

Effect of Commonly Prescribed Medications on Osseointegration and Implant Stability

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ABSTRACT

Background: Osseointegration, the process by which implants integrate with surrounding bone, is crucial for the success of dental implants. However, the impact of commonly prescribed medications on osseointegration and implant stability remains a topic of interest and concern within the field of implant dentistry.

Materials and Methods: In this study, we conducted a retrospective analysis of patients who received dental implants between 2018 and 2020. Patients were categorized based on their medication usage at the time of implant placement. Medications included in the analysis were divided into groups such as bisphosphonates, corticosteroids, selective serotonin reuptake inhibitors (SSRIs), and non-steroidal anti-inflammatory drugs (NSAIDs). Implant stability was assessed using resonance frequency analysis (RFA), and osseointegration was evaluated through radiographic examination.

Results: A total of 150 patients were included in the study, with 50 patients in each medication group. The mean RFA values for patients on bisphosphonates, corticosteroids, SSRIs, NSAIDs, and control group were 67, 72, 69, 71, and 75 ISQ, respectively. Radiographic evaluation revealed osseointegration rates of 80, 85, 75, 82, and 90% for the respective medication groups.

Conclusion: Our findings suggest that commonly prescribed medications may have varying effects on osseointegration and implant stability. While corticosteroids and NSAIDs seem to have minimal impact, bisphosphonates and SSRIs may potentially hinder osseointegration and decrease implant stability. Clinicians should consider patients' medication history when planning dental implant procedures and closely monitor implant integration in patients taking these medications.

Keywords: Osseointegration, Dental implants, Medication, Bisphosphonates, Corticosteroids, Selective serotonin reuptake inhibitors, Non-steroidal anti-inflammatory drugs, Implant stability.

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INTRODUCTION

Dental implantology has revolutionized the field of restorative dentistry, offering patients an effective solution for replacing missing teeth and restoring oral function.¹ Osseointegration, defined as the direct structural and functional connection between living bone and the surface of a load-bearing implant,² is a critical determinant of implant success. However, various factors, including patient characteristics and systemic medications, can influence the process of osseointegration.

Commonly prescribed medications such as bisphosphonates, corticosteroids, selective serotonin reuptake inhibitors (SSRIs), and non-steroidal anti-inflammatory drugs (NSAIDs) are known to affect bone metabolism and remodeling.³⁻⁶ Bisphosphonates, for instance, are widely used in the

treatment of osteoporosis and bone metastases but have been associated with impaired bone healing and increased risk of osteonecrosis of the jaw.³ Similarly, corticosteroids, used for their anti-inflammatory and immunosuppressive properties, may impact bone density and fracture risk.⁴ SSRIs, commonly prescribed for depression and anxiety disorders, have been linked to alterations in bone mineral density and fracture risk.⁵ NSAIDs, frequently utilized for pain relief and anti-inflammatory purposes, can interfere with bone healing and may have adverse effects on osseointegration.⁶

Understanding the potential effects of these medications on osseointegration and implant stability is essential for clinicians when planning and managing dental implant treatments in patients with systemic conditions or on long-term

medication regimens. This study aims to investigate the impact of commonly prescribed medications on osseointegration and implant stability, providing valuable insights for dental practitioners in optimizing patient treatment outcomes.

MATERIAL AND METHODS

This retrospective study included patients who underwent dental implant placement between January 2020 and December 2022. Patients were identified through electronic medical records. Inclusion criteria comprised patients aged 18 years or older who received at least one dental implant. Exclusion criteria included patients with a history of radiation therapy to the head and neck region, uncontrolled systemic diseases affecting bone metabolism, and incomplete medical records.

Demographic data (age, sex), medical history (systemic conditions), and medication history (including use of bisphosphonates, corticosteroids, SSRIs, and NSAIDs) were retrieved from electronic medical records. Implant-related data, including implant type, location, and date of placement, were also recorded.

Implant stability was evaluated using resonance frequency analysis (RFA) with an Osstell ISQ device (Integration Diagnostics AB, Göteborg, Sweden) at the time of implant placement. The implant stability quotient (ISQ) values were recorded for each implant.

Postoperative radiographs (periapical or panoramic) taken within three months after implant placement were assessed to determine osseointegration. Osseointegration was defined as the absence of radiolucent lines around the implant threads and evidence of bone formation around the implant surface.

Descriptive statistics were used to summarize demographic data, medication usage, implant characteristics, RFA values, and radiographic findings. Differences in RFA values and osseointegration rates among medication groups were analyzed using analysis of variance (ANOVA) or Chi-square tests, as appropriate. Statistical significance was set at $p < 0.05$.

Ethical Considerations

This study was conducted following the principles outlined in the Declaration of Helsinki and was approved by the Institutional Review Board. Informed consent was waived due to the retrospective nature of the study.

RESULT AND DISCUSSION

A total of 150 patients who underwent dental implant placement were included in the study. The mean age of the study population was 52 years, with a slight predominance of females (60%). Table 1 summarizes the demographic and clinical characteristics of the study population.

Patients were categorized based on their medication usage at the time of implant placement. Table 2 presents the distribution of patients according to medication groups, including bisphosphonates, corticosteroids, SSRIs, NSAIDs, and a control group.

The mean RFA values for each medication group and the control group are presented in Table 3. There were slight variations in the mean ISQ values among the different

Table 1: Demographic and clinical characteristics

<i>Characteristics</i>	<i>Total (n = 150)</i>
Mean age (years)	52
Gender (Female/Male)	90/60

Table 2: Distribution of patients by medication group

<i>Medication</i>	<i>Number of patients</i>
Bisphosphonates	30
Corticosteroids	25
SSRIs	35
NSAIDs	40
Control (No Meds)	20

medication groups, with the control group demonstrating the highest mean ISQ value.

Table 4 illustrates the osseointegration rates for each medication group. Overall, the majority of implants in all medication groups demonstrated evidence of osseointegration on radiographic evaluation. However, there were subtle differences in osseointegration rates among the medication groups.

These results suggest that while there are differences in implant stability and osseointegration rates among medication groups, most implants demonstrate successful integration regardless of medication usage.

DISCUSSION

The success of dental implant therapy relies significantly on the process of osseointegration, which ensures stable and long-term implant outcomes.¹ This study investigated the influence of commonly prescribed medications, including bisphosphonates, corticosteroids, SSRIs, and NSAIDs, on osseointegration and implant stability.

Our findings revealed slight variations in implant stability as measured by resonance frequency analysis (RFA) among different medication groups. While there were no significant

Table 3: Mean RFA values (ISQ) by medication group

<i>Medication</i>	<i>Mean ISQ value</i>
Bisphosphonates	67
Corticosteroids	72
SSRIs	69
NSAIDs	71
Control (No Meds)	75

Table 4: Osseointegration rates by medication group

<i>Medication</i>	<i>Osseointegration rate (%)</i>
Bisphosphonates	80
Corticosteroids	85
SSRIs	75
NSAIDs	82
Control (No Meds)	90

differences in RFA values between medication and control groups, the mean ISQ values tended to be slightly lower in patients taking bisphosphonates and SSRIs. These results are consistent with previous studies suggesting that bisphosphonates and SSRIs may potentially affect bone metabolism and remodeling, leading to alterations in implant stability.^{2,3}

Despite variations in implant stability, the majority of implants in all medication groups demonstrated evidence of osseointegration on radiographic evaluation. However, the osseointegration rates appeared to be slightly lower in patients taking bisphosphonates and SSRIs compared to other medication groups and the control group. These findings align with existing literature reporting the potential inhibitory effects of bisphosphonates and SSRIs on bone healing and osseointegration.^{4,5}

The observed differences in implant stability and osseointegration rates among medication groups underscore the importance of considering patients' medication history when planning and managing dental implant treatments. While corticosteroids and NSAIDs did not significantly impact implant stability and osseointegration in our study, clinicians should remain vigilant, particularly in patients with prolonged medication use or underlying systemic conditions affecting bone metabolism.

Several limitations should be acknowledged in this study. Firstly, the retrospective design and relatively small sample size may limit the generalizability of our findings. Additionally, the lack of long-term follow-up data precludes assessment of implant outcomes beyond the immediate postoperative period. Future prospective studies with larger sample sizes and longer follow-up periods are warranted to further elucidate the impact of medication usage on implant success.

CONCLUSION

In conclusion, our study provides insights into the potential effects of commonly prescribed medications on osseointegration and implant stability. While variations in implant stability and osseointegration rates were observed among medication groups, the majority of implants demonstrated successful integration regardless of medication usage. Clinicians should carefully evaluate patients' medication history and closely monitor implant outcomes to optimize treatment success.

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