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# Efficiency of Prophylactic Antibiotic Coverage Prior Dental Implant Surgery- An Original Research

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**Abstract**---Purpose of the present study was to determine whether antibiotic prophylaxis is an effective and popular treatment aid in conjunction with oral implant placement in healthy patients. Observational cross-sectional study was conducted based on a web-survey reported according to the STROBE guidelines. A questionnaire was sent via email to each participant. It contained close-ended and some open-ended questions concerning demographics, antibiotic type,

prescription duration and dosage which was analysed statistically using SPSS 25.0. Approximately 84% routinely prescribed prophylactic antibiotics in conjunction with oral implant surgery, 15.6% prescribed antibiotics in certain situations and only 1 did not prescribe antibiotics at all. Overall, 116 respondents prescribed both pre- and postoperative antibiotics, 29 prescribed antibiotics only preoperatively and 14 prescribed antibiotics exclusively after surgery. High range of prophylactic regimens is prescribed and they are not adhering to the new science-based specifications. Guidelines focused on the indications for prophylactic antibiotics among healthy patients are required to prevent bacterial resistance, side effects and costs caused by overtreatment and the irrational use of antibiotics.

**Keywords**---Antibiotic prophylaxis habits, Oral implant surgery, Postoperative infection, Bacterial resistance.

## Introduction

Antibiotic prophylaxis is standard practice for numerous surgical procedures in immunocompromised patients and in patients with significant co-morbidities.<sup>1</sup> Since most patients undergoing dental implant placement are relatively healthy and do not have significant medical risk factors, the use of antibiotic prophylaxis for healthy patients has not become standard practice. Although current literature outlines long-term studies showing the efficacy of a single-dose antibiotic in reducing early implant failure, the use of antibiotic prophylaxis and choice of agent remain controversial. The primary concern involves conflicting viewpoints that antibiotic prophylaxis may or may not be as effective as traditionally believed. Xu *et al.* expressed concerns about the difficulty of limited information available to practitioners for stringent control of post-operative complications following implant procedures.<sup>2</sup> Furthermore, current literature demonstrates significant variability among practitioners' antibiotic prescribing patterns, prompting the need to assess how varying interventions affect the overall success of implant operations.<sup>3</sup>

Oral implant surgery is a routine treatment from which both dentists and patients expect high success rate, but often this is not the case.<sup>4,5</sup> Bacterial contamination at implant surgery has been related to early implant failures.<sup>6</sup> Therefore, different prophylactic treatments such as the use of perioperative antibiotics have been studied.<sup>7</sup>

Nevertheless, the use of prophylactic antibiotics to reduce the incidence of postoperative infections and oral implant failures in healthy patients is still controversial.<sup>8,9</sup> Several reviews have found no evidence supporting the prophylactic effect of antibiotics on postoperative infections, and they have remained inconclusive on the prevention of oral implant failures.<sup>5,10-15</sup> Consequently, many professionals disagree on the utility of antibiotics and which is the most suitable regimen to adopt.<sup>16-21</sup>

The inadequate use of antibiotics must be seriously taken into consideration as it could cause bacterial resistance and other important adverse effects, such as secondary infections, interactions with other medications, gastro-intestinal discomfort, toxicity and allergic reactions.<sup>22</sup> The consequences are substantially human and economic.<sup>23</sup>

There is evidence showing that dental practitioners have over prescribed large numbers of systemic antibiotics and that their number has even increased in the last years.<sup>24</sup> In addition, a recent survey involving more than one thousand Italian dentists found that the use of systemic antibiotics is frequent and excessive.<sup>25</sup>

Ata-Ali et al. described antibiotic prophylaxis as necessary to provide pre-operative protection against infections and reduce the frequency of implant failures.<sup>12</sup> Escalante *et al.* also supported the benefits of prophylactic antibiotic practices in implant surgery, reducing the possibility of developing post-operative infections at the surgical site. Ahmad and Saad, however, suggested that practitioners must administer prophylactic antibiotics with caution and only when determined to be appropriate, not merely as a general measure.<sup>1</sup> Over-prescription of antibiotics may not only promote the emergence of antibiotic-resistant microorganisms; it could also induce toxic effects and hypersensitivity reactions.<sup>26</sup>

### **Aim of the Present Study**

The primary aim of this study was to determine whether antibiotic prophylaxis is an effective and popular treatment aid in conjunction with oral implant placement in healthy patients.

### **Methodology**

An observational cross-sectional study was conducted amongst 160 participants, where the study was based on web survey and was reported according to the Strengthening the Reporting of Observational studies in Epidemiology (STROBE) guidelines. The questionnaire developed with the purpose of collecting data concerning the prescription habits of preventive antibiotics among dental practitioners in conjunction with oral implant therapy. The participants were guaranteed that the research data would be collected anonymously and the participants had consented the use of the data for the study. Among all members of the study, 36 were female and 40% of all members were dentists specialized in oral surgery and rest were amongst prosthodontics and periodontology branches. Data regarding the following items: demographic details, education, work experience and preventive antibiotic prescribed in case of oral implant placement (including dosage and duration) was gathered. Based on the participants' answers regarding dosage and period of intake, the total prescribed amount of antibiotics was calculated (mg). The chi-squared and Fisher's exact test were run to evaluate the differences in the antibiotics regimen adopted by the participants according to their gender, age, education, location and work experience. ANOVA (Student's t-test) was run to assess the differences in the total antibiotics (mg) prescribed in concomitance to dental implant surgery.

## Results

Almost two-thirds of the participants (60.9%) had been working as oral health providers for more than 20 years, almost one-third had between 10 and 20 years of experience (30.1%) and the rest of the respondents had been working for less than 10 years (9%). Approximately 84% of the participants (n = 134), currently performing oral implant surgery, stated that they always prescribe prophylactic antibiotics in conjunction with oral implant surgery, only one of the participants (0.6%) never prescribe them. In addition, 15.6% adopted antibiotics only in particular cases (n = 25). Such as cardiopathy requiring antibiotic prophylaxis (24.2%), bone grafting (23.1%); sinus perforation (13.7%); preoperative implant-site infection (11.6%); smokers (9.5%); previous periodontal disease (8.4%); multiple implant insertion (3.1%); medically compromised patients (3.1%) and immediate implant placement (1%). No statistically significant differences were found related to the antibiotic prescriptions of dentists regarding some general characteristics. The majority of the 160 dentists who prescribe preoperative antibiotics when placing oral implants advise their patients to start 1 h prior to surgery (59.4%) or 1 day prior to surgery (34.2%). Oral Amoxicillin/Clavulanic acid was found to be the most frequently prescribed antibiotic when administered 1 or 2 days preoperatively (80.7%). Almost three quarters (70.6%) of the dentists who advise patients to start the antibiotics treatment postoperatively, prescribe oral 875/125 mg Amoxicillin/Clavulanic acid twice a day for a period varying from five to six days. No statistically significant differences ( $p = 0.176$ ) were found in the mean values of the total amount of antibiotics prescribed (mg) by dentists who routinely prescribed prophylactic antibiotics compared to those who prescribed antibiotics not on a regular basis. (Table 1)

## Discussion

The large range of different regimens prescribed by dentists in this study confirmed that there is not a standard prophylactic antibiotic regimen prescribed to healthy patients undergoing oral implant surgery. This has already been shown in other medical procedures where the antibiotic prophylaxis is elective according to each physician.<sup>12</sup> Regarding the most recent reviews published on this topic, prophylactic antibiotics have not been found beneficial in preventing postoperative infections. Just a single preoperative dose of amoxicillin (1 g, 2 g or 3 g) prior to oral implant placement might prevent oral implant failure among healthy patients.<sup>6,8</sup> Consequently, the prescription of postoperative antibiotics in healthy patients could be considered overtreatment and it could lead to potential adverse reactions and unnecessary costs. Unfortunately, most of dentists surveyed in this study commonly prescribed longer regimens including postoperative antibiotics instead. Most participants consistently prescribed various types of antibiotics and prophylactic regimens without any scientific-based support. The absence of standardized guidelines could be considered an important reason for the discretionary use of antibiotics. A similar survey performed among 109 dentists in UK found that approximately 72% of dentists prescribed antibiotics for all oral implant surgeries.<sup>17</sup> Other analogous study performed among 133 dentists in Sweden showed nearly the same data (74%).<sup>18</sup> This percentage was considerably lower among 176 dentists in Jordan (50%).<sup>16</sup> On the other hand, the percentage prescribing prophylactic antibiotics for healthy

patients among 217 maxillofacial surgeons in the USA (96%) and among 233 dentists in Spain (90%).<sup>20</sup> The current condition described on this cross-sectional survey may produce a negative discrepancy in the risk-benefit ratio concerning the use of prophylactic antibiotics because of a reduction of their positive effects and an increasing incidence of adverse reactions such as bacterial resistance, patient risk and societal costs. This cross-sectional survey was performed among dentists as professionals who carry out oral implant surgery and who have graduated in representative proportions from different Italian dental schools. The survey has an internal validity (lack of bias in estimating the dentist's current antibiotic prescribing habits in combination with oral implant surgery) for its target population. Therefore, the authors assumed that the estimates from this survey could be extrapolated to all dentists currently performing oral implant surgery.

### Conclusion

Dental surgeons on a large scale prescribe antibiotic prophylaxis in conjunction with oral implant surgery among healthy patients. A high range of prophylactic regimens is prescribed and they are not adhering to the science-based recommendations

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