Complications of Body Piercings: A Systematic Review

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PRACTICE **POINTS**

- Intraoral piercings of the tongue, lip, gingiva, or mucosa are associated with the most acute and chronic complications.
- Tissue damage is a common complication associated with cutaneous and mucocutaneous piercings, including trauma, bleeding and bruising, or dysesthesia.
- Given the rapid rise in the popularity of piercings, general practitioners and dermatologists should be aware of the multitude of acute or chronic complications associated with body piercings as well as effective treatment modalities.

The practice of body piercing has been present in many cultures worldwide for centuries, whether for religious or spiritual reasons or as a form of self-expression. In recent years, body piercings have become increasingly popular in all genders, with the most common sites being the ears, mouth, nose, eyebrows, nipples, navel, and genitals. However, despite the widespread utilization of piercings, a comprehensive literature review of associated complications is lacking. This scoping review aims to summarize the literature regarding complications associated with cutaneous and mucosal piercings. Given that body piercing has become more prevalent in recent years and that studies have noted an increase in a variety of piercing-induced complications, it is of utmost importance that piercing salons have proper hygiene practices in place and that patients are aware of the multitude of potential complications that can arise.

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The practice of body piercing has been present in cultures around the world for centuries. Piercings may be performed for religious or spiritual reasons or as a form of self-expression. In recent years, body piercings have become increasingly popular in all genders, with the most common sites being the ears, mouth, nose, eyebrows, nipples, navel, and genitals.[1] The prevalence of body piercing in the general population is estimated to be as high as 50%.[2] With the rising popularity of piercings, there also has been an increase in their associated complications, with one study noting that up to 35% of individuals with pierced ears and 30% of all pierced sites developed a complication.[3] Common problems following piercing include infections, keloid formation, allergic contact dermatitis, site deformation, and tooth fractures.[4] It is of utmost importance that health care professionals are aware of the potential complications associated with such a common practice. A comprehensive review of complications associated with cutaneous and mucosal piercings is lacking. We conducted a systematic review to

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Supplemental information is available online at www.mdedge.com/dermatology. This material has been provided by the authors to give readers additional information about their work.

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summarize the clinical characteristics, complication types and frequency, and treatments reported for cutaneous and mucosal piercings.

METHODS

We conducted a systematic review of the literature adhering to PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analyses) reporting guidelines.[5]

Search Strategy, Study Eligibility Criteria, and Study Selection

A literature search of the Embase, MEDLINE, and PubMed databases was performed on June 20, 2022, using search terms related to body piercing and possible piercing-induced complications (Supplemental Information online). All studies reporting complications following body piercing were included. In vitro and animal studies were excluded. Title and abstract screening were completed by 6 independent researchers (S.C., K.K., M.M-B., K.A., T.S., I.M.M.) using Covidence online systematic review software (www.covidence.org). Six reviewers (S.C., K.K., M.M-B., K.A., T.S., I.M.M.) independently evaluated titles, abstracts, and full texts to identify relevant studies. Conflicts were resolved by the senior reviewer (I.M.M.).

Data Extraction and Synthesis

Five reviewers (S.C., K.K., M.M-B., K.A., T.S.) independently extracted data from eligible studies using a standardized extraction form that included title; authors; year of publication; sample size; and key findings, including mean age, sex, piercing location, complication type, and treatment received.

Treatment type was placed into the following categories: surgical treatments, antimicrobials, medical treatments, direct-target therapy, oral procedures, avoidance, miscellaneous therapies, and no treatment. (Data regarding treatments can be found in the Supplemental Information online.)

RESULTS

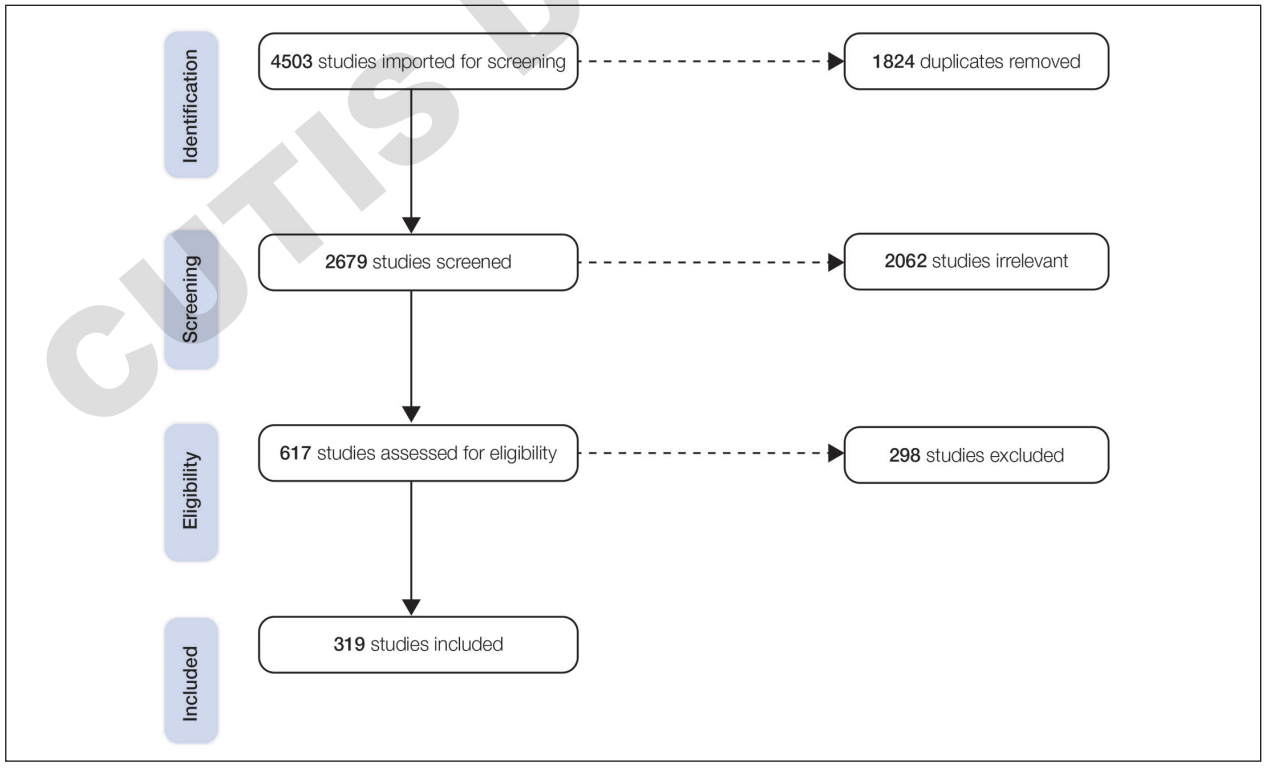
The combined search yielded 2679 studies, 617 of which underwent full-text review; 319 studies were included (Figure). Studies were published from 1950 to June 2022 and included both adult and pediatric populations.

Patient Characteristics

In total, our pooled analysis included data on 30,090 complications across 36,803 pierced sites in 30,231 patients (Table 1). Demographic data are available for 55% (n=30,231) of patients. Overall, 74% (22,247/30,231) of the individuals included in our analysis were female. The mean age was 27.8 years (range, 0–76 years).

Piercing Location

Overall, 36,803 pierced sites had a reported complication. The oral cavity, location not otherwise specified, was the most common site associated with a complication, accounting for 67% (n=24,478) of complications (Table 1).



PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analyses) diagram of study selection process.

Other reported sites included (in decreasing frequency) the ears (21%, n=7551), tongue (5%, n=1669), lip (3%, n=998), navel (2%, n=605), nose (1%, n=540), nipple (1%, n=344), face/body (1%, n=269), genitals/groin (0%, n=183), eyebrow (0%, n=161), hand (0%, n=4), and eyelid (0%, n=1). Piercing complications were more commonly reported among females across all piercing locations except for the eyebrow, which was equal in both sexes.

Complications

Local Infections—Local infections accounted for 36% of reported complication types (n=10,872/30,090): perichondritis (1%, n=85); abscesses (0%, n=25); bacterial colonization (1%, n=106); and local infections, not otherwise specified (98%, n=10,648)(Table 2). The majority of local infections were found to be secondary to piercings of the ear and oral cavity. The nipple was found to be a common site for abscesses (40%, n=10), whereas the tongue was found to be the most common site for bacterial colonization (69%, n=73).

Immune-Mediated Issues—Immune-mediated issues encompassed 5% of the total reported complications (n=1561/30,090). The most commonly reported immune-mediated complications included allergies (31%, n=482), edema and swelling (21%, n=331), dermatitis (18%, n=282), and inflammatory lesions (17%, n=270). The majority were found to occur secondary to ear piercings, with the exception of edema, which mainly occurred secondary to tongue piercings (45%, n=150), and allergy, which primarily was associated with oral piercings (51%, n=245)(Table 2).

Tissue Damage—Tissue damage accounted for 43% of all complications (n=13,036/30,090). The most common forms of tissue damage were trauma (55%, n=7182), dysesthesia (22%, n=2883), bleeding and bruising (18%, n=2376), and pain (3%, n=370)(Table 2). Trauma was mainly found to be a complication in the context of oral piercings (99%, n=7121). Similarly, 94% (n=2242) of bleeding and bruising occurred secondary to oral piercings. Embedded piercings (92%, n=127), deformity (91%, n=29), and necrosis (75%, n=3) mostly occurred following ear piercings. Lip piercings were found to be the most common cause of damage to surrounding structures (98%, n=50).

Oral—Overall, 3193 intraoral complications were reported, constituting 11% of the total complications (Table 2). Oral complications included dental damage (86%, n=2732), gum recession (14%, n=459), and gingivitis (0%, n=2). Dental damage was mostly reported following oral piercings (90%, n=2453), whereas gum recession was mostly reported following lip piercings (59%, n=272).

Proliferations—Proliferations accounted for 795 (3%) of reported piercing complications. The majority (97%, n=772) were keloids, 2% (n=16) were other benign growths,

TABLE 1. Patient Characteristics and Piercing Locations of Included Studies Reporting on Piercing Complications

Piercing location (no. of studies)	n (%[a])(N=36,803)	Sex (F:M)(22,247:7984)	Mean age (range), y
Ear (153)	7551 (21)	3933:897	22.5 (0–76)
Tongue (84)	1669 (5)	239:113	22.1 (13–59)
Nose (25)	540 (1)	96:1	23.4 (9–70)
Nipple (30)	344 (1)	36:4	27.8 (15–60)
Face/body (7)	269 (1)	N/A	27.0 (17–37)
Hand (3)	4 (0)	3:1	20.8 (19–22)
Genitals/groin (20)	183 (0)	18:12	31.6 (21–45)
Lip (39)	998 (3)	229:111	22.8 (17–52)
Navel (22)	605 (2)	78:1	21.1 (13–35)
Eyebrow (14)	161 (0)	4:4	21.7 (8–26)
Eyelid (1)	1 (0)	N/A	18.0 (N/A)
Oral cavity, location not otherwise specified (5)	24,478 (67)	17,611:6840	20.6 (19–26)

Abbreviations: F, female; M, male; N/A, not available

[a]All rounded to the nearest whole number.

TABLE 2. Summary of Reported Piercing Complications by Location (N=30,090)

Type of complications (no. of cases)	Piercing location, n (%[a])
Local infection (10,872)	
Abscess (25)	Ear, 11 (44); tongue, 2 (8); nipple, 10 (40); navel, 1 (4); nose, 1 (4)
Actinomycosis (1)	Nipple, 1 (100)
Perichondritis (85)	Ear, 85 (100)
Cellulitis (4)	Eyelid, 1 (25); eyebrows, 2 (50); nipple, 1 (25)
Pheohyphomycosis (1)	Ear, 1 (100)
Fournier gangrene (1)	Genitals, 1 (100)
Myiasis (1)	Genitals, 1 (100)
Local infections, not otherwise specified (10,648)	Ear, 213 (2); hand, 3 (<1); genitals, 6 (<1); nipple, 33 (<1); tongue, 17 (<1); face/body, 1 (<1); eyebrows, 1 (<1); navel, 2 (<1); nose, 2 (<1); lip, 28 (<1); oral, 10,342 (97)
Bacterial colonization (106)	Tongue, 73 (69); face, 8 (7); genitals, 1 (1); ears, 24 (23)
Immune-mediated issues (1561)	
Inflammatory issues (270)	Ear, 243 (90); tongue, 8 (3); nose, 1 (<1); hand, 1 (<1); genitals, 2 (1); navel, 1 (<1); eyebrows, 1 (<1); oral, 13 (5)
Granuloma (24)	Ear, 14 (58); nose, 9 (38); eyebrows, 1 (4)
Erythema (107)	Ear, 103 (96); tongue, 1 (1); nose, 1 (1); lip, 1 (1); navel 1 (1)
Edema and swelling (331)	Ear, 77 (23); tongue, 150 (45); nose, 2 (1); genitals, 1 (<1); lip, 57 (17); navel, 6 (2); eyebrows, 4 (1); oral, 34 (10)
Dermatitis (282)	Ear, 278 (99); nose, 1 (<1); navel, 3 (1)
Scars and hyperplasia (35)	Ear, 17 (49); tongue, 1 (3); lip, 2 (6); navel, 15 (43)
Allergy (482)	Ear, 235 (49); navel, 2 (<1); oral, 245 (51)
Pruritus (30)	Ear, 30 (100)
Tissue damage (13,036)	
Bleeding and bruising (2376)	Ear, 49 (2); tongue, 61 (3); nose, 2 (<1); nipple, 5 (<1); genitals, 2 (<1); lip, 7 (<1); navel, 6 (<1); eyebrows, 2 (<1); oral, 2242 (94)
Necrosis (4)	Ear, 3 (75); genitals, 1 (25)
Embedded/retained piercings (138)	Ear, 127 (92); tongue, 2 (1); nose, 3 (2); nipple, 4 (3); hand, 1 (1); lip, 1 (1)
Trauma (7182)	Ear, 38 (1); tongue, 3 (<1); nipple, 13 (<1); genitals, 5 (<1); navel, 2 (<1); oral, 7121 (99)
Deformity (32)	Ear, 29 (91); tongue, 2 (6); nose, 1 (3)
Pain (370)	Ear, 76 (21); tongue, 135 (36); nose, 8 (2); hand, 1 (<1); genitals, 1 (<1); lip, 64 (17); navel, 6 (2); eyebrows, 4 (1); oral, 75 (20)
Dysesthesia (2883)	Ear, 2783 (97); tongue, 3 (<1); nipple, 63 (2); genitals, 30 (1); lip, 3 (<1); navel, 1 (<1)
Damage to surrounding structures (51)	Tongue, 1 (2); lip, 50 (98)

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TABLE 2. (continued)

Type of complications (no. of cases)	Piercing location, n (%[a])
Oral damage (3193)	
Dental damage (2732)	Tongue, 193 (7); lip, 86 (3); oral, 2453 (90)
Gum recession (459)	Tongue, 182 (40); lip, 272 (59); oral, 5 (1)
Gingivitis (2)	Tongue, 1 (50); lip, 1 (50)
Proliferations (795)	
Keloid (772)	Ear, 741 (96); tongue, 1 (<1); nipple, 10 (1); face/body, 11 (1); genitals, 9 (1)
Other benign growths (16)	Ear, 6 (38); tongue, 2 (13); nose, 2 (13); nipple, 1 (6); genitals, 3 (19); lip, 2 (13)
Malignancy (7)	Ear, 4 (57); tongue, 1 (14); nipple, 1 (14); lip, 1 (14)
Systemic issues (633)	
Cardiac issues (21)	Ear, 4 (19); tongue, 7 (33); nose, 3 (14); nipple, 1 (5); genitals, 1 (5); navel, 4 (19); oral 1 (5)
Hepatitis (107)	Ear, 106 (99); tongue, 1 (1)
HIV (1)	Genitals, 1 (100)
HSV (1)	Tongue, 1 (100)
Chlamydia (9)	Genitals, 9 (100)
Gonorrhea (1)	Genitals, 1 (100)
Bacterial vaginosis (1)	Genitals, 1 (100)
Tetanus (52)	Ear, 49 (94); navel, 1 (2); lip 1, (2); genitals, 1 (2)
Aspiration and/or inhalation (8)	Ear, 2 (25); tongue, 1 (13); nose, 2 (25); lip, 1 (13); oral, 2 (25)
Secondary organ involvement (150)	Ear, 54 (36); tongue, 24 (16); nose, 1 (1); nipple, 3 (2); face/body, 1 (1); genitals, 41 (27); lip, 3 (2); navel, 5 (3); eyebrows, 1 (1); oral, 17 (11)
Functional impairment (282)	Tongue, 222 (79); genitals, 1 (<1); lip, 59 (21)

Abbreviation: HSV, herpes simplex virus.

[a]All rounded to the nearest whole number.

and 1% (n=7) were malignancies. These complications mostly occurred secondary to ear piercings, which resulted in 741 (96%) keloids, 6 (38%) benign growths, and 4 (57%) malignancies.

Systemic—Overall, 2% (n=633) of the total complications were classified as systemic issues, including functional impairment (45%, n=282), secondary organ involvement (24%, n=150), cardiac issues (3%, n=21), and aspiration/inhalation (1%, n=8). Nonlocalized infections such as hepatitis or an increased risk thereof (17%, n=107), tetanus (8%, n=52), chlamydia (1%, n=9), HIV (0%, n=1), herpes simplex virus (0%, n=1), gonorrhea (0%, n=1), and bacterial vaginosis (0%, n=1) also were included in this category. The tongue, ear, and genitals were the locations most involved in these complications (Table 2). Secondary organ involvement mostly occurred after ear (36%, n=54) and genital piercings (27%, n=41). A total of 8 cases of piercing aspiration and/or inhalation were reported in association with piercings of the head and neck (Table 2).

COMMENT

Piercing Complications

Overall, the ear, tongue, and oral cavity were found to be the sites with the most associated complications recorded in the literature, and local infection and tissue damage were found to be the most prevalent types of complications. A plethora of treatments were used to manage piercing-induced complications, including surgical or medical treatments and avoidance (Supplemental Information). Reports by Metts[6] and Escudero-Castaño et al[7] provide detailed protocols and photographs of piercings.

Infections

Our review found that local infections were commonly reported complications associated with body piercings, which is consistent with other studies.[1] The initial trauma inherent in the piercing process followed by the presence of an ongoing foreign body lends itself to an increased risk for developing these complications. Wound healing after piercing also varies based on the piercing location.

The rate and severity of the infection are influenced by the anatomic location of the piercing, hygiene, method of piercing, types of materials used, and aftercare.[8] Piercing cartilage sites, such as the helix, concha, or nose, increases susceptibility to infections and permanent deformities. Cartilage is particularly at risk because of its avascular nature.[9] Other studies have reported similar incidences of superficial localized infections; infectious complications were seen in 10% to 30% of body piercings in one study,[3] while 45% of American and Australian college students reported infection at a piercing site in a second study.[10]

Systemic Issues

Systemic issues are potentially the most dangerous piercing-induced complications, though they were rarer in our analysis. Some serious complications included septic emboli, fatal staphylococcal toxic shock syndrome, and death. Although some systemic issues, such as staphylococcal toxic shock syndrome and septic sacroiliitis, required extensive hospital stays and complex treatment, others had lifelong repercussions, such as hepatitis and HIV. One report showed an increased incidence of endocarditis associated with body piercing, including staphylococcal endocarditis following nasal piercings, *Neisseria* endocarditis following tongue piercings, and *Staphylococcus epidermidis* endocarditis following nipple piercings.[11] Moreover, Mariano et al[12]—who noted a case of endocarditis and meningitis associated with a nape piercing in a young female in 2015—reinforced the notion that information pertaining to the risks associated with body piercing must be better disseminated, given the potential for morbid or fatal outcomes. Finally, nonsterile piercing techniques and poor hygiene were found to contribute substantially to the increased risk for infection, so it is of utmost importance to reinforce proper practices in piercing salons.[4]

Immune-Mediated Issues

Because piercings are foreign bodies, they are susceptible to both acute and chronic immune responses. Our study found that allergies and dermatitis made up almost half of the immune-mediated piercing complications. It is especially important to emphasize that costume jewelry exposes our skin to a variety of contact allergens, most prominently nickel, heightening the risk for developing allergic contact dermatitis.[13] Moreover, a study conducted by Brandão et al[14] found that patients with pierced ears were significantly more likely to react to nickel than those without pierced ears (P=.031). Although other studies have found that allergy to metals ranges from 8.3% to 20% in the general population,[15] we were not able to quantify the incidence in our study due to a lack of reporting of common benign complications, such as contact dermatitis.

Tissue Damage and Local Problems

Our review found that tissue and oral damage also were commonly reported piercing complications, with the most common pathologies being trauma, dysesthesia, bleeding/bruising, and dental damage. Laumann and Derick[16] reported that bleeding, tissue trauma, and local problems were common physical health problems associated with body piercing. Severe complications, such as abscesses, toxic shock syndrome, and endocarditis, also have been reported in association with intraoral piercings.[17] Moreover, other studies have shown that oral piercings are associated with several adverse oral and systemic conditions. A meta-analysis of individuals with oral piercings found a similar prevalence of dental fracture, gingival recession, and tooth wear (34%), as well as unspecified dental damage (27%) and tooth chipping (22%). Additionally, this meta-analysis reported a 3-fold increased risk for dental fracture and 7-fold

increased risk for gingival recession with oral piercings.[18] Another meta-analysis of oral piercing complications found a similar prevalence of dental fracture (34%), tooth wear (34%), gingival recession (33%), unspecified dental damage (27%), and tooth chipping (22%).[19] Considering the extensive amount of cumulative damage, wearers of oral jewelry require periodic periodontal evaluations to monitor for dental damage and gingival recession.[20] There are limited data on treatments for complications of oral piercings, and further research in this area is warranted.

Proliferations and Scars

Although proliferations and scarring were among the least common complications reported in the literature, they are some of the most cosmetically disfiguring for patients. Keloids, the most common type of growth associated with piercings, do not naturally regress and thus require some form of intervention. Given the multimodal approach used to treat keloids, as described by the evidence-based algorithm by Ogawa,[21] it is not surprising that keloids also represented the complication most treated with medical therapies, such as steroids, and also with direct-target therapy, such as liquid nitrogen therapy (Supplemental Information).

Other proliferations reported in the literature include benign pyogenic granulomas[22] and much less commonly malignant neoplasms such as basal cell carcinoma[23] and squamous cell carcinoma.[24] Although rare, treatment of piercing-associated malignancies include surgical removal, chemotherapy, and radiation therapy (Supplemental Information).

Limitations

There are several limitations to our systematic review. First, heterogeneity in study designs, patient populations, treatment interventions, and outcome measures of included studies may have affected the quality and generalizability of our results. Moreover, because the studies included in this systematic review focused on specific complications, we could not compare our results to the literature that analyzes incidence rates of piercing complications. Furthermore, not all studies included the data that we hoped to extract, and thus only available data were reported in these instances. Finally, the articles we reviewed may have included publication bias, with positive findings being more frequently published, potentially inflating certain types and sites of complications and treatment choices. Despite these limitations, our review provides essential information that must be interpreted in a clinical context.

CONCLUSION

Given that cutaneous and mucosal piercing has become more prevalent in recent years, along with an increase in the variety of piercing-induced complications, it is of utmost importance that piercing salons have proper hygiene practices in place and that patients are aware of the multitude of potential complications that can arise—whether common and benign or rare but life-threatening.

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