

**THERMOPLASTIC RESIN REMOVABLE PARTIAL DENTURE PREFERRED OVER
CONVENTIONAL METAL CLASP RETAINED REMOVABLE PARTIAL DENTURE – A
RANDOMIZED STUDY TRIAL.**Yash Desai*¹, Parmeet Banga*^{1,2}, Saba Supariwala*¹, Samruddhi Kadakia*³¹Private Practice, Mumbai, Maharashtra, India.²Department of Prosthodontics, Crown and Bridge and Implantology, Y.M.T Dental College and Hospital, Kharghar, Navi Mumbai, Maharashtra, India.³D.Y Patil University, School of Dentistry, Nerul, Navi Mumbai, Maharashtra, India.***Corresponding Author: Dr. Yash Desai**

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Article Received on 27/03/2020

Article Revised on 16/04/2020

Article Accepted on 06/05/2020

ABSTRACT

Aim: Conventional RPD's, implant-supported FPD's and FPD's are better treatment modalities for aesthetic and functional recuperation of partially edentulous patients. When removable cast partial dentures are used as a definitive treatment as indicated, but where the patient's major concern is aesthetics, as the location of clasp may be placed in the anterior section of the dental arch in such cases flexible thermoplastic resin removable partial denture's (TR-RPD's) is aesthetically preferred superior to metal clasp removable partial dentures (MC-RPD's). This randomized study trial aims at comparing patient comfort with thermoplastic resin RPD's and metal clasp retained RPD's. **Method:** Thirty (30) partially edentulous subjects were randomly selected and enrolled with MC-RPD's followed by the same 30 subjects with TR-RPD's (n=15, each group). The subjects were asked to grade based on patient comfort and the removable partial denture-related parameters after the delivery of the denture. The subjects were also asked to choose the preferred treatment modality at the end of the study trail. **Results:** Out of 30 subjects 26 (86%, mean age, 65.3years) completed the trial. It was seen that overall scores and ratings with TR-RPD's were significantly higher than those with MC-RPD's ($P < 0.05$) regarding patient comfort and aesthetic appearance. Moreover 75% (20/26) and 83% (22/26) of the subjects claimed better overall comfort and oral appearance with TR-RPD's than with MC-RPD's ($P < 0.001$, both). Score grading for properties like the pain associated with mucosa and food impaction were reported better with TR-RPD's as compared to that of MC-RPD's ($P < 0.05$). Pronunciation of words, speech and overall patient satisfaction was also relatively better with TR-RPD's as compared to MC-RPD's. Although the differences were not evident ($P > 0.05$). Grades regarding mastication, stability for the denture and the ease in the cleansing activity of the denture were almost similar in both types of dentures. **Conclusion:** As soon as the completion of the randomized study trial, the results suggested that TR-RPD's ushered an advantage over MC-RPD's concerning patient comfort and oral appearance in partially edentulous arches.

KEYWORDS: Thermoplastic resin removable partial denture (TR-RPD), metal clasp removable partial denture(MC-RPD), patient comfort, oral appearance.

1) INTRODUCTION

Prosthetic dentistry has a wide range of treatment modalities for restoring partially edentulous cases. Materials such as removable partial dentures, fixed bridges and dental implants are being used with increasing growth rate and continuity to an elderly population and partially edentulous cases requiring prosthetic restorations, where RPD's have substantiated to remain its utmost treatment option. However, metal clasps in comparison to the thermoplastic resin in the anterior portion of the dental arch have proven to be a major drawback aesthetically. In advanced dental clinical setup patient comfort and aesthetic appearance have

proven to the critical factor from patients while considering treatment options. Now a day's thermoplastic resin removable partial dentures also known as non-metal clasp dentures are in incessant demand as an alternative to conventional metal clasps removable partial dentures. Thus, TR-RPD's are effective in the oral-health related quality of life (OHRQoL) indices in patients with partially edentulous arches. Currently, more number of dentists recommend flexible denture because of its high strength, biocompatibility, comfort, and durability. TR-RPD's along with the resin clasps are designed on abutment teeth or positioned in the visible zones of the dental

arches. There are 2 types of TR-RPD's 1) with denture teeth and denture base resin 2) with materials consisting of metals for rests and connectors. Based on the description above 'The Prosthodontic Society of India' aims at using TR-RPD's with materials consisting of metal for definitive treatments. We conducted a study to evaluate patient comfort, periodontal related health problems and clinical performance of abutment teeth with MC-RPD's and TR-RPD's. The outbreak of this study trial reported that cases with TR-RPD's significantly had better OHRQoL than MC-RPD's, where the OHRQoL is adjudged to be important from the patient's outlook. The null hypothesis of this study to be tested with patient comfort is equivalent to that of trials with MC-RPD's. The eligibility criteria for the trials included.

- 1) A removable partial denture for the restoration of missing teeth on one side of the jaw.
- 2) There should be at least one clasp on anterior teeth.
- 3) There should be at least one occluding pair in the posterior section of the arch.
- 4) The subjects should not be reactionary to any sort of metallic allergy or the thermoplastic resin.

2) MATERIALS AND METHODS

2.1 Study design

This randomized cross-study trial was conducted at a single center at Y.M.T dental college and hospital in India. Approval for all the study procedure was taken from the institutional board of Maharashtra, Nashik. The study trials were performed concerning 'The WMA

Declaration of Helsinki'. We gathered informed consent from all the patients before experimenting with the trials on them. We managed to briefly describe the study design to all the participants digitally on the projected screen. The selection of all the participants with the mentioned-above eligibility criteria was assigned from the records of the dental university with having at least one occluding pair in the posterior region. 30 subjects were selected for the study trial based on the oral-health related quality of life (OHRQoL) as the primary outcome. MC-RPD's followed by TR-RPD's were received to the subjects. Structures of all the TR-RPD's were made in guidance to the recommended definitive RPD's by 'The Prosthodontic Society of India'. All the TR-RPD's were made from the thermoplastic resin used as denture base and clasps, however, nickel-chromium alloys were used for the rests, framework and reinforcing wires. The clasps were designed as such with 0.5mm undercut, 1.5mm thickness, 5-7mm width. A definite questionnaire was prepared for all the patients regarding patient comfort, oral appearance and OHRQoL which were evaluated 3 months post the delivery of each RPD's.

2.2 Scoring of patient comfort and preference with both the study trials

A 100mm Visual Analogue Scale (VAS) was used for scoring the overall patient comfort with the dentures at the 3-month end of the study trial after evaluating each type of RPD's. The Visual Analogue Scale (VAS) covered ratings from 'completely dissatisfied' on the left to 'completely satisfied' on the right end of the scale.

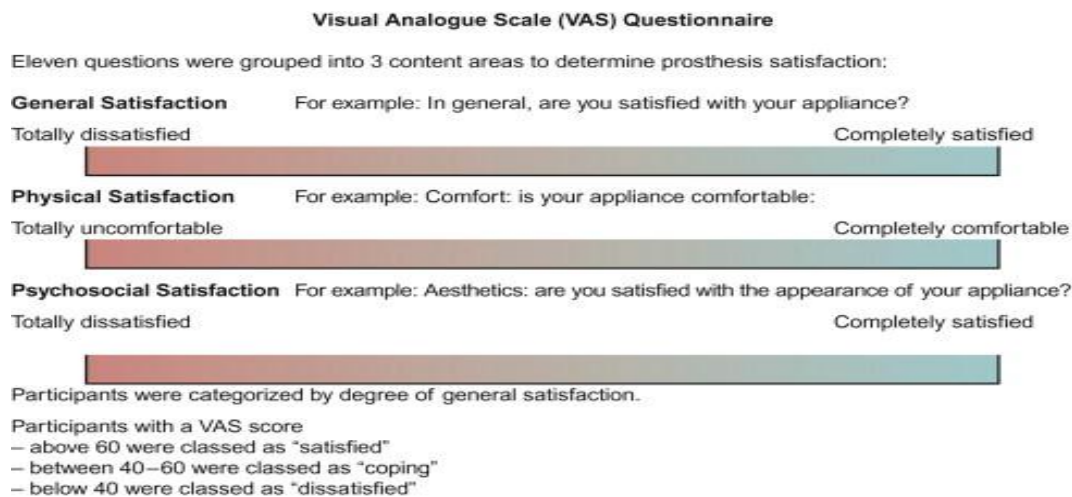


Fig. Scoring of patient comfort and preference of the denture with a 100mm Visual Analogue scale (VAS).

The patients were also asked to grade based on overall oral appearance, the effect of speech after wearing the dentures, its masticatory ability and mucosal pain-related problems in the stress-bearing areas, food impaction, denture cleansing ease on a 5-point Likert Scale.

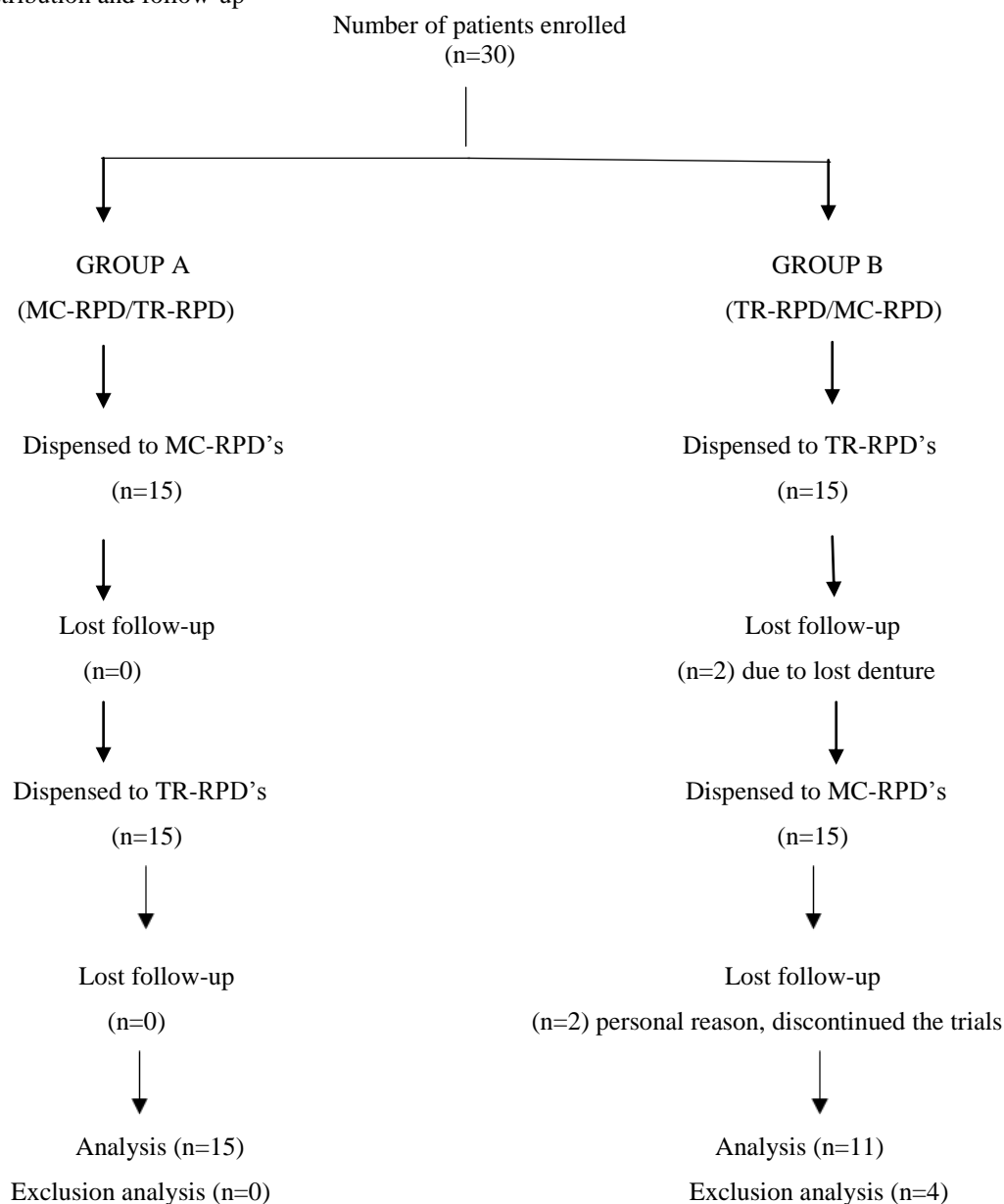
2.3 Statistical analysis

Scores related to overall patient comfort for TR-RPD's and MC-RPD's were taken into consideration using multiple linear regression analysis. Sex, age, jaw-side,

upper or lower arc, denture-related parameters, period were tested with multiple linear regression analysis as a random effect. $P < 0.05$ was statistically significant.

3) RESULTS

3.1 Patient distribution and follow-up



The number of enrolled patients in the study was 30 out of which 4 patients allotted in group B (TR-RPD/MC-RPD) backed off due to personal reasons. Eventually 26 patients (mean age = 65.3yrs, S.D = 7.6yrs, male - 40%, group A n = 15, group B (n = 11)). No complications like extraction of teeth or breakage of the removable partial denture occurred during the study trial.

3.2 General characteristics

Out of all the patients involved in the study trial (n=30), the ratio of men: women were slightly more in group B

3.3 Patient comfort

The results of multiple linear regression analysis showed a significant difference in overall comfort score (TR-RPD – MC-RPD) where ($P < 0.05$). At the end of the 3-month study trial the mean difference score for TR-

RPD's was 87.3 ± 15.5 and for MC-RPD's it was 81.0 ± 17.5 . The results for patient comfort showed a mean difference as 6.3 ± 13.3 where $p > 0.05$.

3.4 Patient grading for TR-RPD's – MC-RPD's

Out of 26 patients, most of them had positive ratings for TR-RPD's than MC-RPD's concerning mucosal pain, oral appearance, patient comfort, food impaction and speech. Ratings with oral appearance: out of 26 patients, 20 had good or very good ratings for oral appearance regarding TR-RPD's (76.9%). However, 6 out of 26 (23.07%) had the same response to MC-RPD's. Out of all the denture-related parameters mentioned-below, TR-RPD's showed better grades than MC-RPD's.

1.1 Table showing patient entry of general features during trial.

GENERAL FEATURES Patient detailed entry	GROUP A MC-RPD/TR-RPD (n=15)	GROUP B TR-RPD/MC-RPD (n=15)	TOTAL (n=30)
Age ^a	65.0 (9.0)	63.7 (10.8)	64.3 (9.2)
Sex (male) ^b	6 (42.0)	4 (20.6)	10 (40.0)
Jaw (maxilla) ^b	8 (50.0)	8 (50.0)	16 (50.0)
No. of occlusal unit ^a	6.1 (2.5)	6.3 (2.7)	6.3 (2.7)
No. of missing teeth ^a	3.3 (2.4)	3.3 (1.8)	3.3 (2.0)
Kennedy's classification ^b			
Class I	3 (14.5)	4 (20.5)	7 (16.5)
Class II	8 (48.9)	7 (35.6)	15 (44.8)
Class III	4 (36.7)	5 (41.9)	9 (34.3)
Class IV	0 (0)	0 (0)	0 (0)

1.2 Table showing the entry for patient ratings for dental parameters.

PATIENT RATINGS Dental parameters entry	GROUP A MC-RPD/TR-RPD (n=15)	GROUP B TR-RPD/MC-RPD (n=15)	TOTAL (n=30)
Denture experience (presence) ^a	6 (36.7)	6 (36.7)	12 (36.7)
Oral maintenance (presence) ^b	4 (33.4)	5 (36.5)	9 (27.6)
Current denture usage (presence) ^b	4 (22.4)	5 (27.6)	9 (34.3)
no. of abutment teeth ^a	1.7 (1.2)	1.7 (1.2)	1.7 (1.2)
No. of resin clasps designed ^a	2.5 (0.5)	2.7 (0.5)	2.6 (0.5)
Oral appearance (0-worst,4-very good) ^c	3 (7)	4 (7)	4 (7)
Importance of oral appearance (0-worst,4-very good) ^c	5 (4)	5 (4)	5 (4)
Clasp visibility problem to the patient (0-not problematic,4-very problematic) ^c	5 (6)	5 (6)	(6)

^a mean (SD), ^b n (%), ^c median (range)

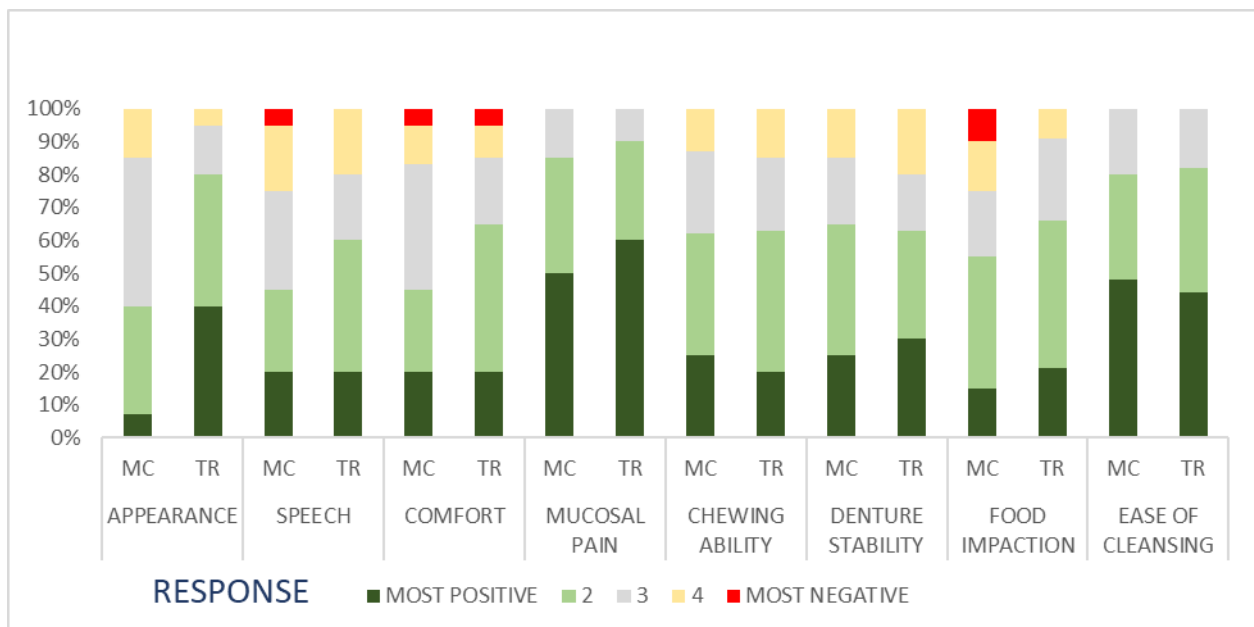


Fig 1: distribution of patient ratings for dentures where (n=26).

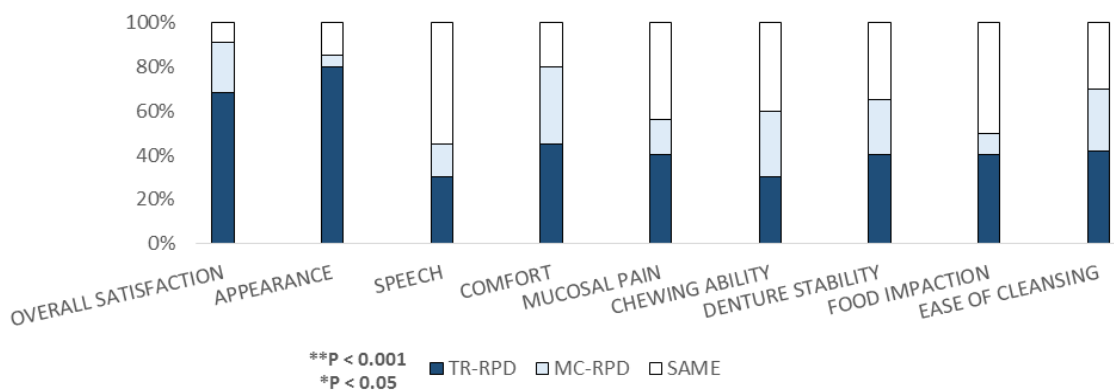


Fig 2: Results of patients (n=26) when compared MC-RPD's with TR-RPD's.

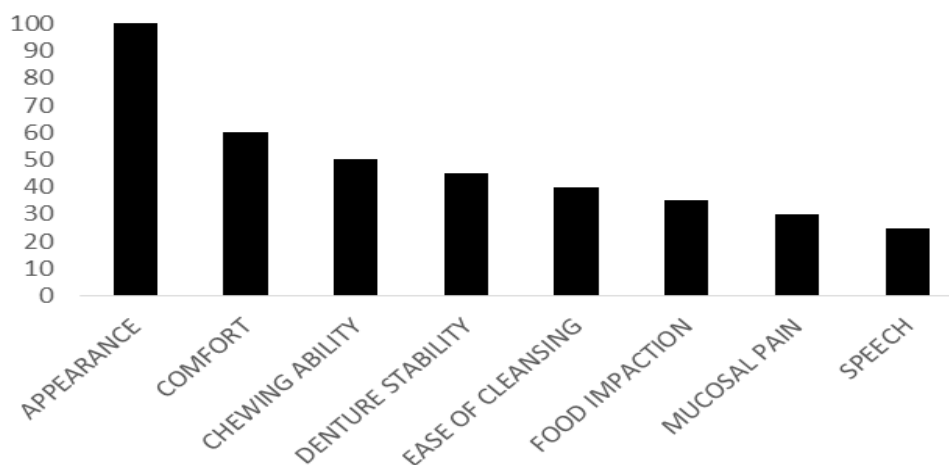


Fig 3: thermoplastic resin when reported as the preferred denture.

3.5 Patient preference

Out of 26 patients, most of the patients preferred TR-RPD's over MC-RPD's, 20 patients 75% (20/26). However, 5 patients choose MC-RPD's 19.23% (5/26) and 1 patient 3.84% (1/26) choose to not show its preference. The number of patients who preferred oral appearance as their preference for TR-RPD's was 20 (n=20), 12 patients for chewing ability (12/20) 60%, 12 patients for denture stability (12/20) 60%, 10 patients for ease in cleansing (10/20) 50%, 13 patients for oral comfort and satisfaction (13/20) 65% as their preferred choice for TR-RPD's.

4) DISCUSSION

The TR-RPD's were noted with overall higher scores for patient satisfaction than MC-RPD's by most of the patients. Thus the change was significantly relevant in overall satisfaction between TR-RPD's and MC-RPD's. In context with oral appearance about 20 patients (20/26, 76.9%) believed of having better oral appearance with TR-RPD's as compared to MC-RPD's. Thus 20 patients (20/26, 76.9%) had a positive remark towards the denture parameters and preferred to incline more towards the TR-RPD treatment modality than MC-RPD. In addition to oral appearance another denture-related

parameter where TR-RPD's noted to be superior to MC-RPD's was the patient comfort and overall patient satisfaction. However, based on all the denture-related parameters the range of effect size with regards to oral appearance proved to be the largest amongst all. Thus all these indications denote that TR-RPD's have a substantial advantage over MC-RPD's. The results with abutment teeth for TR-RPD's along with resin clasps covering the gingival tissues and the food impaction during mastication also proved to be superior with TR-RPD's. On the contrary side after the 3-months denture delivery with TR-RPD's, complications with regards to stability and decrease in retentive forces were noted during the randomized study trial. However, the decline in retentive forces opted to be very minimal. The study trial had few limitations.

1) Rigid TR-RPD's were only taken into consideration because non-rigid TR-RPD's without metal clasps were not preferred where definitive treatment was the prime concern as it showed complications during clinical practice.

2) The period for the study trial was very short.

3) TR-RPD's had a subsequent higher cost of production as compared to MC-RPD's. Thus the cost of production should be taken into consideration from the

patient's outlook while deciding on in our clinical practice.

5) CONCLUSION

The TR-RPD's are a better option for replacing missing teeth in patients where aesthetics is considered to be of their prime concern. The TR-RPD's impart a significantly higher comfort and patient satisfaction with its elasticity, aesthetic appearance and its biocompatibility. Hence the success of the treatment lies in the hands of a clinician who delivers an overall comprehensive prognosis for partially edentulous ridges and plans a systematic treatment modality for the same. Thus thermoplastic resin has a greater impact over metal clasp retained removable partial denture with significant patient comfort and oral appearance.

6) ACKNOWLEDGEMENTS

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