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Influence of Patient's Age and Gender on Dental Implant Treatment Five Year retrospective study

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Abstract

Background: In developing countries, there is an increase in awareness among the population regarding dental implant treatment. However, there is paucity in studies on the relationship between patients' biographic information, and different aspects of dental implant treatment. **Aims:** This study's purpose is to determine the influence of Iraqi patients' age and gender on various clinical aspects in dental implant treatment.

The recorded data included: patient age, gender, implant zone, implant timing, implant side, dental implant system, sinus lift, bone augmentation, implant length, and implant diameter. SPSS Ver. 25 was used to perform the statistical analysis.

Methods and Materials: Biographic data of 196 Iraqi patients who attended a private dental implant center in Baghdad from 7.1.2016 to 30.4.2020 was recorded. During this period 348 dental implant procedures were completed.

Results: There was a highly significant negative relationship ($p=0.006$) between implant length and patient's age, and a significant positive relationship ($p=0.028$) between implant size and patient's age. A statistically significant relationship ($p=0.013$) was found between the patient's age and dental implant zone and dental implant timing ($p=0.016$). A significant difference was found between the two genders in terms of dental implant timing ($p=0.017$).

Conclusion: females are better candidates for dental implant treatment. Older patients seem to benefit more from shorter, and, subsequently, wider dental implants. Also, older patients tend to have lower anterior dental implants.

Keywords: dental implant, biographic data, dental implant dimension, the timing of dental implant

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1 | INTRODUCTION:

There is increasing awareness toward dental implant treatment in developing countries (1-3). In Iraq, the last decade witnessed more patients seeking governmental and private dental centers for dental implant treatment.

However, the majority of conducted studies on dental implants focused on the influence of different surface treatments (4-7); and the clinical outcome of dental implant treatment (8, 9).

There is paucity in studies on the relationship between patients' biographic information, and different aspects of dental implant treatment. Biographic factors could influence dental implant practice. This study aims to determine the influence of Iraqi patients' age and gender on various clinical aspects in dental implant treatment

2 | METHODS:

The study was approved by the Scientific Committee, Ibn Sina University of Medical and Pharmaceutical Sciences 2021. Biographic data of 196 Iraqi patients who attended a private dental implant center (Basamat Dental Center) in Baghdad from 7.1.2016 to 30.4.2020 was recorded. During this period 348 dental implant procedures were completed. These procedures were performed by the same surgeon (first author)

The recorded data included: patient age, gender, implant zone (upper anterior, upper posterior, lower anterior, and lower posterior); implant insertion timing (immediate or delayed implant); implant side, dental implant system, sinus lift, bone augmentation, implant length, and implant diameter.

Inclusion criteria: patients whose data are available and they finished their treatment.

Exclusion criteria: patients with incomplete data and did not finish their treatment.

For the aim of statistical analysis patients' age has been stratified into the following age categories; age group 1:17-30, age group 2:31-40, age group 3: 41-50, age group 4: 51-60, age group 5: 61-70, age group

6: 71 and above.

Both descriptive and inferential statistics were applied in this study. Pearson Correlation, Chi-Square Test, and One-way ANOVA were used to identify the correlations between continuous, categorical, and interval variables. Mann-Whitney test was used to identify the level of difference between the interval variables. The level of significance was considered at $P < 0.05$. SPSS Ver. 25 was used to perform the statistical analysis.

3 | RESULTS:

In this study, male to female ratio was 1/2. The number of male patients was 66, treated with 127 dental implants. The number of females was 130, treated with 221 dental implants (Table 1). Mann-Whitney test showed no significant difference ($p=0.261$) between the age of males and females included in this study.

The used dental implant systems for the included patients were: IBS[®] (274 cases, 73%), Dentaurum[®] (36 cases, 10.3%), ImplantKa[®] (33 cases, 9.5%), DeTech[®] (19 cases, 5.5%), Easy Implant[®] (5 cases, 1.4%), and NeoBiotech[®] (1 case, 0.3%).

The number of implants inserted on the right side was 169, and the number of implants inserted on the left side was 179 dental implants. For males, 52.8% of the implants were inserted on the right side, and 47.2% were inserted on the left side. For females, 46.2% of the implants were inserted on the right side vs 53.8% of the implants inserted on the left side. Chi-Square Test showed no significant difference ($p=0.266$) between the two genders regarding the side of implant insertion. It, also, did not show any significant relationship between the patient's gender and the and the number of dental implants in the upper vs lower arch;

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Seventy-eight (39.7%) out of 196 patients (31 males, and 43 females) had more than one implant, 237 implants in total. The number of implants for females was 139 (58.6%), whereas the number of implants for male patients was 98 (41.4%). The number of implants per patient ranged from 2 to 12 (full arch) implants. The mean age for females treated with multiple implants is lower than the mean age of their male counterparts (Table 1). However, the difference between the two groups was not statistically significant ($p=0.575$).

Age group (41-50) recorded the highest number of patients in this study (no=106, 30.5%) followed by 51-60 age group (no=100, 28.7%). The lowest number of patients was recorded in the age group ≥ 71 (no=8, 2.3%).

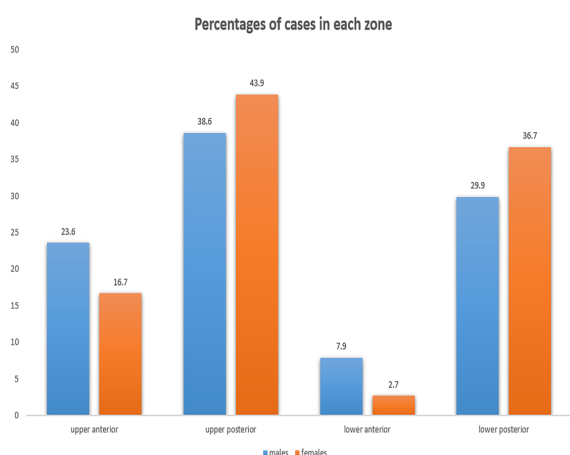


FIGURE 1: percentages of cases in the jaw zones by gender

As shown in Figure 1, most of the dental implants 76.2% were inserted in the upper and lower posterior jaw zones (42% and 34.2% respectively), whereas the remaining 23.9% were inserted in the upper and lower anterior jaw zones (19.3% and 4.6% respectively).

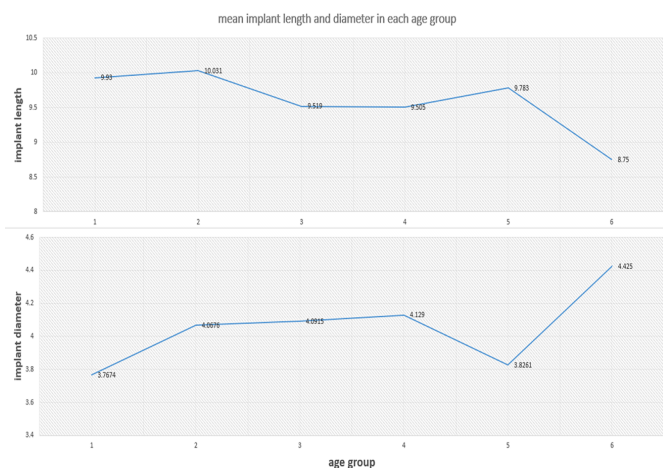


FIGURE 2: The mean dental implant length and diameter by age group

Figure 2, demonstrates the decrease of implant length with older age groups. Age group 2 (31-40 years) reported the highest mean of dental implant length, followed by age group 1(17-30). The lowest mean of dental implant length is clear in age group 6 (70-).

On the other hand, there is an increase in implant diameter in older age groups, except for age group 5. The lowest size (diameter) is reported in age group 1, whereas the highest can be seen in age group 6.

In the posterior zones for upper and lower jaws, the percentages of cases for females are higher, whereas the percentages of cases in upper and lower anterior zones are higher in males. This difference in the implant zone between both genders has been statistically confirmed ($p=0.04$).

As shown in Table 1, the mean implant length and diameter are close in both males and females. This has been statistically confirmed ($p=0.778$ and $p=0.877$ respectively). However, the Pearson Correlation Test showed a highly significant negative relationship ($p=0.006$) between implant length and patient's age, and a significant positive relationship ($p=0.028$) between implant size and patient's age. Apart from age group 61-70, the curve shows a gradual decrease in dental implant length. In comparison, the curve for dental implant diameter shows an increase with the increase of age (Figure 2). The statistical relationship between implant length and diameter was found highly significant ($p=0.000$).

Table 1: The study descriptive statistics

age/gender					
gender	no. of cases	minimum	maximum	mean	SD
males	127	19	78	48.8	12.709
females	221	17	78	45.54	12.107
multiple implant cases/age					
total	237	20	78	49.557	11.38287
males	98	26	75	51.276	11.36896
females	139	20	78	48.345	11.27631
implant zone/ age					

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upper anterior	67	17	78	43.39	15.648
upper posterior	146	22	78	46.79	11.012
lower posterior	119	20	78	47.61	11.883
lower anterior	16	23	63	53.56	9.872
timing of implant/ age					
delayed implant	286	17	78	47.45	12.306
immediate implant	62	19	78	43.37	12.446
implant dimension/gender					
males	implant length	6	13	9.635	1.4817
	implant diameter	2.5	6	4.0394	0.79574
females	implant length	6	13	9.683	1.5888
	implant diameter	2.75	6	4.0525	0.74355
sinus lift/ age					
total	17	24.00	60.00	45.9400	10.39513
males	6	34.00	60.00	48.8333	11.73740
females	11	24.00	54.00	44.3636	9.81094
bone augmentation/ age					
total	41	20.00	60.00	45.1463	11.93642
males	19	31.00	60.00	47.6842	10.15465
females	22	20.00	60.00	42.9545	13.12024

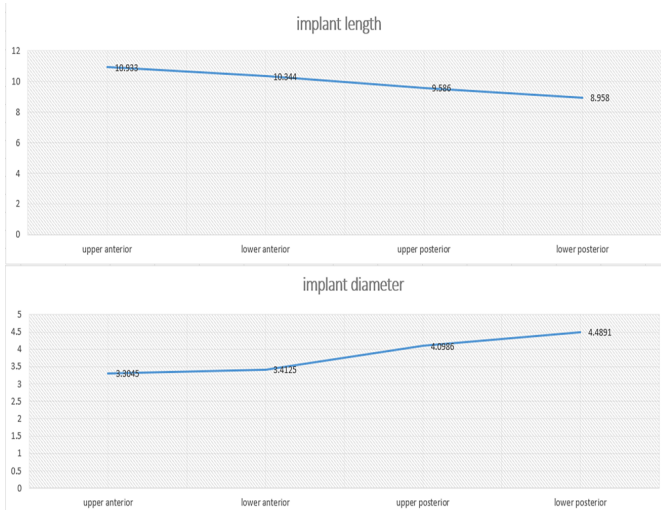


FIGURE 3: The mean dental implant length and diameter by the jaw zone

Figure 3 clarifies the difference between implant length and diameter as the curve moves from the upper anterior toward the lower posterior zone. The mean implant length ranges between 11mm-8mm, whereas the diameter ranges between 3mm to 5mm. One-Way ANOVA showed a highly significant relationship between both implant length and size with the jaw region ($p=0.000$)

Table 1 stratifies the age for each dental implant zone. The upper anterior zone shows the lowest mean of age. In contrast, the lower anterior zone recorded the highest mean of age. One-way ANOVA showed a significant relationship ($p=0.013$) between the patient’s age and the dental implant zone.

Delayed implants were performed in 82.2% of the cases, and immediate implants were performed in 17.8% of the cases. The mean age for delayed implant cases was higher than the mean age for cases with immediate implant cases. The relationship between the implant timing and the patient’s age was statistically confirmed ($p=0.016$). Apart from age group ≥ 71 , Figure 4 shows that the younger the age group the higher the percentage of immediate implant cases.

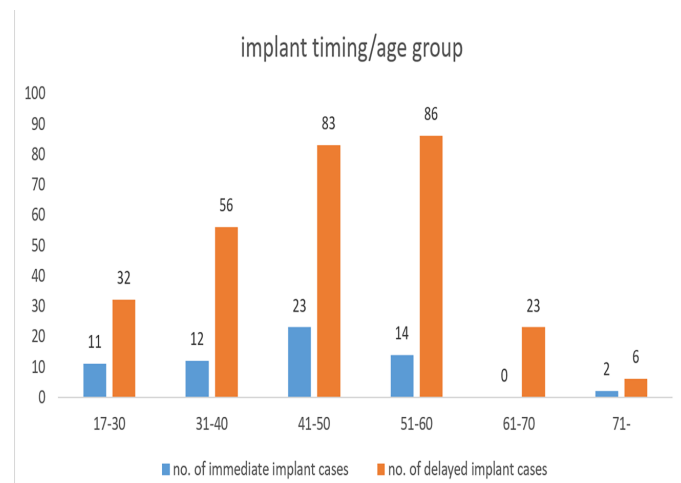


FIGURE 5: The timing of dental implant (delayed/immediate) by age group

The percentage of immediate implant performed for females was 75.8%. in contrast, the percentage of cases of immediate implant for males was 24.2%. This difference has been statistically confirmed ($p=0.017$).

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Out of 348 cases, only 4.9% required sinus lifting, whereas 11.8% of the cases required bone augmentation (Table 1). Chi-Square Test did not show any significant relationship between the patient's gender and the need for sinus lift nor bone augmentation ($p=0.431$, $p=0.569$, $p=0.171$ respectively).

Furthermore, One-way ANOVA did not show a significant relationship between the patient's age and the number of dental implants in the upper vs lower arch; the need for sinus-lift or bone augmentation ($p=0.123$, $p=0.959$, $p=0.388$ respectively).

4 | DISCUSSION

This study focuses on the relationship between patient's age, and gender, and certain dental implant treatment parameters, such as dental implant timing (immediate/ delayed), dental implant zone, dental implant length/ diameter, the need for a sinus lift, and bone augmentation.

As the study shows, dental implant demand was reported in a wide age range. This could indicate an increase in public acceptance of this treatment compared to other fixed or removable dental prosthetics. The patient's perceived preference toward dental implants over other prosthetic options has been acknowledged by other studies ⁽¹⁰⁾. The source of information about dental implant treatment was out of this study's focus. However, the authors' found that patients' relatives and a friend influenced the decision to used dental implant treatment, which agrees with other studies ^(11, 12).

Understandably, the age group (41-50) reported the highest number of patients included in this study. This age group seems to have more dental extractions compared to other age groups. In their study on Iraqi patients' sample, Salih & Al-Nimer found that the highest percentage of tooth extraction (26.96%) was recorded in this age group ⁽¹³⁾

It is generally agreed that posterior teeth loss in both upper and lower arches is more common than upper and lower anterior teeth loss ^(13, 14). This certainly influences the demand for a dental implant in different jaw regions for both gender groups. The

number of dental implants performed for the upper arch was higher than the lower arch. The level of difference is comparable to Negri et al study ⁽¹⁵⁾. However, this study's finding disagrees with other studies ^(16, 17), which found that posterior mandibular implants were more than other jaw regions. This reflects the preference of patients toward implant-supported fixed prostheses in the posterior mandible ⁽¹⁸⁾. The highest number of the upper posterior implant in this study can be justified by the number of implants performed for the upper premolar region in this study (100 cases, 28.7%), most of which have been requested by female patients 67 cases (67%) for aesthetic purposes.

The level of awareness toward dental implant treatment appears to be higher in females compared to males, as the study shows. The male/ female ratio reported in this study was reported in a previous study ⁽¹⁹⁾. This difference, however, seems to vary among studies ^(17, 20-22). Higher female awareness is evident in the number of cases for dental implant treatments for posterior teeth in female patients. The highest number of anterior implants in male patients is another indication that males are less interested in their anterior teeth health. Better female attitude toward dental implants is also reflected by the percentage of females requesting immediate dental implants compared to male patients.

The percentage of immediate dental implant cases reported in this study (17.81%) was higher than the percentage reported (0.88%) in a previous study conducted in the Middle East region ⁽¹⁹⁾. This difference could be related to the selected sample in this study. The number of immediate implants in the posterior region requested by female patients could have an influence on the relationship between the implant zone and implant timing (immediate vs delayed).

Older patients could have better knowledge, and attitude toward dental treatment in general ⁽³⁾, and the multiple dental implants in particular. The small number of immediate implant cases for the older age group could have influenced the statistical findings of this study. Also, older patients could not have the chance to replace their missing teeth immediately, possibly due to the lack of awareness toward immediate implant at the time of extraction.

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Patients' gender did not seem to influence the implant length/ diameter. This finding disagrees with Bural et al study, which reported a larger implant diameter in male patients ⁽¹⁶⁾. This could be partly attributed to the difference between both studies on the male/ female ratio.

Neither patient's age, nor gender seem to influence the need for a sinus lift procedure or the need for bone augmentation. The need for sinus-lift and/or bone augmentation is one of the indications for the time lapses between tooth loss and the time for acquiring dental implant treatment. This could reflect some degree of hesitance among patients to seek immediate dental implant treatment. It worth mentioning some patients seeking dental implant treatment have not been informed about an immediate implant treatment option.

The choice of dental implant dimension, as the study data showed, is mainly related to the anatomical zone, and related occlusal load, which has been confirmed by other studies ⁽¹⁶⁾. Implant dimensions reported in this study did not show a wide range in both dental implant length and diameter. The findings of this study might help the dentist to consider the more appropriate choice for their patients.

It is expected that the implant zone influences both implant length and size, as the study data showed. Similarly, it can be expected dental implants tend to be shorted with increased age. According to this study, dental implant diameter tends to increase with age. This, partly, could be attributed to the compensation for the deficit in dental implant length.

The reason behind the low percentage of cases with sinus lift could be related to the use of short implants in the posterior maxillary zone to overcome the shortage in the maxillary alveolar bone. In their systematic, Mokchek and colleagues stated that short

implants are a reliable alternative to sinus lift procedures ⁽²³⁾.

The bone augmentation technique employed in this study was the lateral ridge augmentation procedure. This technique was shown to be effective in the case of deficit buccolingual dimension ⁽²⁴⁾. The number of cases treated with bone augmentation in this study could be influenced by the use of the bone expansion technique, in cases with IBS[®] implants in particular. Bone Expansion with Cortical Bone Bending (BEB) Protocol was used for the cases included in this study.

To conclude, females are better candidates for dental implant treatment. Older patients seem to benefit more from shorter, and, subsequently, wider dental implants. Also, older patients tend to have lower anterior dental implants.

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