Original Article

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Assessment of Prosthetic Status and Oral Frailty among The Geriatric Population Residing in Old Age Homes of Bhubaneswar City–a Cross Sectional Study

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Abstract:

Objective: The aim of this study was to assess the prosthetic status and oral frailty of the elderly population residing in old age homes of Bhubaneswar city.

Material and Methods: A cross-sectional questionnaire study was conducted among 310 geriatric patients aged 60 years and above residing in old age homes of Bhubaneswar city. Data collection was done using a modified World Health Organization (WHO) 1997 and oral frailty index 8. Descriptive statistics, chi-square test, Pearsons correlation and multinomial logistic regression were used.

Results: The mean age of the study population was 66.72±6.86 years. Forty-seven percent of the study population required multiple units in the upper arch and approximately 30% in the lower arch. There was a significant positive correlation between the prosthetic status of the upper teeth and oral frailty (Pearson correlation coefficient: 0.315, p-value <0.0001). A ~1.751-fold risk of oral frailty was detected in participants with increasing age (p-value=0.049).

Conclusions: The results of this study suggest that most of the need for prostheses in the aged population was inadequate.

Keywords: aged, geriatric, health, oral health, prosthetic status

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Introduction

The World Health Organization (WHO) established the official definition of health in 1946, stating that it is a condition of whole physical, mental, and social well-being rather than only the absence of illness and disability. A pragmatic view of health – the capacity to lead a socially and economically useful life – was indirectly acknowledged in 1977 with the approval of the WHO Global Strategy "Health for All by the Year 2000", which was a key objective of this strategy[1,2]. The mere absence of periodontal disease or caries does not guarantee adequate oral health. This is a crucial element of overall health. To indicate good dental health, one must be able to taste, chew, and swallow as well as have appropriate nutrition, self-esteem, and protection from systemic illnesses[3]. But among older adults, poor oral health is not uncommon and can impair essential activities of daily life and contribute to frailty. An intricate biological process, aging is brought on by the combination of hereditary and environmental variables. This procedure may directly or indirectly increase the chance of contracting illnesses. Dental health may be affected by a number of pathological and/or physiological changes brought on by ageing. As people age, more and more systemic and/or local ailments that require medication can occur.Additionally, various drugs (about 75% of persons over 60 use at least one medication) can negatively impact dental health[4].

In 2013, the term "oral frailty", which was connected to oral function, was first used in Japan. Since then, medical policies have given special focus to methods to address oral frailty. According to the Japan Dental Association, oral frailty is a collection of phenomena and processes that cause changes in a variety of oral conditions (such as the number of teeth, oral hygiene, and oral functions) as people age. These phenomena and processes are also accompanied by a decline in oral health awareness, a decrease in physical and mental reserve capacity, and an increase in oral frailty that causes eating disorders. The overall result is a decline in physical and mental functions. A survey of 2000 elderly persons in Japan found that those who had oral fragility had a higher probability of developing physical frailty[5], sarcopenia, and other serious disorders that required nursing care, as well as death[6]. In another study, oral frailty was described as the age-related functional decline of orofacial structures[7,8].

The general health and social care requirements of the ageing population face enormous problems due to the globally growing rates of this population[9]. According to the 2011 census, at that time there were roughly 104 million people in India who are 60 years of age or older—53 million females and 51 million males[10] and according to the National Statistical Office (NSO)'s Elderly in India 2021, the elderly population was projected to reach 194 million in 2031 from 138 million in 2021, a 41 per cent increase over one decade[11]. Around 86.0% of Odisha's population, or 39.84 lakh seniors, live in rural regions and make up nearly 9.5% of the state's total population, with more than 45% of them living in poverty. They are predicted to increase in number and represent roughly 13.0% of the population by 2026[12].

For the majority of older people, living with their sons is the ideal living situation and just 0.7% of people live in nursing facilities.In the state, there are about fifty old age homes that house, board, and provide medical care for 1,275 elderly people. These facilities are run by NGOs with funding support from the Ministry of Social Justice and Empowerment through an integrated programme for older people as well as from private donations. Presently, three other old age homes with a capacity of 75 people each —one in each of the districts of Cuttack, Jagatsingpur, and Puri—are supported by subsidies from the state government[13].

The aim of the present study was to assess the prosthetic status and oral frailty of the elderly population residing in old age homes of Bhubaneswar city. The method was to obtain baseline data regarding the oral prosthetic

status of the elderly in the old age homes and compare gender differences with prosthetic status and needs. The second objective was to identify old age home elderly at increased risk of oral frailty and to compare prosthetic status with oral frailty.

Material and Methods

Study population and design

A cross-sectional study was conducted among the geriatric population residing in the old age homes of Bhubaneswar city during the months of January 2022-March 2022.

Sampling strategy and size

All the list of old age homes of Bhubaneswar city were obtained from the municipality. A multistage stratified random sampling method was used to pick the old age homes.Bhubaneswar municipality is divided into three zones, the North, South West and South East zones. Two old age homes from each zone were selected randomly, from which the residents constituted the study population. The sample size of 310 was calculated using the formula $n=z^2\ pq/d^2$ where n was the sample size, p=prevalence of disease, q=free from disease, d=allowable error, and z=point on normal deviation based on the empirical data obtained from a previous study[14].

Inclusion and exclusion criteria

Inclusion criteria

- All the inmates aged 60 years and above
- Subjects present in the old age home on the day of the survey.

Exclusion criteria

- Those who did not give informed consent
- Inmates who refused an oral examination.

Ethical permission

The approval for the survey was obtained from the Institutional Review Board (KIIT/ KIMS/IEC/ 862/2022).

Informed consent

We obtained written informed consent from all participants who agreed to participate in the survey.

Survey form

A total sample of 310 people, aged >60 years were examined with a questionnaire following the procedures and diagnostic criteria suggested by the WHO Oral Health Assessment Form 1997.

Data Collection

Prosthetic status

The questionnaire was designed to record data regarding the demographic details (age, sex, education, and marital status). The oral health status with treatment needs was assessed and recorded using a modified WHO 1997 form and the details were filled by the researcher.

Oral frailty

Oral frailty has been lately recommended as an original concept defined as a decrement in oral function. The OFI-8 is an eight-item screening questionnaire that evaluates oral health-related behaviors and oral frailty concepts, designed following consultation with appropriate experts. The eight items in the questionnaire are

1: Harder to eat hard food than half a year ago. (Difficult to eat hard food),

2: Sometimes choked by tea or soup (Choking),

3: Do you use dentures (Using denture),

4: Feeling about oral dryness (Xerostomia),

5: Less frequent going out than half a year ago (Less frequently going out),

6: Capable of chewing hard food like pickled radish or shredded and dried squid (Feasible to chew hard food),

7: Brushing teeth at least twice a day (Brushing teeth at least twice a day),

8: Attending the dentist at least once a year (Regular attendance at dental clinic).

Items 1, 2, and 3 are weighted as two points and others as one point[15]. The scores of the three higher priority items are doubled for the essential elements of oral frailty ("tooth loss", "subjective chewing difficulties", and "subjective swallowing difficulties"). The total OFI-8 score ranges from 0 to 11 points. Higher scores indicate poorer oral health and vice versa.

Training and calibration

A single researcher conducted each oral examination while being supported by a certified recording dentist. Every day, between 25 and 30 people were checked. The calibration of questionnaire by the investigator and the recording dentist was done at the Department of Public Health Dentistry, Kalinga Institute of Dental Sciences.

Statistical analysis

The collected data were used to assess the relationship between the variables with the prosthodontics status. The data were analysed using the SPSS 26 statistical package. Chi-square tests, Pearsons Correlation and Multinomial logistic regression were applied. For all statistical tests, confidence interval and significance were set at 95% and 5%, respectively.

Results

The study population consisted of 310 participants, 210 males (67.7%) and 100 females (43.2%), 60 years of age or older, with a maximum age of 88 years (mean age 66.7±6.8). Seventy-seven percent of the study population were illiterate and 71% were married (Table 1).

Table 1 Sociodemographic details of the study participants (n=310)

Variable		Frequency (n)	Percentage
Age (years)	60-69	227	73.2
	70-79	48	15.5
	80 and above	35	11.3
Gender	Male	211	68.1
	Female	99	31.9
Marital status	Married	219	70.6
	Unmarried	22	7.1
	Divorced	8	2.6
	Widow	61	19.7
Education	Illiterate	239	77.1
	Primary	69	22.3
	Secondary	2	0.6

The statistical distribution of the study subjects according to prosthetic status and needs of their maxillary and mandibular arches are shown in Figures 1 and 2, respectively. Only 7.0% of the study participants had bridge in the upper arch followed by 3.5% in the lower arch (Figure 1). Forty-seven percent of the study population required multiple units in the upper arch and approximately 30.0% in the lower arch. About 12.0% of the study population required a combination of one or multiple units in the upper arch and 29.0% in the lower arch (Figure 2).

The oral frailty index responses are shown in Figure 3. About 86.8% of the study elderly people found difficulty in chewing hard food and 74.2% sometimes or often choked on tea or other liquid foods. A majority of them did not go out and 87.0% of them had not visited a dentist recently.

There was a significant positive correlation between the prosthetic status of the study participants' upper teeth and oral frailty (Pearson correlation coefficient: 0.315, p-value<0.0001) and prosthetic need upper and lower arches (Pearson correlation coefficient: 0.332, p-value<0.0001). A significant negative correlation was seen between prosthetic need upper and prosthetic status lower arches (Pearson correlation coefficient: -.132, p-value<0.020) (Table 2).

Table 3 shows the multinomial logistic regression for estimating the odds ratio and 95% confidence interval for oral frailty scores. A ~1.751-fold risk of oral frailty was detected in participants with patients over 75 years old. (p-value=0.049).

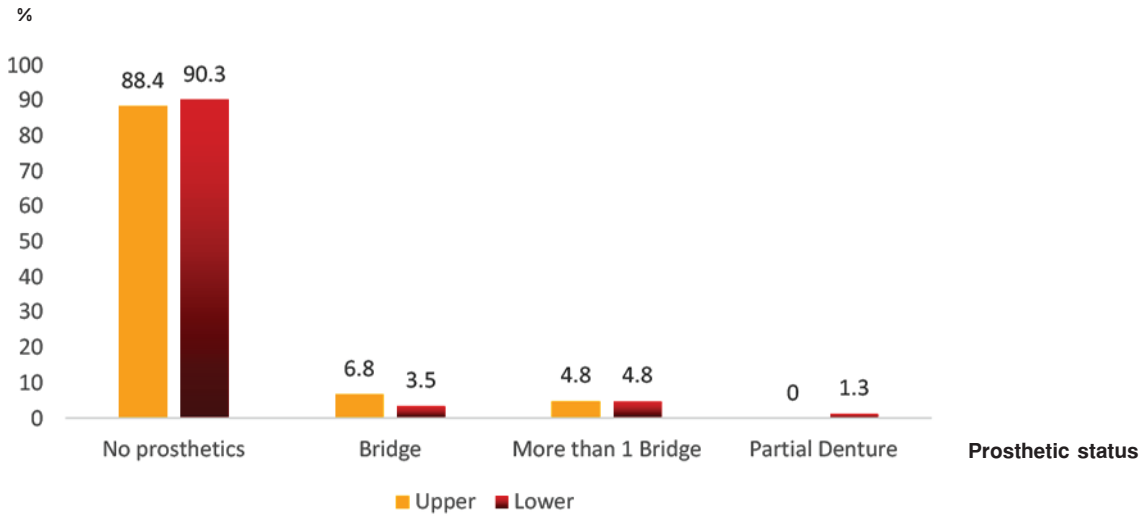

Figure 1 Prosthetic status of the study participants (n=310)

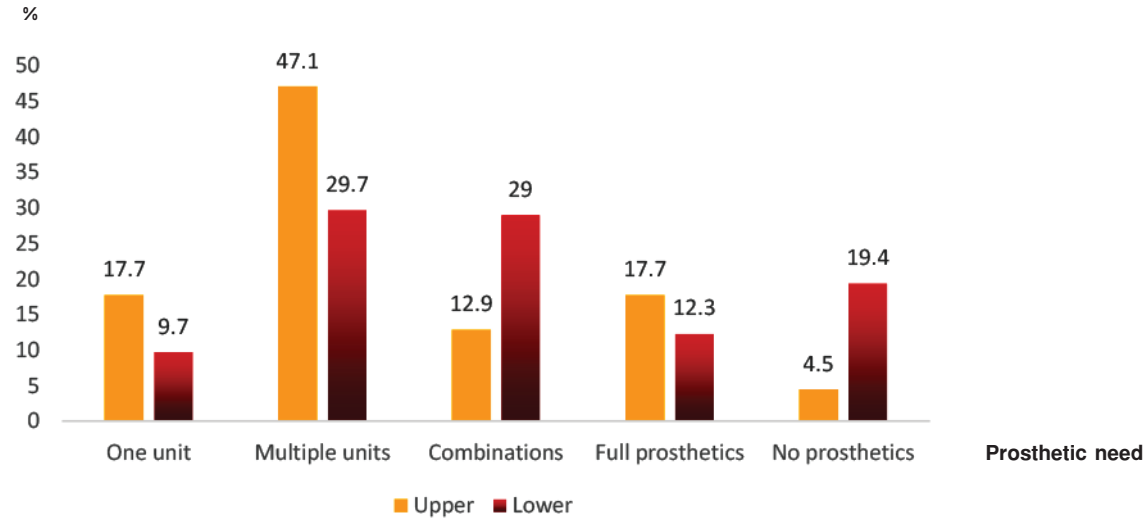

Figure 2 Prosthetic need of the study participants (n=310)

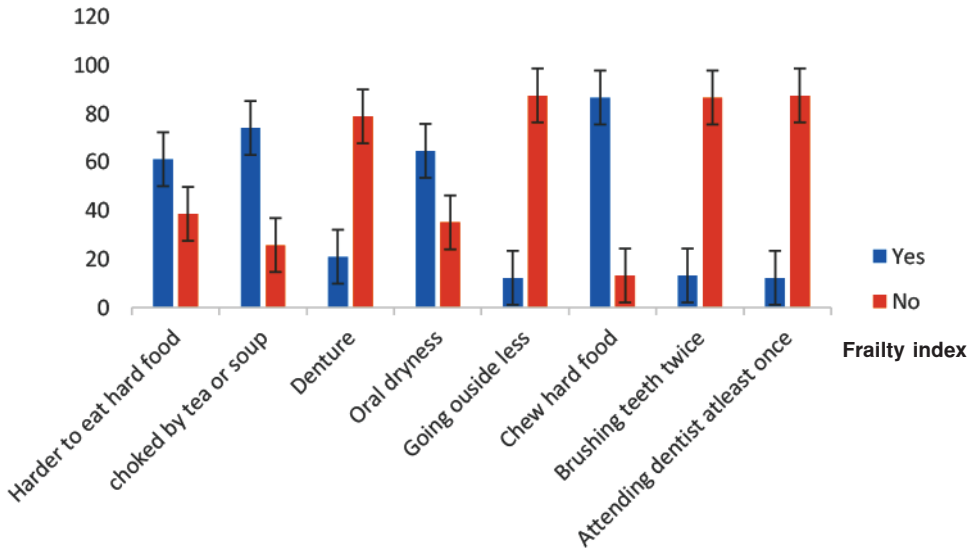

Figure 3 Oral frailty index responses of the study participants (n=310)

Table 2 Pearson correlation between prosthetic status, prosthetic need and oral frailty scores

		Prosthetic status upper	Prosthetic status lower	Prosthetic need upper	Prosthetic need lower	Oral frailty
Prosthetic status upper	Pearson correlation	1	−0.032	−0.009	−0.069	0.315**
	Sig. (2-tailed)		0.572	0.871	0.227	0.000
Lower	Pearson correlation	−0.032	1	−0.132*	−0.032	−0.109
	Sig. (2-tailed)	0.572		0.020	0.574	0.096
Prosthetic	Pearson correlation	−0.009	−0.132*	1	0.332**	−0.028
Need upper	Sig. (2-tailed)	0.871	0.020		0.000	0.667
Prosthetic need lower	Pearson correlation	−0.069	−0.032	0.332**	1	−0.014
	Sig. (2-tailed)	0.227	0.574	0.000		0.837
Oral frailty	Pearson correlation	0.315**	−0.109	−0.028	−0.014	1
	Sig. (2-tailed)	0.000	0.096	0.667	0.837	

*Correlation is significant at the 0.05 level (2-tailed).

**Correlation is significant at the 0.01 level (2-tailed).

Table 3 Multinomial logistic regression for estimating the odds ratios and 95% confidence intervals for oral frailty scores (with non-frailty as the reference category) by the selected factors

Oral frailty	Independent variables	B	Standard error	Sig.	Odds ratio	95% confidence interval for Exp(B)	
						Lower bound	Upper bound
Frail	Age (years)	0.560	0.319	0.049	1.751	0.937	3.269
	Gender	−0.361	0.365	0.323	0.697	0.340	1.427
	Marital Status	0.035	0.145	0.807	1.036	0.780	1.377
	Education	−0.359	0.429	0.402	0.698	0.301	1.617
	Prosthetic status (upper)						
	No prosthesis	0.977	1.071	0.362	2.656	0.325	21.683
	Bridge	0.422	1.297	0.745	1.525	0.120	19.396
	More than one bridge	0[b]	.	.	.	.	.
	Prosthetic status (lower)						
	No prosthetic	0.752	1.265	0.552	2.122	0.178	25.322
	Bridge	1.190	1.368	0.384	3.288	0.225	47.982
	More than one bridge	1.524	1.477	0.302	4.589	0.254	82.909
	Partial denture	0[b]	.	.	.	.	.
	Prosthetic need (upper)						
	Need for one unit	−0.915	0.744	0.219	0.401	0.093	1.722
	Need for multiple units	−0.672	0.664	0.312	0.511	0.139	1.878
	Need for combination of one or multiple unit prosthesis	−0.049	0.758	0.948	0.952	0.216	4.203
	Need for full prosthesis	−0.876	0.820	0.285	0.417	0.084	2.076
	No prosthesis required	0[b]	.	.	.	.	.
	Prosthetic need (lower)						
	Need for one unit prosthetic	0.493	0.719	0.493	1.638	0.400	6.708
	Need for multiple units	−0.106	0.586	0.856	0.899	0.285	2.835
	Need for combination of one or multiple unit prosthesis	0.055	0.563	0.922	1.057	0.350	3.188
	Need for full prosthesis	1.138	0.603	0.059	3.120	0.957	10.171
	No prosthesis required	0[b]	.	.	.	.	.

a. The reference category is non-frailty

b. This parameter is set to zero because it is redundant.

B=Multinomial logisitic regression coefficient

Discussion

This study found that none of the subjects had partial dentures, and 90.3% of the participants did not have any prostheses. Due to a lack of knowledge, financial limitations, and decreased mobility, older people may not use dental services as frequently as younger people. Misconceptions about how to adjust dentures and a lack of interest in aesthetics may also play a role in the low proportion of people with bridges and partial dentures. This finding was in accordance with the findings of Soh et al.[16] Another finding was that males had slightly better prosthesis status than females. Females typically rely on male family members to transport them to medical appointments. A lower level of education and a lack of work, when combined with the lack of access, may be contributing factors to the higher proportion of females who were edentulous than males.

The need for one or multiple unit prostheses or full prostheses in the upper arches was greater in comparison to the need for a combination or no prostheses in the lower arches. This finding was in line with a study by Slade et al.[17], who reported that full prostheses in the upper and lower arches were more necessary than partial dentures.

The need was slightly more in males than in females, similar to Shenoy et al.[18] In another study by Deogade et al, the prosthetic need for males was 82.5% and for females 80.0%[19]. Deogade et al.[19] and Slade et al.[17] also observed that the need for full dentures was greater than the need for multiple-unit dentures, or the need for a combination of single- and multiple-unit dentures in women. Shenoy and Hegde[18] found that the need for full dentures in the maxillae and mandibles was higher than the need for removable partial dentures, with a slightly higher need in men than women. Another study found that males required more multi-unit prostheses and that females were more likely to need single-unit prostheses[20].

As far as we are aware, this is the first study to evaluate the relationship between prosthetic status and oral frailty. But the study also had certain limitations. As this was a cross sectional study, the results could not be applied to the whole geriatric population of India. Also, the oral frailty index results were self-reported, which could have resulted in bias as some subjects may not have been able to assess themselves accurately.

Conclusion

The study found that the majority of the elderly population require prosthesis attention. These findings are sufficient to serve as a helpful reference for future evaluation of the condition and requirement of prostheses in the elderly population. The findings of this study could support the creation of oral health regimens for senior citizens to enhance their dental perception and oral health.

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Conflict of interest

The authors declare no conflicts of interest to report.

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