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# Complications of Implant-Supported Overdentures

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## Abstract

***Background:*** The purpose of this study is to determine the complications of implant-supported overdentures (ISO) and the relationship between demographic/prosthetic data and complications.

***Methods:*** Patients who had been using their ISO for at least three months were included in this study. A questionnaire with demographic and prosthetic information was used to collect data. At the end of the study, the survey results were grouped and evaluated according to study criteria. The data obtained as a result of the study were discussed descriptively.

***Results:*** Of the 34 patients who have taken part in our research, 58.8% were female and 41.2% were male. The average patient's age is 64.58 ± 13.64. Within the limitations of the research, the most common complication for participants using ISO is painful and/or inflamed areas on the soft tissue.

***Conlcusion:*** There is a statistically significant relationship between age range, smoking, area of denture, type of attachment, and complications.

***Keywords:*** Complication, overdenture, dental implant

## INTRODUCTION

Edentulism, which greatly reduces the self-confidence of people, is a condition that weakens chewing, speech, and aesthetics. With conventional complete or partial dentures, it is very difficult to completely overcome all these deficiencies. Especially the over-resorbed alveolar ridge, which reduces the retention, stability, and function of prostheses, is the biggest problem with complete dentures (CD). In addition, it has been reported that in complete edentulous ridges, lower CDs with conventional treatment methods can be displaced by up to 10 mm during function due to the effect of masticatory forces, and retention and stability problems affecting the use of the prosthesis have been reported.[1] These and many other problems have led to the need to search for alternative methods to conventional CDs and led to the inclusion of oral implantology in CDs.

Implant-supported overdentures (ISO) have many advantages compared to conventional CD. The most important reason for the use of dental implants is the preservation of alveolar bone. Bone needs stimulation to maintain its shape and density. The implant reduces bone resorption by transmitting stress and tension to the surrounding bone. With implant treatment, it is possible to maintain facial expression by increasing chewing efficiency and muscle activity.[2] It is easier for the patient to accept and use the prosthesis psychologically. At the same time, it has been reported that the success rate of ISO is higher than that of tooth- and tissue-supported prostheses.[3] ISO can be a simple, aesthetically pleasing, functionally satisfying, and long-lasting treatment for the physician when the implants are placed in the ideal position and angulation and the prosthetic superstructure is carefully prepared.

This study is the extended version of the oral presentation pre- sented at the 25th Scientific Congress of Turkish Prosthodontics and Implantology Association on November 4-7 2021.

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The Glossary of Prosthodontic Terms defines overdenture as "any removable dental prosthesis that covers and rests on one or more remaining natural teeth, the roots of natural teeth, and/or dental implants; a dental prosthesis that covers and is partially supported by natural teeth, natural tooth roots, and/or dental implants."[4]

Many studies have found that overdentures have a positive impact on quality of life and patient satisfaction. Literature states that retention, stability, comfort, speech and chewing efficiency improved drastically with ISO, with enhanced patient satisfaction and a better oral health-related quality of life (OHRQoL).[5] The benefits of ISO include preservation of residual alveolar bone, improvement in masticatory efficiency, increased retention and stability of dentures, and increased patient satisfaction.

There is now overwhelming evidence in the literature to suggest that a 2-implant overdenture should become the first choice for treating the edentulous mandible.[6-8]

Despite the many benefits, ISOs can cause complications such as implant loss, peri-implantitis and soft tissue complications, the need for relining or repair of the resin portion of the denture, replacement or activation of retentive elements, loss of retention and attachment systems, debonding of denture teeth, and fracture of the denture base material.[9]

The aim of this study is to evaluate the types of complications seen in patients with ISO and to determine the relationship with demographic/prosthetic data. The null hypothesis of the study is that there is no relation between the patient's age, prosthesis location, smoking, attachment type, and complications.

## MATERIAL AND METHODS

This study was carried out at Istanbul University, Faculty of Dentistry, Department of Prosthodontics. The patients using ISO have participated in the study. The inclusion criteria for the participants were using ISO for at least 3 months. Exclusion criteria were using ISO for less than 3 months and being under 18 years of age.

The study was approved by the Clinical Research Ethics Committee of the Istanbul University Faculty of Dentistry (375/2019-15). The participants were informed about the study and were asked to volunteer. At the end of the study, the survey results were grouped and evaluated according to the study criteria.

Data were collected using a questionnaire. The survey was conducted face-to-face with the patients by a single researcher. The questionnaire consisted of 3 parts. The first part included the patients' demographic information, such as age, gender, and smoking habit. In the second part, prosthetic information such as age, location, number of implants, type of attachment used, and opposing dentition were recorded. In the last part, the types of complications were recorded. The data obtained as a result of the study were discussed descriptively.

## RESULTS

A total of 34 participants were included in the study; 58.8% were female and 41.2% were male. The incidence of complications was found to be higher in men (Table 1).

The mean age of the participants was 64.58 ± 13.64. There are 2 groups about age: 32.4% of patients are younger than 65, and 67.6% of patients are 65 years and older. The complication rate was found to be 60% in patients younger than 65 years and 79% in patients 65 years and older (Table 2).

Participants were required to have been using ISO for at least 3 months, and the average period of prosthesis use in our study was 24 months.

Eighty-five percent of the participants were smokers. Complications were observed in 75% of smokers and 40% of nonsmokers. According to these results, there is a significant difference between smoking and complications (Table 3).

Bar attachments are present in 26.5% of patients, 29,4% of patients have locator attachments, and 44.1% of patients have ball attachments (Table 4).

In the study, 24 participants had complications; 36% of these participants had only 1 complication, and 64% of participants had more than 1 complication. The distribution of patients according to the type of attachment and complication is listed in Table 5. The most common complications were painful and/or inflamed areas on the soft tissue (28.9%).

**Table 1. Gender and Complication Rate**

| Complication | Yes (%) | No (%) |
|---|---|---|
| Sex | | |
| Female | 65 | 35 |
| Male | 78.6 | 21.4 |

**Table 2. Age and Complication Rate**

| Complication | Yes (%) | No (%) | Total (%) |
|---|---|---|---|
| Age | | | |
| <65 | 60 | 40 | 32.4 |
| >65 | 79 | 21 | 67.6 |

**Table 3. Smoking and Complication Rate**

| Complication | Yes (%) | No (%) | Total (%) |
|---|---|---|---|
| Smoking | | | |
| Yes | 75 | 25 | 85 |
| No | 40 | 60 | 15 |

**Table 4. Type of Attachment and Complication Rate**

| Complication | Yes (%) | No (%) | Total (%) |
|---|---|---|---|
| Type of attachment | | | |
| Bar attachment | 55.5 | 44.5 | 26.5 |
| Locator attachment | 80 | 20 | 29.4 |
| Ball attachment | 73.3 | 26.7 | 44.1 |

**Table 5. Type of Attachment and Complication Type**

| Type of attachment | Bar (n) | Locator (n) | Ball (n) | Total n (%) |
|---|---|---|---|---|
| Complication type | | | | |
| Loss of stability/ retention | 1 | 0 | 3 | 4 (11.8%) |
| Inflamed area | 1 | 3 | 6 | 10 (28.9%) |
| Need for relining | 1 | 0 | 2 | 3 (9.6%) |
| Fracture of overdenture | 0 | 2 | 0 | 2 (5.9%) |
| Fracture/debonding of artificial teeth | 4 | 0 | 1 | 5 (14.9%) |
| Grinding/loosening of clips | 0 | 0 | 2 | 2 (5.8%) |
| Loss of implant | 1 | 2 | 0 | 3 (9.6%) |
| Loosening of screw | 0 | 0 | 1 | 1 (2.9%) |
| Peri-implantitis | 1 | 1 | 1 | 3 (9.6%) |
| Total | 9 | 10 | 15 | 34 |

Inflamed soft tissue areas were only seen in patients with ball attachment. Thus, the relationship between attachment type and inflamed soft tissue area is significant.

Patients in this study had 2 types of denture base material: metal–acrylic and acrylic. In terms of the relationship between type of base material and complications, more complications were seen with acrylic-based overdentures than with metal-acrylic-based overdentures.

When the participants were classified according to the prosthesis location, 6 maxillary overdentures and 33 mandibular overdentures were observed in a total of 34 participants. None of the participants had an inflamed soft tissue area as a complication for maxillary overdentures. The data showed a significant relationship between prosthesis location and the inflamed soft tissue area.

The participants had 82% CDs, 9% fixed prosthesis, and 9% natural teeth as antagonists. Patients who had a CD in the opposite jaw had the most complications.

## DISCUSSION

In our study, there was no significant difference between gender and the presence of complications. In the cross-sectional study on the success and complications of ISO conducted by Loza-Herrero et al,[10] no statistically significant difference was found between gender and the presence of complications. However, Calderon et al reported that this rate was higher in women than in men.[11]

In our study, a significant difference was found between age and the presence of complications, and the incidence of complications was higher in older individuals. The same result was found by Loza-Herrero et al[10] Further studies are needed to confirm these initial findings and to determine whether additional evaluation factors should be included.

In our study, a higher percentage of complications was observed in the locater system. In 2021, Cakarer et al[12] observed in their study that there was no significant difference between the attachment systems regarding implant failure, replacement of the attachment fragments, and fractured overdentures. However, the fragments of the ball and bar attachment required more maintenance. On the other hand, locator attachment was found to be more advantageous than ball and bar systems, regarding the rate of complications in clinical practice.

Loza-Herrero et al[10] reported the most common complication as a lack of stability and retention. Calderon et al[11] also reported that the most common complication of overdenture prostheses is loss of retention. On the other hand, an initial analysis of a prospective study reported by Chaffee et al[13] stated that the most common prosthodontic complication is the tightening of the attachment mechanism. In our study, the most common complication in ISO was found to be painful and/or inflamed areas on the soft tissue.

In our study, it was observed that complications were more common in smokers. Smoking is known to be an important risk. The effect of smoking, especially on peri-implant tissues, has been documented in many studies. Stoker et al[14] reported that peri-implant marginal bone loss in smokers was almost twice as high as in nonsmokers and was independent of the chosen treatment strategy.

In our study, a significant difference was found between the prosthesis location and the presence of complications. However, in the studies conducted by Calderon et al[11] and Rammelsberg et al[15], no significant relationship was found between the prosthesis location and the presence of complications.

Within the limitations of this study, the most common complication of using ISO is painful and/or inflamed soft tissue areas. There is a significant relationship between age, prosthesis location, smoking, type of attachment, and complications. Further studies will be necessary for the confirmation of these initial findings.

**Ethics Committee Approval:** Ethical committee approval was received from the Ethics Committee of Istanbul University Faculty of Dentistry (Approval no: 375/2019-15, Date: 14/02/2019).

**Informed Consent:** Written informed consent was obtained from the patients who agreed to take part in the study.

**Peer-review:** Externally peer-reviewed.

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