



Masticatory Ability and Oral Health Related Quality of Life in Partially Edentulous Patients Involving Posterior Teeth after Rehabilitation with Tooth-Supported Fixed Dental Prosthesis

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Background: Loss of teeth affects the masticatory ability and overall health of the patient especially posterior teeth as they contribute more to mastication as compared to anteriors. Loss of teeth can lead to undesirable consequences and early rehabilitation with any type of prosthesis can lead to desirable changes and thus missing teeth should be replaced as soon as possible.

Aims and Objectives: To determine the change in masticatory ability and quality of life (QoL) after replacement of missing posterior teeth by fixed dental prosthesis.

Methodology: Maximum bite force was recorded before and after treatment. Also a self-perceived questionnaire was filled by the patient to assess the change in QoL. Patients with missing posterior teeth were included. Patients with acute infections or systemic diseases were excluded.

Results: Significant change ($p=0.0001$) in both masticatory ability and QoL of the patient was seen. The co-relation of both was clinically significant while statistically non-significant ($p=0.77$). Results were significant for both the studied parameters but co-relation between them was no significant. It is because of the patients perceived satisfaction of the overall treatment.

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Conclusion: Rehabilitation of posterior teeth improves mastication and also overall oral health related QoL.

Keywords: *Masticatory ability; oral health related quality of life (OHRQoL); maximum bite force (MBF); removable dental prosthesis (RDP); fixed dental prosthesis (FDP).*

1. INTRODUCTION

Masticatory apparatus consists of teeth, surrounding soft tissues and muscles, temporomandibular joint, etc. Loss of teeth affects the masticatory ability and overall health of the patient especially posterior teeth as they contribute more to mastication as compared to anteriors. This can lead to further undesirable consequences and early rehabilitation with any type of prosthesis can lead to desirable changes and thus missing teeth should be replaced as soon as possible [1]. Molars are considered key to occlusion and their loss because of any cause can adversely affect the future dental health. First molar bears the maximum occlusal load as it is the largest tooth in the oral cavity [2]. Measurement of maximum bite force (MBF) of first molar region ranges from 300 to 600N in healthy individuals in natural dentition [3]. Loss of first-molar is crucial in prosthetic rehabilitation as it causes supraeruption of the opposite molar and mesial and distal drifting of the adjacent teeth in the edentulous space which is deleterious while planning for prosthesis as the space becomes insufficient for crown placement [4].

MBF is one of the indicators of the functional health of masticatory apparatus. It exists due to the movements of the closing muscles of the jaw and modified by the craniomandibular biomechanics. It has been considered as an important indicator for determination of disorders in masticatory system. It is measured after the interval of 2 to 3 months as stated in studies by different authors. No particular time interval is mentioned as some authors also took 12 months follow up [3]. Various studies were conducted to relate compare bite force using different prosthesis [5,6].

As masticatory inefficiency can markedly affect the quality of life, it is important to determine the effects of various prosthesis on mastication [7]. These effects can be studied by clinical examination by using transducers or strain gauges or by various investigations such as T-scan [8] or by using questionnaires. Nina et.al concluded in their study that the questionnaire

method can be inexpensive tool to determine the prevalence of prosthetic restorations. So, in the present study a clinical examination that is bite force measurement was done along with self-perceived questionnaire of OHRQoL.

2. AIM AND OBJECTIVES

Aim of the study was to assess and correlate MBF and OHRQoL in partially edentulous patients involving posterior teeth before and after rehabilitation with tooth supported FDPs.

3. MATERIALS AND METHODS

It was an in-vivo prospective study, carried out after the ethical approval from IEC Reference no –DMIMS (DU)/IEC/Sept-2019/8429 at Department of Prosthodontics, Sharad Pawar Dental College, Sawangi (Meghe), DMIMS DU, Wardha. (Duration- 6 months) Sample size was determined using purposive sampling. All the partially edentulous patients involving posterior teeth visiting to department of prosthodontics during the study period were taken as purposive sample.

2.1 Study Design

Observational Study.

2.2 Inclusion and Exclusion Criteria

Patients with missing posterior teeth either maxillary or mandibular, single or multiple were included in the study irrespective of the age, gender and number of missing teeth. Teeth missing in one arch were considered as for recording purpose opposing arch should be intact. All the patients that satisfy the criteria for abutment selection and willing for FPD were included. Informed written consent was obtained from the patients before starting with the procedure. Patients with acute infections or uncontrolled systemic diseases were excluded. Patients with severe periodontal destruction were excluded as it will alter the bite force measurements. Also FPD is contraindicated in such patients.

2.3 Procedure

- Patients with missing posterior teeth were selected according to inclusion and exclusion criteria and considered for fixed dental prostheses.
- MBF was recorded before the start of the treatment and after rehabilitation of missing posterior teeth (after cementation of the prosthesis) using the bite force gauge.
- Self perceived assessment of OHRQoL was done using OHIP-14 questionnaire which is to be filled by the patient pre and post treatment.

2.4 Statistical Analysis

All the obtained data was entered in the Microsoft office excel 2016. Descriptive and inferential statistics were used to analyse the data. Students paired t test and Pearsons correlation coefficient were used. Software used was SPSS 24.0 version and $p < 0.05$ is considered as level of significance.

3. OBSERVATIONS AND RESULTS

Results showed that mean age group of patients with missing posterior teeth or partial edentulism were 32 to 62 years and there was no significant gender predilection, males and females were equally affected (Tables 1,2).

Results after the measurement of maximum bite force showed that mean maximum bite force was increased after treatment by almost 87 N which is highly significant with the p value of 0.0001. (Table 3) The oral health related quality of life also improved after rehabilitation with the difference of approximately 22 score on the scale of OHIP-14 again with the p value of 0.0001 which is highly significant (Table 4).

But on the contrary, the correlation between these two parameters is non significant on analysis. Results were clinically significant but statistically non-significant with a p value of 0.77.(Table 5) This difference is due to self perceived satisfaction of the patient is recorded by the questionnaire which is subjective and can give variable results.

Table 1. Patient distribution (age-wise)

Age Group(yrs)	No of patients	Percentage
31-40 yrs	12	40
41-50 yrs	8	26.67
51-60 yrs	8	26.67
61-70 yrs	2	6.67
Total	30	100
Mean±SD	46.06 ± 9.04(32-62 yrs)	

Table 2. Patient distribution (gender-wise)

Gender	No of patients	Percentage
Male	14	46.67
Female	16	53.33
Total	30	100

Table 3. Comparative evaluation of MBF

	Mean	N	Standard Deviation (SD)	Standard Error (SE) Mean	Mean Difference	t-value
Before t/t	338.80	30	78.53	14.33	86.46±29.71	15.93
After t/t	425.26	30	68.85	12.57		

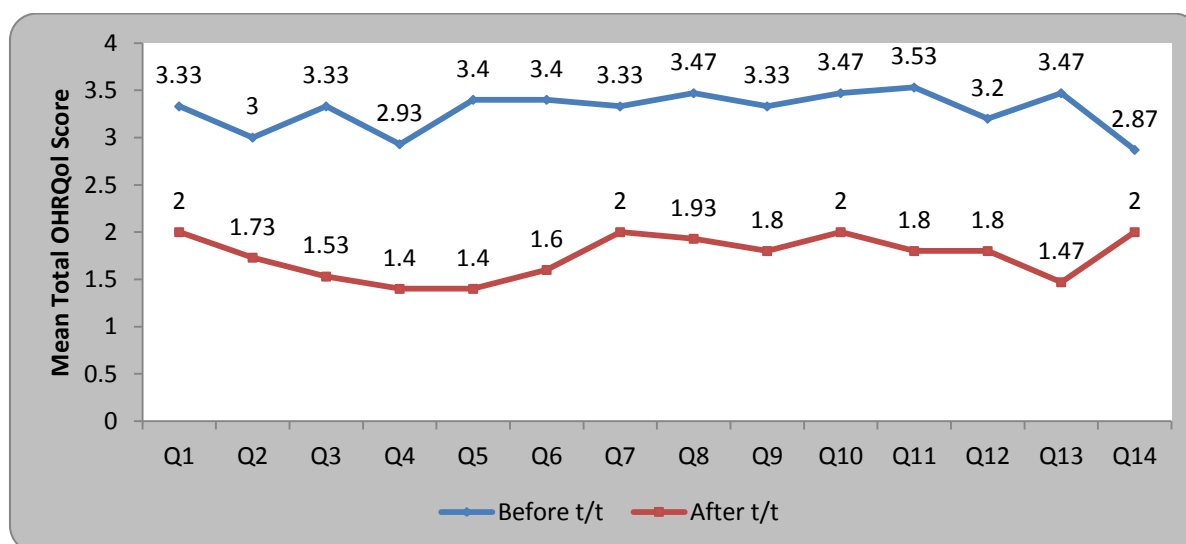
p=0.0001,S

Table 4. Comparative evaluation of OHRQoI score

	Mean	N	SD	SE Mean	Mean Difference	t-value
Before t/t	46.06	30	2.50	0.45	21.60±2.77	42.64
After t/t	24.46	30	3.98	0.72		

Table 5. Correlation between MBF and total OHRQoI score - Pearsons correlation coefficient

	Mean	SD	N	Correlation	p-value
MBF	425.26	68.85	30	0.05	0.77 NS
Total OHRQoI	24.46	3.98	30		



Graph 1. Individual question wise analysis

4. DISCUSSION

Various prosthodontic treatment modalities are there to regain masticatory function in patients with missing molars. Few studies have found out the effects of prosthodontic treatments on mastication in partial or completely edentulous patients and their findings were variable [5,6] Kapur et al. [5] concluded partial RDP and partial implant FDP achieved similar masticating efficiency [5]. On the contrary Liedberg et al. [7] stated that food comminution index in patients with FDP was more as compared to RDP patients [6].

In the study by Mostafa Rezaie et al. (2018) the prevalence of missing first molar amongst different age groups were studied. Results were such that about 40% of the study population had at least one missing first molar. The most commonly lost tooth was mandibular first molar with left side more common as compared to right. [2]. So, in the present study missing posterior

teeth were considered especially molars. Also results indicated that maximum patients presented with missing mandibular molars.

K. Miyaura et al. (2000) investigated biting abilities in patients with natural dentition, complete dentures (CD), RDPs, FDPs. He concluded that the bite forces of the FDP were 80%, RDP- 35% and CD-11% when expressed as % natural dentition. Also, they concluded that bite force improved 2 months after insertion of prosthesis [9]. Geckili O. et al. [10] compared bite force, patient satisfaction and QoL in patients with mandibular over dentures and conventional CD. They concluded that subjects wearing mandibular over dentures had higher values for bite force and patient satisfaction scores, but no change in QoL scores when compared to conventional CD wearers [10]

Gonsalves et al (2013) compared MBF in patients after receiving RDP, IRDP and IFDP in same patient at the interval of 2months. MBF

increased significantly after implant insertion with gain (140 N) observed between RDP and IRDP use, while an increment (306 N) was detected from RDP to IFDP use [11]. Nam et.al [12] conducted a study to analyze the alteration in masticatory ability associated with the implant prosthesis of the second molar. He concluded that masticatory ability improves after 1 month of implant prosthesis cementation [12]. So, in present study we took a follow up period of 2-3 months on the basis of these studies.

Nina et al. [9] conducted a study to determine the prevalence of prosthetic restorations in adults to study the agreement between self-reports and clinical findings of prosthetic restorations, to study answers from a questionnaire in relation to the prevalence of prosthetic restorations. She concluded that the questionnaire method can be a tool which is less expensive to determine the prevalence of prosthetic restorations.¹¹ So we used the questionnaire method to determine changes in QoL.

Significant change ($p=0.0001$) in both masticatory ability and QoL of the patient was seen. The co-relation of both was clinically significant while statistically non-significant ($p=0.77$). Results were significant for both the studied parameters but co-relation between them was no significant. It is because of the patients perceived satisfaction of the overall treatment.

5. CONCLUSION

Report on change in OHRQoL can be assessed to evaluate area which show or do not show improvement and can be marked upon accordingly. Longitudinal study with large study sample size can be done. Various treatment modalities can be considered and assessed. Other parameters of masticatory function can also be evaluated as in present study only MBF is considered. But, literature has shown that MBF significantly influences masticatory performance. Long term follow up evaluation can be done.

CONSENT

Informed written consent was obtained from the patients before starting with the procedure.

ETHICAL APPROVAL

The ethical approval from IEC Reference no – DMIMS (DU)/IEC/Sept-2019/8429 at Department

of Prosthodontics, Sharad Pawar Dental College, Sawangi (Meghe), DMIMS DU, Wardha.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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