

Changing trends of prosthetic rehabilitation of partially edentulous patients visiting a tertiary care dental hospital

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ABSTRACT

Introduction: The choice of prosthetic replacement is largely determined by the patient's choice and economic status, available technology and expertise, as well as the number of missing teeth. The aim of this study was to identify the trend in prosthetic replacement, in partially edentulous patients treated at Riyadh Elm University (REU) hospitals, as well as to investigate the factors that might influence the prosthetic choice. **Methods:** The records from Dentoplus digital system of all partially edentulous patients who had a prosthetic replacement at REU 2013, until June 2018, were screened and analyzed using Statistical software SPSS version 25. Chi-square and Fisher exact tests were performed. Alpha level was set at ≤ 0.05 . **Results:** 6,340 patients received implants, removable or fixed prosthesis. Majority of the patients were females (60%). RPDs were the highest placed restorations (69%). Students (73%) placed most RPDs. Implants significantly increased through the years by almost (30%) (P -value = 0.00). Among FPDs, metal-ceramics were the highest restorations (74%), with a significant increase of all-ceramic restorations through years (P -value = 0.00). Moreover, FPDs were significantly the highest restorations among young-adult and middle-aged patients (P -value = 0.00). **Conclusion:** There was a clear change in prosthetic rehabilitation trends over the past few years. Although removable partial dentures continued to play a major role in prosthetic teeth replacement, the use of dental implants showed a steady increase every year. Students' requirements and level of experience, along with the patient age, had an influence in the prosthetic choice.

Keywords: Fixed partial denture, implant, removable partial denture, tooth replacement

Introduction

In spite of advancement in the field of dentistry prevention is still the slum land. This results in loss of natural teeth rather than their preventive and restorative treatments. Tooth loss is the result of multifactorial causes such as caries, and periodontal diseases.^[1] Tooth loss has an adverse impact on the psychological status of the patients, which results in a significant effect on the self-esteem and social life and most likely patients might experience symptoms of depression with those who have

difficulties in accepting tooth loss.^[2,3] It has been found that tooth loss prevalence is higher in the maxilla with the most affected teeth maxillary molars, on the other hand, anterior teeth are less affected.^[4]

Determining the need, prevalence, and the pattern of partial tooth loss is essential to identify the prosthetic needs of the patients.^[5] A factor which may influence prosthodontic practice is the patients awareness of latest technologies in aesthetic dentistry.^[6,7] Importance of prevention has gained slight momentum in the past few decades leading to change in trends in Prosthodontics. People now prefer retaining of natural teeth, which may anticipate a decline in the number of complete dentures with an increase in the number of removable partial

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dentures (RPD).^[8] Complete replacement has shifted to partial tooth replacement. Teeth replacement is an important need and demand in patients attending the dental clinics, who wish to restore aesthetics and regain function. In the past, the options for replacing missing teeth were limited to only removable dentures and limited types of fixed partial dentures. Nowadays, there are more treatment modalities and materials available for the replacement of missing teeth. Newer modalities promise prevention of residual ridge resorption. Each modality can represent a possible option and carries several advantages and disadvantages.

For all cases, the indications and contraindications with the treatment plan should be carefully considered. A thorough and careful assessment of the patient's condition should be taken into consideration to reach clinical success.^[9] Dental graduates need to have enough skills and experience to provide patients with all types of prosthesis. Moreover, it is essential that the prosthetics teaching provided is adequate to produce confident and "fully qualified trainees." This will ensure the maintenance of patient safety and the delivery of superior care.^[10]

The incidences and placement of removable and fixed restorations, in relation to the number of missing teeth, differs among the population from one place to another. Age and socio-demographic or socio-economic circumstances influence the prevalence of dental restorations.^[11] The dental trend is not constant and might change through the years due to the improvement in people education, the easier access to dental services and the increased attention toward dental health and also be due to social media influence. There is a clear shift toward prevention and patients opting more aesthetic and conservative treatment.^[12] Insufficient information exists on the attitudes of dental patients towards tooth replacement in Saudi Arabia.^[13] Thus, the aim of this study was to identify the trend in prosthetic replacement, in partially edentulous patients treated at Riyadh Elm University (REU) hospitals, as well as to investigate the factors that might influence the prosthetic choices.

Methods

This study was conducted in Riyadh Elm University REU hospitals. The Ethical Review Committee of Riyadh Elm University REU approved this study (RC/IRB/2018/1071).

In this retrospective cross-sectional study, the digital records of all partially edentulous patients who had a prosthetic replacement for their missing tooth/teeth at REU hospitals, from the beginning of the Dentoplus digital system at 2013 up to June 2018 were reviewed and analyzed. The patient record was excluded if demographic data and/or radiographs were missing, completely edentulous patients, and if the type of restoration was not specified. The digital filing system allowed for easy retrieval of data by simply specifying the treatment code. The search was run in the system by entering all partial tooth/teeth replacement restorations codes; fixed partial dentures (FPDs), removable

partial dentures (RPDs) and implant codes. Patient demographic data such as age and gender were recorded.

Also, the missing tooth/teeth number, year of treatment, type and material of prosthetic replacement and the level of the operator (student, intern, postgraduate student or a specialist) were registered and tabulated in an excel sheet designed for this. Patient age was classified according to the UN world population aging 2013.^[14]

The data was analyzed using SPSS version 25 (Armonk, NY: IBM Corp). Continuous variables were expressed in frequencies, percentages, and proportions, while Chi-square test was used to analyze categorical data. The significant level was set at $P \leq 0.05$.

Results

Digital records from 2013 to June 2018 were analyzed. During these years, 6340 patients received a prosthetic replacement for their teeth [Figure 1]. Figure 2 shows that the highest number of restorations were placed in 2017 ($n = 1355$ restorations).

Most of the cases were treated by undergraduate students (81%) followed by postgraduate students (8%), while the specialist placed the least number of prosthetic restorations (4.5%).

Senior undergraduate students (level 12) placed the highest number of restorations while the junior students (level 8) placed the least number of prosthetic restorations (33% and 5% respectively).

The majority of the patients were females, at around 60%. The age range of the study group was between 13-91 years old. The majority of patients were from the middle age category (52%) followed by the old people category (25%). Lower posterior teeth were the most frequently replaced teeth (39%) and lower anterior teeth were the least replaced (5%) [Figure 3].

In general, in all clinics—undergraduate students, interns, postgraduate students and specialist—fixed partial dentures were

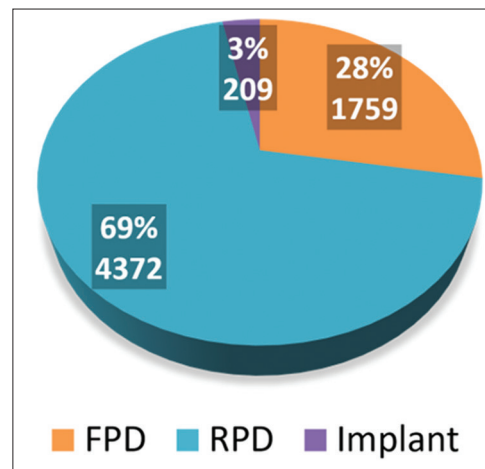


Figure 1: Restorations placed 2013-June 2018

significantly the highest-placed prosthesis among young adults followed by middle-aged patients. (P -value = 0.01)

Furthermore, in the specialist and postgraduate student clinics in specific, fixed partial dentures were significantly the highest-placed prosthesis among young adults and middle-aged patients and the lowest among old people (P -value = 0.00). While among adolescence and old people group RPDs were the mostly placed prosthesis for the replacement of their missing teeth [Table 1].

The specialist and postgraduate students placed dental implants (66%, and 34% respectively). Their use of implants and implant supported prosthesis to replace missing teeth significantly increased through the years (P -value = 0.01). In 2017, the majority of cases were restored with implants or implant-supported prosthesis (39%) and the least placed were FPDs (26%) [Figure 4].

Undergraduate students and interns placed significantly much more RPDs (above 70%) than FPDs (less than 30%). While postgraduate students placed only slightly more RPDs (43.7%) than FPDs (41.7%) and less number of implants (14.6%). Specialists placed significantly more implants (48.4%) and a much lesser number of RPDs (13.1%) (P -value <0.01) [Table 2].

Female patients got significantly more FPDs and implants placed than males (P -value = 0.00)

However, there was no significant difference between males and females, in the type of FPD placed. In both genders

metal-ceramic FPDs were the highest FPD placed. There was a significant gradual increase in all-ceramic FPDs placement through the years (P -value = 0.00). In both genders, acrylic RPDs were significantly placed more than chrome cobalt RPDs (P -value = 0.02) [Figure 5].

Discussion

The revolution in dentistry is a continues process and since the factors affecting prosthetic rehabilitation can change from one time to another and from one area to another, it was important to investigate the trend in prosthetic replacement in our area, and compare it globally and try to investigate the factors that might affect the trend.

The majority of the patients were females similar to Al-Quran *et al.* study.^[15] The reason behind this might be because the females usually are more concerned about their appearance, and there are more non-working females than males who can attend during the students working hours. The majority of the patients in our sample were from the middle age group, which

Table 1: Restorations distribution among age groups in specialist and postgraduate clinics

Age group	TYPE OF RESTORATION %			P
	FPD	IMPLANT	RPD	
Adolescent (under 20 years)	33.3%	16.7%	50.0%	0.001*
Young adults (20-39 years)	52.4%	23.1%	24.5%	
Middle aged (40-59 years)	45.9%	25.1%	29.0%	
Old people (60 years and above)	19.4%	33.1%	47.4%	

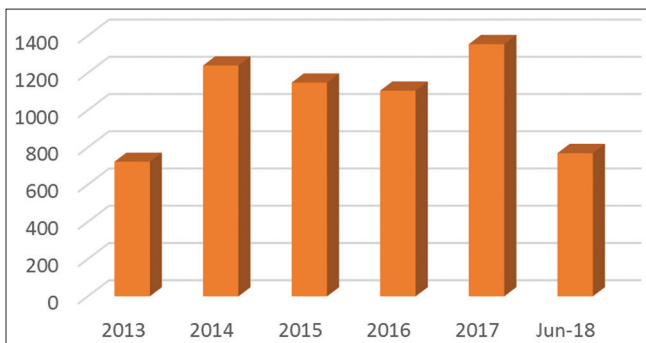


Figure 2: Restorations Frequency through the Years 2013-June 2018

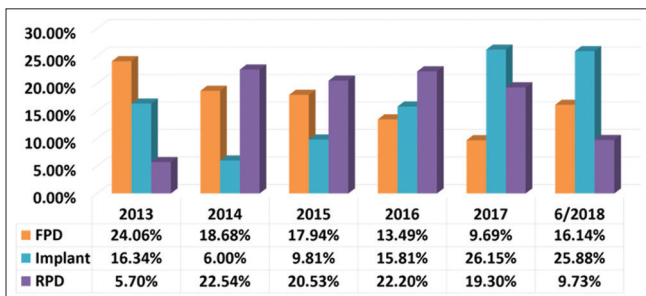


Figure 4: Annual distribution of prosthesis 2013-June 2018

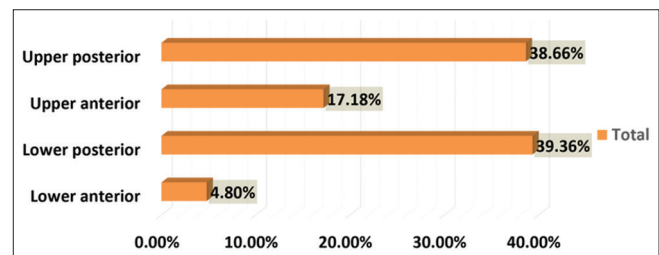


Figure 3: Pattern of missing teeth replaced

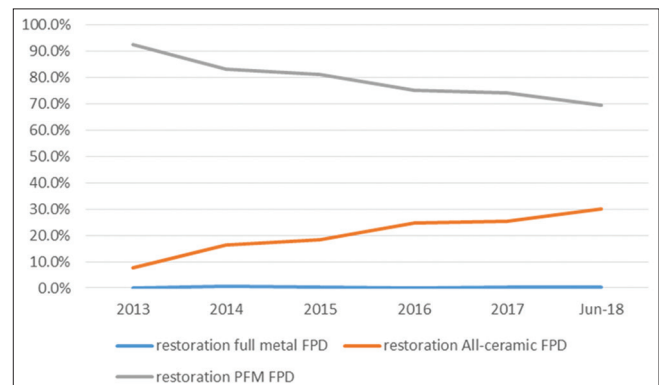


Figure 5: Fixed Partial Denture Type

Table 2: Restorations placed by different operator ranks

Operator rank	Restoration			Total	P
	FPD	RPD	Implants		
Undergraduate student	1379 (27%)	3774 (73%)	0 (0%)	5153 (100%)	0.001*
Intern	66 (16%)	346 (84%)	0 (0%)	412 (100%)	
Postgraduate student	205 (42%)	215 (44%)	72 (15%)	492 (100%)	
Specialist	109 (39%)	37 (13%)	137 (48%)	283 (100%)	
Total	1759 (28%)	4372 (69%)	209 (3%)	6340 (100%)	

was again consistent to Al-Quran *et al.*^[15] whereas majority of population was from the young adult group in study conducted by Ogunrinde *et al.*^[16] Lower posterior teeth were the most frequently replaced teeth (39%). This finding was in agreement with several previous studies, most of which indicated that carries was the number one reason for the loss of the mandibular posterior teeth.^[4,15,17,18] However, a study in Ibadan population found that posterior mandibular teeth are the most retained teeth in their population.^[19]

Among the student group, senior students placed the highest number of restorations, while the very junior students placed the least number of prosthetic restorations. This might be mainly due to the difference in the number of requirement between the senior and the junior levels as well as the higher confidence of senior student. Puryer *et al.* also reported that student confidence level increased with course progression, and hence the number of patients treated increased as they progress.^[10]

There is still a high demand for RPDs and this might be due to the high price of the other modalities.^[20] Students and interns placed significantly much more RPDs than FPDs. The reasons behind this can be both patient-related factors and student-related factor. Patients might be worried about allowing the less experienced students from preparing their teeth and they tend to trust them more with RPDs that require no or minimum preparations. Patients who can afford implants and FPDs will usually attend the specialist or postgraduate students clinic where the prices are much higher.^[16] Likewise, undergraduate students might tend to fear tooth preparation, especially on vital teeth, which might make them accept more RPD cases than FPD cases once they fulfilled their minimum requirements in fixed prosthodontic for the semester.

Undergraduate students are not allowed to place implants, hence postgraduate students and specialists only see implant cases. Postgraduate students placed less number of implants and specialists placed significantly more implants. Patients who can afford implants will usually prefer attending specialist clinics. The dentist has a major role to play in raising the patient awareness which in turn change their attitude toward a treatment option;^[21,22] specialist might have more experience in educating the patient and better inform them about the different options.

In the current study, acrylic RPDs were significantly placed more than chrome cobalt RPDs. This was similar to

previous studies conducted in the private sector in India and Bahrain.^[23,24] However, this was inconsistent with studies conducted in two public dental schools in Saudi Arabia.^[8,17] It is worth mentioning that the treatment in these public institutes is free of charge, which might encourage more expensive treatment options.^[17]

Females had received more FPDs and Implants than males. This was in agreement with Al-Quran *et al.* study which reported that gender is a factor that might influence treatment decision, and that female prefer fixed options due to their apprehensiveness towards their image and that RPDs makes them more conscious about their appearance.^[15] However, this was in contrast with Ogunrinde *et al.* where males got placed more implants than females, they stated that this might be related to the female fear of surgery.^[16]

FPDs were significantly the highest placed prosthesis among young adults and middle-aged patients while it was the lowest among old people who opted more for RPDs. It has been reported that adolescence can't get placed fixed restorations or implants till the complete eruption of teeth and the full development of jaws, old people might find the effort needed to seek implants and FPDs too great and they already adapted to their previous dentures.^[15,16]

Implants and implant-supported prosthesis significantly increased over the years, with almost 10% increase every year from 2014 till June 2018. The use of RPD and FPD for the replacement of missing teeth declined [Figure 4]. Implant use will continue to increase in the future due to the improved patient awareness regarding this option, the number of experts and technology in this field is increasing.^[25] This was in agreement with Kumar *et al.*,^[20] who stated that the annual increase in implant service was 15% in the last few years. In contrast, a study^[16] conducted in Nigerian Teaching Hospital showed that the percentage of the implant-supported prosthesis was low; the study mentioned that the major cause is the low socioeconomic status of the patients attending their clinics.

In the current study although metal ceramic FPDs are the highest placed fixed restorations, the placement of all-ceramic FPDs increased gradually through the years while the metal-ceramic restoration use started to progressively decline. Previous studies reported the same shift of the trend toward all-ceramic restorations.^[20,26]

Recommendations

The changing prosthodontics trend requires to create changes in the dental curriculum to accommodate the new trend and balance in the teaching and training between the conventional restorations and the more advanced one. This will prepare the new generation of dentists and also avoid the gap between dental education/training and the actual market. Carlsson and Omar also reported same trend and stated that there is a gap between the dental practice and the dental schools' curriculum that needs to be addressed and bridged.^[6]

Conclusion

According to the findings of the current study, there is a clear shift in the trend of the prosthetic replacement of missing teeth. This trend requires more studies and investigations to anticipate further the future of prosthodontics.

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Conflicts of interest

There are no conflicts of interest.

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