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Evaluation of Perceived Possible Outcomes in Patients Treated with Mandibular Distal Extension Partial Removable Dental Prostheses

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Cover Page Footnote

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ORIGINAL ARTICLE

Evaluation of Perceived Possible Outcomes in Patients Treated with Mandibular Distal Extension Partial Removable Dental Prostheses

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ABSTRACT

Objectives: This study evaluated the perceived positive and negative general and oral health outcomes of patients after using mandibular distal extension partial removable dental prostheses (PRDPs) and assessed the effect of recall procedures on the treatment outcomes. **Methods:** A questionnaire comprising 20 items, pertaining to perceived positive and negative outcomes related to the patients' perception scores after using mandibular distal extension PRDPs, was designed. The patients were recalled 1 week and 3 months after the insertion of the mandibular distal extension PRDPs. The perception scores were obtained, and the mean values calculated at 1 week and 3 months were compared using the paired t-test. **Results:** A significant difference in the mean scores was observed for the perceived positive outcomes ($p = 0.018$) but not for the perceived negative outcomes at 1 week and 3 months. Most patients agreed or strongly agreed with the statements concerning the perceived positive outcomes and disagreed or strongly disagreed with those concerning the perceived negative outcomes after 3 months. **Conclusion:** Most patients were satisfied with their mandibular distal extension PRDPs in terms of the perceived positive outcomes and disagreed with the statements concerning the perceived negative outcomes. The questionnaire was deemed appropriate for measuring the patients' perceptions about the possible outcomes of using mandibular distal extension PRDPs.

Key words: dentures, patient satisfaction, prosthesis, questionnaire

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INTRODUCTION

Several treatment modalities are available for the treatment of partial edentulism. Among them, partial removable dental prostheses (PRDPs; previously called removable partial dentures), which are used to restore oral functions, occupy a substantial position in prosthodontic annals. PRDP is a commonly approved conventional treatment modality for patients with partial edentulism. It is one of the most economical treatment options for patients who are unable to afford treatment with implants due to anatomical, psychological, or financial reasons.¹⁻⁴

Mandibular PRDPs are usually more problematic than maxillary PRDPs. Compared with the maxillary

arch, retention and stability are less pronounced in mandibular PRDPs owing to a smaller surface area, a mobile tongue on the floor of the mouth, and a high rate of resorption. A mandibular PRDP remains stable if it is entirely and continuously controlled by the patient.⁵ Compared with tooth-borne PRDP, the rotational movements of the distal extension PRDP frequently harm the prosthesis stability, leading to discomfort during function.²

Many dentists and their patients are disappointed after the delivery of a PRDP because the patient refuses or is unable to wear the denture, thereby deeming the treatment unsuccessful. The most important

factor is that the dentist should discuss the patient's expectations and summarize both the satisfactory and unsatisfactory short and long-term outcomes.⁵ The patient's individuality, previous denture experience, attitude toward PRDPs, retention and chewing ability, and esthetics are some of the factors that affect the acceptance of a PRDP.⁶ Furthermore, the risk of damage to the remaining teeth due to factors such as caries, periodontal disease, plaque accumulation, oral candidiasis, and denture stomatitis are some of the reasons for the patient's discontent with a PRDP.^{7,8} In 2009, Akeel conducted a study comprising 67 patients and examined the effect of the quality of a removable prosthesis on patient satisfaction at King Saud University, Riyadh, Saudi Arabia.⁹ Subsequently, he conducted a telephonic interview of 47 patients to determine the patients' usage of and satisfaction with PRDPs 1 year after insertion at King Saud University, Riyadh, Saudi Arabia.¹⁰ In another study, Aljabri et al. performed a telephonic interview to evaluate the levels of satisfaction and dissatisfaction with PRDPs in 60 patients in Makkah city, Saudi Arabia.¹¹ In a recent study, Almohsen and Mahmoud evaluated the level of satisfaction with PRDPs in 60 male patients in the Qassim region, Saudi Arabia.¹² However, the aforementioned studies were conducted for PRDPs in general and not mandibular distal extension PRDPs in particular. Hence, little is known about the perceived possible outcomes of treatment and patient satisfaction with regard to mandibular distal extension PRDPs in the adult Saudi population.

To this end, this study aimed to evaluate the patient's perception of the possible positive and negative general and oral health outcomes after using mandibular distal extension PRDPs at 1 week and 3 months after the insertion of mandibular distal extension PRDPs.

METHODS

This cross-sectional study was conducted between October 2019 and March 2020. Approval for the study was obtained from the Institutional Ethical Committee (Ref No. H-02-24102019).

Subjects' recruitment

A convenience sample was used to select 63 patients with partial mandibular edentulism (Kennedy class I and II) who had received PRDPs for the first time from the dental school.^{1,9-12} All the PRDPs were fabricated according to the "principles, concepts, and practices in prosthodontics" recommended by the Academy of Prosthodontics. The PRDPs were designed and fabricated according to the following principles: a complete examination of the patient; survey of the preliminary casts; mouth preparations (preparing guiding planes, rest seats, and contour reductions);

fabrication of a metal framework with rigid major connectors and relief when positioned over soft tissues; use of retentive elements that were stress-free; and use of an altered cast impression technique.¹³ The recall to fill the questionnaire at 1 week was conducted so that the patient gets adapted to the new PRDP. This is because the adjustment of the prosthesis was completed and the patient's complaints were addressed at 24 and 72 h. The recall to fill the questionnaire at 3 months was conducted to enable the patients to become accustomed to the new PRDP^{14,15} and to ascertain whether the recall procedures had any effect on the treatment outcome. Those who did not come for the recall desired dental implants and were weak and unable to tolerate the treatment were excluded from the study.

Specific methods used

A questionnaire comprising 20 items (Tables 1 and 2), based on a previous study, was modified with the help of two prosthodontists employed in this study.¹⁶ Ten items each in the questionnaire assessed the perceived benefits or perceived positive outcomes and the perceived risks or perceived negative outcomes following the use of PRDPs.¹⁶ The questionnaire was translated from its original version in English to Arabic and then back-translated to confirm the accuracy of the text. Face and content validation was also done by the same two prosthodontists who modified the questionnaire and a pilot test. This questionnaire showed appropriate internal consistency and convergent construct validity. A 5-point Likert scale (strongly disagree [SD]; disagree [D]; neutral [N]; agree [A]; strongly agree [SA]) was used to assess the outcomes following the use of PRDPs; ordinal values (SD = 1, D = 2, N = 3, A = 4, and SA = 5) were assigned to the different categories.¹⁶

The responses were recorded by two trained dental interns using the face-to-face approach, and a brief explanation was provided if the patient did not understand the treatment outcome. The recorded data were compiled and entered into a Microsoft Excel (Microsoft Corp., Redmond, WA) spreadsheet by the same dental interns who helped in completing the questionnaires, and the two sets of values were compared; items were re-entered if discrepancies were found. Consent for treatment and publishing the data was obtained from the patients.

Data analysis

The data recorded using the questionnaire were statistically analyzed using the Statistical Package for the Social Sciences version 24.0 (SPSS Inc., Chicago, IL, USA). Descriptive statistics (counts, percentages, means, and standard deviation) for the patient characteristics and perception scores were obtained. The paired t-test was used to assess the mean values of the items. The confidence interval and

Table 1. Comparison of the positive outcomes after 1 week and 3 months

| | PPO | PPO after 1 week | | PPO after 3 months | | t-value | p-value |
|----|---------------------------------|------------------|-------------|--------------------|-------------|---------|---------|
| | | Mean | SD | Mean | SD | | |
| 1 | Better chewing | 3.63 | 1.22 | 3.63 | 1.11 | 2.88 | 0.018* |
| 2 | Improved eating of foods | 3.70 | 1.12 | 3.59 | 1.17 | | |
| 3 | Better smile | 3.93 | 1.20 | 4.06 | 1.20 | | |
| 4 | Better appearance | 4.00 | 1.16 | 4.21 | 1.03 | | |
| 5 | Improved quality of life | 3.82 | 1.30 | 4.12 | 1.08 | | |
| 6 | Improved general health | 3.95 | 1.21 | 3.95 | 1.21 | | |
| 7 | Better speech | 4.08 | 1.06 | 4.36 | 0.72 | | |
| 8 | Improved oral communication | 3.82 | 1.27 | 4.06 | 1.07 | | |
| 9 | Better digestion | 3.82 | 1.19 | 3.87 | 1.14 | | |
| 10 | Help to protect remaining teeth | 4.12 | 1.00 | 4.27 | 0.86 | | |
| | Total | 3.89 | 1.19 | 4.01 | 1.10 | | |

*Paired t-test. p < 0.05; PPO, perceived positive outcome; SD, standard deviation

Table 2. Paired comparison of the negative outcomes after 1 week and 3 months

| | PNO | PNO after 1 week | | PNO after 3 months | | t-value | p-value | t-value (all 10 items) | p-value (all 10 items) |
|----|--|------------------|-------------|--------------------|-------------|---------|---------|------------------------|------------------------|
| | | Mean | SD | Mean | SD | | | | |
| 1 | Risk of rejection | 2.21 | 1.16 | 1.95 | 0.94 | 4.25 | 0.008* | 0.33 | 0.743 |
| 3 | Treatment is stressful | 1.78 | 0.96 | 1.78 | 0.96 | | | | |
| 4 | Causes harm to the bone and gingival tissues | 1.76 | 0.97 | 1.51 | 0.57 | | | | |
| 6 | Injury to remaining teeth | 2.04 | 1.21 | 1.82 | 0.95 | | | | |
| 8 | Treatment results can be disappointing | 2.06 | 1.29 | 1.93 | 1.15 | | | | |
| 9 | Prolonged treatment may cause anxiety | 1.97 | 0.81 | 1.68 | 0.65 | | | | |
| | Total (6 items) | 1.97 | 1.07 | 1.78 | 0.87 | | | | |
| 2 | PRDP will never be like natural teeth | 3.85 | 1.20 | 4.23 | 0.80 | 3.85 | 0.030* | | |
| 5 | PRDP demands more care than natural teeth | 4.44 | 0.57 | 4.55 | 0.49 | | | | |
| 7 | PRDP treatment needs periodic recall | 4.36 | 0.72 | 4.55 | 0.53 | | | | |
| 10 | Difficulty to chew | 3.76 | 1.03 | 3.97 | 0.86 | | | | |
| | Total (4 items) | 4.10 | 0.88 | 4.32 | 0.67 | | | | |
| | Total (all 10 items) | 2.82 | 1.47 | 2.80 | 1.50 | | | | |

*Paired t-test. p < 0.05; PNO, perceived negative outcome; SD, standard deviation; PRDP, partial removable dental prostheses

significance level (p-value) were set as 95% and <0.05, respectively. The index of reliability by Cronbach's α was used to test the reliability of the questionnaire.

RESULTS

The reliability analysis showed excellent results with a Cronbach's α coefficient of 0.90. Of the 63 patients selected for the study, 3 did not report for the 1-week

recall and 13 did not report for the 3-month recall. Thus, 47 patients were finally included in this study, with a response rate of 74.6%. Most patients (25; 53.2%) were \geq 55 years old, 31 (66%) were males, and 30 (63.8%) presented with class I Kennedy classification (Table 3).

In the perceived positive outcomes category, the mean scores of all 10 items ranged from 3.63 to 4.12 (3.89 ± 1.19) after 1 week and 3.59 to 4.36 (4.01 ± 1.10) after 3 months. All the 10 items had high mean values,

Table 3. Comparison of age with sex and Kennedy classification (n = 47)

| Age in years | Sex | | | | | | Kennedy classification | | | | | | |
|--------------|--------|----|------|------|-------|------|------------------------|------|----------|------|-------|------|-----|
| | Female | | Male | | Total | | Class I | | Class II | | Total | | |
| | n | % | n | % | n | % | n | % | n | % | n | % | |
| <45 | 3 | 19 | 7 | 22.5 | 10 | 21.3 | 7 | 23.3 | 3 | 17.6 | 10 | 21.3 | |
| 45–55 | 5 | 31 | 7 | 22.5 | 12 | 25.5 | 7 | 23.3 | 6 | 35.3 | 13 | 27.6 | |
| >55 | 8 | 50 | 17 | 55 | 25 | 53.2 | 16 | 53.4 | 8 | 47.1 | 24 | 51.1 | |
| Total | n | 16 | - | 31 | - | 47 | - | 30 | - | 17 | - | 47 | - |
| | % | 34 | 100 | 66 | 100 | 100 | 100 | 63.8 | 100 | 36.2 | 100 | 100 | 100 |

n, number of patients

indicating that the patients tended to A/SA with the proposed items of the scale (scores 4 and 5) after 1 week and 3 months (Table 1).

In the perceived negative outcomes category, the mean scores of six items (1, 3, 4, 6, 8, and 9) were determined. The negative perceptions of the patients ranged from 1.76 to 2.21 (1.97 ± 1.07) after 1 week and 1.51 to 1.95 (1.78 ± 0.87) after 3 months. The mean values of the six items were low, indicating that the patients tended to D/SD with the proposed items of the scale (scores 1 and 2) after 1 week and 3 months. The positive perceptions for the four other items (2, 5, 7, and 10) ranged from 3.76 to 4.44 (4.10 ± 0.88) after 1 week and 3.97 to 4.55 (4.32 ± 0.67) after 3 months. The high mean values of the four items indicated that the patients tended to A/SA with the proposed items on the scale (scores 4 and 5) after 1 week and 3 months (Table 2).

In the perceived negative outcomes category, high scores (4 and 5) were obtained for items 2 (PRDP will never be like natural teeth), 5 (PRDP demands more care than natural teeth), 7 (PRDP treatment needs periodic recall), and 10 (difficulty to chew), indicating that they tended to A/SA.

As shown in Figure 1, a comparison of the mean values of the perceived positive outcomes between 1 week and 3 months revealed an increase in the number of patients with positive perceptions ($p = 0.018$; Table 1).

As shown in Figure 2, when the mean values of the perceived negative outcomes were compared between 1 week and 3 months, a decrease in the number of patients who tended to D/SD was observed for items 1, 3, 4, 6, 8, and 9 ($p = 0.008$; Table 2); for the other four items (2, 5, 7, and 10), an increase in the number of patients who tended to A/SA was noted ($p = 0.030$; Table 2). However, when the paired t-test was performed to compare the mean values of all the 10 PNO items, the p-value (0.743) was not significant (Table 2).



Figure 1. Comparison of perceived positive outcomes after 1 week and 3 months SD, strongly disagree; D, disagree; N, neutral; A, agree; SA, strongly agree

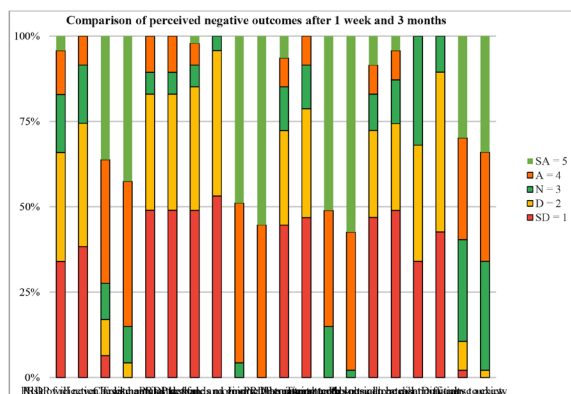


Figure 2. Comparison of perceived negative outcomes after 1 week and 3 months SD, strongly disagree; D, disagree; N, neutral; A, agree; SA, strongly agree

DISCUSSION

Tooth loss is a chronic disability that makes it challenging for patients to accomplish vital chores, such as mastication, interaction with others, and socializing, owing to its physical and functional consequences and the resultant social and psychological difficulties.¹⁷ PRDPs play a significant role in rehabilitating general

health and oral functions.¹⁸ The rehabilitation of patients with PRDPs is a continuous process; the specific needs of the patient, particularly those with Kennedy class I and II, must be addressed. Despite its limitations, an acceptable PRDP can rehabilitate the oral functions if meticulous care is taken during its fabrication. More importantly, the patient should be physically and psychologically prepared to accept the treatment.¹⁹

In the present study, only patients with Kennedy class I (63.8%) and II (36.2%) mandibular arches were treated, but the majority of the patients presented with class III arches, similar to a previous study conducted by Basutkar et al. in our dental school (Ibn Sina National College for Medical Studies, Jeddah, Saudi Arabia).²⁰ The sex distribution in the present study was similar to that described in various other studies, suggesting that males were more interested in replacing their teeth with PRDP than females.^{1,10,21}

The distribution of the patients' perceptions regarding the benefits or positive outcomes of PRDPs was skewed toward the highest grades. Most patients (60%–78%) assigned the highest grades (4 and 5) to their PRDPs after 1 week, and the grades improved (in 71%–87% of the patients) after 3 months. Only for two questions (better chewing and improved eating of foods), the grades for the perceived positive outcomes did not increase after 3 months. A possible reason for the decrease in the scores after 3 months for these two questions could be the loss of retention of the PRDP, which might have impaired the ability to chew, leading to dissatisfaction.²² In the present study, the patients' satisfaction with the PRDP increased 1 week after the insertion of the prosthesis, which might be attributed to the fact that the PRDP improved the previously compromised oral functions. These results are similar to those of studies by Akeel, Aljabri et al., Almohsen and Mahmoud, and Nazeer et al.^{9,11,12,23} The grades further improved after 3 months for most of the questions, possibly due to the repeated recall, which might have resolved most of the patient's problems and resulted in better-perceived outcomes. This finding is in agreement with the results of previous studies, which reported patient satisfaction with their prosthesis after 3 months of use.^{14,15}

Approximately 65%–85% of the patients demonstrated negative perceptions and provided the lowest grades (1 and 2) for six items after 1 week of using the PRDP; the proportion was further lowered (60%–96%) after 3 months. These findings are similar to those reported previously.²⁴ Furthermore, approximately 72%–95% of the patients demonstrated dissatisfaction with the treatment after 1 week by agreeing/strongly agreeing with four negative outcomes—PRDP will never be like natural teeth, PRDP demands more care than natural teeth, PRDP treatment needs periodic recall, and difficulty to chew. The proportion of unsatisfied

patients increased to 65%–100% after 3 months of using the PRDP. Conversely, in the study by Leles et al., the patients disagreed/strongly disagreed with all the perceived negative outcomes in the study.¹⁶ The reason for the high scores for the four parameters in the present study could be attributed to failures in communicating and educating the patients about the drawbacks associated with using PRDPs.^{2,22}

A robust recall program is a key to the success of all PRDPs. All 47 patients in the present study were motivated to follow a strict recall regimen. Additionally, they were recalled after 24 h and 72 h, as per standard protocol.^{19,25} Furthermore, they were examined after 1 week and required to fill out a questionnaire. All patients were followed up at least once before the 3-month recall. During the 3-month recall, the prostheses were examined and the patients were required to fill out the questionnaire again. This might explain the high grades for the perceived positive outcomes and low grades for the perceived negative outcomes, except for the four negative outcomes.

A significant difference in the mean values for the perceived positive outcomes but not for the perceived negative outcomes was observed between the 1-week and 3-month recalls. This result highlights the importance of communication by dentists during the patients' initial visits, thus establishing a patient-dentist relationship and serving as a significant factor in evaluating patients' outcomes.⁵ Patients treated with PRDPs are inclined to experience negative views of treatment and part of them refuse to use or are unable to adapt to using removable dentures.²⁴ Significant differences in the mean values for the six questions (patients tended to D/SD) and four questions (patients tended to A/SA) from the perceived negative outcomes were observed between the 1-week and 3-month recalls. A possible explanation for this result could be other patient-related concerns (personality, attitude toward PRDP, and motivation for PRDP use), which was not assessed in this study but could affect patients' scores for outcomes with PRDP.⁶

Our results showed that high scores for the perceived positive outcomes and low scores for the perceived negative outcomes were common after wearing a PRDP. However, the validity of the perceptions of the outcome measures merits discussion because it relied on questionnaire-based data. The reliability of the results is reinforced by the fact that the results were consistent throughout the study. Individual characteristics may be considered as factors that significantly affect the patient's expectations and beliefs regarding a specific treatment.³ By discussing the patient's concerns and possible limitations of the prosthesis, the management of these variables, which is vital for comprehensive treatment planning, might help clinicians in achieving successful outcomes.

This study has several limitations. The results of this study may not be generalizable to the entire Saudi population because only patients seeking treatment at the dental school were included. A student-treated patient sample may not necessarily correspond to the population, quality control, and treatment planning standards in other government or private dental clinics. Nevertheless, this study provides baseline data for further studies on the topic. Many patients did not attend recall check-ups, which reduced the power of the study and indicated the importance of patient education and motivation. Only one recall measurement was assessed, which might not fully represent the dynamic changes in denture satisfaction over longer periods. Other confounding factors such as ridge resorption, length of the distal extension, size of the tongue, etc. could also influence the patient-perceived outcomes. Lastly, the sample size was small, and additional studies using larger samples and comparing more variables are warranted to further validate the results of this study.

CONCLUSION

This study describes the significance of patient-perceived outcomes and the impact of PRDPs on their general and oral health. The patients were satisfied with the PRDPs (patient assessment score distributions were skewed toward the highest scores in the perceived positive outcomes category and lowest scores in the perceived negative outcomes category for almost all the questions). The patients demonstrated dissatisfaction with their prostheses via four perceived negative outcomes questions. However, a large number of patients expressed their satisfaction with the treatment during the questionnaire and interview sessions. Many patients reported that the treatment had positively influenced their quality of life and, while qualitative, this feedback reinforces the view that prosthodontic rehabilitation with PRDPs can positively impact the quality of life of the patient.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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