

Reasons of tooth mortality by continents in the last 20 years

Motivos de mortalidad dental por continentes en los últimos 20 años

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ABSTRACT

Introduction: The reasons for tooth loss have been well defined for several centuries. However, systematic analysis of the causes of tooth loss in the first years of the present century would shed light on the current manifestation of this phenomenon.

Objective: Determine the main causes of tooth mortality in the last 20 years.

Methods: A systematic review was conducted using the Boolean search engines in PubMed, Web of Science, Scopus and SciELO bibliographic search platforms. The search was based on the following MeSH terms: cause, motive, mortality, extraction, dental extraction, loss, and combinations thereof. The articles included were in English or Spanish. Calibration was performed by the authors to evaluate the articles to be selected.

Results: A total 593 articles were retrieved: 16 from Web of Science, 39 from Scopus, 531 from Pubmed and 1 from SciELO, of which 26 were included in the study. A predominance was found of articles published in English (80.8%). The main causes of tooth mortality dealt with were dental caries (92.30%) and periodontal disease (50.0%).

Conclusions: The evidence obtained in the last 20 years is insufficient to determine the main reasons for dental extraction by continent. There is little availability of articles about areas from the most densely populated and developed countries in each continent. The articles included showed a predominance of dental caries and periodontal disease as the main reasons for dental extraction.

Key words: dental caries; periodontal diseases; predominance; dental extraction; mortality.

RESUMEN

Introducción: Las razones de la pérdida dentaria han sido bien definidas desde hace varios siglos. Sin embargo, sistematizar sobre las causas en los primeros años del presente siglo aportaría una visión de cómo se manifiestan en la actualidad.

Objetivo: Determinar las principales causas de mortalidad dental en los últimos 20 años.

Métodos: Se realizó una revisión sistemática utilizando los motores de búsqueda booleanos en la plataforma de búsqueda bibliográfica de PubMed, Web of Science, Scopus y SciELO. Las palabras clave utilizadas para la búsqueda fueron MeSH: causa, motivo, mortalidad, extracción, extracción dental, pérdida y una combinación entre ellas. Se incluyeron artículos en español e inglés. Se realizó una calibración entre los autores para la evaluación de los artículos a seleccionar.

Resultados: Como resultado de la búsqueda se obtuvieron 593 artículos, de los cuales 16 fueron de Web of Science, 39 de Scopus, 531 de Pubmed y 1 de SciELO. Los artículos incluidos en el estudio fueron 26. Predominaron las investigaciones publicadas en inglés (80,8 %), que destacó entre los motivos de mortalidad dental estudiados, se encontró un predominio de caries dental (92,30 %) y enfermedad periodontal (50,0 %).

Conclusiones: La evidencia obtenida en los últimos 20 años para determinar las principales razones de extracción dentaria por continentes es insuficiente y se observa la poca presencia de artículos en poblaciones de países con mayor desarrollado y número de habitantes de cada continente. Los artículos incluidos mostraron un predominio de la caries dental y la enfermedad periodontal como los principales motivos de extracción dentaria.

Palabras clave: caries dental; enfermedades periodontales; predominio; extracción dental; mortalidad.

INTRODUCTION

Tooth loss is considered one of the main indicators of oral health in populations, and it is one of the most used and popular variables in several investigations. The study of missing teeth in a population can provide certain valuable data such as: people's educational, socio-economic and accessibility to dental services levels. Thus, allows the subsequent comparison of dental records from different population groups. Throughout history there have been numerous research studies on the reasons for

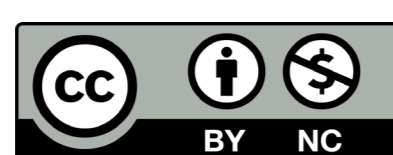
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tooth extraction. Over the years, the volume of studies on this subject has been increasing, providing information and knowledge necessary for the scientific-technical evolution itself. At present, thanks to the high level of information that count on, there are numerous factors that that can be used for comparing data between similar populations and for evaluating oral health levels within a community.^(1,2)

Dental extraction is one of the most common and important procedures in dental practice and there are numerous studies of the frequency of extractions that it is provided with information on the prevalence of oral diseases that we take as causes of tooth extractions. The reasons or causes that we will take into account and that it will rely on to carry out this work are: dental caries and its sequelae,⁽³⁾ periodontal disease,⁽⁴⁾ trauma,^(5,6) orthodontic reasons,⁽⁷⁾ eruption abnormalities,⁽⁸⁾ failed endodontic treatment,⁽⁹⁾ prosthetic reasons,⁽¹⁰⁾ pericoronitis,⁽¹¹⁾ supernumerary,^(12,13) tooth wear,^(14,15) cystic lesions, anatomical abnormalities (hypoplasia), neoplasms,⁽¹²⁾ patient request,^(16, 17, 18) iatrogenic.^(19,20)

In research from previous decades, the results showed the main interest in dental caries and periodontal disease as the main reasons for tooth extraction, leaving behind the many other reasons that cause the premature loss of dental organs. This review focused on the new century, on the new scientific-technical generation, linking studies and research, with the objective of concisely capturing the reasons for tooth extraction.^(21,22) The problem of the review was developed sur the following research question: What is the reason of tooth extraction established by continents?

Despite there being a large number of studies that address the reasons that lead to tooth extraction in adults in different regions of the world, there is little information about it in local populations. Such studies could be important tools in obtaining data on oral health in specific populations.

Due to this the aim of this study was to describe principal causes or motives of dental mortality by continents in the last 20 years.

METHODS

A systematic review was conducted from January to May 2021. This systematic review was registered in PROSPERO (International Prospective Register of Systematic Reviews) under the registration number: CRD42021241201.

Search strategy for the selection of articles

A search was carried out using the Boolean search engines in the bibliographic search platform. PubMed, Web of Science, Scopus and SciELO.

The keywords used for the search were MesH and were represented by: cause (s), motive (s), mortality, extraction, tooth extraction, teeth extraction, loss, pull out and the combination between them.

At the end of each search, alerts were created to receive feedback and systematize in the future about the appearance of new articles related to the topic.

An example of a search formula was the following searching in title, summary and keywords: [((cause*) or (motive*)) and ((extraction) or (lost)) and ((tooth) or (teeth))]

Inclusion criteria

The research included in the study should address the issue of causes, reasons or reasons for mortality, tooth loss or extraction, specifying the regions, localities and / or countries where they were developed, in such a way as to allow the grouping of these reasons by continent and establish parameters at the continental level. In addition, articles that included humans as study participants of any age group were included. They had to study more than two causes of tooth extraction and clearly conclude on the fundamental causes of tooth loss in the studied region.

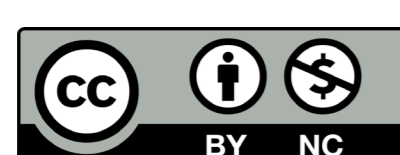
The articles were from journals indexed in the databases described, of the original article type in English or Spanish and corresponding to research published from 2000 to February 2021.

Exclusion criteria

Articles that address the issue of the causes of third molar extraction, research that includes experimental animals and non-human beings, and studies that address the issue of the causes of tooth loss in the population or groups of individuals subject to a certain risk.

Procedure for obtaining the items to include

Calibration was performed between the authors for the evaluation of the articles to be selected. The degree to which the evaluations carried out by the reviewers coincided was performed by the method of Orwin 1994, a Kappa statistic was performed to measure the agreement between the reviewers who would make simple decisions about inclusion/exclusion. Kappa values between 0.40 and 0.59 were considered to reflect



acceptable agreement, between 0.60 and 0.74 adequate agreement, and 0.75 or more reflected excellent agreement.

After the search was performed, the resulting articles were grouped into a desktop EndNote x9 library and screened by custom and smart selection groups. First, one of the authors performed the elimination of duplicates from the result. In that same act, articles unrelated to the subject matter were eliminated. Subsequently and according to the criteria of two authors, the articles were discarded by title, then by reading the abstracts and finally, and to validate the quality of the research, an analysis of the full texts was carried out.

Variables

The variables considered for the present were: main author, title, year of publication and journal where the articles were published. In the same way, for the analysis of the selected investigations, the country where the investigation was developed was considered for its grouping into the continent variable and finally the key variable of the investigation that was causes of tooth extraction (dental caries, periodontal disease, pulp pathologies and / or periapical, root fractures, trauma, orthodontic reasons, eruption abnormalities, failed endodontic treatment, prosthetic reasons, pericoronitis, supernumerary, tooth wear, cystic lesions, anatomical abnormalities (hypoplasia), neoplasms, patient request and iatrogenic).

Articles processing

All the articles were screened in an Excel database that was later exported to IBM-SPSS® Statistics 24 to obtain the frequency results.

RESULTS

As a result of the search, 593 articles were obtained, of which 16 were from Web of Science, 39 from Scopus, 531 from Pubmed and 1 from SciELO ([fig. 1](#)).

During the processes carried out to determine the number of articles to be included in the study, the number decreased considerably until reaching 26 articles, which were the ones that made up the sample ([fig. 1](#)).

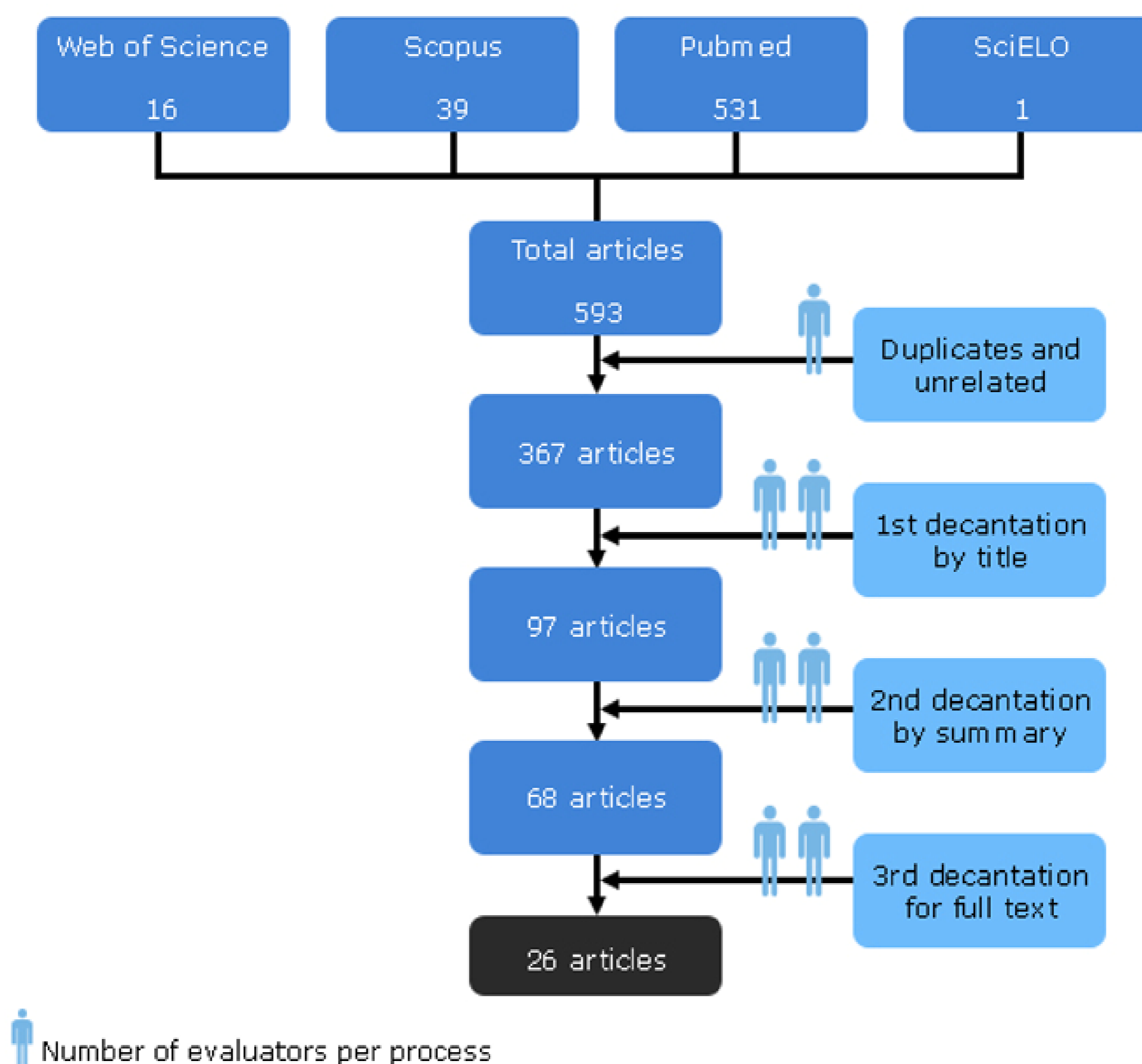


Fig. 1- Conceptual map of the process of obtaining the articles to be included in the research.

It was possible to verify a predominance of research published in English (80.8%) and there was no recurrence of articles published in any particular journal or first authors in the papers included in the study, except in the case of Taiwo^(3,23) from Nigeria, which had two related investigations in 2012 and 2017 respectively.

The years of publication were from 2000 to 2020. Periods from 2001-2003, 2007-2008 and 2019 not being represented ([table 1](#)).

Of the reasons for dental mortality studied, a predominance of dental caries (92.30%) and periodontal disease (50.0%) was found, followed by pulp and periapical pathologies with 7.70%.

Traumas, root fractures, orthodontics reasons and failed endodontic treatments were represented by one article each, representing 3.80% of the total articles included in the research ([table 2](#)).

Table 2 - Reasons for dental mortality according to articles included in the study

Cause / reason for tooth loss	N	%
Tooth decay and its sequelae	24	92.30
Periodontal disease	13	50.00
Pulp and periapical pathologies	2	7.70
Trauma	1	3.80
Root fractures	1	3.80
Orthodontic reasons	1	3.80
Failed endodontic treatment	1	3.80
n=26 articles		

[Table 3](#) shows the distribution of the countries by continents in which the investigations of the articles included in the study were carried out. There is a predominance of research carried out in six countries belonging to the Asian continent, four to the European continent and three to the African and American continents. In the case of the countries of the American continent, they all belonged to the South American area ([fig. 2](#)).

The country in particular with the highest prevalence of articles was Nigeria with 30.8% of the total articles, which far exceeded the rest that were only represented by one or two articles for 3.8% and 7.7% respectively ([table 3](#)).

DISCUSSION

The reasons for tooth loss have been described since the birth of Dentistry and these for centuries have been led by dental caries and periodontal disease.⁽³⁹⁾ Further, with the advancement of science and technology, changes in lifestyles have appeared of complete populations that could displace these two prevalent entities due to other causes that could arise in current times.^(40,41)

This was the case of the investigation by Da Rocha Scalzer Lopes⁽⁵⁾ and his collaborators in Brazil, who concluded that the main causes of tooth loss in their studied sample were trauma and root fractures. In addition, Lucavechi-Alcayaga and others⁽²⁵⁾ in Spain revealed dental caries as one of the two causes of dental mortality that most abounded in their research, but the second was orthodontic reasons.

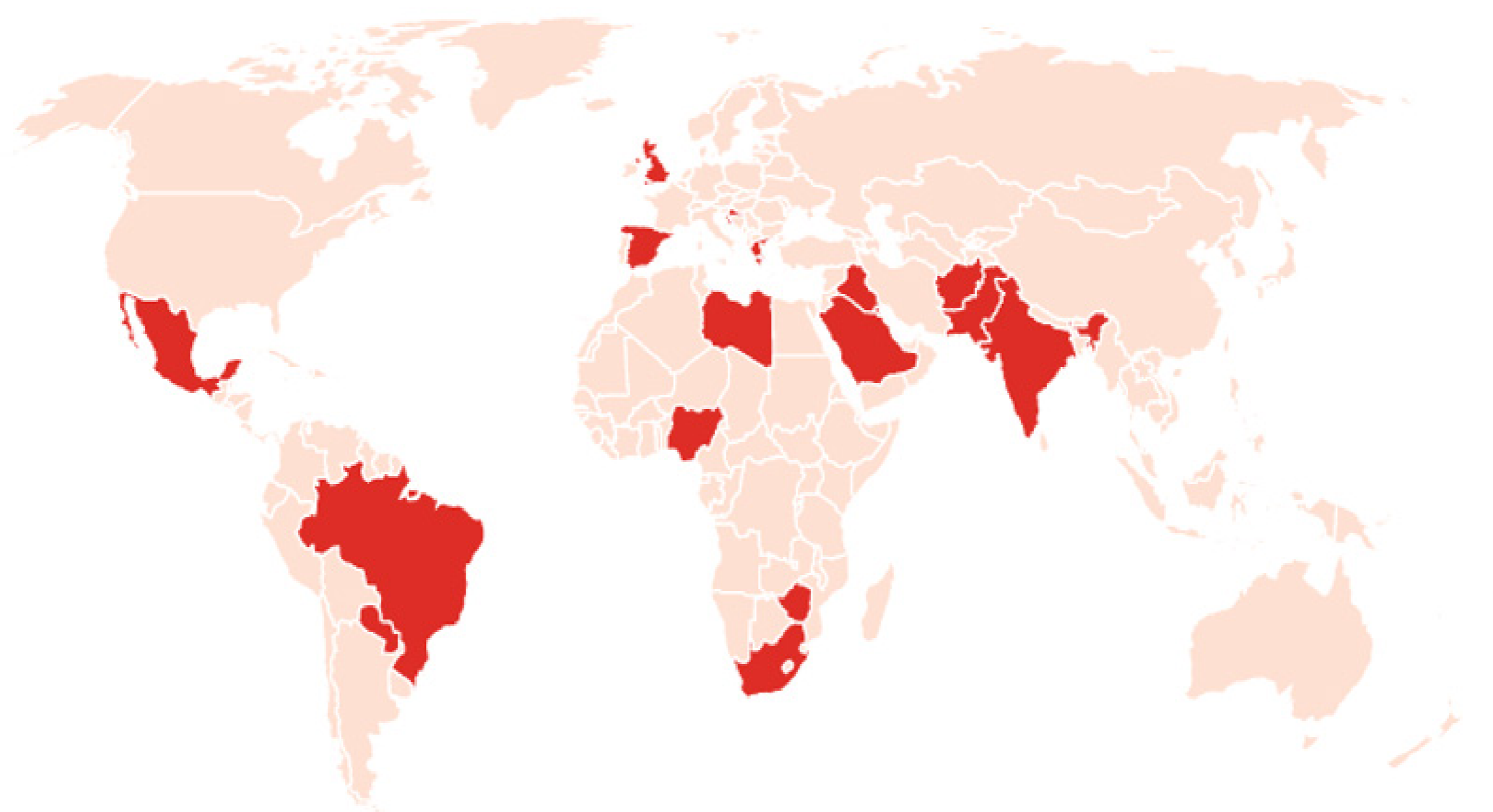
These two investigations in particular,^(5,25) included in the present study, give a preliminary vision that the pattern of causation of dental mortality is changing and deserves to be studied.

When analyzing the map of the countries that have studied causes or reasons for tooth loss in their populations in the last 20 years, we can see that they are insufficient in all the continents where countries are more populated, highly developed and with more possibilities of producing changes in the Known prevalences to date have not provided research on the subject matter. Such is the case in the United States, Canada, China, Russia, and most European countries to name just a few.

The evidence from the last 20 years to determine the main causes and reasons for tooth extraction by continents is insufficient and the presence of articles in populations of the most populated and developed countries of each continent is not evidenced.

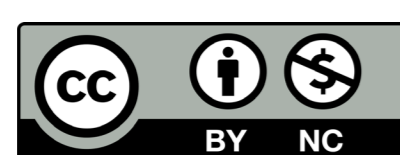
Table 3. Number of publications by country included in the study

Country / Continent	N	%
Asia		
Pakistan	2	7.7
Afghanistan	1	3.8
India	1	3.8
Iraq	1	3.8
Kuwait	1	3.8
Saudi Arabia	1	3.8
Europe		
Spain	2	7.7
United Kingdom	1	3.8
Greece	1	3.8
Croatia	1	3.8
Africa		
Nigeria	8	30.8
Libya	1	3.8
South Africa	1	3.8
America		
Brazil	2	7.7
Mexico	1	3.8
Paraguay	1	3.8
Total	26	100.0

**Fig. 2 -** World map and countries where the researches were developed.

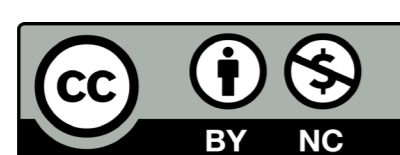
CONCLUSION

Articles that were included showed a predominance of dental caries and periodontal disease as the main reasons for tooth extraction in all countries for each continent.



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CONFLICTS OF INTEREST

The authors declare that they have no competing of interest.

