Abstract

Purpose: The purpose of the study was to examine the clinical variables such as age, gender, esthetic, comfort, speech and mastication on clinical acceptability and patient satisfaction associated with wearing removable partial dentures.

Materials and Methods: Sixty-six patients with 52 maxillary and 34 mandibular removable partial dentures (RPDs) were evaluated for satisfaction with their prostheses using visual analogue scales (VAS). The differences between two independent categories such as genders and dentures replacing mandibular or maxillary arches were tested for significance using Mann-Whitney U-tests. Tests for significance of difference in the Kennedy classification consisting of four categories and opposing arch dentition with three categories were made by Kruskal – Wallis analysis of Variance tests. Spearman rank correlation coefficients between age of patients and retention / stability of RPDs and the VAS scores were determined to test positive or negative correlations.

Results: The difference between males and females for the mean scores for comfort was significant (p < 0.05). Aesthetics had a significant negative association with patients’ age. There were no significant differences between VAS scores and other clinical variables.

Conclusion: The difference between males and females for comfort was significantly different (p < 0.05). There was a significant negative association between aesthetic and age. The difference among other VAS scores and other clinical variables were not significant.

Key words: Prosthodontics, Removable partial denture, Visual Analogue Scale.

Introduction

Removable partial dentures (RPDs) are one of the prosthetic treatment options for partially edentulous patients. Success of RPD treatment is often judged differently by dentists and patients. Dentists consider dentures to be successful when they meet certain technical standards whereas the patients evaluate their prostheses from the view point of their personal satisfaction.1,2 Patients’ satisfaction with RPDs seems to have multicausal factors.1 The risk of low patient’s acceptance has been associated with patients’ demographic variables including age, gender, previous denture experience and clinical variables such as pain, comfort, stability and design of dentures.2,3 According to Wakabayashi et al.4 and Frank et al,5,6 dissatisfaction with RPDs was higher in patients who had no prior experience with dentures. Other similar studies7,8,9 demonstrated that patients younger than 60 years and in poor health showed lower acceptance to RPDs. On the contrary, Knezovic et al.5 found no significant difference in patients’ assessment of the quality of their RPDs among age groups, previous denture experiences and type of opposing dentition.

Frank et al.10 reported that a majority of patients treated with RPDs, in private practices, were satisfied with their prostheses. However, even if the RPDs were constructed according to basic principles and concepts recommended by the Academy of Prosthodontics10, 10% of patients were dissatisfied. One study11 reported that the proportion of patients dissatisfied with their RPDs ranged from 3% to 4%. Thus, conflicting views existed on the influence of various clinical factors associated with the satisfaction or dissatisfaction with RPDs. Some of the clinical factors that are indirectly related to feeling of dissatisfaction with RPDs include age, sex, health, prior denture experience, esthetics and personality of patient. Dissatisfaction has also been reported to be associated with biomechanical factors of RPDs including retention / Stability, type of opposing dentition, pain, and ability to chew and speak. This study examined seven aspects of
clinical variables and evaluated them relative to the factors associated with dissatisfaction with removable partial denture treatment.

**Materials and Methods**

The subjects were selected from patients who were treated at the Prosthodontic Department BLINDED. Maxillary and mandibular clasp retained cast partial dentures were made by the students under the supervision of one instructor. Patients with previous denture experience, pain in the remaining teeth, and who had recent extraction with incomplete healing and history of temporomandibular joint disorders were not included in the study.

Sixty-six subjects consisting of 38 males and 28 females with a mean age of 64.1 years participated in this study. Fifty-two maxillary and 34 mandibular RPDs were constructed by students supervised by one instructor (Table 1). The RPDs replacing partially edentulous arches were divided into four groups according to Kennedy classification (Class 1 through Class IV). Modification spaces and their numbers were not considered. The RPDs were further classified according to arch replacement as mandibular and maxillary RPDs. Opposing arch dentition were classified into three categories as natural teeth which included missing teeth replaced by fixed partial denture, RPD or complete denture. Complaints of pain due to over extension of denture base were relieved. The opposing dentitions were recontoured to develop occlusal harmony by recall appointments.

The patients were recalled after a period of one year for evaluation. The stability and retention of the RPDs were evaluated by one investigator using the index provided by Kapur et al. modified by Wakabayashi et al. (Table 2). Each single prosthesis was evaluated by a sum score of retention and stability from 0 to 5 points by one investigator.

Patients were instructed to complete a questionnaire regarding name, age, gender and chronic diseases. In the other part of the questionnaire, they were required to grade their RPDs depending on the level of satisfaction with regards to aesthetics, pain, comfort, speech ability, mastication ability and general satisfaction using a visual analogue scale (VAS).

The VAS scale consisted of a 100 mm line with the ends defining the grade of feeling between the phases. The left end of the line represented a satisfactory response and the right end of the line represented an unsatisfactory response. The patient registered his/her assessment with a pencil mark across the line at a point that corresponded to his/her subjective feelings. Satisfaction was then expressed as the distance in millimeters from the left end limit to the distance of pencil mark and represented as the VAS score. A low score represented a satisfactory feeling and a high score represented an unsatisfactory feeling. The scores for each RPD (maxillary and mandibular) were separately recorded by one investigator. The VAS was used in this study because it is easily understood and is sensitive. The authors have noted that Several other scales are available including behavior rating scale, verbal scale and combination scale.

The influence of clinical variables on the VAS scores was tested by the non-parametric Wilcoxon rank sum test. Kruskal-Wallis one-way ANOVA was used to establish the differences among the four Kennedy classification partial dentures and among the three different opposing arch dentitions. To establish positive or negative correlations between some of the clinical variables and the VAS scores, the Spearman rank correlation coefficient test was applied. The tests were conducted at 0.05 level of significance. The data were analyzed with statistical software SPSS version 11.0 (SPSS Inc.).

**Results**

Table 3 presents the mean VAS scores for seven clinical variables. The highest mean score value recorded was for stability (46.0 mm) and lowest value was for pain (19.6 mm). A significant difference (p < 0.05) was recorded between males and females for comfort VAS scores (Table 3). There were no significant differences between males and females with other VAS scores. There was no significant difference in VAS rating for maxillary and mandibular dentures and dentition of opposing arches (Table 4). The differences for Kennedy classification were not significant for other VAS scores except for esthetics (Table 5). Patients were dissatisfied with Kennedy Class IV RPDs compared with other types of dentures (p < 0.05). The Spearman’s rank correlation coefficient between age and stability and VAS scores was presented in Table 6. With regards to esthetics, younger patients recorded significant negative correlation indicating that younger patients were less satisfied with Kennedy Class IV RPDs aesthetics compared with older patients (p < 0.05). Similarly, no significant negative association between stability of RPDs and VAS scores was observed.

**Discussion**

This study evaluated the relative differences in VAS scores for some of the clinical variables. Patients treated with RPDs usually complain of pain. However, in this study, the mean VAS score for pain was the lowest compared to other clinical variables. The reason for this could be that all the patients who

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**Table 1**: Distribution of Age, Gender, Maxillary and Mandibular RPDs of Subjects in Study

<table>
<thead>
<tr>
<th>Number of patients</th>
<th>38</th>
<th>28</th>
<th>66</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age range (years)</td>
<td>40 - 66</td>
<td>46 - 64</td>
<td>40 - 66</td>
</tr>
<tr>
<td>Mean age range +/- SD</td>
<td>64.4 ± 7.6</td>
<td>61.2 ± 8.3</td>
<td>64.1 ± 8.2</td>
</tr>
<tr>
<td>Number of RPDs (Maxilla/Mandible)</td>
<td>30 / 18</td>
<td>22 / 16</td>
<td>52 / 34</td>
</tr>
</tbody>
</table>

**Table 2**: Scoring Index for Stability and Retention

<table>
<thead>
<tr>
<th>Stability</th>
<th>0: No stability. Denture base demonstrates extreme rocking on its supporting structures under pressure.</th>
<th>1: Some stability. Denture base demonstrates moderate rocking on its supporting structure under pressure.</th>
<th>2: Sufficient stability denture base demonstrates slight or no rocking on its supporting structure under pressure.</th>
</tr>
</thead>
</table>
participated in this study were relieved of pain by adjusting their dentures during recall appointments and the patients were recalled for evaluation after a period of one year. The findings of this study supported the results of Wakabayashi et al. who investigated the association of clinical variables effects on satisfaction of patients to their prostheses.

In the literature, opinions vary among researchers as to which scales are more sensitive to expose a change in pain and discomfort. The different scales include visual analogue scale, numerical scale, verbal scales and combined scale. In this study, visual analogue scale was used because it has been reported to be superior to the other four behavior rating scales.

Comfort indicates absence of any pain and acceptable feeling with the prosthesis. The VAS scores for comfort for females was approximately twice than that of males. The gender difference was statistically significant (p < 0.05). The finding was in accordance with the study of Wakabayashi et al. who also found that the females showed higher mean value of VAS score than the males. The most commonly reported causes of dissatisfaction with RPDs were the lack of stability, fit and occlusion with opposing teeth. The VAS score for satisfaction although was higher for females compared with males, the difference was not statistically significant which compared favorably with the results of Wakabayashi et al. and Frank et al. All other clinical variables with the exception of comfort were not significant.

This study showed that aesthetics had significant (p < 0.05) negative association with younger patients wearing Kennedy Class IV RPDs which is in agreement with the results of Jepson et al. and Wakabayashi et al. On the other hand, Kenozovic et al. had results that seems to contradict. It is reasonable to assume that younger patients with replacement of anterior teeth by Kennedy Class IV RPDs would be more concerned with the colour and arrangement of teeth. The Kennedy classification I, II and III RPDs had no significant effect on any other VAS scores of the patients. Furthermore, the

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### (Table 3): Mean & Standard Deviation Values for VAS Score for Clinical Variables (millimeter)

<table>
<thead>
<tr>
<th></th>
<th>Aesthetic</th>
<th>Pain</th>
<th>Comfort</th>
<th>Stability</th>
<th>Speech</th>
<th>Mastication</th>
<th>General Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean VAS Score (SD)</td>
<td>35.4 (+/-12.8)</td>
<td>19.6 (+/- 2.7)</td>
<td>35.6 (+/- 3.0)</td>
<td>46.0 (+/- 3.9)</td>
<td>28.4 (+/- 3.4)</td>
<td>41.6 (+/- 4.1)</td>
<td>41.7 (+/- 4.0)</td>
</tr>
</tbody>
</table>

### (Table 4): Mean & Standard Deviation Values for VAS Scores in Millimeters for Maxillary, Mandibular RPDs and Gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>Aesthetics</th>
<th>Pain</th>
<th>Comfort</th>
<th>Stability</th>
<th>Speech</th>
<th>Mastication</th>
<th>General Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maxilla (n=52)</td>
<td>34.2 (±-6.0)</td>
<td>10.6 (±-4.1)</td>
<td>36.1 (±-4.9)</td>
<td>42.4 (±-6.1)</td>
<td>25.6 (±-4.7)</td>
<td>38.6 (±-5.1)</td>
<td>45.7 (±-6.1)</td>
</tr>
<tr>
<td>Mandible (n=34)</td>
<td>40.4 (±-4.8)</td>
<td>21.6 (±-5.7)</td>
<td>32.7 (±-5.0)</td>
<td>51.2 (±-4.9)</td>
<td>31.4 (±-4.5)</td>
<td>42.4 (±-5.2)</td>
<td>38.3 (±-5.0)</td>
</tr>
<tr>
<td>Male (n=38)</td>
<td>32.4 (±-6.1)</td>
<td>10.6 (±-2.8)*</td>
<td>20.7 (±-5.9)</td>
<td>43.8 (±-6.6)</td>
<td>24.8 (±-5.9)</td>
<td>37.9 (±-5.8)</td>
<td>38.0 (±-6.1)</td>
</tr>
<tr>
<td>Female (n=28)</td>
<td>39.1 (±-3.8)</td>
<td>19.5 (±-4.1)*</td>
<td>40.1 (±-4.3)</td>
<td>47.1 (±-4.2)</td>
<td>29.4 (±-4.1)</td>
<td>41.8 (±-4.9)</td>
<td>45.3 (±-4.8)</td>
</tr>
</tbody>
</table>

* Denotes significance difference between the clinical variables. The standard deviation numbers are in the brackets.

### (Table 5): Mean & Standard Deviation Values for VAS Scores in Millimeters for Kennedy Class I, II, III and IV RPDs & Opposing Dental Arch Dentition

<table>
<thead>
<tr>
<th>Kennedy Classification</th>
<th>Aesthetics</th>
<th>Pain</th>
<th>Comfort</th>
<th>Stability</th>
<th>Speech</th>
<th>Mastication</th>
<th>General Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I (n=44)</td>
<td>44.6 (±-4.9)*</td>
<td>20.9 (±-5.0)</td>
<td>34.8 (±-6.1)</td>
<td>57.6 (±-6.2)</td>
<td>32.4 (±-3.4)</td>
<td>54.6 (±-6.2)</td>
<td>46.9 (±-5.8)</td>
</tr>
<tr>
<td>Class II (n=21)</td>
<td>20.0 (±-3.2)*</td>
<td>19.4 (±-4.3)</td>
<td>25.9 (±-4.6)</td>
<td>48.4 (±-6.9)</td>
<td>26.7 (±-5.1)</td>
<td>42.3 (±-8.1)</td>
<td>36.4 (±-7.1)</td>
</tr>
<tr>
<td>Class III (n=11)</td>
<td>57.6 (±-21.0)*</td>
<td>5.1 (±-3.9)</td>
<td>51.7 (±-21.9)</td>
<td>40.3 (±-8.2)</td>
<td>0.9 (±-0.4)</td>
<td>34.1 (±-6.7)</td>
<td>49.8 (±-7.4)</td>
</tr>
<tr>
<td>Class IV (n=10)</td>
<td>78.5 (±-6.1)*</td>
<td>29.6 (±-6.7)</td>
<td>63.6 (±-22.3)</td>
<td>56.8 (±-7.3)</td>
<td>37.0 (±-12.9)</td>
<td>51.3 (±-9.4)</td>
<td>68.7 (±-21.4)</td>
</tr>
</tbody>
</table>

* Denotes significant difference between the different factors and brackets include standard deviation.

### (Table 6): Spearman's Rank Correlation Coefficient among some of the Variables and the VAS Scores

<table>
<thead>
<tr>
<th></th>
<th>Aesthetics</th>
<th>Pain</th>
<th>Comfort</th>
<th>Stability</th>
<th>Speech</th>
<th>Mastication</th>
<th>Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>-0.304*</td>
<td>-0.039</td>
<td>-0.162</td>
<td>-0.06</td>
<td>-0.079</td>
<td>-0.147</td>
<td>-0.297</td>
</tr>
<tr>
<td><strong>Retention &amp; Stability</strong></td>
<td>-0.173</td>
<td>-0.040</td>
<td>-0.106</td>
<td>-0.287</td>
<td>-0.101</td>
<td>-0.099</td>
<td>-0.234</td>
</tr>
</tbody>
</table>

* Denotes significant difference.
correlation coefficient between stability of RPDs recorded by the investigator and the VAS score was not statistically significant (Table 5). This study did not examine the correlations between the number of replaced teeth, different designs of major connectors and previous denture experience with their respective VAS scores. Further investigation of these clinical variables is needed.

Conclusion
The difference in the mean visual analogue (VAS) rating for comfort between males and females was statistically significant. Aesthetics with Kennedy Class IV partial denture showed a negative association with the age of patients. There were no significant difference between VAS scores and other clinical variables examined.

References