ORIGINAL RESEARCH

Assessment of Changes in Oral Health-related Quality of Life and Nutritional Status of Edentulous Patients before and after Insertion of Complete Dentures

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Abstract

Purpose: The present study was designed to assess changes in oral health-related quality of life (OHRQoL) and nutritional status (NS) of edentulous patients before and after the insertion of complete dentures in a dental school in India.

Materials and methods: A longitudinal observational study was carried out among 100 patients. A face-to-face interview was conducted for eligible participants, and the questionnaires—geriatric oral health assessment index (GOHAI) and oral health impact profile-14 (OHIP-14) were administered to determine the OHRQoL of patients. A mini nutritional assessment-short form (MNA-SF) was used to assess the NS. The questionnaires were filled 1 week before denture insertion to 1, 3, and 6 months postinsertion. The data obtained were subjected to statistical analysis.

Results: A great improvement in OHRQoL and NS of edentulous patients was observed after the insertion of complete dentures. The overall mean OHIP score before treatment was 3.35 + 0.32, and it decreased to 0.17 ± 0.02 at 6 months after treatment ($p = 0.001$). The overall mean GOHAI score increased from 1.53 ± 0.14 before treatment to 2.46 ± 0.08 after 6 months ($p = 0.001$). The mean MNA score significantly increased from 0.69 + 0.26 to 2.28 ± 0.10 after 6 months of wearing complete dentures ($p = 0.001$).

Conclusion: Low NS is a key indicator associated with poor OHRQoL among completely edentulous patients. In the present study, a great improvement in OHRQoL and NS of denture wearers was evident postinsertion from the mean OHIP, GOHAI, and MNA scores.

Keywords: Complete denture, Edentulous, Nutritional status, Oral health-related quality of life.

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Introduction

Health has recently been identified as a worldwide social goal.[1] "Nutrition" is one of the chief components of health, functional independence, and QoL of the geriatric population.[2] The process of aging is characterized by a physiological decline in food intake, which makes the geriatric population vulnerable to compromised nutritional health.[2] Edentulousness is another clinical consequence often encountered in the elderly population.[3] Owing to edentulousness, nutrition intake is severely affected, which causes an impact on both generals as well as OHRQoL. Hence, nutrition deserves special attention as an individual reaches old age.[4]

In 1995, World Health Organization characterized "quality of life" as "a composite measure of physical, mental, and social well-being as perceived by an individual or by a group of individuals."[5] OHRQoL is a rapidly growing phenomenon that has emerged over the past two decades.[6] OHRQoL is a complex phenomenon that is associated with various functional, psychological, and social factors and experiences of pain or discomfort.[7] Frequently used questionnaires used for the assessment of OHRQoL are OHIP,[8] Oral impacts on daily performance,[9] and GOHAI.[10] MNA-SF is a generally utilized instrument to evaluate the nourishing status of the elderly in light of its unwavering quality of recognizing nutritional risks, intervention, and follow-up all through treatment.[11,12]

It has been observed that the mean GOHAI, MNA scores, NS, and OHRQoL are strongly correlated to each other.[13] However, there is a scarcity of data regarding the impact of wearing complete dentures on OHRQoL and NS of edentulous patients in India. Therefore, the present study will help to monitor the satisfaction amongst edentulous patients wearing complete dentures and to find the relationship between OHRQoL and NS of edentulous patients wearing complete dentures.

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Materials and Methods

The longitudinal study was conducted in Manav Rachna Dental College, Faridabad, Haryana, over a duration of 9 months, starting from October 2020 to June 2021. Prior to the start of the study, ethical approval was obtained from the Institutional Ethical Review Board, Manav Rachna Dental College, Faridabad, Haryana.

All patients reporting to the outpatient department of prosthodontics during the abovementioned period were screened for the eligibility criteria, which are as follows:

Inclusion Criteria

- Patients were reported to the department of prosthodontics for prosthodontic rehabilitation through complete dentures.
- Patients willing to participate in the study and who had signed the informed consent.

Exclusion Criteria

- Patients with implant-supported dentures.
- Patients with a history of any temporomandibular or psychosomatic disorder.
- Patients who were not available for a duration of 6 months (required for follow-up of the study).
- Patients who could not understand and comprehend the questionnaire.

Initially, 128 patients were recruited for the study, but a final sample of 100 participants was obtained in accordance with the inclusion and exclusion criteria of the study (Fig. 1). After checking for eligibility, the purpose of the survey was explained to the eligible participants. Each participant was made to read and sign the consent form in Hindi/ English language.

The complete denture was fabricated using conventional techniques with minor case-based modifications. All the dentures were processed in the same laboratory using the compression molding technique with standard laboratory procedures.

Permission was taken to use the validated English version of GOHAI,[10] OHIP-14,[6] and Hindi version of GOHAI,[11] and OHIP[14] questionnaires from the respective authors before the commencement of the study for the implementation of the survey; a face-to-face interview was conducted for eligible participants. The filling of the survey form commenced with the patient being asked two global questions regarding their OH. The questionnaires-GOHAI[10] and OHIP[6] were administered to determine the OHRQoL of patients and MNA-SF[12] to assess their NS. The questionnaires were filled-from 1 week before denture insertion to 1, 3, and 6 months after postinsertion.

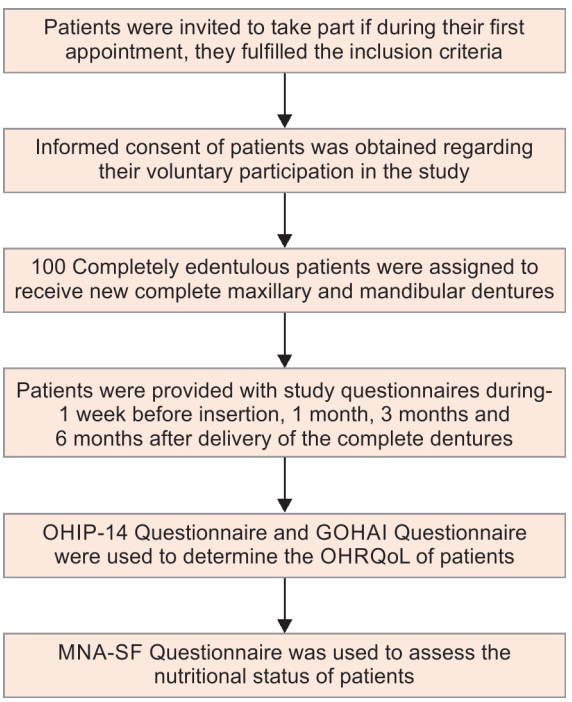

Fig. 1 Flow diagram of the study

The GOHAI questionnaire[10] measures patient-reported oral functional problems along with the psychosocial impact associated with oral disease. This questionnaire contains 12 items relating to three fields: (1) The functional field, which includes physical functions like eating, speaking, and swallowing, (2) The psychosocial field, which includes concern about OH, social discomfort, dissatisfaction with appearance, and (3) Pain or discomfort field which involves usage of medications and discomfort when chewing certain foods.[10] The 12th question pertaining to dental sensitivity was not considered in the present study since the patients were completely edentulous. A three-point Likert scale was used for the assessment of GOHAI. The response set in the present study was: always, very often, and often = 1; sometimes, seldom = 2; and never = 3. The GOHAI scores were calculated at four intervals, that is, 1 week before insertion and after 1, 3, and 6 months postinsertion, with a higher score indicating better self-reported OH.

The OHIP-14 questionnaire[6] includes seven dimensions with 14 items to evaluate the QoL of the patients. This questionnaire measures an individual's perception of the social impact of oral disorders on their well-being. Subjects were asked if they had experienced any of the problems mentioned in the questionnaire. The responses were rated on a five-point Likert scale of never to very often. The responses were registered, with a score of 4 for a problem that always exists, a score of 3 for "in most cases," a score of 2 for "sometimes," a score of 1 for "seldom," and a score of 0 for "never." As a result, the overall score ranged between 0 and 56, and the OHRQoL would decrease with a higher OHIP-14 score.

The MNA-SF questionnaire[13] helps to identify elderly patients who were malnourished or at risk of malnutrition. This questionnaire assesses NS and also incorporates queries pertaining to other geriatric concerns such as food intake, weight loss, mobility, acute disease or psychological stress, depression, and cognitive impairment. The screening was completed by filling in the boxes in the questionnaire with appropriate numbers as per the patient's response at four intervals, that is, 1-week preinsertion and 1, 3, and 6 months postinsertion, respectively. The total MNA score was calculated by summing the ordinal values for the six questions in the MNA questionnaire at the designated time intervals.

The data obtained from the survey was arranged systematically, and the collected information was compiled in an excel sheet for the purpose of statistical analysis, which was performed using Statistical Package for the Social Sciences version 26.0. Descriptive statistics were performed by calculating the mean and standard deviation (SD) for the continuous variables. Nominal categorical data between the groups were compared using the Chi-square goodness-of-fit test. Mean values at different time intervals were compared using paired *t*-test. Comparisons between OHIP-14, GOHAI, and MNA scores according to age and gender were made using a student's *t*-test. The *p*-value was considered significant when <0.05 and a confidence interval of 95% was taken.

Results

The mean age of the study population was 62.86 ± 6.29 years, with a minimum age of 42 years and a maximum age of 77 years. The study population comprised 34% ($n = 34$) of individuals below the age of

60 years, while 66% ($n = 66$) were above 60 years of age. The study population had 68% ($n = 68$) males and only 32% ($n = 32$) females.

The study population was asked two questions pertaining to self-perceived OH. They described the health of teeth/mouth, with the majority, that is, 63% ($n = 63$), answering fair, and 32% ($n = 32$) answering poorly. Only 5% ($n = 5$) had good OH. When asked if their health of the mouth has improved or deteriorated or remained the same over the past 6 months, 62% ($n = 62$) answered improvement, and 36% ($n = 36$) answered it to be the same. Only 2% ($n = 2$) believed, it got worse.

There was an overall decrease in mean OHIP scores among all the domains as compared to pretreatment. Also, the OHIP scores further decreased from 1 to 3 months and then at 6 months, implying an improvement in OH impact posttreatment. The overall mean OHIP score before starting the treatment was 3.35 ± 0.32. At 1 month posttreatment, it decreased to 0.21 ± 0.02, which further improved and decreased to 0.17 ± 0.02 at 6 months after treatment. There was a significant percentage change in OHIP scores posttreatment as compared to before treatment, and all the domains exhibited >30% change in OHIP within 1 month posttreatment. This change further increased to 69–92% after 6 months among different OHIP domains, and the difference was found to be statistically significant ($p = 0.001$) for all the domains (Table 1).

The mean GOHAI scores of the study population were assessed before starting the treatment and then posttreatment at an interval of 1, 3, and 6 months. There was an overall improvement in mean GOHAI scores among all the domains as compared to pretreatment. Also, the GOHAI scores further improved from 1 to 3 months and then at 6 months, implying an improvement in geriatric OH posttreatment.

The overall mean GOHAI score before starting the treatment was 1.53 ± 0.14. At 1 month posttreatment, it improved to 1.98 ± 0.08, which further improved and decreased to 2.30 ± 0.15 at 3 months after treatment and 2.46 ± 0.08 after 6 months posttreatment. There was a significant percentage change in GOHAI scores posttreatment as compared to before treatment. All the domains exhibited >30% change in GOHAI within 1 month posttreatment. This change further increased to 188.5% after 6 months among different GOHAI domains except swallowing comfortably, which showed a marginal change of 25.3%. However, the difference was found to be statistically significant ($p = 0.001$) for all the domains (Table 2).

The mean MNA scores improved from pretreatment to posttreatment. The mean MNA score before treatment was 0.69 ± 0.26, which significantly increased to 1.80 ± 0.24 after 1 month of wearing a denture. This further improved to 2.21 ± 0.15 after 3 months and 2.28 ± 0.10 after 6 months of wearing a denture. The mean body mass index (BMI) increased from a mean value of 1.00 before starting treatment to 2.28 after 6 months. There was a significant change in all questions of MNA after treatment was given to the study subjects ($p = 0.001$). There was a 265% change in food intake of the individuals after 1 month, and this significantly improved to almost 387% increase after 6 months. The BMI also improved from 102% after 1 month to 181% increase after 6 months of treatment (Table 3).

The mean OHIP, GOHAI, and MNA scores were compared among the two age-groups, that is, <60 and >60 years. There was no significant difference ($p = 0.001$) between the two age-groups for any of the indices recorded. The mean GOHAI values were the same for both age-groups. The mean OHIP, GOHIAI, and MNA scores were compared among males and females. There was no significant difference between the two genders for any of the indices recorded. The mean GOHAI values were almost similar for both males (2.46) and females (2.47) (Table 4).

The overall mean OHIP score before starting the treatment was 3.35 ± 0.32. At 1 month posttreatment, it decreased to 0.21 ± 0.02, which further improved and decreased to 0.17 ± 0.02 at 6 months after treatment. The overall mean GOHAI score before starting the treatment was 1.53 ± 0.14. At 1 month posttreatment, it improved to 1.98 ± 0.08, which further improved and decreased

Table 1: Mean OHIP-14 scores and % change among the study population at different time intervals

	Pre		*1 month*		*3 months*		*6 months*		*% change*		
OHIP-14	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	*1 month*	*3 months*	*6 months*
1. Trouble pronouncing words	3.22	0.88	2.13	0.51	1.04	0.35	0.33	0.47	33.8	67.7	89.7
2. Worsen taste	3.17	1.19	2.23	0.66	1.37	0.56	0.98	0.49	29.7	56.8	69.1
3. Painful aching in mouth	3.24	0.91	2.19	0.42	1.13	0.64	0.67	0.47	32.4	65.1	79.3
4. Uncomfortable to eat	3.80	0.40	2.16	0.37	1.12	0.56	0.68	0.47	43.2	70.5	82.1
5. Self-conscious	3.65	0.59	2.54	0.52	1.50	0.63	1.11	0.83	30.4	58.9	69.6
6. Felt tense	3.75	0.48	2.23	0.47	1.05	0.50	0.63	0.48	40.5	72	83.2
7. Diet unsatisfactory	3.79	0.64	2.03	0.26	1.06	0.66	0.77	0.82	46.4	72.03	79.7
8. Interrupt meals	3.71	0.46	2.21	0.41	1.01	0.67	0.68	0.55	40.4	72.8	81.7
9. Difficult to relax	3.68	0.47	1.82	0.50	0.63	0.56	0.48	0.50	50.5	82.9	86.9
10. Embarrassed	3.76	0.43	1.89	0.35	0.78	0.63	0.48	0.59	49.7	79.3	87.2
11. Irritable to others	3.69	0.49	2.09	0.55	0.93	0.62	0.49	0.56	43.4	74.8	86.7
12. Difficulty doing usual jobs	3.27	1.00	1.94	0.60	0.70	0.59	0.37	0.48	40.7	78.6	88.7
13. Felt life less satisfying	3.62	0.75	1.82	0.61	0.55	0.61	0.33	0.58	49.7	84.8	90.9
14. Totally unable to function	2.67	1.16	1.39	0.82	0.37	0.58	0.21	0.54	47.9	86.1	92.1
Mean OHIP	3.35	0.32	0.21	0.02	0.21	0.02	0.17	0.02	Statistically significant change at $p < 0.001$		

to 2.30 ± 0.15 at 3 months after treatment and 2.46 ± 0.08 after 6 months posttreatment. The mean MNA score before treatment was 0.69 ± 0.26, which significantly increased ($p = 0.001$) to 2.28 ± 0.10 after 6 months of wearing complete dentures.

Oral health-related quality of life (OHRQoL) before denture insertion was associated with a nutritional deficit, thereby emphasizing the need for greater integration between dentistry and nutrition is required to promote the health of older adults.

There was a great improvement in OHRQoL and NS of denture wearers postinsertion as observed from mean OHIP, GOHAI, and MNA-SF scores. A strong association was found between mean GOHAI, OHIP-14, and MNA scores and, thereby, NS and OHRQoL.

Discussion

Complete edentulism has a significant concern and leads to reduced QoL along with impact on general health. However, it has been observed that due to wider and advanced OH services globally, the edentulism rate is declining every decade. Studies have shown that elderly edentulous patients depict an improved overall OHRQoL after complete denture therapy.[15,16]

There is very limited literature available in India regarding OH and NS among denture patients after the insertion of maxillary and mandibular dentures. It has been found that among denture wearers, there is a great impact on food choice and on the intake of key nutrients, causing various nutritional problems. A study conducted by Singh et al.[17] showed that edentulous patients with no or only one prosthesis (upper or lower) experience more difficulty in chewing solid food, placing them at a greater risk of malnutrition.

In the present study, there was a decrease in mean OHIP scores among all the domains as compared to pretreatment scores. Also, the OHIP scores further decreased from 1 to 3 months and then at 6 months, suggesting an improvement in OHRQoL. Similar findings were reported by Veyrune et al.,[18] who also observed that patients with the lowest initial GOHAI score derived the greatest benefit from the placement of new dentures, thereby emphasizing that the decision to fabricate dentures should take into consideration the QoL and subject's perceived needs, along with a clinical evaluation. The mean OHIP scores tend to increase with advancing age.[15,16] Similar findings were observed in our study, where patients over 60 years of age had greater OHIP scores as compared to patients below 60 years of age.

In the present study, there was an overall improvement in mean GOHAI scores among all the domains as compared to pretreatment scores. Also, the GOHAI scores further improved from 1 to 3 months and then at 6 months, implying an improvement in geriatric OH posttreatment. The highest mean GOHAI scores 1 month after denture insertion was for limiting contact with people because of the condition of teeth or dentures, eating without discomfort, being pleased or happy with the looks of teeth and gums or dentures, and use of medication to relieve pain or discomfort from around the mouth. This may be as they learn to accept the functional limitations of their dentures. There was a decrease in the mean GOHAI score for swallowing and eating food comfortably, which might be a result of the short follow-up period of the study since eating with dentures require practice and adaptation over time. There was a significant increase in the mean GOHAI scores 1 month after the placement of complete dentures.

A similar study conducted by Veyrune et al.[18] reported no difference in GOHAI scores 6 weeks after the placement of the new dentures and a significant increase in the GOHAI scores 12 weeks after placement. These results emphasize the importance of a follow-up of patients during the period of adaptation that is essential for the psychological and functional integration of the new prosthesis.[19]

The elderly population is vulnerable to malnutrition for multiple reasons, including physiological and functional changes that occur

Table 2: Mean GOHAI scores and % change among the study population

	Pre		*1 month*		*3 months*		*6 months*		*% change*		
GOHAI	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	*1 month*	*3 months*	*6 months*
Limitation of types/ amounts of food?	1.06	0.31	2.00	0.21	2.52	0.50	2.94	0.31	88.7	137.7	177.4
Trouble biting/chewing	1.07	0.33	1.89	0.31	2.15	0.36	2.96	0.19	76.6	100.9	176.6
Swallow comfortably	1.74	0.59	1.98	0.43	1.49	0.75	1.30	0.72	13.8	14.4	25.3
Difficulty in speaking	1.22	0.54	1.98	0.14	2.90	0.30	2.98	0.14	62.3	137.7	181.9
Eating without discomfort	3.00	0.00	2.02	0.14	1.22	0.42	1.00	0.00	32.7	59.3	66.7
Contact with people limited by oral condition?	1.11	0.31	2.05	0.29	2.98	0.14	3.00	0.00	84.7	168.4	170.2
Happy with looks?	3.00	0.00	2.00	0.00	1.19	0.39	1.00	0.00	33.3	60.3	66.7
Use of medication to relieve pain or discomfort?	1.40	0.69	2.00	0.00	2.60	0.49	3.00	0.00	42.8	85.7	114.3
Worries about problems with teeth or denture?	1.04	0.19	1.96	0.19	2.65	0.48	3.00	0.00	88.4	154.8	188.5
Feeling of nervousness or self-conscious due to dent problems?	1.08	0.39	1.96	0.19	2.65	0.48	3.00	0.00	81.5	143.0	177.8
Felt uncomfortable eating in front of other people?	1.12	0.48	1.96	0.19	2.90	0.30	2.96	0.28	75.0	158.9	164.2
Mean GOHAI	1.53	0.14	1.98	0.08	2.30	0.15	2.46	0.08	Statistically significant change at $p = 0.001$		

Table 3: Mean MNA scores and % change among the study population at different time intervals

	Pre		*1 month*		*3 months*		*6 months*		*%change*		
MNA	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	*1 month*	*3 months*	*6 months*
Decline in food intake	0.41	0.69	1.50	0.58	1.96	0.19	2.00	0.00	265.8	378.0	387.8
Weight loss	1.17	0.92	1.71	0.97	2.73	0.69	2.95	0.33	46.2	133.3	152.1
Mobility	0.98	0.14	1.99	0.10	2.00	0.00	2.00	0.00	103.1	104.1	104.1
Psychological stress or acute disease?	0.00	0.00	2.00	0.00	2.00	0.00	2.00	0.00	66.7	66.7	66.7
Neuropsychological problems	0.58	0.52	1.58	0.49	1.94	0.34	1.94	0.34	172.4	234.4	234.4
BMI	1.00	0.71	2.02	0.69	2.68	0.55	2.81	0.39	102.0	168.0	181.0
Mean MNA	0.69	0.26	1.80	0.24	2.21	0.15	2.28	0.10	Statistically significant change at $p = 0.001$		

Table 4: Mean change in scores after 6 months of insertion according to age and gender

		Mean OHIP		*Mean GOHAI*		*Mean MNA*	
Variables		*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
Age-group	<60 years	0.54	0.16	2.46	0.07	2.27	0.14
	>60 years	0.61	0.17	2.46	0.09	2.28	0.08
	p-value	0.700		0.821		0.985	
Gender	Males	0.60	0.17	2.46	0.08	2.27	0.12
	Females	0.55	0.16	2.47	0.08	2.29	0.07
	p-value	0.764		0.677		0.840	

with age.[16] Mostly nutritional intervention programs focus primarily on infants, young children, adolescents, and pregnant and lactating mothers, leaving behind the elderly. There is a pronounced impact of malnutrition on the elderly population since their general well-being, and personal satisfaction is affected, primarily owing to food choices due to the absence of teeth.[15]

The MNA-SF is a valid, reliable, and sensitive assessment tool to assess the NS and evaluate malnutrition risk in elderly patients.[20] Su et al.[21] conducted a study to determine if older adults wearing dentures have a greater risk of malnutrition. In this study, MNA-SF was used to assess their NS. The results showed that the use of partial dentures to meet the dietary needs of edentulous patients helps in maintaining a healthy NS. Surya et al.[22] conducted a quantitative research study to determine the effect of the use of complete dentures on NS in elderly patients. The results showed that the elderly complete denture wearers had a normal NS of 60%, while those who did not use complete dentures had a normal NS of 34.8%. The authors concluded that complete dentures improve the NS of elderly patients.

Pereira et al.[23] observed that approximately two-thirds of the evaluated elderly in the elderly homes of Salvador were either malnourished or at risk of developing malnutrition. El Hélou et al.,[24] reported a prevalence of 6.1% for malnutrition and 37.4% for the risk of malnutrition in the Lebanese population. Guigoz,[25] in a systematic review of studies, included 30,000 elderly patients from different countries worldwide, especially from Europe and the United States, and observed the proportion of malnutrition and risk of malnutrition as 23 and 46%, respectively.

The elderly at home possess a greater risk of health problems resulting due to their NS. Such evidence highlights the nutritional vulnerability of institutionalized elderly and stresses the significance of nutritional care required for this population since malnutrition in this group is associated with increased morbidity and dependence.[26]

Nutritional status (NS) was also found to be strongly associated with their OHRQoL as measured by the OHIP in the current study, which was similar to observations by Banerjee et al.,[15] Gil-Montoya et al.,[20] and Patel et al.[26] Rosli et al.[27] conducted a study in order to determine the association between OHRQoL and NS among older adults in Kuala Pilah district, Malaysia. The BMI of respondents was measured, and the validated Malay version of GOHAI was used to measure OHRQoL. It was observed that older adults with poor perception of their OH were more likely to have unsatisfactory BMI in comparison to those who perceived their OH to be good. Bailey et al.[28] assessed 210 individuals and reported that OH problems are related to an inadequate intake of nutrients. Hence, the prime consideration should be given to oral status, as it is a significant component of overall health.

The strengths of the study include detailed follow-up for 6 months after wearing complete dentures and comprehensive analysis of NS of patients along with its impact on OHRQoL.

The limitation of the study was that the previous history of denture usage was not taken into account. The sensitivity of GOHAI towards various demographic differences could not be assessed as well. Larger sample-sized multicentric studies could be required to build a comprehensive database for future policy decisions on NS and QoL of the elderly population.

Conclusion

There was a great improvement in OHRQoL and NS of denture wearers postinsertion, as evident from mean OHIP, GOHAI, and MNA scores. Low NS was associated with poor OHRQoL among the completely edentulous patients before denture insertion. A strong association was found between mean GOHAI, OHIP-14, and MNA scores and, thereby, NS and OHRQoL. There is a positive impact of complete dentures on the NS and OHRQoL of edentulous patients.

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