



# **GRADUATION PROJECT**

## **Degree in Dentistry**

### **ORAL COMPLICATIONS ASSOCIATED TO LINGUAL PIERCINGS**

**Madrid, academic year 2025/2026**

Identification number: 100

## RESUMEN

**Introducción:** Los piercings linguales se han vuelto cada vez más populares, especialmente entre adultos jóvenes. Sin embargo, su impacto en la salud oral sigue siendo una preocupación relevante debido a la variedad de complicaciones descritas en la literatura; **Objetivos:** Este estudio tuvo como objetivo analizar y clasificar de manera sistemática las complicaciones orales asociadas a los piercings linguales, integrando la evidencia científica actual con el fin de mejorar la concienciación y la prevención entre pacientes y profesionales de la salud bucodental; **Metodología:** Se realizó una revisión sistemática de la literatura siguiendo las directrices PRISMA. Los estudios relevantes se identificaron mediante búsquedas en bases de datos y fueron seleccionados según criterios de inclusión y exclusión previamente definidos. Se incluyeron estudios observacionales y clínicos dentro del período establecido; **Resultados:** Los resultados muestran que los piercings linguales están asociados con una amplia variedad de complicaciones orales, afectando principalmente a los tejidos dentales y periodontales. Las complicaciones más frecuentes incluyen recesión gingival, fracturas y fisuras del esmalte, desgaste dental y lesiones de tejidos blandos. Estas alteraciones se localizan principalmente en las superficies linguales de los incisivos mandibulares. El trauma mecánico, la acumulación bacteriana y los factores conductuales fueron identificados como los principales mecanismos implicados; **Conclusiones:** Los piercings linguales representan un factor de riesgo significativo para la salud oral. Es fundamental mejorar la concienciación, el diagnóstico precoz y las estrategias preventivas para reducir la incidencia y gravedad de las complicaciones. Los profesionales odontológicos desempeñan un papel clave en la educación del paciente y en su manejo clínico.

## PALABRAS CLAVE

Odontología, piercing lingual, complicaciones orales, recesión gingival, trauma dental, enfermedad periodontal.

## ABSTRACT

**Introduction:** Tongue piercings have become increasingly popular, particularly among young adults. However, their impact on oral health remains a relevant concern due to the variety of complications reported in the literature; **Objectives:** This study aimed to systematically analyze and classify the oral complications associated with tongue piercings, integrating current

scientific evidence in order to improve awareness and prevention among patients and dental professionals; **Methods:** A systematic review of the literature was conducted following PRISMA guidelines. Relevant studies were identified through database searches and screened based on predefined inclusion and exclusion criteria. Observational and clinical studies published within the selected time frame were included; **Results:** The findings indicate that tongue piercings are associated with a wide range of oral complications, particularly affecting dental and periodontal tissues. The most commonly reported complications include gingival recession, enamel cracks and fractures, dental wear, and soft tissue lesions. These alterations are predominantly localized on the lingual surfaces of mandibular anterior teeth. Mechanical trauma, bacterial accumulation, and behavioral factors were identified as key contributors to the development and progression of these conditions; **Conclusions:** Tongue piercings represent a significant risk factor for oral health. Increased awareness, early diagnosis, and preventive strategies are essential to reduce the incidence and severity of associated complications. Dental professionals play a crucial role in patient education and clinical management.

**KEYWORDS**

Dentistry, tongue piercing, oral complications, gingival recession, dental trauma, periodontal disease.

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# 1. INTRODUCTION

## 1.1. Overview of the lingual piercings

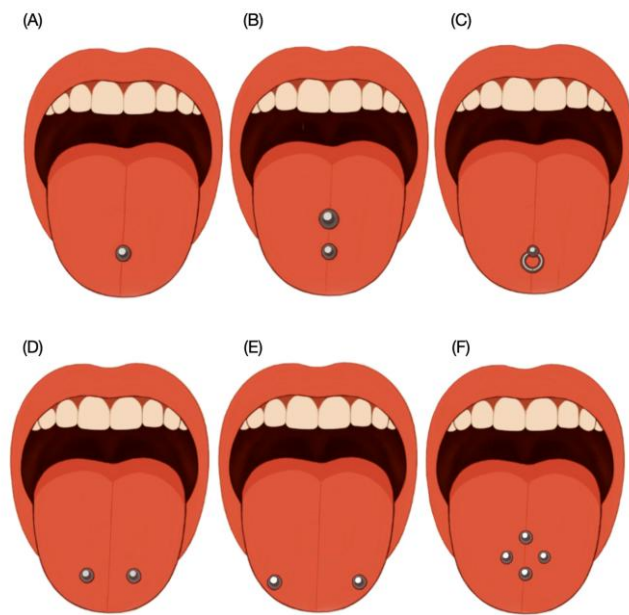
Body piercing is a widespread form of body modification characterized by the insertion of jewelry through a part of the human body. Piercings can be placed in various anatomical locations, including the ears, nose, lips, tongue, eyebrows, navel, and even cheeks. This practice has ancient tribal origins and has been performed for centuries for diverse purposes, ranging from aesthetic and cultural expression to ritual or spiritual significance (1,2).

Among all forms of piercings, oral piercings, particularly lingual piercings, have become increasingly common in recent decades, especially among adolescents and young adults. Because of the unique anatomy and function of the tongue, this type of piercing presents specific biological and clinical implications, making it an important subject of study in the field of dentistry (1,3,4).

### 1.1.1. Definition of lingual piercing

There are several types of intraoral piercings, including those located on the tongue, lips, cheeks, frenula, and even the uvula. Among these, the lingual piercing, commonly referred to as the tongue piercing, is the most widespread and socially recognizable form. It is particularly popular among teenagers and young adults, who often view it as a means of self-expression, aesthetic enhancement, or individuality (2,4).

A lingual piercing involves the insertion of a piece of metallic jewelry—usually a straight barbell—through the tongue, most commonly along the midline, between the tip and the lingual frenum. Other variations exist, such as lateral tongue piercings or multiple piercings, although they are less frequent due to their higher risk of complications (Figure 1). The jewelry typically consists of biocompatible materials such as surgical stainless steel, titanium, niobium, or Teflon, chosen to minimize allergic reactions and corrosion inside the oral cavity (2,5).



**Figure 1.** Schematic diagram illustrating the most common sites for tongue piercings. (A) Single middle tongue; (B) double piercing in midline; (C) ring piercing; (D,E) double piercing horizontally and (F) multiple piercing usually involving two or more piercings arranged in a row or symmetrically on either side of the midline (2).

### 1.1.2. Epidemiology and social context

Intraoral piercings have become relatively common in the general population, with studies reporting a prevalence ranging from 0.8% to 12% among the population. Among the different intraoral sites, the tongue is by far the most frequently pierced area, followed by the lips. This trend has been particularly observed among adolescents and young adults, with a slightly higher prevalence in women compared to men (3–7).

The growing popularity of tongue piercings reflects broader social and cultural changes over recent decades. Once considered an act of rebellion or nonconformity, oral piercings have gradually become a mainstream form of body art, largely normalized through social media exposure, celebrity influence, and contemporary fashion trends. The motivations for obtaining a lingual piercing are diverse: while many individuals view it as a means of aesthetic enhancement, self-expression, or body art, others associate it with a sense of individuality, boldness, or even social defiance (2,3,6).

## 1.2. Anatomical and Physiological Background

The tongue is one of the most important structures in the oral cavity and plays a crucial role in mastication, deglutition, speech, and taste perception. Because of its vital functions, it is essential to protect it, which first requires a proper understanding of its anatomy. The tongue has a complex structure composed of multiple sensitive elements, including muscles, nerves, blood vessels, and glands. Each of these components can potentially be affected during or after the placement of a piercing, leading to a variety of local or systemic complications.

### 1.2.1. Anatomical and physiological overview of the tongue

The tongue is a muscular organ, anatomically, its dorsal surface is divided into two main regions: the anterior two-thirds, known as the body, and the posterior one-third, known as the root or base of the tongue. The anterior portion is separated along the midline by a median fibrous septum, which divides the tongue into symmetrical halves. The dorsal surface is covered by a stratified squamous epithelium, which forms different types of papillae (filiform, fungiform, circumvallate, and foliate) some of which contain taste buds responsible for taste perception. In contrast, the ventral surface is smoother and thinner, allowing the underlying blood vessels to be visible. It is connected to the floor of the mouth by the lingual frenulum, a mucosal fold that separates the left and right sides of the tongue and limits excessive movement (8,9).

The tongue is richly supplied by blood vessels and nerves. The lingual artery, a branch of the external carotid artery, provides the main blood supply, while the lingual veins drain into the internal jugular vein. The anterior two-thirds of the tongue receives general sensation from the lingual nerve (branch of the mandibular nerve, CN V3) and taste from the facial nerve (CN VII). The posterior third is innervated by the glossopharyngeal nerve (CN IX) for both taste and sensation. Motor control of the tongue muscles is provided by the hypoglossal nerve (CN XII). On the ventral surface, the lingual and hypoglossal nerves run close to the lingual vessels (8).

The tongue is composed of several muscles divided into two groups: extrinsic and intrinsic. The extrinsic muscles attach to bones and are responsible for the gross movements of the tongue, such as protrusion, retraction, and elevation. They include the genioglossus, hyoglossus, styloglossus, and palatoglossus muscles. The intrinsic muscles, on the other hand, do not attach to any bone and are responsible for changing the tongue's shape, allowing fine movements during speech and mastication. These include the superior and inferior longitudinal,

transverse, and vertical muscles. All tongue muscles are innervated by the hypoglossal nerve (cranial nerve XII), except for the palatoglossus, which is supplied by the pharyngeal plexus (9).

The oral cavity contains several glands responsible for saliva secretion. There are three major salivary glands: the parotid, submandibular, and sublingual glands. The sublingual gland, located just beneath the tongue, is closely associated with it and contributes to the lubrication of the oral cavity. In addition, numerous minor salivary glands are scattered throughout the mucosa, including the von Ebner's glands, anterior lingual glands, labial, and palatine glands. Among them, the von Ebner's glands, located near the circumvallate papillae, secrete a serous fluid that plays an important role in cleansing the taste buds and facilitating taste perception (8,10).

### 1.2.2 Mechanisms of potential damage

Due to its complex anatomy, the tongue is an extremely sensitive organ, and the placement of a piercing can lead to several types of injury. Its rich vascular network increases the risk of hemorrhage at the moment of perforation, with the severity depending on the vessels affected. The intricate innervation of the tongue also makes it vulnerable to nerve injury, which may result in paresthesia or taste alteration (2,6).

The perforation itself creates a direct pathway for bacterial contamination, making the area prone to local or systemic infections, especially in the absence of proper hygiene. In addition to these direct injuries, the presence of jewelry in constant contact with oral tissues can cause mechanical irritation, leading to soft tissue inflammation, periodontal problems, or even tooth chipping and enamel wear (1–3,7).

## 1.3 Current State of the Subject

Lingual piercings, despite their popularity, have been associated with a wide range of complications that can affect both soft and hard oral tissues. These complications can be classified into short-term and long-term effects, depending on when they appear and the type of tissue involved.

### 1.3.1 Short-term complications

The placement of a tongue piercing is a traumatic procedure that can result in significant tissue injury if not performed by a professional with adequate anatomical knowledge. Accidental perforation of blood vessels or nerves may lead to hemorrhage, paresthesia, or dysesthesia. The piercing procedure also causes soft tissue trauma, initiating an inflammatory response characterized by pain, redness, and swelling. These immediate reactions are common and usually transient, but in some cases, excessive edema or bleeding can compromise speech, swallowing, or even airway patency (1,2,11–14).

### 1.3.2 Long-term complications

Although short-term complications are often transient, more severe long-term complications may develop over time. The piercing procedure itself creates an open wound that facilitates the entry and proliferation of bacteria and viruses. Studies have shown that tongue piercings increase the risk of transmission of viral infections such as Hepatitis A (HAV), Hepatitis B (HBV), Hepatitis C (HCV), HIV, Herpes Simplex Virus (HSV), and Epstein–Barr Virus (EBV), as well as bacterial infections including *Neisseria*-induced endocarditis, *Streptococcus viridans* infection, and Ludwig’s angina (1–3,13,14).

In addition to infectious risks, the piercing site may heal with scarring, occasionally leading to bifid tongue formation or atypical trigeminal neuralgia due to chronic nerve irritation. Once the jewelry is in place, mechanical complications can also occur: tooth fractures or chipping, gingival recession, and periodontal diseases are among the most common. The continuous friction of the jewelry against oral soft tissues can result in ulcerations, mucosal trauma, and chronic irritation, compromising oral health and comfort in the long term (1,2,5,6,11,12,15).

## 1.4 Justification of the study

Tongue piercings have become increasingly popular in recent years; however, numerous complications are associated both with the procedure itself and with the long-term presence of the piercing. These issues often reflect a lack of anatomical knowledge or aseptic technique among some practitioners, as well as insufficient post-procedure care (5,11).

Research has shown that only about 47% of individuals undergoing tongue piercing are informed about the potential risks to their general health. Awareness is even lower regarding oral complications: only 30% are aware of possible gingival issues, and about 40% of dental complications. This highlights a significant lack of information and awareness among the population concerning the consequences of lingual piercings (1,2,11,16).

Therefore, studies like this one are essential to improve public understanding of the associated risks and to encourage preventive education, both for patients and professionals involved in oral body modifications.

## **2. OBJECTIVE**

To systematically analyze and classify the oral complications associated with lingual piercings, integrating current scientific evidence to improve awareness and prevention among patients and professionals.

## **3. MATERIAL AND METHODS**

In order to conduct this literature review, an in-depth bibliographic search was performed using several reliable sources, including PubMed, Google Scholar, Medline Complete, as well as books and articles available in my personal library and through the CRAI Dulce Cachón library. The key terms used for the search included: *“tongue piercing”, “oral piercing”, “lingual piercing”, “complications”, “oral complications”, “periodontal disease”, “dental trauma”, “infection”, “bacterial infection”, “systemic complications”, “hepatitis”, “endocarditis”, “anatomy” and “tongue anatomy”*. The advanced research equations used in the databases were *“tongue piercing” AND “oral complications”, “lingual piercing” AND “infection”, “oral piercing” AND “systemic complications”, “tongue piercing” AND “periodontal disease”, “oral piercing” AND “dental fractures”*. For the selection of articles, filters including *“Full free text”* and *“Articles from the last 10 years”* were applied when available through CRAI Dulce Cachón.

The articles were chosen following inclusion and exclusion criteria presented in the Table 1.

The PICO research question (Participants, Intervention, Comparison, Outcomes) guiding this review was formulated as follows: In individuals with lingual piercings (participants), what are the reported oral complications associated with tongue piercings (intervention), compared to individuals without oral piercings (comparison), in terms of both short-term and long-term health outcomes (outcomes), focusing on prevalence, severity, and clinical implications.

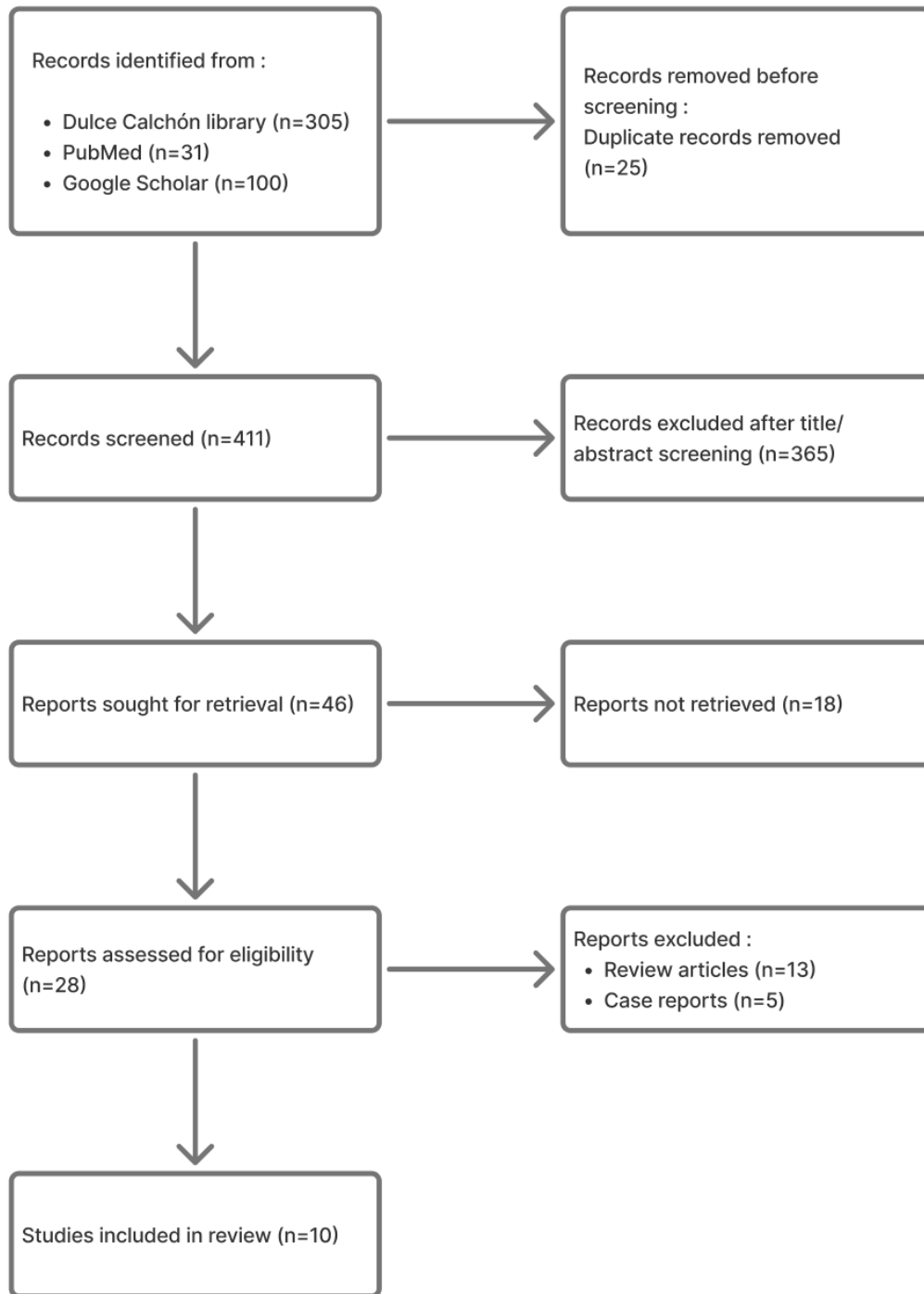
This structured methodology ensured a consistent, transparent and reproducible approach for identifying, analyzing and synthesizing the relevant scientific evidence.

| Inclusion criteria                                               | Exclusion criteria                                                                                     |
|------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| Scientific articles published between 2010 and 2026              | Articles published before 2010                                                                         |
| Articles from reliable sources (PubMed...)                       | Articles from unreliable sources                                                                       |
| Articles written in English                                      | Articles in other language than English                                                                |
| Information relevant to tongue piercings and their complications | Information not pertinent about the subject of the thesis such as other piercings than the tongue ones |

**Table 1:** Inclusion and Exclusion criteria

#### 4. RESULTS

PRISMA 2020 flow diagram illustrating the study selection process for the systematic review of oral complications associated with lingual piercings



**Source :** Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA2020 statement: an updated guideline for reporting systematic reviews. *BMJ* 2021;372:n71. doi:10.1136/bmj.n71 (17).

The literature search identified a total of 436 records across the selected databases (CRAI Dulce Cachón library, PubMed, and Google Scholar). After removing 25 duplicate records, 411 articles were screened based on title and abstract. A total of 365 records were excluded for

not being relevant to the research topic. 46 articles were sought for retrieval, of which 18 could not be accessed. 28 full-text articles were assessed for eligibility. After applying the inclusion and exclusion criteria, 18 studies were excluded (13 review articles and 5 case reports). Finally, 10 studies were included in the present review.

|   | Year & Authors              | Country                  | Type of Study                       | Sample Size (n)         | Age Range                        | Objective                                                                                                                                     | Summary                                                                                                                                                                                      |
|---|-----------------------------|--------------------------|-------------------------------------|-------------------------|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | 2019, Schmidt et al. (18)   | Switzerland              | Case Series                         | 18                      | 20.8 - 51.9                      | To investigate the association between oral piercings and periodontal conditions                                                              | Teeth located close to tongue piercings (TP) showed higher probing depth, gingival recession and attachment loss, particularly in mandibular incisors                                        |
| 2 | 2017, Tomaževič et al. (19) | Slovenia                 | Case-control study                  | 45 (17 TP / 28 control) | 16 - 28                          | To assess the prevalence and type of dental injuries and periodontal complications in individuals with tongue piercing compared with controls | Tongue piercing users showed significantly higher prevalence of dental injuries, particularly enamel fractures, and gingival recession compared with subjects without piercing.              |
| 3 | 2012, Gill et al. (20)      | United States of America | Retrospective epidemiological study | 617                     | 9 – 62                           | To analyze the epidemiology and clinical characteristics of oral piercing injuries treated in U.S. emergency departments.                     | An estimated 24,459 oral piercing injuries were treated in emergency departments between 2002 and 2008, with infections (42%) and puncture wounds (29%) being the most common complications. |
| 4 | 2022, Ibraheem et al. (21)  | Saudi Arabia             | Cross-sectional case-control study  | 97 (48 TP / 49 control) | Adults (mean $\approx$ 38 years) | To assess the influence of tongue piercing on periodontal and implant                                                                         | Individuals with tongue piercings showed significantly worse periodontal and inflammatory                                                                                                    |

|   |                           |         |                                     |                          |                       |                                                                                                                                                                      |                                                                                                                                                                                                                                             |
|---|---------------------------|---------|-------------------------------------|--------------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   |                           |         |                                     |                          |                       | peri-implant health status in adults.                                                                                                                                | parameters, particularly in the mandibular anterior region, including increased probing depth, gingival inflammation and crestal bone loss compared with controls.                                                                          |
| 5 | 2019, Kołek et al. (22)   | Poland  | Cross-sectional questionnaire study | 69 (tongue piercing )    | 18 - 40               | To evaluate the prevalence and types of complications associated with body and oral piercings.                                                                       | Among participants with oral piercings, several complications were reported including swallowing of jewelry, tooth abrasion, chipped teeth and gingival recession.                                                                          |
| 6 | 2019, Ziebolz et al. (23) | Germany | Cross-sectional case-control study  | 100 (50 TP / 50 control) | ≥18 (mean ≈ 28 years) | To comprehensively assess oral health status, oral behaviour and oral health-related quality of life in patients with tongue piercing compared with a control group. | Participants with tongue piercing showed worse dental and periodontal health, including higher probing depth, bleeding on probing, gingival recession and increased prevalence of enamel cracks and tooth abrasions compared with controls. |
| 7 | 2012, Ziebolz et al. (24) | Germany | Case-control study                  | 92 (46 TP / 46 control)  | 18 - 27               | To evaluate tooth and periodontal damage in individuals wearing tongue piercings compared with                                                                       | Subjects with tongue piercings showed significantly higher prevalence of enamel fissures, enamel cracks and gingival recessions, particularly on the lingual surfaces of mandibular                                                         |

|   |                           |        |                                     |             |         |                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                             |
|---|---------------------------|--------|-------------------------------------|-------------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   |                           |        |                                     |             |         | matched controls without piercing.                                                                                                                                                   | anterior teeth.                                                                                                                                                                                                                                                                                                             |
| 8 | 2020, Covello et al. (1)  | Italy  | Cross-sectional observational study | 70          | 18 - 40 | To evaluate the knowledge of risks related to oral piercings and to observe the main oral complications associated with them.                                                        | Clinical examination revealed frequent oral complications including gingivitis, gingival recession and tooth fractures in individuals with oral piercings. A large proportion of participants were also unaware of the potential oral health risks associated with piercings.                                               |
| 9 | 2012, Plessas et al. (25) | Greece | Cross-sectional study               | 110 (51 TP) | 18 - 25 | To compare the prevalence of dental and periodontal complications associated with lip and tongue piercings and to evaluate influencing factors such as wear time and piercing habits | Dental defects (tooth wear, chipping) and gingival recession were frequently observed near pierced sites. Tongue piercings showed higher prevalence of dental defects, while gingival recession occurred similarly in lip and tongue piercings. Longer piercing wear time was associated with increased periodontal damage. |

|    |                         |        |                    |                           |         |                                                                                                                                                                                                                                                            |
|----|-------------------------|--------|--------------------|---------------------------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 10 | 2010, Pires et al. (26) | Brazil | Case-control study | 180 (60 TP / 120 Control) | 13 - 28 | To evaluate periodontal status and identify risk factors for gingival recession, especially in the anterior lingual mandibular region. Individuals with tongue piercings showed up to an 11-fold higher risk of gingival recession compared with controls. |
|----|-------------------------|--------|--------------------|---------------------------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**Table 2:** Table of results

## 5. DISCUSSION

### 5.1. Principal findings

The results of this review indicate that tongue piercings are significantly associated with a wide range of oral complications, particularly affecting dental and periodontal tissues. The included studies consistently demonstrate a higher prevalence of gingival recession, enamel fractures, and dental wear in individuals with tongue piercings compared to non-pierced controls (18–26).

For instance, Covello et al. (2020) reported that approximately 86% of the 70 subjects with tongue piercings presented localized or generalized gingivitis, highlighting the strong association between oral piercings and periodontal inflammation (1). Similarly, both Covello et al. (2020) and Pires et al. (2010) identified gingival recession of up to 4 mm in the lingual mandibular region in nearly 80% of pierced individuals, compared to no more than 34% in control groups (1,26). These findings strongly support the hypothesis that tongue piercings contribute to the deterioration of periodontal tissues.

Dental damage was also consistently reported across the included studies. For example, Tomažević et al. (2017) found that individuals with tongue piercings had a 12.2-fold higher risk

of dental injury compared to non-pierced subjects (19). In addition, Ziebolz et al. (2012) observed a significantly higher prevalence of enamel fissures and cracks in pierced individuals, particularly on the lingual surfaces of mandibular anterior teeth (24). These results reinforce the idea that repetitive mechanical contact between the barbell and dental structures plays a central role in the development of dental complications.

Moreover, several studies suggest that the severity of these complications is influenced by additional factors such as the duration of piercing use, the length and material of the jewelry, and individual behaviors. Longer periods of exposure have been associated with increased tissue damage, supporting a cumulative effect of repeated trauma over time (5,21,23). Similarly, inappropriate jewelry dimensions may enhance contact with oral structures, thereby increasing the risk of both dental and periodontal injuries.

Taken together, these findings indicate that tongue piercings should be considered a relevant risk factor for oral health. The consistency of the reported complications across multiple studies highlights the importance of improving awareness and implementing preventive strategies among both patients and dental professionals. In particular, early identification of risk factors and modification of behaviors related to piercing use may play a crucial role in reducing the incidence and severity of these oral complications.

## **5.2. Interpretation of the Findings**

### **5.2.1. Mechanisms Underlying Oral Complications**

The oral complications associated with tongue piercings can be primarily explained by mechanical and repetitive traumatic processes affecting both dental and periodontal tissues. The presence of a barbell within the oral cavity creates continuous contact between the piercing and surrounding structures, particularly during functional activities such as speaking, mastication, and swallowing. This repeated contact generates microtrauma over time, which may progressively lead to enamel damage, including cracks, fractures, and wear. Similarly, constant friction against the gingival tissues contributes to the development of gingival recession, especially in areas that are anatomically more exposed, such as the lingual surfaces of the mandibular anterior teeth (18,20,22,23).

This mechanical mechanism is further supported by the characteristic localization of the lesions observed in the included studies. Indeed, the lingual surfaces of the lower anterior teeth are particularly vulnerable due to their direct and repeated contact with the barbell during tongue movements. The dynamic nature of the tongue increases both the frequency and intensity of these contacts, thereby amplifying the cumulative traumatic effect over time. As a result, even minor but repeated impacts may progressively compromise the structural integrity of both enamel and periodontal tissues (5,6).

In addition, the type, size, and positioning of the jewelry may further influence the extent of mechanical damage. Longer or improperly fitted barbells can increase the range of movement within the oral cavity, leading to more frequent collisions with dental and gingival structures. This may explain the variability in the severity of complications reported among different individuals, suggesting that not only the presence of the piercing but also its characteristics play a crucial role in the development of oral damage (23).

In addition to mechanical factors, the presence of a foreign body in the oral cavity may also facilitate bacterial accumulation on the surface of the jewelry. The barbell can act as a plaque-retentive factor, promoting the adhesion of oral microorganisms such as *Streptococcus oralis* and *Eikenella corrodens* (27). These bacteria are part of the normal oral microbiota and are involved in biofilm formation. The irregular surface and the material of the jewelry may favor bacterial colonization, making it more difficult to maintain adequate oral hygiene in the surrounding area.

Furthermore, the accumulation of bacterial biofilm around the piercing may contribute to a localized inflammatory response. This inflammatory process can exacerbate gingival irritation and may accelerate the progression of periodontal tissue breakdown over time. In this context, the piercing not only acts as a mechanical irritant but also as a contributing factor to microbial imbalance, reinforcing the multifactorial nature of the observed complications.

Altogether, these mechanical and microbiological mechanisms provide a plausible biological explanation for the consistent association observed between tongue piercings and oral complications in the included studies. These findings highlight that the development of such complications is not the result of a single factor, but rather the consequence of the interaction between repeated trauma, bacterial accumulation, and individual susceptibility.

### 5.2.2. Contributing and Aggravating Factors

In addition to the mechanical and microbiological mechanisms described, several factors appear to influence the severity and progression of oral complications associated with tongue piercings. One of the most consistently reported factors is the duration of piercing use. Studies such as that of Ziebolz et al. (2019) have shown that longer exposure to the piercing is associated with increased prevalence and severity of gingival recession ( $p = 0.03$ ) and dental cracks ( $p < 0.01$ ), suggesting a cumulative effect of repeated trauma over time (5,23). This time-dependent relationship highlights the progressive nature of oral damage, where continuous mechanical irritation gradually leads to more pronounced structural and periodontal alterations.

Furthermore, the characteristics of the jewelry itself, particularly the length and material of the barbell, may play a significant role. Longer barbells increase the range of movement within the oral cavity, thereby enhancing the frequency and intensity of contact with teeth and gingival tissues. Ziebolz et al. (2019) also reported significant associations between barbell length and several types of dental damage, including gingival recession, enamel infractions, and abrasions ( $p < 0.01$ ), as well as enamel cracks ( $p = 0.04$ ), reinforcing the importance of mechanical factors in the development of these complications (23). In addition, the material of the jewelry may influence both mechanical impact and bacterial adhesion, with harder materials potentially increasing the risk of enamel damage, while rough or porous surfaces may favor plaque accumulation (27).

Behavioral factors also contribute to the progression of oral complications. Habits such as playing with the piercing, biting on the barbell, or excessive manipulation can significantly increase mechanical stress on oral structures. These repetitive actions not only intensify direct trauma but may also accelerate the onset of dental fractures and gingival recession. In addition, poor oral hygiene may further exacerbate the accumulation of biofilm around the piercing, enhancing the inflammatory response of periodontal tissues (5,20,24). This interaction between behavioral and microbiological factors further supports the multifactorial nature of the observed complications.

Moreover, individual susceptibility may also play a role in the development and progression of these conditions. Variations in gingival thickness, tooth morphology, and oral hygiene practices may influence how patients respond to the presence of a tongue piercing. This

could explain why similar exposures do not always result in the same severity of complications among different individuals .

Overall, these factors highlight that the impact of tongue piercings on oral health is not solely dependent on their presence, but also on individual behaviors, duration of exposure, and characteristics of the jewelry, which together modulate the severity of the observed complications. This multifactorial perspective emphasizes the importance of personalized risk assessment and targeted preventive strategies in clinical practice.

### 5.2.3. Consistency with Existing Literature

The findings of this review are largely consistent with the existing literature on oral complications associated with tongue piercings . Most of the included studies report a higher prevalence of dental and periodontal alterations in individuals with tongue piercings compared to non-pierced controls, particularly in relation to gingival recession and enamel damage. For instance, Ibraheem et al. (2021) or Pires et al. (2010) reported significantly greater probing depths in the anterior mandibular region among pierced individuals compared to controls, indicating a clear impact on periodontal health. This consistency across different study designs, including cross-sectional and case-control studies, strengthens the reliability of the observed associations and is in agreement with previous literature reviews, such as the scoping review by Malcangi et al. (2023) (21,26,28).

Furthermore, the localization of the reported lesions, mainly affecting the lingual surfaces of mandibular anterior teeth, is repeatedly described in the literature and supports the mechanical explanation previously discussed. Ibraheem et al. (2021) also reported significantly higher clinical attachment loss on these surfaces ( $5.3 \pm 0.1$  mm), confirming the findings of systematic reviews such as that of Difloe-Geisert et al. (2023). This convergence of evidence suggests a consistent pattern of damage directly related to the anatomical position of the piercing and its interaction with oral structures during functional movements (18,21).

In addition, the agreement between studies extends beyond the type and localization of lesions to include the identification of contributing factors. Several authors highlight the role of duration of piercing use, jewelry characteristics, and behavioral habits in modulating the severity of oral complications. This reinforces the multifactorial nature of these conditions and

supports the biological plausibility of the associations observed across different populations (5,26).

However, some variability exists between studies regarding the prevalence and severity of specific complications. These differences may be explained by variations in sample size, population characteristics, duration of piercing use, and methodological differences. In particular, the inclusion or exclusion of certain risk factors, such as smoking, may significantly influence the results. For example, Ibraheem et al. (2021) excluded smokers from their sample, whereas Ziebolz et al. (2019) included a population in which a large proportion of participants were smokers, potentially contributing to differences in periodontal outcomes (21,23).

Moreover, differences in diagnostic criteria and clinical assessment methods may also limit the comparability of findings. The lack of standardized measurement protocols for parameters such as gingival recession or enamel damage introduces variability between studies, which should be taken into account when interpreting the results.

Overall, despite these methodological differences, the available evidence demonstrates a high level of agreement, reinforcing the conclusion that tongue piercings are associated with an increased risk of oral complications, particularly enamel damage and periodontal alterations. This consistency across studies strengthens the validity of the findings and supports the relevance of this topic in clinical practice.

### **5.3. Clinical Implications**

The findings of this review, particularly regarding the types of complications observed (such as gingival recession and dental damage) and their preferential localization in the anterior mandibular region, are consistent with the initial hypothesis that tongue piercings can have significant consequences on oral health. The results are also in agreement with previously published studies and literature reviews, which similarly report an increased risk of dental and periodontal alterations associated with lingual piercings (2,5).

The presence of these oral complications should be carefully considered in clinical practice when managing patients with tongue piercings. Dental professionals play a key role in the early identification and management of these conditions. Routine dental examinations should include careful assessment of areas most commonly affected, particularly the lingual

surfaces of mandibular anterior teeth, the ventral surface of the tongue, and the surrounding gingival tissues. Early signs such as gingival recession, enamel cracks, or mucosal lesions should be promptly identified in order to prevent further progression (29). In addition, periodontal parameters such as probing depth, clinical attachment loss, and bleeding on probing should be systematically evaluated in order to detect early inflammatory changes and monitor disease progression over time.

From a clinical management perspective, it is important to adopt a proactive and preventive approach. Regular follow-up appointments should be recommended for patients with tongue piercings, allowing for continuous monitoring and early intervention when necessary. In cases where significant damage is observed, such as advanced gingival recession or repeated dental fractures, clinicians may need to consider more invasive management strategies, including restorative treatments or periodontal therapy (29).

In addition, it is essential for dental professionals to inform patients about the potential risks associated with this practice, including dental trauma and periodontal damage, as a significant proportion of individuals remain unaware of its possible consequences (1,29). Patient education should not only focus on the risks but also on practical recommendations to minimize complications. Preventive measures such as maintaining optimal oral hygiene, reducing manipulation of the piercing, and ensuring appropriate jewelry size and material should be emphasized.

Furthermore, advising patients to replace metal barbells with shorter or less traumatic alternatives after the healing phase may help reduce mechanical stress on oral tissues. The importance of avoiding harmful habits, such as biting or playing with the jewelry, should also be clearly explained. In some cases, modifying or removing the piercing may be recommended to limit ongoing tissue damage, particularly when complications persist despite preventive measures.

Finally, dental professionals also have a role in preventive counseling for individuals considering tongue piercings. Providing clear and evidence-based information about potential oral health risks may support more informed decision-making. This highlights the importance of

integrating oral health education into broader preventive strategies, ultimately aiming to reduce the incidence and severity of complications associated with tongue piercings.

#### **5.4. Limitations of the Study**

This review presents several limitations that should be considered when interpreting the results. First, most of the included studies were observational in nature, particularly cross-sectional and case-control designs, which limits the ability to establish a causal relationship between tongue piercings and the observed oral complications (23,26). While these study designs allow for the identification of associations, they do not provide sufficient evidence to confirm a direct cause-and-effect relationship. Therefore, the results should be interpreted with caution, particularly when considering the clinical implications of these findings.

In addition, the sample sizes of several studies were relatively small and often based on specific populations, which may limit the generalizability of the findings (18,19). Many studies included participants from dental clinics or specific demographic groups, which may not accurately represent the general population. Differences in population characteristics, such as age, oral hygiene habits, socioeconomic status, and lifestyle factors, may also have influenced the results and were not consistently controlled across studies. This variability may contribute to differences in the reported prevalence and severity of oral complications (18).

Another limitation lies in the heterogeneity of the methodologies used. Variations in the assessment of oral conditions, such as differences in diagnostic criteria for gingival recession or dental damage, may affect the comparability of results between studies. Furthermore, some studies relied on clinical observations without standardized measurement protocols, which may introduce measurement bias. The absence of calibrated examiners or standardized indices may also reduce the reliability and reproducibility of the findings.

Moreover, potential confounding factors were not consistently addressed across the included studies. Variables such as smoking, alcohol consumption, parafunctional habits, and oral hygiene practices may significantly influence periodontal and dental health outcomes. The lack of control for these factors in some studies may have led to an overestimation or underestimation of the association between tongue piercings and oral complications (24).

In addition, the cross-sectional nature of many studies prevents the evaluation of the temporal progression of oral lesions. It remains unclear whether certain complications develop shortly after piercing placement or progressively over time. Longitudinal studies would be necessary to better understand the evolution and long-term impact of tongue piercings on oral health.

Moreover, this review focused specifically on tongue piercings. A broader analysis including other types of oral piercings, such as lip, uvula, or cheek piercings, could provide a more comprehensive understanding of the overall impact of oral piercings on oral health. Comparing different types of piercings could also help identify whether certain locations are associated with higher risks of specific complications.

Finally, this review focused exclusively on oral complications and did not consider systemic effects associated with tongue piercings. While this approach allowed for a more targeted analysis, it may limit the overall understanding of the full spectrum of potential complications. Future studies integrating both local and systemic outcomes would provide a more complete perspective on the health implications of oral piercings.

## **5.5. Recommendations and Future Perspectives**

Future research should aim to address the limitations identified in the current literature. In particular, there is a need for well-designed longitudinal studies to better understand the progression and long-term impact of oral complications associated with tongue piercings. Such studies would allow for a more accurate assessment of causal relationships and provide insight into the temporal evolution of dental and periodontal damage following piercing placement.

In addition, the development of standardized diagnostic criteria and evaluation methods would improve the comparability of results across studies. Establishing uniform protocols for assessing gingival recession, dental damage, and soft tissue alterations would enhance the quality, reproducibility, and reliability of future research. The use of calibrated examiners and validated clinical indices could further strengthen the methodological rigor of upcoming studies.

Future research should also focus on identifying specific risk factors associated with the development of oral complications. Variables such as age, oral hygiene practices, smoking habits, duration of piercing use, and characteristics of the jewelry should be systematically investigated in order to better understand individual susceptibility. This approach could contribute to the development of risk profiles and allow for more personalized preventive strategies in clinical practice.

From a clinical perspective, future studies should evaluate the effectiveness of preventive and educational interventions provided by dental professionals. Assessing the impact of patient education, regular follow-up, and modifications of jewelry characteristics could help determine the most effective approaches to reducing the incidence and severity of oral complications associated with tongue piercings. In particular, interventional studies comparing different preventive strategies could provide valuable evidence for clinical guidelines.

Moreover, interdisciplinary approaches involving dentists, hygienists, and other healthcare professionals could be explored in order to improve patient management and education. Integrating oral health awareness into broader public health strategies may also contribute to reducing the prevalence of complications associated with oral piercings.

Finally, further research should explore not only local oral complications but also potential systemic effects associated with tongue piercings. A more comprehensive understanding of both local and systemic outcomes would provide a global perspective on the health implications of this practice.

Overall, expanding the current body of evidence through more robust, standardized, and interdisciplinary research will be essential to improve both clinical management and preventive strategies in patients with oral piercings.

## **6. CONCLUSIONS**

1. This thesis aimed to systematically analyze and classify the oral complications associated with tongue piercings, while integrating current scientific evidence to improve

awareness and prevention among patients and dental professionals. Through the analysis of the available literature, it has become evident that tongue piercings are associated with significant oral health risks, particularly affecting dental and periodontal tissues.

2. The findings of this review allowed for the classification of the main oral complications related to tongue piercings. The most frequently reported alterations include gingival recession, enamel damage (such as cracks and fractures), and soft tissue lesions. These complications are predominantly localized in the anterior mandibular region, highlighting a consistent pattern of damage associated with this practice.
3. The analysis of the included studies suggests that these complications are mainly explained by repeated mechanical trauma caused by the contact between the jewelry and oral structures, as well as by microbiological factors related to biofilm accumulation. In addition, several contributing factors such as the duration of piercing use, the characteristics of the jewelry, and individual behaviors appear to influence the severity of these alterations.
4. These findings highlight the importance of improving awareness and prevention strategies. A significant proportion of individuals remain insufficiently informed about the potential oral health risks associated with tongue piercings. Therefore, dental professionals play a key role in patient education, early detection of complications, and the implementation of preventive measures in clinical practice.

## **7. SUSTAINABILITY**

The sustainability of this research is reflected in its impact on public health, prevention, and the reduction of risks and healthcare costs. As lingual piercings become increasingly common, many individuals remain unaware of the oral and systemic complications associated with them. By gathering and analysing current scientific evidence, this work contributes to public

health by promoting safer behaviours and improving overall oral well-being within the population.

This study also enhances prevention, as it provides reliable information that can guide adolescents, young adults, and professionals involved in piercing practices. Better awareness helps reduce avoidable complications such as periodontal diseases, dental fractures, and severe infections, supporting long-term oral health.

Finally, by reducing the incidence of complications that require professional treatment, emergency care, or hospitalization, this research contributes to lowering healthcare costs and minimizing unnecessary clinical interventions, improving the efficiency and sustainability of health systems.

Aligned with Sustainable Development Goal 3 (*Good Health and Well-Being*), this work encourages responsible decision-making and supports a more sustainable approach to oral healthcare.

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## 9. ANNEXES