

Factors Affecting Prosthodontics Treatment Modalities for a Single Missing Tooth

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Abstract

The selection of treatment choices for the decision to replace a single lost tooth is made by several chairside, dental-related, and patient-specific aspects. The objective of this study was to determine the individual factors that impact the decision-making process for selecting a treatment option to replace a single lost tooth. 440 patients (224 males and 216 females) above 18 years old, attending the College of Dentistry, University of Basrah, Iraq, with only a solitary missing tooth were considered in this descriptive-analytical study. Each participant was surveyed using a standardized questionnaire to gather information on their age, gender, and educational background. Following the questionnaire, a trained examiner conducted a thorough clinical examination to determine the number and position of any lost teeth. Data were collected through a particular proforma to assess patients' choices about three distinct types of prostheses considering various influencing factors. Analysis was carried out on those variables using a t-test. Pain and discomfort, damaging the adjacent tooth, treatment cost, dental phobia, and treatment duration were significant elements that influenced the selection of the prosthetic type. Most participants indicated that the primary factor for declining a replacement for a lost tooth was the presence of pain and discomfort. The highest percentage of subjects (37%) was within the implant prostheses category; most of them were under 40 years old. The most important factor affecting the selection of fixed partial dentures was damaging the neighboring teeth in about 40%. Removable partial dentures were selected by most non-graduated individuals 40.2% most of them above 50 years old. The relation between treatment options and tooth position was significant $p\text{-value} = 0.04$. Dental implants are the most popular way to restore a single tooth gap, followed by fixed and removable partial dentures. Pain and discomfort were the biggest considerations in patients' tooth replacement decisions. Education and location of lost teeth affect treatment options significantly.

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Introduction

Contemporary dentistry acknowledges the significance of the patient's emotional and psychological state about their oral condition [1]. Teeth are crucial for maintaining a healthy self-image [2]. Dental caries and periodontal issues are primary factors leading to tooth loss; however,

trauma or congenital absence may also contribute. The loss of teeth has a range of detrimental impacts on an individual, leading to substantial impairments that can greatly disrupt social activities [3,4]. The implications of having lost teeth involve impaired chewing ability, diminished facial structure support, speech impairments, unappealing appearance, and

temporomandibular dysfunctions [5]. Failure to replace missing teeth can lead to neighboring teeth drifting and opposing teeth supra erupting into the empty area, which can complicate future treatment [6,7]. To address these challenges, it is imperative to immediately restore any teeth that are missing [8]. While many studies have indicated a decrease in edentulism, a

significant number of individuals continue to experience tooth loss [9]. According to the recommendations of the World Health Organization (WHO), people should have a minimum of 21 functioning teeth to avoid the need for dentures and maintain a healthy diet [10]. Dentists frequently encounter the necessity of restoring a solitary tooth [11]. The phrase 'need' is frequently employed to denote the kind of service that dentists think their patients should get, whereas 'demand' pertains to the therapy specifically sought by the patients themselves [12]. Most research on prosthetic need and demand has indicated that the former surpasses the latter in magnitude [13]. Several treatment modalities are already accessible solutions to meet the difficulty of restoring a tooth [14]. Among these modalities are removable prostheses and fixed prostheses. The fixed partial denture can either be supported by natural teeth or by dental implants [15,16]. Removable dentures are time-consuming and jeopardize the health of adjacent tissues [17]. To choose the most suitable course of therapy for each patient, it is necessary to thoroughly assess each case and carefully consider all available treatment choices [18]. Treatment choices are subject to constant evolution owing to the ongoing development [19]. Treatment decisions should not be made only based on clinical examination or the judgment of a dentist. Instead, they should be thoroughly addressed with patients in close consultation [20,21]. A set of clinical and individual factors that may potentially impact the selection of treatment [22,23]. The expense of therapy is often prioritized over oral health conditions and patient desire in many instances [24]. Pain and dental fear are significant variables that might influence patient's choice to avoid treatment entirely [25,26].

The objective of this study was to examine the factors influencing the selection of three commonly used treatment procedures for replacing a single missing tooth. At the same time, the study intended to investigate how age, gender, position of the missing tooth, and education level impact the choice of treatment modalities.

Material and Methods

This study, which focused on description and analysis, was conducted from 10th October 2022 to 15th November 2023 on the patients visiting Prosthodontics Department at the College of Dentistry University of Basrah, Iraq. The study employed a randomized sampling approach. The study involved 440 participants from both genders, who had a single missing tooth, spanning from the front incisors to the posterior second molars. All volunteer patients are in the age group of 18-65 years. The exclusion criteria were the patient's voluntary

decision to decline participation in the questionnaire and oral examination, patients with special needs or mentally retarded, Patients having periodontal diseases, patients younger than 18 years old, patients having more than one missing tooth or edentulous spaces at the distal extension base. Every participant was notified of the study's anonymous, voluntary, and optional spirit. Additionally, each patient was given consent, which included a written description of the assessment's purpose. The institutional ethical committee granted the ethical approval. Every participant was subjected to a clinical examination by sitting in the dental chair in an upright position. All the examinations were carried out by a single observer responsible for the research in all stages of the process, standing in front of the patient. Clinical observation was done under a properly illuminated setting using sterile diagnostic instruments. A meticulously designed and verified proforma was utilized for the purpose of gathering data. The proforma fell into two parts. The initial part focused on demographic details such as gender, educational background, age, and the place where the missing tooth. It also included the most popular treatment option. The following part outlined the treatment options preferred by the patient, as well as the variables or factors that influenced their choice, namely pain, discomfort, damaging the adjacent tooth, cost of treatment, dental phobia, and duration of the treatment. The statistical analysis was conducted using SPSS version 21.0, a computer software known as Statistical Package for Social Sciences. A descriptive analysis was conducted to calculate the frequency and percentage. Independent T-tests and Paired T-tests were employed to examine the impact of age, gender, tooth position, and education level on various treatment choices. P-values were computed using a significance level of 0.05, to determine statistical significance.

Results

This descriptive-analytical study consists of 440 participants. 224 (50.9 %) were males and 216 (49.09%) were females. Most of the participants were under 40 years of age, about 39.3%. Moreover, 57% of the participants were graduates, and 42.9% were undergraduates. The primary drawback to seeking timely and specific treatment was the experience of pain and suffering by 409 (92.9%) participants while damaging the adjacent teeth was 216 (49%) participants, expense and cost was 201 (45.6%) participants, dental phobia was 83 (18.8%) participants, and duration of treatment was 37 (8.4%) participants as described in Table 1.

The analysis of participants' age and treatment options was also conducted as illustrated in Table 2.

The comparison failed to demonstrate any statistically significant difference ($p=0.72$).

A higher percentage of subjects who were under 40 years old selected dental implants about 50.2%.

Moreover, those who were between 40 and 50 years old also selected the implants as the treatment of choice about 34.2%. Subjects above 50 years old mostly chose removable partial dentures about 42.9%.

Besides that, when the participants were asked about treatment options they would opt for, missing tooth replacement, dental implants were chosen by 163 (37%) participants, fixed partial dentures were chosen by 120 (27.2%) participants, and removable partial dentures were chosen by 114 (25.9%) participants. While candidates who opted for no treatment were 43 (9.7%) participants.

Table 3 displays the allocation of treatment choices based on gender. The frequency of treatment options chosen by males was 32.1% dental implant, 30.3% fixed partial dentures, 26.3% removable partial dentures, and 11.1% opting for no treatment. Meanwhile, the frequency of treatment options chosen by females was 42.1% dental implant, 24% fixed partial dentures, 25.4% removable partial dentures, and 8.3% opting for no treatment. According to that, a non-significant difference was observed ($p=0.06$).

Table 4 illustrates the relation between the location of missing teeth and the treatment options. Most of the missing teeth were in the posterior zone (244 subjects) compared to the anterior zone (196 subjects). The percentage of dental implants, fixed partial dentures, removable partial dentures, and no treatment selected for the anterior aesthetic zone was 47.9%, 24.4%, 27%, and 0.1%, respectively. While the percentage of dental implants, fixed partial dentures, removable partial dentures, and no treatment selected for the posterior zone was 28.2%, 29.5%, 25%, and 17.2%, respectively. From that, a significant difference ($p=0.04$) was found.

Similarly, when the level of education was compared with treatment options. The percentage of treatment options chosen by graduated subjects was 56.1% dental implant, 25.4% fixed partial dentures, 15.1% removable partial dentures, and 3.1% opting for no treatment. Conversely, the proportion of available treatment choices chosen by non-graduated subjects was 11.6% dental implants, 29.6% fixed partial dentures, 40.2% removable partial dentures, and 18.5% opting for no treatment. Subsequently, a

statistically significant difference ($p=0.03$) was noted, as indicated in Table 5.

Discussion

Multiple distinct solutions exist for addressing the treatment of a solitary lost tooth, and each of these solutions has its own set of advantages and disadvantages. Hebel et al. [27] discussed these advantages and disadvantages, assessing just the clinical circumstances while disregarding the patient's decision. The goal of this study was to look at the factors that contribute to the selection of these various treatment solutions. When patients were queried about the variables influencing their selection of treatment modality overall, pain and discomfort were reported as the highest (92.9%) which is opposite to the findings carried out by, Mohapatra et al. [28], Nayana et al. [29], and Shetty et al. [30] where 52%, 43.2%, and 33.2% of the participants emphasized that the primary factor influencing their choice of prosthesis was the significant expense associated with it. The results of our survey indicated that 37% of the participants expressed a preference for dental implants over fixed partial dentures 27.2%, removable partial dentures 25.9%, and 9.7% no treatment option, which does not correspond with restorative dentistry recommendations to opt for a fixed partial denture wherever feasible [31]. For the implant group, pain and discomfort were the highest reported deciding factors 27.5%, and this finding disagrees with Hastreiter and Jiang [32], who revealed that cost was the primary determinant in the election of dental implants; they declared that implants could provide various advantages compared to a fixed partial denture and removable partial denture. Nevertheless, it is a costlier alternative treatment type. Seldom does a patient express a preference or consent to use a removable denture as a substitute for a solitary missing tooth, particularly when it is an anterior tooth [31]. In their study, Ally Hebel et al. [27] stated that a notable advantage of fixed partial dentures is their relatively short completion time, making the duration of fixed denture treatment a determining factor. On the other hand, most of our patients did not consider the lengthy duration of therapy to be a significant drawback; this is consistent with the findings of Bragger et al. [33] in their study. The primary rationale for choosing the removable option is based on cost considerations. Patients often do not have much desire to choose a removable partial prosthesis as a substitute for a single lost tooth. In this study, 56.1% of subjects refused the wearing of removable dentures because they were afraid of getting pain or discomfort; this finding aligns with research conducted by Satpathy et al. [34] where

71.24% of all patients demonstrated disappointment with a removable solution for replacing the missing tooth. All types of prosthetic therapy may be accessible to both young and old patients; the latter may see the effort required to get such treatment as excessively demanding [27].

Regarding the analysis of treatment options and three different age groups, the analysis revealed no statistically significant differences ($p=0.72$). This is contrary to research in which a considerably higher proportion of young people declined the use of removable dentures [35]. In addition to that, it was discovered that the patient's gender is a factor that could potentially influence the therapy options available. It was observed that when females opt to replace a tooth that is missing, they typically prefer implant treatment options more than other treatment modalities. This occurrence might be ascribed to the notion that females tend to be more self-aware of their physical appearance, and the use of removable prostheses further heightens their consciousness of their appearance. This observation aligns with the findings of Al-Quran et al. [24]. More missing teeth were in the posterior zone compared to the anterior zone, similar findings observed by Atieh et al. [36], in which the first molar is the most tooth to be lost (57.1%) in the Kingdom of Saudi Arabia. Education may play a role in influencing the patient's understanding of the various options available for tooth replacement as well as the significance of the procedure [34]. Our investigation revealed a statistically significant difference ($p=0.03$) in the treatment procedure chosen based on education levels. This finding aligns with the research conducted by Naseer Ahmer et al. [37], who also observed significant variations in treatment modality chosen based on education levels. In addition to that, the degree of education influenced the decision to seek therapy, as 18% of the individuals who did not complete their educational requirements declined any form of treatment.

Conclusion

There are a few limitations in this study, especially in the institutional setup where the costs of treatment are lower in comparison to private clinics.

Within these restrictions, we may infer that patients must have a clear understanding of the positive and negative aspects associated with various treatment modalities to make sound choices.

In addition to that, Dental implants are the most common procedure for restoring a single tooth gap for patients followed by fixed partial denture and then removable partial denture.

Among the multiple factors that affect patients' decision on the replacement of a single missing tooth, pain, and discomfort were the most important. The level of education and position of missing teeth in the dental arch has a significant effect on the treatment choice.

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Table 1. Factors affecting the selection of prosthesis type (N=440).

Reasons for refusing prosthesis	Pain and discomfort N (%)	Damaging the adjacent teeth N (%)	Cost of treatment N (%)	Dental phobia N (%)	Duration of treatment N (%)
Dental implant	121 (27.5)	2 (0.4)	98 (22.2)	31 (7)	23 (5.2)
Fixed partial denture	37 (8.4)	176 (40)	90 (20.4)	11 (2.5)	6 (1.3)
Removable partial denture	247 (56.1)	38 (8.6)	5 (1.1)	28 (6.3)	8 (1.8)
Opting No treatment	4 (0.9)	0	8 (1.8)	13 (2.9)	0
Total	409 (92.9)	216 (49)	201 (45.6)	83 (18.8)	37 (8.4)

Table 2. The relation between treatment options and age.

Type of prosthesis	Age			Total (N)	P-Value
	< 40 years	40-50 years	1. > 50 years		
Dental implant	87 (50.2%)	50 (34.2%)	26 (21.4%)	163 (37%)	0.72
Fixed partial denture	34 (19.6%)	47 (32.1%)	39 (32.2%)	120 (27.2%)	
Removable partial denture	29 (16.7%)	33 (22.6%)	52 (42.9%)	114 (25.9%)	
Opting No treatment	23 (13.2%)	16 (10.9%)	4 (3.3%)	43 (9.7%)	
Total	173 (100%)	146 (100%)	121 (100%)	440 (100%)	

Table 3. The relation between treatment options and gender.

Type of prosthesis	Gender		Total (N)	P-Value
	Male N (%)	2. Female N (%)		
Dental implant	72 (32.1%)	91 (42.1%)	163 (37%)	0.06
Fixed partial denture	68 (30.3%)	52 (24%)	120 (27.2%)	
Removable partial denture	59 (26.3%)	55 (25.4%)	114 (25.9%)	
Opting No treatment	25 (11.1%)	18 (8.3%)	43 (9.7%)	
Total	224 (100%)	216 (100%)	440 (100%)	

Table 4. The relation between treatment options and tooth position.

Type of prosthesis	Position of the missing tooth		Total (N)	P-Value
	Anterior zone N (%)	3. Posterior zone N (%)		
Dental implant	94 (47.9%)	69 (28.2%)	163 (37%)	0.04
Fixed partial denture	48 (24.4%)	72 (29.5%)	120 (27.2%)	
Removable partial denture	53 (27%)	61 (25%)	114 (25.9%)	
Opting No treatment	1 (0.5%)	42 (17.2%)	43 (9.7%)	
Total	196 (100%)	244 (100%)	440 (100%)	

Table 5. The relation between treatment options and education level.

Type of prosthesis	Education level		Total (N)	P-Value
	Graduated N (%)	4. Non-Graduated N (%)		
Dental implant	141(56.1%)	22 (11.6%)	163 (37%)	0.03
Fixed partial denture	64 (25.4%)	56 (29.6%)	120 (27.2%)	
Removable partial denture	38 (15.1%)	76 (40.2%)	114 (25.9%)	
Opting No treatment	8 (3.1%)	35 (18.5%)	43 (9.7%)	
Total	251 (100%)	189 (100%)	440 (100%)	