

## Altmetric analysis of third molar surgery

Análise altimétrica da cirurgia de terceiros molares

Análisis altmétrico de la cirugía del tercero molar

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### Ricardo Grillo

ORCID: <https://orcid.org/0000-0002-8096-738X>  
Faculdade São Leopoldo Mandic, Brazil  
Faculdade Planalto Central, Brazil  
E-mail: doutorgrillo@uol.com.br

### Mauricio Sousa de Freitas

ORCID: <https://orcid.org/0000-0002-2556-668X>  
Faculdade São Leopoldo Mandic, Brazil  
Centro Universitário do Pará, Brazil  
E-mail: freitasmau96@gmail.com

### Lucas Durans Meireles

ORCID: <https://orcid.org/0000-0001-7850-6317>  
Faculdade São Leopoldo Mandic, Brazil  
E-mail: lucasdurans@icloud.com

### Renan Martins de Lima Raposo

ORCID: <https://orcid.org/0000-0002-2953-9785>  
Faculdade São Leopoldo Mandic, Brazil  
E-mail: renanraposo10@hotmail.com

### Lourimar de Moura Moreira

ORCID: <https://orcid.org/0000-0003-2006-6579>  
Faculdade São Leopoldo Mandic, Brazil  
E-mail: drdmmoreira@gmail.com

### Rubens Gonçalves Teixeira

ORCID: <https://orcid.org/0000-0003-0814-0940>  
Faculdade São Leopoldo Mandic, Brazil  
E-mail: rgte@terra.com.br

### Abstract

*Objectives:* We are surrounded by a huge amount of data, and it is problematic to assimilate this huge amount of data and convert it into knowledge. This study is intended to provide a guide for compiling an exemplary list of the top articles relevant to third molar surgery according to altmetric analysis. *Methods:* A bibliographic search (retrospective study) was performed on the Dimensions app with the scheme ("third molar" surgery) in the title, abstract and keyword. The number of citations, altmetric attention score and journal of publication were ranked and analyzed through Microsoft Excel. Tables and graphics were generated to enable data visualization. A graphical illustration of keywords was produced using VOSviewer. *Results:* A useful list of the top 50 articles was created. There are some notable facts such as the increasing interest in alternative therapies to analgesia for third molar surgery, with a 95% confidence interval ( $p < 0.05$ ). Some curiosities have been discussed as the increasing interest in surgical methods such as coronectomy and piezosurgery. *Conclusions:* In addition to the bibliometric analysis, the altmetric analysis is a new, web-based, valuable approach to scientific updating. Both are complementary analyzes. Altmetrics is a great way to update yourself.

**Keywords:** Altmetric; Bibliometrics; Citation; Impact factor; Molar, Third; Social media; Top-cited articles; Twitter.

### Resumo

*Objetivos:* Estamos cercados por uma enorme quantidade de dados, e é problemático assimilar essa enorme quantidade de dados e convertê-los em conhecimento. Este estudo destina-se a fornecer um guia para a compilação de uma lista exemplar dos principais artigos relevantes para a cirurgia de terceiros molares de acordo com a análise altmétrica. *Métodos:* Foi realizada uma pesquisa bibliográfica (estudo retrospectivo) no aplicativo Dimensions com o esquema (cirurgia "terceiro molar") no título, resumo e palavra-chave. O número de citações, pontuação de atenção altmétrica e periódico de publicação foram classificados e analisados por meio do Microsoft Excel. Tabelas e gráficos foram gerados para possibilitar a visualização dos dados. Uma ilustração gráfica de palavras-chave foi produzida usando o VOSviewer. *Resultados:* Uma lista útil dos 50 principais artigos foi criada. Há alguns fatos notáveis, como o crescente interesse por terapias alternativas à analgesia para cirurgia de terceiros molares, com intervalo de confiança de 95% ( $p < 0,05$ ). Algumas curiosidades têm sido discutidas como o crescente interesse por métodos cirúrgicos como a coronectomia e a piezocirurgia. *Conclusões:* Além da análise bibliométrica, a análise altmétrica é uma

abordagem nova, baseada na web, valiosa para atualização científica. Ambas são análises complementares. Altmetria é uma ótima maneira de se atualizar.

**Palavras-chave:** Altmétrico; Bibliometria; Citação; Fator de impacto; Molar, Terceiro; Mídia social; Artigos mais citados; Twitter.

### Resumen

**Objetivos:** Estamos rodeados de una gran cantidad de datos, y es problemático asimilar esta gran cantidad de datos y convertirlos en conocimiento. Este estudio pretende proporcionar una guía para compilar una lista ejemplar de artículos clave relevantes para la cirugía del tercer molar según el análisis alométrico. **Métodos:** Se realizó una búsqueda bibliográfica (estudio retrospectivo) en la aplicación Dimensiones con el esquema (cirugía del "tercer molar") en el título, resumen y palabra clave. El número de citas, la puntuación de atención alométrica y el diario de publicación se clasificaron y analizaron utilizando Microsoft Excel. Se generaron tablas y gráficos para permitir la visualización de datos. Se produjo una ilustración gráfica de palabras clave utilizando VOSviewer. **Resultados:** Se creó una lista útil de los 50 artículos principales. Hay algunos hechos destacables, como el creciente interés por las terapias alternativas a la analgesia para la cirugía de terceros molares, con un intervalo de confianza del 95% ( $p < 0,05$ ). Se han comentado algunas curiosidades, como el creciente interés por métodos quirúrgicos como la coronectomía y la piezocirugía. **Conclusiones:** además del análisis bibliométrico, el análisis alométrico es un nuevo enfoque basado en la web que es valioso para la actualización científica. Ambos son análisis complementarios. Altmetrics es una excelente manera de ponerse al día.

**Palabras clave:** Altmétrico; bibliometría; Citación; Factor de impacto; Molar, Tercero; Redes sociales; Artículos más citados; Twitter.

## 1. Introduction

A simple path to the development of mankind is through science (Tahim et al, 2016). Contributions through scientific articles can be measured, among others, by the number of citations. If researchers publish an outstanding scientific paper that could change or improve concepts, a long line of other authors could adopt that paper as the basis for additional research that would benefit science and, of course, humanity. A huge and increasing variety of articles are published each year and it is humanly impossible to read just the summary of each article on a particular subject. Scientometrics, particularly bibliometrics and altmetrics, are fields of library science (Chellappandi & Vijayakumar, 2018), that help professionals of all levels, scholars or academics, get a high quality bibliographic search that saves time and effort.

Bibliometric analysis is an area of library science and information technology that applies statistical and mathematical methods to analyze indicators for the review of books, articles, and other publications (Grillo, 2021). Altmetric analysis is an alternative web-based metrics as an essential data source in addition to the publication of articles (Di Girolamo & Reynders, 2017). Altmetrics has established itself in science with statistics from social media. The name Altmetrics is the combination of Alternative + Metrics, alternative forms of evaluating scientific work through web quotations. The ranking created is assigned to the interest of every internet user. This interest can guide researchers and editors to produce scientific papers that meet the curiosity of the majority.

Recently, this has generated considerable interest within the community due to the increasing number of articles on oral and maxillofacial surgery, notoriously third molar surgery. The authors use the latest technologies that are designed to efficiently bring the topic up to date. Understanding the altmetrics is important not only for third molar surgery, but also for other topics in oral and maxillofacial surgery.

This retrospective study provides a list of the most frequently mentioned articles related on third molar surgery. The authors believe that altmetric analysis could be beneficial for any academic study or professional level as it saves the time and effort of updating. The specific aim of this study was to assist oral surgeons and general dentists, academics, and scholars in performing an altmetric analysis. Some statistical tests were done to ensure more impressive subjects, meaning and relevance of these papers. This list should stay on this interesting level for a while.

## 2. Methodology

This altmetrical analysis is a retrospective study that followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement (Vandenbroucke et al, 2014). This paper attempted to follow the principles of the Leiden Manifesto (Hicks et al, 2015), with special attention to transparency, avoidance of false precision, and allowing data to be verified.

### *Search strategy*

A literature search was done until March 24, 2021, using Dimensions platform. A search was conducted using the strategy ("third molar" AND surgery) on the "Title and Abstract" option. No language restriction, publication year range, journal impact factor, or methodology selections were applied. As a review, this article is exempt from institutional review board approval.

### *Data extraction and Scientometric Parameters*

Articles were identified through a search on the Dimensions platform. A Pubmed search was conducted the same day. The list of the top 50 articles was sorted according to the Altmetric Attention Score (AAS) and created using the following variables: AAS, number of scientific citations, journal title, country of origin (corresponding author), institution, topic categories. The researchers designed a spreadsheet in Microsoft Office Excel, and each work was retrospectively hand-searched to identify subject area, country of origin and institution involved. In order to be included in this study sample, publications had to show surgery of the third molar in the title and/or abstract without any restrictions in terms of language or year of publication. Articles unrelated to third molar surgery were manually excluded as duplicates (systematic review updates).

### *Methodological design and data analysis*

A list was created with Microsoft Excel and filled out manually. The list of publications was manually stratified according to the topic area of complications, guidelines, medication, PRP/PRF, surgical technique and transplant. The institution and country of origin were called up manually, taking into account the corresponding author.

The free software VOSviewer (Leiden University, The Netherlands) was used to create a graphical representation of some critical elements, a visual form of scientometric analysis. Non-specific keywords such as humans, male and female have been removed from the list. Descriptive statistics, charts and a Pearson correlation test were performed in Microsoft Excel to assess the statistical relationship between AAS and the number of Dimensions citations ( $p < 0.05$ ).

The data were analyzed to produce the most relevant and up-to-date scientific papers on third molar surgery after AAS. AAS extracts data from some web-based sources such as Twitter, Facebook, or Mendeley readers. AAS uses a different weight for each different indicator (Table 1 and Figure 1).

**Table 1** – Altmetric Attention Score Weight.

Data resources	Weight
News	8
Blog	5
Policy document (per source) Patent Wikipedia	3
Peer review (Publons, Pubpeer) Weibo Google + F1000 Open Syllabus	1
Linkedin	0,5
Twitter Facebook Reddit Pinterest Q&A Youtube	0,25

Source: <https://help.altmetric.com/support/solutions/articles/6000233311-how-is-the-altmetric-attention-score-calculated>.

**Figure 1** – Example of the Altmetric score in the Dimensions app.



Source: <https://dimensions.freshdesk.com/>.

### 3. Results and Discussion

A retrospective list of the top 50 the most mentioned articles was created with the variables reference with year or publication, number of citations, AAS and journal of publication. In addition to these data, the main topic of the article, the country of origin and the affiliated institution were discussed.

#### *Scientometric analysis*

The original search found 3,053 articles on third molar surgery and, 3,581 on Pubmed. Pubmed was only used as a comparison as it is a handy, fast, easy to use (Falangas, 2008) and available platform, but there is no way to search by number of citations or web-mentions. The list of the top 50 third molar surgery with the highest AAS is given in Table 2.

**Table 2** – Third molar articles classified in AAS ranking.

rank	reference	citations	AAS	Journal
1	Friedman, 2007 [15]	118	653	American Journal of Public Health
2	Mutlu et al., 2013 [30]	50	380	Journal of Oral and Maxillofacial Surgery
3	Jerjes et al., 2010 [52]	23	261	British Dental Journal
4	Ghaemini et al., 2016 [19]	45	251	Cochrane Database of Systematic Reviews
5	Niebler et al., 2015 [31]	2	153	Postgraduate Medicine
6	Levine et al., 1978 [23]	878	150	The Lancet
7	Macleod et al., 2002 [38]	25	57	Australian Dental Journal
8	Jesudasan et al., 2015 [53]	20	51	British Journal of Oral and Maxillofacial Surgery
9	Coulthard et al., 2014 [25]	64	50	Cochrane Database of Systematic Reviews
10	Al-Khateeb et al., 2008 [54]	54	40	IJOMS
11	Majid, Al-Mashhadani, 2014 [42]	37	35	Journal of Oral and Maxillofacial Surgery
12	Marciani, 2012 [55]	22	30	Atlas of the Oral and Maxillofacial Surgery Clinics
13	Mendes et al., 2018 [40]	2	30	Medicina Oral Patologia Oral y Cirugia Bucal
14	Merry et al., 2010 [36]	66	27	British Journal of Anaesthesia
15	Krishanappa et al., 2018 [56]	5	27	Cochrane Database of Systematic Reviews
16	Bailey et al., 2020 [57]	1	21	Cochrane Database of Systematic Reviews
17	Costa et al., 2015 [37]	25	17	Anesthesia Progress
18	Eshghpour et al., 2013 [17]	13	16	DARU Journal of Pharmaceutical Sciences
19	Faria et al., 2011 [39]	18	16	Journal of Applied Oral Science
20	Eshghpour et al., 2013 [18]	22	13	Journal of Oral and Maxillofacial Surgery
21	Weil et al., 2007 [26]	64	14	Cochrane Database of Systematic Reviews
22	Ngeow, Lim, 2016 [32]	30	13	Advances in Therapy
23	Gay-Escoda et al., 2019 [21]	9	13	BMJ Open
24	Ramos et al., 2016 [58]	24	12	TRIPLEO

25	Kunkel et al., 2007 [59]	40	12	Journal of Oral and Maxillofacial Surgery
26	Gear et al., 1996 [24]	380	11	Nature Medicine
27	Taberner-Vallverdú et al., 2017 [22]	20	11	Medicina Oral Patologia Oral y Cirugia Bucal
28	Tan, Li, 2017 [41]	4	10	Oncology Letters
29	Beirne, 2013 [33]	5	10	Evidence-Based Dentistry
30	Boschini et al., 2020 [60]	2	10	The Journal of the American Dental Association
31	Renton et al., 2012 [28]	35	10	Journal of Oral and Maxillofacial Surgery
32	Sammut et al., 2013 [61]	5	9	British Dental Journal
33	Lopes da Silva et al., 2020 [62]	2	9	IJOMS
34	Ghaemina, 2013 [20]	8	9	Evidence-Based Dentistry
35	Renton, 2013 [27]	27	9	British Dental Journal
36	Rossi et al., 2020 [46]	0	9	Clinical Oral Investigations
37	Canellas et al., 2018 [43]	25	9	IJOMS
38	Chen et al., 2016 [35]	19	9	The Journal of the American Dental Association
39	Al-Moraissi et al., 2015 [44]	28	8	IJOMS
40	Eshghpour et al., 2014 [16]	41	8	Journal of Oral and Maxillofacial Surgery
41	Koray et al., 2014 [63]	26	8	IJOMS
42	Almeida et al., 2018 [34]	6	8	IJOMS
43	Su et al., 2017 [64]	15	8	Journal of Oral and Maxillofacial Surgery
44	Moller et al., 2005 [8]	101	7	British Journal of Anaesthesia
45	Kugelberg et al., 1991 [9]	95	7	IJOMS
46	Singh et al., 2012 [10]	65	7	Journal of Maxillofacial and Oral Surgery
47	Van Dyke et al., 2004 [11]	44	7	Clinical Therapeutics
48	Abdeshahi et al., 2012 [12]	35	7	Journal of Cranio-Maxillofacial Surgery
49	Dantas et al., 2016 [13]	22	7	Medicina Oral Patologia Oral y Cirugia Bucal
50	Leung, Cheung, 2016 [14]	12	7	PLOS ONE

Source: Pubmed.

The mean AAS was 53.58, and ranged from 7 (Moller et al, 2005; Kugelberg et al, 1991; Singh et al, 2012; Van dyke et al, 2004; Abdeshahi et al, 2013; Dantas et al, 2016; Leung & Cheung, 2016) to 653 (Friedman, 2007). The Journal of Oral and Maxillofacial Surgery (16%) and the International Journal of Oral and Maxillofacial Surgery (14%) had the largest number of top articles. Brazil and the USA are the countries with the highest scores with eight articles each. The other papers come from Great Britain (7), Iran (4), Spain, Netherlands, India (3), China, (2), Australia, Denmark, Germany, Hong Kong, Iraq, Italy, Jordan, Malaysia, New Zealand, Sweden, Turkey and Yemen (1).

The Mashhad University of Medical Sciences in Iran, is the only institution with three top articles (Eshghpour et al, 2014; Eshghpour et al, 2013a; Eshghpour et al, 2013b). In second place with two articles are Rijnstate Hospital (The Netherlands) (Ghaemina et al, 2016 & Ghaemina et al, 2013), University of Barcelona (Spain) (Gay-Escoda et al, 2019 &

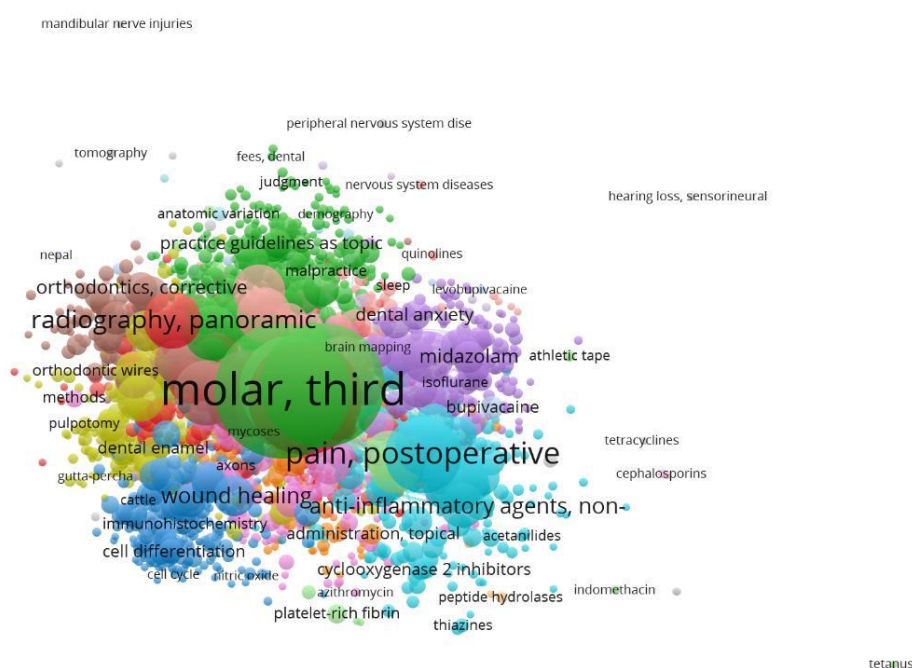
Taberner-Vallverdú et al, 2017), University of California (USA) (Levine et al, 1978 & Gear et al, 1996), University of Manchester (Coulthard et al, 2014 & Weil et al, 2007) and King's College London (Renton, 2013 & Renton et al, 2012) (both in the UK).

The articles have been divided into the following subject categories: Medication (27), Surgical technique (6), Complications (11), Guidelines (2), Use of platelet rich-fibrin or platelet (3), and Transplant (1).

### Keywords

A total of 2,043 different MeSH keywords were retrieved. The most frequent keywords in this list of top 50 most cited were reported in "molar, third", "tooth extraction", "tooth, impacted", and "mandible".

**Figure 2** – A graphical keyword visualization performed through VOSviewer.



Source: VOSviewer.

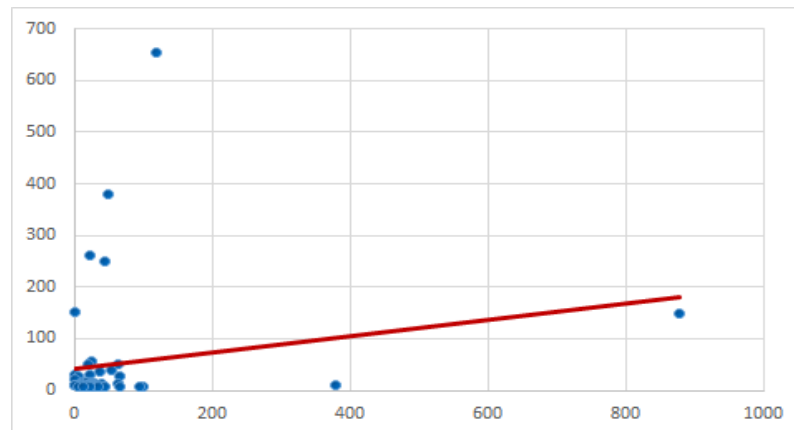
In Figure 2 is feasible to see a visual representation of keywords in a network visualization generated through free software VOSviewer (Leiden University, Netherlands). VOSviewer is a tool helpful to construct and visualize bibliometric networks. The size of the circles is connected to the number of citations using the determined keyword.

### Statistical analysis

A Pearson's correlation test was performed to assess the relationship between the number of citations and the number of mentions (AAS). There is a poor correlation ( $r = 0.18076$ ,  $p < 0.05$ ) between these two variables (Figure 3). A t-Student test was performed to assess the normal distribution of the number of citations ( $t = -285.120944$ ) and AAS ( $t = 0.00745$ ). Despite the AAS, the number of citations is normally distributed ( $p < 0.05$ ).



**Figure 3** – A Pearson’s correlation graph between the number of citations and the AAS.

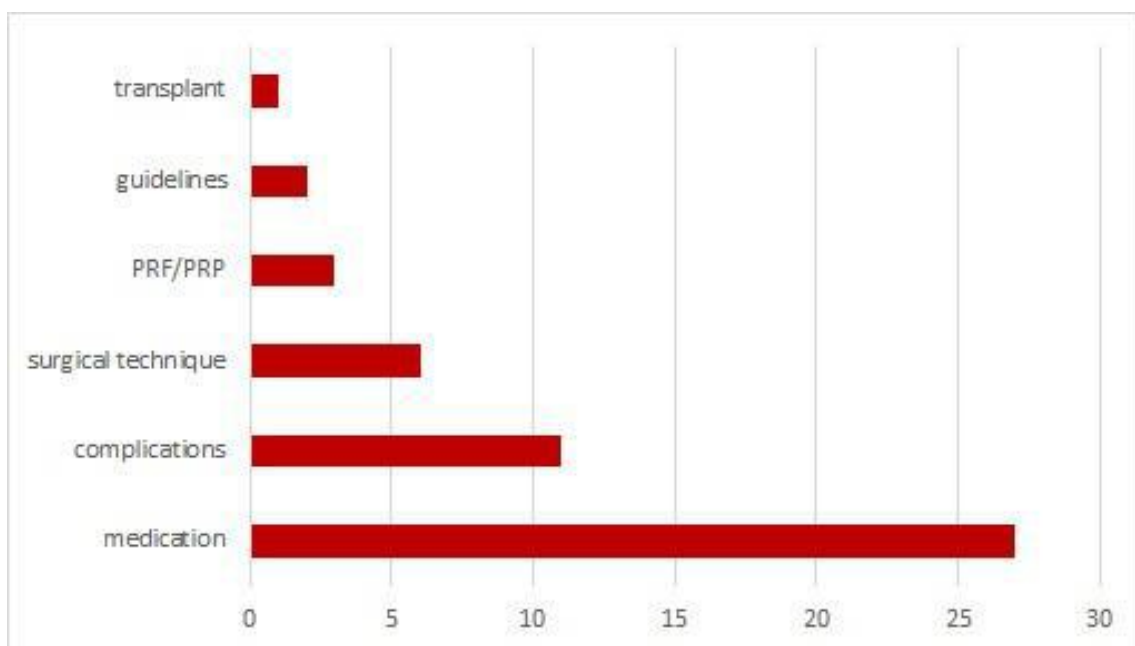


Source: Microsoft Excel.

Today we have a world full of information and it is becoming more and more complex to convert this dull amount of data into knowledge. Because of the significant impact the internet has had on our lives, health professionals cannot keep data from online social media out of the discussion, and this is the importance of altmetric analysis (Wang et al, 2017). Relevant scientific information is found with greater availability, and because of its high availability, AAS can be a valuable guide for filtering out more relevant matters.

There are several relevant aspects to this study. Interest in drugs and complications is increasing, with these two categories being closely linked to higher drug prevalence (Figure 4). Because there is a moderate incidence of complications in third molar surgery, dental surgeons are concerned about this problem and are looking for a better solution to these complications and are researching more about medications. The interest in analgesia (19/27) is higher than in antibiotics (1/27).

**Figure 4** – Top 50 articles and the topic of the categories.



Source: <https://trends.google.com/trends/>.



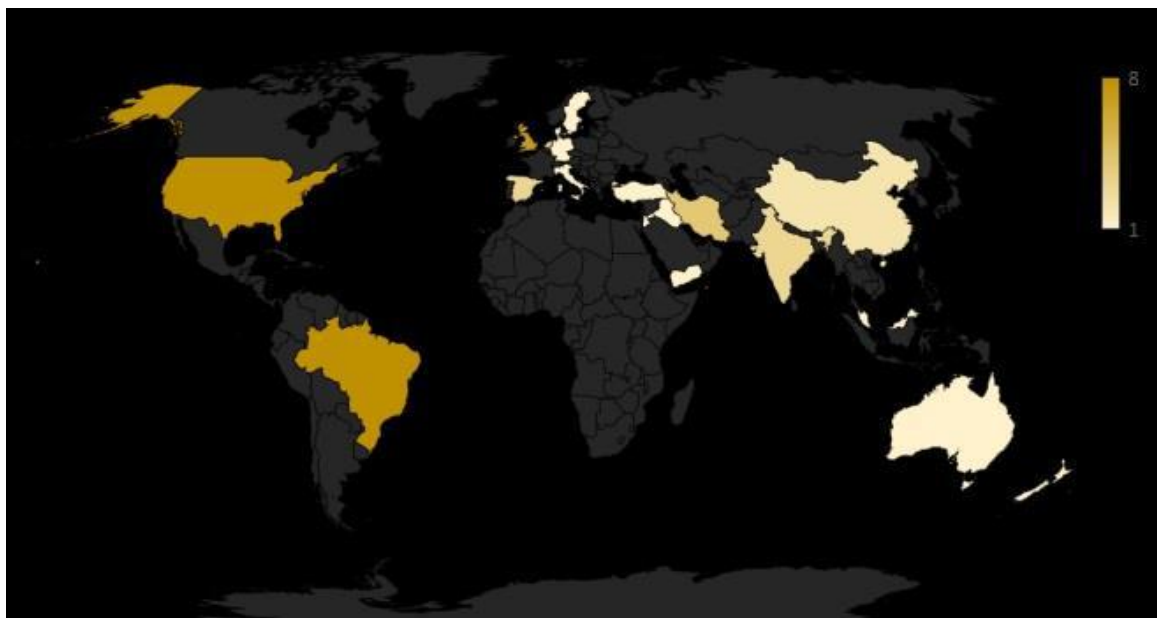
Regarding medication, there are five articles on narcotics use (Van Dyke et al, 2004; Gay-Escoda et al, 2019; Gear et al, 1996; Mutlu et al, 2013; Nieber & Dayno, 2016), four articles on corticosteroids (Ngeow & Lim, 2016; Beime et al, 2013; Almeida et al, 2019; Chen et al, 2017), three each on nonsteroidal anti-inflammatory drugs (Nieber & Dayno, 2016; Nieber & Dayno, 2016; Costa et al, 2015) and analgesics (Moller et al, 2005; Well et al, 2007; Macleod et al, 2002). This order of relevance is the one commonly used routinely in dental offices and hospitals for analgesia in third molar operations. There are some articles on more than one topic (Nieber & Dayno, 2016; Nieber & Dayno, 2016).

Another interesting finding is the growing interest in alternative therapies to treat third molar complications, particularly pain and dry socket. There is a growing body of concern about the role of herbal medicine (Dantas et al, 2016; Eshghpour et al, 2013; Faria et al, 2011), and the use of bromelain (Mendes et al, 2019; Tan & Li, 2018; Majid & Al-Mashhadani, 2018) in oral surgery with encouraging results. The same interest can be seen for platelet-rich fibrin and platelet-rich platelet (Singh et al, 2012; Eshghpour et al, 2013; Canellas et al, 2019). An article on hypnosis and the management of pain and anxiety can be found on list (Abdeshahi et al, 2013).

Coronectomy, a special technique that is held to be responsible for the drastic reduction in paresthesia, is also attracting increasing interest (Ghaemini, 2013) as piezosurgery (Al-Moraissi et al, 2016).

This study evaluates articles from 20 countries from America, Asia, Europe, and Oceania. Only the African continent does not have a representative, especially Brazil, Great Britain and the USA (Figure 5). The author with more top 50 articles is Professor Majid Eshghpour, Department of Maxillofacial Surgery at Mashhad University of Medical Sciences, Mashhad, Iran, with three articles. Prof. Eshghpour (2014), (2013a) and (2013b) has investigated alternative drugs to third molar surgery and alveolar osteitis.

**Figure 5** – Countries of origin of the top 50 articles.

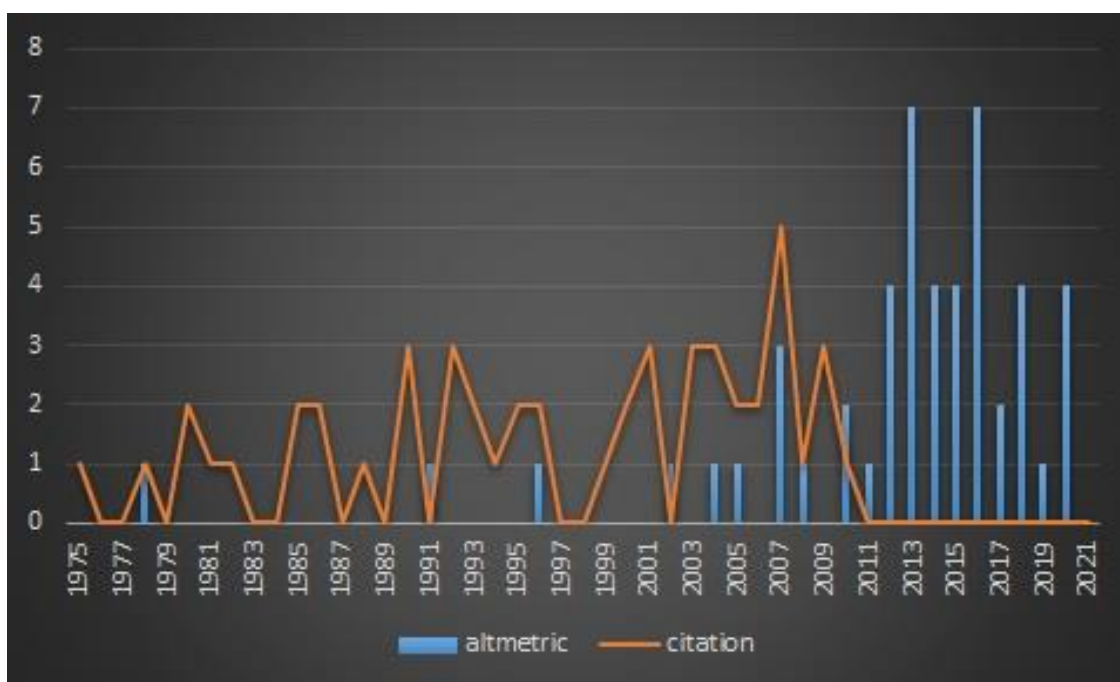


Source: <https://trends.google.com/trends/>.

With the Journal of Oral and Maxillofacial Surgery and the International Journal of Oral and Maxillofacial Surgery, 26 different journals are part of the list. Two high quality journals are included, Nature Medicine (Gear et al, 1996) and The Lancet (Levine et al, 1978).

If one compares several articles annually in an AAS with a citation rank (bibliometric analysis), the discrepancy between the groups becomes visually clear. While the citations are used in an altmetric ranking and condensed to the last few years, the citations in a bibliometric ranking are scattered over the years and only a few or no citations are new (Figure 6). This can be explained by the fact that an article has been published and that article is cited in another article, takes longer than on a social media (Twitter, Facebook) or another digital media such as Wikipedia (Kim et al, 2019). The visual graphical difference can be explained because Altmetric started collecting information from all media since 2011 and is more sensitive to breaking news (Kim et al, 2019).

**Figure 6** – Comparison of the top 50 articles between AAS rank and bibliometric rank.

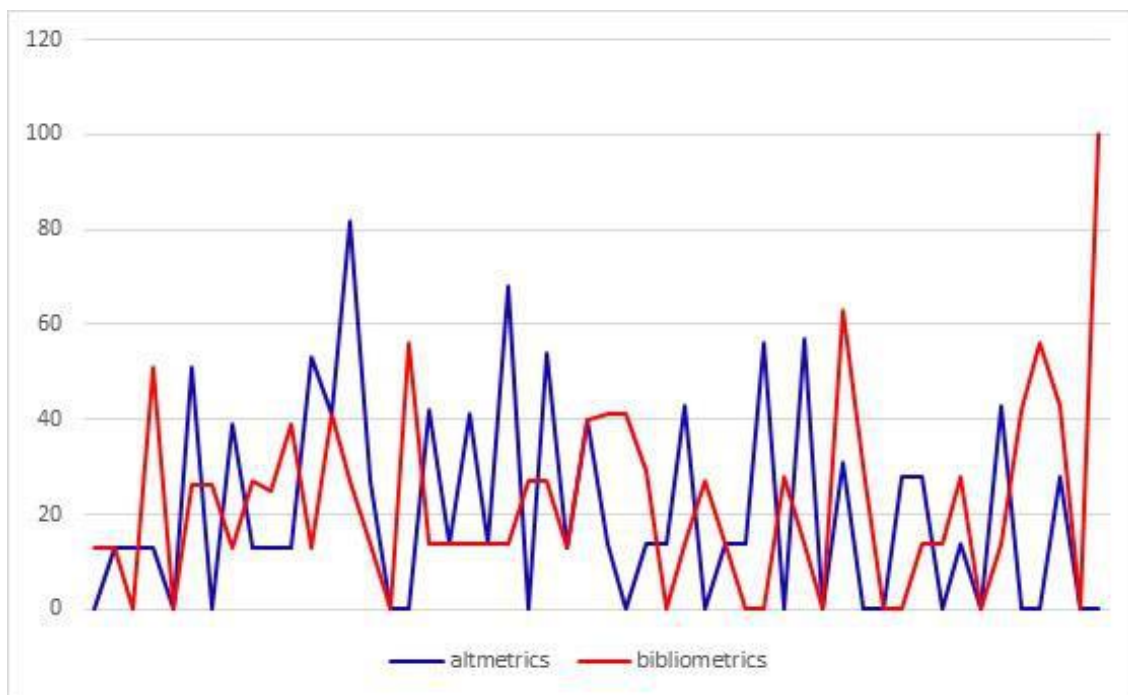


Source: <https://dimensions.freshdesk.com/>.

Some studies indicated a strong correlation between bibliometrics and altmetrics, others a weak (Wang et al, 2017). In the present study, we can see that this correlation is poor ( $p < 0.05$ ). The distribution between these two analyzes is unequal. It should be noted that high-grade journals such as The Lancet and Nature Medicine have a lot of citations but not that big AAS (Levine et al, 1978 & Gear et al, 1996) Article without citation but with score in AAS; the article has not yet been cited in another article, but it is disseminated worldwide via social media (Rossi et al, 2020). In addition, articles with numerous citations could also be more widely disseminated through the use of social media, in particular Twitter and Facebook (Friedman, 2007), as a supplementary analysis to bibliometrics.

AAS is a handy tool that will guide readers through their professional studies and helps healthcare professionals know what patients are looking for. Altmetric analysis does not replace traditional bibliometric analysis, which focuses on ranking classic articles that are fundamental to knowledge in the health field. A combination of these two analyzes would be ideal (Kim et al, 2019; Kolahi & Khazaei, 2018). A visual comparison can be found in Google Trends, and even with the proliferation of altmetrics (Kolahi & Khazaei, 2018), we can see a shift in interest in altmetrics and bibliometrics (Figure 7).

**Figure 7** – Google Trends graphics showing alternating interests between altmetrics and bibliometrics in weekly periods of the last 12 months.



Source: <https://trends.google.com/trends/>.

Altmetrics could solve an old ongoing challenge in dentistry, which is the slow acceptance of new dental or medical technologies by scientists and graduates. Dentists, researchers, and journal editors should pay attention to both altmetrics and bibliometrics (Kolahi & Khazaei, 2016).

Keywords are critical to determining the content of an article and describing the content through a controlled vocabulary (US National Library of Medicine National Institute of Health, 2021). The purpose of controlled vocabulary indexing is to enable bibliographic searches and increase precision, sensitivity and efficiency (Baumann, 2016). A network scoring of keywords through graphic visualization is beneficial in choosing a relevant title and keyword, an effective method for wider dissemination (Grillo, 2021; Mondal et al, 2018).

This work suffers from a number of limitations, particularly due to the lack of precision in scientometry. This study was limited to collecting and analyzing data that was only contained on one platform and that produced different results when performed on distinct platforms.

#### 4. Conclusion

This research is a first step towards a deeper look into altmetric analysis as a tool to identify current trends and interests in scientific articles that have just been read and reported and that are not only cited by other articles but also from all web-based media, comprising social media. This is in line with our previous conclusion that altmetric analysis is a great means of updating. Choosing an appropriate keyword is a critical step in achieving wide coverage. Future studies are required because the since science is very dynamic and this list needs to be updated from time to time, the authors believe in two or three years.

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