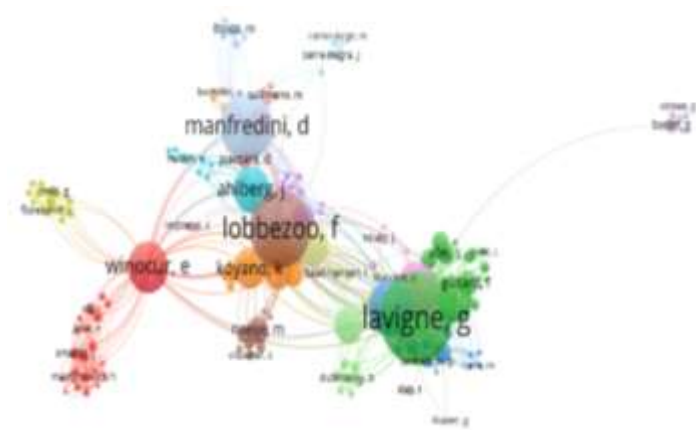
Author and journal metrics

The number of authors varied from one to 14 per article, with articles with four (23%) and five authors (23%) being the most common. The authors who published the most were Lavigne G (33 articles; 6.698 citations), Lobbezoo F (28 articles; 5.103 citations), Manfredini D (20 articles; 4.007 citations), Montplaisir J (17 articles; 2.837 citations), and Rompre P (13 articles; 2.077 citations), who were present as co-authors or main authors in 60 articles (Table 1). Figure 2 shows the co-authorship map between the authors, revealing national and international collaborations between research groups and authors. Among the 10 top researchers, five had an h-index greater than 40, with Svensson P having the highest index, 75 (Table 1).

Table 1. Bibliometric indicators of the ten authors with the most articles in the top 100 on sleep bruxism

Authors	N of papers	First author	N of citations	Total papers in WoS-CC	N of citations in WoS-CC	h-index WoS-CC
Lavigne G	33	9	6.698	292	5.660	58
Lobbezoo F	28	10	5.103	425	7.474	51
Manfredini D	20	13	4.007	273	4.700	55
Montplaisir J	17	0	2.837	150	5.310	51
Rompre P	13	1	2.077	42	892	13
Kato T	11	4	2.999	151	2.935	35
Winocur E	9	1	2.435	87	2.948	33
Ahlberg J	9	1	2.177	105	2.552	30
Svensson P	6	1	1.895	669	17.471	75
Naeije M	6	0	959	164	1.314	42

Figure 2. Bibliographic coupling between authors in top 100 most-cited sleep bruxism



The journals that published the most articles in the top 100 most cited were the Journal of Oral Rehabilitation (28%; 5.070 citations), the Journal of Dental Research (13%; 2.256 citations) and the Journal of Orofacial Pain (6%; 2.824 citations). Together, they had 8.540 citations in total (57% of total citations).

Study design, main theme, diagnostic, criteria and sample

Table 2 presents the study design characteristics, main theme, and diagnostic criteria for SB. Cross-sectional studies (29%; 3.553 citations), literature reviews (23%; 3.747 citations), and case control studies (19%; 2.698 citations) were the most common study designs. Studies with a main theme of aetiology, prevalence and associated factors were the most frequent (67%; 9.603 citations), followed by studies on the treatment of sleep bruxism (16%; 1.713 citations). The most used diagnostic criteria for SB were instrumental approaches with a combination of questionnaires and/or clinical examination (Table 2).

Table 2. Characteristics of the 100 most cited articles on sleep bruxism

	Number of papers	Number of citations	Citations ratio ¹
Study design			
Randomized clinical trial	11	1.155	105,00
Non-randomized clinical trial	2	139	69,50
Systematic review	10	1.747	174,70
Cohort	2	205	102,50
Case-Control	19	2.698	142,00
Transversal	29	3.553	122,51
Consensus among experts	2	1.489	744,50
Literature review	23	3.747	162,91
Case reports	2	167	83,50
Total	100	14.900	

Main theme			
Etiology, Prevalence and associated factors	67	9.603	143,32
SB Diagnostic Methods	8	1.334	166,75
Treatment	16	1.713	107,07
Consensus among experts	2	1.489	744,50
Revision	7	761	108,71
Total	100	14.900	
SB diagnostic criteria			
Questionnaire/Self-report	12	1.778	146,00
Questionnaire/Self-Report + Clinical Examination	16	1.490	93,12
Questionnaire/Self-report + Instrumental approaches	9	1.153	128,11
Instrumental Approaches	5	866	173,20
All approaches	58	9.613	165,74
Total	100	14.900	

¹ Citation ratio = Number of citations / number of articles

Most articles used a sample in the adult age range between 18 and 60 years old (65%; 8.505 citations) and samples with up to 100 individuals (36%; 4.220 citations). Articles that differentiated between sleep and awake bruxism accounted for 41% (7.204 citations) and articles that dealt exclusively with SB accounted for 59% (7.696 citations).

Institutions, countries and continents

Among the 43 academic centres that published within the 100 most cited articles, three institutions were responsible for almost half of the articles: the University of Montreal, Canada (24%; 4.275 citations), the University of Padua, Italy (10%; 1.764 citations), and the University of Amsterdam, The Netherlands (10%; 2.929 citations).

Figure 3 shows the global distribution of articles. Four countries were responsible for more than half of the publications: Canada (27%; 4.665 citations), Italy (16%; 2.240 citations), the USA (12%; 1.435 citations), and Netherlands (12%; 3.064 citations). All continents had articles in the top 100, except Africa and Oceania. Two continents were the most prominent: Europe (45%; 6.940 citations) and

Table 3. Poisson regression between the total number of citations in the Web of Science Core Collection and bibliometric data

Variables	N. of papers (%)	N. of citations (%)	Total number of citations		RR adjusted (95% CI)	p
			RR no adjusted (95% CI)	p		
Study design						
Observational	52 (52.0)	6.623 (44.4)	0.69 (0.36 - 1.29)	0.245	-	-
Reviews	33 (33.0)	5.494 (36.9)	0.90 (0.47 - 1.71)	0.741	-	-
Others (Consensus, Case report, Clinical trial)	15 (15.0)	2.783 (18.7)	1		-	-
Continents						
Anglo-Saxon America	39 (39.0)	6.100 (41.0)	1.34 (0.99 - 1.83)	0.059	1.44 (1.05 - 1.09)	0.023
Europe	45 (45.0)	6.940 (46.6)	1.33 (0.95 - 1.86)	0.101	1.30 (0.94 - 1.79)	0.107
Others (Latin America and Asia)	16 (16.0)	1.860 (12.4)	1		1	
Main theme						
Others (Review, SB Diagnostic Methods)	17 (17.0)	3.584 (24.1)	1.97 (1.16 - 3.34)	0.012	2.06 (1.23 - 3.46)	0.006
Etiology, prevalence and associated factors	67 (67.0)	9.603 (64.4)	1.34 (1.05 - 1.71)	0.020	1.38 (1.06 - 1.79)	0.018
Treatment	16 (16.0)	1.713 (11.5)	1		1	
Open Access						
Yes	18 (18.0)	3.079 (20.7)	1.19 (0.72 - 1.96)	0.506	-	-
No	82 (82.0)	11.821 (79.3)	1		-	-
Year of publication						
1966 - 2000	23 (23.0)	3.472 (23.3)	0.98 (0.66 - 1.45)	0.910	-	-
2001 - 2020	77 (77.0)	11.428 (76.7)	1		-	-
International collaboration						
Yes	46 (46.0)	7.241 (48.6)	1.11 (0.79 - 1.56)	0.549	-	-
No	54 (54.0)	7.659 (51.4)	1		-	-

DISCUSSION

This study is innovative because it is the first bibliometric analysis to identify and evaluate qualitatively and quantitatively the most cited articles on sleep bruxism. Two global bibliometric analyses on bruxism have already been carried out, one of which focussed on sleep-related characteristics of children and adolescents with SB and AB (Ribeiro-Lages et al, 2021). The other study included bruxism universally and with the analysis of citation performance (Al-Moraissi, Ho, Christidis, 2023). Our study has shown the scientific evolution of the operationalisation of SB. Regression analyses associated a greater number of citations to studies published in developed countries and addressing topics on aetiology, prevalence, and review guides for professionals and researchers.

The choice to include 100 articles in this bibliometric survey was based on other articles published in recent years comparing areas of dentistry with number of citations (Mattos et al, 2021; Ahmad, Arshad, Della Bella et al, 2020; Baldiotti et al, 2021; Perazzo et al, 2019). Citation rates vary between different specialties and topics researched. For example, bibliometric analyses on periodontics, oral cancer and cariology (Baldiotti et al, 2021; Ahmad, Asif, Alam, Slots, 2020; Pena-Cristóbal et al, 2018) include articles with approximately 2000 citations, while paediatric dentistry and forensic dentistry studies often have a maximum of 200 citations (Perazzo et al, 2019; Sengupta et al, 2020). In the present study on sleep bruxism, only six articles (Lobbezoo et al, 2018; Lobbezoo et al, 2013; Lavigne, Montplaisir, 1994; Lavigne et al, 1996; Lavigne et al, 2008; Manfredini, Winocur, Guarda-Nardini et al, 2013) had more than 400 citations and so could be considered “classic articles” (Ahmad, Asif, Alam, Slots, 2020). However, in smaller study areas with fewer researchers, articles with more than 100 citations are also considered classics (Andersen, Belmont, Cho, 2006). Therefore, half of the articles in this bibliometric analysis had this characteristic, which

reflects the importance of these articles in building knowledge about sleep bruxism.

The most cited article in this top 100 had approximately 800 citations within 12 years of publication. This is a consensus of experts on definitions, classification, diagnostic grading and operationalisation of bruxism for use in clinical and research settings (Lobbezoo et al, 2013). Articles with high citation rates confirm that the scientific community recognizes it as a relevant contribution, influencing the understanding of a disease or treatment and new research trends (Perazzo et al, 2019). This consensus article (Lobbezoo et al, 2013) was cited by all other studies in this top 100 published in subsequent years. This can be justified by the Bandwagon or adherence effect, in which the high number of citations of an article leads to a tendency for citation by other researchers (Asatani et al, 2018).

The ten most cited articles appear in the first positions in all search bases (WoS-CC, WoS-AD, Scopus, Google Scholar, and PubMed), showing that such documents have an impact on citations in different databases. The number of citations in the databases was positively correlated from moderate to strong: articles with high citation numbers in WoS-CC also received citations in the same proportion in the comparison databases. The Web of Science database was chosen for the bibliometric analysis as it allows the retrieval of peer-reviewed articles published in high-quality journals around the world from 1945 onwards (Mattos et al, 2021). Google Scholar was the database that retrieved the highest number of citations in all articles, as they do not undergo peer review. The use of databases most used in bibliometric studies provided the list of most cited articles on SB, without excluding any relevant studies.

Most of the most cited articles in the top 100 were published in the last two decades. Articles that have been published for longer tend to accumulate more citations over time, and more recent articles may not have had enough time to receive a greater number of citations (Feijoo et al, 2014). When the most cited articles are recent, they

indicate a trend in the line of investigation or theoretical/practical updates in the area (Baldiotti et al, 2021). In this bibliometric analysis, a small number of articles published more than 20 years ago were identified, although this may be because those that did not differentiate between sleep and wake bruxism in the selection criteria were excluded. A greater number of articles exclusively addressing sleep bruxism have been published in the last decades.

Most of the articles were published by a group of authors (Lavigne G, Lobbezoo F, Manfredini D, Rompre P, and Montplaisir J), demonstrating collaborations between these researchers. These authors also had the highest h-indexes, with an average of their indices higher than 40. The h-index demonstrates the productivity and impact of researchers, being a method of measuring scientific quality and evaluating current production, and predicting future scientific performance (Hirsch, 2007).

Countries in Europe and Anglo-Saxon America published a greater number of articles, corroborating other bibliometric analyses in dentistry (Baldiotti et al, 2021; Perazzo et al, 2019). This result reflects better funding policies and greater appreciation of researchers in these countries. Canada, Italy, and the Netherlands showed high levels of research collaboration. Economically developed countries publish more articles and carry out research collaborations with other developed countries (Hirsch, 2007). The lower prevalence of publications from countries in Africa and Oceania has also been observed in other bibliometric analyses in dentistry (Hirsch, 2007).

Mapping cooperation networks between institutions and authors reveals scientific networks, highlighting the structures of scientific collaboration (Wu et al, 2017). The institutions that published the most articles on SB corroborate our findings, as they are the academic centres of the authors with the largest publications. Only 23 academic centres are on the list of publications with more than 100 citations, and Brazil was the only developing country with institutions that

collaborated with those of other countries. There is a need to promote international research and collaboration related to dentistry in underdeveloped countries as research collaboration between different countries can improve the quality and sharing of knowledge.

The Journal of Oral Rehabilitation was the journal with the highest number of publications and citations in this top 100, corroborating the literature (Ribeiro-Lages et al, 2021). This journal covers aspects of oral rehabilitation and applied oral physiology, encompassing diagnostic and clinical management aspects. Authors tend to submit works to the most prestigious journals, as they are attracted by their visibility and greater likelihood of being cited. Most journals have paid access, and some have controlled access depending on the article to be published. The largest number of citations found are published in paid journals.

Observational studies (cross-sectional, case-control) and reviews were the main study designs of the most cited articles. Primary studies represent the majority of articles published in Dentistry, as they are an effective and low-cost method for evaluating general health problems in the population (Levin, 2006). In the present study, ten articles are of the systematic review type without meta-analysis, covering topics on SB diagnostic methods, aetiology, prevalence, and treatment. Systematic review articles had a high citation density, receiving 8 to 36 citations per year. This can be explained by the greater appreciation of evidence-based dentistry in recent years (Ahmad, Arshad, Della Bella et al, 2020). More recent studies use the combination of systematic reviews with bibliometric analyses, in order to complement the evidence (Araujo et al, 2022). Furthermore, in this bibliometric analysis, 11 articles were randomised clinical trials, which shows a considerable number of studies with a higher level of evidence in bruxism research compared to the other top 100 (Perazzo et al, 2019; Ahmad, Asif, Alam, Slots, 2020; Pena-Cristóbal et al, 2018; Sengupta et al, 2020). Most of these studies have been carried out on the management and treatment of the condition.

Studies aiming to understand the aetiology, prevalence, and factors associated with SB represented the majority of articles, followed by treatment or management studies. This is likely because SB is considered to be multifactorial and its aetiology has not yet been completely elucidated (Lobbezoo et al, 2018). The studies that evaluated treatment alternatives for SB are not in the most cited positions in the top 100, a fact that can be explained by the lack of a treatment established as a gold standard. The effectiveness of various types of management methods is not supported by scientific evidence from short- and long-term evaluations, in addition to methodological errors that compromise the quality of publications (Minakuchi et al, 2022). Only nine studies were a review for clinicians or of SB diagnostic methods. Assessing an individual's bruxism in a reliable and valid way means that in addition to the presence or absence of masticatory muscle activity, it is important to assess at what point bruxism may become a risk factor for a disorder (Lobbezoo et al, 2018). The most cited articles on SB still reflect the lack of an effective treatment for the condition.

The most used diagnostic criteria in the top 100 were a combination of questionnaires/self-report, clinical examination, and/or instrumental approaches. When added to studies that used exclusively instrumental approaches or self-report, they made up the majority of studies. This reflects the search for a more precise diagnosis, being included in the classification system of both consensuses (Lobbezoo et al, 2018; Lobbezoo et al, 2013) as definitive sleep bruxism. Higher sensitivity and specificity values are related to portable diagnostic devices, while questionnaires and clinical exams showed similar specificity but low sensitivity (Melo et al, 2019). Articles using questionnaire criteria and/or clinical examination are studies of aetiology or prevalence, as are articles with longer publication times. Instrumental approaches were mostly used in small samples sizes of individuals over 18 years of age. The diagnosis of SB by polysomnography (PSG) is a challenge in clinical practice due to limited availability, waiting time,

high cost, and difficulties in behavioural management of the patient (Lobbezoo et al, 2013). In view of the results, there is a preference for citing articles with more reliable diagnostic criteria methodologies, avoiding the use of only self-report as a diagnosis of SB.

More than 200 keywords were used by authors in publications in the most cited journals. The most used keywords were "bruxism", "sleep bruxism" and "sleep", which are expected results as they are the terms most used in the articles. Some other words relate to the type of study or similar nomenclature to the act of bruxism: "review", "polysomnography", "tooth grinding", and "rhythmic masticatory muscle activity". The use of important keywords for a given topic allows the relevant information in articles to be easily identified.

Analysing the profile of the literature, observational articles over 50 years old were found that still receive citations due to the importance of their findings. Systematic reviews, reviews, and expert consensus articles on bruxism have a high citation density per year, demonstrating a search for evidence of guides and definitions. Furthermore, the differentiation between SB and AB in the last 20 years has become more evident in research and articles on the topic, indicating the search for associated factors and treatment management for each condition. Studies on the treatment of the consequences of sleep bruxism are still few in relation to epidemiology studies, which indicates the lack of standardisation and standard treatment for the condition

CONCLUSION

The 100 most cited articles on sleep bruxism were published mainly by countries in Anglo-Saxon America, with an observational design, addressing aetiology, prevalence, and associated factors as the main theme. The most used diagnostic criteria were self-report, clinical examination, and instrumental approaches. Articles were frequently published in

the Journal of Oral Rehabilitation and Gilles Lavigne was the author with the most articles and most cited. The list of top 100 articles can provide references that guide clinicians and researchers on the evidence, existing gaps, and guiding articles on sleep bruxism.

REFERENCES

ADNAN, Samira *et al.* Bibliometric study on the literature related to dental research and education published in Journal of Pakistan Medical Association. **Journal of the Pakistan Medical Association**, v. 72, n. 1, p. 84, 2022.

AHLBERG, Jari *et al.* Correlates and genetics of self-reported sleep and awake bruxism in a nationwide twin cohort. **Journal of Oral Rehabilitation**, v. 47, n. 9, p. 1110-1119, 2020.

AHMAD, Paras *et al.* A bibliometric analysis of Periodontology 2000. **Periodontology 2000**, v. 82, n. 1, p. 286-297, 2020.

AHMAD, Paras *et al.* Systemic manifestations of the periodontal disease: a bibliometric review. **Molecules**, v. 25, n. 19, p. 4508, 2020.

AL-MORAISSEI, Essam Ahmed; HO, Yuh-Shan; CHRISTIDIS, Nikolaos. Publication performance and trends in bruxism research: A bibliometric analysis. **Journal of oral rehabilitation**, v. 50, n. 11, p. 1217-1228, 2023.

ANDERSEN, Julia; BELMONT, John; CHO, Cheng T. Journal impact factor in the era of expanding literature. **Journal of Microbiology Immunology and Infection**, v. 39, n. 6, p. 436, 2006.

ASATANI, Kimitaka *et al.* Detecting trends in academic research from a citation network using network representation learning. **PloS one**, v. 13, n. 5, p. e0197260, 2018.

BALDIOTTI, Ana Luiza Peres *et al.* The top 100 most-cited papers in cariology: a bibliometric analysis. **Caries Research**, v. 55, n. 1, p. 32-40, 2021.

BRANCHER, Letícia Coutinho *et al.* Social, emotional, and behavioral problems and parent-reported sleep bruxism in schoolchildren. The **Journal of the American Dental Association**, v. 151, n. 5, p. 327-333, 2020.

CELESTE, Roger Keller; BROADBENT, Jonathan M.; MOYSES, Samuel Jorge. Half-century of Dental Public Health research: bibliometric analysis of world scientific trends. **Community dentistry and oral epidemiology**, v. 44, n. 6, p. 557-563, 2016.

DE ARAÚJO, Lucas Peixoto *et al.* Intentional foraminal enlargement: a systematic review with bibliometric analysis. **Brazilian Dental Science**, v. 25, n. 4, 2022.

DRUMOND, Clarissa Lopes *et al.* Respiratory disorders and the prevalence of sleep bruxism among schoolchildren aged 8 to 11 years. **Sleep and Breathing**, v. 21, n. 1, p. 203-208, 2017.

FEIJOO, Javier F. *et al.* The 100 most cited articles in dentistry. **Clinical oral investigations**, v. 18, n. 3, p. 699-706, 2014.

HIRSCH, Jorge E. Does the h index have predictive power?. **Proceedings of the National Academy of Sciences**, v. 104, n. 49, p. 19193-19198, 2007.

KUANG, B. *et al.* Associations between sleep bruxism and other sleep-related disorders in adults: a systematic. Underlying mechanism of sleep bruxism in patients with obstructive sleep apnea or insomnia, v. 89, p. 19, 2022.

LAVIGNE, G. J. *et al.* Bruxism physiology and pathology: an overview for clinicians. **Journal of oral rehabilitation**, v. 35, n. 7, p. 476-494, 2008.

LAVIGNE, G. J.; MONTPLAISIR, J. Y. Restless legs syndrome and sleep bruxism: prevalence and association among Canadians. **Sleep**, v. 17, n. 8, p. 739-743, 1994.

LAVIGNE, G. J.; ROMPRÉ, P. H.; MONTPLAISIR, J. Y. Sleep bruxism: validity of clinical research diagnostic criteria in a controlled polysomnographic study. **Journal of dental research**, v. 75, n. 1, p. 546-552, 1996.

LEVIN, Kate Ann. Study design III: Cross-sectional studies. **Evidence-based dentistry**, v. 7, n. 1, p. 24-25, 2006.

LOBBEZOO, Frank *et al.* Bruxism defined and graded: an international consensus. **Journal of oral rehabilitation**, v. 40, n. 1, p. 2-4, 2013.

LOBBEZOO, Frank *et al.* International consensus on the assessment of bruxism: Report of a work in progress. **Journal of oral rehabilitation**, v. 45, n. 11, p. 837-844, 2018.

MANFREDINI, Daniele *et al.* Epidemiology of bruxism in adults: a systematic review of the literature. **J Orofac Pain**, v. 27, n. 2, p. 99-110, 2013.

MANFREDINI, Daniele *et al.* Prevalence of sleep bruxism in children: a systematic review of the literature. **Journal of oral rehabilitation**, v. 40, n. 8, p. 631-642, 2013.

MATTOS, Flávio de Freitas *et al.* Top 100 most-cited papers in core dental public health journals: Bibliometric analysis. **Community Dentistry and Oral Epidemiology**, v. 49, n. 1, p. 40-46, 2021.

MELO, Gilberto *et al.* Bruxism: an umbrella review of systematic reviews. **Journal of oral rehabilitation**, v. 46, n. 7, p. 666-690, 2019.

MINAKUCHI, Hajime *et al.* Managements of sleep bruxism in adult: A systematic review. **Japanese Dental Science Review**, v. 58, p. 124-136, 2022.

PENA-CRISTÓBAL, Maite *et al.* The 100 most cited articles on oral cancer. **Journal of Oral Pathology & Medicine**, v. 47, n. 4, p. 333-344, 2018.

PERAZZO, Matheus França *et al.* The top 100 most-cited papers in Paediatric Dentistry journals: A bibliometric analysis. **International Journal of Paediatric Dentistry**, v. 29, n. 6, p. 692-711, 2019.

POLMANN, Helena *et al.* Association between sleep bruxism and anxiety symptoms in adults: A systematic review. **Journal of oral rehabilitation**, v. 46, n. 5, p. 482-491, 2019.

RAMOS, Priscila Figueiredo Cruz *et al.* Breathing problems, being an only child and having parents with possible sleep bruxism are associated with probable sleep bruxism in preschoolers: a population-based study. **Sleep and Breathing**, v. 25, n. 3, p. 1677-1684, 2021.

RIBEIRO-LAGES, Mariana Batista *et al.* A world panorama of bruxism in children and adolescents with emphasis on associated sleep features: A bibliometric analysis. **Journal of Oral Rehabilitation**, v. 48, n. 11, p. 1271-1282, 2021.

RINTAKOSKI, Katariina; KAPRIO, Jaakko. Legal psychoactive substances as risk factors for sleep-related bruxism: a nationwide Finnish Twin Cohort study. **Alcohol and Alcoholism**, v. 48, n. 4, p. 487-494, 2013.

SENGUPTA, Namrata *et al.* Analysis of 100 most cited articles on forensic odontology. **The Saudi dental journal**, v. 32, n. 7, p. 321-329, 2020.

WU, Meiqin *et al.* Study on subclinical hypothyroidism in pregnancy: a bibliometric analysis via CiteSpace. **The Journal of Maternal-Fetal & Neonatal Medicine**, v. 35, n. 3, p. 556-567, 2022.