

**Impact of Retro-molar pad carving on complete denture wearers satisfaction and quality of life: a cross-over, double-blind clinical trial.**

**Statistics**

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### **Statistical analysis:**

The SPSS computer software (IBM SPSS Statistics v21.0; IBM Corp., USA) was utilized for the statistical analysis of the collected data in this study. The significance of the conducted statistical results was considered at two tailed  $\alpha$  of .05. Normal distribution of the data was tested utilizing the Shapiro-Wilk test and the skewness test considering skewness z-score threshold values range from -3.29 to +3.29. All the continuous variables were not normally distributed, except for age and OHIP scores before treatment. Descriptive statistics for normally distributed continuous variables (age and OHIP scores before treatment) included the mean, standard error, standard deviation, median, maximum value, minimum value, and confidence intervals. Meanwhile, descriptive statistics for the non-normally distributed continuous variables included the mean, standard deviation, median, interquartile range, minimum value, and maximum value. Categorical variables in this study (presence of redness, erosion, keratosis, ulceration, and denture fissuratum) were presented as frequencies and percentages.

The Wilcoxon Signed Ranks test was used to test paired differences in satisfaction ratings, dentist's evaluations, and OHIP-EDENT scores after using carved and non-carved lower dentures. The Mann Whitney U test was utilized to identify differences in satisfaction ratings, dentist's evaluations, and OHIP-EDENT scores between genders. Spearman's Rho rank correlations were used to identify the correlations between satisfaction ratings, dentist's evaluations, and OHIP-EDENT scores. Associations between identification of lesions following denture use (presence of redness, erosion, keratosis, ulceration, and denture fissuratum) and having the retromolar pad area of the lower denture carved or not were tested via Fisher's Exact test.

The multiple linear regression analysis was used to identify the contribution of having the retromolar pad area carved or not, satisfaction ratings, and dentist evaluation towards the prediction of OHIP-EDENT scores considering the confounding effects of gender and age.

The calculated sample size was 46 participants. A priori power analysis based on linear multiple regression test (G\*Power, version 3.1.9.7; Heinrich-Heine University) calculated the minimum sample size to be 46 participants. The calculation considered a significance level ( $\alpha$ ) of .05, a statistic power ( $1 - \beta$ ) of 0.8, and an effect size of 0.3. Extra participants were recruited to balance for participant drop outs and secure the required minimum sample size. Fifty participants were recruited for the study, and none of participants was lost during the investigation (drop out ratio was 0%). Therefore, 50 participants were finally recruited and completed the study, and had their data collected and analyzed.

## Results

The data was collected from a total of 49 participants (23 females and 27 males), and was then processed and analyzed. Participants age ranged from 40 to 78 years old (mean age= 62.8 years old, SD= 8.01, SE= 1.145, median= 63.0, 95% CI= 60.51 – 65.12).

Table 1 demonstrates the descriptive statistics for continuous variables in this study including dentist evaluations of dentures, patients' satisfaction with dentures, and OHIP-EDENT scores among the participants of this study. Paired comparisons of carved and non-carved lower dentures showed that patient satisfaction with retention at function ( $P= .002$ ) and comfort during the use of carved lower dentures ( $P= .026$ ) were significantly higher than non-carved lower dentures (Table 1). Furthermore, the patients demonstrated a tendency to be more satisfied with denture retention at rest as well as during eating when used carved lower dentures in comparison to non-carved ones. This difference was not significant but was close to be significant ( $P= .052$ ,

Table 1). In addition, carved lower dentures were associated with lower OHIP scores (better impacts on oral health) than the non-carved lower dentures; however, the difference was not significant ( $P= .055$ , Table 1). Nevertheless, this tendency was confirmed by the Mann Whitney U test as a significant difference was found in the OHIP scores between carved and non-carved lower dentures ( $MWU= 887.0$ ,  $Z= -2.241$ ,  $P= .025$ ). The carved lower dentures were associated with lower OHIP scores indicating better impacts on oral health than the non-carved dentures.

Table 2 presents the distribution (frequencies and percentages) of redness, erosion, keratosis, ulceration, and denture fissuratum following the use of the tested complete denture designs during this study. Redness was the most observed mucosal change, 18.4% with non-carved dentures and 12.2% with carved dentures. No significant differences in mucosal changes were observed between carved and non-carved lower dentures ( $P> .05$ , Table 2).

The results showed that the dentists assigned better ratings for upper dentures in comparison to non-carved lower dentures regarding to denture retention ( $P= .004$ ) as well as denture support ( $P= .011$ ) (Table 3). In addition, patients assigned significantly lower pain scores for upper dentures than non-carved lower dentures ( $P= .008$ , Table 3). Also, patients reported higher satisfaction with upper dentures considering denture retention at rest ( $P= .035$ ), denture retention at function ( $P< .001$ ), and comfort during denture use ( $P< .001$ ) in comparison to non-carved lower dentures (Table 3). In contrast, no significant differences between upper dentures and lower carved dentures regarding any dentist ratings or patient satisfaction for any evaluated factor ( $P> .05$  Table 3).

Gender base variations showed that females were assigned higher dentist ratings for retention of non-carved lower dentures ( $P= .031$ ), stability of lower non-carved dentures ( $P= .003$ ), support of lower non-carved dentures ( $P= .014$ ), esthetics of lower carved ( $P= .007$ ) and

non-carved dentures ( $P= .001$ ), stability of upper denture ( $P= .035$ ), and esthetics of upper denture ( $P= .004$ ) (Table 4). Also, females reported more pain with lower carved dentures in comparison to males ( $P= .015$ , Table 4). In addition, females assigned higher satisfaction ratings regarding retention during function of lower non-carved denture ( $P= .015$ ), comfort of lower non-carved denture ( $P= .007$ ), retention at rest for upper denture ( $P= .007$ ), retention at function for upper denture ( $P= .002$ ), comfort of upper denture ( $P= .001$ ), and retention during eating with upper denture and lower non-carved denture ( $P= .045$ ) (Table 4).

Table 5 presents correlations between age, patient satisfaction, and OHIP scores. The results show that older patients were more comfortable with upper dentures than younger patients (Spearman Rho= 0.309,  $P= .031$ , Table 5). Also, higher pain scores were associated with higher OHIP scores (i.e. worse impacts) after using carved ( $P= .001$ ) and non-carved ( $P< .001$ ) lower dentures (Table 5). In addition, lower OHIP scores (i.e. better impacts) were associated with higher satisfaction with retention at rest, retention at function, denture comfort, general satisfaction with dentures, retention during eating, and retention during speaking after using carved or non-carved lower dentures ( $P< .05$ , Table 5). Besides, correlations between age and dentist rating of dentures showed that older participants were found to have better dentist ratings of retention (Sperman Rho= 0.402,  $P= .004$ ) and higher stability (Spearman Rho= 0.402,  $P= .003$ ) of upper dentures than younger participants.

A multiple linear regression analysis was used to identify the contribution of having the retromolar pad area carved or not, satisfaction ratings, and dentist evaluation of dentures towards the prediction of OHIP scores considering the confounding effects of gender and age (Table 6). Being a female, having lower dentist ratings of denture esthetics, and having more pain due to lower dentures were associated with higher scores of OHIP indicating worse oral health impacts

of the prosthesis ( $P < .05$ , Table 6). Being a female was associated with an increase of OHIP scores by 4 units ( $P = .007$ ). Also, for each decreased unit of dentist ratings of denture esthetics, the OHIP scores were increased by 2 units ( $P = .018$ ). Furthermore, for each increased unit of pain levels due to lower dentures, the OHIP scores were increased by 0.7 units ( $P = .020$ ) (Table 6).

Further multiple linear regression analyses were conducted to identify the contribution of having the retromolar pad area carved or not and dentist evaluation of dentures towards the prediction of patient satisfaction with different denture aspects considering the confounding effects of gender and age (Table 7). The results showed that carved lower dentures were associated with 1.144 times higher satisfaction with lower denture retention during function ( $P = .040$ , Table 7). **Dr Samiha please note that Being carved or not was significant predictor for retention of the denture during function.**

Besides, patients satisfaction with lower denture retention at rest was decreased by 0.053 unit for each year increase in the age ( $P = .027$ , Table 7). Also, being a female was associated with higher patient satisfaction with lower denture retention at rest ( $B = 0.970$ ,  $P = .033$ ), lower denture retention at function ( $B = 1.404$ ,  $P = .027$ ), lower denture comfort ( $B = 1.374$ ,  $P = .007$ ), general satisfaction with upper and lower dentures ( $B = 1.361$ ,  $P = .002$ ), and retention of upper and lower dentures during eating ( $B = 0.978$ ,  $P = .036$ ) (Table 7).

In addition, higher levels of perceived pain due to lower dentures were associated with lower levels of satisfaction with lower denture retention at rest ( $B = -0.184$ ,  $P = .032$ ), lower denture retention at function ( $B = -0.365$ ,  $P = .002$ ), lower denture comfort ( $B = -0.440$ ,  $P < .001$ ), general satisfaction with upper and lower dentures ( $B = -0.254$ ,  $P = .002$ ), retention of upper and lower dentures during eating ( $B = -0.320$ ,  $P < .001$ ), and retention of upper and lower dentures during

speaking ( $B = -0.235$ ,  $P = .005$ ) (Table 7). Furthermore, higher dentist ratings of lower denture stability (**Dr Samiha please note for the discussion that this could be explained by that stability is related to each of retention, support and occlusion**) was associated with higher patient satisfaction with lower denture retention at rest ( $B = 0.527$ ,  $P = .037$ ), lower denture retention at function ( $B = 0.958$ ,  $P = .005$ ), and lower denture comfort ( $B = 0.723$ ,  $P = .011$ ) (Table 7).

## Tables

**Table 1.** Descriptive statistics for continuous variables including dentist evaluations of dentures, patients' satisfaction with dentures, and OHIP-EDENT scores among the participants of this study (N= 50).

Variable	Descriptive statistics						Paired comparisons of NCLD and CLD		
	Mean	SD	Med	Min	Max	IQR	Z	P	
<b>Dentist evaluation of dentures</b>									
Retention of NCLD	8.02	1.882	8.5	2.0	10.0	2.8	-1.357	.175	
Retention of CLD	8.34	2.011	8.5	2.0	10.0	1.8			
Stability of NCLD	8.36	1.454	8.5	2.0	10.0	1.5	-1.906	.057	
Stability of CLD	8.63	1.642	9.0	1.0	10.0	1.0			
Support of NCLD	8.78	1.295	9.0	2.0	10.0	1.0	-1.053	.292	
Support of CLD	9.05	0.694	9.0	7.0	10.0	1.0			
Esthetic of NCLD	8.87	0.846	9.0	6.5	10.0	1.0	-.223	.824	
Esthetic of CLD	8.90	0.878	9.0	6.0	10.0	1.0			
Retention of upper denture	8.89	1.217	9.0	5.5	10.0	1.5			
Stability of upper denture	8.66	1.192	8.5	4.5	10.0	1.5			
Support of upper denture	9.21	0.707	9.5	7.0	10.0	1.3			
Esthetic of upper denture	8.90	0.835	9.0	7.0	10.0	1.0			
<b>Patient satisfaction with dentures</b>									
Pain due to NCLD	2.08	2.745	0.0	0.0	10.0	4.0	-1.901	.057	
Pain due to CLD	1.20	2.336	0.0	0.0	8.0	1.0			
Retention at rest of NCLD	8.06	2.313	9.0	2.0	10.0	3.0	-1.943	.052	
Retention at rest of CLD	8.67	2.025	9.0	0.0	10.0	2.0			
Retention at function of NCLD	6.33	3.085	7.0	0.0	10.0	5.0	-3.054	.002	
Retention at function of CLD	7.59	2.684	8.0	0.0	10.0	3.5			
Comfort of NCLD	7.18	2.796	8.0	0.0	10.0	4.0	-2.225	.026	
Comfort of CLD	8.00	2.415	9.0	0.0	10.0	3.0			
Insertion of NCLD	9.92	1.891	10.0	2.0	20.0	0	-.071	.943	
Insertion of CLD	9.84	0.514	10.0	8.0	11.0	0			
Pain due to upper denture	0.67	2.115	0.0	0.0	10.0	0			
Retention at rest for upper denture	8.84	1.724	9.0	2.0	10.0	1.0			
Retention at function for upper denture	8.41	1.848	9.0	3.0	10.0	3.0			
Comfort for upper denture	8.74	1.765	9.0	2.0	10.0	2.0			
Insertion for upper denture	9.80	0.456	10.0	8.0	10.0	0			
General satisfaction with upper and non carved lower dentures	7.88	2.304	9.0	0.0	10.0	2.8			
General satisfaction with upper and carved lower dentures	8.37	1.551	9.0	4.0	10.0	2.0			
Retention during eating with upper and non carved lower dentures	7.25	2.260	8.0	1.0	10.0	3.0	-1.944	.052	
Retention during eating with upper and	7.98	1.953	8.0	0.0	10.0	2.5			

carved lower dentures								
Smile and appearance of upper and non carved lower dentures	9.61	0.885	10.0	6.0	10.0	0.5	-.283	.777
Smile and appearance of upper and carved lower dentures	9.65	0.694	10.0	7.0	10.0	0.5		
Retention during speaking with upper and non carved lower dentures	9.14	1.414	10.0	3.0	10.0	1.0	-.662	.508
Retention during speaking with upper and carved lower dentures	9.10	2.400	10.0	0.0	20.0	2.0		
<b>OHIP scores</b>								
OHIP scores before dentures	22.59	10.82	20.0	4.0	48.0	17.0		
OHIP scores after using NCLD	11.12	7.793	9.0	2.0	39.0	8.0	-1.916	.055
OHIP scores after using CLD	8.45	6.433	6.0	0.0	31.0	7.5		

NCLD= Non-carved lower denture, CLD= Carved lower denture, OHIP= Oral Health Impact Profile – 14, SD= Standard deviation, Med= Median, Min= Minimum value, Max= Maximum value, IQR= Interquartile range, Z= Z statistic using Wilcoxon signed ranks test, P= Two-tailed probability value.

**Table 2.** Distribution of redness, erosion, keratosis, ulceration, and denture fissuratum following the use of the tested complete denture designs in this study (N= 50).

Variables	Non-carved lower denture				Carved lower denture				Comparison between carved and non-carved dentures	
	No		Yes		No		Yes			
	Fre	%	Fre	%	Fre	%	Fre	%	Z	P
Redness	40	81.6	9	18.4	43	87.8	6	12.2	-0.837	.402
Keratosis	49	100.0	0	0	49	100.0	0	0	0	1.00
Erosion	48	98.0	1	2.0	47	95.9	2	4.1	-0.583	.560
Ulceration	48	98.0	1	2.0	49	100.0	0	0	-1.000	.317
Denture Fissuratum	49	100.0	0	0	49	100.0	0	0	0	1.00

Fre= Frequency, % = Percentage. Z= Z statistic using Wilcoxon signed ranks test, P= Two-tailed probability value.

Table 3. Paired comparisons of dentist and patient denture ratings between upper complete dentures and each tested design of lower dentures in this study (N= 50).

Compared pairs	Z	P
<b>Dentist evaluation of dentures</b>		
Retention of NCLD versus upper denture	-2.887	.004
Retention of CLD versus upper denture	-1.506	.132
Stability of NCLD versus upper denture	-1.343	.179
Stability of CLD versus upper denture	-.854	.393
Support of NCLD versus upper denture	-2.558	.011
Support of CLD versus upper denture	-1.165	.244
Esthetic of NCLD versus upper denture	-0.019	.985
Esthetic of CLD versus upper denture	-0.153	.879
<b>Patient satisfaction with dentures</b>		
Pain due to NCLD versus upper denture	-2.653	.008
Pain due to CLD versus upper denture	-1.178	.239
Retention at rest of NCLD versus upper denture	-2.104	.035
Retention at rest of CLD versus upper denture	-0.285	.775
Retention at function of NCLD versus upper denture	-4.149	.000
Retention at function of CLD versus upper denture	-1.831	.067
Comfort of NCLD versus upper denture	-3.546	.000
Comfort of CLD versus upper denture	-1.700	.089
Insertion of NCLD versus upper denture	-0.688	.491
Insertion of CLD versus upper denture	-0.500	.617

NCLD= Non-carved lower denture, CLD= Carved lower denture, Z= Z statistic using Wilcoxon signed ranks test, P= Two-tailed probability value.

Table 4. Gender based differences of dentist ratings of the dentures, patient satisfaction with dentures, and OHIP scores among the study sample (N= 50).

Variable	Male		Female		Gender difference		
	Mean	SD	Mean	SD	MWU	Z	P
Age	61.07	6.821	64.95	8.968	204.0	-1.873	.061
<b>Dentist evaluation of dentures</b>							
Retention of NCLD	7.48	2.040	8.68	1.452	191.0	-2.153	.031
Retention of CLD	7.85	2.437	8.93	1.105	228.5	-1.401	.161
Stability of NCLD	7.83	1.647	9.00	0.831	153.5	-2.931	.003
Stability of CLD	8.33	1.896	9.00	1.205	213.0	-1.721	.085
Support of NCLD	8.43	1.517	9.21	0.797	176.5	-2.466	.014
Support of CLD	9.02	0.628	9.09	0.781	267.5	-.611	.541
Esthetic of NCLD	8.56	0.738	9.25	0.827	133.5	-3.370	.001
Esthetic of CLD	8.65	0.806	9.21	0.882	166.5	-2.691	.007
Retention of upper denture	8.63	1.276	9.21	1.087	209.0	-1.808	.071
Stability of upper denture	8.32	1.360	9.09	0.781	194.0	-2.107	.035
Support of upper denture	9.17	0.785	9.27	0.612	283.5	-.279	.780
Esthetic of upper denture	8.63	0.715	9.23	0.869	157.5	-2.861	.004
<b>Patient satisfaction with dentures</b>							
Pain due to NCLD	2.22	3.068	1.91	2.348	290.0	-.151	.880
Pain due to CLD	0.70	1.918	1.82	2.684	198.5	-2.428	.015
Pain due to upper denture	0.30	0.912	1.14	2.965	285.0	-.424	.672
Retention at rest of NCLD	7.33	2.801	8.96	0.999	207.0	-1.860	.063
Retention at rest of CLD	8.52	1.949	8.86	2.145	257.5	-.841	.400
Retention at function of NCLD	5.33	3.234	7.55	2.444	177.0	-2.430	.015
Retention at function of CLD	7.22	2.778	8.05	2.554	231.0	-1.353	.176
Comfort of NCLD	6.22	3.017	8.36	1.989	165.5	-2.682	.007
Comfort of CLD	7.82	2.419	8.23	2.448	255.0	-.871	.384
Insertion of NCLD	9.56	1.577	10.36	2.172	266.5	-1.008	.313
Insertion of CLD	9.82	0.623	9.86	0.351	294.0	-.094	.925
Retention at rest for upper denture	8.26	2.087	9.55	0.671	172.0	-2.687	.007
Retention at function for upper denture	7.67	2.019	9.32	1.086	150.5	-3.074	.002
Comfort for upper denture	8.00	2.057	9.64	0.581	148.0	-3.210	.001
Insertion for upper denture	9.70	0.542	9.91	0.294	246.0	-1.525	.127
General satisfaction with upper and non carved lower dentures	7.26	2.768	8.64	1.246	222.0	-1.536	.125
General satisfaction with upper and carved lower dentures	8.00	1.776	8.82	1.097	225.0	-1.491	.136
Retention during eating with upper and non carved lower dentures	6.59	2.576	8.05	1.495	198.5	-2.008	.045
Retention during eating with upper and carved lower dentures	8.07	1.639	7.86	2.316	295.0	-.041	.967
Smile and appearance of upper and	9.56	0.892	9.68	0.894	263.5	-.897	.370

non carved lower dentures							
Smile and appearance of upper and carved lower dentures	9.56	0.698	9.77	0.685	240.0	-1.524	.127
Retention during speaking with upper and non carved lower dentures	8.96	1.698	9.36	0.954	264.0	-.734	.463
Retention during speaking with upper and carved lower dentures	8.89	1.368	9.36	3.274	246.5	-1.097	.273
<b>OHIP scores</b>							
OHIP scores before dentures	23.04	9.469	22.05	12.492	268.0	-.584	.559
OHIP scores after using NCLD	11.07	6.644	11.18	9.174	266.5	-.616	.538
OHIP scores after using CLD	7.78	4.925	9.27	7.953	294.5	-.051	.959

NCLD= Non-carved lower denture, CLD= Carved lower denture, OHIP= Oral Health Impact Profile – 14, SD= Standard deviation, MWU= Mann Whitney U test statistic, Z= Z statistic, P= Two-tailed probability value.

Table 5. Correlations between age, patient satisfaction, and OHIP scores among the study population (N= 50).

Variable	Statistics	Age	OHIP after NCLD	OHIP after CLD
Age	Rho	1.000	-.226	.047
	P	-	.119	.746
Pain due to NCLD	Rho	-.076	.554	.183
	P	.605	<.001	.208
Pain due to CLD	Rho	.269	.205	.467
	P	.061	.158	.001
Pain due to upper denture	Rho	-.182	.166	-.214
	P	.212	.254	.139
Retention at rest of NCLD	Rho	-.079	-.367	.017
	P	.591	.010	.910
Retention at rest of CLD	Rho	-.243	-.175	-.414
	P	.093	.228	.003
Retention at function of NCLD	Rho	.162	-.480	-.164
	P	.266	<.001	.261
Retention at function of CLD	Rho	-.162	-.164	-.511
	P	.267	.261	<.001
Comfort of NCLD	Rho	.175	-.518	-.214
	P	.230	<.001	.141
Comfort of CLD	Rho	-.214	-.223	-.643
	P	.141	.123	<.001
Insertion of NCLD	Rho	-.012	-.344	-.162
	P	.934	.016	.266
Insertion of CLD	Rho	-.194	-.365	-.248
	P	.181	.010	.086
Retention at rest for upper denture	Rho	.199	-.346	-.192
	P	.170	.015	.187
Retention at function for upper denture	Rho	.229	-.271	-.288
	P	.113	.059	.045
Comfort for upper denture	Rho	.309	-.339	-.188
	P	<b>.031</b>	.017	.196
Insertion for upper denture	Rho	.050	-.341	-.310
	P	.731	.016	.030
General satisfaction with upper and non carved lower dentures	Rho	.041	-.481	-.052
	P	.778	<.001	.721
General satisfaction with upper and carved lower dentures	Rho	.058	-.316	-.491
	P	.695	.027	<.001
Retention during eating with upper and non carved lower dentures	Rho	.260	-.582	-.032
	P	.072	<.001	.828
Retention during eating with upper and carved lower dentures	Rho	-.069	-.320	-.459
	P	.639	.025	.001
Smile and appearance of upper and	Rho	-.102	-.290	-.196

non carved lower dentures	P	.484	.043	.177
Smile and appearance of upper and carved lower dentures	Rho	.181	-.359	-.207
	P	.213	.011	.153
Retention during speaking with upper and non carved lower dentures	Rho	.066	-.435	-.145
	P	.655	.002	.321
Retention during speaking with upper and carved lower dentures	Rho	-.016	-.276	-.505
	P	.911	.055	<.001
OHIP score before treatment	Rho	-.104	.253	-.052
	P	.479	.079	.722

NCLD= Non-carved lower denture, CLD= Carved lower denture, OHIP= Oral Health Impact Profile – 14, Rho= Spearman correlation coefficient, P= Two tailed probability value.

**Table 6.** Linear regression analyses to predict OHIP scores after treatment utilizing the demographic variables, having the lower denture carved or not, dentist ratings of lower dentures, and patient satisfaction with dentures among the study sample (n= 50).

Dependent variable	Predictors*	Unst Co		St Co	t	P	95% CI for B	
		B	SE	Beta			Lower Bound	Upper Bound
OHIP scores after treatment R <sup>2</sup> = .468 DW = 1.837	Constant	63.274	13.648	---	4.636	<.001	36.118	90.430
	Gender	4.063	1.465	.281	2.774	.007	1.149	6.977
	Age	-.132	.080	-.146	-1.645	.104	-.292	.028
	Carved denture or not	-1.324	1.222	-.092	-1.084	.282	-3.755	1.107
	Dentist rated lower denture retention	.314	.507	.084	.619	.538	-.695	1.323
	Dentist rated lower denture stability	-.704	.793	-.151	-.888	.377	-2.282	.873
	Dentist rated lower denture support	.477	.833	.069	.572	.569	-1.182	2.135
	Dentist rated lower denture esthetics	-2.070	.860	-.245	-2.408	.018	-3.780	-.359
	Perceived pain due to lower denture	.711	.299	.253	2.374	.020	.115	1.306
	Patient satisfaction with lower denture retention at rest	-.213	.473	-.064	-.451	.653	-1.154	.727
	Patient satisfaction with lower denture retention at function	-.281	.400	-.115	-.704	.484	-1.077	.514
	Patient satisfaction with lower denture Comfort	.090	.522	.033	.173	.863	-.948	1.128
	Patient satisfaction with easiness of lower denture insertion	-.359	.473	-.068	-.758	.450	-1.300	.583
	Patient general satisfaction with upper and lower dentures	-.244	.518	-.066	-.471	.639	-1.275	.787
	Patient satisfaction with retention of upper and lower dentures during eating	-.207	.504	-.061	-.411	.682	-1.211	.796
	Patient satisfaction with smile and appearance of upper and lower dentures	-1.720	.888	-.188	-1.937	.056	-3.488	.047
	Patient satisfaction with retention of upper and lower dentures during speaking	-.653	.366	-.177	-1.787	.078	-1.381	.074

R<sup>2</sup>= Coefficient of determination, DW= Durbin Watson statistic, Unst Co= Unstandardized coefficient, St Co= Standardized coefficient, B= Beta statistics, SE= Standard Error, t= t statistics, P= Two tailed probability value, CI= Confidence intervals. \*Gender, age, having the lower denture carved or not, and dentist ratings of lower dentures, and patient satisfaction with dentures were entered in the regression model.

**Table 7.** Linear regression analyses to predict patient satisfaction with different denture aspects utilizing the demographic variables, having the lower denture carved or not, and dentist ratings of lower dentures among the study sample (n= 50).

Dependent variable	Predictors*	Unst Co		St Co	t	P	95% CI for B	
		B	SE	Beta			Lower Bound	Upper Bound
Patient satisfaction with lower denture retention at rest R <sup>2</sup> = .295 DW=2.000	Constant	6.768	3.155	---	2.145	.035	.499	13.038
	Gender	.970	.449	.222	2.163	<b>.033</b>	.079	1.862
	Age	-.058	.026	-.211	-2.242	<b>.027</b>	-.109	-.007
	Carved denture or not	.338	.395	.078	.856	.394	-.447	1.124
	Dentist rated lower denture retention	-.170	.164	-.151	-1.035	.303	-.495	.156
	Dentist rated lower denture stability	.527	.249	.373	2.114	<b>.037</b>	.032	1.022
	Dentist rated lower denture support	.080	.264	.038	.301	.764	-.446	.605
	Dentist rated lower denture esthetics	-.021	.273	-.008	-.075	.940	-.564	.523
	Perceived pain due to lower denture	-.184	.084	-.216	-2.184	<b>.032</b>	-.351	-.017
Patient satisfaction with lower denture retention at function R <sup>2</sup> = .309 DW=1.728	Constant	4.512	4.410	---	1.023	.309	-4.249	13.273
	Gender	1.404	.624	.238	2.251	<b>.027</b>	.165	2.643
	Age	-.031	.036	-.084	-.864	.390	-.103	.041
	Carved denture or not	1.144	.549	.195	2.085	<b>.040</b>	.054	2.235
	Dentist rated lower denture retention	-.266	.229	-.175	-1.158	.250	-.722	.190
	Dentist rated lower denture stability	.958	.335	.504	2.858	<b>.005</b>	.292	1.623
	Dentist rated lower denture support	-.166	.371	-.059	-.446	.657	-.904	.572
	Dentist rated lower denture esthetics	-.431	.382	-.125	-1.128	.262	-1.189	.328
	Perceived pain due to lower denture	-.365	.112	-.319	-3.251	<b>.002</b>	-.588	-.142
Patient satisfaction with lower denture comfort R <sup>2</sup> = .394 DW=2.100	Constant	6.926	3.523	---	1.966	.052	-.075	13.927
	Gender	1.374	.501	.261	2.743	<b>.007</b>	.378	2.369
	Age	-.037	.029	-.112	-1.290	.200	-.094	.020
	Carved denture or not	.412	.441	.079	.934	.353	-.465	1.289
	Dentist rated lower denture retention	-.275	.183	-.203	-1.502	.137	-.638	.089
	Dentist rated lower denture stability	.723	.278	.426	2.600	<b>.011</b>	.171	1.276
	Dentist rated lower denture support	-.345	.295	-.137	-1.168	.246	-.931	.242

<p>Patient satisfaction with easiness of lower denture insertion R<sup>2</sup>= .121 DW=1.973</p>	Dentist rated lower denture esthetics	.032	.305	.010	.104	.917	-.575	.639
	Perceived pain due to lower denture	-.440	.094	-.430	-4.682	<.001	-.626	-.253
	Constant	10.809	2.225	---	4.858	<.001	6.388	15.229
	Gender	.498	.316	.181	1.574	.119	-.130	1.126
	Age	-.011	.018	-.065	-.619	.538	-.047	.025
	Carved denture or not	-.072	.279	-.026	-.259	.796	-.626	.481
	Dentist rated lower denture retention	-.146	.115	-.206	-1.265	.209	-.376	.083
	Dentist rated lower denture stability	.198	.176	.222	1.125	.264	-.151	.547
	Dentist rated lower denture support	-.393	.186	-.297	-2.109	.038	-.764	-.023
	Dentist rated lower denture esthetics	.263	.193	.164	1.365	.176	-.120	.646
<p>Patient general satisfaction with upper and lower dentures R<sup>2</sup>= .228 DW=2.247</p>	Perceived pain due to lower denture	-.094	.059	-.176	-1.589	.116	-.212	.024
	Constant	7.778	2.976	---	2.614	.011	1.865	13.692
	Gender	1.361	.423	.346	3.216	.002	.520	2.201
	Age	-.018	.024	-.075	-.759	.450	-.067	.030
	Carved denture or not	.323	.373	.082	.867	.388	-.417	1.064
	Dentist rated lower denture retention	-.261	.154	-.258	-1.693	.094	-.568	.045
	Dentist rated lower denture stability	.216	.235	.170	.919	.361	-.251	.683
	Dentist rated lower denture support	-.133	.249	-.070	-.533	.596	-.628	.363
	Dentist rated lower denture esthetics	.107	.258	.047	.415	.679	-.405	.620
<p>Patient satisfaction with retention of upper and lower dentures during eating R<sup>2</sup>= .223 DW=1.917</p>	Perceived pain due to lower denture	-.254	.079	-.332	-3.207	.002	-.412	-.097
	Constant	8.189	3.235	---	2.531	.013	1.761	14.617
	Gender	.978	.460	.229	2.126	.036	.064	1.891
	Age	-.013	.026	-.047	-.477	.634	-.065	.040
	Carved denture or not	.454	.405	.107	1.121	.265	-.351	1.259
	Dentist rated lower denture retention	-.166	.168	-.151	-.987	.326	-.499	.168
	Dentist rated lower denture stability	.101	.255	.074	.397	.693	-.406	.609
	Dentist rated lower denture support	.111	.271	.054	.410	.683	-.427	.650
	Dentist rated lower denture esthetics	-.209	.280	-.084	-.745	.458	-.766	.348
	Perceived pain due to lower denture	-.320	.086	-.386	-3.713	<.001	-.491	-.149

	denture							
Patient satisfaction with smile and appearance of upper and lower dentures R <sup>2</sup> = .092 DW=1.959	Constant	9.960	1.298	---	7.676	<.001	7.382	12.539
	Gender	.235	.184	.149	1.275	.206	-.131	.602
	Age	-.009	.011	-.091	-.856	.394	-.030	.012
	Carved denture or not	.014	.163	.009	.088	.930	-.309	.337
	Dentist rated lower denture retention	-.085	.067	-.209	-1.264	.210	-.219	.049
	Dentist rated lower denture stability	.078	.102	.153	.761	.449	-.126	.282
	Dentist rated lower denture support	-.112	.109	-.147	-1.027	.307	-.328	.104
	Dentist rated lower denture esthetics	.115	.112	.124	1.021	.310	-.109	.338
	Perceived pain due to lower denture	-.067	.035	-.219	-1.952	.054	-.136	.001
	Constant	12.767	3.044	---	4.194	<.001	6.718	18.816
Patient satisfaction with retention of upper and lower dentures during speaking R <sup>2</sup> = .185 DW=2.367	Gender	.702	.433	.179	1.623	.108	-.158	1.562
	Age	-.019	.025	-.076	-.754	.453	-.068	.031
	Carved denture or not	-.280	.381	-.072	-.735	.464	-1.038	.477
	Dentist rated lower denture retention	-.009	.158	-.009	-.055	.957	-.323	.305
	Dentist rated lower denture stability	.254	.240	.201	1.056	.294	-.224	.731
	Dentist rated lower denture support	-.074	.255	-.039	-.290	.773	-.581	.433
	Dentist rated lower denture esthetics	-.462	.264	-.202	-1.752	.083	-.986	.062
	Perceived pain due to lower denture	-.235	.081	-.309	-2.903	<b>.005</b>	-.397	-.074
	Constant	12.767	3.044	---	4.194	<.001	6.718	18.816
	Gender	.702	.433	.179	1.623	.108	-.158	1.562

R<sup>2</sup>= Coefficient of determination, DW= Durbin Watson statistic, Unst Co= Unstandardized coefficient, St Co= Standardized coefficient, B= Beta statistics, SE= Standard Error, t= t statistics, P= Two tailed probability value, CI= Confidence intervals. \*Gender, age, having the lower denture carved or not, and dentist ratings of lower dentures were entered in the regression model.