

**THE INFLUENCE OF SMOKING ON THE CONTENTS OF DENTAL  
IMPLANT LOSS CARRIED OUT IN THE SPECIALIZED CLINICS  
UNIPOS / UNORP**

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## ABSTRACT

Implantology is a specialty of dentistry responsible for oral rehabilitation with the inclusion of dental implants and prosthetic crowns for the perfect aesthetic and functional replacement of element(s) lost. Several studies have shown that local exposure of peri-implant tissues tobacco consumption may be associated with failure of dental implants. This study aimed to investigate the loss of implants installed in Implantology clinic patients UNORP/UNIPOS. This research was a survey on dental records from 2006 to 2015. It was concluded that there was no smoking in the absolute interference with osseointegration. However, patients should be alerted about the delay in healing of the peri-implant tissue.

**Keywords: Dental implants, smoker, osseointegration, peri-implant, healing.**

## Introduction

To obtain the success Dental Surgeons depend on the achievement and maintenance of osseointegration short, medium and long-term asymptomatic way and mucous healthy surrounding tissues. In the same way that a patient can lose teeth through the involvement of the supporting tissues, you can also lose the implants through certain risk factors, including smoking.

The World Health Organization estimates that one-third of the adult population, ie, about 1 billion and 200 million people, are smokers. Research has shown that approximately 47% of the world's male population and 12% of female smokers. In Brazil there are 23 million smokers, 61% men and 39% women, equivalent to 12% of the adult population. The total number of deaths related to smoking reach 200,000 / year [1].

Cigarette smoke has over 4,700 toxic substances. The tar, for example, consists of more than 40 carcinogenic compounds. Since carbon monoxide (CO) in contact with the blood hemoglobin oxygenation difficult, and consequently the organs deprived of oxygen causes some diseases such as atherosclerosis.

Nicotine is considered by the World Health Organization (WHO) psychoactive drugs that cause dependence. It also increases the release of catecholamines which constrict blood vessels, accelerate heart rate, causing hypertension.

According to studies, most authors agree that smoking is a major risk of failure in osseointegration of titanium implants, but only jointly with other determinants such as malpractice operator, infection, bone overheating, over-instrumentation, poor bone quantity and quality, systemic diseases, anatomical limitations, degree of initial fixation of the implant, oral hygiene and occlusion [2].

Teixeira study (2012) [3] brings dental implants as fairly safe option. However, even with the significant probability of success they may be susceptible to some complications and so lists as one of the risk factors for complications or even loss of implants osseointegrated smoking.

According to Matos (2008) [4] some conditions are previously observed the implementation and related to failure or as stated by some authors loss treatment such as quality and quantity of bone and soft tissue, close and anatomical structures deployment area, presence of health changes that can affect the bone healing, psychotic syndromes, harmful habits such as bruxism, smoking, local hygiene deficit and lack of patient compliance.

Also the planning and inadequate implementation can lead to implant failure. And, after osseointegration, failures may be related to the occlusal overload, peri-implantitis, implant fatigue in the components, causing loss of screws and fractures. The same literature also shows that the loss of implants may be related to old age, smoking, diabetes, head and neck radiotherapy and patients undergoing therapies involving postmenopausal estrogen.

McCoy (2002) [5] warns in his study that the knowledge and diagnosis of the causes of loss of teeth on the implants are inserted are key factors for success or failure. Noting that when the loss occurred macrotraumas or decay there is great possibility in the successful treatment because there is no involvement of bacterial or occlusal issues. When the loss occurred because of periodontal

problems, there is a potential risk for implants, in view of the presence of bacterial infection. When they lost teeth from bruxism are considered inaccurate diagnosis for implant placement, because that can overwhelm the prosthesis and the bone-implant interface.

Success rates permeate the implants, however, the failure by the loss is also noticeable and may be related to factors such as systemic condition of the patient, quality of bone recipient bed and the presence of surgical trauma or bacterial contamination [6].

In the same vein Ramalho-Ferreira (2010) [7] states that despite the predictable and stable results presented by osseointegration for a significant time, with success rates very close to 90%, like any other technique that is subject to the incidence of failures / losses.

Despite the high rate of success in rehabilitation with implants, failures can pose increased therapeutic time, and result in additional costs and cause some discomfort for the patient and for the professional embarrassment.

The aim of this study was to verify through data collection in the dental records of clinical implantology UNIPOS / UNORP, the influence of smoking on the process of osseointegration of dental implants installed in patients.

### **Study Design**

Was conducted over 30 days, a data survey by a team of 10 students of graduation UNIPOS / UNORP, over 13,283 records of patients treated at the college, from 2006 to 2014 were selected for the study 421 records of patients who underwent surgery for the installation of titanium implants. Inclusion criteria, the research followed defined inclusion criteria for conducting the study must appear in the medical records: installation of titanium implants, filled anamnesis form and signed by the patient and clinical outcomes. There were no exclusion for gender, age associated diseases, location and type of implant. Exclusion criteria, exclusion criteria as the records were eliminated that did not present necessary information in accordance with the inclusion criteria. A total of 421 (100 %) of the records, 158 (37.5 %) were suitable within the inclusion criteria.

## Results

For research were selected 158 patients of which 21 (13.29%) were smokers and 137 (86.71%) nonsmokers. 525 implants were performed, 253 in the maxilla and 272 in the jaw, an average of 3.3 implants per patient (figure 1). Of the total of 525 implants, 62 (11.8%) were performed in 463 smokers and in nonsmokers (88.2%). In total 23 (4.38%) implants were lost, 6 (1.14%) in smokers and 17 (3.24%) in nonsmokers (figure 2, 3 and 4). The success rate of dental implants in smokers was 90.33%, while in non-smokers was 96.33 %. The success rate of this study is similar to that cited by authors like Ramalho-Ferreira (2010) which shows a success rate of dental implants close to 90 %.

## Discussion

Osseointegration is the ability to merge the implant to the bone and this inability leads to failure and loss of the same. There are several reasons considered risk factors, including the continued use of tobacco in the form of cigarette. The World Health Organization defines addiction as a state in which at least one in three of these situations occurs: Strong desire or compulsion to use a substance; difficulty controlling their use; physiological withdrawal; tolerance; progressive neglect of alternative interests; persistent use despite harmful consequences [8].

The success of bone healing is related to the lifestyle of the patient and smoking may impair bone formation, as well as the osseointegration of the implant [9].

Bones are rigid structures that anchor and protect viscera and muscles. However, they are subject to fractures, tumor resections and deformations, among other conditions. Though the bones are capable of spontaneous repair in large bone lesions become necessary surgical procedures in which autogenous bone graft and / or biomaterial implants help repair bone damage [10,11].

According Berley et al., (2010) [12] and Zheng et al., (2008) [13] cigarette components can lead to death of osteocytes, lowering the concentration of bone morphogenetic protein (BMP) and phosphatase alkaline and may also decrease bone mineral density.

The nicotine is the addictive agent in tobacco toxic and can trigger cellular and pharmacological responses in many biological systems, such as the central nervous system and stimulation of cardiac muscle, increased diuresis and relaxation of smooth muscle [14].

The nicotine present in tobacco delays the healing process, induces the decrease in the number of neutrophils and macrophages, and leads to increased platelet aggregation, reducing blood microperfusion and stimulates the formation of microcoágulos, resulting in thrombus that associated with vasoconstriction, generate tissue ischemia [10].

Nicotine stimulates the proliferation and adhesion of fibroblasts to the implant and induces the reduction in activity of osteogenic cells [15,16], factors undesirable during the process of osseointegration and incorporation of grafts.

According to Bueno study, AC (2011) [17], exposure to cigarette smoke was prejudicial to osteogenesis of the parietal bone, osseointegration of implants in the tibia and the maximum force to break the femur in rats. These changes are due to the effects of exposure to cigarette smoke and is not derived from a malnourished condition, for all animals gained weight during the experiment and the solid and liquid intakes remained within the standards recommended by Svendsen & Hau [18] .

In the present study, there was no chronic inflammatory response or the formation of fibrous tissue layer at the interface newly formed / implant bone. In the experimental groups, the newly formed bone is in direct contact with the dense hydroxyapatite blocks (HAD). The most important change observed refers to the lower volume of Bone found around HAD implants in animals of the CI group (cigarette group) compared to the CT group (control group), which can be attributed to reduced osteogenesis and the peri-implant bone loss caused by the effects of nicotine, as described in studies by Smith et al., 2010 [9] and Kamer et al., 2006 [19].

Hinode et al., 2006 [20] evaluated the influence of smoking on the failure rate of dental implants (biological, mechanical, iatrogenic and inadequate adaptation of patients to therapy), running study of "meta-analysis".

After critical search and analysis of 175 studies, 19 studies were included (controlled and longitudinal cases) and concluded that when comparing smokers and nonsmokers, an additional failure rate of implants was significantly high, especially when the implants were located in the maxilla, with higher prevalence in relation to the jaw that did not show a significant risk in relation to smoking habit.

Around 30 percent of adults are smokers, so that dentists involved in periodontal treatments or implants should consider the habit, discussing with them the clinical aspects of treatment and diagnosis.

Bain et al. (2002) [21] performed a meta-analysis on the effect of smoking on the occurrence of flaws in machined surface implants or processed (Osseotite). After comparing the data, reported an absolute success rate of 92.8% for machined implants in patients nonsmokers and 93.5% in smokers. In cases of implant surface treated with a cumulative success rate was 98.4% for non smokers and 98.7% for smokers. They concluded that there were no statistically significant differences between the groups of smokers and non-smokers, however were no clinically relevant difference between the types of implants, suggesting better performance to the implants with surface treatment.

Strietzel et al. (2007) [22] performed a systematic review and meta-analysis study to assess whether the use of tobacco interferes with the prognosis of implants with and without accompanying augmentation procedures compared with non-smokers. Identified 139 publications and 29 were considered for the meta-analysis and 35 for the systematic review. Both methods have been shown to have increased risk of failure of implants among smokers as well as smokers who received grafting procedures, and reporting increased risk for complications.

The healing is affected by the consumption of cigarettes and could jeopardize the success of grafts and implants. The rate of marginal bone loss around the implants is about three times higher in smokers. The incidence of postoperative complications is higher among smokers. This negative response appears to be associated with arterial vasoconstriction and decreased blood flow given by release of by-products such as nicotine, carbon monoxide-hydrogen and

cyano that increase platelet aggregation and leukocyte dysfunction and fibroblasts [23].

Healing by secondary intent depends first or promoted by coagulation of blood thrombi and high temperature induces vasodilation delaying this process. On the other hand the process of osseointegration of dental implants is closely connected to the oxygenation. The nicotine present in tobacco disadvantage oxygenation, reducing blood flow to irrigate the surgical area. Bone loss, periodontal disease or gingivitis are complications which may also be attributed to smoking.

The action of antibiotics also suffers inhibition when administered post-surgery. The peri-implantitis, inflammation of the tissues surrounding the implant is a complication that can occur in smokers. The peri-implantitis was defined as terms related to implants where inflammation occurs a complex with loss of supporting bone in tissue implants [24].

Study by Bain & Moy (1993) [25] where two groups of patients were divided smokers and nonsmokers totaling 540 and 2,194 implants placed in six years. In general it was found that 5.92% of the implants not osseointegrated, but when the smoker and non-smoker group was analyzed separately, it was observed that the absence of osseointegration has occurred in 11.28% of smokers and 4.76% of nonsmokers. A possible explanation to this fact was attributed to vasoconstriction and decreased platelet aggregation caused by smoking.

Jones (2000) [26] reported the results of periodontal treatment, the healing of dental implants, cosmetic treatments and oral cancer therapy are quite committed to cigarette users patients. Periodontal disease, the failure of endosseous implants and the development of oral cancer are closely related entities with tobacco use. [27]

They related yet, periimplantitis with the current tobacco use, promoting tissue inflammation, formation of deep pockets and increased bone resorption around the implant. Abandonment or simple decrease in cigarette use can



significantly contribute to the success of osseointegration rates. Due to hormonal and psychosocial factors, women have more difficulty leaving the vices than men, according to the Brazilian Society of Pulmonologists. According to the latest research Vigitel (2013) [28], the Ministry of Health, the number of former smokers in the country is higher among men (26.0%) than among women (18.6%).

Patients smokers should first be aware of post-surgical risks and the higher incidence of complications and failures in implant therapy. However, patients users of large amounts of cigarettes, find it difficult to reduce the use. They allege that after the stress of surgery consume tobacco as calming device.

### **Conclusion**

It was concluded that the successful osseointegration of the group of smokers and non-smokers are equivalent. Smoking was not an absolute risk factor that contraindicate implant treatment. However, patients should be advised to reduce or stop smoking during treatment, as smoking may increase postoperative complications, a negative effect on healing.

### **Competing interests**

The authors declare que they have no competing interests.

### **Acknowledgement**

We appreciate greatly the UNIPOS graduate for support and also UNORP of Sao Jose do Rio Preto / SP for the support.

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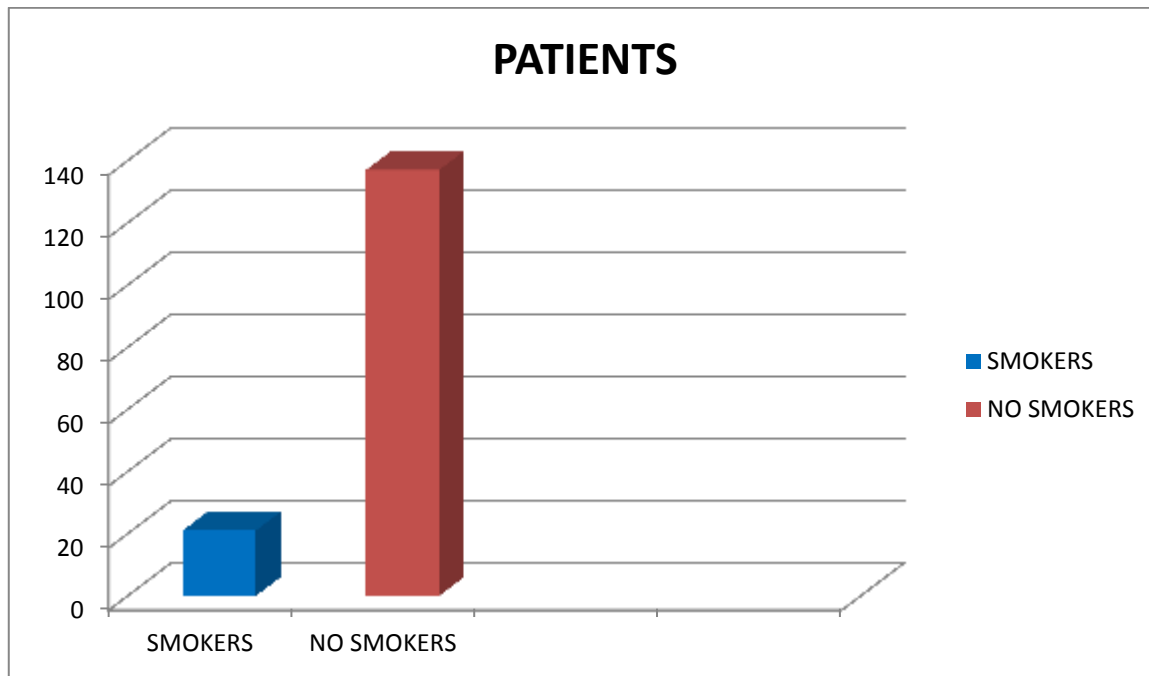
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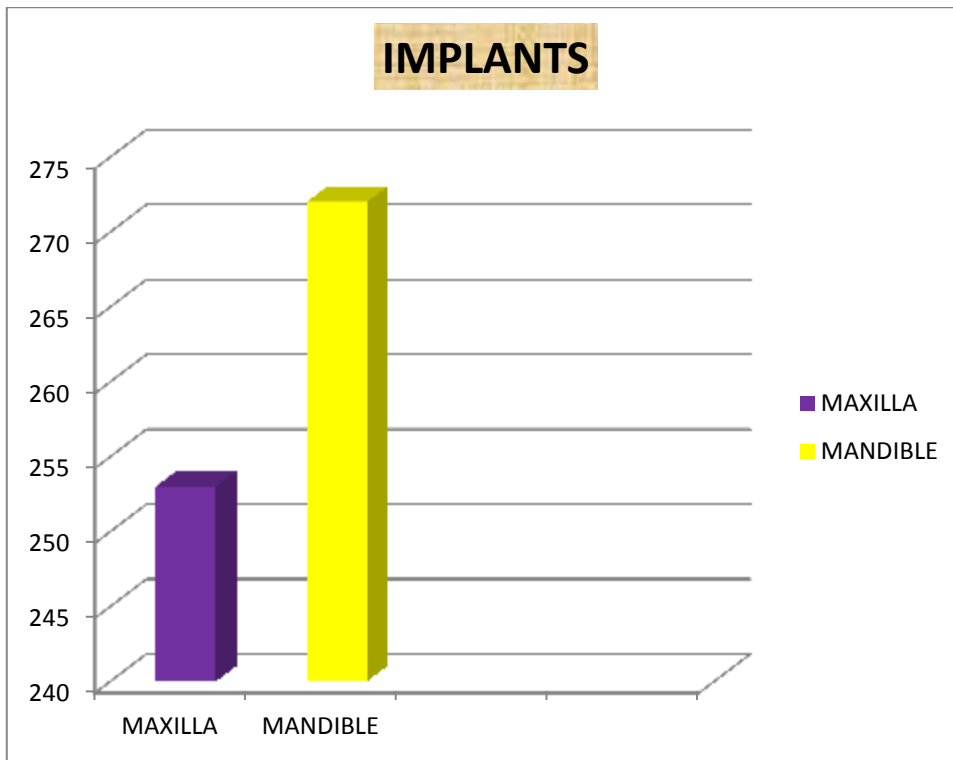
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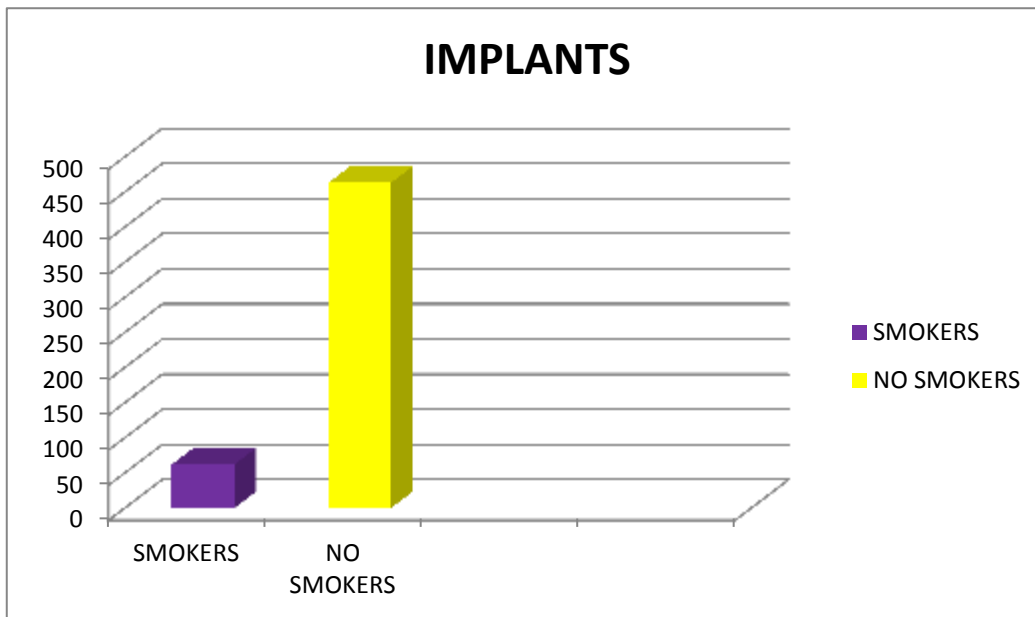
**Figure 1 – Graph showing the relationship of numbers of smokers and non-smokers.**



**Figure 2 - Graph showing the relationship of implant numbers in the maxilla and mandible.**



**Figure 3 - Graph showing the relationship implants numbers between smokers and nonsmokers.**



**Figure 4 - Graph showing the relationship implants lost numbers between smokers and nonsmokers.**

