



# Does Nutritional Status Affects Oral Health Related Quality of Life Among Elderly? A Cross-Sectional Study at A Tertiary Care Health Centre, Rishikesh, India

Mahendra Singh<sup>1</sup>, Abhishek Sharma<sup>2</sup>, Sujal M Parkar<sup>3</sup>, Yogesh Arvind Bahurupi<sup>4</sup>, Pradeep Aggarwal<sup>5</sup>, Rohit Katre<sup>6</sup>

<sup>1,4,5,6</sup>All India Institute of Medical Sciences (AIIMS), Rishikesh, Uttarakhand, India

<sup>2</sup>RUHS College of Dental Sciences (Government Dental College and Hospital), Jaipur, Rajasthan, India

<sup>3</sup>Sidhpur Dental College and Hospital, Patan, Gujarat, India

## ABSTRACT

**Aim:** Present study was conducted to evaluate the impact of nutritional status on oral health related quality of life using Geriatric Oral Health Assessment Index (GOHAI) among geriatric population attending outpatient department (OPD) of tertiary health care centre in Rishikesh.

**Settings and Design:** Present cross-sectional study was conducted on geriatric male & female participants attending Outpatients Department (OPD) of tertiary care centre, RISHIKESH.

**Methods and Material:** Nutritional assessment was recorded by using Mini Nutritional Assessment (MNA) tool. Oral health related quality of life was assessed using pre-validated Hindi version of Geriatric Oral Health Assessment Index (GOHAI) questionnaire.

**Statistical analysis:** Kruskal-Wallis and Mann-Whitney U test were applied using SPSS 22.0 Software. Logistic regression analysis was done to find out risk factors.

**Results:** A total of 281 participants completed the questionnaire with mean age of  $66.89 \pm 6.43$  years. About three fourth (73%) of total participants were at risk of malnourishment. A statistically significant difference ( $P=0.005$ ) was observed when the median GOHAI scores were compared with nutritional status (MNA scores).

**Conclusions:** A statistically significant difference was found between nutritional status and geriatric oral health related quality of life (GOHAI). Nutritional status affects oral health related quality of life among elderly population.

**Keywords:** Nutrition, Oral health, Quality of life, Elderly

## INTRODUCTION

Ageing can be explained as continuous physiological process, which includes structural changes and impacts individual functional capacity. Globally, there is a demographic shift towards ageing population due to advances in medicine, reduced birth and mortality rates, and with increased life expectancy. As projected, population of oldest old >80 years of age will be

thrice in 2050 as compared to 2017 globally.<sup>1,2</sup> India has second largest population in the world and had about 10% of >65 years old population in 2011. Lives of these elderly people can be impacted by social, economic and health insecurity.<sup>3</sup>

Health has been regarded as absence of disease or free from suffering in past decades but in recent times this concept has been changed to quality of life

**How to cite this article:** Singh M, Sharma A, Parkar SM, Bahurupi YA, Aggarwal P, Katre R. Does Nutritional Status Affects Oral Health Related Quality of Life Among Elderly? A Cross-Sectional Study at A Tertiary Care Health Centre, Rishikesh, India. *Natl J Community Med* 2022;13(10):705-709. DOI: 10.55489/njcm.131020222306

**Financial Support:** None declared

**Conflict of Interest:** None declared

**Date of Submission:** 29-07-2022

**Date of Acceptance:** 14-09-2022

**Date of Publication:** 31-10-2022

**Correspondence:** Dr. Abhishek Sharma (E-mail: drabhi712@gmail.com)

**Copy Right:** The Authors retain the copyrights of this article, with first publication rights granted to Medsci Publications.

(QoL).<sup>4</sup> QoL is a multidimensional construct, and captures social, functional, psychological factors in addition with free from disease or discomfort. In line with this, idea of oral health related quality of life (OHRQoL) has been evolved, that estimates how oral health can impact an individual's overall health, daily activities and ultimately quality of life. Several instruments have been developed to assess OHRQoL.<sup>5-7</sup> Geriatric Oral Health Assessment Index (GOHAI) is one of widely used among elderly population worldwide. It has been developed and validated across various countries.<sup>8-11</sup> It records individuals self-reported oral health related functional problems.

Nutrition plays a very important role in preventing disease and thus restoring overall health of elderly individuals. Assessment of nutritional status among elderly can help clinicians in management of various acute and chronic diseases.<sup>12</sup> Various tools have been developed and validated to assess nutritional status, Mini Nutritional Assessment (MNA) is one among them is widely being used.<sup>13</sup> Previous studies have shown significant impact of malnutrition on oral health related quality of life among elderly population. There is an interrelationship between nutrition and oral health.<sup>14-16</sup>

Food choice is determined by oral health status among elderly, which in turn affects nutrient ingestion and ultimately resulting in nutritional deficiencies. Missing teeth, edentulism is common among elderly people. Many among them cannot afford prosthesis for missing teeth.<sup>17-18</sup> Relation between oral health and nutrition, can further impact oral health related quality of life among elderly. Therefore, present study was conducted to evaluate the impact of nutritional status on oral health related quality of life by using Geriatric Oral Health Assessment Index (GOHAI) among geriatric population attending Out-patient Department (OPD) of tertiary care health centre in city of Rishikesh.

## SUBJECTS AND METHODS

The cross-sectional questionnaire-based study was conducted at a tertiary care health centre in city of Rishikesh. The present study is part of the project entitled "Comprehensive Geriatric assessment of elderly patients attending tertiary care hospital, Rishikesh," approved by Research Cell Ethics Committee vide letter No. AIIMS/IEC/18/354.

**Sample Size:** Considering the prevalence of impaired activities of daily living (ADL) as 21%<sup>19</sup> at 95% confidence interval and allowing the 5% marginal error the sample size was determined to 265 by using the prevalence formula:  $n = Z^2 * p * q / L^2$ . Considering the non-response rate of 20%, total sample size for the study was taken as 320.

The participants were selected based on following inclusion and exclusion criteria:

**Inclusion criteria:** Both male and female participants having age of  $\geq 60$  years attending outpatients department of tertiary care centre.

**Exclusion criteria:** Those patients who did not give consent to participate were excluded from the study. Participants with serious medical problems and requiring emergency medical care were also excluded from the study

**Data Collection:** The participants were informed about the purpose and nature of the study and the consent was sought. The data related to demographic characteristics, co-morbid conditions, nutritional status and OHRQoL were collected. The demographic data like age, gender, marital status, education, and occupation were collected through personal interview. The co-morbid conditions were retrieved from medical file. Nutritional assessment was recorded using MNA tool, which was interpreted as Score  $<17$ : Malnourished, score 17–23.5: At risk of malnutrition, and score  $> 23.5$ : Well nourished.<sup>13</sup> Oral health related quality of life was assessed by using pre-validated Hindi version of GOHAI questionnaire.<sup>11</sup> We used 3-point GOHAI scale in present study but originally it was developed as a 6-point scale. As responses like always, very often and often can create confusion among elderly to tell, these responses were merged and pre-validated and translated 3 point-scale was used.

**Statistical Analysis:** After collection of data, the questionnaire of all 320 participants, were evaluated for its completeness. Incomplete questionnaires were not considered for further statistical analysis. Data were coded and entered in Micro soft Excel 2019. Descriptive statistics were determined, such as means and standard deviation (SD) for continuous variables and median, frequency and percentages for categorical variables. The GOHAI scores were dichotomized as score  $<25$  need for oral care and score  $>25$  do not need oral care.<sup>19</sup> The logistic regression analysis was performed stating, GOHAI score as dependent variable on categorical variables (age, sex, marital status, education, occupation, hypertension, diabetes and MNA). Backward stepwise method was used, with  $P=0.05$  and removal with  $P=0.10$  to select independent variables. Odd ratios with a 95% confidence interval (CI) of risk of GOHAI score were calculated. Goodness-of-fit was verified using the Hosmer-Lemeshow test. Statistical Package for Social Science (SPSS version 22.0) was used for statistical analysis. Level of significance was kept as  $P < 0.05$ .

## RESULTS

Out of 320 participants, 281 participants completed the questionnaire; hence, the results for 281 participants were presented. The demographic characteristic of the participants is shown in Table 1. The age of the participants was ranging from 60 to 87 years with mean age of  $66.89 \pm 6.43$  years.

Nearly equal number of male ( $n=136$ , 48.40%) and female ( $n=145$ , 51.60%) participated in the study. Majority of the participants (65.80%) were married and living with their spouse.

**Table 1: Demographic characteristic of study participants**

Variables	Participants (%)
<b>Age groups (in years)</b>	
60-69	186 (66.2)
70-79	76 (27)
>80	19 (6.8)
<b>Gender</b>	
Male	136 (48.4)
Female	145 (51.6)
<b>Marital Status</b>	
Married and spouse alive	185 (65.8)
Married and spouse dead	89 (31.7)
Unmarried	7 (2.5)
<b>Education</b>	
Illiterate	163 (58)
Primary	32 (11.4)
Upper Primary	33 (11.7)
Secondary	17 (6)
Higher Secondary	19 (6.8)
Graduate	12 (4.3)
Postgraduate	5 (1.8)
<b>Occupation</b>	
Agriculture	49 (17.4)
Labourers	33 (11.7)
Skilled Workers	16 (5.7)
Business	7 (2.5)
Service	11 (3.9)
Housewives	103 (36.7)
Retired	30 (10.7)
Unemployed	32 (11.4)

**Table 2: Nutritional status of study subjects**

MNA Nutritional Category <sup>25</sup>	Participants (%)
Normal (24 to 30 points)	74 (26.3)
At Risk (17 to 23.5 points)	170 (60.5)
Malnourished (Less than 17 points)	37 (13.2)

More than half of the participants (n=163, 58%) were illiterate having agriculture as main occupation. The common co-morbid conditions reported by the participants were hypertension, diabetes, and asthma. Out of 281, 170 (60.50%) participants were at risk regarding their MNA nutritional status (Table 2).

The responses and the mean  $\pm$  SD scores of each item of GOHAI are shown in Table 3. "Always" was the most common response given by the participants for all the three domains. There was a significant difference (P=0.005) when the median GOHAI scores were compared according to the MNA scores. A highly significant difference (P < 0.001) was observed when the median MNA scores were compared according to the GOHAI need for oral care and do not need oral care (Table 4).

Multiple logistic regression analysis for the association between total GOHAI score and risk factors is presented in Table 5. Occupation was found to be significant (P=0.05) risk factor with crude odds ratio of 1.71, 95% CI of 0.68-4.34. Malnourishment was also found associated significantly with GOHAI scores with crude OR 0.46 (95% CI = 0.22-0.96).

**Table 3: Distribution of response and characteristics of Geriatric Oral Health Assessment Index (GOHAI)**

Items	Always=1 (%)	Sometime=2 (%)	Never=3 (%)	Mean $\pm$ SD (Median)
<b>Functional limitations</b>				
Limit the kinds of food	152 (54.10)	89 (31.70)	40 (14.20)	1.60 $\pm$ 0.73(1.0)
Trouble in biting or chewing	110 (39.10)	83 (29.50)	88 (31.30)	1.92 $\pm$ 0.84(2.0)
Able to swallow comfortably	136 (48.40)	78 (27.80)	67 (23.80)	1.75 $\pm$ 0.81(2.0)
Unable to speak clearly	222 (79.0)	39 (13.90)	20 (7.10)	1.28 $\pm$ 0.59(1.0)
<b>Pain and discomfort</b>				
Able to eat without discomfort	129 (45.90)	82 (29.20)	70 (24.90)	1.79 $\pm$ 0.82(2.0)
Used medication to relive pain	170 (60.50)	105 (37.40)	6 (2.10)	1.42 $\pm$ 0.53(1.0)
Sensitive to hot, cold or sweet foods	168 (59.80)	63 (22.40)	50 (17.80)	1.58 $\pm$ 0.78(1.0)
<b>Psychosocial</b>				
Limit contact with people	252 (89.70)	21 (7.50)	8 (2.80)	1.13 $\pm$ 0.41(1.0)
Pleased with look of teeth	135 (48.0)	72 (25.60)	74 (26.30)	1.78 $\pm$ 0.84(2.0)
Worried about teeth, gums, or dentures	172 (61.20)	93 (33.10)	16 (5.70)	1.44 $\pm$ 0.60(1.0)
Self-conscious of teeth, gums, or dentures	171 (60.90)	93 (33.10)	17 (6.0)	1.45 $\pm$ 0.61(1.0)
Uncomfortable eating in front of others	215 (76.50)	58 (20.60)	8 (2.80)	1.26 $\pm$ 0.50(1.0)

**Table 4: Distribution of participants according to the various Geriatric Oral Health Assessment Index GOHAI and Mini Nutritional Assessment (MNA) categories**

Category	Mean $\pm$ SD	Median (IQ range)	P Value
<b>MNA</b>		<b>GOHAI Score</b>	
Normal (n=74)	19.95 $\pm$ 5.91	21.0 (9)	0.005* <sup>a</sup>
At risk (n=170)	18.16 $\pm$ 5.02	18.0 (8)	
Malnourished (n=37)	16.54 $\pm$ 4.68	17.0 (10)	
<b>GOHAI</b>		<b>MNA Score</b>	
Need oral care (GOHAI<25) (n=245)	20.82 $\pm$ 3.62	21.0 (5.50)	<0.01* <sup>b</sup>
Do not need oral care (GOHAI>25) (n=36)	22.92 $\pm$ 2.94	23.0 (4.50)	

<sup>a</sup>Kruskal Wallis test; <sup>b</sup>Mann Whitney U test, \*P<0.05 significant

**Table 5: Multiple logistic regression analysis for the association between total GOHAI score and risk (Sociodemographic) factors**

Variables	Crude OR	95% CI	P Value	Adjusted OR	95% CI	P Value
<b>Age</b>			0.94	-	-	-
70-79	0.93	0.38-2.25	0.87	-	-	-
>80	1.20	0.29-5.02	0.79	-	-	-
Sex (female)	1.56	0.57-4.22	0.38	-	-	-
Marital status (married)	1.82	0.18-17.96	0.61	-	-	-
Education (Illiterate)	1.37	0.57-3.26	0.48	-	-	-
<b>Occupation (Unemployed)</b>	1.71	0.68-4.34	0.25	2.16	0.98-4.74	<b>0.05*</b>
Hypertension (yes)	0.88	0.39-1.99	0.75	-	-	-
Diabetes (yes)	0.72	0.25-2.10	0.55	-	-	-
MNA			0.12			0.09
At Risk	0.00	0.00	0.99	0.00	0.00	0.99
<b>Malnourished</b>	0.46	0.22-0.96	<b>0.04*</b>	0.21	0.21-0.92	<b>0.03*</b>
Constant	0.14		<0.001	0.18		<0.001

OR: odds ratio, CI: confidence interval, \*P<0.05 significant

## DISCUSSION

There is an increase in the burden of oral diseases and other non-communicable diseases among geriatric population globally, especially in the developing countries.<sup>26</sup> Present study was undertaken to assess nutritional status among geriatric population attending a tertiary care health centre to assess the impact of nutritional status on oral health quality of life. Many socio-demographic factors that can affect oral health related quality of life among elderly were also evaluated. Caution should be made while interpreting the findings of study, as association between GOHAI and nutritional status was based on MNA scores, not based on Body Mass Index (BMI) scores.

We found in the current study that the participants with lesser GOHAI score were at greater risk of nutritional deficiencies. Our findings are similar with the results demonstrated by Rodakowska E et al.<sup>20</sup>

Our study findings demonstrate that most impacted items of GOHAI components were limited contact with people followed by uncomfortable eating and unable to speak clearly (>75%). Besides these, psycho-social and functional limitations such as limitation of kind of food were also impacted among more than half of respondents. These factors in turn can affect intake of appropriate nutrients to meet with average daily requirement, ultimately resulting in nutritional deficiencies.

A statistically significant difference was found between MNA scores and GOHAI score among geriatric participants, which is in accordance with the findings reported by Patel et al<sup>13</sup> and Banerjee et al<sup>21</sup> and these findings can be justified by the fact that nutrition and oral health are interrelated. Poor oral health conditions such as edentulism (loss of teeth) as result of ageing and chronic periodontitis among elderly can impact intake and choice of food resulting in nutritional impairment. Additionally, xerostomia (dry mouth) and loss of taste sensation due to atrophy of taste buds are also common problems among the elderly which can lead to nutritional imbalance.

In the present study, we found that age, sex and education had no significant influence on GOHAI score.

These findings are in contrast with the results obtained by Rekhi et al and Chavers et al, Mehta et al where they found that age groups, sex (males) and education status had significant impact on GOHAI.<sup>22, 23,24</sup> In accordance with our findings, previous studies also observed no influence of age, sex, education on oral health related quality of life among elderly.<sup>2,21</sup>

Results showed that occupation and malnourishment significantly affected GOHAI scores, as unemployed participants had greater scores as per GOHAI scale. This may be due to fact of poor oral health/hygiene attitude and practices among unemployed. Usually, a fair amount of money is required for dental care utilization or dental health care is costly so unemployed individuals cannot afford dental care.

As the present study was cross-sectional in nature, temporal associations cannot be explored. Moreover, participants were recruited from a single tertiary care health centre, generalisations of the findings should be cautiously done.

In future, based on the findings of the study, we recommend a multi-centric longitudinal study to find out more fruitful insights. Oral health care and nutritional programmes must be designed and focused to meet with elderly people requirements.

## CONCLUSION

Most of the total elderly participants (about 75%) were found at risk for malnourishment and malnourished. A statistically significant difference was found between nutritional status as assessed by MNA and geriatric oral health related quality of life (GOHAI). It can be concluded that nutritional status affects oral health related quality of life among elderly population.

## REFERENCES

1. Ageing and Health. Available from <https://www.who.int/news-room/fact-sheets/detail/ageing-and-health>. [Accessed on 2021 January 15]

2. Gladius JH, Archana Lakshmi PA, Vidya DC, Das B. A study on morbidity status of geriatric population in the field practice area of Karpaga Vinayaga Institute of Medical Sciences, Tamil Nadu, India. *Int J Community Med Public Health* 2016;3:2575-8.
3. Central Statistics Office Ministry of Statistics and Programme Implementation Government of India. Available from: [http://mospi.nic.in/sites/default/files/publication\\_reports/EllderlyinIndia\\_2016.pdf](http://mospi.nic.in/sites/default/files/publication_reports/EllderlyinIndia_2016.pdf). [Accessed on 2020 Oct 24].
4. The World Health Organization Quality of Life Assessment: Position paper from the World Health Organization. *Soc Sci Med* 1995;41:1403-9.
5. Sischo L, Broder HL. Oral health-related quality of life: What, why, how and future implications. *J Dent Res* 2011;90:1264-70.
6. Karmacharya P, Saha S, Kumari M. Comparison of chewing ability, oral health-related quality of life, and nutritional status before and after the insertion of complete denture among edentulous patients in Lucknow. *J Indian Assoc Public Health Dent* 2017;15:145-50.
7. Dable RA, Nazirkar GS, Singh SB, Wasnik PB. Assessment of oral health related quality of life among completely edentulous patients in Western India by using GOHAI. *J Clin Diagn Res* 2013;7:2063-7.
8. Atchison KA, Dolan TA. Development of the Geriatric Oral Health Assessment Index. *J Dent Educ* 1990; 54: 680-7.
9. Othman WN, Muttalib KA, Bakri R, Doss JG, Jaafar N, Salleh NC, et al. Validation of the geriatric oral health assessment index (GOHAI) in the Malay language. *J Public Health Dent* 2006;66:199-204.
10. Tubert-Jeannin S, Riordan PJ, Morel-Papernot A, Porcheray S, Saby-Collet S. Validation of an oral health quality of life index (GOHAI) in France. *Community Dent Oral Epidemiol* 2003;31:275-84.
11. Mathur VP, Jain V, Pillai RS, Kalra S. Translation and validation of Hindi version of geriatric oral health assessment index. *Gerodontology* 2016;33:89-96.
12. Chahar P, Mohanty VR, Aswini YB. Oral health-related quality of life among elderly patients visiting special clinics in public hospitals in Delhi, India: A cross-sectional study. *Indian J Public Health* 2019;63:15-20
13. Patel P, Shivakumar KM, Patil S, Suresh KV, Kadashetti V. Association of oral health-related quality of life and nutritional status among elderly population of Satara district, Western Maharashtra, India. *J Indian Assoc Public Health Dent* 2015;13:269-73.
14. Kazemi S, Savabi G, Khazaei S, et al. Association between food intake and oral health in elderly: SEPAHAN systematic review no. 8. *Dent Res J (Isfahan)*. 2011;8(Suppl 1):S15-S20.
15. Wells JL, Dumbrell AC. Nutrition and aging: Assessment and treatment of compromised nutritional status in frail elderly patients. *Clin Interv Aging* 2006;1:67-79.
16. Marais ML, Marais D, Labadarios D. Assessment of nutritional status of older people in homes for the aged in the Somerset West area. *South Afr J Clin Nutr* 2007;20:102-8.
17. Samnieng P, Ueno M, Shinada K, Zaitso T, Wright FA, Kawaguchi Y. Oral health status and chewing ability is related to mini-nutritional assessment results in an older adult population in Thailand. *J Nutr Gerontol Geriatr* 2011;30:291-304.
18. Gil-Montoya JA, Subirá C, Ramón JM, Gonzalez-Moles MA. Oral health-related quality of life and nutritional status. *J Public Health Dent* 2008;68:88-93.
19. Chakrabarty D, Mandal PK, Manna N, Mallik S, Ghosh P, Chatterjee C et al. Functional disability and associated chronic conditions among geriatric populations in a rural community of India. *Ghana Med J* 2010;44:150-4
20. Rodakowska E., Mierzyńska, K., Bagińska, J. et al. Quality of life measured by OHIP-14 and GOHAI in elderly people from Białystok, north-east Poland. *BMC Oral Health*. 2014;14: 106.
21. Banerjee R, Chahande J, Banerjee S, Radke U. Evaluation of relationship between nutritional status and oral health related quality of life in complete denture wearers. *Indian J Dent Res*. 2018 Sep-Oct;29(5):562-67. doi: 10.4103/ijdr.IJDR\_285\_17. PMID: 30409933
22. Rekhi A, Marya CM, Oberoi SS, Nagpal R, Dhingra C, Kataria S. Periodontal status and oral health-related quality of life in elderly residents of aged care homes in Delhi. *Geriatr Gerontol Int*.2015;16:474-80.
23. Chavers LS, Gilbert GH, Shelton BJ. Chronic oral disadvantage, a measure of long-term decrements in oral health-related quality of life. *Qual Life Res*. 2004; 13: 111-23.
24. Mehta A, Murali G, Jonathan B. Oral health related quality of life of older patients attending a government dental hospital in Delhi. *J Indian Assoc Public Health Dent*. 2020;18(2):15-55.
25. Vellas B, Guigoz Y, Garry PJ, Nourhashemi F, Bennahum D, Lauque S, et al. The Mini Nutritional Assessment (MNA) and its use in grading the nutritional state of elderly patients. *Nutrition*. 1999 Feb;15(2):116-22. doi: 10.1016/s0899-9007(98)00171-3.
26. Boutayeb A, Boutayeb S. The burden of non communicable diseases in developing countries. *Int J Equity Health*. 2005 Jan 14;4(1):2. doi: 10.1186/1475-9276-4-2.

**Key Message:** Nutrition plays an important role among geriatric population to improve and maintain satisfactory oral health related quality of life.