Oral Health Status of Elderly Living in Residential Homes at Damanhour City, Egypt

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Abstract

Background: *Oral health is essential to overall health of older adults and their quality of life.* ***Objective:*** *the aim of this study was to assess the oral health status of elderly living in residential homes at Damanhour City, Egypt.* ***Setting:*** *The study was conducted at the available governmental residential home in Damanhour City.* ***Subjects:*** *all available elders age 60 years and above, accepted to participate in the study and residing in the previously mentioned setting.* ***Tools:*** *data was collected using structured interview schedule, Oral Health Assessment Tool and a self-reported Oral Health Assessment Index.* ***Results:*** *The results revealed that the mean age of elders were 69.07 ±6.34 years, females constituted 44.0% and males were 56.0%. Oral health status was perceived as good by 26.2% of the male compared to 15.1% of females. Nearly three-quarters of males and 63.6% of females don't brush their teeth. Subsequently, 59.1% of males suffer from toothache versus 50.0% of females and 88.6% of the studied elders could not afford dental care service.* ***Conclusion:*** *The present study concluded that the majority of elders had poor oral health status because of their lack of access and utilization of dental care services; consequently there is high percentage of dental problems.* ***Recommendations:*** *The study recommended that developing appropriate and effective oro-dental health care programs oriented to this age group is an essential requirement.*

Keywords: Oral health, periodontal, disease, older adults.

Introduction

Oral health is a critical component of every individual's general health and wellbeing. The World Health Organization recognizes oral health as an integral part of general health and a basic human right[1,2]. Evidence demonstrates that age, poverty, education levels and living in a rural area are risk factors for poor oral status. Oral health, however, means more than just an attractive smile. Poor oral health and untreated oral diseases and conditions

usually have a significant impact on the quality of life[3].

The word oral refers to the mouth. The mouth includes not only the teeth and the gums (gingiva) and their supporting tissues, but also the hard and soft palate, the mucosal lining of the mouth and throat, the tongue, the lips, the salivary glands, the chewing muscles, and the upper and lower jaws. A large percent of the older population suffers from a reduced quality of life due to oral and facial pain. This pain is largely due to infections of the gums that support the teeth and can lead to tooth loss. This finding is especially critical since the majority of the population is affected by some type of periodontal disease or gingivitis[4].

Periodontal disease (PD) is the most pandemic prevalent chronic condition among older population. It is a life time disease accumulation rather than an age specific condition. It is characterized by progressive destruction of tooth's supporting soft and hard structures such as gingivae, periodontal ligament and alveolar bone[5-7].

Oral disease is common in advanced age. The most common oral health problems encountered by the elderly are teeth loss, dental caries, gingivitis, peridontitis, xerostomia, oral lesions, and dental problems. A study done in Alexandria revealed that the majority 81.52% of home-based elderly are complaining of one dental problem while the rest 18.42% of the aged suffered from more than one dental problems such as tooth-ache, decay and abscess[7,8]. Although most of these disorders are not life threatening, they may impose a significant burden on the individuals and communities and can greatly result in pain, change in dietary habits, sleep disturbance and reduced social contact. Moreover, it reduces an elderly person's quality of life[9].

Oral health also affects systemic health regardless of an individual's age. Underscoring the importance of the relation between oral and systemic health have several important findings. One example is the link between poor oral health and bacterial endocarditis, a debilitating condition in which the lining of the heart and heart valves become inflamed[10]. Individuals with poor oral health have a 25% increased risk of coronary heart disease as compared to individuals with optimal oral health[11]. Poor mouth care also can contribute to oral cancer, which takes more lives annually than cervical or skin cancer. Additionally, poor oral health affects the digestive process, which begins with physical and chemical activities in the mouth. Left untreated, digestive tract problems can result in intestinal failure and

Irritable Bowel Syndrome[3]. Moreover, poor oral health is also linked with diabetes mellitus[11]. Researchers found that individuals with poor oral health, especially poor periodontal health, have a 3 times greater risk of developing diabetes than an individual with optimal periodontal health[12].

Successful ageing is synonymous with maintenance of quality of life. Quality of life can be understood as "the degree to which a person enjoys the important possibilities of life"[13]. While most oral diseases are not fatal, they do lead to significant morbidity, which ends up in serious physical, social and psychological consequences that affect the patients' quality of life. From a dental perspective this involves controlling oral disease and restoring damaged tissue, with an underlying premise that treatments effective in achieving those goals will consequently produce improved oral function, comfort and social wellbeing[14,15]. Good oral health is essential to healthy aging. Because effective interventions to prevent and control oral disease exist, good oral health can be achieved by older adults. The public health system can play a vital role in ensuring that this occurs[16].

Aim of the Study

To assess the oral health status of elderly living in residential homes at Damanhour City, Egypt.

Research Question:

What is the oral health status of elderly living in residential homes at Damanhour City?

Materials and Method

Materials

Design: A correlational study.

Setting: The study was conducted in the available Damanhour governmental compound of residential home in Damanhour City namely Mogamae Dar El Mossenin. The compound is composed of three floors, each one considered as a separate residential home (Dar El-Hanan, Dar El-Hana and Dar El-Amal). These are the only governmental residential homes available in El-Beheira Governorate. The number of elders residing in these homes amounted to 95 persons.

Subjects: The subjects comprised the available elders residing in the previously mentioned setting and fulfilling the following criteria:

- Age 60 years and above.
- Willing to participate in the study.
- Able to communicate.

Their total number amounted to 75 elders.

Tools: In order to collect the necessary information for the study, three tools were used:

Tool I: Socio-demographic and clinical data structured interview schedule

It was developed by the researcher based on literature review and included the following items:

- General characteristics and demographic information of the elders: such as age, gender, religion, area of residence, level of education, marital status, occupation before retirement, income.
- General health: elders' perception regarding their overall health, the presence of health problems, and level of dependency in performing activities of Daily Living.
- Risk behaviors affecting oral health such as smoking, consumption of acidic drinks, alcohol.
- Oral health practices and the utilization of dental services.

Tool II: Revised Kayser-Jones Brief Oral Health Assessment Tool (BOHAT)[17- 19]

Kayser-Jones Oral Health Assessment Tool is the most comprehensive, validated and reliable screening tool. Its reliability is (r= 0.83), inter-rater reliability (r= 0.68), and content validity have been established by six field experts. [20] The BOHSE is a screening tool with demonstrated reliability and validity that should be used by most health care providers either professional nurse or caregivers to assess the elders' oral health status and detecting oral health problems among them in both community and institutional settings. The original BOHSE tool with 10 categories was modified by Chalmers & Pearson (2005) in three ways. Firstly, by eliminating the categories for lymph nodes and pairs of teeth in chewing position. Secondly, by combining the tissue and gum categories, and thirdly, by adding a category for the assessment of behavioral problems and pain related to oral and dental problems. Also, a trigger for referral to a dentist was added. The modified tool was used in this study, thus the final OHAT used in this study had eight categories. The eight categories evaluated in the OHAT included the following: (a) Lips, (b) Tongue, (c) Gums & tissues inside cheeks, (d) Saliva, (e) Teeth/dentition (condition of natural teeth), (f) Denture/artificial teeth, (g) Oral

cleanliness, and (h) Dental pain complain. Each category was described and rated on a 3-point ordinal scale from healthy oral condition (score 0) to changed oral status (score 1) or to severe oral health problem/unhealthy condition (score 2).

Tool III: Geriatric Oral Health Assessment Index[21- 22]

It is a self-reported oral health status in the previous 3 months. This scale was developed by Dolan et al (1990), translated into Arabic, standardized and tested for content validity and reliability to Egyptian culture by Hamza et al (1999). It was used to assess oral health-related problems affecting older people in three hypothesized dimensions (physical, psychosocial function, pain or discomfort). Physical function included eating, speech, and swallowing, while psychosocial function included worry or concern about oral health, self-image, self-consciousness about oral health, and avoidance of social contacts because of oral problems. Pain or discomfort including the use of medication to relieve pain from the mouth. It consists of twelve items, which are rated on five-point scale with 1 indicating always, 2 indicating often, 3 indicating sometimes, 4 indicating seldom, 5 indicating never. Each subject was asked if he/she had experienced any of the twelve problems in the previous 3 months. A simple summative score ranged from 12 to 60 was divided into three categories: high score ranged from 57-60 (i.e. good oral health status), while 51-55 moderate score (i.e. fair oral health status), and less than 50 is a low score denoting poor oral health status.

Method

1- Before the conduction of the study, official letters from the Faculty of Nursing, Damanhour University were forwarded to the Ministry of Social Affairs and the director of the residential homes to obtain their approval and assistance in order to carry out the study and interview the elders.

2- The director of the residential homes was informed about the aim of the study.

3- The study tool I socio-demographic and clinical data structured interview schedule was tested for content validity by three jury experts in Gerontological Nursing at Alexandria and Community Health Nursing at Damanhour University.

4- A pilot study was carried out on 7 elders from the only available private residential home at Damanhour City "Dar El-Saada''. They were chosen randomly to test clarity and in order

to determine the approximate time needed for each interview.

5- Each elderly person was interviewed individually to collect the necessary data. It took approximately 45-60 minutes to complete the study tools depending upon understanding and response of elders.

6- Each elderly was examined to assess their oral cavity status. Either by inspection and /or palpation for detecting oral health problems among elders using tool II.

7- In case of detecting the existence of actual or potential oral problems and/ or needs, the researcher instructed the elders about the importance of oral hygiene measure and referred them to General hospital (outpatient clinic).

8- Data were collected during period starting from the first of January 2013 to the end of April 2013. It was possible to visit the home for 3 days/week to interview two or three residents per day..

Ethical considerations:

Verbal consent was obtained from each elder after explaining the purpose of the study. Privacy was maintained during the process of data collection. Confidentiality of collected data and anonymity were guaranteed.

Statistical Analysis

After data were collected, they were coded and analyzed. The statistical package for social sciences (SPSS) was utilized for data analysis and tabulation. Statistically significant at $p \leq 0.05$

The following statistical measures were used:

Descriptive statistics:

- Count and percentage: used for describing and summarizing qualitative data.
- Minimum, maximum, arithmetic mean (X), standard deviation (SD). They were used as measures of control tendency and dispersion respectively for normally distributed quantitative data.

Analytical statistics:

1- Chi square (X^2): it was used to test the association between categories of qualitative variables.

2- Fisher exact test and Monte Carlo test: used when expected frequency < 5 exceeding 20% of cells.

3- t-test: used to compare two sample means

Graphical presentation:

Graphs were done for data visualization by using Microsoft Excel.

Results

Table (1) shows that the age of the residents ranged from 60 to 89 years, with a mean age of 69.07±6.34 years, with a significant sex differences (t=2.150, p= 0.035). Of the 75 residents involved in the study 42 (56.0%) were males and 33 (44.0%) were females. It was surprising that 26.2% of males were from urban and 73.8% from rural areas versus 42.4% and 57.6% of women respectively. The majority of elders were illiterate and/or read & write. Moreover, about half of them don't have enough income (>200 LE); these were 42.9% of males compared to 51.6% of the females.

Table (2) shows presents elders' health status; that more than one third of them perceived their overall general health to be good; 41.3% as fair and 20.0% as bad. Gastrointestinal problems are the most prevalent chronic conditions among elders, affecting 45.2% of males and 42.4% of females. More than one third of participants have diabetes; these were 38.1% of males compared to 30.3% of females. Concerning number of daily medication consumed, the mean number of medication were 2.48 ± 1.65 for the daily prescribed medications received by elders, with a significant gender differences (t=12.104, p= <0.001). Exactly one third of males compared to 39.4% of females had musculoskeletal problems that limit their mobility. Moreover, the majority of elders were independent in daily living activities; these were 81.0% of males compared to 78.8% of females.

Regarding elders' cigarette smoking pattern, **figure (1)** reveals that 54.76% of males were smoker compared to none of the females.

Figure (2) illustrates that one third of the smokers burn one pack daily.

Table (3) represents that only more than one fifth (21.4%) of elders perceived their oral health status as good and the rest as either fair 49.3% or poor (29.3%). The majority of males and females elders (73.8% and 84.9% respectively) perceived their oral health status as poor or fair. Moreover, about three quarters (74.7%) of elders partially lost their teeth and 18.6% were edentulous. Studying the difference between males and females, the table shows that 21.4% and 15.2% of the studied male and female elders respectively were completely edentulous. This resulted in, that more than one third for males (35.7%) and 45.4% of females reported of being unsatisfied with their natural teeth appearance. In addition, nearly the same percentages of elders (35.7% of males and 33.3% of females) had problems in chewing food.

Table (4) portrays oral hygiene habits among older people, although tooth brushing remains the most popular oral hygiene practice yet more than two thirds (69.3%) of elders don't brush their teeth; these were 73.8% of males compared to 63.6% of females. Among the main reasons reported by elders for not brushing their teeth were negligence and missing teeth (61.5% and 28.9%) respectively.

Table (5) illustrates the percentages of those elders who currently suffered from oral problems; these were 58.4% of males compared to 54.5% of females. More than half of the participants (55.0%) suffered from toothache, followed by bleeding gums (52.0%) and calculus deposition (40.0%). Nearly the same percentages were mentioned by males and females' older population regarding the main oral problems found.

Table (6) portrays that more than two thirds (68.6%) of those elders with partial and complete tooth loss reported that they have not denture prosthesis and 31.4% of elders have prostheses. Of those elders with denture prostheses, nearly half (45.5%) have complete removable denture (upper and lower dentures). Males amounted to 40% compared to 57.1% of females. However, 41.2 percent of elders don't usually use their removable denture(s). The percent among males was 54.5% versus to 16.7% of females. Concerning elders' perception or feelings that removable dentures fit, only 47.1% of elders reported sound fit and the rest of them (52.9%) feel that it's loose. Consequently, 58.8% of elders have inflammation of gums that is caused by dentures; this was observed in 54.5% of males compared to 66.7% of females. Regarding the duration of using the existing removable dentures, 36.4% of males reported using their dentures from one to less than five years compared to 50.0% of females. While, nearly half (52.9%) of elders feel that currently there is a need for new dentures because they are not satisfied with dentures' appearance as reported by one third of them.

Table (7) shows that visit to the dentist allows for a comprehensive evaluation of teeth, gums, soft tissues, and for prevention, early detection, and treatment of oral health problems. 52.0% of elders are covered by insurances; of these 57.1% were males compared to 36.5% of females. While, nearly half (48.0%) of participants reported that they don't have dental insurance that covers the cost of their dental follow up and treatment. Furthermore, 29.3% of elders reported having visited the dentist within the previous year. No gender-based difference was observed as to the frequency of dental visits. These were 33.3% of males compared to 24.2% of females. When asked

about purpose of the last visit to the dentist, 49.3 percent of them reported for restorative treatment, followed by dental emergency/extraction as mentioned by one third of them and 22.7% of elders for making prostheses either complete or partial dentures. Concerning the major barriers in getting dental services, 46.7% of elders reported presence of barriers in getting services; of these 42.9% were males compared to 51.5% of females. Those barriers in getting dental care or services vary from one person to another, so the table portrays that the majority (88.6%) of elders have financial problem compared to 20.0% reported transportation problem. Unfortunately, less than half (45.3%) of elders have difficulties in getting emergency dental services and 32.0% have difficulties in getting basic dental services.

Figure (3) clarifies the distribution of the elders according to the self-reported oral health status through scores obtained by using Geriatric Oral Health Assessment Index. The majority of both males and females revealed poor oral health condition 92.9% and 84.8% respectively.

Regarding elder's mean scores of self-reported oral health status; **figure (4)** shows that female attained higher mean scores than those achieved by males (43.21 and 38.57 scores respectively).

Figure (5) portrays the mean scores obtained as a result of elders' dental condition screening by using Oral Health Assessment Tool (OHAT). It was obvious that, the mean OHAT scores for males and females elders were 6.83 ± 3.08 and 6.33 ± 2.97 respectively.

Table (8) shows the relation between self -reporting oral health status scores and personal characteristics of elders. No significant relation was observed between self-reporting oral health status scores and all personal characteristics of elders such as age, place of residence, marital status, level of education and income.

Table (9) shows the relation between oral conditions based on oral health assessment and age of elders. No significant relation between age groups and almost all categories of oral health assessment. Except for, natural teeth condition which was significantly influenced by the elders' age ($p=0.015$). Once the oral health assessment was done, the researcher was referring elders for dentist for treatment.

Table (10) shows the relation between oral conditions based on oral health assessment and oral follow up of elders. No significant relation was observed between elders with different dental visit pattern and categories of oral health assessment.

Table (11) conveys the relation between oral conditions based on oral health assessment and smoking pattern of elders. No significant relation was observed between elders with different smoking pattern and categories of oral health assessment

Discussion

With aging, elderly persons are more frequently found to have complex medical histories. It has also been shown that systemic diseases increase and affect oral health and quality of life[23]. The oral health problems reported by elderly include periodontal diseases, dental caries, in particular root caries, and teeth loss. Recent findings suggest that the improvement of oral health may have a positive impact on general health[24].

Oral health problems can hinder a person's ability to be free of pain and discomfort, to maintain a satisfying and nutritious diet, and to enjoy interpersonal relationships and a positive self-image. Overall, oral health problems are more frequently found in an older adult population for whom other health problems are often a priority[25]. Results of the present study revealed that more than one fifth of male versus one third of female elders perceived their oral health status as poor (table 3). As well, more than half of elders currently complain of dental problems (table 5). The same results were reported among elderly in several studies as Refael et al 2009 who mentioned that the majority of elderly populations in Brazilian cities have poor oral health[26]. Moreover, these findings were reported by Al-Shehri (2012) who reported that oral health of the institutionalized elderly population in Saudi Arabia is generally poor and their treatment needs are high[27].

Basic oral health services as check-ups, cleaning and fillings are an essential component of primary health care. Access to this component of basic oral care is a fundamental right for everyone[28]. Elderly people clearly are in great need for dental care and visiting a dentist is basic. It is an opportunity for the dental professional to review home care practices and advice for appropriate measures to prevent complication. A visit yearly is considered the standard measure of appropriate utilization of dental care[25]. The result of the present study portrays that less than half of participants don't visit a dentist since more than five years ago (table 7). This is in agreement with study done on older population in Ireland at 2009[29] when questioned on their frequency of dental visits within recent years, 22 percent of older people with natural teeth and 71

percent with no natural teeth replied they never visit the dentist, and only 44 percent of them attend the dentist regularly (every 2 years or more). Only 38 percent of those with teeth attend the dentist for routine check-ups; just 2 percent of those who have lost all their teeth go to the dentist for an oral health check-up. The majority of older people with teeth only go to the dentist when they are in pain and have a problem or when they feel they need treatment. Those with no teeth tend to not visit the dentist at all, unless they are in need of new dentures or experience pain.

Socioeconomic characteristics played a significant role in those who received dental care and is one of the variables influencing the oral health. Despite the elder's needs for dental services, yet they have barriers in getting them. Dental care is unreachable for many older persons living on a fixed or low income[30-31]. The result of the present study revealed that, financial burden was reported as a barrier to seek dental care. These results were supported by Dolan (1993) who reported that dental utilization rates are lower for older adults than for younger age groups, and barriers to care include the cost of dental care, the lack of perceived need for care, transportation problems, and fear[32]. Another study done by Gluzman et al at New York (2013) mentioned that the overall of the study sample, 92.0% needed some type of dental care and 96% stated that they had not seen a dentist since they became homebound and their quality of life was significantly affected by the lack of basic dental care[33]. This is consistent with the studies of Thompson et al. (2014)[34] and Wallace (2012)[35] who mentioned that cost is a major barrier to accessing dental care. This finding may be attributed to limited access to oral health care because of place of residence, economic factors, complex of medical illness, social isolation, and other individual and social factors[36]. The same findings were reported in the present study (table 7).

Accessibility to public health services is a vital determinant for the health of population. Distance and transportation are major concerns, especially in residential homes where medical facilities are sparse. Thus elderly of those institutions often confront problem to get health care. It is not surprisingly that, one fifth of elders reported transportation as reasons for not obtaining dental services. These results are congruent with a study in Nigeria by Awoyemi, who demonstrated that geographical proximity of services is an important factor that affected the utilization of health services[37- 38].

Oral hygiene is necessary because it affects the elders' oral health. A high proportion of elders in the present study were neglecting teeth brushing. This is

dissimilar to studies done by Wayatt (2002)[39] who emphasize the importance of oral hygiene. This finding is supported by Hawash (2006)[7] and Petersen et al. (2010)[40] who reported that tooth brushing remains the most popular oral hygiene practice worldwide.

Epidemiological research indicates that periodontal diseases are widespread throughout the world and evidence exists to show that their extent and severity increases with age[41]. The result of the present study revealed that nearly the same percent of male and female have toothache. Of the common oral problems among elders, bleeding gums**,** gingivitis and calculus deposition were reported by almost half of elders (table 5). On the contrary, Shay (2012) reported that toothache is uncommon for elderly and the more commonly reported are soft tissue complaints[42].

Edentulism can have obvious negative esthetic and functional (speech, chewing/ eating) consequences[43]. About one fifth of the study sample was edentulous. Therefore, they are more susceptible to chewing difficulties as mentioned by more than one third of them (table 3). Similar finding were reported by Allen (2003) [44] and Hawash (2006)[7] who reported that the prevalence of total tooth loss (edentulousness) varies widely between various communities, from 36% in one study in New Zealand, to 1% in a Japanese population. Oral health problems, whether from missing teeth, ill-fitting dentures, cavities, gum disease, or infection, can cause difficulty eating[45]. In the present study, less than half of the edentulous elders had both upper and a lower denture. However, in this group, more than one third of them did not always use their denture(s) (table 6). This is in line with Vargas study who reported that 80 percent of those who had lost all of their natural teeth had both dentures; however, 18 percent did not usually use them[25]. This can cause difficulty chewing, speaking, and swallowing. Subsequently, increases the risk of developing cavities and soft tissue problems[46]. Quality of dental prostheses (dentures) can help persons who have lost some or all of their natural teeth improve their quality of life by restoring lost function and esthetics. Dentures are worn because of their essential role in appearance, speech, and mastication, which far outweighs their potential for damage[47-48]. In the present study, approximately half of elders reported that their dentures were loose. Accordingly, they complain of inflammation of gums. This contradicts the use of dentures for the purpose of improving the health and well-being of the patient; they may occasionally become injurious to oral tissues[48].

Health authorities worldwide are now confronting an increasing public health problem, including a growing burden of oral disease among older people. Globally, poor oral health among older people has been illustrated particularly in high levels of tooth loss, dental caries experience, periodontal disease, xerostomia, and oral cancer. Poor oral health may have a profound effect on general health [24, 40]. Concerning the effects of poor oral health on elder's daily life, findings of the present study as self-reported by the elders revealed that the majority of them had poor oral health condition (figure 3). Regarding elder's mean scores of self-reported oral health status; the mean scores attained by female elders were higher than those achieved by males, and with significant gender differences (figure 4). Additionally, their ability to eat any foods was often affected by the presence of oral pain or discomfort and there was an overall change in chewing ability. As well, nearly the same percent of elders reported that they were not satisfied with their oral self-image and chewing ability (table 3). These results are in agreement with Kandelman et al., 2008 who reported that among the negative impacts on daily life of poor oral health are reduced chewing performance, constrained food choice, weight loss, impaired communication, low self-esteem and well-being[40, 49].

There are many factors influencing the oral health of the older patient. For this reason, the assessment phase of their oral health is crucial to successful treatment. According to findings of dental screening done for elders by using Oral Health Assessment Tool, it was obviously that, the mean OHAT scores for male were higher than female elders (figure 5). Soft tissue changes in the oral cavity can be a source of discomfort and may discourage full compliance with a daily hygiene regimen. It is important to realize the factors affecting oral hygiene may not remain constant[42].

There is a need for dental health education amongst the elderly population. Older persons may have difficulty in meeting their personal care needs due to physical and mental disabilities and chronic diseases that develop over time. Consequently, it may not be possible for them to use routine dental services. Therefore, geriatric dentistry clinics should be set up to deal with their dental and oral health needs and /or mobile dentistry services should be made available to ensure better treatment of oral care among older persons.

Moreover, the results of the present study revealed that the highest percent of moderate leadership behaviors reported by the studied educators with" Leader giving subordinate her/his clear vision and trust"

(LB2). Sample items include make sure that people are creatively rewarded for their contributions to the success of projects and actively listen to diverse points of view. This result in agreement with Tsai (2011) who stated that leader behaviors includes advance planning, goal clarification, and task focus, as well as with effects such as value congruence[5]. Also, this finding in the same line with Reave (2005) who reported that rewarding (praise) was one of four consistent differentiators between good and bad leadership[23].

Conclusion

Based on the finding of the present study, the following may be concluded:

1. The two most frequent general health problems were gastrointestinal problems followed by musculoskeletal. Females suffering more from musculoskeletal problems than males.
2. Females perceived their oral health to be poorer than males. This was obviously as males were more frequently edentulous than females.
3. There was high percentage of dental problems; toothache was reported higher by males than females.
4. Elders had lack of access and utilization of dental care services; more than one-third of them had not been to the dentist within the last 5 years, mainly due to the cost of the dental care.

Recommendations

The following recommendations can be made in the light of the current study results:

1. Appropriate and effective oro-dental health care programs oriented to this age group.
2. Primary care providers and community health nurse should be educated about the consequences of oral diseases. The dentist must understand the cultural, psychological, educational, social, economic, dietary and chronologically specific experience that may have influenced elder's life.
3. A national oral health promotion campaign is needed targeting older people and should be carried out to raise their awareness of the need for dental visits (even if they have no teeth).
4. Adequate government funding and active participation need to be available to provide oral health care and training programs in geriatric care.
5. An adequate number of trained and competent hygienist and dental assistants are also of paramount importance in elders' residential homes.

Table (1): Distribution of elderly living in residential homes according to their personal characteristics by gender.

Personal characteristics	Male (n = 42)		Female (n = 33)		Total (n=75)		Test of sig.	p
	No.	%	No.	%	No.	%		
Age								
60 –	28	66.7	26	78.8	54	72.0		
75 –	10	23.8	6	18.2	16	21.3	MC	0.440
85 +	4	9.5	1	3.0	5	6.7		
Min. – Max.	60.0 – 89.0		60.0 – 85.0		60.0 – 89.0		t=2.150*	0.035*
Mean ± SD	**70.43±6.46**		**67.33±5.82**		**69.07±6.34**			
Place of residence								
Urban	11	26.2	14	42.4	25	33.3	χ^2=2.192	0.139
Rural	31	73.8	19	57.6	50	66.7		
Level of education								
Illiterate & Read and write	28	66.6	21	63.6	49	65.4		
Primary & Preparatory school	5	11.9	5	15.1	10	13.4		
Secondary education	5	11.9	0	0.0	5	6.7	MC	0.193
Above-average education	3	7.1	4	12.1	7	9.3		
Bachelor's degree	1	2.4	3	9.1	4	5.3		
Monthly income								
<100 L.E	6	14.3	5	15.2	11	14.7		
100 - <150 L.E	2	4.8	6	18.2	8	10.7	MC	0.319
150- < 200 L.E	10	23.8	6	18.2	16	21.3		
200 +	24	57.1	16	48.4	40	53.3		

p: p value for Chi-square test MCp: p value for Monte Carlo test

FEp: p value for Fisher Exact test *: Statistically significant at $p \leq 0.05$

Table (2): Distribution of elderly living in residential homes according to their health status and dependency level by gender.

Health status	Male (n = 42)		Female (n = 33)		Total (n=75)		Test of sig.	p
	No.	%	No.	%	No.	%		
Perception of general health								
Good	21	50.0	8	24.2	29	38.7		
Fair	15	35.7	16	48.5	31	41.3	χ^2=5.458	0.060
Poor	6	14.3	9	27.3	15	20.0		
Health problems experienced during the last year #								
None	1	2.4	2	6.1	3	4.0	FE	0.579
Musculoskeletal problems	14	33.3	13	39.4	27	36.0	χ^2=0.295	0.587
Cardiovascular problems	2	4.8	3	9.1	5	6.6	FE	0.649
Liver problems (Cirrhosis)	2	4.8	1	3.0	3	4.0	FE	1.000
GIT problems (Constipation)	19	45.2	14	42.4	33	44.0	χ^2=0.059	0.807
Diabetes	16	38.1	10	30.3	26	34.6	χ^2=0.319	0.572
Anemia	2	4.8	1	3.0	3	4.0	FE	1.000
Prostate Enlargement	4	9.5	0	0.0	4	5.3	FE	0.126
Urinary Tract Disorder	3	7.1	4	12.1	7	9.3	FE	0.692
Number of daily prescribed medications								
Mean ± SD	**2.37 ± 1.57**		**2.60 ± 1.75**		**2.48 ± 1.65**		t= 12.104*	<0.001*
Dependency level in daily living activities								
Independent	34	81.0	26	78.8	60	80.0	χ^2=0.054	0.816
Partially dependent	8	19.0	7	21.2	15	20.0		

Not mutually exclusive p: p value for Chi-square test MCp: p value for Monte Carlo test

FEp: p value for Fisher Exact test *: Statistically significant at $p \leq 0.05$ p: p value for Student t-test

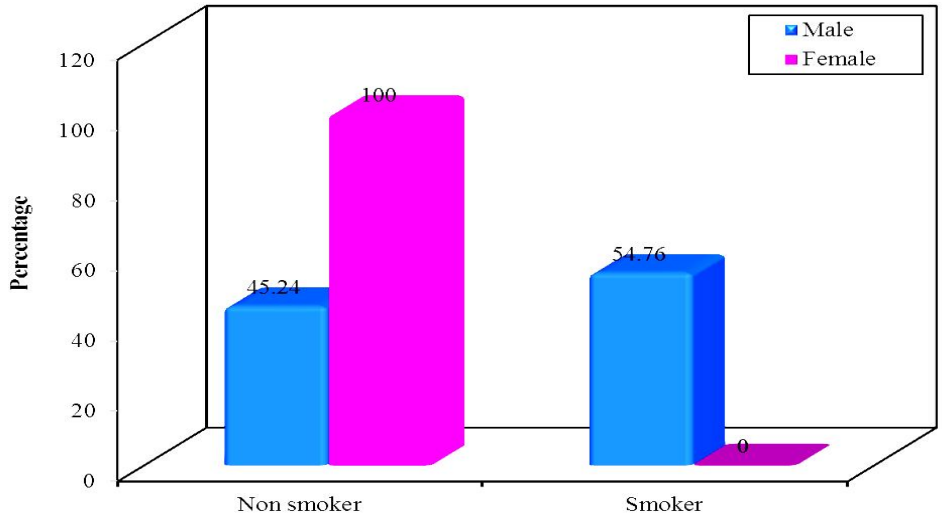

Figure (1): Elders' cigarette smoking pattern

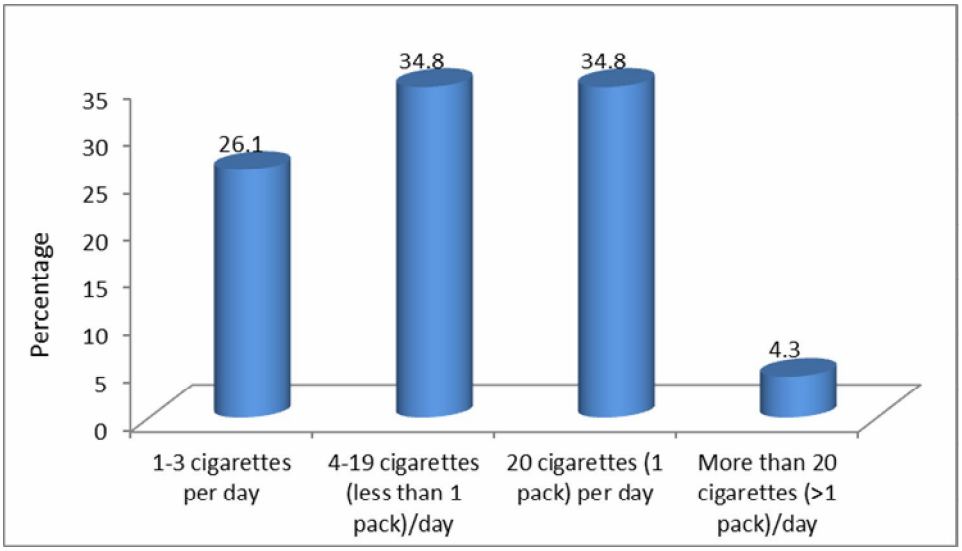

Figure (2): Number of cigarettes smoked per day by males' elders

Table (3): Distribution of elderly living in residential homes according to their oral health status by gender.

Oral health status	Male (n = 42)		Female (n = 33)		Total (n=75)		Test of sig.	p
	No.	%	No.	%	No.	%		
Perception of oral health								
Good	11	26.2	5	15.1	16	21.4	MC	0.489
Fair	21	50.0	16	48.5	37	49.3		
Poor	10	23.8	12	36.4	22	29.3		
Dentation status								
Complete dentition	2	4.8	3	9.1	5	6.7		
Partial tooth loss	31	73.8	25	75.7	56	74.7	$\chi^2=1.727$	0.422
Edentulous (complete teeth loss)	9	21.4	5	15.2	14	18.6		
Teeth appearance satisfaction								
Yes	27	64.3	18	54.6	45	60.0	MC	0.704
No	15	35.7	15	45.4	30	40.0		
Problems in chewing food								
Normal	27	64.3	22	66.7	49	65.3	MC	0.214
Impaired	15	35.7	11	33.3	26	34.7		

p: p value for Chi-square test MCp: p value for Monte Carlo test

Table (4): Distribution of elderly living in residential homes according to their dental hygienic practices by gender.

Oral health status	Male (n = 42)		Female (n = 33)		Total (n=75)		Test of sig.	p
	No.	%	No.	%	No.	%		
Practice teeth brushing								
Yes	11	26.2	12	36.4	23	30.7	χ^2=0.900	0.343
No	31	73.8	21	63.6	52	69.3		
Frequency of teeth brush	(n=11)		(n=12)		(n=23)			
1-2 times per day	9	81.8	12	100.0	21	91.3	MC	0.217
5 or more times per day	2	18.2	0	0.0	2	8.7		
Reasons for not brushing teeth	(n=31)		(n=21)		(n=52)			
Negligence	19	61.3	13	61.9	32	61.5		
Missing teeth	9	29.1	6	28.6	15	28.9	MC	0.944
Bleeding gum	2	6.4	0	0.0	2	3.8		
Cost	1	3.2	2	9.5	3	5.8		

p: p value for Chi-square test MCp: p value for Monte Carlo test *: Statistically significant at $p \leq 0.05$

Table (5): Distribution of elderly living in residential homes according to presence of oral problems by gender.

Oral health problems	Male (n = 42)		Female (n = 33)		Total (n=75)		Test of sig.	p
	No.	%	No.	%	No.	%		
Presence of oral problems								
Yes	22	58.4	18	54.5	40	53.3	MC	0.389
No	20	47.6	15	45.5	35	46.7		
Type of problems #	(n=22)		(n=18)		(n=40)			
Toothache	13	59.1	9	50.0	22	55.0	χ^2=0.331	0.565
Gingivitis	9	40.9	7	38.9	22	40.0	χ^2= 0.017	0.897
Pain in jaws (including jaw joint)	0	0.0	2	11.1	2	5.0	FE	0.196
Dental decay	13	31.0	7	21.2	20	26.7	χ^2 =1.453	0.484
Bleeding gums	22	58.4	17	51.5	39	52.0	MC	0.955
Loose teeth	9	21.4	9	27.3	18	24.0	MC	0.665
Calculus deposition	17	40.5	13	46.4	30	40.0	χ^2 =1.735	0.420

p: p value for Chi-square test MCp: p value for Monte Carlo test # not mutually exclusive

FEp: p value for Fisher Exact test *: Statistically significant at $p \leq 0.05$

Table (6): Distribution of elderly living in residential homes according to their denture status by gender.

Items	Male		Female		Total		Test of sig.	p
	No.	%	No.	%	No.	%		
Have denture prosthesis	**(n=40)**		**(n=30)**		**(n=70)**			
Yes	15	37.5	7	23.3	22	31.4	χ^2	
No	25	62.5	23	76.7	48	68.6	=1.875	0.171
Type of denture prosthesis	**(n=15)**		**(n=7)**		**(n=22)**			
• **Removable denture**								
Upper and lower dentures	6	40.0	4	57.1	10	45.5	FE	0.652
Upper denture only	5	33.3	1	14.3	6	27.3	FE	0.616
Lower denture only	0	0.0	1	14.3	1	4.5	FE	0.318
• **Fixed denture**								
(bridge or dental implant)	4	26.7	1	14.3	5	22.7	FE	1.000
Frequency of wearing the removable dentures	**(n=11)**		**(n=6)**		**(n=17)**			
Continuously	5	45.5	5	83.3	10	58.8	FE	0.304
Occasional	6	54.5	1	16.7	7	41.2		
Removable dentures' status								
Loose	6	54.5	3	50.0	9	52.9	FE	1.000
Fit	5	45.5	3	50.0	8	47.1		
Inflammation of gums caused by removable dentures								
Yes	6	54.5	4	66.7	10	58.8	FE	1.000
No	5	45.5	2	33.3	7	41.2		
Duration of using the existing dentures	**(n=11)**		**(n=6)**		**(n=17)**			
Less than 1 year	1	9.0	0	0.0	1	5.9		
1 to less than 5 years	4	36.4	3	50.0	7	41.2		
5 to less than 10 years	2	18.2	1	16.7	3	17.6	MC	1.000
10+ years	4	36.4	2	33.3	6	35.3		
Elders' perception that they need for new dentures								
Yes	6	54.5	3	50.0	9	52.9	FE	1.000
No	5	45.5	3	50.0	8	47.1		
Reasons for a need of new dentures	**(n=6)**		**(n=3)**		**(n=9)**			
Present dentures are broken	4	66.7	2	66.7	6	66.7	FE	1.000
Unfitted denture	2	33.3	1	33.3	3	33.3		

p: p value for Chi-square test FEp: p value for Fisher Exact test *: Statistically significant at $p \leq 0.05$

Table (7): Distribution of elderly living in residential homes according to oral follow up by gender.

Items	Male (n = 42)		Female (n = 33)		Total (n=75)		Test of sig.	p
	No.	%	No.	%	No.	%		
Presence of dental insurance								
Yes (private/ governmental)	24	57.1	15	36.5	39	52.0	MC	0.779
No	18	42.9	18	54.5	36	48.0		
Last visit to a dentist or dental clinic								
Less than one year	14	33.3	8	24.2	22	29.3	χ^2=0.737	0.391
1 to less than 2 years	5	12.0	3	9.1	8	10.7	FE	1.000
2 to less than 5 years	4	9.5	10	30.3	14	18.7	χ^2=5.256*	0.022
5 or more years ago.	19	45.2	12	36.4	31	41.3	χ^2 =0.600	0.439
Purpose of the last visit #								
Restorative/Fillings	20	47.6	17	51.5	37	49.3	FE	0.501
Dental Emergency/Extraction	17	40.5	8	24.2	25	33.3	χ^2=0.633	0.416
Dentures/Partial Dentures	11	26.2	6	18.2	17	22.7	FE	1.000
Crowns/Bridges	4	9.5	5	15.2	9	12.0	FE	1.000
Gum Therapy/Periodontal treatment	2	4.8	0	0.0	2	2.7	FE	0.501
Presence of barriers in getting dental services								
Yes	18	42.9	17	51.5	35	46.7	χ^2 =0.557	0.456
No	24	57.1	16	48.5	40	53.3		
Barriers in getting dental services #	**(n=18)**		**(n=17)**		**(n=35)**			
Financial problem	15	83.3	16	94.1	31	88.6	χ^2 =1.367	0.242
Transportation problem	5	27.8	2	11.8	7	20.0	FE	1.000
Don't like/trust dentists	2	11.1	1	5.9	3	8.6	FE	1.000
Difficulty in getting appointment	0	0.0	2	11.8	2	5.7	FE	0.187
Types of dental health services have difficulty in obtaining it #								
- Emergency dental services	21	50.0	13	39.4	34	45.3	χ^2 =3.230	0.072
- Basic dental service: check-ups, cleaning and fillings.	13	31.0	11	33.3	24	32.0	χ^2 =0.048	0.826
- Advanced dental services: crowns, bridges, implants.	6	14.3	9	27.3	15	20.0	FE	0.126
- Prosthodontics dental services.	8	19.0	2	6.1	10	13.3	FE	0.170

p: p value for Chi-square test MCp: p value for Monte Carlo test # not mutually exclusive

FEp: p value for Fisher Exact test *: Statistically significant at $p \leq 0.05$

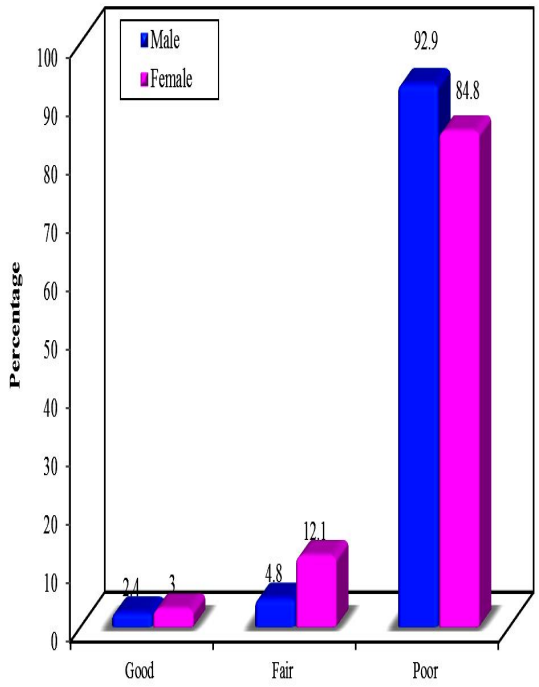

Figure (3): Self-reported oral health status scores by gender using Geriatric Oral Health Assessment Index

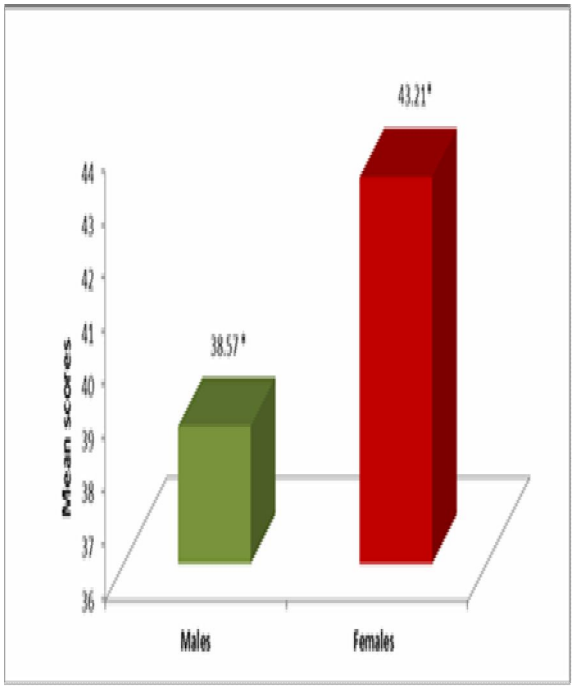

Figure (4): Mean scores of self-reported oral health status by gender using Geriatric Oral Health Assessment Index

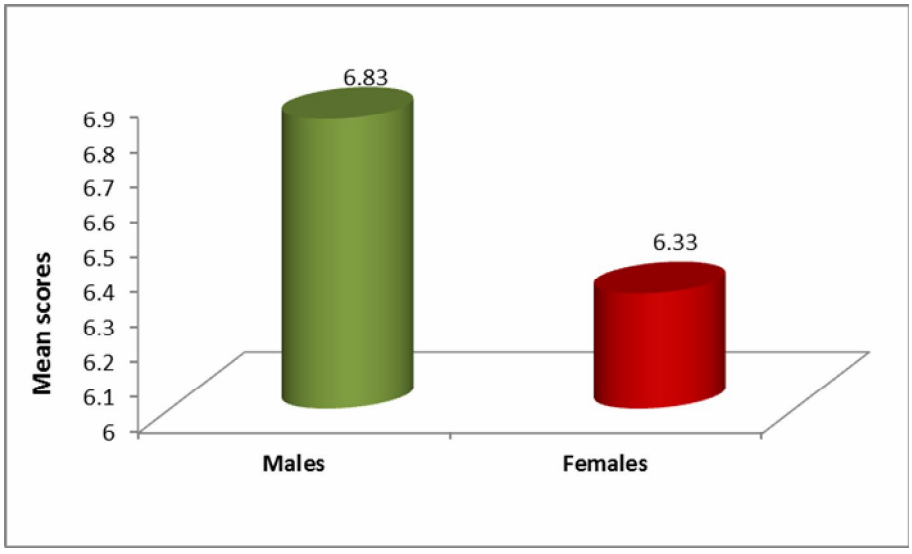

Figure 5: Mean scores of dental screening of elders by gender using Oral Health Assessment Tool

Table (8): Relation between self-reporting oral health status scores and personal characteristics of elders.

Personal characteristics	Fair (n = 6)		Poor (n = 67)		Good (n=2)		Total (n =75)		Test of sig.	p
	No.	%	No.	%	No.	%	No.	%		
Age										
60-	5	83.3	47	70.1	2	100.0	54	72.0		
75 –	1	16.7	15	22.4	0	0.0	16	21.3	MC	1.000
85+	0	0.0	5	7.5	0	0.0	5	6.7		
Place of residence										
Urban	3	50.0	22	32.8	0	0.0	25	33.3		
Rural	3	50.0	45	67.2	2	100.0	50	66.7	MC	0.455
Marital status										
Single	2	33.3	3	4.5	0	0.0	5	6.7		
Divorced	0	0.0	2	3.0	0	0.0	2	2.7		
Separated	1	16.7	23	34.3	2	100.0	26	34.7	MC	0.205
Married	0	0.0	5	7.5	0	0.0	5	6.7		
Widow	3	50.0	34	50.7	0	0.0	37	49.3		
Level of education										
Illiterate & Read and write	3	49.9	44	65.7	2	100.0	49	65.4		
Primary & Preparatory school	1	16.7	9	13.4	0	0.0	10	13.3		
Secondary school graduate	1	16.7	4	6.0	0	0.0	5	6.7	MC	0.528
Above-average education	0	0.0	7	10.4	0	0.0	7	9.3		
Bachelor's degree	1	16.7	3	4.5	0	0.0	4	5.3		
Monthly income										
<100 L.E	2	33.3	9	13.4	0	0.0	11	14.7		
100- <150 L.E	0	0.0	8	11.9	0	0.0	8	10.7		
150 - < 200 L.E	0	0.0	16	23.9	0	0.0	16	21.3	MC	0.329
200 +	4	66.7	34	50.8	2	100.0	40	53.3		

MCp: p value for Monte Carlo test *: Statistically significant at $p \leq 0.05$

Table (9): Relation between oral conditions based on oral health assessment and age of elders.

	<75 years (n = 54)		≥75 years (n = 21)		Total (n= 75)		Test of sig.	p
	No.	%	No.	%	No.	%		
Lips								
Changed lips condition	36	66.7	13	61.9	49	65.3	MC	0.200
Severe lips problem	6	11.1	0	0.0	6	8.0		
Tongue								
Changed tongue	28	51.9	10	47.6	38	50.7	MC	0.307
Severe tongue problem	4	7.4	1	4.8	5	6.7		
Gums/ soft tissues								
Changed gums	32	59.3	11	52.4	43	57.3	MC	0.141
Severe gums problem	9	16.7	3	14.3	12	16.0		
Saliva								
Changed saliva	37	68.5	7	33.3	44	58.7	MC	0.374
Severe saliva problem	10	18.5	5	23.8	15	20.0		
Natural teeth								
Changed teeth	26	48.1	1	4.8	27	36.0	MC	0.015*
Severe teeth problem	24	44.4	8	38.1	32	42.7		
Dentures								
Changed dentures status	6	11.1	1	4.8	7	9.3	MC	0.432
Severe dentures problem	9	16.7	1	4.8	10	13.3		
Oral cleanliness								
Changed oral cleanliness	37	68.5	11	52.4	48	64.0	MC	0.838
Severe oral cleanliness problem	10	18.5	2	9.5	12	16.0		
Dental pain								
Mild dental pain	29	53.7	9	42.9	38	50.7	χ^2=0.847	0.776
Severe dental pain	8	14.8	1	4.8	9	12.0		

p: p value for Chi-square test MCp: p value for Monte Carlo test *: Statistically significant at $p \leq 0.05$

Table (10): Relation between oral conditions based on oral health assessment and oral follow up of elders.

	Dental visit pattern				Total (n = 75)		Test of sig.	p
	≤one year (n =22)		>one year (n =53)					
	No.	%	No.	%	No.	%		
Lips								
Changed lips condition	14	63.3	35	66.0	49	65.3	MC	0.788
Severe lips problem	1	4.5	5	9.4	6	8.0		
Tongue								
Changed tongue	13	59.1	25	47.2	38	50.7	MC	0.350
Severe tongue problem	0	0.0	5	9.4	5	6.7		
Gums/ soft tissues								
Changed gums	13	59.1	30	56.6	43	57.3	χ^2= 0.130	0.937
Severe gums problem	3	13.6	9	17.0	12	16.0		
Saliva								
Changed saliva	12	54.5	32	60.4	44	58.7	MC	0.782
Severe saliva problem	4	18.2	11	20.8	15	20.0		
Natural teeth								
Changed teeth	6	27.3	21	39.6	27	36.0	MC	0.703
Severe teeth problem	10	45.5	22	41.5	32	42.7		
Dentures								
Changed dentures status	1	4.5	6	11.3	7	9.3	MC	0.925
Severe dentures problem	3	13.6	7	13.2	10	13.3		
Oral cleanliness								
Changed oral cleanliness	15	68.2	33	62.3	48	64.0	MC	0.761
Severe oral cleanliness problem	4	18.2	8	15.1	12	16.0		
Dental pain								
Mild dental pain	13	59.1	25	47.2	38	50.7	χ^2=1.886	0.390
Severe dental pain	1	4.5	8	15.1	9	12.0		

p: p value for Chi-square test MCp: p value for Monte Carlo test

Table (11): Relation between oral conditions based on oral health assessment and smoking pattern of elders living in residential homes.

	Smoking pattern				Total (n = 75)		Test of sig.	p
	smoker (n = 23)		Non-smoker (n = 52)					
	No.	%	No.	%	No.	%		
Lips								
Changed lips condition	17	73.9	32	61.5	49	65.3	MC	0.445
Severe lips problem	2	8.7	4	7.7	6	8.0		
Tongue								
Changed tongue	14	60.9	24	46.2	38	50.7	MC	0.367
Severe tongue problem	2	8.7	3	5.87	5	6.7		
Gums/ soft tissues								
Changed gums	13	56.5	30	57.7	43	57.3	χ^2= 0.989	0.610
Severe gums problem	5	21.7	7	13.5	12	16.0		
Saliva								
Changed saliva	13	56.5	31	59.6	44	58.7	MC	0.696
Severe saliva problem	6	26.1	9	17.3	15	20.0		
Natural teeth								
Changed teeth	5	21.7	22	42.3	27	36.0	MC	0.172
Severe teeth problem	14	60.9	18	34.6	32	42.7		
Dentures								
Changed dentures status	3	13.0	4	7.7	7	9.3	MC	0.175
Severe dentures problem	3	13.0	7	13.5	10	13.3		
Oral cleanliness								
Changed oral cleanliness	15	65.2	33	63.5	48	64.0	MC	0.482
Severe oral cleanliness problem	5	21.7	7	13.5	12	16.0		
Dental pain								
Mild dental pain	14	60.9	24	46.2	38	50.7	χ^2=1.836	0.399
Severe dental pain	3	13.0	6	11.5	9	12.0		

p: p value for Chi-square test MCp: p value for Monte Carlo test

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