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# The Retrospective Evaluation of Clinical and Demographic Characteristics of Dental Implant Patients

**Objective:** The aim of this study is to retrospectively examine the demographic and clinical conditions of the patients who underwent dental implant surgery at the clinic between the years 2020-2022, the characteristics of the implants placed, and to evaluate the data with descriptive statistical methods.

**Materials and Methods:** Demographic data (age and gender), edentulous status, locations and dimensions of implants (diameter and length) obtained from the medical files of 150 patients who were operated on with the indication of dental implants at the Dicle University Faculty of Dentistry, Department of Oral and Maxillofacial Surgery clinic between the years 2020-2022 were recorded. The obtained data was evaluated with descriptive statistical analysis.

**Results:** 150 patients (88 women and 62 men) were included in the study. The mean age of these patients were 54 (18-75). The most treated age range was 46-55 years with 41 patients (27%). It was determined that 264 implants (56.1%) were placed in the maxilla and 206 implants (43.9%) were placed in the mandible. In addition, 158 (34%) implants were located in the anterior region and 312 (66%) were located in the posterior region. The average diameter of the implants were 3.85 mm and the average length was 11.4 mm.

**Conclusion:** In this study, the most common dental implant application age range was 46-55 years, and the most common implant indication was partial edentulism with a toothless ending. The most common dental implant areas were determined as the mandibular first molar and maxillary first molar tooth regions.

*Key Words: Implant, retrospective study, demographic*

### Dental İmplant Uygulanan Hastaların Klinik ve Demografik Özelliklerinin Retrospektif Olarak Değerlendirilmesi

**Amaç:** Bu çalışmanın amacı, 2020-2022 yılları arasında kliniğimizde dental implant cerrahisi uygulanan hastaların demografik ve klinik durumlarını ile yerleştirilen implantların özelliklerini retrospektif olarak incelemek ve tanımlayıcı istatistiksel yöntemler ile değerlendirmektir.

**Gereç ve Yöntem:** 2020-2022 yılları arasında Dicle Üniversitesi, Diş Hekimliği Fakültesi, Ağız, Diş ve Çene Cerrahisi kliniğimizde dental implant endikasyonu ile opere edilen 150 hastanın tıbbi dosyalarından elde edilen demografik veriler (yaş ve cinsiyet), dişsizlik durumları, implantların lokasyonları ve boyutları (çap ve uzunluk) kaydedildi. Elde edilen veriler tanımlayıcı istatistiksel analizler ile değerlendirildi.

**Bulgular:** Çalışmaya 150 hasta (88 kadın ve 62 erkek) dâhil edildi. Bu hastaların yaş ortalaması 54 (18-75) idi. En fazla tedavi edilen yaş aralığı 41 hasta (%27) ile 46-55 yaş aralığıdır. Maksillaya 264 implant (%56.1) ve mandibulaya 206 implant (%43.9) yerleştirildiği tespit edildi. Ayrıca implantların 158'si (%34) anterior bölgede, 312'si (%66) posterior bölgede lokalizedir. İmplantların ortalama çapı 3.85 mm ve ortalama uzunluğu 11.4 mm'dir.

**Sonuç:** Bu çalışmada, en sık dental implant uygulanan yaş aralığı 46-55 yıl olup, en sık implant endikasyonu dişsiz sonlanan kısmi dişsizlik olarak belirlendi. En sık dental implant uygulanan bölgeler mandibular 1. molar ve maksiller 1. molar diş bölgeleri olarak tespit edildi.

*Anahtar Kelimeler: İmplant, retrospektif çalışma, demografik*

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## Introduction

The current goal of dentistry is to provide infection control for patients, as well as to offer treatment in a way that meets the patients' functional and aesthetic expectations (1). The desire to restore function and aesthetics to patients who have lost their teeth for various reasons has led to advances in dentistry (2). With the developments in dentistry, dental implants that restore the functions of lost teeth have begun to be applied (3).

Dental implants have gained scientific acceptance in the treatment of complete and partial edentulism cases involving the restoration of lost teeth since Brenemark (4) first described osseointegration in the 1960s (5).

Although dental implant treatment is an effective treatment method frequently used for the rehabilitation of tooth loss, one of the prerequisites for the placement and long-term successful use of implants is the presence of bone tissue in sufficient quantity and quality, in order to provide stabilization (6-9). In addition, factors related to the patient such as general health and systemic condition, age, gender, smoking habits, oral hygiene, implant care habits, and recurrent infections; factors related to the implant factors such as size, characteristics, location, installation protocol and factors related to the clinicians' experience have been considered as predisposing factors for implant success, survival, and failure (10-13).

Minimizing failure in dental implant applications is an important issue for patient and physician comfort. For this reason, it is necessary to apply the most accurate treatment planning for the patient by carefully analyzing the risk factors that may cause failure (14). Therefore, there is a need for clinical and experimental studies that will increase success in this field by revealing objective criteria that have taken their place in the scientific literature.

The aim of this study is to retrospectively analyze the demographic information of the patients who underwent dental implant surgery at the Dicle University Faculty of Dentistry, Department of Oral and Maxillofacial Surgery clinic and the characteristics of the implants placed and evaluate them with descriptive statistical methods.

### Materials and Methods

The present study was conducted in accordance with the Principles of the Declaration of Helsinki. Ethical approval of the study was obtained from the Clinical Research Ethics Committee of the Deanery of Dicle University Faculty of Dentistry (Date: 29/06/2022, Protocol code: 2022-35).

In this retrospective study, 470 dental implants placed in 150 patients who underwent dental implant treatment by the same surgeon at the Dicle University Faculty of Dentistry, Department of Oral and Maxillofacial Surgery between the years 2020-2022 were included. Patients outside the age range of 18-75 years, patients with contraindications for implants, and patients whose control X-rays could not be obtained due to the lack of communication were excluded from the study.

The implants included in the study were ITI (Straumann AG, Waldenburg, Switzerland), Nucleoss (Şanlılar Medical Devices, İzmir, Türkiye), MIS (MIS Implant Technologies Ltd, Shlomi, Israel), Implance (AGS Medical, Trabzon, Türkiye), NTA (Toros Dental, Türkiye), and Bioinfinity (Uysal Medikal, Türkiye) brand dental implant systems. The patients were informed about dental implant surgery before the operation and written informed consent was obtained from each patient. The demographic information of the patients, their clinical status, and the characteristics of the implant or implants placed were recorded in the medical files of the patients on the day of operation. In addition, preoperative and postoperative panoramic films were taken of the patients. The patients were prescribed an antibiotic containing an amoxicillin-clavunalic acid combination (an antibiotic containing clindamycin was prescribed for patients with penicillin allergy), an analgesic, and a mouthwash containing chlorhexidine gluconate to be used for 5-7 days post-implantation. The sutures were removed at post-operative 7-10 days and the operation area was clinically checked. All patients were called to the clinic for follow-ups at post-operative 1, 3 and 6 months. The missing tooth or teeth were restored with fixed or removable implant-supported prostheses 3 months after implant surgery or 6 months after implant surgery in patients who underwent additional surgical procedures (sinus lifting surgery, etc.). Patients were evaluated in terms of age, gender, edentulous status, implanted areas, number of implants, diameters and lengths of implants, and additional surgical procedures.

The SPSS version 21 (Chicago, IL, USA) program was used for the descriptive statistical analysis of the obtained data. Chi-square test and independent t test were used as statistical tests.

### Results

Of the 150 patients included in the study, 62 (41.3%) were male and 88 (58.7%) were female (Figure 1). A total of 470 dental implants applied to these 150 patients were evaluated. It was determined that of the 470 implants, 210 (44.7%) were applied to male patients and 260 (55.3%) were applied to female patients (Figure 2). When the age range of the patients were evaluated, it was determined that there were 10 patients (6.6%) between the ages of 18-25, 23 patients (15.3%) between the ages of 26-35, 26 patients (17.3%) between the ages of 36-45, 41 patients between the ages of 46-55 (27.3%, 35 patients (23.3%) between the ages of 56-65, and 15 patients (10%) over the age of 65 (Figure 3). The mean age was found to be 54 years. The most common age range for dental implants was found to be 46-55 (27%), followed by the 55-65 (23%) age range. The age range where dental implants were least applied was determined as the 18-25 (10%) age range. It was determined that 264 (56.1%) of the implants were placed in the maxilla and 206 (43.9%) were placed in the mandible (Figure 4). When the distribution of dental implants between the jaws by gender was compared statistically, no significant difference was found (p=0.5077, Chi-square test) (Table 1). Sixty-five percent of all dental implants were used to eliminate partial edentulism ending with a toothless ending, 16.7% were used to eliminate complete edentulism, 10.3% were used to eliminate single tooth deficiency, and 8% were used to eliminate partial edentulism ending with teeth (Figure 5). It was determined that 34% (n=158) of these implants were localized in the anterior region (incisors and canines region), and 66% (n=312) were localized in the posterior region (1st premolar and later) (Figure 6-7). In addition, 52% (n=250) of the implants were located on the right side and 48% (n=220) were located on the left

side. When the implants were compared according to the anterior-posterior and right-left localizations, a statistically significant difference was found (p=0.0239, Chi-square test) (Table 2). In addition, when the data were compared in terms of gender and right-left and anterior-posterior location, no statistically significant difference was found (p=0.2257, Chi-square test) (Table 3).
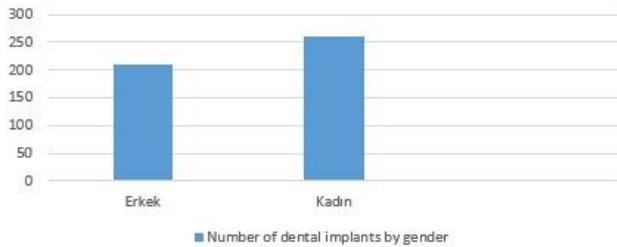


**Figure 1.** Distribution of Patients by Gender
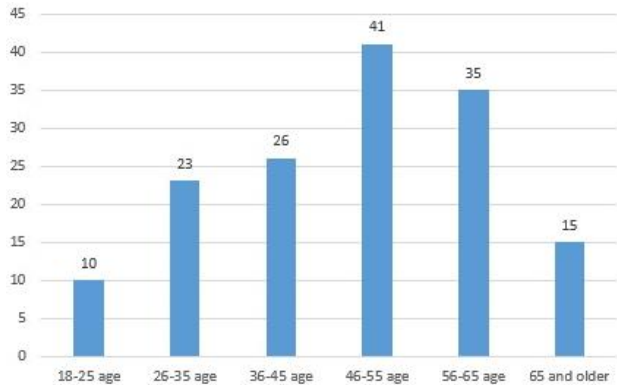


**Figure 2.** Distribution of Dental Implants by Gender



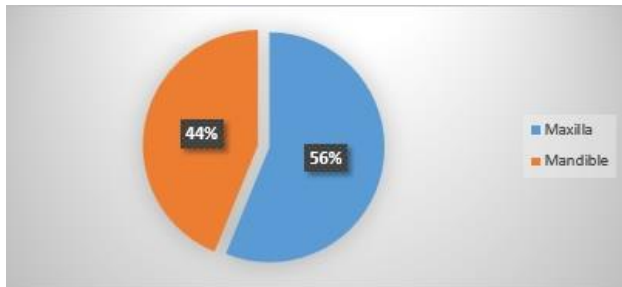**Figure 3.** Distribution of Dental Implants by Age
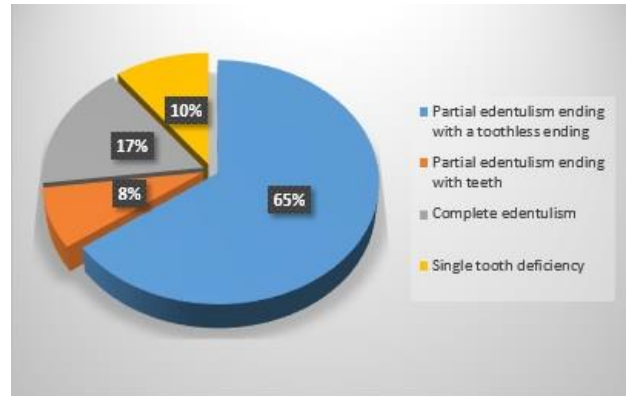


**Figure 4.** Distribution of Dental Implants by Jaws



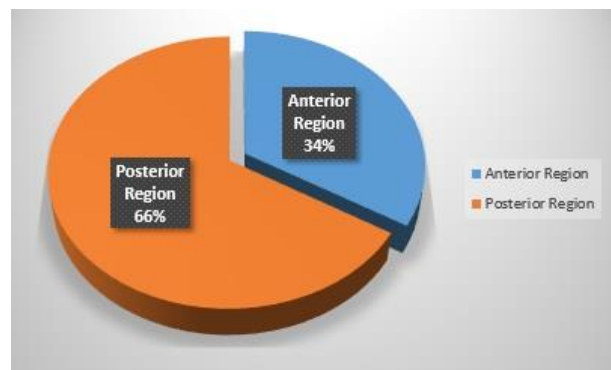**Figure 5.** Edentulism Status of Patients



**Figure 6.** Distribution of Dental Implants by Anterior and Posterior Location
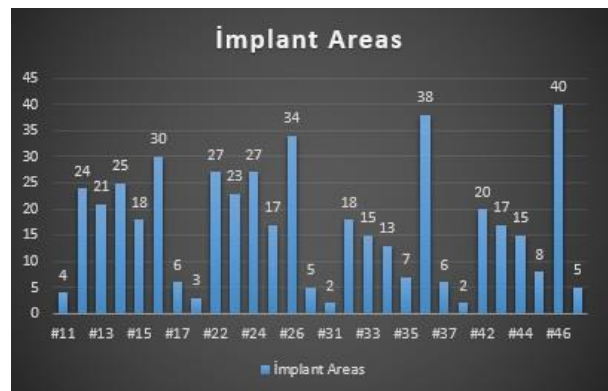


**Figure 7.** Implant Sites

**Table 1.** Distribution of dental implants by gender and localization in the jaws

| Gender | Maxilla (n) | Mandible (n) | Total (n) | p Value |
|--------|-------------|--------------|-----------|---------|
| Male | 122 | 88 | 210 | p=0.5077 |
| Female | 142 | 118 | 260 | |
| Total | 264 | 206 | 470 | |

$\chi^2$ test - Chi-Square=0.439

**Table 2.** Distribution of dental implants according to anterior-posterior and right-left localization

| Localization | Right (n) | Left (n) | Total (n) | p Value |
|---|---|---|---|---|
| Anterior | 72 | 86 | 158 | p=0.0239 |
| Posterior | 178 | 134 | 312 | |
| Total | 250 | 220 | 470 | |

$\chi^2$ test - Chi-Square=5.102

**Table 3.** Distribution of dental implants by gender, right-left and anterior-posterior location

| Gender | Anterior (n) | Posterior (n) | Right (n) | Left (n) | p value |
|---|---|---|---|---|---|
| Male | 122 | 88 | 132 | 95 | p=0.2257 |
| Female | 142 | 118 | 118 | 125 | |
| Total | 264 | 206 | 250 | 220 | |

$\chi^2$ test - Chi-Square=4.353

The most commonly implanted area was determined as the mandibular first molar region [78 (16.59%)]. The lengths of the implants applied to this area were found to be 8-14 mm (mean 10.8 mm) and the diameters were found to be 3.3-4.8 mm (mean 4.0 mm). This region was followed by the maxillary first molar region [75 (15.7%)]. The lengths of the implants applied to this area were found to be 6-14 mm (mean 10.5 mm) and the diameters were found to be 3-4.8 mm (mean 3.7 mm).

The least implanted area was determined as the mandibular incisor region [4 (0.85%)]. Following this region was the mandibular 2nd premolar tooth region [19 (4.04%)].

When the lengths of all applied implants were evaluated, the length was found to be 6-14 mm (mean 11.4 mm). When the diameters of all applied implants were evaluated, the implant diameter range was found to be 3.0-4.8 mm (mean 3.85). Thirty four percent (158 pieces) of the implants applied were in the aesthetic region (canine between teeth) and the average implant diameter in this region was 3.5±0.25 mm, and the average implant length was 11.5±0.72 mm. 66% (312 pieces) of the implants applied were to the posterior region (1st premolar and back) and the average implant diameter in this region was 3.85±0.16 mm, and the average implant length was 10.6±0.65 mm. A statistically significant difference was found between both anterior and posterior implant diameters and implant lengths (Independent t-test) (p<0.0001). The longest implant area was determined as the maxillary canine region with an average length of 12.2 mm, and the average diameter of the implants applied to this area were 3.8 mm. The shortest implant area was determined as the maxillary 1st and 2nd molar and mandibular 2nd molar regions with an average length of 6 mm. In addition, it was determined that 10% of the implant sites required additional surgery, and the most common procedure was the elevation of the sinus floor. There is a negative relationship between implant length and implant diameter.

**Discussion**

Today, dental implants are widely used in the treatment of missing teeth (15). Retrospective evaluation of the clinical applications of dental implants, which have been used for a long time, is very valuable in terms of guiding physicians (16). The aim of this study is to evaluate the demographic and clinical data of the patients operated on and the implants applied at the Dicle University Faculty of Dentistry, Department of Oral and Maxillofacial Surgery between the years 2018 and 2020. The need for implant treatment is related to age in proportion to tooth loss. A study on this subject conducted by Vehemente et al. (15) reported the mean age as 53.5 years and that the age range varied between 16-92. In a similar study, Brennan et al. (17) reported the mean age as 53.4 years, the age group most frequently implanted as 40-60 years, followed by the 20-40 age group and then the 60-80 age group. In a study by Eltaş et al. (18), the mean age was reported as 45.2 years and the age range was reported to vary between 20-78 years. In a study by Bural et al. (19), the mean age was reported as 52.12 years and the most common dental implant applied age range was reported respectively as 50-59 years (30.8% of implants), 60-65 years (25.2% of implants), and 40-49 years (20.7% of implants). In the study where Mundt (20) reported the special application results of 663 implants in 159 patients, the mean age was reported as 54 years. In a study where 182 dental implants in 58 patients were evaluated, Sarı et al. (21) reported the mean age as 52.43±13 years. In addition, the age range for which dental implants were most frequently applied was determined as 56-65 years, and the age range for which dental implants were least applied was determined as 18-25 years. In a study by Polat et al. (22), the mean age and age range were reported respectfully as 51.7 years and 18-70 years in women, and 51.2 years and 22-75 years in men. In a study by Urvasızoglu et al. (16), the mean age was reported as 41.1 years and the age range for which dental implants were most frequently applied was 46-55 years, followed by the 36-45 age range. When the age ranges of the individuals included in the present study were examined, it was seen that the most frequently implanted age range was 46-55 years, and the mean age was 54. The reason for this difference was thought to be the size difference of the patient population and study sample.

When the edentulous status of the patients included in the present study were examined; it was observed that the most common condition was partial edentulism with a toothless ending (65%). In a similar retrospective study, Urvasızoglu et al. (16) reported that the most frequently applied dental implants were to partially edentulous patients. In the 2013 study by Bural et al. (19), it was reported that the majority of the placed dental implants were for the treatment of complete edentulism (48.2% of implants), followed by partial edentulism (23.2% of implants). In the 2019 study by Polat et al. (22), it was reported that 80% of the placed dental implants were for partial edentulism treatment. In the 2022 study by Sarı et al. (21), it was reported that

61% of the placed dental implants were for the treatment of partial edentulism with a toothless ending. On the other hand, in the Bornstein et al. (23) study, the most common implant indication was found to be a single missing tooth. Although the present study is in line with the literature, these differences in implant treatment indications can be attributed to patients' preference for dental implant treatment for different reasons (chewing, aesthetic, retention, protection of adjacent teeth, etc.).

In the present study, it was determined that of the 470 dental implants placed, 56.1% were placed in the upper jaw and 43.9% were placed in the lower jaw. Sarı et al. (21) reported that of the 182 dental implants placed, 54.4% were placed in the upper jaw and 45.6% were placed in the lower jaw. In a 2018 study by Adalı et al. (14), it was reported that 51.6% of the placed dental implants were localized in the upper jaw and 48.3% were localized in the lower jaw. Urvasızoglu et al. (16) reported that of the 233 dental implants placed, 53.2% were placed in the upper jaw and 46.8% were placed in the lower jaw. In another study conducted by Urvasızoğlu et al. (24) in 2019, it was reported that 52.4% of the 498 dental implants were placed in the upper jaw and 47.6% were placed in the lower jaw. In the study of Polat et al. (22), it was determined that 56.2% of the 315 dental implants were applied to the upper jaw and 43.8% were applied to the lower jaw. The findings are in line with the present study.

It was determined that 34% of the implants applied in the present study were applied to the aesthetic region and 66% were applied to the posterior region. Vehemente et al. (15) showed in a study that there was a higher rate of implant application in the posterior area, similar to the present study. Sarı et al. (21) reported that 28.5% of the implants were localized in the anterior region and 71.5% were localized in the posterior region. In a study by Urvasızoglu et al. (16), it was reported that 40% of the placed dental implants were localized in the esthetic region and 60% were localized in the posterior region. In the study by Polat et al. (22), it was determined that 28.2% of the placed dental implants were localized in the anterior region and 71.7% were localized in the posterior region. In the study by Adalı et al. (14), it was reported that 27.8% of the placed dental implants were localized in the anterior region and 72.1% were localized in the posterior region. These findings are also consistent with the present study. In this study, the greater localization of dental implants in the posterior region can be attributed to the fact that partial edentulism with a toothless ending was reported as the most common implant indication.

In the present study, the mandibular first molar was the most implanted tooth region, followed by the maxillary first molar region. The least implanted area was the mandibular incisor region. In a study conducted by Sarı et al. (21), it was reported that the mandibular canine tooth was the most implanted tooth region, and the maxillary lateral tooth region was the least implanted

tooth region. In a study by Urvasızoglu et al. (16), the most implanted area was reported as the mandibular 1st molar region, followed by the maxillary 1st molar region. The least implanted area was reported as the lower anterior region.[16] In the present study, the most frequent implantation being to the mandibular first molar region is attributed to these teeth being the earliest permanent teeth, tooth loss caused by clinical factors, frequent tooth decay and periodontal diseases or traumatic factors of the first molars. In a study on this issue, Akın et al. (25) reported that the most frequently lost tooth was tooth number 18, followed by the first molars.

When the results of the present study were evaluated; longer and narrower diameter implants (mean implant diameter 3.5 mm, average implant length 11.5 mm) were shown to be used in the esthetic area while shorter and larger diameter implants (mean implant diameter 3.85 mm, average implant length) 10.6 mm) were shown to be preferred in the posterior area. The maxillary sinus for the posterior maxilla and the mandibular canal for the posterior mandible are anatomical limitations in the posterior region for dental implant surgery. (26, 27) This is thought to be the reason for the use of shorter and larger diameter implants applied to the posterior region. A study by Sarı et al. (21) reported that the mean implant diameters of the placed implants were 4.12±0.21 mm in the anterior region, and 4.18±0.13 mm in the posterior region, while the mean implant lengths of the placed implants were 11.10±0.88 mm in the anterior region and 10.33±0.71 mm in the posterior region. In the study of Urvasızoğlu et al. (16) it was reported that the mean implant diameter was 3.6 mm in the anterior region, 3.9 mm in the posterior region, and the mean implant length was 12.0 mm in the anterior region and 10.7 mm in the posterior region. When the most commonly used implant diameters and lengths were evaluated in the study by Polat et al. (22), the values were reported at different rates as 3.0-3.8 mm (80.9%) and 10-12 mm (51.7%) in the anterior region, while they were 3.0-3.8 mm (49.1%) mm and 10-12 mm (65.5%) in the posterior region.

Dental implants continue to be applied as the best and most reliable treatment in regaining the lost function and aesthetics of missing teeth. As a result, dental implant surgery is applied in a wide age range and with different indications. In this study, it was reported that the age range for which dental implants were most frequently applied was 46-55 years, and the most common implant indication was partial edentulism with a toothless ending. The most common dental implant areas were determined as the mandibular first molar and maxillary first molar tooth regions. In the light of the data, it can be thought that retrospective studies on dental implant treatment will provide informative and guiding results and guide physicians to minimize complications and failures in implant surgeries. However, it is anticipated that larger, multicenter and multidisciplinary studies are needed.

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