OBSERVATIONAL STUDY ABOUT RELATIONSHIP BETWEEN NUTRITION AND ORAL HEALTH IN GERIATRIC PATIENTS

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Abstract- **The aim of this observational study was to investigate the relationship between nutrition and oral health in geriatric patients. Data collection involved administering questionnaires and conducting clinical examinations. Sociodemographic information, nutritional status (evaluated using the Mini-Nutritional Assessment), and oral health parameters (including objective measures such as caries experience and denture usage, as well as subjective measures using the Geriatric Oral Health Assessment Index) were assessed. Community Periodontal Index and Loss of Attachment measurements were used to evaluate periodontal health. Data analysis involved descriptive statistics and statistical tests such as chi-square, regression, and correlation analyses. The study included 60 participants, with a slightly higher proportion of females (56.7%) compared to males (43.3%). The findings revealed significant impacts of dental issues on various aspects of participants' lives, including food choices (60.0% reported limitations), chewing difficulties (33.3% experienced problems), swallowing discomfort (30.0% reported discomfort), speech limitations (40.0% felt restricted), and social interactions (36.7% limited contacts). The associations between oral health variables (GOHAI, xerostomia, chewing problems), nutritional status (MNA), and periodontal health indicators (CPI, LOA) were statistically significant ($p < 0.05$). The analysis of demographic variables revealed significant associations between GOHAI scores and gender, age, height, and weight. The study highlights significant oral health challenges among independent elderly individuals, with compromised oral health indicators and poor periodontal health. The findings underscore the importance of integrating oral health and nutritional assessments into geriatric care to improve overall well-being. Further research and interventions are needed to address these oral health issues and promote better oral health outcomes for the elderly population.**

Keywords: **Nutrition, Elderly, Dental status, Masticatory function, Oral health related quality of life.**

INTRODUCTION:
It is clear from study into the complexities of human development that becoming older is an inevitable aspect of existence. Instead of viewing old age as an anomaly, one should accept it as a normal, biologically unavoidable event. The average human lifetime has significantly increased thanks to remarkable advances in medicine and the adoption of extensive public health initiatives in the second half of the 20th century. However, it is crucial to understand that the aging process frequently results in distinct health issues for those 65 and older, who constitute the period of old age. Therefore, it is our responsibility to provide these people the extra thought and care they require.[1]

The aging process is a complex biological phenomenon that involves various changes in the body over time. These changes can affect different aspects of health, including physical, cognitive, and emotional well-being. For example, older adults may experience a decline in physical strength and mobility, changes in memory and cognitive function, and an increased risk of developing chronic health conditions. Given these age-related changes and potential health challenges, it is important to provide special consideration and care for older adults. Tailored healthcare services, preventive measures, and support systems are necessary to address the specific needs and concerns of older individuals.[1]

Older adults (those over 65 years) experience health issues as a result of ageing, which necessitates special attention. The existence of a systemic illness may be of further concern because it not only affects the patient's capacity to practice good oral hygiene and promote oral health, but it may also be linked to the development of certain oral disorders. Despite not being life-threatening, impairments have an impact on a person's quality of life. Due to the significant role that chronic diseases play in the acceptability and effectiveness of dental treatment plans, it is important to understand the chronic diseases that old dental patients deal with on a daily basis while planning treatment for them. Poor eating habits in the elderly have been attributed to oral health issues. Diet and nutrition should be taken into consideration as an integral aspect of the oral health assessment and management of the elderly due to the close relationship between a poor nutritional status and the integrity of the mouth cavity. Therefore, dentists are in a prime position to improve the health of the senior population. Dentists should be aware of dietary risk factors in the senior population and, via careful screening, can treat when nutritional issues are still in their early stages and hence most beneficial and effective.[1-2] The oral health of elderly individuals can significantly impact their daily lives and overall well-being. Oral health issues, such as dental decay, periodontal disease, and tooth loss, can lead to difficulties in eating, speaking, and social interactions. These problems can affect the nutritional intake, masticatory function, and oral health-related quality of life (OHRQoL) of elderly individuals. For epidemiological and clinical research to give accurate data for health promotion, illness preventive programmes, and resource allocation in the healthcare system, measures of oral health-related quality of life (OHHQoL) are crucial.[2] These measures are designed to evaluate the impact of oral health conditions on a person's overall well-being and functioning. According to Fitzpatrick et al.[3] and Slade and Spencer[4], there are various applications of these measures. One of the most common dimensions assessed by

OHQoL instruments is physical symptoms, which involves evaluating the presence and severity of oral health-related symptoms such as pain, discomfort, or difficulty in performing daily activities related to oral health. The perception of well-being is another dimension assessed by these measures. It involves capturing an individual's subjective evaluation of their oral health-related quality of life, including their satisfaction with their oral health, self-esteem, and overall happiness in relation to their oral health condition. Functional capacity is the third main dimension addressed by OHQoL instruments. It involves assessing an individual's ability to perform specific activities related to oral health, such as eating, speaking, and maintaining oral hygiene. Among the OHQoL instruments that have been found to have sufficient validity and reliability, one frequently used tool is the Geriatric Oral Health Assessment Index (GOHAI). The GOHAI is specifically designed to assess the impact of oral health conditions on older adults' quality of life. In summary, these measures provide a comprehensive understanding of the impact of oral health conditions on individuals' physical symptoms, perception of well-being, and functional capacity. The Geriatric Oral Health Assessment Index (GOHAI) is one of the commonly used instruments in this field.

It is unclear how much weight the subjective oral health indicators and dental criteria should have when evaluating mastication and, in turn, nutritional status. To improve the application of study criteria and take into consideration these indicators for epidemiological and therapeutic aims, it is necessary to identify the most suitable criteria for categorizing masticatory function in nutritional studies.[5]

The objective of our study was to investigate the relationship between nutrition and oral health in geriatric patients and to analyse associations between oral health variables, nutritional status, and periodontal health indicators.

MATERIALS AND METHODS:
This study utilized an observational design. Written informed consent was obtained from all participants prior to their inclusion in the study.

Study Population:
A convenience sample of independent elderly individuals attending our hospital was selected. During a two-month period, all attending patients aged 65 years or older were invited to participate in the study.

Data Collection:
Data collection involved administering interviewer-led questionnaires and conducting clinical examinations. Trained researchers conducted the data collection process. The following assessments were included:

Sociodemographic Data:
Participants' sociodemographic information, including age, gender, and educational level, was collected using structured questionnaires.

Nutritional Status Assessment:
The Mini-Nutritional Assessment short form (MNA-SF) was employed to evaluate the participants' nutritional status. The MNA-SF questionnaire, consisting of anthropometric measurements (BMI, mid-arm circumference, and calf circumference), dietary intake assessment, and global health assessment, was administered. Measurements of weight, height, and arm and calf circumferences were taken using standardized protocols.

Oral Health Assessment:
Objective oral health parameters were assessed, including caries experience, denture usage, and the number of posterior dental functional units (FU). The Geriatric Oral Health Assessment Index (GOHAI) was utilized to evaluate participants' subjective oral health. The GOHAI questionnaire included questions related to the participants' perception of xerostomia and chewing problems.

Community Periodontal Index (CPI) and Loss of Attachment (LOA):
The Community Periodontal Index (CPI) was used to assess participants' periodontal health. The CPI evaluates periodontal conditions and assigns scores accordingly. Additionally, Loss of Attachment (LOA) measurements were obtained to assess the amount of attachment loss due to periodontal disease. Trained dental professionals conducted the CPI and LOA assessments.

Data Analysis:
Descriptive statistics will be used to summarize the sociodemographic characteristics of the study population and the distribution of MNA, CPI, LOA, and GOHAI scores. Statistical analyses, such as chi-square tests, regression analyses, or correlation analyses, will be conducted to explore associations between oral health variables (GOHAI, xerostomia, chewing problems), nutritional status (MNA), and periodontal health indicators (CPI, LOA). Significance levels will be determined at $p < 0.05$.

Inclusion criteria:
1.) Patients above age of 60 years.
2.) Patients who are willing to participate in our study.

Exclusion criteria:
1.) Patients with psychological/mental/behavior disorders were excluded.
2.) Those who do not give consent for the study.
3.) Patients under age of 60 years.

RESULTS:

TABLE 1. FREQUENCY DISTRIBUTION OF GENDER

		Frequency	Percent
	Female	34	56.7
	Male	26	43.3
	Total	60	100.0

The study included a total of 60 participants. Among them, 34 participants were female, accounting for 56.7% of the total sample. The remaining 26 participants were male, representing 43.3% of the total sample.

These findings indicate a slightly higher proportion of female participants compared to male participants in the study.

TABLE 2. FREQUENCY AND PERCENTAGE DISTRIBUTION OF QUESTIONS

S.N	Questions	Response	Frequency distribution	
			N	%
1	How 2 did you limit the kinds or amounts of food you eat because of problems with your teeth or dentures?	1 2 3	36 16 8	60.0 26.7 13.3
2	How 2 do you have trouble biting or chewing any kinds of food, such as tough meat or apples?	0 1 2 3	14 12 20 14	23.3 20.0 33.3 23.3
3	How 2 were you able to swallow comfortably?	0 1 2 3	12 16 14 18	20.0 26.7 23.3 30.3
4	How 2 have your teeth or dentures prevented you from speaking the way you wanted?	0 1 2 3	6 24 12 18	10.0 40.0 20.0 30.0
5	How 2 were you able to eat anything without feeling discomfort?	0 1 2 3	18 18 8 16	30.0 30.0 13.3 26.7
6	How 2 did you limit contacts with people because of the condition of your teeth or dentures?	0 1 2 3	8 12 22 18	13.3 20.0 36.7 30.0
7	How 2 were you pleased or happy with the looks of your teeth and gums, or dentures?	0 1 2 3	14 8 20 22	23.3 13.3 33.3 30.0
8	How 2 did you use medication to relieve pain or discomfort from around your mouth?	0 1 2 3	12 16 10 22	20.0 26.7 16.7 36.7

9	How 2 were you worried or concerned about the problems of your teeth, gums or dentures?	0 1 2 3	14 16 4 16	23.3 26.7 23.3 26.7
10	How 2 did you feel nervous or self-conscious because of problems with your teeth, gums, or dentures?	0 1 2 3	16 14 8 22	26.7 23.3 13.3 36.7
11	How 2 did you feel uncomfortable eating in front of people because of problems with your teeth or dentures?	0 1 2 3	14 2 20 24	23.2 3.3 33.3 40.0
12	How 2 were your teeth or gums sensitive to hot, cold, or sweets?	0 1 2 3	10 14 12 24	16.7 23.3 20.0 40.0
13	Has food intake declined over the past 3 months due to loss of appetite, digestive problems, chewing or swallowing difficulties?	0 1 2	14 42 4	23.3 70.0 6.7
14	Weight loss during the last 3 months	1 2 3	20 32 8	33.3 53.3 13.3
15	Mobility	0 1 2	6 24 30	10.0 40.0 50.0
16	Has suffered psychological stress or acute disease in the past 3 months?	0 2	22 38	36.7 63.3
17	Neuropsychological problems	0 1 2	8 22 30	13.3 36.7 50.0
18	Body Mass Index (BMI) (weight in kg) / (height in m)2	0 1 2 3	4 14 20 22	6.7 23.3 33.3 36.7
19	CPI score	0 1 2 3 4	11 6 20 17 6	18.3 10.0 33.3 28.3 10.0
20	LOA scores	0 1 2 3 4	8 15 12 20 5	13.3 25.0 20.0 33.3 8.3

The results of the study shed light on the significant and wide-ranging impacts of dental issues on various aspects of participants' lives. A substantial proportion of participants (60.0%) reported having to limit the kinds or amounts of food they consume due to problems with their teeth or dentures. This finding highlights the challenges faced by individuals in maintaining a diverse and balanced diet, potentially leading to nutritional deficiencies. Furthermore, a considerable number of participants (33.3%) experienced difficulties biting or chewing certain foods, such as tough meat or apples. This can have implications for their overall nutritional intake, as well as their ability to enjoy a wide range of foods.

In terms of swallowing comfortably, only 30.0% of participants reported being able to do so without discomfort. This suggests that a significant portion of the sample may experience difficulties in safely and comfortably swallowing food, potentially leading to further complications related to nutrition and overall well-being. Another noteworthy finding is that 40.0% of participants felt that their teeth or dentures prevented them from speaking the way they wanted. This can impact individuals' confidence and social interactions, potentially leading to self-consciousness or limitations in communication.

Moreover, 30.0% of participants reported being able to eat without feeling discomfort, indicating that a considerable portion of the sample experiences some level of discomfort or pain during eating. This can significantly impact individuals' enjoyment of meals and their ability to consume food comfortably. Additionally, a substantial number of participants (36.7%) reported limiting their contacts with people due to the condition of their teeth or dentures. This finding highlights the potential impact of dental issues on individuals' social lives, leading to feelings of embarrassment, self-consciousness, or even withdrawal from social situations.

These findings collectively underscore the far-reaching consequences of dental issues on individuals' daily activities, including eating, speaking, and socializing. The study highlights the need for comprehensive dental care and support to address not only the functional aspects but also the psychosocial implications of dental problems. By addressing these concerns, individuals can improve their overall well-being, enjoy a varied diet, and confidently engage in social interactions.

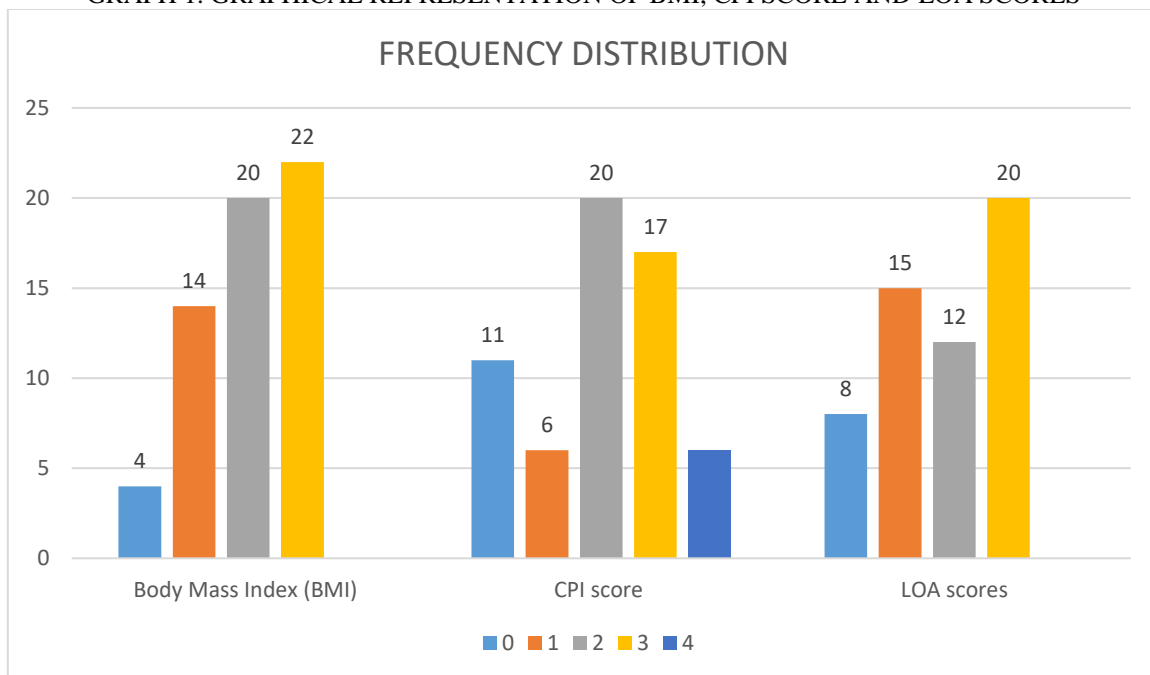GRAPH 1. GRAPHICAL REPRESENTATION OF BMI, CPI SCORE AND LOA SCORES

TABLE 3: CO- RELATION OF DEMOGRAPHIC VARIABLES WITH GOHAI SCORES

	GOHAI SCORES	
Demographic variables	X2	P value

P<0.05,

Gender	1.221	0.042*
age	1.253	0.029*
height	1.342	0.031*
weight	1.732	0.002*

STATISTICAL SIGNIFICANT*

The GOHAI scores were analyzed in relation to demographic variables, namely gender, age, height, and weight. The statistical analysis revealed the following findings:

Gender:
The chi-square test (X2) yielded a value of 1.221.
The corresponding p-value was 0.042*, indicating a statistically significant association between gender and GOHAI scores.
Age:
The chi-square test (X2) yielded a value of 1.253.
The corresponding p-value was 0.029*, suggesting a statistically significant association between age and GOHAI scores.
Height:
The chi-square test (X2) yielded a value of 1.342.
The corresponding p-value was 0.031*, indicating a statistically significant association between height and GOHAI scores.
Weight:
The chi-square test (X2) yielded a value of 1.732.
The corresponding p-value was 0.002*, demonstrating a statistically significant association between weight and GOHAI scores.

DISCUSSION:
The association between senior adults' dental health and nutritional status has been the subject of several researches over the past 10 years.[6] Evaluating the impact of oral health on overall well-being (OHQoL) holds significant importance in epidemiological and clinical studies, as it provides accurate insights essential for promoting health, preventing diseases, and effectively distributing healthcare resources. The Geriatric Oral Health Assessment Index (GOHAI) is one of the tools that is most frequently utilised for this purpose,additionally, it has been discovered that amongst the elderly people, the GOHAI is a strong predictor of self-rated dental appearance.[7] By focusing specifically on issues linked to physiological, physical, and psychological demands, the Geriatric Oral Health Assessment Instrument (GOHAI) seeks to supplement clinical assessments.[8]
In a similar study conducted by S.S. Shaheen et al,[9] based on the CPI and LOA for each research subject's gender and age group, their periodontal health was determined. The results of their study were inconsistent with our findings.
The CPI and LOA scores of our study were not sectionalised for each study subject's gender and age group. In our study, it was found that approximately 60.0% of the respondents indicated that they had to restrict their food choices or intake due to dental or denture-related issues which was inconsistent with the findings in a similar study conducted by Juliana A. D. B. Camposet al.[1]
Furthermore, it was observed in our study that when it comes to comfortable swallowing, only 30.0% of the participants reported being able to do it without experiencing any discomfort. This finding was consistent with the results as reported in the study by Nada El Ostaet al.[5]
A substantial proportion of participants (60.0%) in our study reported having to limit the kinds or amounts of food they consume due to problems with their teeth or dentures, which is less when compared to a similar study in similar geographical area by Rajani A. D. et al [10] where 82% of the population had reported to limitation kinds and amount of food they could consume due to various teeth related problems.
In terms of swallowing comfortably, only 30.0% of participants reported being able to do so without discomfort, which is similar to the study done by Wong MC et al [11] where maximum population they had in their cohort also reported the same discomfort. Also in contrast to study done by Rajani A. D. et al [10] where 36% of the population had discomfort swallowing food, hence suggesting that the awareness in the population about dental related issues being looked into by.

CONCLUSION:
Our study revealed that significant oral health challenges among independent elderly individuals attending our hospital, as evidenced by compromised oral health indicators such as GOHAI scores, self-reported xerostomia, and chewing problems. Additionally, a considerable proportion exhibited poor periodontal health based on CPI and LOA measurements. These findings underscore the importance of integrating oral health and nutritional assessments into geriatric care to improve overall well-being. Further research and interventions are needed to address these oral health issues and promote better oral health outcomes for the elderly population.

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