

ASSESSMENT OF ORAL HEALTH, ORAL HEALTH KNOWLEDGE AND ORAL SELF CARE PRACTICES AMONG RURAL ELDERLY

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Abstract

Background: Dental disease is one of the major prevalent preventable public health challenges that resulted in a significant burden on older adults. **Aim** to Assess oral health, oral health knowledge and oral self-care practices among Rural Elderly. **Design:** Cross-Sectional design was used. **Setting:** The present study was done at El- Awasja Village, Hehia district, Sharkia Governorate. **The study sample** included 190 older adults selected by multistage cluster sampling technique. **Three tools of data collection:** **I)** A structured interview questionnaire. **II)** Oral Health Assessment Tool for Non-Dental Professionals. **III)** Oral Health Knowledge and Oral Self-Care Practices Structured Interview questionnaire. **Results:** The ages of the studied elderly ranged between 60 and 90 years with an average of 72.64 ± 1.90 years, 63.2% of the studied elderly had poor oral health while, 36.2% of them had good oral health. 76.3% of the elderly had inadequate oral health knowledge and 69.5% of them had poor oral self-care practice. Also, the study revealed highly significant negative correlations between total oral health status of the studied elderly and their oral health knowledge and their oral self-care practice. **Conclusions:** More than two thirds of the studied elderly had poor oral health status, majority of them had inadequate oral health knowledge, and poor oral self-care practice. Age, educational level, living condition, total knowledge about oral health, total oral self-care practice were statistically significant predictors of elderly's total oral health status. **Recommendation:** Developing and implementing appropriate and effective oral health care programs oriented to rural elderly to improve their oral health knowledge, oral self-care practices, and oral health status.

Key words: Oral Health, Oral Health Knowledge, Oral Self Care Practices, Rural Elderly.

Introduction

Aging is a complex biological phenomenon which results from a genetic-environmental interaction. This mechanism will raise the risk of contracting diseases, directly or indirectly (Paredes-Rodríguez et al., 2016). The WHO reports that in 2000 there were 600 million people aged 60 years and over, and by 2050 this would grow to 1.2 billion, then 2 billion. Similarly, in Egypt, the percentage of the

elderly reached around 7.1% of the total population of Egypt, taking the overall number of elderly people to 5.9 million in 2012, according to the Central Agency for Public Mobilization and Statistics (Abd El-Mottelb et al., 2018).

Oral health is a condition of oral and related tissues and structures that contribute positively to the physical, mental and social well-being and enjoyment of the possibilities of life by enabling individuals to talk, eat and

socialize without hindrance from pain, discomfort or embarrassment(Oyapero et al., 2015).

With ageing, changes in oral cavity and peripheral tissues play a critical role such as decreased saliva flow rate, increased teeth loss, tooth caries, changes in temporomandibular joints, atrophy in oral mucosa and muscles(Abdulsamet et al., 2016).Oral disease issues are prevalently recurrent and impact 3.9 billion people worldwide globally. Oral diseases place a heavy burden on the government health care system which brings a much larger economic strain on citizens(Liu et al., 2016).

Factors associated with oral disease include: (1) socio-economic factors such as rising age, being female, lower educational level, lower economic status, lower social standing, fitness and rural residence (2) chronic conditions such as asthma, diabetes, arthritis, angina pectoris, stroke, hypertension and obesity (3) health risk behaviour, including smoking, former smoking, deficient fruit and vegetable intake and infrequent dental appointments, and (4) other health-related causes, including physical inability, reduced general fitness, social stability and self-esteem and quality of life(Pengpid & Peltzer, 2018).

Common oral diseases in old age are tooth loss, denture-related conditions, poor oral cleanliness, caries, periodontal disease, hyposalivation, oral precancerous conditions, and oral cancer (Kossioni et al., 2018).Many studies have generally suggested that oral disease is associated with a higher risk of cancer, cardiovascular disease (CVD), stroke and also associated with an increased risk of aspiration pneumonia, cognitive dysfunction, dementia and reduced dietary intake. Thus, the

prevention of poor oral health in elderly individuals is an important public health issue (Nanri et al., 2017).

Healthy oral health practices are imperative among all individuals in order to decrease their risk of the development of dental diseases and individuals who have good attitude and practice by brushing the teeth daily have better oral hygiene, less dental caries and periodontal disease experience than those who brush less frequently. Individuals with good knowledge of oral health practices are also reported to have lower prevalence of periodontal disease and dental caries(Bashiru et al., 2017).

Early diagnosis, early intervention and preventive therapies can avoid or decrease the progression of most oral diseases that can cause discomfort, negative health effects and affect quality of life if left untreated. Good quality of life depends on healthy teeth and oral tissues. One of the essential tasks of oral health care is to provide appropriate treatment for those with oral lesions or disorders so that the disease is held early and complications are avoided (Osadolor et al., 2019).

Gerontological nurses play a significant role in maintaining the oral health of the elderly and are an important part of an effective oral hygiene programme. Nurses' knowledge and skills allow them s to assess elderly oral care needs, establish individualized care strategies, offer dental hygiene services, refer to dentists, and establish oral health programme(Ghayth et al., 2019).

Significance of the study

The oral health of elderly populations is a significant concern, as it is closely linked to general health and health-related quality of life. Poor oral health exacerbates oral diseases, leading to an increased risk of non-

communicable diseases and self-care dependence, especially in the elderly, worldwide. Knowledge and practices play influential roles in individual oral care. However, the evidence of Knowledge and practices related to oral care among the elderly is still inadequate (Wong, 2020). Therefore, many researchers state that enhancing educational and training programmes in this area is highly necessary to improve oral care performance in the elderly (Constanza et al., 2012). So that, the existing study was conducted to assess oral health, oral health knowledge and oral self-care practices among rural elderly.

Aim of the study

The current study aimed to assess oral health, oral health knowledge and oral self-care practices among rural elderly.

Research questions:

1. What is the oral health status of elderly people in a rural area?
2. What is oral health knowledge of elderly people in a rural area?
3. What is the self-reported oral health practices of elderly people in a rural area?
4. Are there associations between oral health, oral health knowledge and oral self-care practices among rural elderly?

Subject and Methods

Research Design

Cross-Sectional design was used to conduct this study.

Study Setting

The existing study was conducted at El-Awasja village in Sharkia Governorate.

Sampling technique:

A Multistage cluster sampling technique was used in the recruitment of this study subjects as follows:

- **First stage (selection of district):**

The study was conducted in Sharkia Governorate, which consists of 21 districts. The investigator used simple random sampling technique to pick up a random district, it was Hehia district (consists of 28 villages).

- **Second stage (selection of village):**

The investigator picked up one village from the 28 villages randomly (El-Awasja village).

- **Third stage (selection of elderly people):**

The selected village was divided into 17 clusters. 4 clusters were selected randomly from them.

- All the elderly people in the selected clusters were included in the study sample till reaching the calculated sample size.

Sample size calculation:

The sample size was calculated using EPI info 7. Based on the number of elderly people in a rural area (El-Awasja village in Sharkia Governorate) is 900 according to records of family health center of the village and the prevalence of Periodontal Status among elderly in a previous study is 19.5% (Khapung et al., 2017); sample was calculated to be 190 elderly participants with test power 80% and confidence level 95%.

Tools for Data Collection

Tool I: It composed of three parts

Part 1: Demographic Questionnaire that was prepared by researcher and developed based on the review of current related literature. It was used to assess demographic characteristic of the elderly, age, sex, educational level... etc.

Part 2: Medical history of the elderly, medication used to take daily and self-reported oral health.

Part 3: Dietary and smoking habits of the elderly as; following special diet, fluids amount, and history of smoking.

Tool II: The Oral Health Assessment Tool (OHAT) For Non –Dental Professional. This tool was developed by **Chalmers et al. (2005)**. It was used in English form to assess oral health in elderly individuals. It covers the current oral health status of the patient including factors that may lead to oral disease risk and suggest the need for referral. The OHAT encompasses 8 categories of oral hygiene, namely lips, tongue, gums and tissue, saliva, natural teeth, dentures, oral cleansing and dental pain.

➤ **Scoring system:**

The eight categories are rated by the examiner using a 3-point scale (0, 1, 2);

- 0 indicates the healthy oral cavity
- 1 indicates oral cavity changes
- 2 indicates unhealthy oral cavity.

The final score is the sum of the scores from the 8 categories and ranges from 0 (very healthy) to 16 (very unhealthy). Resulting in scores ranging from 0 to 16. The higher the score (equal or more than 8) 50% or more, the poorer the elderly oral health.

Tool III: Elderly Oral Health Knowledge and Oral Self-Care Practice Structured Interview Questionnaire.

Part 1: Elderly Oral Health Knowledge Structured Interview questionnaire. This tool was developed by **Al -Emam (2014)**. It was used in Arabic form to assess oral health

knowledge of the studied elderly.

➤ **Scoring system:**

The total number of questions is thirteen, for each question several correct answers were allotted, the number of correct answer ranges from four to seven, each correct answer was allotted one grade with the total grade for all question ranges from four to seven and zero for wrong answer or don't know. The knowledge scores were depending on the numbers of grades the participant obtained regarding all questions. The total grade

was computed out of seventy (70) grades and knowledge was considered adequate if the percent score was 60% or more (equal or more than 42 grade) and inadequate if less than 60% (less than 42 grade).

Part 2: Elderly Oral Self-Care Practice (OSCP) Structured Interview questionnaire. This tool was developed by **Al -Emam (2014)**. It was used in Arabic form to assess the OSCP as reported by the studied elderly about oral care.

This part was divided into two sections:

The first section included (13) questions (**questions 1-13**) for elderly with natural teeth, eleven multiple choice questions, and three open ended questions. The multiple-choice questions answer ranged from three to five answers.

The second section included (8) multiple choice questions (**questions 14-21**), for elderly with artificial teeth. The multiple-choice questions answer ranged from two to five answers.

➤ **Scoring system:**

For elderly participant using dentures: the total number of questions is twenty-one, for each question one correct answer was allotted one grade and zero for wrong answer or don't know. The OSCP scores were depending on the numbers of grades the participant obtained regarding all questions. The total grade was computed out of (21) grades and OSCP was considered good oral self-care practice if the percent score was 60% or more (equal or more than 12.6 grade) and poor oral self-care practice if less than 60% (less than 12.6 grade).

For elderly participant with natural teeth: the total number of questions is thirteen, for each question one correct answer was allotted one grade and zero for wrong answer or don't know. The OSCP scores were depending on the numbers of grades the participant obtained regarding all questions. the total grade was computed out of (13) grades and OSCP was considered good oral self-care practice for Natural teeth if the percent score was 60% or more (equal or more than 7.8 grade) and poor oral self-care practice if less than 60% (less than 7.8 grade).

Validity:

The tools were tested for content validity by three experts from the department of Gerontological Nursing, Medical Surgical Nursing and Community Health Nursing Department. These experts assessed the tool for clarity, relevance, comprehensiveness, applicability, and understanding. All recommended modifications in the tools were applied.

Reliability:

Testing the reliability of the tools through Alpha Cronbach reliability analysis.

Items	Alpha Cronbach	f	P-value
Oral Health Assessment Tool (OHAT) for Non-Dental Professional	0.74	2.991	.004
Elderly Oral Health Knowledge Structured Interview questionnaire	0.72	2.894	.009
Oral Self-Care Practice Structured Interview questionnaire	0.77	3.018	.001

Pilot study

Before performing the main study, a pilot study was carried out on 19 elderly attended to El- Awasja village, constituting about 10 % of the total study sample. The purpose of pilot was to test the questions for any ambiguity, and to assess the practicability and feasibility of using the structured interview questionnaire sheet for the elderly. It also helped the researcher to determine the time needed for filling out the forms. The tools were finalized accordingly. Those who shared in the pilot study were included in the main study sample.

Field work:

Once permission was granted to proceed with the study, the investigator started to prepare a schedule for collecting the data by dividing village into (clusters) with the assistance of Omda who assigned a facilitator in the same village to facilitate the researcher's work. The researcher interviewed the

elderly individuals. The researcher usually started by introducing herself to elderly individuals, the aim and nature of study discussed briefly, and reassured them that information obtained is strictly confidential and would not be used for any purposes other than research. Each elderly was interviewed individually at home to collect the necessary data. Time estimated for filling out the questionnaire 20-25 minutes. The researcher visited the village 4 days/week (Sunday, Monday, Thursday and Friday) from 2PM to 5PM. Data collection ran over a period of four months from November 2019 to February 2020.

Ethical Considerations:

The ethical issues were taken into consideration during all phases of the study. Firstly, the study was approved by the pertinent authority of Research Ethics Committee (REC) of faculty of nursing at Zagazig University. After explanation of the nature and aim of the study, subjects were given the opportunity to refuse the participation and they were notified that they could withdraw at any time of data collection also they were assured that the information would be confidential and used for the research purpose only. The investigator assured maintaining anonymity and confidentiality of subjects' data.

Administrative Design:

An official Permission to conduct the study was obtained by submission of official letters issued from the Dean of the Faculty of Nursing at Zagazig University to the Omda of El- Awasja village explaining the nature and aim of this study and seeking facilitating the role of investigator

Statistical Design

Data entry and statistical analysis were done using SPSS 20.0 statistical software package. Data were presented

using descriptive statistics in the form of frequencies and percentages for qualitative variables, and means and standard deviations and medians for quantitative variables. Chi- square test (χ^2) was used for comparisons between qualitative variables. Cronbach alpha coefficient was calculated to assess the reliability of the scales through their internal consistency. Spearman rank correlation was used for assessment of the inter-relationships among quantitative variables and ranked ones. In order to identify the independent predictors of variable, multiple linear regression analysis was used and analysis of variance for the full regression models was done. Statistical significance was considered at p . value < 0.05 .

Results:

Table(1): Regarding demographic characteristics of the studied elderly in the study sample, the age of the studied elderly ranged from 60-90 years with a meanage of (72.64 ± 1.90) years). As well as, (64.2%) of the elderly were females. Additionally, the highest percentages of elderly were married (73.7%), (42.1%) of them were illiterate and the irmonthlyincome was not sufficient (55.8%).

Table (2) shows that (74.7%) of the studied elderly suffered from chronic diseases, (62%) of them suffered from hypertension and (93.7%) of them take drug treatment for these diseases regularly. Also, (61.6%) of the studied elderly had partial loss of teeth, (20%) of them were using dentures and (39.5%) of them were using full upper and lower dentures. Also, indicates that (90.5%) of the studied elderly didn't follow special diet. Also, (59.5%) of the studied elderly drunk one liter to 2 liters per day. Moreover, (66.8%) of the elderly didn't smoke.

Table (3): As regards oral health status of the studied elderly, reveals that (45.8%) of the studied elderly had healthy lips. Also, (49.5%) and (42.1%) of the elderly had tongue and dentures changes, respectively. While, (44.7%) and (37.4%) of the studied elderly had unhealthy natural teeth and had dental pain, respectively. Also, shows that (63.2%) of the studied elderly had poor oral health status. While, (36.8%) of them had good oral health status.

Figure (1) shows that 76.3% of the studied elderly had inadequate knowledge about oral health. While, only 23.7% of them had adequate knowledge.

Figure (2) illustrates that 69.5% of the studied elderly had poor oral self-care practice. While, only 30.5% of them had good oral self-care practice.

Table (4) indicates that highly significant negative correlations were demonstrated between total oral health status of the studied elderly and their oral health knowledge and their oral self-care practice. Also, shows positive correlations between total knowledge about oral health of the studied elderly and their oral self-care practice.

Table (5): As regards multiple linear regression models for the elderly oral health status, the table indicates that age, educational level, living condition, total knowledge about oral health and total oral self-care practice were statistically significant predictors of elderly's total oral health status score.

Table (6) displays the best fitting multiple linear regression models for the elderly oral health knowledge, it shows that educational level, current working status, monthly income, total oral self-care practice, total oral health status and total nutrition status score were statistically significant predictors of elderly's total knowledge about oral health.

Table (7) clarifies the best fitting multiple linear regression models for the elderly oral self-care practice, it demonstrates that age, educational level, monthly income, total knowledge about oral health, total oral health status and total nutrition status score were statistically significant predictors of elderly's oral self-care practice.

Table (1):Demographic characteristics of the studied elderly (n=190).

Items	N	%
Age (year)		
60-<70	90	47.4
70-<80	74	38.9
≥80	26	13.7
Mean±SD	72.64±1.90	
Gender		
Female	122	64.2
Male	68	35.8
Marital status		
Single	3	1.6
Married	140	73.7
Divorced	5	2.6
Widowed	42	22.1
Educational level		
Illiterate	80	42.1
Read & write	8	4.2
Basic education	71	37.4
Secondary education	26	13.7
University / Postgraduate education	5	2.6
Current occupation		
Work	34	17.9
Not work	156	82.1
Crowding index		
<1	40	21.1
1-<2	103	54.2
≥ 2	47	24.7
Living condition		
Husband /wife	140	73.7
Sons	40	21.1
Relatives	4	2.1
Alone	6	3.1
Monthly income		
Not sufficient	106	55.855.8
Sufficient	52	27.4 27.4
Sufficient and save	32	16.8 16.8

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Table (2): Medical history, medication use and self- reported oral health status, denture use and habits among the studied elderly (n=190).

Items	N	%
chronic diseases		
Yes	142	74.7
No	48	25.3
Types of chronic diseases (n=142): @		
Hypertension	88	62
Diabetes mellitus	34	23.9
Heart disease	21	14.8
Respiratory diseases.	13	9.2
Liver disease	15	10.6
Kidney diseases	6	4.2
Diseases of the digestive system	39	27.5
Neuropsychiatric diseases	7	4.9
Osteoporosis	5	3.5
Arthritis	2	1.4
On medication (n=142)		
Yes	133	93.7
No	9	6.3
Natural state of teeth		
Completely present	32	16.8
Partial loss	117	61.6
Completely lost	41	21.6
Using dentures		
Yes	38	20
No	152	80
Kind of dentures (N=38)		
Full upper dentures	4	10.5
Full lower dentures	3	7.9
Full upper and lower dentures	15	39.5
Partial upper dentures	4	10.5
Partial lower dentures	3	7.9
Upper and lower partial dentures	7	18.4
Bridge	2	5.3
Follow specific diet		
Yes	18	9.5
No	172	90.5
Fluid amount/ day		
Less than 1 liter per day	47	24.7
One liter to 2 liters per day	113	59.5
More than 2 liters per day	30	15.8
Smoking		
Yes	63	33.2
No	127	66.8

@ More than one response

Table (3): Oral health status of the studied elderly according to Oral Health Assessment Tool (OHAT) for Non-Dental Professionals (n=190).

Items	Healthy		Changes		Unhealthy	
	N	%	N	%	N	%
Lips	87	45.8	56	29.5	47	24.7
Tongue	55	28.9	94	49.5	41	21.6
Gums and Tissues	53	27.9	70	36.8	67	35.3
Saliva	75	39.5	60	31.6	55	28.9
Natural Teeth	42	22.1	63	33.2	85	44.7
Denture(s) (n=38)	12	31.6	16	42.1	10	26.3
Oral Cleanliness	46	24.2	70	36.8	74	39
Dental Pain	50	26.3	69	36.3	71	37.4
Oral health according to OHAT	N		%			
Good	70		36.8			
Poor	120		63.2			

Figure (1): Total oral health knowledge of the studied elderly (n=190).

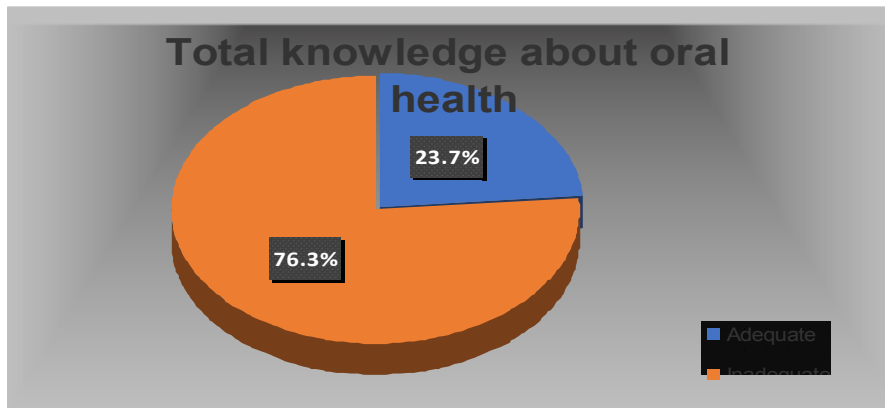
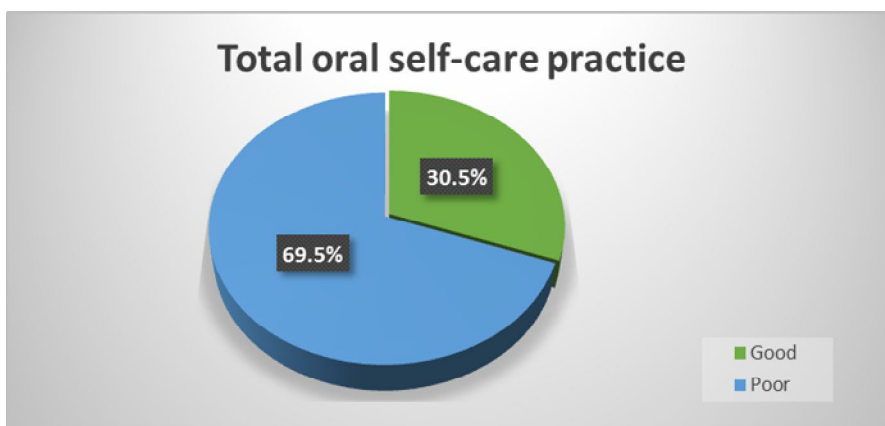


Figure (2): Total oral self-care practice as reported by the studied elderly (n=190).



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Table (4): Correlations between Oral health status, oral health knowledge and oral self-care practice.

Items	Total knowledge	Total oral self-care practice	Total oral health status
Total knowledge		r = 0.364 P = .002**	r = -0.345 P = .005**
Total oral self-care practice	r = 0.364 P = .002**		r = -0.398 P = .000**
Total oral health status	r = -0.345 P = .005**	r = -0.398 P = .000**	

Table (5): Best Fitting Multiple Linear Regression Model for Oral health status.

	Unstandardized Coefficients	standardized Coefficients	T	P. value
	B	β		
Age	.120	.127	2.097	.037*
Educational level	.205	.210	3.037	.006**
Living condition	.117	.123	1.979	.041*
Total oral health knowledge	.215	.228	3.476	.000**
Total oral self-care practice	.253	.261	3.503	.000**
ANOVA				
Model	Df.	F	P. value	
Regression	6	10.94	.000**	

Table (6): Best Fitting Multiple Linear Regression Model for oral health knowledge.

	Unstandardized Coefficients	standardized Coefficients	T	P. value
	B	β		
Educational level	.169	.176	3.201	.001**
Current working status	.108	.112	1.437	.02*
Monthly income	.119	.126	1.574	.01*
Total oral self-care practice	.222	.239	3.786	.000**
Total oral health status	.256	.270	3.497	.000**
ANOVA				
Model	Df.	F	P. value	
Regression	6	9.564	.000**	

Table (7): Best Fitting Multiple Linear Regression Model for oral self-care practice.

	Unstandardized Coefficients	standardized Coefficients	T	P. value
	B	β		
Age	.102	.111	1.371	.031*
Educational level	.193	.201	3.260	.002**
Monthly income	.174	.168	2.239	.041*
Total knowledge	.229	.241	3.568	.000**
Total oral health status	.251	.267	3.686	.000**
ANOVA				
Model	Df.	F	P. value	
Regression	6	8.962	.000**	

Discussion

Oral health can be described as having a comfortable and functional dentition that enables individuals to continue their social role; it is integral to general health and essential to well-being. The mouth reflects the health and well-being of a person during a lifetime. Good oral health is a vital part of everyday life. Poor oral health is intimately associated with economic deprivation, social exclusion, and cultural difference. Emerging evidence has demonstrated a strong relation between the effects of oral disease and overall health. The mouth is the entrance to the rest of the body. Oral disease is associated with chronic disorders such as heart disease, stroke, respiratory infections, diabetes and food troubles [Mohsen et al., 2017]. Therefore, the current study aimed to assess oral health knowledge and oral self-care practices of elderly people in a rural area.

Concerning demographic characteristics, the mean age of the studied elderly in the present study was 72.64 ± 1.90 year which is close to the mean reported by [Al-Shehri, 2012] in Saudi Arabia (72 ± 8.5 years). The same point is confirmed by [Naet et al., 2014] among Singaporean elderly (74.4 years) and in (Kaohsiung) Taiwan (76.0 ± 0.4 years) [Hsu et al., 2014], more than two thirds of the elderly were female. The finding is in harmony with many similar previous studies such as [Sangouam et al., 2016] in Muang, Phitsanulok, Thailand (64.3%) and [Marino et al., 2013] in Chilean (61.2%).

Regarding the marital status, the current study findings revealed that slightly less than three quarter of the study sample were still married and living with their spouses. This might due

to the majority of older women were illiterate and all of them reside at rural areas. Additionally, the Egyptian people looked to marriage as compulsory and rule from religion. In the same context the results of [Kiesswetter et al., 2019] which were conducted in Amsterdam, Dutch mentioned that 74.6 % of the elderly were married.

According the level of education, the results of the current study revealed that nearly half of the studied elderly were not educated (illiterate). These results are supported by [Elhddad et al., 2018] in Benghazi in Libya demonstrated that 52.1% of the studied elderly were illiterate. This could be attributed to low levels of education in this generation in Egypt, particularly in rural areas where people's education is usually lower, especially at a time when it was not mandatory.

As regards current occupation, the current study findings revealed that the majority of the study sample were not work. This can be attributed to a decline in the capacity to work due to multiple chronic diseases among elderly people and a lack of employment opportunities for elderly people. These results are in agreement with [Mohsen et al., 2017] in Benha city who stated that more than three quarters of the studied elderly did not work, while these findings disagree with [Masood et al., 2017] in United Kingdom who reported that only one tenth of the studied elderly were not working. This difference might be due to attributed to difference in living standards between in Egypt and United Kingdom.

As regards monthly income, more than half of the studied elderly had insufficient income. This might be due to inability to work and high prices of basic needs for life as food items and

medicines that used in the treatment of chronic diseases. This study confirmed by [Qian, 2017] in National Dental Centre of Singapore who found that 78.5 of the studied elderly had insufficient income.

Regarding the health characteristics of the studied sample, the present study revealed that nearly three quarter of the studied elderly had chronic diseases, and the most common diseases were hypertension, disease of digestive system and diabetes mellitus disease. This might be attributed by adverse effects of aging which making the individual more vulnerable and susceptible to chronic diseases development and Excessive pressure from life leads to the occurrence of these diseases. This finding agrees with results done by [Abdallah et al., 2018] in Sharqia Governorate, Egypt demonstrated that the most common diseases were hypertension (58.7%) and diabetes mellitus (44%) and [Zelig et al., 2018] in cross-sectional analysis of data obtained from the electronic health records (Axium, EXAN, Vancouver, BC, Canada) demonstrated that the studied elderly had hypertension (71.7%) and diabetes (28%).

The current study demonstrated that two third of the studied elderly have partial tooth loss. This may be due to old age, smoking, not eating a healthy diet and neglecting to treat oral inflammations. These results are in agreement with Ariga et al. (2012) in South India who stated that 64.8% of the studied elderly had partially tooth loss. Also, the present study findings showed that more than one third of the studied elderly (39.5%) have complete removable denture (upper and lower dentures). This finding agrees with results done by Mubarak et al. (2015) in

Dammam demonstrated that (68.1%) of the elderly had complete denture wearer.

Regarding smoking habits among the studied elderly, the current study findings showed that, more than one third of the studied elderly were current smokers, smoking for more than 20 years, and smoking from five to ten cigarettes daily. several reasons exist for smoking up till now, including longer duration of smoking habit, higher number of cigarettes smoked daily, lower intention and fewer attempts to quit and higher rate of hardcore smokers among elderly smokers. Similar findings were reported by [Al-Sinaidi, 2012] in Riyadh who found that slightly more than one third of the studied elderly were smokers.

Concerning the results of the current study findings revealed that nearly less than half of the studied elderly had unhealthy natural teeth, oral cleanliness and dental pain, while tongue, denture and gum and tissues changed in less than half of the studied elderly. This can be explained by that, inadequate knowledge as well as inadequate practice and limited dentist visiting among the majority of the studied elderly. Also, the majority of them suffering from chronic diseases and were depending on multiple medication that affect negatively on oral health. These findings go on line with that of Simpelaere et al. (2016) in Antwerp, Belgium who found that half of the studied elderly had unhealthy natural teeth and oral cleanliness, two third had changes in tongue and more than one third had gum and tissues changes.

Regarding the total score of oral health status examination, the results of the present study showed that more than two third of the studied elderly had unhealthy (poor) oral health status, while more than one third of them had healthy (good) oral health status. This might be

due to the neglect of tooth brushing, tooth flossing and routine dental checkup among elderly. These results are consistent with **Ghayth et al., (2019)** in Assiut City, Egypt who found that more than half of the elderly had unhealthy oral status and more than two fifth of them had healthy oral status. Another study was done by **Petelin et al. (2012)** in Slovenia who found that 30.75% of the elderly had poor oral health status.

The results of the current study mentioned that the age was statistically significant predictor of oral health status in multiple linear regression models. In the same context, a cross-sectional study conducted in a medium-size city in southeastern Brazil by **Rodrigues et al. (2012)** who found a statistically significant association between age and poor oral health (edentulism).

Regarding educational level, the results of the current study found that the educational level was statistically significant predictor of the oral health status of the elderly. In agreement with this finding, a study carried out in Delhi by **Rekhi et al. (2016)** found that there was a significant association between education and oral health-related quality of life (OHRQoL); as participants with any form of formal education reported significantly better oral health-related quality of life as compared with those who did not have any formal education.

In terms of living condition, the results of the current study found that living condition was statistically significant predictor of the oral health status of the elderly. The results of the current study contradicted by the results of the study conducted by **Abdallah et al. (2018)** in Sharqia Governorate, Egypt demonstrated that the elderly living with their spouses had better oral health

assessment than individual living without spouses.

Regarding total score of oral health knowledge, the results of the present study showed that more than three quarter of the studied elderly had inadequate knowledge about oral health status, while more than one third of them had adequate knowledge about oral health. This might be due to high level of illiteracy and lack of oral health education for elderly. These findings are consistent with a study conducted in Ajman by **Al-Sharbatti & Sadek, (2014)** and another study by **Bashiru et al., (2017)** in Port Harcourt, Rivers State who reported that near two third of the studied elderly had poor oral health knowledge and more than one third had good oral health knowledge.

The results of the current study found that the educational level was statistically significant predictor of oral health knowledge of the elderly. In agreement with this finding, a study carried out in Tehran by **Gholami et al., (2014)** who found association between oral health knowledge and educational level; as higher education was related to a higher knowledge score of oral health.

Regarding monthly income, the results of the current study found that the monthly income was statistically significant predictor of total knowledge of oral health. In the agreement with this result, **Chowdary et al., (2015)** in India mentioned that socioeconomic status showed a significant association with oral health literacy.

Concerning the correlation between elderly's oral health knowledge and oral health status, the findings of the current study showed statistically significant negative correlation between oral health knowledge (OHK) of the studied elderly and oral health status, as

the higher OHK score, the lower oral health status score which indicates good oral health according to OHAT for Non-Dental Professionals. This finding was further supported by multiple linear regression models, in which oral health knowledge was statistically significant predictor of oral health status of the studied elderly. These results are consistent with a study conducted in India by **Chowdary et al., (2015)** who demonstrated that Oral health literacy scores showed a negative correlation with oral hygiene status, dental caries prevalence, periodontal status and prosthetic needs. So, subjects with low oral health literacy had a poor oral hygiene status, high dental caries prevalence, periodontitis, and they were in need for a prosthesis. Also, a study conducted in Sharqia Governorate, Egypt by **Abdallah et al., (2018)** found that there was a significant negative correlation between oral health knowledge and oral health status.

Regarding the total score of elderly's oral self-care practice, the results of the present study showed that more than two third of the studied elderly had poor oral self-care practice, while one third of them had good oral self-care practice. This may be attributed to lack of elderly knowledge about the right technique of oral health care procedures (tooth brushing & flossing) and lack of regular using of these procedures among elderly. These results are consistent with a study conducted in Thai by **Samnieng et al., (2013)** who reported that more than two thirds of the studied elderly had poor oral health practice, while less than one third of them had good oral health practice. In the same line, another study was done by **Al-Sharbatti & Sadek, (2014)** in Ajman who reported that more than three quarters of the studied elderly

had poor oral health practice, while more than one tenth of them had good oral health practice.

The results of the current study revealed that the age was significantly independent positive predictor of oral self-care practice in multiple linear regression models. In the same context, a study conducted in Rivers State, Nigeria by **Bashiru et al., (2017)** found that age of the participants was significantly inversely related to practice. The significant inverse relationship was further confirmed by the negative correlation, suggesting that as the age of the participants' increases there was a significant decrease in the knowledge and practices of the pensioners. They also reported that poor oral health practice was significantly higher among older participants. Similarly, **Singh et al., (2012)** in India who stated that as the age increases, oral health knowledge, attitude and practice becomes significantly poor.

Regarding educational level, the current study found that the educational level was significantly independent predictor of oral self-care practice score in multiple linear regression models. In agreement with this finding, a study carried by **Ghayth et al., (2019)** in Assiut City, Egypt found that there was highly statistically significant difference between educational level and oral self-care practice.

Regarding monthly income, the current study found that the monthly income was statistically significant predictor of oral self-care practice. These findings disagree with **Mohsen et al., (2017)** in Benha City, Egypt who found that there was no statistically significant difference between monthly income and total score of oral self-care practice.

The present study revealed that the total knowledge was statistically

significant predictor of total oral self-care practice of the studied elderly and this finding was supported by multiple linear regression models. This point supported in a study was done by **Ueno et al., (2013)** in Japan demonstrated that the higher a participant's oral health literacy, the more often they brushed their teeth or dentures, self-checked oral condition with a mirror, had regular dental checkups, and the better their oral hygiene status. Furthermore, the study carried out by **Lee et al., (2012)** in Carolina found that an increase in the oral health literacy was associated with better oral hygiene.

Regarding the correlations between elderly's oral self-care practice and oral health status, the findings of the current study showed a statistically significant negative correlation between oral self-care practice (OSCP) of the studied elderly and oral health status, as the higher OSCP score, the lower oral health status score which indicate good oral health according to OHAT for Non-Dental Professionals. This finding was further supported by multiple linear regression models, in which oral self-care practice was statistically significant predictor of oral health status of the studied elderly. These results are consistent with study conducted in Egypt by **Abdallah et al., (2018)** who demonstrated that that there was a significant negative correlation between oral self-care practice and oral health related quality of life.

Regarding the correlations between elderly's oral health knowledge and oral self-care practices, the findings of the current study indicated statistically significant positive correlation between the score of total knowledge about oral health of the studied elderly and oral self-care practice. This may be due to the

higher oral health knowledge has a direct impact on oral self-care practices by improving the individual's self-awareness and personal hygiene performances. This finding was further confirmed by multiple linear regression models, in which oral self-care practice was statistically significant predictor of oral health knowledge of the studied elderly. In agreement with this finding, a study carried out in Sharqia Governorate, Egypt by **Abdallah et al., (2018)** who found that there was a significant positive correlation between the total knowledge about oral health and oral self-care practice of the studied elderly.

Conclusion

On the light of results of the current study, it was concluded that about more than two thirds of the studied elderly had poor oral health status. Moreover, the majority of the studied elderly had inadequate oral health knowledge and poor oral self-care practices. Additionally, the current study revealed that oral health status was significantly associated with oral health knowledge and oral self-care practices of the studied elderly. Significant predictors of oral health status were age, educational level, living condition, oral health knowledge, and oral self-care practices.

Recommendations

- 1- Developing and implementing appropriate and effective oral health care programs oriented to rural elderly to improve their oral health knowledge, oral self-care practices, and oral health status.
- 2- Establishing routine dental checkup for elderly in all health care facilities to promote oral health and enhance quality of life.
- 3- Further research about obstacles of rural elderly's oral health.

References

- Abd Allah, E. S., Mohamed, R. A., & Abo El seoud, A. R. (2018).** Educational program to improve quality of life among elderly regarding oral health. *Future Dental Journal*, 4(2), 211-215.
- Abd El-Mottelb, B. S., Mo'Awad, E., & El-Din, S. B. (2018).** Predicators of successful aging among academic emeritus. *Egyptian Nursing Journal*, 15(2), 144-155.
- Abdulsamet, T., Dogan, M.S., Fatih, D., & Izzet, Y. (2016).** Polypharmacy and Oral Health among the Elderly. *Journal of Dentistry, Oral Disorders & Therapy*, 4(1), 1-5.
- Al Emam, N. E. (2014).** Effect of Oral Health Care intervention on Oral Health Related Quality of Life of institutionalized Older Adults. PHD Thesis, Faculty of Nursing, Mansoura University.
- Al-Sharbatti S., & Sadek, M., (2014).** Oral Health Knowledge, Attitudes & Practices of the elderly in Ajman, UAE Proceedings of the 6th Annual Scientific Meeting of Gulf Medical University, 3 (S2), 152-164.
- Al-Shehri, S. A. (2012).** Oral health status of older people in residential homes in Saudi Arabia. *Open Journal of Stomatology*, 2, 307-313.
- Al-Sinaidi, A. A. (2012).** Periodontal health and oral hygiene practice of elderly Saudis living at Riyadh Nursing Home. *King Saud University Journal of Dental Sciences*, 3(1), 1-5.
- Ariga, P., Bridgitte, A., Rangarajan, V., & Philip, J. M. (2012).** Edentulousness, denture wear and denture needs of the elderly in rural South India. *Iranian journal of public health*, 41(7), 40-43.
- Bashiru, B., Ernest, A., & Johnson O., (2017).** Gender and Age-related Disparity in Oral Health Knowledge, Attitude and Practice among Elderly Pensioners in Port Harcourt, Rivers State. *Centaral African Journal of Public Health*, 3 (3), 34-39.
- Chalmers JM, King PL, Spencer AJ, Wright FA& Carter KD. (2005).** The oral health assessment tool—validity and reliability. *Australian Dental Journal*, 50(3),191–199.
- Chowdary, M. S., Sudhir, K. M., Reddy, V. C., Kumar, K., & Srinivasulu, G. (2015).** Oral health literacy and its impact on oral health status among institutionalized elderly population. *IOSR J Dent Med Sci*, 14(8), 96-104.
- Constanza, G. U., Fernando, R. O., Iris, E. S., & Darinka, M. S. (2012).** Oral health practices and beliefs among caregivers of the dependent elderly. *Gerodontology*, 29(2), 742-747.
- Durey, A., Bessarab, D., & Slack-Smith, L. (2016).** The mouth as a site of structural inequalities; the experience of Aboriginal Australians. *Community Dent Health*, 33(2), 161-163.
- Elhddad, A. I. M., EL-Refadi, R. I., & Kablan, R. A. (2018).** Oral Health Related Quality of Life Among Completely Edentulous Patients. *Libyan Journal of dentistry*, 2(2), 80-83.
- Ghayth, E. I., Fahmy, H. D., El-moghrab, N. M., El-Aziz, A., &**

- Mahmoud, N. (2019).** Knowledge and Reported Practice Among Elderly with Oral and Dental Problems at Assiut City, Egypt. *Assiut Scientific Nursing Journal*, 7(17), 102-112.
- Gholami, M., Pakdaman, A., Jafari, A., & Virtanen, J. J. (2014).** Knowledge of and attitudes towards periodontal health among adults in Tehran. *EMHJ-Eastern Mediterranean Health Journal*, 20 (3), 196-202.
- Hsu, K. J., Lee, H. E., Wu, Y. M., Lan, S. J., Huang, S.T., & Yen, Y.Y. (2014).** Masticatory factors as predictors of oral health-related quality of life among elderly people in Kaohsiung City, Taiwan. *Quality of Life Research*, 23(4), 1395-1405.
- Khapung, A., Rao, G. N., Shrestha, S., Dhami, B., & Gupta, S. (2017).** Periodontal Status and Oral Health-Related Quality of Life among Elderly attending Kantipur Dental College, Kathmandu, Nepal. *Journal of Nepalese Society of Periodontology and Oral Implantology*, 1(2), 46-50.
- Kiesswetter, E., Hengeveld, L. M., Keijser, B. J., Volkert, D., & Visser, M. (2019).** Oral health determinants of incident malnutrition in community-dwelling older adults. *Journal of dentistry*, 85, 73-80.
- Kossioni, A.E., Maggi, S., Muller, F., & Petrovic, M. (2018).** Oral health in older people: time for action. *European Geriatric Medicine*, 9, 3-4.
- Lee, J. Y., Divaris, K., Baker, A. D., Rozier, R. G., & Vann Jr, W. F. (2012).** The relationship of oral health literacy and self-efficacy with oral health status and dental neglect. *American journal of public health*, 102(5), 923-929.
- Liu, J., Zhang, S. S., Zheng, S. G., Xu, T., & Si, Y. (2016).** Oral health status and oral health care model in China. *Chin J Dent Res*, 19(4), 207-215.
- Marino, R., Albala, C., Sanchez, H., Cea, X., & Fuentes, A. (2013).** Self-assessed oral-health status and quality of life of older Chilean. *Archives of gerontology and geriatrics*, 56(3), 513-517.
- Masood, M., Newton, T., Bakrib, N., Khalidd, T., & Masood Y., (2017).** The Relationship between Oral Health and Oral Health Related Quality of Life among Elderly People in United Kingdom. *Journal of Dentistry*, 56, 78-83.
- Mohsen, M. M., Abd EL Megeed, H. A., Elsayed, D. M. S., & Abd El-Rhman, M. E. (2017).** Quality of Dental Care among Elderly in Benha City. *Journal of Nursing and Health Science*, 6(4), 64-76.
- Mubarak, S., Hmud, A., Chandrasekharan, S., & Ali, A. A. (2015).** Prevalence of denture-related oral lesions among patients attending College of Dentistry, University of Dammam: A clinico-pathological study. *Journal of International Society of Preventive & Community Dentistry*, 5(6), 506-512.
- Na, T. M., Nair, R., Di Ying, J. N., & Yee, R. (2014).** Oral health status and complete denture status of independent-living Singaporean elderly residing in a community home. *Singapore dental journal*, 35, 9-15.

- Nanri, H., Yamada, Y., Itoi, A., Yamagata, E., Watanabe, Y., Yoshida, T., ... & Kimura, M. (2017).** Frequency of fruit and vegetable consumption and the oral health-related quality of life among Japanese elderly: A cross-sectional study from the Kyoto-Kameoka study. *Nutrients*, 9(12), 1-14.
- Osadolor, O. O., Otakhoigbogie, U., & Osadolor, A. J. (2019).** Oral health care among elderly patients attending a Nigerian teaching hospital. *Journal of Dental and Orofacial Research*, 15(2), 45-48.
- Oyapero, A., Edomwonyi, A., & Akinola, T. O. (2015).** Oral Health Related Quality of Life of Patients with Disability Attending a Public Physiotherapy Clinic in Lagos, Nigeria. *J Oral Hyg Health*, 3(4), 1-7.
- Paredes-Rodríguez, V. M., Torrijos-Gómez, G., González-Serrano, J., López-Pintor-Muñoz, R. M., López-Bermejo, M. Á., & Hernández-Vallejo, G. (2016).** Quality of life and oral health in elderly. *Journal of clinical and experimental dentistry*, 8(5), e590- e596.
- Pengpid, S., & Peltzer, K. (2018).** The prevalence of edentulism and their related factors in Indonesia, 2014/15. *BMC oral health*, 18(1), 1-9.
- Petelin, M., Cotič, J., Perkič, K., & Pavlič, A. (2012).** Oral health of the elderly living in residential homes in Slovenia. *Gerodontology*, 29 (2), e447-e457.
- Qian, Y. (2017).** A Clinic Based Survey Investigating Self-Reported Oral Health-Related Quality of Life, Number of Natural Teeth, and Oral Hygiene Habits Among Elderly Singaporeans. PHD thesis, Duke University, 52.
- Rekhi, A., Marya, C. M., Oberoi, S. S., Nagpal, R., Dhingra, C., & Kataria, S. (2016).** Periodontal status and oral health-related quality of life in elderly residents of aged care homes in Delhi. *Geriatrics & Gerontology International*, 16(4), 474-480.
- Rodrigues Junior, H. L., Scelza, M. F. Z., Boaventura, G. T., Custódio, S. M., Moreira, E. A. M., & Oliveira, D. D. L. (2012).** Relation between oral health and nutritional condition in the elderly. *Journal of Applied Oral Science*, 20(1), 38-44.
- Samnieng, P., Ueno, M., Zaitso, T., Shinada, K., Wright F., & Kawaguchi, Y., (2013).** The Relationship between Seven Health Practices and Oral Health Status in Community -Dwelling Elderly Thai. *Gerodontology*, 30(4), 254 –261.
- Sangouam, S., Wongsriya, K., Ratanadheeradhorn, S., & Channetikit, A. (2016).** The oral health status and hygiene of the dependent elderly in Muang, Phitsanulok, Thailand. *Journal of Dentistry Indonesia*, 23(3), 64-68.
- Šapurić, M., & Tozja, F. (2015).** Assessment of knowledge and attitudes to preserve oral health among older people aged 60+ in FYROM. *Balkan Journal of Dental Medicine*, 19(1), 26-32.
- Simpelaere, I. S., Van Nuffelen, G., Vanderwegen, J., Wouters, K., & De Bodt, M. (2016).** Oral health screening: feasibility and reliability of the oral health

- assessment tool as used by speech pathologists. *International Dental Journal*, 66(3), 178-189.
- Singh, K., Kochhar, S., Mittal, V., Agrawal, A., Chaudhary, H., & Anandani, C. (2012).** Oral health: knowledge, attitude and behaviour among Indian population. *Educational Research*, 3(1), 066-071.
- Wong, F. M. (2020).** Factors Associated with Knowledge, Attitudes, and Practices Related to Oral Care Among the Elderly in Hong Kong Community. *International Journal of Environmental Research and Public Health*, 17(21), 1- 15.
- Zelig, R., Byham-Gray, L., Singer, S. R., Hoskin, E. R., Fleisch Marcus, A., Verdino, G., ... & Touger-Decker, R. (2018).** Dentition and malnutrition risk in community dwelling older adults. *J Aging Res Clin Practice*, 7, 107-114.