Original Article

Predicting denture satisfaction and quality of life in completely edentulous: A mixed-mode study

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Abstract

Aim: The aim of the study was to evaluate the effect of dentist's communication skills and patient's psychological factors in predicting denture satisfaction and quality of life.

Settings and Design: Cohort study.

Materials and Methods: Patient-related variables were obtained using questionnaires in both pre- and post-intervention phases. In addition to this, in preintervention phase, lacunae in doctor–patient communication were obtained. Based on this, the postgraduates were trained in relevant communication skills required during complete denture treatment. In postintervention phase, the postgraduates were again followed up for continuation or decay of skills.

Statistical Analysis: Mixed-mode approach - quantitative and qualitative analysis.

Results: Both groups were similar in psychological parameters, personality domains, denture quality and quality of life at baseline. However, there was significant difference in denture satisfaction ($P < 0.001$) in both the groups. In the experimental group, denture satisfaction was more (80.4%) and quality of life had improved from baseline to 3 months ($P = 0.000$). Denture satisfaction was associated with self-efficacy ($P = 0.002$) and the communication skills of the dentist ($P = 0.000$). Quality of life was associated with the conscientiousness domain of personality ($P = 0.049$) and the communication skills of the dentist ($P < 0.05$).

Conclusion: Satisfaction and quality of life with dentures were associated with self-efficacy, conscientiousness domain and the communication skills of the dentist. Denture satisfaction can be predicted by dentist communication skills. Therefore, training in communication skills for complete denture patient management and assessment of the psychological profile of the patient could contribute to the effective patient-centered practice to avoid patient dissatisfaction.

Keywords: Communication skills training in dental, complete denture treatment, doctor–patient communication, oral health-related quality of life, patient satisfaction

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INTRODUCTION

There are various determinants of acceptability of denture (satisfaction and quality of life) with dentures (oral health-related quality of life [OHRQoL]). Studies have found a varied association between denture satisfaction and denture quality, patient psychology, technical skills, communication skills of the dentist and oral anatomy, etc.[1,2] Apart from these positive and negative indicators for complete denture success, still, many patients are unable to adapt to a complete denture.[3] Patients with difficulties accepting the loss of teeth are more prone to experience depression.[4] Other factors that contribute are the patient's personality, relationship with the dentist, and their attitude toward the dentist and denture.[5] However, these are not evaluated routinely. The treatment choice is a shared decision between the patient and the dentist.[6] In dentistry, there is sparse evidence of teaching and assessment for communication skills. The learning of communication skills is from the role models, i.e., seniors, a teacher, and peers and is not assessed in the exam. Literature does not reveal clear data on the teaching of communication skills and patient psychology in dental in India.

There is still a dearth of quality studies to determine a prognostic preoperative method for predicting the acceptability of denture. Due to this lacuna in previous literature, there is no method to predict the denture satisfaction and quality of life with dentures in completely edentulous patients. Therefore, the aim was to study the effect of communication skills of the dentist and the psychological factors of completely edentulous patients to predict satisfaction and quality of life with dentures. The objectives were to evaluate the effect of communication skills of the dentist on the acceptability of complete denture and to evaluate the role of psychological factors of patients on the acceptability of complete denture. The research hypothesis was that given that the complete denture set is of acceptable technical quality – (a) developing dentist's communication skill influences satisfaction and quality of life with complete dentures; (b) patients psychological factors influence satisfaction and quality of life with complete dentures.

MATERIALS AND METHODS

The present study was conducted in the Department of Prosthodontics, from April 2015 to February 2018. Written informed consent was obtained from the postgraduates and patients for video recording of doctor–patient interactions. The study was commenced after approval from the Institutional Human Ethical Committee (Ph. D./2016/03/07). All the procedures performed in the study were conducted following the ethical standards given in the 1964 Declaration of Helsinki, as revised in 2013.

All the completely edentulous patients reporting to the outpatient department of the department with a treatment plan for a complete denture were included based on inclusion and exclusion criteria. The inclusion criterion was those patients who had a treatment plan for complete dentures and also those with previous denture experience. Exclusion criteria were patients with compromised denture quality (those scoring less in functional assessment of dentures [FAD] questionnaire), requiring major preprosthetic corrections, gross anatomical factors affecting retention (carcinoma of maxilla/mandible), having xerostomia as a major symptom, known psychosis, mental retardation, dementia, and known neurological disorders.

The sample size was estimated to be 100, using Open Epi Version 3.03,Open Source Epidemiologic Statistics for Public Health, Version. www.OpenEpi.com, Atlanta, Georgia, taking general satisfaction of edentulous patients after complete denture level as 67.12%, absolute precision of 10%, and dropout rate as 10%. It was a mixed-mode study, where quantitative data were obtained using questionnaires, whereas qualitative data were obtained from video recordings (of doctor–patient interactions during treatment), exit interviews (of the treated patients), and follow-up sessions. The treatment was performed by six prosthodontic postgraduates in the second and third year of their postgraduate program, to ensure adequate technical expertise in complete denture treatment. The study design was a cohort, where the postgraduates served as their control before and after training in communication skills.

The patients were administered prevalidated English questionnaires relevant to the study [Table 1] translated into the local language (Tamil).[7-14] Forward and backward translation of the questionnaires was also done. Face and content validity was done by language and subject experts. A pilot study was done to evaluate the need for study and to select appropriate data collection tools. The complete dentures (conventional) were fabricated according to the same principles and quality, by postgraduates under the guidance of faculty members of the department using standard clinical and laboratory procedures. The clinical procedures were standardized in the department. During denture delivery, the quality of the denture was assessed by two prosthodontics (blinded) using the FAD questionnaire, based on which only good quality dentures were included in the study.

Table 1: Questionnaires used for the study

Timing of administration	Tools for assessment of	Filled by	Prevalidated English questionnaires used
Before treatment	Patient details	Patient	Informed consent, sociodemographic factors
	Psychological aspects	Patient	1. DASS 21[7]
			2. GSES[8]
			3. Big five personality traits (big five inventory for personality dimensions)[9]
After treatment	Oral health-related quality of life at baseline	Patient	OHIP-EDENT-1[14]
	Denture quality	Prosthodontist	FAD[10]
	Communication skills of the dentist	Expert	Expert rated communication skills assessment (Kalamazoo consensus-based on video recordings)[11,12]
		Patient	Patient-rated communication skills assessment (ABIM patient satisfaction tool)[11]
	Patient satisfaction with denture	Patient	SCDRQ (Denture Related Questionnaire-Patient self-assessment of the denture).[13]
	Oral health-related quality of life at 1 month	Patient	OHIP-EDENT-2
	Oral health-related quality of life at 3 months	Patient	OHIP-EDENT-3

DSAA: Depression, anxiety, stress scale, GSES: General self-efficacy scale, OHIP-EDENT-1: Oral health impact profile in edentulous adult questionnaire, FAD: Functional assessment of denture

Video recording of the six postgraduate patient's interaction was done, while they treated fifty consenting edentulous patients (initial consultations to posttreatment adjustment interactions). Video recordings were done using a DSLR camera (Nikon D5200 2.1 MP, Nikon Corp, Japan) mounted on a tripod. The collected data were transcribed verbatim and thematically analyzed using the Kalamazoo scale by the primary investigator (prosthodontist) and was discussed with other raters (senior health professions educator and master trainer on communication skills and clinical psychologist) for consensus charting (method for building consensus in qualitative research). Based on this, the postgraduate's strengths and weaknesses in communication skills were identified and were edited as video clips.

After completion of the treatment, an exit interview was conducted by the primary investigator to investigate patients' views on edentulousness, influencing factors for treatment, and dentist–patient relationship. The questions were asked on topics obtained from the discussion of the literature review. The topics were transformed into questions that could be used as a guide and were subsequently expanded in the interviews. The questions asked during the focus group discussion are as follows: (1) what according to you are the factors that influenced you to undertake complete denture treatment?; (2) are you satisfied with the treatment? Which factor influenced your acceptance/dejection with the dentures?; (3) which according to you is most important in complete denture treatment based on your experience during the complete denture treatment-dentist communication or denture quality. What do you expect from the doctor during the treatment? The interviews were conducted until saturation of concepts was reached, i.e., no more patterns or themes emerged from the interview

and similar comments were given by the participants. They were video recorded, transcribed verbatim, and thematically analyzed by the primary investigator. Data from the interviews were organized and codified into units, categories, and themes and discussed with the other raters until consensus was reached.

Based on the observations made in the baseline data collection of fifty patients, a targeted remedial course was planned for training the postgraduates in communication skills relevant to complete denture treatment. It was planned to conduct a general training module for all the postgraduates along with individualized guidance counseling. The training was conducted by a senior health professions educator and master-trainer on communication skills, a clinical psychologist, and a subject expert (prosthodontist). This training session module is copyrighted as SBV-EPICS©-Evidence-Based Personalized Imparting of Communication Skills (9258/2017-CO/L).[15]

The General module topics were based on the book authored by one of the resource persons and customized for complete denture treatment.[15] Nine interactive sessions were conducted for teaching relevant communication skills using various methods such as role play, real-life patient experiences and narratives, interactive power point presentation, and buzz sessions. Training videos were made with the help of interns and faculties of the institution for scenarios such as the good-bad doctor, types of patient personality, nonverbal communication, Kalamazoo scale subdivisions, and examples of real-life patient scenarios. The script for all the training videos used for sessions is copyrighted as SBV-DICE©-Dental script for Intensive Communication Skills Education (11786/2017CO/L). The individualized sessions were conducted for each postgraduate for 1 h each. During these sessions, video

clips on their strength in communication skills were shown, appreciated, and encouraged to keep it up. Thereafter, their weaknesses were shown, and suggestions were given for improvement.

Posttraining, it was planned to continue following up postgraduates while interacting with another set of fifty patients using the same methodology (questionnaires, video recordings, and interviews) to assess retention or decay of skills taught. Different set of patients was done to avoid bias in already treated patients which could have contaminated the study since it involves qualitative parameters such as interview. However, the exit interviews kept on giving new themes even though the sample size of 50 was achieved. The saturation could be achieved only after we reached 66 participants. Therefore, we had to go beyond the estimated sample size.

Posttraining, immediate open feedback regarding the training revealed that the postgraduates found the feedback very helpful and wanted it to be done regularly. Therefore, the Balint method of self-reflective feedback was adopted to conduct periodic feedback sessions.[15] This method is used in family medicine and oncology, but there is no evidence of application in dental till now. In this method, trainers used to conduct meetings every 2 months with the postgraduates. During these sessions, feedback was given on their interaction with patients during that period based on the video-recorded observations. The focus group discussions were based on difficulties faced in handling interactions, peer sharing of experiences, and self-reflection of performance. In this method, following the case presentation by the postgraduates, inputs were given by their peers/colleagues and trainers. Video tags were used for giving feedback on the performance of postgraduates. This follow-up session's methodology is copyrighted as SBV-PrO-PReP© (Practice Oriented-Peer Review for Prosthodontics) (9257/2017-CO/L). The data obtained from these meetings were transcribed verbatim and thematically analyzed.

Statistical analysis was done using Statistical Package for the Social Sciences (SPSS) version 20.0, IBM, Chicago, USA). The mixed-mode method was used for evaluation. Quantitative and qualitative methods were used for the evaluation of patient variables and postgraduate variables, respectively. Quantitative evaluation was done for descriptive statistics using percentage, mean (standard deviation); for inferential statistics using Chi-square test, independent and dependent *t*-test, repeated-measures ANOVA, correlation, and logistic regression. A qualitative evaluation was done

for exploring the postgraduate's communication skills posttraining and for evaluating perceptions of patients treated by them about the complete denture treatment. The qualitative evaluation was phenomenology (phenomenon studied-communication training) based using horizontalization and conceptual framework. For patient interviews and follow-up (Pro-Prep) sessions, the focus group discussion method was used.

RESULTS

Various questionnaires were administered to the patients before and after denture treatment to obtain information regarding their quality of life at baseline (before denture), 1 month, and 3 months after receiving denture, satisfaction with denture, psychological aspects, communication skill of the dentist, and quality of the denture [Table 1].

In the present study, there was no significant difference between both groups in terms of socioeconomic variables. In both the control and experimental groups, most of the patients were of 50–70 years of age and were males with education up to high school level and married, working, and financially independent [Table 2].

The OHRQOL before denture, i.e., at the baseline (OHIP-EDENT 1) was almost the same for the control group (27.6 ± 19.8) and experimental group (29.5 ± 19.5) respectively [Table 3]. A significant difference in the quality of life after receiving dentures at 3 months was observed as compared to that after 1 month in both the groups [Table 4].

Both the control and experimental groups were similar in depression, anxiety, and stress scores; self-efficacy; and personality domains except for the openness domain ($P = 0.000$) [Table 4]. The denture quality was similar in both groups. However, both groups had a significant difference in patient satisfaction with dentures ($P < 0.001$) [Table 5]. Patient satisfaction with denture was more in the experimental group (80.4%). The experimental group patients were eight times more likely to report patient satisfaction (odds ratio = 7.914). However, more percentage of the control group patients was dissatisfied with their dentures (66%) [Table 6].

Quality of life across periods of baseline (before denture), 1, and 3 months was the same in the control group. However, there was an improvement in the quality of life in the experimental group from before denture to 1 month to 3 months as indicated by the decrease in scores across these periods [Table 7].

Table 2: Comparison of socioeconomic variables between the experimental and control groups

Variables	Experimental (*n*=66), *n* (%)	Control (*n*=50), *n* (%)	χ^2	df	*P*
Age (years)					
40-50	10 (15)	7 (14)	8.885	4	0.064
50-60	10 (15)	19 (38)			
60-70	30 (46)	15 (30)			
70-80	12 (18)	8 (16)			
80 plus	4 (6)	1 (2)			
Sex					
Male	39 (59)	26 (52)	0.581	1	0.446
Female	27 (41)	24 (48)			
Marital status					
Married	52 (79)	40 (80)	0.764	2	0.682
Divorced	1 (2)	0 0			
Widowed	13 (19)	10 (10)			
Education					
No formal education	7 (11)	7 (14)	1.313	3	0.726
Elementary school	25 (37)	15 (30)			
High school	27 (41)	24 (48)			
College	7 (11)	4 (8)			
Present occupation					
Working	25 (38)	21 (42)	3.775	2	0.151
Retired	25 (38)	11 (22)			
Housewife	16 (24)	18 (36)			
Financial status					
Independent	34 (52)	25 (50)	0.026	1	0.510
Dependent	32 (48)	25 (50)			

Table 3: Comparison of quality of life before denture (baseline) between the experimental and control groups

Variables	Mean±SD	
	Experimental group (*n*=66)	Control group (*n*=50)
Quality of life before the denture	27.6±19.8	29.5±19.5

SD: Standard deviation

Denture satisfaction was positively associated with the self-efficacy of the patient and the communication skills of the dentist in the experimental group. This means that the higher the self-efficacy of the patient, the higher was satisfaction with dentures; and the better the communication skill of the dentist, the better the satisfaction with dentures. The quality of life at 3 months was positively associated with conscientiousness personality trait in the experimental group. In both, groups, the quality of life at 3 months was associated with the communication skills of the dentist [Table 8].

Predictor analysis revealed that patients who are satisfied with the communication skills of the dentist (*P* = 0.000) are prone to high satisfaction with their dentures. Similarly, patients who are satisfied with their dentures are prone to good quality of life after 3 months of receiving dentures [Table 9].

The exit interviews revealed that, during the preintervention phase, expectations of the patients were high as they were not informed regarding the limitations of their oral anatomy. They felt dejected as they were unable to adjust to the prosthesis or their problems were not being addressed adequately. However, postintervention, the patients had developed faith in treating the doctor, satisfied, used to take self-ownership of problems, had better overall health, and developed a personal rapport with the doctor. The collected data revealed aspects that are ignored in the routine doctor–patient interaction [Table 10].

DISCUSSION

The present study evaluated the predictors for improving the satisfaction and quality of life of edentulous patients. This study was also concerned with the evaluation of communication skills during real-time doctor–patient interactions during complete denture treatment. During exit interviews, the patient's used to openly discuss their opinion regarding the doctor's communication skills and satisfaction with the treatment. Therefore, it was decided to include a different set of patients for the postintervention phase as including the same patients could have incorporated bias and contaminated the results. However, some patients could have been included if the study was conducted on simulated patients or if the study evaluated quantitative variables alone for the assessment of communication skills.

Since the estimated sample size was 100, half of the sample was taken in the 1st phase (i.e., 50). In the 3rd phase, the planned sample size was 50 but new concepts/themes kept emerging in interviews. Therefore, the sample size was extended till

Table 4: Comparison of psychological factors (depression, anxiety, stress, and self-efficacy), personality domains, and oral health-related quality of life at 1 and 3 months between the experimental and control groups

Variables	Mean±SD		Mean difference (95% CI)	P
	Experimental group (*n*=66)	Control group (*n*=50)		
Psychological factors				
Depression	7.7±9.4	9.8±10.4	2.1 (−1.4-5.8)	0.242
Anxiety	4.9±7.2	6.5±7.2	1.5 (−1.1-4.2)	0.257
Stress	8.8±10.0	11.8±10.5	2.9 (−0.8-6.8)	0.126
Self-efficacy	36.4±4.9	34.6±6.2	−1.8 (−3.8-0.2)	0.078
Personality domains				
Extraversion	3.4±0.7	3.6±0.6	0.1 (−0.0-0.4)	0.198
Agreeableness	4.2±0.6	4.0±0.6	−0.1 (−0.4-0.0)	0.098
Conscientiousness	4.3±0.6	4.0±0.6	−0.2 (−0.4-0.0)	0.064
Neuroticism	2.3±0.7	2.5±0.9	0.1 (−0.1-0.4)	0.444
Openness	3.4±0.7	2.8±0.6	−0.5 (−0.7−−0.2)	0.000
OHIP-EDENT at 1 and 3 months				
QOL at 1 month	27.7±19.8	29.5±19.5	1.8 (−5.4-9.1)	0.621
QOL at 3 months	3.3±6.4	23.6±20.4	20.3 (14.3-26.3)	0.000

SD: Standard deviation, CI: Confidence interval, QOL: Quality of life, OHIP-EDENT: Oral health impact profile in edentulous adult questionnaire

Table 5: Comparison of the technical quality of denture at baseline and patient satisfaction with denture between experimental and control groups

	Technical quality of denture at baseline			
Variables	Satisfactory denture quality, *n* (%)	Unsatisfactory denture quality, *n* (%)	χ^2	P
Experimental group (*n*=66)	65 (98.5)	1 (1.5)	0.039	0.678
Control group (*n*=50)	49 (98)	1 (2)		
	Patient satisfaction with denture			
Variables	Good denture satisfaction	Poor denture satisfaction	χ^2	P
Experimental group (*n*=66)	53	13	23.58	<0.001
Control group (*n*=50)	17	33		

Table 6: Description of patient satisfaction with denture scores and odds ratio analysis in experimental and control groups

	Mean (SD)			
Experimental group (*n*=66)		Control group (*n*=50)		
Poor denture satisfaction, *n* (%)	Good denture satisfaction, *n* (%)	Poor denture satisfaction, *n* (%)	Good denture satisfaction, *n* (%)	
13 (19.6)	53 (80.4)	33 (66)	17 (34)	
Intervention	Satisfaction			
	++	-	Total	
+	53	13	66	
−	17	33	50	
Total	70	46	116	
	Estimate	Lower	Upper	
Odd based parameters				
Odds ratio	7.914	3.4069	18.3839	
MLE odds	7.7466	3.3783	18.5689	
Ratio: Fischer exact		3.1611	20.1257	
Risk-based parameters				
Risk ratio	2.3619	1.5765	3.5385	
Risk difference	46.303	30.0403	62.5658	

SD: Standard deviation

Table 7: Comparison between experimental and control groups on oral health-related quality of life at baseline, 1 month, and 3 months

	Mean±SD		Mean difference (95% CI)	F-ratio	P
	Experimental group (*n*=66)	Control group (*n*=50)			
OHIP-before denture	27.6±19.8	29.5±19.5	1.8 (−5.4–9.1)	0.246	0.621
OHIP-1 month after denture	5.8±8.2	26.9±18.0	21.0 (15.5–26.5)	70.106	0.000
OHIP-3 months after denture	3.3±6.4	23.6±20.4	20.3 (14.3–26.3)	57.940	0.000

SD: Standard deviation, OHIP: Oral health impact profile, CI: Confidence interval

saturation of themes was obtained. The mixed-mode method for evaluation helped us to know valuable perspectives of patients and postgraduates which could not have been identified on doing quantitative evaluation alone. The qualitative

Table 8: Association of patient's denture satisfaction and oral health-related quality of life at 3 months with psychological factors of patients, dentist's communication skills, and technical quality of denture in both experimental and control groups

Variables	Patient denture satisfaction scores			
	Experimental group (*n*=66)		Control group (*n*=50)	
	Correlation coefficient	*P*	Correlation coefficient	*P*
Psychological factors				
Depression	−0.174	0.162	−0.190	0.185
Anxiety	−0.140	0.262	−0.187	0.194
Stress	−0.167	0.180	−0.261	0.067
Self-efficacy	0.368	0.002*	−0.113	0.435
Personality domains				
Extraversion	0.006	0.961	0.087	0.547
Agreeableness	0.012	0.921	0.201	0.162
Conscientiousness	0.156	0.210	0.170	0.238
Neuroticism	−0.166	0.183	−0.170	0.237
Openness	−0.003	0.978	−0.040	0.784
Dentist communication skills				
Patient rated dentist communication skills (ABIM)	0.652	0.000*	0.577	0.000*
Expert rated dentist communication skills (Kalamazoo)	0.093	0.456	0.110	0.447
Technical quality of denture				
Expert rated denture quality (FAD)	0.151	0.227	−0.176	0.221
Variables	Oral health-related quality of life scores			
	Experimental group (*n*=66)		Control group (*n*=50)	
	Correlation coefficient	*P*	Correlation coefficient	*P*
Psychological factors				
Depression	0.147	0.240	0.228	0.111
Anxiety	0.120	0.339	0.137	0.342
Stress	0.113	0.366	0.097	0.504
Self-efficacy	−0.222	0.073	−0.226	0.115
Personality domains				
Extraversion	−0.051	0.683	0.061	0.676
Agreeableness	−0.087	0.486	−0.173	0.230
Conscientiousness	−0.243	0.049*	−0.239	0.094
Neuroticism	0.215	0.083	0.186	0.196
Openness	0.256	0.256	−0.111	0.444
Dentist communication skills				
Patient rated communication skills (ABIM)	−0.249	0.043*	−0.321	0.023*
Expert rated communication skills (Kalamazoo)	0.010	0.939	−0.154	0.287
Technical quality of denture				
Expert rated denture quality (FAD)	0.064	0.608	0.167	0.246

FAD: Functional assessment of denture, ABIM: American Board of Internal Medicine. *Significance-*P*<0.05

evaluation is useful for validating the quantitative section of the questionnaires and for identifying improvements.[16]

Both the groups were similar in socioeconomic characteristics, OHRQoL before denture, technical quality of dentures, and psychological factors. Both the groups were similar in personality traits also except for the openness domain in the experimental group. This domain is associated with differences in intellectual curiosity, esthetic sensitivity, imagination, and creative outcomes and has been found to have little and weaker effects on health outcomes,[17] so it is very unlikely that it would have influenced our result.

In the experimental group, patient satisfaction was more when compared to poor satisfaction in the control group. This could be attributed to communication skills training (intervention) as other factors were similar at baseline. In our study, patient satisfaction was associated with dentist communication skills as rated by the patient, i.e., better communication skills of the dentist, better the satisfaction with the denture. Patients have been found to exaggerate in satisfaction and a satisfied patient rates the dentures as the best without any criticism, and if dissatisfied, rates the dentures as worse than deserved. Better outcomes related to satisfaction have been found in patients who feel positively about their dentist's communication.[18,19]

It was found that experimental group patients had eight times more chances of reporting satisfaction. This matched with postintervention video recordings of doctor–patient interactions and exit interviews, in which the experimental group was more satisfied with dentures and the overall treatment. This strengthens the importance of discipline-specific training and the incorporation of qualitative parameters in any study. The

Table 9: Predictors of high patient satisfaction with dentures and good oral health-related quality of life among patients after 3 months of receiving dentures

Predictors of high patient satisfaction with dentures					
Variables	OR (95% CI)	*P*	*B*	SE	Wald
Psychological factors					
Reference-low stress		0.293			2.455
Moderate stress	3.44 (0.53-22.38)	0.195	1.236	0.955	1.676
Severe stress	1.76 (0.22-13.92)	0.592	0.565	1.055	0.287
Reference-low self-efficacy					
High self-efficacy	0.72 (0.27-1.95)	0.521	-0.325	0.506	0.412
Dentist communication skills					
Reference-poor patient satisfaction with dentist communication skills (ABIM)					
Good patient satisfaction with dentist communication skills (ABIM)	0.08 (0.03-0.21)	0.000	-2.548	0.491	26.902
Technical quality of denture					
Reference-poor expert rated denture quality (FAD)					
Good expert rated denture quality (FAD)	0.64 (0.02-22.61)	0.807	-0.443	1.817	0.060
Constant	1.90	0.526	0.644	1.016	0.401
Predictors of good oral health-related quality of life					
Variables	OR (95% CI)	*P*	*B*	SE	Wald
Psychological factors					
Reference-low self-efficacy					
High self-efficacy	1.98 (0.73-5.37)	0.178	0.684	0.508	1.812
Personality domains					
Reference-conscientiousness –low					
Conscientiousness – high	2.22 (0.75-6.56)	0.147	0.800	0.552	2.099
Reference-neuroticism –low		0.208			3.138
Neuroticism – average	0.77 (0.17-3.49)	0.736	−0.259	0.769	0.114
Neuroticism – high	1.87 (0.43-8.22)	0.407	0.627	0.755	0.688
Communication skills					
Reference-poor patient satisfaction with dentist communication skills (ABIM)					
Good patient satisfaction with dentist communication skills (ABIM)	0.66 (0.20-2.15)	0.486	−0.421	0.604	0.485
Reference-poor patient satisfaction with dentures (SCDRQ)					
Good patient satisfaction with dentures (SCDRQ)	6.80 (2.09-22.15)	0.001	1.917	0.603	10.111
Technical quality of denture					
Reference- poor expert rated denture quality (FAD)					
Good expert rated denture quality (FAD)	0.00 (0.00)	0.999	−20.127	26329.546	0.000
Constant	0.12	0.010	−2.162	0.841	6.618

Model fit: $P=0.000$, $R^2=0.431$. OR: Odds ratio, FAD: Functional assessment of denture, ABIM: American Board of Internal Medicine, CI: Confidence interval, SE: Standard error

incorporation of qualitative parameters helps in targeting improvements in patient care in aspects considered important by them.[20]

Patient satisfaction was associated with the psychological domain of self-efficacy. Early identification and providing patient support for enhancing self-efficacy can reduce/prevent loss of treatment adherence, improve patient's motivation, compliance with instructions, and follow-up during treatment. In the present study, during pretraining, patients used to avoid follow-up and discontinued wearing dentures, whereas posttraining, patients felt free to approach the dentist in case of difficulties postinsertion. This is similar to previous studies on preventing decayed teeth in children, periodontal disease, and dental anxiety.[21]

In our study, there was a significant improvement in the OHRQOL of the patients at 3 months than at 1 month. A similar observation has been made in a previous study, wherein improvement in OHRQoL was observed in complete denture patients from baseline to 1st- and 3rd-month postdenture insertion.[22] This finding is contrary to the study by Subramanian *et al.* that an increase in the denture-wearing duration decreased the satisfaction of the patients.[23] OHRQOL at 3 months was found to be associated with dentist communication skills. This can be attributed to overall care by treating postgraduates which were appreciated by patients during their exit interviews such as understanding need or agenda, clearing doubts, regular follow-up, motivation, and ensuring compliance, etc., It has been found that information to the patient if communicated effectively, decreases anxiety and complaints, improves satisfaction, and increases chances of them following advice.[24]

OHRQOL at 3 months was associated with the personality trait of conscientiousness. Low conscientiousness patients are less affected by their edentulous state, unlikely to undergo treatment, indifferent, and less compliant.

Table 10: Patient interviews: Preintervention thematic analysis obtained from transcripts of interview

Codes/themes	Statements
Preintervention thematic analysis	
Dejected	"I do not want to wear the dentures and do not want to come for corrections"
Lost hopes	"I had lost hopes with denture treatment because of my ill-fitting and loose dentures"
Blaming doctor	"This denture is good enough to be worn by a doll;" "my daughter in law was telling-is it for this denture that you went so many times"
Lost interest in dentures	"I do want to come for treatment further" (Despite the family's insistence patient refuses to come)
High expectations	Multiple follow-ups and Guides doctor: "All is fine but I have a problem in one corner; you can reduce the thickness here"
Post-intervention thematic analysis	
Satisfied/self-confident/self-convinced/acknowledgment of doctors efforts	The patient seems to be satisfied and positive with the denture and explains to the doctor "it will get adjusted in another one week like the previous denture. Even the previous denture pained in for one week"
	The patient tells "I have to get used to dentures. The doctor did well and the best possible treatment." She feels upset that others having denture did not have any problem, then why she is having problems; maybe for everyone, it's not the same
Taking self-ownership of problems	The patient feels that his looks have improved; does not have any complaint with the dentist; feels that he has a sunken cheek and thus dentures need not be blamed
Faith	The patient says–"All said that good work will be done here so he had faith before coming for treatment". He has faith that if something goes wrong it will be corrected
Rapport	Building association with religion (linguistic prejudice)-patient enquires about the doctor's name and other details about religion; asks more about religion (bible) and tells that he also has read some chapters; offers a gift to the doctor; asks the doctor to call for her marriage
Better overall health (improvement in diabetes)	The patient talks about the difference between eating with natural teeth and artificial teeth. He says he feels his diabetes has improved since one of his friends had told him to chew slowly and eat. That friend's diabetes had reduced when he started chewing
Closeness, considering as family, sharing problems	When asked questions about satisfaction with the dentist, the patient tells the treating doctor that they are trying to get words out of my mouth and asking about you. The patient talks about the doctor (appreciates her). He says he considers her like his daughter; tells her that speaking well is very important
Inviting home	Patient's calls doctor for lunch, for daughters marriage
Getting gifts and referrals	The patient gets farm products, watch for the doctor

High conscientious patients are more likely to undertake treatment; however, they are more exacting in assessing results with treatment. A similar finding was observed in orthodontics on patients with malocclusion.[25]

In the present study, it was found that patients who are satisfied with the communication skills of the dentist have more chances for denture satisfaction. This could be because the postgraduates were trained in procedure-specific (complete denture treatment) communication skills. This strengthens the finding that providing information to patients can correct misconceptions regarding the treatment and also increases a sense of predictability during the procedure.[26]

In the present study, it was found that those patients who were satisfied with their dentures were prone to good OHRQoL after 3 months of receiving dentures. This reaffirms that patient's involvement in treatment (e.g., tooth selection and try-in approval) and satisfaction with their denture contributes to their satisfaction.[27]

In the present study, the postgraduates wanted to continue getting feedback on the skills learned. Thus, the continuation of feedback with postintervention video recording and Pro-prep sessions helped them to practice newly learned skills. Literature reveals that communication skills need a continuous application and follow-up as it weakens with time. These skills are more effectively acquired if the learners get an opportunity to practice and receive feedback on their performance.[28]

The improvement in communication skills was assessed using a questionnaire (ABIM scale), video recording (Kalamazoo scale), and exit interviews with the patients. It was found that patients appreciated the postgraduates in all of these. Students trained in communication skills were rated higher than the untrained students in all aspects of communication, doctor–patient relationship, and in recapitulating patients' statements.[29,30]

The present study evaluated both satisfaction and quality of life for obtaining a broad view of the factors influencing complete denture treatment. Both of these are two distinct outcomes. While satisfaction is associated directly with the therapy, the quality of life is associated with the influence of therapy on patients' health.[31] The factors influencing both are also different. While the satisfaction ratings vary with patient preferences, expectations, and the quality of the information given by the health-care provider, OHRQoL does not have the same effect as it is not directly oriented toward treatment modalities. Since both the patient-reported outcomes deal with direct quantification of patients' opinions on

different aspects of the treatment; therefore, a highly positive association exists between them. Therefore, comparing studies using patients' ratings of satisfaction or OHRQoL alone may become difficult. Unlike our study, these two have been used separately for evaluating the treatment effectiveness.[32]

The quality of the complete dentures was evaluated by two prosthodontists who were blinded. Interrater reliability of the FAD questionnaire was verified by the kappa score, which was 0.85. The K-value of 0.67–0.99 for interrater agreement indicated substantial reproducibility to almost perfect reproducibility. Our study did not find any association between patient satisfaction and OHRQOL at 3 months with the technical quality of the denture. This does not indicate that adherence to careful clinical technique is not important. Rather, it implies that patient satisfaction is not based only on the technical quality of the dentures but other factors as documented in previous studies.[27]

This study is a pioneering effort in the field of prosthodontic postgraduate teaching in the Indian context to the best of our knowledge. It is a "Discipline-Based Education Research" attempted within the existing curriculum prescribed by the Dental Council of India.

The strength of the present study is need-based evaluation in the baseline phase, in-depth evaluation of psychological factors, intraoperative assessment of doctor–patient communication, discipline-specific communication skills training, customization of training for prosthodontic postgraduates, 360° evaluation of the effect of training, video-based follow-up sessions (PrO-PReP), a mixed-mode method for evaluation, and incorporation of role of important aspects together.

The limitations of the present study are a small group of postgraduates, time-consuming analysis of the multiple and voluminous video-recordings (around 900 recordings), and the psychological dimensions of postgraduates were not evaluated. This small number permitted us to focus on each postgraduate and closely monitor their progress to give individualized feedback on their newly learned skills and gained insights. To counterbalance the small cohort of caregivers, a large number of care-receivers were included both pre and postintervention. This permitted us for quantitative data collection and analysis. However, though this method is labor intensive and time consuming, it is do-able for the postgraduates, who are just a handful. Its effectiveness in increasing patient satisfaction by several folds (7.9 times in this study) makes it worthwhile.

Future directions for the present study can be undertaking a similar study on a larger cohort of undergraduate or postgraduate students, psychological evaluation of postgraduates, further assessment of patients positive for depression, anxiety, stress for any disorder, long-term evaluation of dissatisfied patients, and follow-up of postgraduates in their workplace to see for continuation or decay of skill.

CONCLUSION

The present study concluded that self-efficacy and conscientiousness domain of personality, satisfaction with dentist communication skills, and satisfaction with dentures contribute to predicting satisfaction and OHRQOL with complete dentures. Furthermore, effective need-based training in communication skills and 360° evaluation of the treatment done by the postgraduates contributed significantly to complete denture patient satisfaction and OHRQOL. Before starting the treatment, knowledge about the patient's psychological status and personality can help the dentist to assess the patient's psychological state for taking up and continuing the treatment and also in alignment of communication skill strategies to suit each patient and thus obtain satisfaction with the treatment and the dentist.

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