

Oral Health Status of Elderly People Living in Different Old Homes of Karachi

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ABSTRACT

Objective: To assess the oral health status of elderly people living in Karachi based old homes

Methodology: A cross-sectional study was conducted over a period of two to three months, enrolling 96 subjects from old homes of Karachi using purposive sampling. Older adults aged above 65 years who were mentally stable and given consent were included in the study. Data was collected via a self-constructed Proforma with WHO Oral examination form. Data was entered and analyzed via SPSS 23.0. Expected outcomes include higher Decayed Missing Filled Teeth (DMFT) scores, as well as a higher rate of periodontal disease resulting in higher rate of tooth loss.

Results: A total of 59 males and 37 females were included in the study. Among the participants, 70.8% had Bleeding on probing (BOP), 62% had pocketing of 4-5 mm, 66.6% had a greater decayed component, and 85% had missing teeth. T test results showed that the Decayed component was significantly associated with gender (p 0.01) and age (p 0.01). The Missing component was significantly associated with age only (p 0.00). The Decayed Missing Filled Teeth DMFT index was significantly associated with gender (p 0.00), systemic disease (p 0.04) and age (p 0.02). The Community Periodontal Index CPI was found significant with gender (p 0.01) and age (p 0.05). ANOVA test showed that Decayed, Missing component and DMFT were significantly associated with marital status only (p 0.001, p 0.09 and p 0.00 respectively).

Conclusion: Oral health status worsens with age as shown by the current study. Old home people are more vulnerable to debilitating condition and hence need more care.

KEYWORDS: Oral health, Periodontal status, Decayed Missing Filled Teeth (DMFT) Index.

INTRODUCTION

Dental caries is defined as a pathologic process that involves microorganisms, leading to the enamel decalcification, decomposition of dental hard tissue

and it results in the dental cavity.¹ Geriatrics is a field that is concerned with early detection, proper management, and early prevention of diseases in the elderly and addressing issues specific to growing age. It is derived from the Greek word “Geron” meaning “Old man” plus “iatreia” meaning “the treatment of diseases.”² Oral health is an integral part of the overall health of an individual. Inadequate oral hygiene status and untreated dental diseases affects the overall life of older people. Dental caries is a major health problem globally and is the most widespread disease. Dental caries results when plaque that accumulates on the tooth converts the free sugars from diet into acids which gradually damage the tooth. An excessive intake of free sugars, inadequate exposure to fluoride, and a lack of plaque removal by tooth brushing can result in caries, pain, infection, and lastly tooth loss. The immune system of a person weakens as he ages. In

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this situation, dental caries may cause toothache, swelling, and tooth loss, and can worsen the condition as he might feel difficulty in mastication. Elderly people are more prone to dental caries, especially root caries which is considered a leading cause of tooth extractions in this age group. It is also found that as the aging process occurs, the body becomes more susceptible to microbial attacks; in the case of dental health, this includes conditions like periodontitis. Poor oral hygiene and a decrease in the salivary flow rate are associated with aging, this not only leads to caries but also leads to periodontitis.³ Inflammation starts first at the marginal gingiva in contact with dysbiotic biofilm that initiates gingivitis which further leads to periodontitis. The periodontal disease was found to be ranging from 20% to 50% across the globe.⁴ Asia having third highest prevalence and around two third of this is the geriatric population.⁵ Loss of tooth due to periodontal disease leads to several disabilities such as difficulty in chewing, impaired speech, changes in appearance, and may contribute to conditions like Costen's syndrome and possibly having general impact on social interactions of patients.

In 2010, the French High Health Authority (HAS) published a report reviewing studies on various dental diseases. It highlighted that 33-50% of adult had at least one decayed tooth requiring treatment, 30-60% of adults living in special elderly care institutions had conservative dental care needs, and 44% had at least one decayed tooth. Further researches on people living at their homes revealed that 37% of them had caries.⁶ A study was conducted in India between 2000-2004 and 2005-2009 to evaluate the burden of dental caries among geriatric population over the past two decades. A systematic review from attainable literature was made through 6 community-based articles. The prevalence of caries was observed to range between 31.5% and 100%. A weighted prevalence of dental caries was observed at 83.6% and 82.3%, respectively.⁷ In 2004, a survey was brought off in India which revealed that out of 1052 dentate

elderly adults, 676 (64.2%) had decayed teeth (66.7% with root caries), 69 (6.6%) had filled teeth and recurrent decay was seen in 1.6% of total i.e., 17 adults. Filled teeth were evident in 233 (22.2%) adults, root canal treatment in 51 (4.8%) and extractions were noticeable in 424 (40.3%). There was a significant statistical difference in the findings of dental caries between urban and rural areas. Dental caries was more prevalent among the elderly population under study, with a notable increase in prevalence among residents in rural areas compared to the urban population. Only a few old people had affirmation of past filling or root canal treatment whereas their requirement for treatment was noteworthy.⁸ Another survey conducted in the population of northeast China found 67.5% prevalence of dental caries in older people and 2.6863.40 DFT index. This observation of prevalence was quite similar to those observed in many prior studies conducted in India (64.2%), Beijing (66.03%; 2.3762.96) and Hungary (2.0461.45) but higher than the report made in Canada (49.3%; 1.6262.53) and that of second China National Oral Health Survey made in 1995 (64.8%). This indicates that dental caries does not necessarily improve with economic development but remain a highly prevalent disease.⁹ In Asia and Africa, the highest prevalence of untreated caries was found; many studies reported caries prevalence of 50% or more in their elderly. Untreated caries was found in 25% of community dwellers in Australia and up to 99% in South Africa, while in institutionalized older adults, the prevalence ranged from 47% in India to 99% in Vietnam. The finding of untreated root caries was found from 8% (Finland) to 74% (Brazil) in community dwellers, and from 30% (Hong Kong) to 96% (Vietnam) in institutionalized older adults. Socioeconomic risk factors for caries include household income and education while behavioral risk factors of caries in geriatric population include tooth brushing and dental visit frequency and dietary habits.¹⁰ A survey on periodontitis was carried out in Pakistan in 2014. According to WHO, it was stated that 18%

population of Pakistan has some form of periodontal problems and out of these 31% has periodontitis. 64% adults have moderate to severe periodontitis and around 93% of the 65 year and above suffer from some periodontal disease.¹¹ From 2004 to 2006, the National Survey of Adult Oral Health conducted by Robert Thompson and colleagues reported that 25% of adults aged 35 to 54 had moderate to severe periodontitis. However, 44% of individuals aged 55 to 74 had moderate to severe periodontitis, which increased to 61% among those over 75 years old.¹² Previous researches have worked on these two dental diseases and have identified their potential risk factors in Geriatrics. Dental caries begins only when the conditions of the oral secretions allow pathogenic microorganisms to form gelatinous plaque, which adheres to the surfaces of the teeth. Among various factors, dental caries and periodontitis can result from decreased salivary gland function (xerostomia), immune compromise, alveolar bone resorption, uncontrolled diabetes, poor oral hygiene, and the use of antihypertensive medications—all of which are commonly encountered in the geriatric population. It can be controlled by taking appropriate measures if the disease is diagnosed at an early stage, which involves the removal of plaque, reducing acid stimulus, by reducing sugar consumption.

RATIONALE

As one ages, the individual becomes more susceptible to physical ailments as well as oral diseases as the immune system declines and degenerative changes occur. Similarly, dental caries and periodontitis become more common in this age group and are serious health problems. If left untreated, they can lead to tooth destruction, discomfort, infection, abscess formation, pain, and, in advanced stages, ultimately tooth loss. Salivary flow also decreases in many people belonging to this age group due to different physiological changes and medications used. Xerostomia further promotes the chances of periodontitis and dental

caries. Furthermore, maintenance of oral hygiene also becomes difficult in this age group. Moreover, people living in old homes have limited available resources for maintenance of diet and oral care. Their psychological health is also impaired leading to neglected oral care. Since seeking dental care becomes increasingly difficult especially for institutionalized elderly individuals due to various reasons like transport difficulties, high cost, psychological issues and other barriers. Early diagnosis of the disease becomes crucial for this disadvantaged population. Hence, our study aims to assess the oral health status of elderly people living in Karachi based old homes.

METHODOLOGY

A descriptive cross-sectional study was conducted, recruiting ninety-six subjects of age 65 and above from Sahara Old Home DHA and Sahara Old Home Ibrahim Hyderi of Karachi, with non-probability purposive sampling. Ethical approval was taken from Ethical Review Committee Bahria University Medical and Dental College (vide letter No. ERC-BUHS 50/2022). Permission from administration was obtained in advance prior to the visit. Upon arrival at the venue, informed consent was taken from the elderly individuals or their guardians. Study duration was over the period of two months from Feb 2023 to March 2023. Sample size was calculated using proportional method for infinite population size keeping CI at 90% the calculated sample size is $n=100$ (OpenEpi, Version 3). Subjects who were mentally unstable, non-cooperative, unwilling to participate, had received dental treatment within the last 6 months, or had taken antibiotics within the last 6 months were excluded from the study. The people who agreed were seated in an appropriate place. Oral examination was performed by dentists. A self-constructed proforma was used, which included demographic and socioeconomic sections, followed by an oral examination conducted using the WHO Oral Health Assessment Form for Adults (2013). DMFT index and CPI index was assessed. Data was

entered in SPSS Version 23.0. Descriptive statistics were run. Means and standard deviations were assessed. Inferences were made according to the normality of the data. Chi square test was used for assessing associations with categorical variables. Student test and ANOVA test were used for assessing associations with continuous variables.

RESULTS

Table.1 Demographics show 61.5% males while 38.5% females, 79.2% were married while 47.9% had elementary education but 37.5% had a degree

Table 1: Demographics and Medical History		
Variable	Frequency (n=96)	Percentage
Gender		
Male	59	61%
Female	37	38.5%
Marital Status		
Never married	17	17.7%
Married	76	79.2%
Previously married	3	3.1%
Education level		
No Qualification	14	14.6
Elementary education	46	47.9
Degree or higher	36	37.5
Occupation Level		
Professional	17	17.7
Intermediate	18	18.8
Manual worker	33	34.4
Unemployed	28	29.2
Presence of Systemic Disease		
No	88	91.7
Yes	8	8.3
Systemic disease		
ASTHMA	1	1.0
DM	4	4.2
HTN	2	2.1
HTN, IHD	1	1.0
No disease	88	91.7
Smoking Status		
Never	44	45.8
Past	8	8.3
Current	36	37.5
Occasional	8	8.3
General Health		
Good	45	46.8
Fair	50	52.0
Bad	1	1.04

qualification. Majority were found with no systemic disease (91.7%). 45.8% had never smoked however, 37.5% were currently smoking.

Table 2 Descriptive statistics of dental parameters		
Variable	Frequency (n=96)	Percentage %
Bleeding on probing		
No	28	29.2
Yes	68	70.8
CPI Score		
No	28	29.2
4-5mm pocket	60	62.5
> 6mm pocket	8	8.3
D Score		
0 decay	0	0
1-4 decayed	25	26
5-9 decayed	64	66.6
> 10 decayed	7	7.2
M Score		
0 missing	0	0
1-3 missing	85	88.5
4-6 missing	9	9.3
> 6 missing	2	2.0
F Score		
0 filled	35	36.4
1-3 filled	35	36.4
4-6 filled	26	27

Table.3 Means of dental parameters		
Variable	Mean	SD
D	0.18	0.09
M	0.06	0.11
F	0.06	0.06
DMFT	0.22	0.16
BOP	1.70	0.45
CPI	0.06	1.33

Table.4 Association test for categorical variables			
Variable	BOP		P value
	No	Yes	
Gender			
Male	17	42	0.923
Female	11	26	
Marital Status			
Never			0.98
Married	5	12	
Married	22	54	
Previously Married	1	2	

Education Level				
No Qualification	8	6		0.03*
Below degree	13	33		
Degree	7	68		
Occupation				
Professional	5	12		0.93
Intermediate	6	12		
Manual worker	10	23		
Unemployed	7	21		
Smoking Status				
Never		33		0.05*
Past	11	6		
Current	2	23		
Occasionally	13	6		
	2			
Systemic Disease				
No	28	57		0.02*
Yes	0	11		
General Health				
Good	14	42		0.28
Fair	14	26		
Variable	CPI Score			P Value
	No	4-5mm Pocket	>6mm Pocket	
Gender				
Male	17	37	5	0.99
Female	11	23	3	
Marital Status				
Never Married	5	10	2	0.96
Married	22	48	6	
Previously Married	1	2	0	
Education Level				
No Qualification	8	6	0	0.04*
Below degree	13	28	5	
Degree	7	26	3	
Occupation				
Professional	5	10	2	0.88
Intermediate	6	12	0	
Manual worker	10	20	3	
Unemployed	7	18	3	
Smoking Status				
Never	11	29	4	0.04*
Past	2	6	0	
Current	13	19	4	
Occasional	2	6	0	
Systemic Disease				
No	28	51	6	0.05*
Yes	0	9	2	
General Health				
Good	14	37	5	0.56
Fair	14	23	3	

P value ≤ 0.05 taking significant

Their perception of general health was reported as 52% fair and 46.8% good. Table 2 shows the descriptive statistics of dental outcomes. Among the 96 participants, 68 (70%) had positive bleeding on probing, and 68 (70.8%) were suffering from

periodontal pocket formation. Additionally, 66.6% had more than five decayed teeth. All participants were found to have some missing teeth, with none having all 32 teeth present. Furthermore, 61 (63.4%) participants were found to have filled teeth. Table.3 represents mean and standard deviations of the dental parameters. Bleeding on probing has the highest mean values 1.7 while missing component, filled component and CPI has lowest mean values.

Table 5A: t-test for association

Variable	Means									
	D		M		F		DMFT		CPI	
	t	p	t	p	t	p	t	p	t	p
Gender	12.1	0.01*	-0.7	0.44	-1.4	0.14	-3.5	0.00*	-2.5	0.01*
Systemic Disease	0.84	0.40	0.61	0.54	-0.60	0.54	0.85	0.04*	-0.90	0.36
Age	19.5	0.01*	5.82	0.00*	10.1	0.06	13.0	0.02*	12.4	0.05*

P value ≤ 0.05 taking significant

Table.4 depicts BOP and CPI association with demographic and medical and addiction variables. Significant association was observed for BOP with education level (p 0.03), smoking status (0.05) and systemic disease (p 0.02). The CPI was also found significantly associated with same variables i.e. education level (p 0.04), smoking status (0.04) and systemic disease (p 0.05).

Table.5B ANOVA test for association

Variable	Means									
	D		M		F		DMFT		CPI	
	f	p	f	p	f	p	f	p	f	p
Marital status	7.83	0.001*	1.71	0.09*	0.55	0.57	16.9	0.00*	1.08	0.34
Education Status	1.47	0.23	1.77	0.17	0.56	0.57	1.44	0.24	0.09	0.90
Occupation	1.92	0.13	1.18	0.31	0.78	0.52	0.43	0.72	3.53	0.01*
General Health	0.07	0.79	1.20	0.27	0.27	0.60	0.17	0.67	1.58	0.21
Smoking Status	1.67	0.17	0.23	0.87	0.60	0.61	2.53	0.06	2.41	0.07

P value ≤ 0.05 taking significant

Table.5A shows t test results of dental outcomes where Decayed component was found significant with gender (p 0.01) and age (p 0.01). The Missing component was

found significantly associated with age only (p 0.00). Filled component was not significantly associated with any variable. DMFT was found significantly associated with gender (p 0.00), systemic disease (p 0.04) and age (p.0.02). the CPI was found significantly associated with gender (0.01) and age (p 0.05). Table.5B shows ANOVA results of dental outcomes where Decayed, Missing component and DMFT were found to be significantly associated with marital status only (p 0.001, p 0.09 and 0.00) respectively. Filled component was not found significantly associated with any variable. CPI was only found significantly associated with occupation (p 0.01).

DISCUSSION

Oral health care of older individuals who are dependent on care providers residing in old homes is the need of time. This research was designed as a descriptive cross-sectional study, with data collected from two old homes in Karachi, over a two month period in early 2023. Although the sample size was relatively small which was determined using proportional sampling, resulting in a total of 96 elderly participants.

Table 1 shows the demographic and medical history data. The majority of old aged population were male (61%), married (79.2%), and had education levels below a degree (47.9%). Most participants reported good general health (46.8%), with 8.3% having systemic diseases, such as asthma, diabetes mellitus (DM), and hypertension (HTN). Furthermore, 37.5% of participants were current smokers. It is essential to consider demographic factors and systemic health conditions when assessing oral health in elderly individuals, as they can impact dental outcomes significantly.^{13,14} A study conducted earlier, suggests that oral disease in elderly population can result in systemic discomfort affecting over all well-being.¹⁵

Table 2 provides an overview of dental parameters. Notably, 70.8% of participants had positive BOP, indicating gum bleeding upon probing. Additionally, 70.8% of participants exhibited

periodontal pocket formation (CPI scores), and the majority had decayed teeth (66.6%). No participants had all 32 teeth present, and 63.4% had filled teeth. Similar conclusions were made in a review published in 2020, where global studies on old aged people were assessed. It was concluded that the periodontal status deteriorates with age which is most likely due to the result of multiple systemic diseases associated in this age group.⁴

These findings highlight the significant impact of periodontal issues and dental caries among the elderly population in old homes. Despite the known effects of poor oral health on the geriatric population, the need to provide oral healthcare for dependent elderly individuals is often neglected, making access to dental care difficult.¹⁶ In addition, the oral health awareness, knowledge, attitude, and practices of elderly people living in institutes are assumed to be low.¹⁷ Therefore, the oral health in this demographic group is a matter of concern, and access to dental care and prevention programs should be a priority.^{18,19}

Table 3 presents the mean and standard deviation values for dental parameters. BOP had the highest mean value (1.70), indicating a considerable prevalence of bleeding gums among participants. On the other hand, the missing component had a mean value of 0, implying that all participants had some degree of tooth loss. The DMFT index had a mean value of 0.22, suggesting that, on average, participants had one or more decayed, missing, or filled teeth. These mean values underscore the need for comprehensive dental care for the elderly population living in old homes, focusing on both prevention and treatment.²⁰

Table 4 shows association tests between dental outcomes (BOP and CPI) and categorical variables, such as gender, marital status, education level, occupation, smoking status, systemic disease, and general health. Significant associations were observed between BOP and education level, smoking status, and systemic disease. Similarly, the CPI was significantly associated with education level, smoking status, and systemic disease.

The unclear role of care providers facilitating with oral hygiene instructions, coupled with their lack of basic training results in hurdles in providing oral health care in old homes.²¹ The findings in this table emphasize the role of socioeconomic factors and health conditions in influencing oral health outcomes among the elderly. Education and awareness campaigns targeting this population shall be designed with these factors in mind.^{22,23}

Tables 5A and 5B present the results of t-tests and ANOVA tests to assess associations between dental outcomes (D, M, F, DMFT, CPI) and various demographic and medical variables. Gender, age, and marital status were significantly associated with dental outcomes. For instance, gender was associated with DMFT, with females exhibiting higher mean values. Age was associated with D, M, DMFT, and CPI, indicating that as age increases, dental issues become more prevalent. Marital status was associated with D, M, and DMFT, suggesting that the dental condition varies among married and unmarried individuals. These findings underscore the multifactorial nature of oral health in the elderly population.^{24,25}

CONCLUSION

This study assessed the oral health status & challenges faced by elderly individuals residing in old homes in Karachi. The high prevalence of periodontal issues and dental caries, as well as their association with socioeconomic factors and systemic health conditions underscores the significance of a targeted oral health approach as a future recommendation to improve the wellbeing of this vulnerable population.

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Muhammad Mohsin Haider: conceived the study designed, carried out the data collection and statistical analysis and drafted the manuscripts.

Muhammad Arqam Najmi: Participated in its design and coordination. drafted, read and approved the final manuscript.

Kulsoom Fatima Rizvi: Participated in its design and coordination. Statistical analysis, drafted, read and approved the final manuscript.

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