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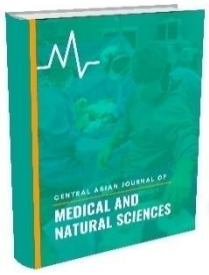

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# A Cross-Sectional Study of Iraqi Patients to Determine the Degree of Satisfaction with Dental Implants

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**Abstract:** Background: Although the last decade in Iraq has seen a significant increase in patients seeking both governmental and private dental centres for the purpose of undergoing dental implant procedures, most studies have focused solely on examining the impact of treatment on those who have already undergone the procedure.

Objective: Our paper presents a cross-sectional study that examines the assessment outcomes of patient satisfaction with dental implants.

Patients and methods: The study analysed the clinical and demographic characteristics of patients who received dental implants via databases. Using SPSS, we analysed the data and grouped the 93 cases using K-nearest neighbour and linear regression models. The patients included both male and female genders and were between the ages of 30-60 that including from many Iraqi hospitals between 16th Jun 2022 to 25th March 2023. For patients who underwent delayed or immediate implants, we recorded all dental implant outcomes in databases and analyzed the cumulative survival rate in months.

Results and Discussion Our findings identified age as a significant risk factor, with most patients who underwent dental implants being above 50 years old. Gum disease was the most common cause for dental implants (33.4%), followed by tooth decay (22.6%) and other causes. In the long term, smoking significantly impacts patients, with 54.8% being smokers and 45.2% non-smokers. Our results indicate that the complication rate after dental implantation was 16.2%, with infection being the highest risk factor for post-surgery patients. This had an impact

on survival rates, which remained stable for patients who underwent delayed implants for the first 80 months. However, patients who received immediate implants experienced a drop in survival rates during the last 70 months.

Conclusion Our study has found that delayed implants yield greater patient satisfaction and better aesthetic results compared to immediate implants.

**Key words:** Dental implants, Delayed implants, Immediate implants, Upper anterior, Lower posterior, Fixed denture, and Removable denture.

**Introduction**

Dental implants are artificial roots that are surgically inserted into the mandibular or maxillary bone and that achieve an intimate attachment to the bone through a process called osseointegration, which is defined as the direct structural and functional connection between the living, ordered bone and the surface of an implant [1-5]. These structures generate a solid base on which both restorations of individual teeth, as well as partial or total prostheses, can be performed, fulfilling various requirements among which stand out: Function and aesthetics, replacing removable dentures with fixed teeth, thus improving the biomechanics of chewing or serving as an anchor for various types of dentures, increasing their stability and fixation very significantly. [6-8]

In elderly patients with a long period of total edentulism, the mucosa has little adaptation; the alveolar ridge is reducing its dimensions, muscle strength, and chewing efficiency decrease, which limits the patient's ability to meet their nutritional needs [9,10]. An overdenture with an acrylic base can provide a good therapeutic option to correct the large discrepancy of the dental arches. Implantology is divided into two main segments: intraosseous or end osseous implants and juxta osseous or subperiosteal implants, depending on whether they work inside or on the bone tissue of the jaws. [11-14]

The introduction of osseointegration and the consolidation of implantology as a science have contributed to stomatology, a therapeutic conception based on the connection of the Osseointegrated implant to the prosthetic superstructure to rehabilitate missing teeth and thereby improve physical function, in addition to comfort and satisfaction. Treatment with implants is currently a common practice in dental practices. The publication of a large series of patients rehabilitated with implants and the short, medium, and long-term follow-up confirm the effectiveness of these treatments. The predictability and effectiveness of dental implants in the rehabilitation of patients with total and partial edentulism has been completely demonstrated in these times. [15-18]

As a result, its use and indication spread, improving the success rate from 85% in the eighties to almost 99% today. In contrast, the failure of treatment with dental implants can be associated with the learning curve of the surgeon and rehabilitator, poor primary stability, the type of implant surface, and the amount and quality of bone, among others [19,21].

**Patients and methods**

The investigation assessed the clinical and demographic features of patients who underwent dental implant surgery through databases. The collected data was analysed with SPSS software, using K-nearest neighbour and linear regression modelling to group the 93 cases. Both male and female genders were represented among the patients who were aged between 30 and 60 and admitted in many different hospitals in Iraq during the period of 16th June 2022 to 25th March 2023. For patients who received either delayed or immediate dental implants, all implant outcomes were recorded in databases, and the cumulative survival rate was analyzed in months.

Our study included primary outcomes of patients between the ages of 30 and 60, both male and female genders, with ASA classification in four grades. Causes leading to negative results were also recorded, including Arthritis, Diabetes, heart attack, High cholesterol, Hypertension, Kidney disease, and Osteoporosis, as well as smoking.

Additionally, our study identified secondary outcomes related to dental implants, such as their location within the jaw, the types of teeth they were used for, the types of dentures they supported, the diameter and length of the implants, the timing of implant placement (delayed or immediate), and rates of implant failure.

Moreover, we also found a correlation between complication rates after surgery and the occurrence of implant failure. We evaluated the outcomes of survival rates, which demonstrated a significant difference between immediate and delayed implants, as illustrated by the Kaplan-Meier curve.

**Results**

***Table 1:*** *Baselines demographic characteristics for participants who underwent dental implant surgery.*

| | | Age |
|---|---|---|
| **N** | V | 93 |
| | Mi | 0 |
| *Me* | | ***45.0000*** |
| *Med* | | ***45.0000*** |
| *SD* | | ***8.99275*** |
| *Min* | | ***30.00*** |
| *Max* | | ***60.00*** |

***Table 2:*** *Determine the rate of genders who conducting dental implants into 93 cases.*

| | | F, 93 | P (%) | VP (%) | CP (%) |
|---|---|---|---|---|---|
| **Va** | ***Men*** | 58 | 62.4 | 62.4 | 62.4 |
| | ***Women*** | 35 | 37.6 | 37.6 | 100.0 |
| | ***T*** | 93 | 100.0 | 100.0 | |

***Table 3:*** *Distributions of causes for patients with dental implant surgery.*

| | | **F, 93** | **P (%)** | **VP (%)** | **CP (%)** |
|---|---|---|---|---|---|
| **V** | **Gum disease** | 31 | 33.3 | 33.3 | 33.3 |
| | **Plaque and tartar buildup** | 20 | 21.5 | 21.5 | 54.8 |
| | **Poor of oral hygiene** | 21 | 22.6 | 22.6 | 77.4 |
| | **Tooth decay** | 21 | 22.6 | 22.6 | 100.0 |
| | **T** | **93** | **100.0** | **100.0** | |

***Table 4:*** *Distributions of smoking classification for patients with dental implant surgery.*

| | | F, 93 | P (%) | VP (%) | CP (%) |
|---|---|---|---|---|---|
| ***V*** | **Non-smokers** | 42 | 45.2 | 45.2 | 45.2 |
| | **Smokers** | 51 | 54.8 | 54.8 | 100.0 |
| | **T** | 93 | 100.0 | 100.0 | |

***Table 5:*** *Preoperative clinical comorbidities outcomes for 93 participants with dental implant surgery.*

| | F, 93 | P (%) | VP (%) | CP (%) |
|---|---|---|---|---|
| **Arthritis** | 7 | 7.5 | 7.5 | 7.5 |
| **Diabetes** | 11 | 11.8 | 11.8 | 19.4 |
| **heart attack** | 15 | 16.1 | 16.1 | 35.5 |
| **High cholesterol** | 12 | 12.9 | 12.9 | 48.4 |
| **Hypertension** | 32 | 34.4 | 34.4 | 82.8 |
| **Kidney disease** | 6 | 6.5 | 6.5 | 89.2 |
| **Osteoporosis** | 10 | 10.8 | 10.8 | 100.0 |
| **T** | **93** | **100.0** | **100.0** | |

***Table 6:*** *ASA classifications.*

| | F, 93 | P (%) | VP (%) | CP (%) |
|---|---|---|---|---|
| **ASA 1** | 21 | 22.6 | 22.6 | 22.6 |
| **ASA 2** | 55 | 59.1 | 59.1 | 81.7 |
| **ASA 3** | 7 | 7.5 | 7.5 | 89.2 |
| **ASA 4** | 10 | 10.8 | 10.8 | 100.0 |
| **T** | **93** | **100.0** | **100.0** | |

***Table 7:*** *Identify implant zones for 93 participants.*

| | | F, 93 | P (%) | VP (%) | CP (%) |
|---|---|---|---|---|---|
| | **Lower anterior** | 7 | 7.5 | 7.5 | 7.5 |
| | **Lower posterior** | 30 | 32.3 | 32.3 | 39.8 |
| | **Upper anterior** | 14 | 15.1 | 15.1 | 54.8 |
| | **Upper posterior** | 42 | 45.2 | 45.2 | 100.0 |
| | **T** | **93** | **100.0** | **100.0** | |

***Table 8:*** *Types of dentures.*

| | | F, 93 | P (%) | VP (%) | CP (%) |
|---|---|---|---|---|---|
| V | **Fixed denture** | 63 | 67.7 | 67.7 | 67.7 |
| | **Removable denture** | 30 | 32.3 | 32.3 | 100.0 |
| | **T** | 93 | 100.0 | 100.0 | |

***Table 9:*** *Types of teeth.*

| | F, 93 | P (%) | VP (%) | CP (%) |
|---|---|---|---|---|
| **Acrylic teeth** | 20 | 21.5 | 21.5 | 21.5 |
| **Metal–ceramic tee** | 11 | 11.8 | 11.8 | 33.3 |
| **Natural teeth** | 62 | 66.7 | 66.7 | 100.0 |
| T | 93 | 100.0 | 100.0 | |

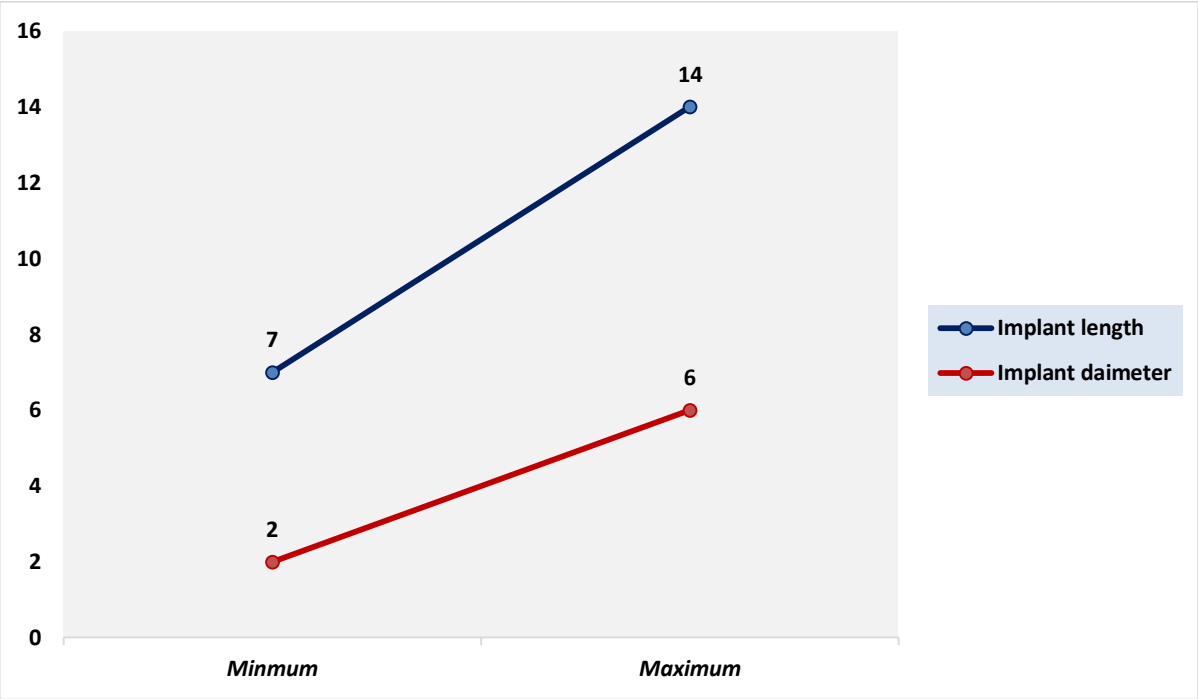


***Figure 1:*** *Determine implant dimensions in terms of length and diameter.*

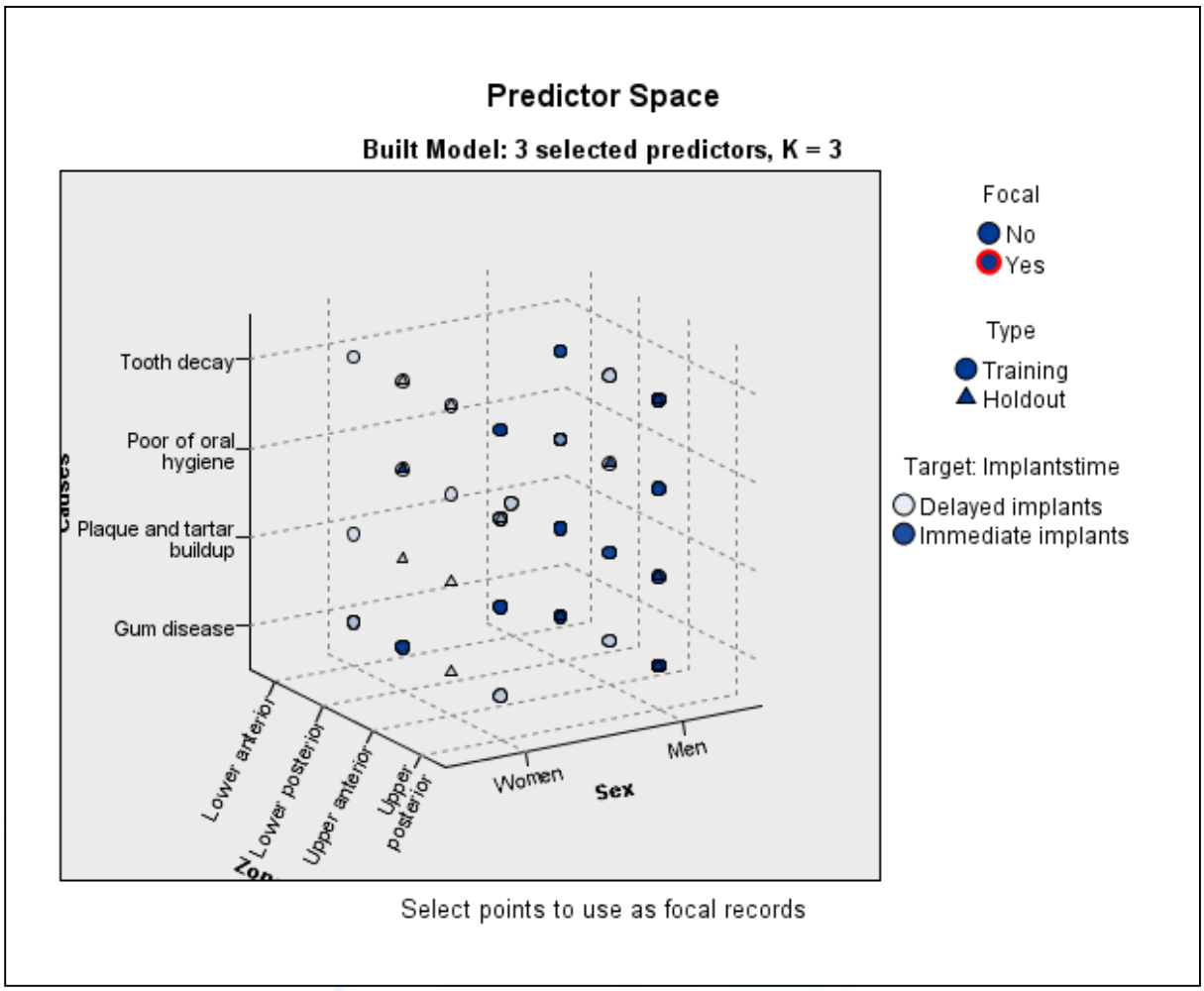


***Figure 2**: Modelling input parameters in associated with implants time as output.*

***Table 10:** Identify dental implant failure.*

| | | F, 93 | P (%) | VP (%) | CP (%) |
|---|---|---|---|---|---|
| *V* | **No** | 79 | 84.9 | 84.9 | 84.9 |
| | **Yes** | 14 | 15.1 | 15.1 | 100.0 |
| | **T** | 93 | 100.0 | 100.0 | |

***Table 11:*** *Post-operative complications of dental implant.*

| | F, 93 | P (%) | VP (%) | CP (%) |
|---|---|---|---|---|
| **Bleeding** | 3 | 3.2 | 3.2 | 3.2 |
| **Edema** | 2 | 2.2 | 2.2 | 5.4 |
| **Emphysema** | 1 | 1.1 | 1.1 | 6.5 |
| **Failed osseointegration** | 2 | 2.2 | 2.2 | 8.6 |
| **Infection** | 4 | 4.3 | 4.3 | 12.9 |
| **Mandibular fractures** | 3 | 3.2 | 3.2 | 16.1 |
| **No-complication** | 78 | 83.9 | 83.9 | 100.0 |
| **T** | 93 | 100.0 | 100.0 | |

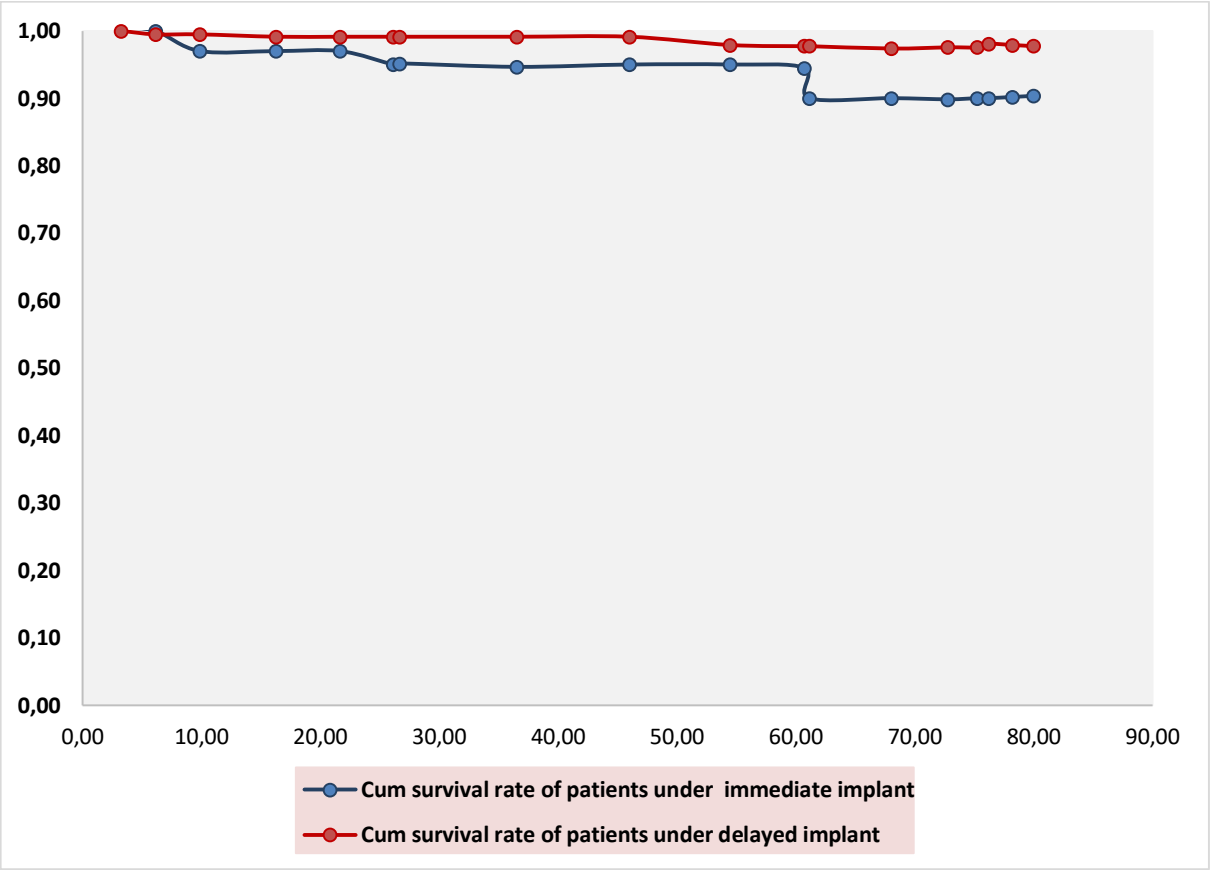


***Figure 3:*** *Assessment of cumulative survival rate outcomes in comparison between immediate and delayed implants by Kaplan–Meier curve.*

**Discussion**

Our study analysed 93 participants who underwent dental implant surgery, with a higher percentage of men (58%) enrolled compared to women (35%). Our findings identified age as a significant risk factor, with most patients who underwent dental implants being above 50 years old. Gum disease was the most common cause for dental implants (33.4%), followed by tooth decay (22.6%) and other causes. In the long term, smoking significantly impacts patients, with 54.8% being smokers and 45.2% non-smokers. Additionally, preoperative clinical comorbidities revealed that 34.4% of patients had hypertension, representing a greater proportion of cases. In the ASA classification, there are four classifications, with 59.1% of patients being classified as ASA grade 2.

In terms of implant outcomes, the findings indicate that 45.2% of patients underwent upper posterior procedures, while 32.3% underwent lower posterior procedures. The types of dentures used were determined, with 67.7% of participants using fixed dentures and 32.3% using removable dentures. Additionally, the types of teeth used by patients were also recorded, with natural teeth being the most used (66.7%) and metal-ceramic teeth being the least commonly used (11.8%). In addition, our study found an implant failure rate of 15.1%, with a success rate of 84.9%.

Furthermore, our results indicate that the complication rate after dental implantation was 16.2%, with infection being the highest risk factor for post-surgery patients. This had an impact on survival rates, which remained stable for patients who underwent delayed implants for the first 80 months.

However, patients who received immediate implants experienced a drop in survival rates during the last 70 months.

The success rates of dental implants have a significant different in where it indicated that almost all of the patients with individual implants were 89.05%, where the success rate was increased by 95% with denser bone and the anterior mandible having even higher success rates which caused implant survival rate in a graduate clinic were 97.5% [22,23].

Last studies were presented risk factors related with post-operative complications for patients with dental implants where factors were shown such as Anatomic factors, such as the location of major blood vessels and neurovascular bundles, can contribute to complications during implant placement as well as age and smoking were presented as risk factor have influence on patients which cause during early-stage. Besides to that, post-operative complications were effect on patients after surgery, which include injury, adjacent teeth damage, and perforations of the nasal cavity or maxillary sinus. [24-26]

Also, a previous study has examined the success rates of immediate and delayed implants and found that immediate implants have a higher success rate due to shorter treatment times and reduced post-extraction alveolar bone resorption. However, delayed implant placement is often preferred as it allows for both immediate and delayed implant placement, resulting in good clinical outcomes [27,28].

**Conclusion**

Our study has found that delayed implants yield greater patient satisfaction and better aesthetic results compared to immediate implants. Additionally, the long-term outcomes have indicated a decrease in complication rates. However, it should be noted that these findings only applied to 16.2% of our patient sample. Furthermore, our results have confirmed that immediate implants have a significantly higher failure rate compared to delayed implants. Moreover, the survival rate of patients who underwent delayed implants exhibits greater stability compared to immediate implants, with males showing a higher failure rate than females in immediate implants.

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