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Efectividad de la rejilla palatina en el tratamiento del hábito de succión digital en niños. Revisión de literatura

The effectiveness of the palatal grid in the treatment of the digital suction habit in children

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Palabras claves:
Succión digital, maloclusión, rejilla palatina, hábitos orales, tratamiento, niños

Resumen

Introducción: la succión digital es un hábito que tiene un alto nivel de prevalencia en los niños, sin embargo, su constancia después de los 3 años puede ocasionar problemas de maloclusión. Es por ello por lo que, la utilización de la rejilla palatina se ha convertido en un dispositivo que ayuda de forma eficaz a controlar estos problemas. **Objetivo:** analizar la eficacia de la rejilla palatina mediante una revisión bibliográfica para evitar el hábito de succión digital de los niños. **Metodología:** se implementó una metodología descriptiva con un enfoque cualitativo mediante una revisión bibliográfica y documentada con un procedimiento metodológico basado en estrategias de búsqueda y criterios de inclusión y exclusión. **Resultados:** se evidenció que la mayor cantidad de problemas de maloclusión debido a la succión nutricional y no nutritiva, se presentan en niños de 3 a 10 años, además, que la implementación de la rejilla palatina o lingual tiene resultados eficaces para mejorar o impedir los hábitos de succión digital. **Conclusión:** el hábito de la succión constituye un acto de supervivencia para los seres humanos, sin embargo, si es persistente puede ocasionar maloclusiones o deformaciones dentofaciales en los infantes. De la misma manera, se constató que el uso a nivel mundial de la rejilla palatina ha demostrado gran eficacia para el tratamiento de esta patología, pero existe poca literatura actualizada para poder evidenciar la efectividad de este aparato. **Área de estudio general:** Medicina. **Área de estudio específica:** Odontología. **Tipo de estudio:** Artículos originales

Keywords:
Digital suction, malocclusion, palatal grid, oral habits, treatment, children

Abstract

Introduction: Finger sucking is a habit that has an elevated level of prevalence in children; However, its persistence after the age of 3 can cause malocclusion problems. That is why the use of the palatal grid has become a device that effectively helps control these problems. Objective: To analyze the effectiveness of the palatal grid through a literature review to avoid the habit of digital sucking in children. Methodology: A descriptive methodology with a qualitative approach was implemented through a bibliographic and documented review with a procedure based on search strategies and inclusion and

exclusion criteria. Results: It was shown that the greatest number of malocclusion problems due to nutritional and non-nutritive suction occur in 3-10-year-old children. In addition, the implementation of the palatal or lingual grid has effective results to improve or prevent digital sucking habits. Conclusion: The habit of sucking constitutes an act of survival for human beings; However, if it is persistent, it can cause malocclusions or dentofacial deformities in infants. In the same way, it was found that the worldwide use of the palatal grid has demonstrated significant effectiveness for treating this pathology, but there is little updated literature to demonstrate the effectiveness of this device. General area of study: Medicine. Specific area of study: Dentistry. Type of study: Original articles.

Introduction

Humans have a set of reflexes that begin during the gestation period and many of these prevail after birth. Since they fulfill the function ofsurvival and body satisfaction(1).This is why, according to the World Health Organization (WHO),(2),The sucking reflex is a basic principle of newborn survival, given that 40% of infants aged 0 to 6 months are fed exclusively by sucking breast milk. However, in the words of Awuapara et al.(3),If this unconscious action persists after 2 or 3 years, it generates non-nutritive sucking habits that are harmful to dental and orthodontic health in the long term.

Reason why, there isan increased risk of developing oral and dental problems such as: wear of the upper incisors at the palatal level, protrusion of the upper incisors and oral malocclusions, especially open and cross bite.(4). In addition, these sucking habits during the tooth eruption process can cause proclination of the upper incisors and retroclination of the lower incisors, resulting in an anterior open bite.(5).

Reason why, according to Parra & Zambrano(6),In Ecuador, digital sucking in children is a problem that affects comprehensive oral health, since it represents 21.6% of oral deformities. Preschool age is the most prone to developing these malformations. In turn, in the province of Azuay, 44.2% of children have habitsparafunctional (finger sucking, upper lip sucking, onychophagia, tongue protraction, among others) that generate orofacial problems and the appearance of oral pathologies(6).

This is why the palatal grid has become a fundamental instrument to prevent the habit of digital sucking in children.(7).Since it is a stainless steel fixation device that prevents the infant from inserting his finger into the oral cavity, its implementation is therefore effective for the treatment of oral malocclusions.(3)Along the same line of research for Pérez et al.(8),The use of the palatal grid generated favorable results with an estimated critical value of -18.620 and a $p < 0.001$. Likewise, it was found that the application of this dental device significantly decreased digital sucking habits in a period of 18 weeks, correcting malocclusion problems and malformations in the oral cavity.(8).

In this sense, this bibliographic review study is important because the research topic is relevant to know the effectiveness and current incidence of the use of the palatal grid as a treatment to reduce digital sucking habits that affect the health of infants. Since there are no updated studies with specific data on the implementation of this oral device. To this end, the following objective has been established in this work:To analyze the effectiveness of the palatal grid in the treatment of sucking habitsdigital in childrenthrough a literature review to prevent the digital sucking reflex in children.

Methodology

In this study, a descriptive methodology was carried out with a qualitative approach through a bibliographic and documented review. Since this methodological process allows to select, analyze, identify and collect information in accordance with the research objectives and the theme of the implementation of the palatal grid as a treatment to correct the habit of digital sucking in children(9)For this purpose, a methodological procedure, search strategies and inclusion and exclusion criteria were established for the selection of studies concerning the academic purposes of this research.

Search strategies

In the search strategies of this research, a bibliographic review of the literature was implemented through the use of digital databases: Scopus, Pubmed, Scielo, Dialnet and Redalyc. To do so, a search validation process was first established through the use of the descriptors of the science of Medical Subject Headings (MeSH) or Descriptors in Health Sciences (DeCS) with keywords such as:*Fingersucking, Malocclusions, Palatal, Suction and habits.* Similarly, the Boolean operators AND and OR were used to optimize the systematization of the search (see Table 1).

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Table 1.*Search process according to keywords and boolean operators*

Search engines	Keywords and operators	Total
Scopus	(fingersucking) AND (malocclusion) OR (palatal) AND (grid)	519
Pubmed	(fingersucking) AND (oral habits) AND (malocclusion)	309
Scielo	(digital suction) OR(palatal grid)	51
Dialnet	(digital suction) OR (palatal grid)	66
Google Scholar	(fingersucking) AND (oral habits) AND (malocclusion) OR (Palatal grid)	76
	General search result	1021

Inclusion criteria

The inclusion criteria were: documents published in the last 5 years (2019-2024), types of study; systematic reviews, bibliographical reviews, case studies, clinical trials, meta-reviews and medical reports, in English and Spanish. It should be noted that some specific documents were considered to support the background and methodology of the study.

Exclusion criteria

In this research, the following exclusion criteria were established: undergraduate and graduate theses, reports, books, memoirs, articles containing experiments with animals and documents that lack scientific information from an authority or scientific journal.

Ethical aspects

This research was carried out without any prohibition of authorship by the researchers. In addition, the principles of responsibility regarding the anonymous handling of the information collected in the review of the reports are established.(10)It should be noted that,Ethically, this study is considered risk-free, since it is a secondary research based on documentary sources, sono informed consent was obtained.

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Results

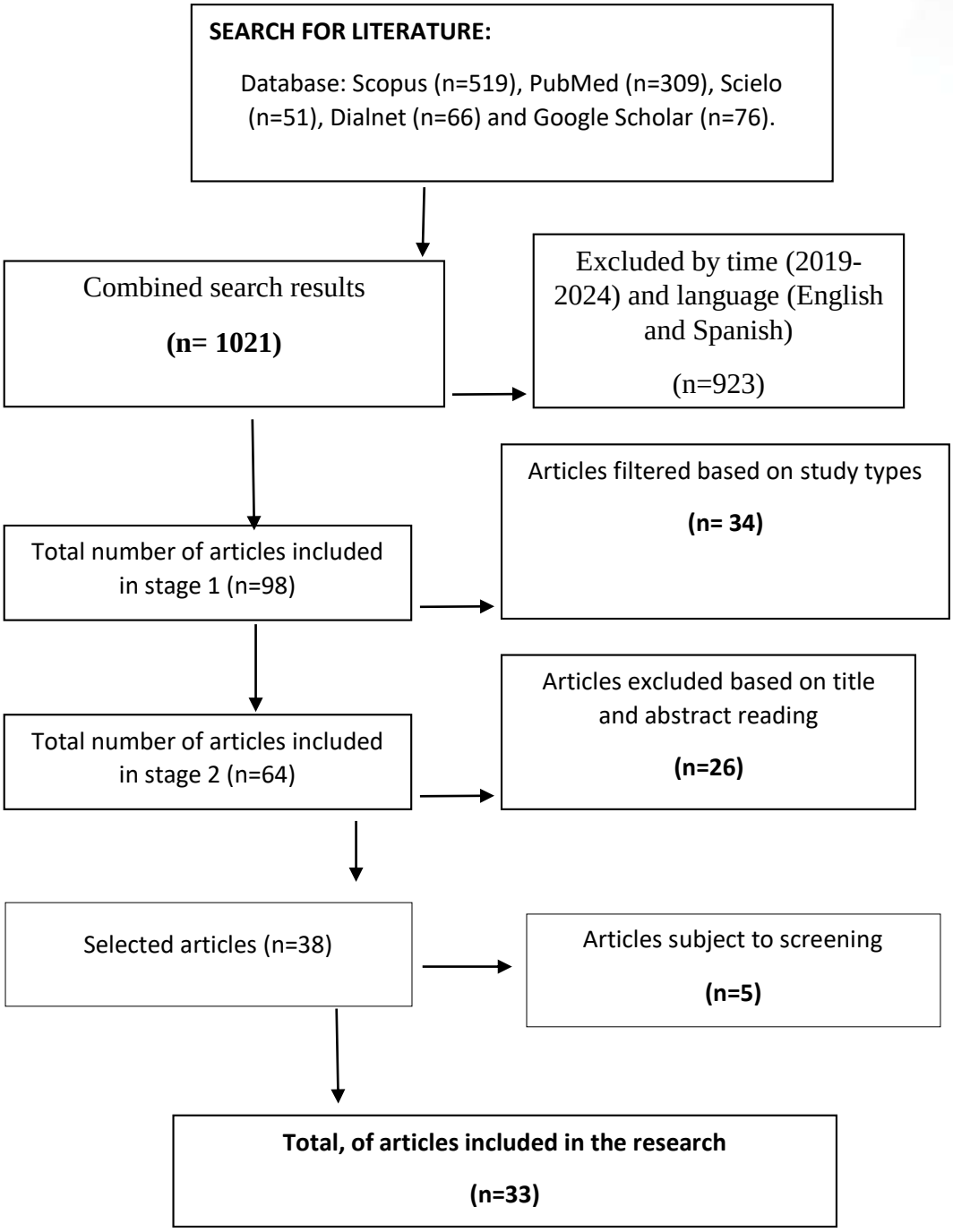

Figure 1. Item Selection Flowchart

Note. The flowchart indicates the bibliographic results of the digital search that were selected and systematized according to the use of filters and a screening of the information.

In the present review article, a total of 33 studies were selected, which are divided into: 40% (n= 13) in Pubmed, 21% (n= 7) in Dialnet, 18% (n= 6) in Scielo, 15% (n= 5) in

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Google Scholar and 6% (n= 2) in Scopus. That is, There is a small number of articles in scientific databases that address the issue of the use of Palatal grid for the treatment of digital sucking in children(see figure 2).

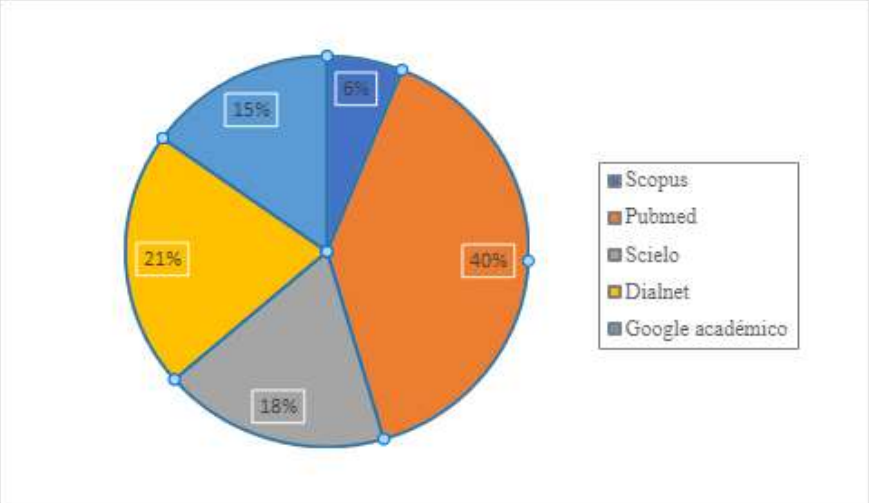

Figure 2.*Articles systematized according to the database*

Note. Graphical representation of the distribution of articles according to the scientific databases selected for this study.

In turn, according to the literature review, different types of studies were obtained according to the search strategies and inclusion and exclusion criteria. These are distributed as follows: 64% (n= 21) correspond to clinical studies, 12% (n= 4) are bibliographic reviews, 12% (n= 4) systematic reviews, 6% (n= 2) descriptive studies, 3% (n= 1) quasi-experimental study and 3% (n= 1) qualitative study (see figure 3).

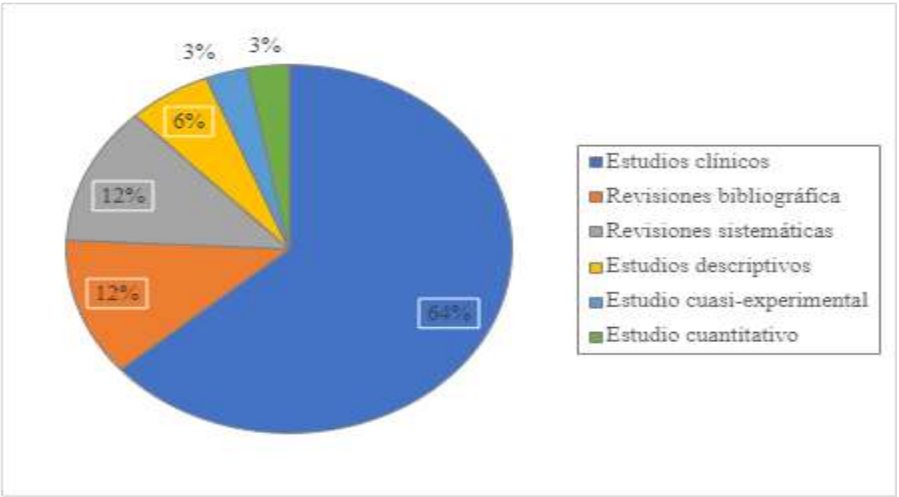

Figure 3.*Articles systematized according to the types of study*

Note. Graphical representation according to the type of study.

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Furthermore, the literature review showed that there are several national and international studies on the use of the palatal grid for the treatment of digital sucking habits in children. Therefore, the following classification has been established according to their continental location: 58% (n= 19) in Latin America, 18% (n= 6) in Asia, 18% (n= 6) in Europe and 6% (n= 2) in Africa. Therefore, it was observed that there is a greater tendency to carry out studies on the palatal grid and its relationship with digital sucking habits in Latin America, Asia and Europe (see figure 4).

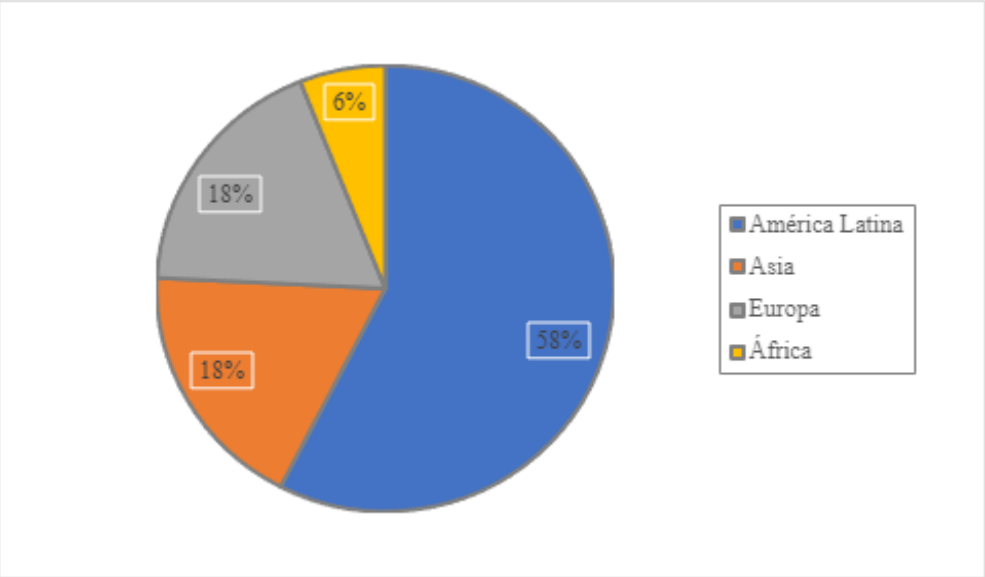

Figure 4.*Articles systematized according to geographic location*

Note. Graphic representation according to its geographical location according to the continent.

This study recorded various types of findings that are present in a significant number of studies. Therefore, its reading is valuable in order to establish a specific vision of this problem and the research or theoretical bases that serve as arguments and evidence for the present study, which are:

HeThe diagnosis of digital sucking habits begins at 3 years of age. To do so, according to the literature review, the following assessment was determined: first, an intraoral oral examination should be performed to determine the frequency and intensity of digital sucking in the child through a comprehensive evaluation of the patient's clinical history. In addition, to determine the state of the teeth, the palate and the oral structure. At the same time, it is important to perform an orofacial evaluation to determine the correct functioning of the oral organs and tissues, without neglecting the comprehensive examination of the child considering the digital structures where lacerated areas or loss of skin continuity could be observed. At the same time, according to the degree of affectation, dental x-rays should be performed to determine the type of dental-facial condition. After that, according to the degree of affectation, parents are informed about

the types of invasive and noninvasive treatments. In the case of implementing a non-invasive treatment, the child must follow psychological support and periodic visits to the pediatric dentist to evaluate the progress of the treatment and if invasive treatment is required, it is given through the implementation of equipment.(11).

HEIn the bibliographic review of the selected studies, it was found that there is an age range between 3 and 10 years. Because this stage of life is where the greatest number of malocclusion problems are generated due to the nutritional and non-nutritive suction of the infant.(12).

In this contextThere are various causes that are related to the persistence of the digital sucking habit during childhood. However, according to the bibliographic review, it is stated that one of the main reasons for this habit is irregular breastfeeding and the use of pacifiers or soothers. In turn, the prolongation of the breastfeeding stage beyond two years of the infant's life is another primary cause that triggers this unconscious behavior in children.(13).

DAccording to the selected literature, it was determined that the sucking habit produces dentofacial anomalies of which malocclusion is the main oral problem due to the effects of digital sucking.

Regarding intraoral characteristics, the deterioration of the upper incisors at the palatal level stands out mainly, in addition,the position of the teeth, the perioral musculature and the functional forcesof protrusion or proclination of these teeth. Of these, the most common are open and cross bites.(14).

As for the extraoral characteristics produced by this habit, buccofacial asymmetry is highly prevalent, because it isan alteration that is defined by the presence of a disharmony between both sides of the face. That is, it is when inthe frontal vertical plane of the face, one of the two sides is shown unbalanced in relation to the other.In the same way, the deformation of the sucked fingers occurs and these are the main elements affected by this compulsive behavior.(6).

HEdetermined the treatments most commonly using fixed or removable appliances to prevent the deleterious habit, highlighting the implementation of the palatal or lingual grid, designed to treat malocclusions and prevent non-nutritional sucking habits.(7). Considering thatThe grid is a fixed or removable device made of steel wire or transparent acrylic, which are welded to the bands of the upper molars in the case of being fixed or anchored in an acrylic base in the case of being removable and cover the portion of the palate where the finger is placed during sucking.(4).

The treatment protocol with the palatal gridIn the treatment of digital sucking habits using the palatal grid, it is important to note that it is an intervention that can cause discomfort,

therefore, socialization with parents through informed consent is essential. After that, the following implementation protocol must be followed:

1. Clinical planning must be carried out, in which the specialist determines the type of grid to be implemented (fixed or removable). In addition, the duration of the intervention is established, which is usually 3 to 6 months.
2. A measurement of the oral cavity is performed to determine the dimensions of the appliance to be implemented.
3. The next step is the placement of the grid with an induction on the use of the palatal grid and dental care.
4. It is important to make regular appointments with your treating dentist to review the progress of your treatment.
5. After the time has elapsed and the treatment has progressed, the grid is removed and a general evaluation is performed. Finally, positive reinforcement is established on the importance of taking care of oral health.(15).

The palatine gridIt helps to avoid the habit of finger sucking because the instrument is placed in the patient's mouth and prevents him from inserting his finger into the palate, thereby preventing him from experiencing the satisfaction that sucking produces and gradually eliminating this habit. In addition, it is an inexpensive device and very easy to make and use.(16).

This research showed that there is a tendency to implement clinical studies, especially cross-sectional, descriptive, observational, non-experimental, retrospective field and prospective studies. For this reason, the information obtained in this work is largely based on articles that were carried out through the collaboration of participants with non-nutritive sucking problems and who had a previous diagnosis.

Discussion

Sucking habits in humans are a survival mechanism in the first years of life, since they allow the child to feed and develop the organism for its growth.(15). In turn, these sucking reflexes are closely linked to breastfeeding and the development of the stomatognathic system, becoming a common reflex in childhood.(17, 18)However, for Rondón et al.(14)and Kumar et al.(15),The prolongation of the breastfeeding period influences the formation of a habitparafunctional, which is digital suction, since 71.58% of the participants developed parafunctional habits, of which 18.10% are related to digital suction.

In turn,Galan-Gonzalez (19)and Chuquimarca et al.(20),In a study on the impact of parafunctional habits in breastfeeding patients, they found that digital sucking represents 15% of which 55% (n=110) are female and present a long-term health risk.Also

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Guignot(21), in a study on the prevalence of sucking in children aged 3 to 5 years, mentions that non-nutritive sucking habits develop oral health problems in 81.5% (n= 224) and 17.4% (n= 68) have posterior crossbite conditions.(22).At the same time, according to Chuquimarca et al.(20),Thumb sucking causes open bite and mandibular dislocation in both men and women, with the female sex having the highest prevalence of oral pathologies.(8).Likewise, for Carvalho et al.(21)There is a prevalence ofmalocclusion in children with 40.46% and of these 14.04% represents the open bite due to the risk factor associated with the use of the pacifier with 10.39%. For this reason, digital sucking represents a serious problem for infants, since it generates oral problems that can persist throughout the patient's life, generating malocclusions.

Similarly, Polanco et al.(22)In a study on health culture and deforming oral habits, they mention that digital sucking along with other parafunctional habits are responsible for 100% of school-aged children with oral deformities. In which upper transversal problems stand out in girls with 40.18%. Unlike Mendoza et al.(23)who claim that malocclusion problems are present in 80% of the child population, with digital sucking being the main cause of developing this pathology at 13.8%. However, Borrego et al.(12)mentions that non-nutritive digital sucking is associated with dental-maxillofacial problems, of which 95.2% represent labial dysfunction and 73.8% are female.

Regarding malocclusion problems caused by digital sucking, Kolawole et al.(24)In a study of oral habits in children aged 1 to 12 years, the most common features of this oral problem were found to be spreading (29.9%), crowding (21.7%) and increased overjet (16.4%). Of these, 13.4% of the child patients required treatment. Unlike Caruso,(25)and Otsugu(26)They claim that the main habitThe most common parafunctional mouth breathing that causes oral conditions is mouth breathing with 36.4%, followed by tongue-thrust swallowing, since digital sucking only represented 5.56%. However, Rodríguez-Olivo et al.(27),They suggest that the most harmful habit for malocclusion is anteposition with 58.7%, unlike digital sucking and mouth breathing, which are the least frequent parafunctional behaviors and with the least relationship to oral health problems.

On the contrary, in relation to the sex of the participants forBehroz (28) andAu Yeung (29), Male infants had a higher prevalence of digital sucking habits and problems related to malocclusion. Similarly, according toZakirulla et al. (30)They point out that male infants with problems related to malocclusion due to inadequate oral habits represented 26.2% with the pathology of crowded teeth. However,Laganàet al.(31)In a study of malocclusions in children over 8 years of age, they state that non-nutritive sucking habits did not represent a determining variable for morphological or palatal problems. Therefore,Souto Souza(32) mentions that nutritive and non-nutritive sucking habits do not have sufficient evidence for their relationship with malocclusion problems, since these habits are associated with problems chewing and swallowing food..

Along the same lines, Kalla et al.(33)They point out that there is not enough evidence to determine the association of malocclusions with the habit of digital sucking, since duration and frequency were not evident in the results of the study, but it was possible to verify that it is a type of harmful parafunctional reflex caused by non-nutritive sucking. For this reason, the implementation of a treatment or therapy to improve this pathology is necessary. For this, the use of both fixed and mobile appliances is essential to prevent the patient from inserting their fingers into the oral cavity and generating a harmful habit.(4). This is why Moreira et al.(34)and Villavicencio & Hernandez(11)They mention that the implementation of the fixed palatal grid represents 80% effectiveness for the treatment of oral problems related to the habit of digital sucking in children.

In this sense, for Lima et al.(35),In a literature review, it was found that non-nutritive sucking habits account for 89.5% of the studies reviewed with prevalence in malocclusion problems. In turn, Parra-Iraola & Zambrano-Mendoza(36)They suggest that digital sucking is one of the main risk factors that influence oral deformities in children in Latin America. Therefore, it is an important health problem within dentistry and pediatric dentistry.

Conclusions

In this research on the effectiveness of the implementation of the palatal grid for the treatment of digital sucking habits in children, the following conclusions were established in accordance with the general objective of the study and the proposed problem, which are:

- First, it was concluded according to the bibliographic review that the sucking reflex is a natural mechanism of the infant's organism to feed itself, however, if this behavior persists after breastfeeding, it makes children prone to acquiring parafunctional habits such as digital sucking, which is harmful to oral health.
- Second, digital or non-nutritive sucking is related to dentolabial deformities and malocclusion problems, mainly anterior open bite.
- Third, the literature review showed that there is a prevalence of malocclusions due to digital sucking in children aged 1 to 10 years, especially females.
- Finally, the implementation of the palatal grid is an effective dental alternative to treat malocclusion problems caused by non-nutritive sucking in children, however, there are no updated and significant studies that corroborate this effectiveness. Therefore, it is essential to carry out new research work, case studies and clinical studies to be able to verify the effectiveness of this device in comparison with other surgical and non-surgical methods and treatments to improve the oral health of infants.

Conflict of interest

The author of this scientific research declares that there is no conflict of interest in relation to the article presented.

Authors' contribution statement

The author Alexis Xavier Rivilla Torres contributed to the writing and preparation of the literature review article.

Bibliographic Review

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