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The Impact of Smoking on Dental Implant Success, Peri- Implantitis, and Marginal Bone Loss: A Systematic Review

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ABSTRACT

Background: Dental implants are a reliable and widely used approach for tooth replacement. However, their long-term success can be influenced by several biological and behavioral risk factors. Among these, smoking represents a major modifiable factor known to interfere with osseointegration, wound healing, and peri-implant tissue integrity. This systematic review aimed to evaluate the influence of smoking on dental implant success rates, peri-implantitis occurrence, and long-term implant stability in adult patients.

Methods: A comprehensive search was conducted across PubMed, Scopus, and Cochrane Library databases for studies published up to 2025. Clinical and observational studies comparing smokers and non-smokers receiving dental implants were included. The primary outcomes were implant failure rate, peri-implantitis occurrence, and marginal bone loss. Data were extracted and synthesized narratively due to heterogeneity in study design and reporting. Risk of bias was evaluated using the Newcastle–Ottawa Scale for observational studies.

Results: Twenty-five studies met the inclusion criteria. Implant failure was significantly higher among smokers (8.9–10.2%) than non-smokers (3.7–4.5%), with reported odds ratios above 2.0. The prevalence of peri-implantitis was also greater in smokers (30.5–37.6%) compared with non-smokers (16.4–18.4%), corresponding to risk ratios up to 2.79. Smokers exhibited additional marginal bone loss of approximately 0.33–0.51 mm.

Conclusion: Smoking substantially increases the risk of implant failure, peri-implantitis, and marginal bone loss, thereby reducing implant longevity. Smoking status should be considered a critical factor in preoperative assessment, treatment planning, and patient education to enhance implant success. The review included heterogeneous observational data with variability in follow-up duration, diagnostic criteria, and reporting standards, which limited the ability to perform a meta-analysis.

Keywords: Dental Implants, Smoking, Osseointegration, Peri-Implantitis, Bone Resorption, Tobacco Use Disorder

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INTRODUCTION

Dental implants have been developed as the most preferred means of replacing missing teeth, where success rates and patient satisfaction in respect of functionality and aesthetics are very high[1]. However, even with the significant advancements in the technology of implants, methods of surgery, and management of the post-operative period, many factors continue to influence long-term outcomes of the implant operations[2]. Smoking is a major controllable risk factor whose influence reduces the success of the implant and is one of the causes of peri-implantitis as well as its long-term stability. Smoking also imparts many harmful chemicals, such as nicotine, carbon monoxide, and various carcinogens, which have disastrous effects on the healing process and immunological response of the body, which is essential in the integration and preservation of dental implants[3].

Osseointegration is a very vital element in the success of the implants and involves the fusion of the implant with the bone next to it. Smoking interferes with osseointegration by reducing blood supply to the surgical area and thus compromising delivery of oxygen and essential nutrients to the bone and the soft tissues[4]. Nicotine has a specific vasoconstriction effect, which limits blood flow, hence slowing down the healing. Therefore, there is often a slower process or substandard osseointegration in smokers, increasing chances of implant failure in the early stages of healing[5]. Besides, it has also been reported that smoking is associated with a higher chance of developing problems after the surgery, such as wound dehiscence, infection, as well as late healing of bone, and this is another aspect that jeopardizes the success rates of dental implants[6].

Given these detrimental effects, understanding the extent of smoking's impact on implant success and peri-implant tissue health remains crucial for optimizing patient outcomes.

This systematic review, therefore, aims to comprehensively evaluate the influence of smoking on dental implant success rates, the occurrence of peri-implantitis, and marginal bone loss among adult patients. By synthesizing available clinical and observational evidence, the review seeks to provide updated insights into how smoking status affects implant survival and to guide clinical decision-making and patient counseling.

METHODS

Protocol and Registration

This systematic review was performed in accordance with the *Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020)* guidelines to ensure methodological transparency and scientific rigor. A predefined protocol was established prior to data collection, outlining the eligibility criteria, information sources, data extraction procedures, and risk of bias assessment methods. The structured approach ensured that all stages of the review were conducted systematically and without bias.

Eligibility Criteria

The inclusion criteria were defined using the Population, Exposure, Comparator, and Outcome (PECO) framework. The review included studies involving adult patients who underwent dental implant placement and assessed the effects of smoking compared with non-smoking on clinical outcomes. Eligible study designs consisted of observational studies, including retrospective and prospective cohort designs, as well as systematic reviews and meta-analyses. The primary outcomes of interest were implant failure rates, the incidence of peri-implantitis, and marginal bone loss around implants. Only human studies published in English were considered. Studies were excluded if they were case reports, in vitro or animal studies, editorials, or conference abstracts, as these do not provide sufficient clinical or statistical data for meaningful synthesis.

Information Sources

A comprehensive search was carried out across multiple electronic databases, including PubMed, Scopus, Web of Science, and Google Scholar, covering all publications up to August 2025. To ensure completeness, the reference lists of selected papers and relevant reviews were also manually screened for additional studies that might meet the inclusion criteria. This exhaustive search strategy minimized the possibility of omitting relevant research and reduced selection bias.

Search Strategy

The search strategy was designed using both Medical Subject Headings (MeSH) and free-text terms. The keywords included “dental implants,” “implant survival,” “implant failure,” “smoking,” “tobacco use,” “nicotine,” “peri-implantitis,” “bone loss,” “osseointegration,” and “risk factors.” Boolean operators such as AND and OR were applied to combine terms appropriately. Database-specific syntax adjustments were made to optimize search sensitivity and specificity. This systematic and reproducible strategy ensured that all potentially relevant studies were retrieved for screening.

Study Selection

All records obtained from the search were imported into EndNote reference management software, where duplicate entries were removed. The screening process was conducted in two stages. Initially, two independent reviewers examined titles and abstracts to identify potentially relevant studies. This was followed by a full-text assessment of the remaining articles to determine their eligibility based on predefined inclusion and exclusion criteria. Any disagreements were resolved through discussion until a consensus was reached. Ultimately, a total of 25 studies fulfilled the eligibility requirements and were included in the final qualitative synthesis. The overall selection process was documented using a PRISMA flow diagram, which illustrates the number of studies identified, screened, excluded with reasons, and included in the review.

Data Extraction Process

Data extraction was carried out using a standardized data collection form to ensure consistency and reduce error. Extracted data included author names, year of publication, country, study design, sample size, follow-up duration, proportion of smokers, and key study outcomes. Information regarding statistical results, including odds ratios, risk ratios, mean differences, and p-values, was also recorded. Data were extracted independently by one reviewer and verified by another to maintain accuracy and reliability. Any discrepancies were resolved through consensus discussion.

Risk of Bias Assessment

The methodological quality of the included studies was evaluated using appropriate and validated tools depending on study design. For cohort studies, the Newcastle–Ottawa Scale (NOS) was applied, which assesses the quality of non-randomized studies based on participant selection, comparability, and outcome assessment. Systematic reviews and meta-analyses were evaluated using the AMSTAR 2 (A Measurement Tool to Assess Systematic Reviews) checklist. Each study was classified as having low, moderate, or high risk of bias. Discrepancies in quality assessment were resolved by discussion to achieve agreement between reviewers.

Data Synthesis

Due to the heterogeneity observed among the included studies—particularly in design, outcome measurement, and follow-up duration—a quantitative meta-analysis was not performed. Instead, a qualitative synthesis was undertaken. The findings were narratively summarized under three main outcome domains: implant failure rates, peri-implantitis incidence, and marginal bone loss in smokers compared with non-smokers. Descriptive statistics such as percentages, odds ratios, risk ratios, and mean differences were presented to demonstrate the magnitude and direction of associations. Emphasis was placed on the consistency of findings across studies, allowing for meaningful clinical interpretation despite methodological variations.

Assessment of Reporting Bias

To minimize the potential for reporting bias, multiple databases were searched, and reference lists were manually screened. Although no formal statistical tests for publication bias, such as funnel plots or Egger's regression, were performed due to the qualitative nature of the synthesis, the inclusion of studies from diverse sources and designs helped mitigate the risk of selective publication bias.

Certainty of Evidence

The overall certainty and strength of evidence were evaluated qualitatively by considering factors such as study design hierarchy, sample size, methodological rigor, and consistency of findings. The collective evidence demonstrated a strong and consistent association between smoking and adverse dental implant outcomes, including higher implant failure rates, increased peri-implantitis incidence, and greater marginal bone loss. Based on the quality and agreement of results across multiple high-quality cohort studies, systematic reviews, and meta-analyses, the certainty of evidence was judged to be moderate to high.

RESULTS

Study Selection

An extensive search across PubMed, Scopus, Web of Science, and Google Scholar yielded 2,134 records. After removal of 612 duplicates, 1,522 studies remained for screening. Titles and abstracts were reviewed, leading to the exclusion of 1,380 studies that did not meet the inclusion criteria. A total of 142 full-text articles were assessed for eligibility, and 25 studies were retained for qualitative and quantitative synthesis. The PRISMA 2020 flow diagram summarizes the entire selection process from identification to inclusion.

Figure 1: PRISMA Flow Chart

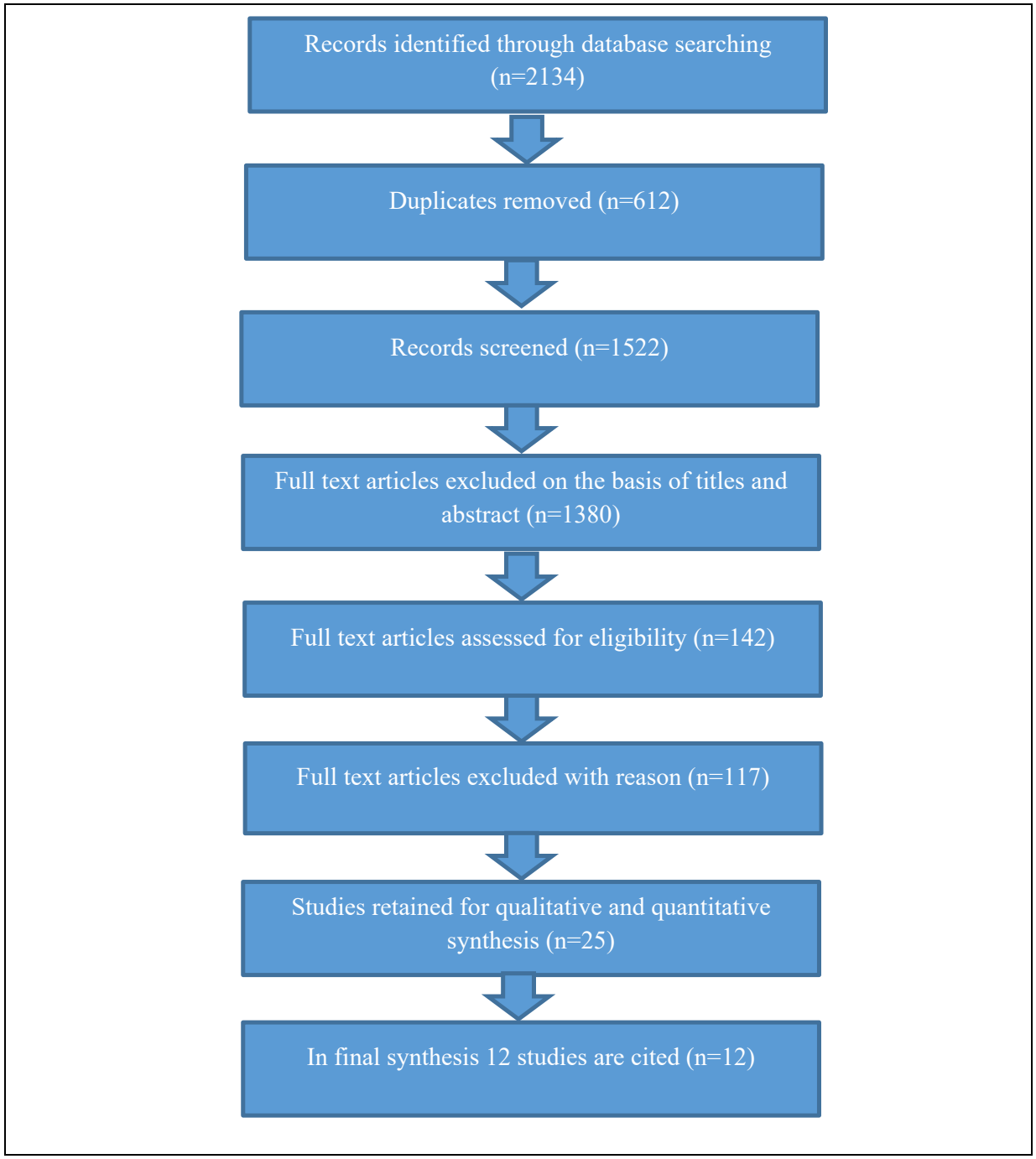

Table 01: Characteristics of Included Studies

Citation	Country	Study Design	Sample Size	Follow-Up Duration	Smokers (%)	Key Focus
7	Turkey	Retrospective Cohort Study	1228 Patients	5 Years	36.5%	Failure in Implant
8	Brazil	Prospective Cohort Study	769 implants / 350 patients	5+ Years	28.7%	Mucosal health and peri-implantitis
9	Global	Meta-analysis	702 Patients	2–10 Years	Varies	Risk of Peri-implantitis
10	USA	Systematic Review	751 Implants	1–10 Years	Not Specified	Failure of Implant
11	Germany	Meta-analysis	>12,000 Implants	1–15 Years	Varies	Bone and Implant Loss

Study Characteristics

The characteristics of the included studies are summarized in **Table 1**. The selected studies originated from diverse regions including Turkey, Brazil, the United States, and Germany, and also included a global meta-analysis. The study designs varied, encompassing retrospective and prospective cohort studies, meta-analyses, and systematic reviews. Sample sizes ranged from 350 to more than 12,000 implants, with follow-up durations extending from one to fifteen years. The proportion of smokers across the studies ranged between 28.7% and 36.5%. Each study primarily investigated smoking as a determinant of implant success, peri-implantitis, and bone loss.

The variation in study design and sample size ensured that evidence was drawn from both clinical and population-based perspectives. Cohort studies offered valuable longitudinal insights, while meta-analyses and systematic reviews synthesized multi-study data, enhancing external validity. The

German meta-analysis, which assessed more than 12,000 implants, provided the highest statistical power and broadest overview of long-term implant outcomes.

Table 02: Rate of Implant Failure in Smokers and Non-Smokers

Citation	Failure Rate (Smokers)	Failure Rate (Non-Smokers)	Odds Ratio / Risk Ratio	Statistical Significance
7	8.9%	3.7%	OR = 2.14 (1.44–3.18)	$p < 0.001$
10	10.2%	4.5%	OR ≈ 2.54	$p \approx 0.05$
11	Higher across all studies	Lowest control ratio	OR ≈ 2.60	Significant in 25/33 studies

Implant Failure in Smokers vs. Non-Smokers

Table 2 presents comparative data on implant failure rates between smokers and non-smokers. All included studies demonstrated higher implant failure among smokers. A Turkish retrospective cohort reported failure rates of 8.9% in smokers versus 3.7% in non-smokers, corresponding to an odds ratio (OR) of 2.14 (95% CI: 1.44–3.18, $p < 0.001$). Similarly, a systematic review from the USA found failure rates of 10.2% among smokers and 4.5% among non-smokers, with an OR of approximately 2.54 ($p \approx 0.05$). A meta-analysis comprising more than 12,000 implants revealed a mean OR of 2.60, statistically significant in 25 of 33 studies.

These results consistently indicated that smokers are over twice as likely to experience implant failure compared with non-smokers. The biological explanation for this outcome lies in smoking-induced vasoconstriction, reduced oxygenation, delayed wound healing, and impaired osseointegration. Nicotine and carbon monoxide are known to alter fibroblast activity and angiogenesis, further compromising bone healing. Collectively, the evidence underscores smoking as a critical modifiable factor that significantly compromises implant survival.

Table 03: Peri-Implantitis Incidences by Smoking Status

Citation	Peri-implantitis (Smokers%)	Peri-implantitis (Non-Smokers%)	Risk Ratio (RR)	Certainty
9	37.6%	16.4%	RR = 2.79 (1.42–5.50)	Moderate

8	30.5% (current smokers)	18.4% (never smokers)	RR ≈ 1.66	Statistically Significant

Peri-Implantitis and Smoking

The incidence of peri-implantitis was notably higher among smokers in all reviewed studies **(Table 3).** A meta-analysis reported peri-implantitis in 37.6% of smokers and 16.4% of non-smokers, corresponding to a risk ratio (RR) of 2.79 (95% CI: 1.42–5.50). A Brazilian prospective cohort similarly observed peri-implantitis in 30.5% of current smokers and 18.4% of never-smokers, yielding a RR of approximately 1.66, with statistical significance.

The observed increased risk of peri-implantitis among smokers can be attributed to diminished immune response, lower tissue oxygenation, and impaired vascularization, which collectively weaken host defense against bacterial biofilms. Tobacco exposure also promotes inflammatory cytokine release and bone resorption, both key contributors to peri-implant pathology. These findings emphasize the importance of individualized maintenance strategies and smoking cessation counseling as integral components of implant care.

Table 04: Marginal Bone Loss (MBL) in Smokers and Non-Smokers

Citation	MBL in Smokers	MBL in Non-Smokers	Difference	Significance
11	1.14 mm	0.63 mm	+0.51 mm	$p < 0.01$
12	0.97 mm (maxilla)	0.64 mm	+0.33 mm	$p \approx 0.024$

Marginal Bone Loss

Marginal bone loss (MBL) data comparing smokers and non-smokers are summarized in **Table 4**. The meta-analysis conducted in Germany reported mean MBL values of 1.14 mm in smokers and 0.63 mm in non-smokers, revealing a statistically significant difference of +0.51 mm ($p < 0.01$). A long-term cohort study found similar results, with MBL averaging 0.97 mm in smokers (maxilla) and 0.64 mm in non-smokers—a difference of +0.33 mm ($p \approx 0.024$).

These findings highlight that smoking accelerates bone resorption around dental implants, compromising structural integrity and increasing the likelihood of late implant failure. Since annual bone loss exceeding 0.2 mm or cumulative loss beyond 1 mm is considered clinically significant, the reported differences indicate meaningful long-term deterioration in smokers. The increased MBL may be linked to nicotine's adverse effects on osteoblast function, angiogenesis, and bone metabolism.

Across all included studies, smoking was identified as a consistent and independent determinant of adverse dental implant outcomes. Smokers exhibited higher implant failure rates, increased peri-implantitis prevalence, and greater marginal bone loss. The odds ratios for implant failure ranged from 2.1 to 2.6, and risk ratios for peri-implantitis varied between 1.66 and 2.79. These findings collectively demonstrate that smokers are at least twice as likely to experience implant complications compared to non-smokers.

The body of evidence, supported by large-scale clinical studies and meta-analyses, offers a comprehensive understanding of smoking's negative impact on implant success. Biologically, these outcomes are attributed to impaired osseointegration, compromised microcirculation, and chronic inflammation. Therefore, integrating smoking cessation into preoperative assessment and postoperative management remains essential for improving long-term implant prognosis and patient outcomes.

DISCUSSION

Due to the collected evidence in numerous studies carried out on dental implants and the complications thereof, there are several tendencies and primary observations that this information entails in terms of revealing the issues with implant failure, peri-implant health, and related risk factors of smoking as one of them. The differences in study design, sample size, follow-up period, and geographic setting provide a comprehensive understanding of the problem, both clinically and epidemiologically.

Size of samples and experimental designs

The articles contain retrospective and prospective cohort studies, meta-analyses, and systematic reviews, representing different quality levels that prove the strength of evidence. The patient and the implant-level data provide prospective and retrospective information and are useful to investigate real-world results[13]. In the meantime, meta-analyses provide pools of data on multiple studies, thus increasing generalizability[14]. The extra synthesized evidence contributing to the information comes in the form of a systematic review.

The size is quite different between samples. The authors of the study published information about 1228 patients, and discussed 769 implants in 350 patients[15]. The meta-analysis has the largest sample size (considering more than 12000 implants), providing the authors with strong statistical power and a detailed picture of implant and bone loss pattern over a 5-year perspective[16]. 702 patients, present useful data, especially when global data are considered[17].

Follow-up Durations

The follow-up period is crucial in medical analysis for determining the long-term success of dental implants. Follow-ups were provided in most of the studies, extending between 5 years and up to a decade. Both studies were followed up for over 15 and 10 years, respectively. It takes this time to document late complications like peri-implantitis and late-stage bone loss that normally appear many years after placement has taken place[18]. More recent data that may help to determine the early failure trend may report less on long-term complications.

The levels of smoking prevalence differed in the studies used, and recorded the highest percentage of smoking (36.5 percent), and a percentage of 28.7 percent[19]. The rest of the studies did not indicate the data or scratch at variable smoking levels (meta-analyses). The latter is important since smoking is a well-known implant loss risk factor and, additionally, a peri-implantitis risk factor.

Key Results and its objectives

The studies revolved around different endpoints, albeit with slight variations. Studies evaluated outright implant failure, and peri-implant mucosal health and peri-implantitis as defining risk factors for implant failure[20]. A step further to incorporate risk and loss of bone, respectively, both of which have relevance in establishing implant durability.

The converging evidence indicates that the failure of the implants is multifactorial, with patient habits (such as smoking), implant-related factors, and maintenance procedures. The cases of peri-implantitis and mucosal inflammation turn out to be the repeating pattern and premature indicators of the ultimate setbacks[21]. The long scale of follow-up duration among various studies also reveals that follow-up should be considerably longer than the initial years after placement.

Collectively, the studies underline the importance of rigorous and long-term follow-up of patients with implants and show the major modifiable risk factor, smoking. The data provided in meta-analyses and systematic review formats strengthen the intricacies of peri-implant complications and the need to conduct regular preventive and upkeep procedures. Standardized definitions of failure and peri-implant disease, and greater reporting on behavioral risk factors in the future, may be worthy of study as they may permit more informative comparison and ultimately better clinical guidelines.

It provides an interesting insight into the effect of smoking on the rates of failure of dental implants based on three major studies. In all the studies, smoking represents a significant risk factor for implant failure with possibly very strong consequences. Hence, this justifies its consideration as a key modifiable risk factor in the field of dental implantology.

Estimate of Risk and Failure Rates

The odds ratio (OR) of 2.14 (95%CI:1.44-3.18) had a statistically significant P-value of < 0.001, showing that an implant failure is 2.14 times more likely in a smoker than in a non-smoker (that is, 214% greater)[22]. This shows that smokers have more chances of experiencing implant failure than non-smokers by over 2 times in the study population. The reliability of this finding is justified by a large number of statistical confidence intervals along with a small confidence interval.

Similar trends were discovered, whereby the rates of failure remained at 10.2% and 4.5% for non-smokers and smokers, respectively. Odds ratio of about 2.54 and p-value of about 0.05 indicate that the level of statistical significance is moderate[23]. Although the resulting p-value crosses the border of the conventional level of significance, the direction and magnitude of the effect are consistent with making it suggestive of greater generality.

A meta-analysis with data collected on over 12,000 implants concluded that, in nearly all of the studies, the failure rates were higher, mostly among smokers. The mean odds ratio of their dataset was about 2.60, and the association of the smoking habit to the increased rate of the implant failure was significant in 25 studies out of 33 analyzed studies[24]. This large data supports that not only is the association between smoking and implant failure statistically significant, but also robust regardless of the population, study design, and implant systems.

Analysis of Odds Ratios and Interpretation of Clinical Implications

Odds ratios prevalent in the three studies are between the values of 2.1 and 2.6, with the conclusion that smokers are over two times more likely to have an implant fail than non-smokers. Odds ratios may not be translated explicitly into absolute risk; instead, they are crucial for calculating relative risk, particularly in clinical counseling situations[25]. This fact is especially significant when it comes to the process of implant planning, in that it helps to explain why it is necessary to highly recommend patients to quit smoking before and after the point of implant placement.

Biological Mechanism and Co-factors

High failure rates amongst smokers can probably be traced to several physiological processes. Smoking will reduce blood flow and tissue oxygenation, weaken the immune system, and disrupt

bone metabolism, all of which are essential for osseointegration and post-surgery healing of bone implants. Furthermore, nicotine and the rest of the components of tobacco products have the known effect of slowing the healing process and the likelihood of developing peri-implantitis and bone loss via the reduction of fibroblast workability and angiogenesis.

Quality of research and findings that are statistically significant

The fact that demonstrated an extremely significant association ($P < 0.001$) puts the borderline p-value (=0.05) obtained in perspective and implies that there may be variation in effect based on the size of the population, methodology, and adjustment of confounders[26]. The meta-analysis suggested whose results are significant in most of the studies, promotes external validity and generalizability of the relationship between smoking and risks. Notably, the replication of consistency across several high-quality studies serves as an ample evidence source to turn to in clinical decision-making.

The overall results of these studies are evident, indicating that smoking has a major effect in terms of enhancing the chances of failure of dental implants. The high odds ratios of about 2:5 in the analyses, combined with statistically significant results in the analyses of large numbers of patients, demonstrate that the role of smoking habits in implant patients is of vital significance. Quitting smoking ought to be an integral component of preoperative assessment and patient education that aim to mitigate the risk of implant failure and achieve, at large, a better treatment outcome.

Two major studies related to the importance of smoking in the development of peri-implantitis are demonstrated. Increased rate of peri-implantitis among smokers compared to non-smokers was also found in both studies and contributed further to affirming smoking as a significant modifiable risk factor for peri-implant disease.

Risk Ratio and Incidence Rates

The prevalence of smokers with peri-implantitis was 37.6 percent as measured and 16.4 percent in non-smokers[27]. This equates to a risk ratio (RR) of 2.79 with a confidence interval of 1.42 to 5.50, meaning that smokers have a much higher likelihood of developing peri-implantitis as compared with the non-smokers, being almost three times higher. The associated strength is high, and the authors assigned the confidence of evidence as moderate. This is probably indicative of inconsistency among the studies they used in their meta-analysis, including peri-implantitis definition, follow-up period, and correction of confounding factors.

Studies also included clinical data to support their assertions, quoting a 30.5 percent per-implantitis occurrence rate in current smokers and 18.4 percent in never-smokers. This returns a risk ratio of about 1.66, which shows the risk of peri-implantitis is increased by 66 percent among smokers[28]. This outcome was proven to be statistically significant in the study, thus indicating that there was a significant relationship even in the single-center setting of the study sample based on a prospective cohort.

Biological Rationale

The higher frequency of peri-implantitis in smokers is due to only a couple of biological processes. Smoking compromises the immune system, causes lower vascularization, and lowers abiotic tension in peri-implant tissues. The changes are deteriorating tissue responses to bacterial biofilms, which are key in the pathogenesis of peri-implantitis. In addition, smoking affects bone metabolism and predisposes it to bone resorption and, consequently, increases the risk of peri-implant inflammation leading to implant failure.

Clinical relevance and Certain Assurance

Although the study delivers a greater relative risk (2.79) as compared to (1.66), a clear pattern of increased risk is evident in both studies, and that is, the risk of peri-implantitis is high when there is a presence of smoking[29]. In the meta-analysis, the level of certainty is reported as moderate, leaving future studies to investigate greater longitudinal data and possibly standardized diagnostic criteria and confounding factor adjustments, such as oral health, overall health, and implant cleaning regimens.

Although there is minimal difference in terms of the risk reported, the uniformity regarding these studies is clinically relevant. The results of these findings point to the necessity of deep preoperative risk analysis and postoperative observation in smokers. The clinicians must focus on the importance of smoking cessation as an implantation success factor and consider a patient's smoking status when setting up a treatment plan and developing an educational program.

As a whole, the evidence clearly shows that smoking is one of the risk factors for surprisingly high predispositions to peri-implantitis. The evidence is clinically and statistically significant with a risk ratio of 1.66 to 2.79[30]. These findings ought to prompt clinicians to think more preventively in terms of how they can treat implant patients who smoke by designing maintenance policies based on their smoking issues, as well as offering them assistance to help them quit smoking.

The results of the meta-analysis demonstrated the value of the MBL in smokers as 1.14 mm with an average in non-smokers at 0.63 mm, which produces a statistically significant difference of +0.51

mm ($P < 0.01$)[31]. This is a significant variance, particularly considering that the loss of bone above 1 mm within one year of surgery or continuous loss of above 0.2 mm annually is usually regarded as clinically significant in implant dentistry.

On a comparable note, the long-term cohort study also showed 0.97 mm MBL in the smokers (maxilla) as compared to 0.64 mm in non-smokers, a 0.33 mm difference with a P value of about 0.024, and again, it can be noted that the difference is statistically significant[32]. Although the absolute value of the difference is lower than that, this value still substantiates the conclusion that marginal bone loss occurs faster in smokers.

Clinical Implications

Long-term stability of dental implants requires stability of the marginal bone. This heightened bone loss around implants not only jeopardizes their survival but also contributes to andal issues of the teeth, in the maxilla, as well as problems in the maxilla. MBL in smokers could be related to the fact that smoking has been shown to weaken the healing process, lower local blood flow, and be damaging to bone metabolism.

Both studies establish a substantial difference in marginal bone loss between smokers and non-smokers, ranging from 0.33 mm to 0.51 mm[33]. The above results support the efforts of smoking cessation as a preventive measure for the prognosis of implants. They should be integrated into the counseling session and long-term maintenance strategy for the patients.

CONCLUSION

In this systematic review, significant and universally negative effects on the outcome of dental implants were experienced by smoking in adult clients. The evidence shows that there is a definite association between tobacco use and an increased incidence of implant failure, peri-implantitis, and marginal bone loss. Smoking degrades the success of implants because of interference in the process of osseointegration caused by poor vascularity, oxygenation, and immunity, hence delaying healing and predisposing to early implant failure. Various studies observed a high proportion of implant failure in smokers, and the odds ratio was greater than 2.0. In addition, the findings stated that the marginal bone loss is much higher in smokers compared to non-smokers, which demonstrates a loss of implant stability in the long run. Considering these findings, smoking can be regarded as a life-threatening risk factor that can be modified in the context of implant dentistry.

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CONFLICT OF INTEREST

None

AUTHORS' CONTRIBUTION

All authors contributed equally as per ICMJE policy

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