

Oral Hygiene Status of Institutionalised Dependent Elderly in India – a Cross-Sectional Survey



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ABSTRACT

Background/Introduction

For various reasons, the care demand from elderly people is low and difficult to determine, whereas their oral hygiene status would need urgent care.

Objective

To assess the oral hygiene status of institutionalized dependent elderly in Bangalore City, India.

Methods

A cross-sectional study of 322 dependent elderly patients was conducted at seven elderly homes of Bangalore City, India. The oral hygiene status recorded includes dental and prosthetic hygiene.

Results

The mean Debris Index and Plaque Index scores of dentate elderly were 2.87 ± 0.22 and 3.17 ± 0.40 , respectively, the mean Denture Plaque and Denture Stomatitis scores were 3.15 ± 0.47 and 1.43 ± 0.68 , respectively.

Conclusion

The dental hygiene was inadequate. This study emphasizes the care demand and the need for help in oral hygiene procedures for the dependent institutionalized elderly.

Key words: dependent elderly, institutionalized elderly oral health, elderly oral hygiene status

INTRODUCTION

The age distribution of the world's population is changing. With advances in medicine and prolonged life expectancy, the proportion of older people will continue to rise worldwide.

The international literature shows that the proportion of elderly people has increased considerably during the last decades and is expected to further increase during the next decades. This demographic shift will have important implications for health-care services. More (frail) elderly people will present more morbidity and care dependency and, consequently, will need an increasing proportion of health-care services.⁽¹⁾ Those elderly people who are not able to function independently are often supported by domiciliary care service or admitted to (residential) care homes.^(2,3) The growth in this population is staggering, posing tremendous challenges in caring for this ageing population.

Oral infections and poor oral health, most notably tooth loss and severe periodontal conditions, are more prevalent in this age group. The consequences of these diseases and conditions are significant, leading to disabilities and reduced quality of life.⁽⁴⁾

Advances in oral health care and treatment during the last decades have resulted in a reduced number of edentulous individuals. A still increasing number of dentate elderly people have tooth wear, periodontal disease, and sophisticated tooth-supported restorations and prostheses. Hence, they are in need of both preventive and curative oral health care continuously.

Complexity of the oral conditions, oral mucosal lesions, systemic diseases, and medication use make (frail) elderly people more vulnerable to oral problems than younger age groups, especially when they are cognitively impaired.^(5,6) Weakened oral health due to neglect of self care and professional care and due to reduced oral health-care utilization is

already present when (cognitively impaired) elderly people are still community-dwelling.^(6,7)

At the moment of (residential) care home admittance, many elderly people in countries all over the world are in need of oral health care urgently. If their needs are not met, their oral health will be persistently poor and will utmost probably further deteriorate during their residency because of increasing care dependency and subsequent lack of adequate oral health care.^(8,9)

In response to this need, a study was designed with an objective to assess the oral hygiene status of institutionalized dependent elderly in Bangalore City, India.

METHODS

A cross-sectional survey was carried out among institutionalized elderly in Bangalore City, India, to assess their oral hygiene status. The study was carried out by two investigators, the first and second authors of this article. The study is conducted according to the principles of the Declaration of Helsinki (version 17c, 2004) and in accordance with the Medical Research Involving Human Subjects Act (WMO). Ethical clearance was obtained from Institutional Review Board, The Oxford Dental College and Research Centre, Bangalore, India.

There are 65 old age homes in Bangalore City, in which 1,536 elderly are residing. This information was collected from THE ELDERERS HELPLINE 1090 (A project of Bangalore City and Nightingales Medical Trust), a voluntary organization working for Elders Welfare and other sources.

Based on the previous literature,⁽¹⁰⁾ the Plaque Index values were extracted (Plaque Index 0.6 ± 1.2), with 80% of the statistical power and 95% CI; the sample size required for this study was 300.

A random sample of seven elderly homes accommodating a total of 462 elderly residents in Bangalore City, India, was selected. Keeping in mind the selection criteria, the sample taken was slightly more than required. The elderly homes selected had the elderly residents totally dependent on their caretakers for their personal and oral hygiene care.

To participate in the study, a resident should:

- be residing in the institution for a long term
- supply a written informed consent, undersigned by himself or his legal representative
- have ten or more natural teeth or had dentures and
- have the cognitive and physical condition required for undergoing an oral examination.

Edentulous elderly residents without dentures were excluded from the study.

Research data were gathered in the institutions by a trained examiner. He had carried out the data collection after exercising and calibrating the examination criteria and after determining their intra- and inter-examiners' reliability in a pilot study.

Barthel Index was used for assessing the level of dependency.⁽¹¹⁾ A pre-tested proforma was used to record, which included recording of dental plaque, debris, denture plaque, and denture stomatitis.

Debris Component of the Simplified Oral Hygiene Index (OHI-S)⁽¹²⁾

The OHI-S differs from the original OHI (The Oral Hygiene Index) in the number of the tooth surfaces scored (6 rather than 12), the method of selecting the surfaces to be scored, and the scores, which can be obtained. The occlusal and incisal extent of the debris is noted as it is removed. The surface area covered by debris is estimated by running the side of the No. 5 explorer along the tooth surface being examined. The criteria used for assigning scores to the tooth surfaces are the same as those used for the OHI (The Oral Hygiene Index). The criteria used for assigning scores to the tooth surfaces are the same as those used for the OHI (The Oral Hygiene Index). Criteria for classifying debris are as follows:

0. No debris or stain present.
1. Soft debris covering not more than one-third of the tooth surface, or presence of extrinsic stains without other debris regardless of surface area covered.
2. Soft debris covering more than one-third, but not more than two-thirds, of the exposed tooth surface.
3. Soft debris covering more than two-thirds of the exposed tooth surface.

Interpretation: Score of 0.0–0.6 is considered good, 0.7–1.8 is considered fair, and 1.9–3.0 is considered poor.

Turesky - Gilmore - Glickman Modification of Quigley Hein Plaque Index⁽¹³⁾

The amount of plaque present on the subjects' teeth was assessed using the Turesky - Gilmore - Glickman modification of Quigley Hein plaque index (1972). After the subject had rinsed away loose debris with water, plaque-disclosing solution (Alpha Plak) was applied to all natural teeth using a cotton-bud. Excess dye was removed by rinsing with water, and buccal and lingual surfaces of all teeth were scored based on the criteria of the index. This index is based on a numerical scale of 0 to 5:

0. No plaque.
1. Separate flecks of plaque at the cervical margin of the tooth.
2. A thin continuous band of plaque (up to 1 mm) at the cervical margin of the tooth.
3. A band of plaque wider than 1 mm but covering less than one-third of the crown of the tooth.
4. Plaque covering at least one-third but less than two-thirds of the crown of the tooth.
5. Plaque covering two-thirds or more of the crown of the tooth.

The index for the entire mouth is determined by dividing the total score by the number of surfaces examined. Interpretation: a score of 0–1 is considered low and a score of 2 or more is considered high.

Denture Plaque (Addictive Index for plaque accumulation by Augsburger *et al.*)⁽¹⁴⁾

Loose debris was rinsed off the denture and plaque was disclosed using the plaque disclosing solution (Plaque check) using cotton pellets. Excess dye was rinsed off in gently running water. Disclosed mature plaque was scored on each of four buccal surface and four mucosal surface segments. Plaque accumulations on the dentures were divided into eight groups, four on the facial surface and four on the basal tissue contact surface. The scoring was done and the results were tabulated as follows:

- 0. No plaque.
- 1. Light plaque, 1% to 25% of area covered.
- 2. Moderate plaque, 26% to 50% of area covered.
- 3. Heavy plaque, 51% to 75% of area covered.
- 4. Very heavy plaque, 76% to 100% of area covered.

Denture Stomatitis/Denture-induced Stomatitis

The palatal area was examined and denture stomatitis classified according to the method described by Schou *et al.*⁽¹⁵⁾ The denture bearing mucosa of maxillary jaw was scored on a 0–3 scale according to the classification of Budtz-Jørgensen *et al.*⁽¹¹⁾

- 0. Stomatitis not present.
- 1. Pin-point erythema.
- 2. Diffuse erythema.
- 3. Inflammatory papillary hyperplasia.

Descriptive statistical analysis has been carried out in the present study. Statistical software namely SPSS 15.0 was used.

RESULTS

In this study, seven elderly homes were randomly selected; 322 elderly residents who were dependent on their caretakers for their daily personal and oral hygiene care were enrolled in this study.

Barthel Index was used to check for the level of dependency of the elderly residents.

Demographic Data

The mean age of the dependent elderly residents was 76.98 ± 7.33 (Table 1); 27.32% dependent elderly residents were males and 72.67% dependent elderly residents were females (Table 2).

TABLE 1.

Distribution of dependent elderly residents according to age

Age	n	%
65–70	103	31.98
71–80	129	40.06
81–90	85	26.39
> 90	3	1.55
Total	322	100
Mean ± SD	76.98±7.33	

TABLE 2.

Distribution of dependent elderly residents according to gender

Gender	n	%
Male	88	27.32
Female	234	72.67
Total	322	100.0

TABLE 3.

Dependency score of elderly residents according to using Barthel Index

Index	Mean Score
Barthel Index	20.94±8.76

Dependency Status

The level of dependency assessed using the Barthel Index showed a mean score of 20.94 ± 8.76 (Table 3).

Dental and Prosthetic Status

197 (61.18%) elderly residents were dentate and 125 (38.82%) elderly residents were denture wearers (Table 4).

Oral and Denture Hygiene Status

The mean score of Debris component of Oral Hygiene Index Simplified of dentate elderly residents was 2.87 ± 0.22 (Table 5) and the mean score of Plaque Index Score of dentate elderly residents was 3.17 ± 0.40 (Table 6).

The mean score of denture plaque of denture-wearing elderly residents was 3.15 ± 0.47 (Table 7) and the mean score of Denture Stomatitis of denture-wearing elderly residents was 1.43 ± 0.68 (Table 8)

TABLE 4.
Distribution of dependent elderly residents according to their dentition status

	<i>n</i>	%
Dentate	197	61.18
Denture wearers	125	38.82
Total	322	100.0

TABLE 5.
Debris Index score of dentate elderly residents

<i>Index</i>	<i>Mean Score</i>	<i>Index Score</i>	<i>Interpretation</i>
Debris	2.87±0.22	0.0–0.6	good
		0.7–1.8	fair
		1.9–3.0	poor

TABLE 6.
Plaque Index score of dentate elderly residents

<i>Index</i>	<i>Mean Score</i>	<i>Index Score</i>	<i>Interpretation</i>
Plaque	3.17±0.40	0–1	low
		2 or more	high

TABLE 7.
Denture plaque score of denture-wearing elderly residents

<i>Index</i>	<i>Mean Score</i>	<i>Index Score</i>	<i>Interpretation</i>
Denture Plaque	3.15±0.47	0	No plaque
		1	Light plaque
		2	Moderate plaque
		3	Heavy plaque
		4	Very heavy plaque

TABLE 8.
Denture stomatitis score of denture-wearing elderly residents

<i>Index</i>	<i>Mean Score</i>	<i>Index Score</i>	<i>Interpretation</i>
Denture Stomatitis	1.43±0.68	0	Stomatitis not present
		1	Pin-point erythema
		2	Diffuse erythema
		3	Inflammatory papillary hyperplasia

DISCUSSION

Maintaining oral health in elderly individuals is essential to ensure comfort, health, and well-being. Poor oral health in geriatric populations can lead to life-threatening conditions, including malnutrition and dehydration, brain abscesses, valvular heart disease, joint infections, cardiovascular disease, and pneumonia.⁽¹⁶⁾ Epidemiologic prevalence studies, however, reveal that the oral health status of the institutionalized elderly is poor. Studies in the United States, Canada, Great Britain, and Europe have demonstrated high prevalence rates of caries, poor oral hygiene and denture care, gingival inflammation, dry mouth, bleeding gums, and periodontal disease among nursing home elders.⁽¹⁶⁾

The purpose of this article was to assess the oral hygiene status the institutionalized elderly, discuss the prevention of oral disease conditions, review the evidence base for selected care interventions used for oral hygiene, and recommend ways that health-care providers can facilitate best practices for oral health care in institutionalized elders.

The participants in this study were representative of the dependent institutionalized elderly. The number of elderly institutionalized women was higher than that for men (it was found to be 72%), life expectancy being higher than for men.⁽¹⁷⁾

In the present study, the level of dependency was assessed using the Barthel Index, which is well adapted to evaluating the functional status of handicapped persons. This Index provides an evaluation of the ability to perform basic daily living activities (eating, moving from wheelchair to bed, personal toilet, getting on and off toilet, bathing self, walking on level surface, ascending and descending stairs, dressing, controlling bowels and bladder). Each activity is scored, with score 10–15 indicating independence, 5 partial dependence, and 0 complete dependence. With this Index, a total score of < 20 is considered as indicating complete dependence. In the present study, the study population was completely dependent, with the mean score of 20.94 ± 8.76.

It was a condition of Ethical Committee that all participating residents should give informed consent, and that no elderly resident should be coerced into taking part. Elderly residents with neither natural teeth nor denture were not suitable for the study, where dental and denture hygiene was the principle outcome and, hence, edentulous elderly residents without dentures were excluded.

The Oral Hygiene Status of 322 Functionally Dependent Elderly Residents

Dental Plaque

The high levels of dental plaque reflected the large proportion elderly residents who could not, or did not, brush their teeth, and who did not receive assistance. Caretakers and residents were aware of these shortcomings. Caretakers sometimes commented on the lack of oral hygiene materials and the reliance on relatives to provide them. Some caretakers expressed

anxiety or embarrassment about the condition of their oral hygiene. These findings were similar to those reported by Frenkel *et al.*⁽¹⁰⁾ and similar to reports by Isaksson *et al.*,⁽¹⁸⁾ Peltola *et al.*,⁽¹⁹⁾ and Kullberg *et al.*⁽²⁰⁾

Debris Score

The high levels of oral debris reflected the large proportion elderly residents who could not, or did not, brush their teeth, and who did not receive assistance. These findings were similar to a study done by Nicol *et al.*⁽²¹⁾

Denture Plaque

Previous studies have showed a significant relation between denture stomatitis and denture plaque. Schou *et al.*⁽¹⁵⁾ and Lindquist *et al.*⁽²²⁾ in their findings showed that all patients who had stomatitis also had visible denture plaque. They also found that stomatitis was cured if the plaque was removed. Most of the authors seem to agree that a significant correlation exists between poor denture cleanliness and denture stomatitis. Budtz-Jorgensen and Bertram⁽²³⁾ suggest that the poor denture cleanliness is primary due to leucocytic emigration and to the continuous shedding of epithelial cells of inflamed mucosa and, to a lesser degree, to neglected denture hygiene. In the present study, elderly residents reported that dentures were soaked overnight in water but not generally brushed. This is likely to account for the increased finding of denture plaque. These findings were similar to the study conducted by Frenkel *et al.*⁽¹⁰⁾ where the denture plaque score was 2.77 ± 0.87 and also similar to findings of Nicol *et al.*⁽²¹⁾ and Schou *et al.*,⁽¹⁵⁾ where the baseline scores for denture plaque was 2.1 ± 1.1

Denture-induced Stomatitis

The relationship between high denture plaque levels and diffuse erythema/papillary hyperplasia (i.e., Grade 2 and 3 denture induced stomatitis) is well documented. These findings were similar to the results from the study Budtz-Jorgensen *et al.*,⁽¹¹⁾ Frenkel *et al.*,⁽¹⁰⁾ and Nicol *et al.*⁽²¹⁾

General preventive measures are essential to promoting good oral and general health in the elderly, including daily oral hygiene practices, with specific attention to control of dental plaque and xerostomia, regular oral health assessment, and dietary awareness.

The key factor in realizing and maintaining good oral health is daily oral hygiene care by removing the oral bacterial plaque, mainly composed of pathogenic gram-negative germs.^(24,25)

Mechanically remove plaque from natural teeth with small, soft toothbrush (or electric toothbrush) and fluoride dentifrice twice a day; gently brush teeth, tongue, and gums daily. Facilitate flossing, as appropriate. Consider oral or topical fluoride or antiplaque agents in consultation with dental professional. Clean dental prostheses with denture brush twice a day; remove and soak them at night whenever possible. Regularly inspect prostheses for cracks, sharp edges, missing teeth. Regularly clean denture storage container, and initiate

denture identification program. Alleviate/prevent xerostomia; routinely ask elder if mouth feels dry or uncomfortable. Give fluids, such as water-based mouth rinses, frequently. Use artificial saliva or lip lubricants. Have elder chew sugar-free gum or suck on sugar-free candy, as appropriate. Periodically review xerostomia-inducing medications for reduction of drug levels/alternate drugs.

Educational Approaches

Educational interventions can improve nurses' knowledge and accuracy of oral health assessment. Interventions that include oral health education with direct hands-on training for nursing assistants have demonstrated improved oral health outcomes for residents. Other educational approaches that may be useful include the participation of dentists in formal presentations of oral health curricular content in professional nursing programs.

CONCLUSION

The evidence suggests that poor oral hygiene among institutionalized elders is a much greater problem than commonly realized. Oral hygiene for this population typically has been perceived as a burden, but good oral care has significant benefits for both the quality of life and overall general health of frail elders. Nurses can play a critical role in improving oral health care for these older adults, thus promoting better patient outcomes. Evidences suggest that supervised oral health care in residential care homes for elderly people is more effective in improving oral health and oral health care of the residents.⁽²⁶⁾

A systematic review aimed to review implementation strategies used to promote or improve oral health care for older people in long-term care facilities concluded that knowledge, self-efficacy, and facilitation of behaviour are determinants that are often addressed in implementation strategies for successful improvement of oral health care in older patients.⁽²⁷⁾ Evidence also suggest that professional cleaning of teeth and dentures, with individual instruction, can be recommended to improve oral hygiene of the elderly.⁽²⁸⁾

Hence the nursing and related health-care professions can support the efforts of caregivers by recognizing, recommending, and supporting best practices in this important area.

CONFLICT OF INTEREST DISCLOSURES

The authors declare that no conflicts of interest exist.

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