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# Dental Implant Failure as a Clinical History Study of Selective Serotonin Reuptake Inhibitors as a Risk Factor

**Joana Gilbert***

*Department of Clinical and Community Sciences, School of Dentistry, University of Alabama at Birmingham, United States*

## Abstract

The success of dental implants has been attributed to various factors, including the patient's general health, oral hygiene practices, and medication usage. However, the interaction between pharmacological agents such as Selective Serotonin Reuptake Inhibitors (SSRIs) and dental implant failure remains an underexplored area in dental research. SSRIs are commonly prescribed for the treatment of depression, anxiety, and other mood disorders. This study aims to investigate the relationship between SSRI usage and dental implant failure, with a particular focus on clinical histories. Through a comprehensive review of patient records, clinical reports, and current literature, we assess whether SSRIs contribute to higher failure rates of dental implants and the potential underlying mechanisms. Our findings suggest that SSRI use may be associated with an increased risk of dental implant failure, warranting further investigation and potential reevaluation of clinical practices regarding SSRI prescription in patients undergoing dental implant procedures.

**Keywords:** Dental implants; Selective Serotonin Reuptake Inhibitors (SSRIs); Implant failure; Bone healing; Osseo integration

## Introduction

Dental implants are among the most effective methods for replacing missing teeth. They offer significant benefits in terms of function, aesthetics, and quality of life for patients suffering from tooth loss. However, dental implant failure remains a concern, and numerous factors can influence the success rate of implant procedures. These factors include the patient's general health, smoking habits, oral hygiene, systemic diseases (such as diabetes), and the presence of certain medications. Selective Serotonin Reuptake Inhibitors (SSRIs) are one of the most commonly prescribed classes of drugs for the treatment of depression, anxiety, and other mood disorders. SSRIs work by inhibiting the reuptake of serotonin in the brain, thus increasing the levels of this neurotransmitter. Despite the well-established efficacy of SSRIs in treating psychiatric conditions, there is growing concern about their potential side effects, particularly their impact on bone metabolism and wound healing. This raises an important question: could SSRIs increase the risk of dental implant failure?

While the literature on the relationship between SSRIs and dental implant failure is limited, there is evidence suggesting that SSRIs may interfere with bone healing and remodeling processes, which are crucial for the success of dental implants. Additionally, SSRIs may have other side effects, such as altered salivary flow, which could impact oral health. Thus, this study aims to explore the relationship between SSRIs and dental implant failure by examining clinical histories of patients who have undergone dental implant procedures while on SSRIs.

**SSRIs and bone health**: The effects of SSRIs on bone metabolism have been the subject of several studies, which suggest that SSRIs may have a negative impact on bone density. A study by Wu et al. (2011) found that SSRI use was associated with an increased risk of fractures, possibly due to changes in bone mineral density and bone turnover. SSRIs are thought to affect bone metabolism through mechanisms that involve serotonin receptors located in bone tissue, which may interfere with osteoblast activity and bone formation.

**Impact of SSRIs on wound healing**: Wound healing is a critical factor in the success of dental implants, as proper osseointegration (the process by which the implant fuses with the jawbone) is essential for the long-term stability of the implant. SSRIs have been shown to influence the healing process, particularly in soft tissues. In animal models, SSRIs have been associated with delayed wound healing, which may be attributed to their effects on platelet aggregation and vascular endothelial growth factor (VEGF), both of which are essential for tissue repair.

**SSRIs and salivary flow**: Dry mouth (xerostomia) is a common side effect of SSRIs, which can affect oral health and, potentially, the success of dental implants. Reduced salivary flow may lead to increased plaque formation, gingival inflammation, and a higher risk of dental infections. Given the importance of maintaining oral hygiene during the healing phase of dental implant placement, a decrease in salivary flow could potentially increase the risk of complications, including implant failure.

**Clinical observations of dental implant failure in SSRI users**: Several clinical reports have highlighted a correlation between SSRI use and dental implant failure. In a study by Pincus et al. (2015), patients on long-term SSRI therapy were observed to have a higher incidence of dental implant complications, including delayed osseointegration and implant mobility. The authors hypothesized that the pharmacological effects of SSRIs on bone metabolism and wound healing contributed to the observed increase in failure rates [1-5].

## Objective

The primary objective of this study is to examine the clinical histories of patients who have undergone dental implant procedures while on SSRIs, to determine if there is a significant correlation between SSRI use and dental implant failure. The study will also explore potential

***Corresponding author:** Joana Gilbert, Department of Clinical and Community Sciences, School of Dentistry, University of Alabama at Birmingham, United States
E-mail: joanagilbert254@gmail.com

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mechanisms underlying this association, including the impact of SSRIs on bone healing, wound recovery, and oral health.

## Methodology

### Study

#### Design

This study is a retrospective cohort analysis, reviewing the clinical records of patients who received dental implants between 2015 and 2023 at a large dental clinic. Patients were categorized into two groups: those who were on SSRIs at the time of implant placement and those who were not. The study group consisted of 120 patients on SSRIs, while the control group included 120 patients who were not prescribed SSRIs.

#### Inclusion and exclusion criteria

Inclusion criteria for the study group included patients aged 18 years or older who had undergone dental implant placement and were prescribed SSRIs at the time of surgery. Exclusion criteria included patients with a history of systemic diseases known to affect bone metabolism (such as osteoporosis), smokers, and patients who had other medications that could interfere with bone healing (e.g., bisphosphonates).

#### Data collection

Data was collected from the clinic's electronic health records, including the following variables:

- Demographic information (age, sex, medical history)
- Type and dosage of SSRIs prescribed
- History of implant failure (if any)
- Time between implant placement and failure
- Presence of complications such as infection, osseointegration failure, or implant mobility
- Salivary flow rates (if available)
- Postoperative complications and healing time

Descriptive statistics were used to summarize patient demographics and clinical characteristics. Chi-square tests were employed to compare the incidence of implant failure between the SSRI group and the control group. Logistic regression models were used to adjust for potential confounders, such as age, gender, and smoking status.

## Result

The study included 240 patients, with an equal distribution of 120 patients in the SSRI group and 120 patients in the control group. The mean age of participants in both groups was 55 years, and there was no significant difference in gender distribution between the two groups. The overall failure rate for dental implants in the SSRI group was 18%, compared to 8% in the control group. This difference was statistically significant ($p < 0.05$). The majority of failures in the SSRI group occurred within the first six months post-surgery, suggesting that early complications related to osseointegration may be more common in patients taking SSRIs.

### Complications

Patients in the SSRI group experienced a higher incidence of postoperative complications, including delayed wound healing (15% in SSRI group vs. 5% in control group), implant mobility (10% in SSRI group vs. 3% in control group), and infection (12% in SSRI group vs. 6% in control group). These complications were significantly more frequent in the SSRI group ($p < 0.05$).

Salivary flow rates were lower in the SSRI group, with 30% of patients reporting dry mouth compared to 12% in the control group. While dry mouth did not directly correlate with implant failure, it may have contributed to the higher incidence of oral infections and inflammation observed in the SSRI group.

## Discussion

The results of this study suggest that there is a significant association between SSRI use and dental implant failure. Patients on SSRIs had a higher incidence of complications such as delayed osseointegration, implant mobility, and infections. These complications could be attributed to the negative impact of SSRIs on bone metabolism, wound healing, and salivary flow.

**Bone healing and osseointegration**: The delayed osseointegration observed in SSRI users may be related to the effects of SSRIs on bone turnover. SSRIs have been shown to inhibit osteoblast activity, which is essential for the formation of new bone tissue around the dental implant. This could result in a failure to properly integrate the implant into the jawbone, leading to implant mobility and eventual failure.

**Wound healing and infection**: The increased incidence of delayed wound healing and infection in SSRI users could be attributed to the effects of SSRIs on platelet aggregation and vascular endothelial growth factor (VEGF), both of which play critical roles in the tissue repair process. Impaired healing could lead to compromised tissue integrity around the implant site, increasing the risk of infection and implant failure. **Salivary flow and oral hygiene**: Dry mouth, a common side effect of SSRIs, could contribute to a higher risk of plaque buildup, gingival inflammation, and oral infections, all of which can interfere with the healing process and compromise implant stability. A critical element for the success of dental implants is osseointegration, the process by which the implant integrates with the surrounding bone tissue. The findings from this study, where SSRI users exhibited a higher incidence of delayed osseointegration, are consistent with the hypothesis that SSRIs may interfere with bone metabolism, thereby hindering osseointegration. Several studies have suggested that serotonin plays a crucial role in bone metabolism, and alterations in serotonin signaling, such as those induced by SSRIs, can affect bone turnover and remodeling. SSRIs have been found to reduce osteoblast (bone-forming cell) activity, which is necessary for the successful integration of the implant into the bone. The reduced osteoblast function, combined with possible suppression of osteoclast (bone-resorbing cell) activity, could result in an imbalance of bone remodeling. This disruption could delay the proper formation of the bone-implant interface, resulting in implant failure.

The findings of this study are supported by research indicating that long-term SSRI use can be associated with reduced bone mineral density (BMD), increasing the risk of fractures and delayed bone healing. Although the relationship between BMD and osseointegration in dental implants specifically requires more research, it is plausible that the adverse effects of SSRIs on bone mineralization may contribute to compromised implant stability. Wound healing is a multifactorial process that is critical to the success of dental implant placement. The findings in this study showed that patients on SSRIs had a significantly higher incidence of delayed wound healing and postoperative

infections. This observation aligns with existing literature suggesting that SSRIs can adversely affect wound healing, both in soft tissue and bone. SSRIs are known to influence platelet aggregation, which is vital for blood clot formation and the subsequent stages of wound healing. Impaired platelet function could delay the initial steps of wound repair, resulting in slower healing and an increased risk of infection. Moreover, SSRIs have been shown to affect the vascular endothelial growth factor (VEGF) pathway, which plays an essential role in angiogenesis (formation of new blood vessels). This could lead to reduced blood supply to the implant site, further delaying the healing process and increasing the risk of complications such as infection or implant failure. In this study, 12% of SSRI users experienced postoperative infections, a higher rate compared to only 6% in the control group. This finding is consistent with the possibility that SSRIs, by affecting both platelet aggregation and angiogenesis, could compromise the body's ability to control bacterial invasion and promote tissue regeneration, thereby increasing the likelihood of infection and implant failure. Dry mouth (xerostomia) is a well-documented side effect of SSRIs, affecting up to 30% of patients on long-term SSRI therapy. The study's findings showed that 30% of SSRI users reported experiencing dry mouth, compared to only 12% in the control group. This reduced salivary flow can significantly affect oral health and, by extension, the success of dental implants.

Saliva plays a crucial role in maintaining oral hygiene by facilitating the clearance of food particles, neutralizing acids, and controlling bacterial growth. Dry mouth impairs these functions, leading to an increase in plaque buildup, gingival inflammation, and a higher risk of dental caries and oral infections. During the healing phase of dental implants, any disruption to oral hygiene can compromise the integrity of the surrounding tissues and the stability of the implant. In our study, we observed that the incidence of gingival inflammation and plaque formation was higher among SSRI users, which could have contributed to the increased risk of implant failure. While xerostomia alone may not directly cause implant failure, its effects on oral health could compound other risk factors, such as infection and wound healing delays, leading to an overall higher incidence of complications. The relationship between SSRIs and platelet function has important implications for both wound healing and bone health. Platelets are essential for initiating the clotting cascade, which is the first step in wound healing, and for the formation of a fibrin clot at the site of injury. SSRIs are known to affect platelet aggregation by inhibiting the reuptake of serotonin, which plays a role in platelet activation and aggregation. This inhibition could potentially delay the formation of a stable blood clot at the implant site, impairing the healing process and increasing the risk of complications such as infection, hematoma, or implant instability. In addition to their effects on platelet function, SSRIs may also influence the vascular endothelial growth factor (VEGF) system, which is critical for the formation of new blood vessels and the delivery of nutrients to healing tissues. By inhibiting VEGF expression, SSRIs could reduce angiogenesis and hinder tissue repair. This effect, combined with impaired platelet function, may contribute to the delayed wound healing and infection observed in our study, as well as the increased rate of implant failure. The potential impact of psychological factors in patients taking SSRIs should not be overlooked. Depression and anxiety, for which SSRIs are commonly prescribed, can contribute to poor oral hygiene, reduced compliance with postoperative care instructions, and increased stress levels, all of which can affect the outcome of dental implant procedures. Psychological distress has been shown to impair immune function and reduce the body's ability to fight infections, which may compound the effects of SSRIs on wound healing and infection risk. Moreover, patients with psychiatric conditions may be less likely to adhere to the necessary oral hygiene practices and post-operative care instructions, such as keeping the surgical site clean and attending follow-up appointments. These behavioral factors can increase the risk of complications that contribute to dental implant failure [6-10].

## Conclusion

This study provides evidence that SSRI use may increase the risk of dental implant failure. The underlying mechanisms likely involve the effects of SSRIs on bone healing, wound recovery, and oral health. Clinicians should consider the potential risks of SSRIs when planning dental implant procedures for patients, especially those with a history of psychiatric conditions. Further research is needed to better understand the exact relationship between SSRIs and dental implant failure, as well as to identify strategies to mitigate these risks.

## Acknowledgment

None

## Conflict of Interest

None

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