AN EDUCATIONAL PROGRAM FOR ELDERLY PEOPLE TO IMPROVE DENTAL HEALTH STATUS

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Abstract

Background: Good dental health is essential for overall health and healthy aging; the elderly people poor dental health has been considered a risk factor for general health problems. Educational program needed to improve knowledge, practice & attitude regarding dental health and denture care. **Aim:** The aim of this study is to evaluate the effect of an educational program for elderly people to improve dental health status. **Design**: A quasi experimental research design with pre and post test was utilized in this study. **Sample:** Convenience sample was utilized in this study to choose 90 elderly people. **Setting:** The study was conducted at one geriatric home (Berket Al- Sabba) and geriatric club (Dar Altakwa) at Menofia Governorate. **Tools:** Interview questionnaire of this tool developed by the investigator based on review of related literature and it is composed of five parts. Demographic characteristics of the studied elderly, past and present medical history elderly knowledge about dental health, and denture care, elderly reported practices of dental health and denture care, elderly attitude toward dental health and denture care. **Results**: The study showed 96.7% of elderly had good knowledge post implementation of educational program, 76.7% of them had adequate reported practice post implementation of educational program. Also 28.9% them had positive attitude post implementation of educational program. **Conclusion**: The educational program were effective in improving the elderly knowledge, attitude & practices regarding dental health and denture care. **Recommendation:** Health educational program required for elderly to raise awareness about dental health and denture care.

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INTRODUCTION

Population aging is the inevitable increase in the share of elderly people, by 2030, 1 in 6 people in the world will be aged 60 years or over, at this time the share of the population aged 60 years and over will increase from 1 billion in 2020 to 1.4 billion. By 2050, the world's populations of people aged 60 years and older will double (2.1 billion), the number of persons aged 80 years or older is expected to triple between 2020 and 2050 to reach 426 million [1].

The aging of elderly people, affect the status of their oral health, they may have oral problems such as tooth loss, dental caries, dry mouth, periodontal disease, and cancer, these oral problems may affect food selection and nutritional intake and may finally lead to frailty, malnutrition, and sarcopenia [2]. 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 people is an important public health issue [3].

Oral health is important for maintaining the pleasure of eating and speaking and it greatly contributes to the improvement of the quality of life, oral health is an important factor for general health, poor health contributes negatively to oral health and dental problems are more prevalent in the elderly people. oral disorders have strong effects on personal satisfaction and well-being, even when they had high rates of physical and mental conditions, ageing is a recognized risk factor for periodontitis, there is epidemiological evidence that a reduction in Quality of Life (QoL) in the elderly directly contributes to more oral diseases, musculoskeletal disorders, and physical and mental health issues [4].

Educational program for the elderly people is very important for early diagnosis and preventive therapies that can avoid or decrease the progression of most oral diseases which cause discomfort, negative health effects and affect life if left untreated. Healthy 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 [5].

The increasing proportion of elderly people in the total population the difference of elderly, both in health and functionality as well as in financial, social status and the increasing elderly people with multiple chronic conditions that make deficits in their oral health, this increasing the need of dental health programs resulting in the retention of natural teeth until old age and improving dental health status [6].

The prevention of oral diseases is very important to maintain oral health. Furthermore, a healthy diet improves the health of the elderly and reduces their illness, implementation of preventive measures based on current strategies regarding the treatment of caries as an infectious and contagious disease, daily oral hygiene can decrease with the consequent increase in caries risk to, to include dietary advice to reduce the abuse of carbohydrate intake, especially between meals, and control the intake of food and liquids with excessive sugar content [7].

The gerantological health nurse had an important role through improving elderly knowledge, practice and attitude pertaining to dental health, encouraging elderly people to take a self-care approach to their health and respecting the decisions of them. Geriatric nurses and elderly people work in mutual collaboration using holistic care approaches. enable the elderly to assume the responsibility for their own health [8].

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Gerantological health nurse role in oral health. The oral health related nursing interventions are actions performed to assist the elderly people attain optimum dental health. Each nursing intervention is carefully planned using knowledge, critical thinking and skills to determine oral health related interventions for the elderly **[9].**

SIGNIFICANCE OF THE STUDY

Egypt is the most populous country in the Middle East and the third-most populous on the African continent after Nigeria and Ethiopia. One of the main features of the Egyptian population over the last few decades is the gradual increase in the absolute and relative numbers of elderly people. In line with global trends, Egypt's population is aging with 6.9 % of the population over 60 years of age in 2017, and projected to be 9.2% by 2030 and 20.8% by 2050 **[10]**.

Study done at Benha city in Egypt showed that 61.3% of the studied elderly had dental loss as dental disease, 50% had gum inflammation, 43.3 % had broken teeth, 34.7% had dental caries and 21.3% have discoloration of teeth. Also study done at Damnhour city in Egypt stated that more than half 55.0% of the studied elderly suffered from toothache, 52.0% had bleeding gums, 50.0% had dental decay& loose teeth, 40.0% had gingivitis and 40.0% had calculus deposition **[8]**.

Knowledge and practices play influential roles in elderly oral care. However, the evidence of Knowledge and practices related to oral care among the elderly is still inadequate **[11]**. So it is important to perform an educational program for elderly people to improve dental health status.

THE AIM OF THE STUDY

The aim of this study is to evaluate the effect of an educational program for elderly people to improve dental health status

A. Research hypothesis:

Knowledge, practice and attitude of the elderly regarding dental health status were improved after the implementation of an educational program.

SUBJECTS AND METHODS

I. Technical item

The technical items include research design, setting, sample and tool for data collection.

Research design:

A quasi experimental research design with pre and post test was utilized in this study.

Setting:

The study was conducted at one geriatric home (Berket Al- Sabba) and geriatric club (Dar Altakwa) at Menofia Governorate.

Sampling:

Sample type: Convenience sample was utilized in this study to choose 90 elderly people from total 530 elderly people.

The following formula was used to determine sample size:

In order to calculate the sample size, **Epi website (Open Source Statistics for Public Health), [12] was used, with the following sample size equation:**

Sample size n = [DEFF*Np (1-p)]/ [(d²/Z²$_{1-\alpha/2}$*(N-1)+p*(1-p)]

Where:

N = Population size = 530

n = Sample size

DEFF = Design effect = 1

P = % frequency of knowing dental health and problems among elderly people = 25% (from a pilot study).

d = 5%

Z = 1.96

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α = 0.05

Thus sample size was 90 elderly people

Tools for data collection:

An interview questionnaire was developed by the investigator based on review of related literature and it is composed of five parts.

Part 1: Demographic characteristics of the studied elderly it includes 6 questions about Age, sex, marital status…..etc.

Part 2: Past and present medical history it includes 8 questions about suffer from chronic diseases, what the disease, smoking…etc.

Part 3: Elderly knowledge about dental health, and denture care it include:

A-Questions related to dental healthit include 24 questions as: Meaning of dental health, dental health problems, dental plaque ……..etc.

B-Questions related to denture care it include 3 questions as: Meaning of denture, method of denture cleaning, problems of denture………………..etc.

Scoring system for knowledge items:

Complete correct answer was given two grades, incomplete correct answer was given one grade and wrong answer or don't know given zero grade.

For knowledge about dental and denture health status scoring were evaluated through 27 items, giving a range of 0-54 it was categorized into

Poor knowledge:(0<27) < 50%

Fair knowledge: (27<41) 50 %< 75%

Good knowledge: (41-45) ≥75%)

Part 4: Elderly reported practices of dental health and denture care

A. Elderly reported practices of dental health include 15 questions as: prepare the equipment needed for tooth brushing, wash the tooth brush before using, put adequate amount of toothpaste on tooth brush, brush upper outside teeth upward to downward over teeth……etc.

B. Elderly reported practices of denture care include 12 questions as: Prepare equipment needed for the procedure, remove denture from the mouth gently, place dentures in denture cup, use toothbrush and toothpaste specialized for denture cleaning, apply toothpaste specialized for denture cleaning on tooth brush…….etc.

Scoring system for the elderly reported practices items:

The elderly was given one for done and zero for not done.

The reported practice items include: 27 items, given range of 0-27 it was categorized into:

Inadequate practice: (<13.5) <50%

Adequate practice: (≥13.5) ≥ 50%

Part 5: Elderly attitude toward dental health and denture care

A- Attitude related to dental health it includes 10 questions as: I think eating sugary food is harmful, i think milk, cheese, egg, vegetables and fruits keep teeth healthy, i think dental wash keep teeth healthy, i think brushing teeth keep teeth healthy…….etc.

B- Attitude related to denture care it include 9 questions as: I think cleaning denture at night is useful, I think cleaning denture after eating is important, i think it is effective cleaning denture more than once per week……etc.

Scoring system for attitude items:

The elderly was given two for agree, one for sometimes and zero for disagree.

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The total score was evaluated through practice 19 items, given range of 0-38 it was categorized into:

Negative attitude (0<19) <50%

Moderate attitude (19< 29) 50% <75%

Positive attitude (≥29) ≥ 75%

Validity:

The developed tool was reviwed by nursing experts, in the field of Community Health Nursing, from Faculty of Nursing, Helwan, University, Menofia University and expert in the field of Community Medicine, Faculty of Medicine, Menofia University to measure the tools for clarity, relevance, comprehensiveness, applicability and reliability.

Reliability

Reliability was estimated and study tool was tested by using calculating Cronbach alpha coefficient test, which revealed that all parts of the tool consisted of relatively homogenous as indicated high reliability of tool. The Cronbach alpha was 0.83 for knowledge, and 0.80 for practices and 0.78 for attitude of elderly regarding dental and denture care.

Ethical considerations:

An official permission to conduct the proposed study was obtained from the Scientific Research Ethics Committee, Faculty of Nursing, Helwan University. Participation in the study is voluntary and subjects given complete full information about the study and their role before signing the informed consent. The ethical considerations was include explaining the purpose and nature of the study, stating the possibility to withdraw at any time, confidentiality of the information where it was not be accessed by any other party without taking permission of the participants. Ethics, values, culture and beliefs was be respected.

II- Operational Item:

Preparatory phase:

It was include reviewing of past, current, national and international

related literature and theoretical knowledge of various aspects of the study using books, articles, internet, periodicals and magazines to develop tools for data collection.

Pilot study:

The pilot study was done on 10% (9) of the sample to examine the clarity of questions and time needed to complete the study tools. Based on the result, no modifications were done. So the sample of the pilot study was included in the main study sample.

Field work:

1. The official letter was issued from the Dean of Faculty of Nursing, Helwan University, and was directed to the directors of geriatric home and geriatric club at Menoufia Governate including the aim of the study to obtain permission after establish a trustful relationship, each elderly was interviewed at the meeting room to establish the study purpose.

2. Data was collected during the six months' beging from March to end of September through (2021-2022) 2 days/week (Sunday& Wednesday) from 10am-12pm until needed sample was completed, informed consent was obtained from the elderly after investigator introduce herself for them, then explain the purpose of the study.

3. Educational program was developed based on the result of pretest

4. Evaluate the effect of the educational program by using the same tool one time only. Teaching method was be used, lecture, brain storming, demonstration and redemonstration.

An Educational program for elderly was conducted through four phase: Preparatory phase, assessment,

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planning & implementation and evaluation.

- **First, preparatory phase**: Tools of data collection development, review of the past and current related literature covering various aspects of dental health status for elderly was done using available books, articles and magazine.

- **Second, assessment phase:** Before start designed educational program, it was applied to assess the elderly knowledge, attitude, practices toward dental and denture care**.**

- **Third planning & implementation phase:** By developing educational program to improve dental health status for elderly, through improving elderly knowledge, attitude and practices toward dental health care**,** content of the educational program include: Meaning of dental and denture health, causes of dental and denture problems, prevention of dental and denture problems, practice of how to care with teeth and denture….**…….etc**.

  General objective: By the end of the educational program, the elderly was able to determine knowledge about dental and denture health, applay best practice about dental and denture health and

 determine best attitude about dental and denture health the program was done through 2 theoretical session each session lasts 45 minute, and one clinical session that lasts 45miute and immediately did the post test.

- **Fourth, evaluation phase:** This phase aimed to evaluate the effect of the educational program for the elderly people knowledge, practice and attitude toward dental health and denture care by using same questionnaire of pretest

III- Administrative Item:

After explanation of the study aim and objectives, an official permission was obtained from the Dean of Faculty of Nursing and, the directors of Birket Alsabaa geriatric homes and directors of Dar Altakwa geriatric club for the elderly in Menoufia Goverante asking for cooperation and permission to conduct the study.

IV-Statistical Item:

All data collected were organized, tabulated and analyzed using appropriate statistical test. The data was computed and analyzed using Statistical Package for the Social Science (SPSS) version 22 Graphics were done using Excel program. Quantitative data were presented by mean (X) and standard deviation (SD). It was analyzed using student t- test for comparison between two means, and ANOVA (F) test for comparison between more than two means. Qualitative data were presented in the form of frequency distribution tables, number and percentage. It was analyzed by chi-square (χ^2) test. Level of significance was set as p value < 0.05 for all significant tests.

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RESULTS

Part I: - Demographic characteristics of studied elderly.

Table (1): Distribution of the Studied Elderly People according to the Demographic Characteristics (n = 90)

Demographic characteristics	No	%
Age (Years)		
60 – 70	51	**56.7**
71 – 80	29	32.2
> 80	10	11.1
Mean ± SD	**65.4 ± 4.3 years**	
Sex:		
Males	47	**52.2**
Females	43	47.8
Marital status		
Single	5	5.6
Married	38	**42.2**
Divorced/Widow	47	**52.2**
Educational Level		
No read & write/ read & write	31	**34.4**
Basic education	14	15.6
Secondary Education	16	17.8
University education	29	**32.2**
Occupation:		
Farmer	13	14.4
Worker	17	18.9
Employee	46	**51.1**
*Other	14	15.6
Residence:		
Rural	49	**54.4**
Urban	41	**45.6**

*Others means: House wife, carpenter, driver

Table (1): Shows that, 56.7% of the studied elderly people aged between 60 to 70 years with mean age ±SD was 65.4 ± 4.3 years. 52.2% were male. 34.4 of elderly were no read and write /read and write and 32.2% had university education. As regards marital status, 42.2% of them were married and 52.2% were divorced and widowed. Concerning residence, 54.4% lived in rural areas, while 45.6% lived in urban areas. 51.1% of them were employed.

Part II: - Studied elderly people according to present and past medical history

Table 2: Frequency Distribution of Studied Elderly People according to Present and Past Medical History (n=90)

Medical history (present and past)	No	%
Suffered from any chronic disease		
Yes	62	68.9
No	28	**31.1**
If yes which diseases?(n=62)		
Diabetes mellitus	29	**46.8**
Hypertension	14	**22.6**
Musculoskeletal disorder	7	11.2
*Others	12	19.4

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Smoking Yes No	30 60	**33.3** 66.7
Lost teeth Yes No	65 25	**72.2** 27.8
If yes Quantity of loss (n=65) Partial Total	40 25	**61.5** 38.5
If yes, years of loss teeth (n=65) <1 1 - < 3 3 – 5 > 5	20 5 11 29	38.8 7.7 16.9 **44.6**
Have a denture Yes No	56 34	**62.2** 37.8
If yes, duration of use denture (n=56) < 3 years 3 -5 years > 5 years	20 4 32	35.7 7.1 **57.2**

*Others means: Hepatic, urological, respiratory and cancer.

Table (2): Reveals that 31.1 of elderly people not suffered from any chronic diseases, 46.8 % of them had diabetes mellitus, followed by 22.6% had hypertension, there were 33.3 of studied elderly were smoker, about 72.2 had lost their teeth,61.5% of them had partial loss,44.6% of them lost their teeth from >5 years, 62.2 % of them had denture, 57.2 of them wear denture from >5years.

Part III: Elderly people knowledge related to dental health, and denture care

Table (3-8) and figure (1-3) answer research hypothesis: An educational program improve knowledge, practice and attitude of elderly regarding dental health status.

Table (3): Statistical difference of the Studied Elderly People according to their Knowledge about Dental Health Pre and Post Educational Program (n = 90)

Knowledge about dental health	Pre Program						Post Program							P- value
	Wrong answer& don't know		Incomplete correct answer		Complete correct answer		Wrong answer & don't know		Incomplete correct answer		Complete correct answer			
	No	%	No	%	No	%	No	%	No	%	No	%		
Meaning of dental health	40	44.5	20	22.2	30	33.3	2	2.2	6	6.7	82	91.1	64.9	<0.0001**
Dental health problems	31	34.4	35	38.9	24	26.7	2	2.2	9	10	79	87.8	66.1	<0.0001**
Meaning of dental plaque	46	51.1	24	26.7	20	22.2	1	1.1	12	13.3	77	85.6	81.1	<0.0001**
Causes of dental plaque.	44	48.9	28	31.1	18	20	1	1.1	10	11.1	79	87.8	86.3	<0.0001**
Symptoms of dental plaque.	42	46.7	27	30	21	23.3	1	1.1	5	5.6	84	93.3	86.6	<0.0001**

Influence of dental plaque	46	51.1	24	26.7	20	22.2	1	1.1	11	12.2	78	86.7	82.4	<0.0001**
Methods of Prevention of dental plaque	31	34.4	32	35.6	27	30	1	1.1	8	8.9	81	90	66.6	<0.0001**
Meaning of dental carries	46	51.1	28	31.1	16	17.8	1	1.1	4	4.4	85	**94.5**	99.8	<0.0001**
Causes of dental carrier's	34	37.8	37	41.1	19	21.1	0	0	7	7.8	83	92.2	88.4	<0.0001**
Symptoms of dental carries	33	36.7	44	48.9	13	14.4	2	2.2	16	17.8	72	**80**	77.6	<0.0001**
Method of prevention of dental carries	35	38.9	39	43.3	16	17.8	0	0	8	8.9	82	91.1	93.3	<0.0001**
Foods causing dental sensitivity	33	36.7	46	51.1	11	12.2	2	2.2	10	11.1	78	86.7	90.4	<0.0001**
Meaning of gingivitis	44	48.8	32	35.6	14	15.6	2	2.2	6	6.7	82	91.1	95.6	<0.0001**
Causes of gum bleeding	43	47.8	28	31.1	19	21.1	1	1.1	5	5.6	84	93.3	90.9	<0.0001**
Symptoms of gum disease	37	41.1	33	36.7	20	22.2	2	2.2	4	4.4	84	93.3	83.2	<0.0001**
Methods of prevention of gum disease	44	48.9	32	35.6	14	15.6	3	3.3	8	8.9	79	87.8	88.8	<0.0001**
Meaning of perdonitis	59	65.6	15	16.6	16	17.8	3	3.3	7	7.8	80	88.9	96.1	<0.0001**
Symptoms of peridonitits	62	68.9	15	16.6	13	14.5	3	3.3	5	5.6	82	91.1	106.8	<0.0001**
Causes of peridonitis	61	67.8	15	16.6	14	15.6	4	4.4	5	5.6	81	90	100.2	<0.0001**
Methods of prevention of periodontitis	61	67.8	15	16.6	14	15.6	4	4.4	3	3.3	83	92.3	102.6	<0.0001**
Effects of fluorides on teeth	60	66.6	16	17.8	14	15.6	4	4.4	5	5.6	81	90	99.5	<0.0001**
Reasons of oral cancer	56	62.2	11	12.2	23	25.6	8	8.9	6	6.7	76	84.4	66.2	<0.0001**
the system that can affected by health of teeth	59	65.6	10	11.1	21	23.3	4	4.4	14	15.6	72	**80**	75.4	<0.0001**

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Causes of bleeding during tooth brushing	42	46.7	30	33.3	18	20	6	6.7	10	11.1	74	82.2	66.5	<0.0001**
total Knowledge	**16.9 ± 8.5 Range: 0 – 45**						**44.7 ± 5.9 Range:16-48**						**t=17.2**	<0.0001**

t= Paired t test.   ** Highly Statistically significant at p<0.001

   Table (3): Indicates that, there was marked improvement in elderly knowledge regarding dental health in post implementation of educational program with highly statistically significant difference (p<0.0001) in all items of knowledge. In addition, the mean total score Knowledge about dental health status increased from 16.9 ± 8.5 pre educational program to 44.7 ± 5.9 post educational program.

Table (4): Statistical difference of the Studied Elderly People according to their Knowledge about Denture Care Pre and Post Educational Program (n = 90)

The Elderly people ' knowledge about denture health status	Pre Program						Post Program						χ^2	P-VALUE
	Wrong answer& I don't know		Incomplete correct answer		Complete correct answer		Wrong answer& don't know		Incomplete correct answer		Complete correct answer			
	No	%	No	%	No	%	No	%	No	%	No	%		
What are the meaning of denture	42	46.7	28	31.1	20	22.2	3	3.3	10	11.1	77	**85.6**	73.7	<0.0001**
Methods of denture cleaning	46	51.1	26	28.9	18	20	2	2.2	14	15.6	74	82.2	78.5	<0.0001**
Problems of denture	49	54.4	29	32.2	12	13.4	5	5.5	14	15.6	71	**78.9**	81.3	<0.0001**
Total Knowledge	**2.0 ± 0.9 Range: 0 – 6**						**5.4 ± 1.2 Range:0 – 6**						**t=13**	<0.0001**

t= Paired t test. ** Highly Statistically significant at p<0.001

   Table (4): Indicates that, there was marked improvement in elderly knowledge regarding denture care in post implementation of educational program with highly significant improvement (p<0.0001) in all items of knowledge. In addition, the mean total score Knowledge about denture health status increased from 2 ± 0.9 pre educational program to 5.4 ± 1.2 post educational program.
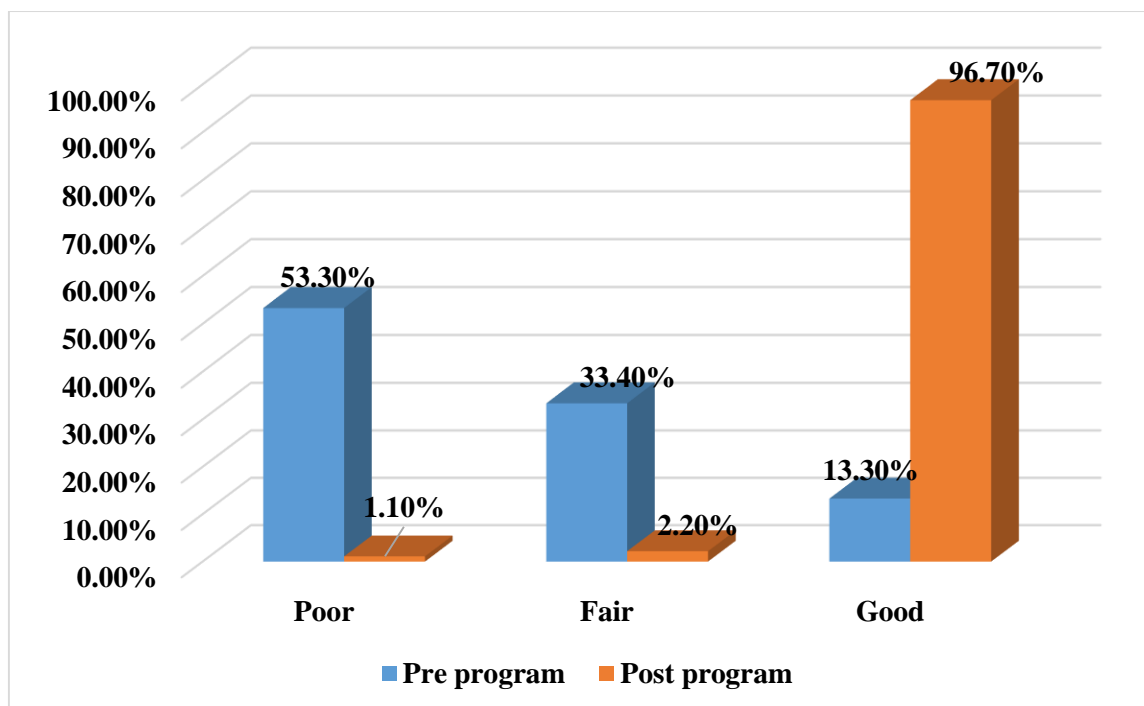
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Figure (1): Percentage Distribution of the Elderly total Knowledge regarding Dental Health and Denture Care Pre and Post Educational Program (n=90)

Figure (1): Illustrates that, 13.3% of elderly people had good total knowledge pre implementation of educational program. While improved to 96.7 of them had good knowledge regarding dental health and denture care post implementation of educational program.

Part VI: - Elderly people reported practice regarding dental health, and denture care:

Table (5): Statistical difference of Elderly Reported Practices of Dental Health Pre and Post Educational Program (n=34)

The procedure of brushing teeth	Pre Program				Post Program					P- value
	Not Done		Done		Not Done		Done			
	No	%	No	%	No	%	No	%		
Prepare the equipment needed for tooth brushing	22	64.7	12	35.3	3	8.8	31	**91.2**	22.5	<0.0001**
Wash the tooth brush before using	22	64.7	12	35.3	4	11.8	30	88.2	19.8	<0.0001**
Put adequate amount of toothpaste on tooth brush	23	67.6	11	32.4	3	8.8	31	**91.2**	24.5	<0.0001**
Brush upper outside teeth, upward to downward over teeth	20	58.8	14	41.2	3	8.8	31	**91.2**	18.7	<0.0001**
Brush upper inside teeth, upward to downward over the teeth	23	67.6	11	32.4	5	14.7	29	85.3	19.4	<0.0001**
Brush the top of the teeth of the upper jaw	21	61.8	13	38.2	3	8.8	31	**91.2**	20.5	<0.0001**

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Brush lower outside teeth, downward to upward up over the teeth	20	58.8	14	41.2	4	11.8	30	88.2	16.2	<0.0001**
Brush lower inside teeth, downward to upward over the teeth	23	67.6	11	32.4	3	8.8	31	**91.2**	24.5	<0.0001**
Brush the top of the teeth of the lower jaw	22	64.7	12	35.3	5	14.7	29	85.3	17.5	<0.0001**
Brush the tongue	29	85.3	5	14.7	6	17.6	28	82.4	30.7	<0.0001**
Rinse the mouth after brushing teeth	26	76.5	8	23.5	7	20.6	27	79.4	20.9	<0.0001**
Brush at least 2minute	27	79.4	7	20.6	7	20.6	27	79.4	23.2	<0.0001**
Use dental floss to remove food particles and plaque	31	91.2	3	8.8	6	17.6	28	82.4	36.5	<0.0001**
Floss is gently inserted between teeth & scrapped along the teeth sides close to gum	25	73.5	9	26.5	8	23.5	26	**76.5**	16.8	<0.0001**
Use mouth wash to clean teeth	26	76.5	8	23.5	8	23.5	26	**76.5**	17.5	<0.0001**
total practice	**4.0 ± 2.1 Range: 0 - 15**				**12.3 ± 4.1 Range:0 – 15**				**t= 7.2**	<0.0001**

t= Paired t test. ** Highly Statistically significant at p<0.001

  Table (5): Indicates that, there was marked improvement in elderly reported practices regarding dental health in post implementation of educational program with highly statistically significant difference (p<0.0001) in all items of reported practice. In addition, the mean total score of reported practice about dental health status increased from 4.0 ± 2.1 pre educational program to 12.3 ± 4.1 post educational program.

Table (6): Statistical difference of Elderly Reported Practices of Denture Care Pre and Post Educational Program (n=56)

The procedure of denture brushing	Pre program				Post Program				χ^2	P-value
	Not Done		Done		Not Done		Done			
	No	%	No	%	No	%	No	%		
Prepare equipment needed for the procedure	18	32.1	38	67.9	5	8.9	51	**91.1**	9.2	<0.002**
Remove denture from the mouth gently	15	26.8	41	73.2	5	8.9	51	**91.1**	92	<0.002**
Place dentures in denture cup	22	39.3	34	6.7	10	17.8	46	82.2	6.2	<0.01**
Use toothbrush and toothpaste specialized for denture cleaning	33	58.9	23	41.1	18	32.1	38	67.9	8.2	<0.004**
Apply toothpaste specialized for denture cleaning on tooth brush	36	64.3	20	35.7	21	37.5	35	62.5	8.1	<0.004**
Brush outer surface of the	33	58.9	23	41.1	22	39.3	34	**60.7**	4.2	<0.03*

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denture with back and forth motion									
Brush the inner surface of the denture vertically, use upward strokes	37	66.1	19	33.9	22	39.3	34	**60.7**	8.0	<0.004**
brush the chewing surfaces of the denture with back and force motion	32	57.1	24	42.9	18	32.1	38	67.9	7.0	<0.008 **
Rinse denture with warm water	28	50	28	50	15	26.8	41	73.2	6.3	<0.01**
Brush gum after removing denture by soft tooth brush.	37	66.1	19	33.9	19	33.9	37	66.1	11.5	<0.0007**
Store denture in denture cup with water and cleaning agent	31	55.4	25	44.6	20	35.7	36	64.3	4.3	< 0.03 S*
Rinse denture before wearing	23	41.1	33	58.9	13	23.2	43	76.8	4.1	<0.04 S*
Mean total score practice (12 Items)	**5.8 ± 2.1 Range: 0 - 12**				**10.7 ± 4.1 Range:0 – 12**				**t= 9.4**	<0.0001**

t= Paired t test. * Statistically Significant at P<0.05, ** Highly Statistically significant at p<0.001

Table (6): Indicates that, there was marked improvement in elderly reported practice regarding denture care in post implementation of educational program with highly statistically significant difference (p<0.0001) in all items of reported practice expect in brush outer surface of the denture with back and forth motion, store denture in denture cup with water and cleaning agent and rinse denture before wearing was statistically significant at (p>0.05).
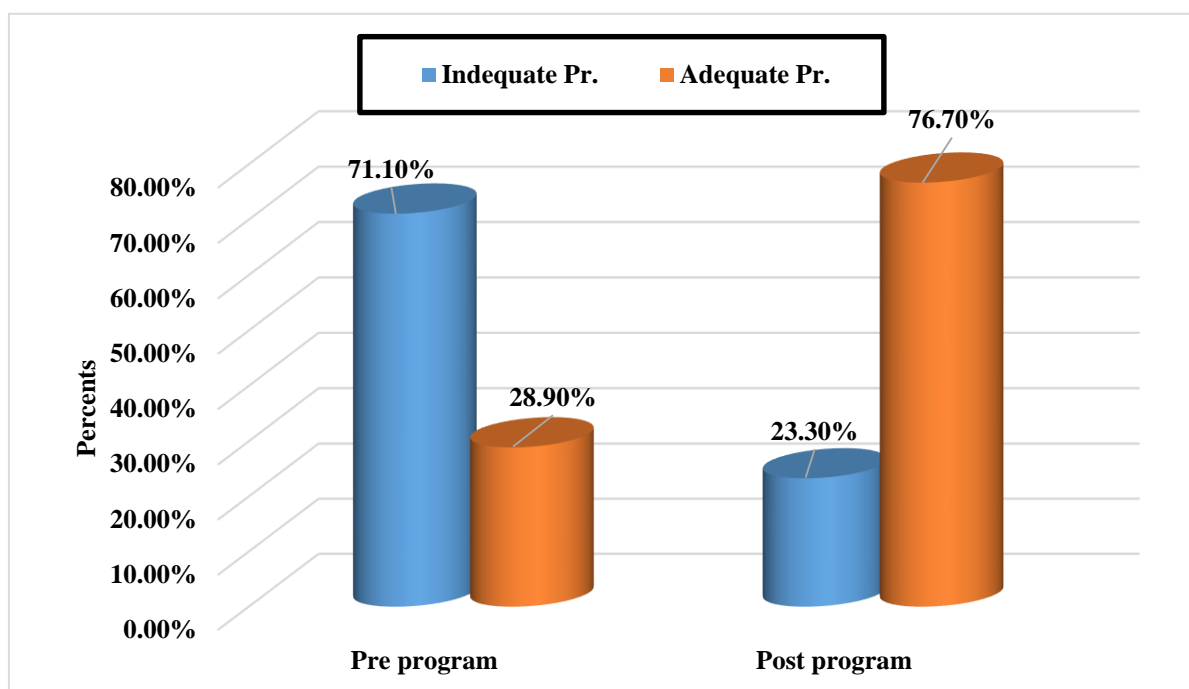

Figure (2): Percentage Distribution of the Elderly Total Reported Practices regarding Dental Health and Denture Care Pre and Post Educational Program (n=90)

Figure (2): Illustrates that 28.9% of elderly people had adequate total reported practice pre implementation of educational program. While improved to 76.7 of them had adequate reported practice regarding dental health and denture care post implementation of educational program.

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Part V: Elderly people attitude toward dental health and denture care

Table (7): Statistical difference of Elderly Attitude toward Dental Health Pre and Post Educational Program (n=34)

Elderly attitude about dental health	Pre Program						Post Program						χ²	P
	Disagree		Sometimes		Agree		Disagree		Sometimes		Agree			
	No	%	No	%	No	%	No	%	No	%	No	%		
I think eating sugary food is harmful	7	20.5	2	6	25	73.5	0	0	1	2.9	33	**97.1**	9.4	<0.002**
I think milk, cheese, eggs, veg and fruits keep teeth healthy	7	20.5	2	6	25	73.5	19	55.9	5	14.7	10	29.4	11.1	<0.0008**
I think dental wash keep teeth healthy	9	26.3	2	6	23	67.5	1	2.9	1	2.9	32	94.2	9.1	<0.002**
I think brushing teeth keep teeth healthy	10	29.4	5	14.7	19	55.9	0	0	2	6	32	94	15.6	<0.0001**
I think Dental wash after sugary food is necessary	9	26.5	2	6	23	67.5	2	6	4	11.8	28	82.2	4.3	<0.03*
It is necessary to wash the teeth before bedtime	15	44.1	5	14.7	14	41.2	0	0	4	11.8	30	88.2	21.6	<0.0001**
Chang tooth brush every 2month is necessary	25	73.5	7	20.5	2	6	5	14.7	2	6	27	79.3	35.3	<0.0001**
I think brush teeth at least 2minute is necessary	20	58.8	4	11.8	10	29.4	9	26.5	2	6	23	67.5	10.0	<0.001**
I think dental floss in necessary	16	47.1	4	11.8	14	41.1	3	8.8	2	6	29	85.2	15.5	<0.0001**
I think regular checkup for teeth is harmful	3	8.8	8	23.5	23	67.7	25	73.5	7	20.5	2	**6**	32.9	<0.0001**
total Attitude	**11.2 ± 5.8 Range: 0 – 20**						**18.4 ± 8.2 Range:0-20**						t=9.5	<0.0001**

t= Paired t test. * Statistically Significant at P<0.05, ** Highly Statistically significant at p<0.001

Table (7): Indicates that, there was marked improvement in elderly attitude regarding dental health in post implementation of educational program with highly statistically significant improvement (p<0.0001) in all items of attitude expect think dental wash after sugary food is necessary with statistically significant at (p>0.05). In addition, the mean total score attitude about dental health increased from 11.2± 5.8 preprogram to 18.4± 8.2 post program.

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Table (8): Statistical difference of Elderly Attitude toward Denture Care Pre and Post Educational Program (n=56)

Elderly people ' attitude about denture health	Pre Program						Post Program						χ^2	P
	Disagree		Sometimes		Agree		Disagree		Sometimes		Agree			
	No	%	No	%	No	%	No	%	No	%	No	%		
I think cleaning denture at night is useful	17	30.4	7	12.5	32	57.1	5	8.9	11	19.6	40	71.5	6.2.4	<0.01**
I think cleaning denture after eating is important	10	17.9	17	30.4	29	51.8	4	7.2	5	8.9	47	83.9	11.1	<0.0008**
I think it is effective Cleaning denture more than once per week	11	19.6	24	42.9	21	37.5	9	16.1	12	21.4	35	62.5	4.5	<0.04*
I think it is necessary cleaning the denture	24	42.8	23	41.1	9	16.1	0	0	5	8.9	51	**91.1**	61.2	<0.0001**
It is necessary to brush denture with denterifers	13	23.2	26	46.4	17	30.4	8	14.3	10	17.8	38	67.9	11.0	<0.0009**
The best way for storing denture in water	20	35.7	21	37.5	15	26.8	42	75	4	7.2	10	**17.8**	9.1	<0.002**
I think storing denture in cleaning solution is important	25	44.6	10	17.9	21	37.5	8	14.3	11	19.6	37	66.1	13.4	<0.0002**
I think storing denture in clothes is harmful	27	48.2	11	19.6	18	32.1	9	16.1	6	10.7	41	73.2	19.4	<0.0001**
Regular checkup for denture is necessary	31	55.3	16	28.6	9	16.1	4	7.2	11	19.6	41	73.2	42.9	<0.0001**
Total Attitude	**6.9 ± 2.5 Range: 0 - 18**						**11.7 ± 5.9 Range:0-18**						**t=9.5**	<0.0001**

t= Paired t test. Not significant at P>0.05 * Statistically Significant at P<0.05 ** Highly Statistically significant at p<0.001

Table (8): Indicates that, there was marked improvement in elderly attitude regarding denture care in post implementation of educational program with highly statistically significant improvement (p<0.0001) in all items of attitude expect I think it is effective cleaning denture more than once per week with statistically significant difference at (p>0.05). In addition, the mean total score attitude about denture care increased from 6.9± 2.5 pre program to 11.7± 5.9 post program**.**
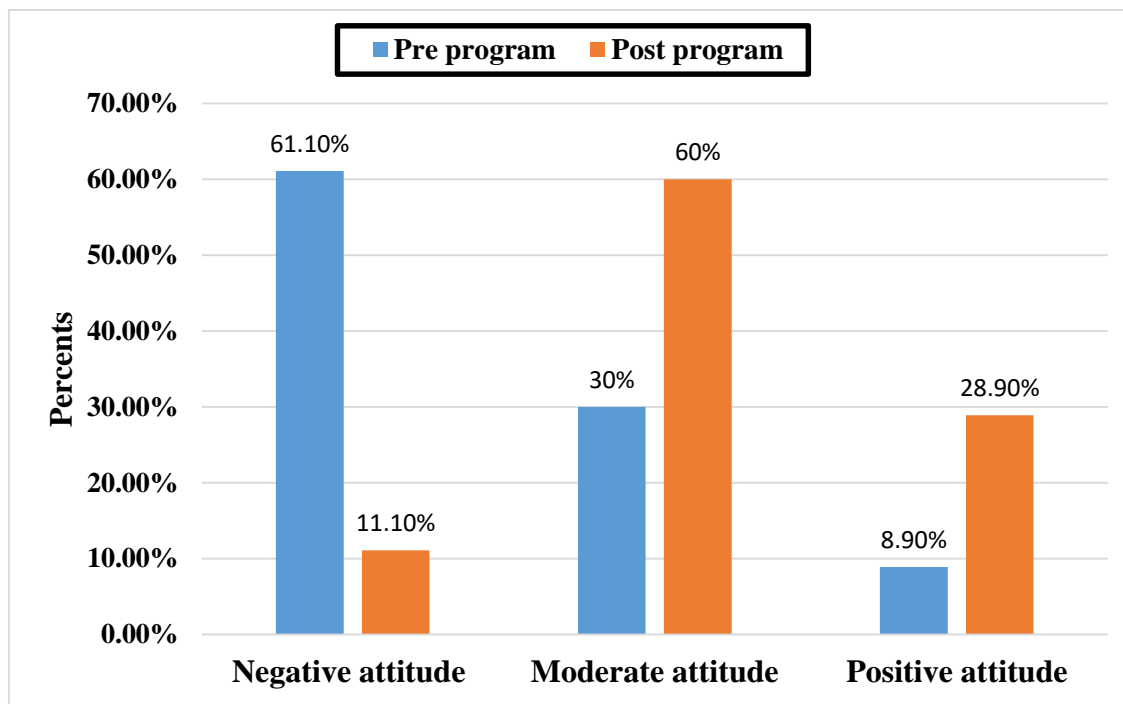
Figure (3): Percentage Distribution of the Elderly Total Attitude regarding Dental Health and Denture Care Pre and Post Educational Program (n=90)

Figure (3): Illustrates that 8.9% of elderly people had positive attitude pre implementation of educational program. While improved to 28.9 of them had positive attitude regarding dental health and denture care post implementation of educational program.

DISCUSSION

Part I: Demographic characteristics of studied elderly people

The current study revealed that more than half of studied elderly person aged between 60 to 70 years with mean age ±SD was 65.4 ± 4.3 years**. (Table 1)**, this result disagreed with **Khalil et al.** [13] in Egypt in a study entitled **"** effect of mobile- Based educational program through bluetooth and What Sapp. application on the oral Health values, dental Literacy, and Oral Self-Efficacy among Older Adults" (n=76)who reported that 70.8% of studied elderly was more than 70 years.

In relation to gender, the current study illustrated that more than half of studied sample were male. This result is supported by **Mohamed et al.** [14] who studied "quality of Life among elderly People at Geriatric Home Elhlal Elahmer and Noor Wel Amal geriatric homes" in Beni-Suef governorate, Egypt, (n=20) elderly as mentioned that 60% of studied sample were male, this result disagreed with **Miranda-Medina & Alcocer-Nuñez** [15] who done a descriptive, prospective, cross-sectional study about "oral health-related quality of life of elderly people and associated socio-demographic factors" in Brazil, (n= 240) as mentioned that female participants accounted for 60.8%.In

addition; education, the recent study demonstrated that more than one thirds of studied sample no read and write /read and write, this result goes in same line with **Basali et al.** [16] who studied " health education program for elderly with oral and dental problems about oral Health" at Assiut City, Egypt (n=130) as reported that 86.9% of studied sample were non educated**.** Otherwise this result disagreed with **Kwon et al.** [17] who studied entitled "oral health knowledge and oral health related quality of life of older adults" in California (n= 304) as mentioned that 60% of studied elderly had high education. From the investigator point of view, this might be due 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.

Furthermore, the current study illustrated that more than half of studied sample were employed, this result is supported by **Bianco et al.** [18] as mentioned that 74% of studied sample were employed, on other hand, this result is disagreed with **Ghayth et al.** [8] who studied "knowledge and reported practice among elderly with oral and dental problems "at Assiut City, Egypt, (n=1300) as reported 88.6% of studied sample weren't employed.

The findings of the current study illustrated that more than half of studied sample lived in rural areas. This result agrees with **Mohsen et al.** [19] who studied "quality of dental care among elderly" in Benha City, Egypt (n =150) who found that 62.7% of the participant elderly were from rural areas. From the investigator point of view this might be due to there wasn't hospital in rural area for dental so that they came to nearest hospital in city acceptable price comparing to the private dental clinics.

Part II: - Studied elderly people according to past and present medical history

Regarding suffering from chronic disease, the current study revealed that, more than one thirds of studied sample didn't suffering from any chronic diseases **(table 2),** this result agreed with, **Khamrin et al.** [20] who studied **"**Factors Associated with Health Literacy, Self-Efficacy, Social Support, and Oral Health Care Behaviors Among Elderly" Thailand who reported that 50% of studied elderly didn't had chronic disease. But this result contradicted with **Choi & Jung** [21] in Korea, who studied entitled**"** factors influencing oral health-related quality of life in older adults in rural areas", and reported that 88% of studied patient had chronic disease.

In addition, the current study illustrated that about half of studied elderly had diabetes mellitus, this results in same line with **Abdallah et al.** [22] in Sharqia Governorate, Egypt (n=75) studied entitled "educational program to improve quality of life among elderly regarding oral health" demonstrated that the most common diseases were hypertension (58.7%).

More ever, the current study illustrated that nearly one third of studied elderly there were smoker, this result consistent with **Abd Allah et al.** [3] who studied entitled assessment "oral health knowledge and oral self-care practices among rural elderly in Egypt" (n =190) who reported that 66.8% of studied sample were smoker.

As regards loss of teeth, the current study revealed that about three quarter of studied elderly lost their teeth, this result is supported by **Shimazaki et al.** [23] in Barazil who done a study about "oral factors associated with swallowing function in independent elders "(n=4667) as reported that 41% of studied sample had loss teeth. This might be due to most of them smoker and had chronic disease which affect on their health.

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Also, the current study demonstrated that more than two thirds of studied elderly had partial teeth loss, this result congruent with **Abd Allah et al.** [24] who done a cross sectional study (n =190)the "effect of oral health on nutritional status of older Adults in a rural area "in Egypt as stated that 65% of studied sample had partial loss of teeth.

The current study illustrated that more than two thirds of studied elderly have denture, this result is disagreed with **Charleekrua et al.** [25] who studied "swallowing problems among community-dwelling elderly Thailand, " (n=872) as reported 86% of studied elderly not wear denture.

Knowledge of the elderly regarding dental health status will be improved after the implementation of the educational program.

The following result proved the research hypothesis knowledge, practice and attitude regarding dental health status was improved after implantation of educational program.

Part III: Elderly people knowledge related to dental health

Regarding elderly people knowledge related to dental health, the current study revealed that there was marked improvement in elderly knowledge regarding dental health in post implementation of educational program with highly statistically significant difference in all items of knowledge,**(table 3)** this result contrary with **Chisnoiu et al.** [26] who studied "oral health-related knowledge, attitude and practice among patients in Rural Areas", Romania,(n=258) as mentioned that the basic knowledge of rural patients about oral and dental health can be considered satisfactory (81%). This might be due to effect of education program, adequate session, effective media, and giving them written material before session

In addition, the current study revealed that, there was marked improvement in elderly knowledge regarding denture health post implementation of educational program with highly significant improvement. **(table 4)**. This result is supported by **Basali et al.** [16] as mentioned that there was statistically significant improvement of knowledge post program compared to preprogram. This might be due to effect of education program, adequate session,

The current study illustrated that, there was statistically significant difference between studied total knowledge regarding dental health and denture care pre implementation and post implementation of educational program. **(figure 1)**. The results of the present study are also supported by **Abd Allah et al.** [22] who reported that there were statistically significant improvements in elderly's knowledge, which indicates the effectiveness of the program in leading a positive change in their knowledge.These reveals that implementation of educational program had good impact on their knowledge and improved it. Thus, there was statistical significant difference between total score of knowledge pre and post program.

Part VI: - Elderly people reported practices regarding dental health, and denture care:

Regarding Elderly people reported practice regarding dental health, the present study revealed that, there was marked improvement in elderly educational program with highly statistically significant difference in all items of reported practice **(table 5)**. This result agreed with a study done by **Verbree et al.** [27]" Evaluation of an oral care program to improve the oral health of home-dwelling older People statistically significant differences in the group of older people with dentures and natural teeth in the three months participating in the oral care program. practices, which

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indicates the effectiveness of the program in leading a positive change in their practices

The current study revealed that, there was marked improvement in elderly reported practice regarding denture care in post implementation of educational program with highly statistically significant difference in all item of reported practice **(table 6)**. These results of the present study are also supported by **Apratim et al.** [28] who studied entitled "denture hygiene habits among elderly patients wearing complete dentures" in India (n=230) as reported that 72% of participants had low level of practice toward denture care.

This might be due to health educational program was successful in improving reported practice among the studied elderly by using pictures, videos, and asking elderly for re-demonstrating. Thus, there was a statistical significant difference in pre and post tests. it was found that the vast majority of the studied elderly had adequate reported practice about tooth brushing related to health educational program was successful in improving reported practice about tooth brushing among the studied elderly by demonstrating tooth brushing and flossing using pictures, videos, and asking elderly for re-domenstrating. Thus, there was a statistical significant difference between total score of reported practices about tooth brushing in pre and postprogram.

The current study illustrated that about one thirds of elderly people had adequate total reported practice pre implementation of educational program which improved to more than three quarter of them had adequate reported practice regarding dental health and denture care after implementation of educational program with statistically significant relation **(figure 2)**. This result in same line with **Chisnoiu et al.** [26] as reported that the studied sample showed poor practice regarding oral and dental health, also the

results of the current study are consistent with **Basali et al.** [16] as reported he studied elderly had improvement of practice compared to preprogram with statistically significant relation. This low level of practice preprogram might be due to dental care is not practiced in Egypt as most patients visit the dental clinic only when they had pain or an emergency dental problem, improvement of practice post program might be due to attendance session regularly, used clear picture.

Part V: Elderly people attitude toward dental health and denture care

The current study revealed that, there was marked improvement in elderly attitude regarding dental health post implementation of educational program with highly statistically significant improvement $(p<0.0001)$ in all item of attitude with statistically significant **(table7)**. This result in same line with **Šapurić & Tozja** [29] who studied entitled "assessment of knowledge and attitudes to preserve oral health among older people aged 60 in Fyrom" (n=193) as mentioned that oral health behavior (attitude) of elderly people, aged over 60 years, in Fyrom is bad, investigator point of view this improvement might be due to adequate session, regular attended to the session which in rich their knowledge and practice thus reflect on their attitude

Regarding elderly attitude toward denture care pre and post educational program, the current study revealed that there was marked improvement in elderly attitude regarding denture care in post implementation of educational program with highly significant improvement in all items of attitude expect I think it is effective cleaning denture more than once per week with statistically significant difference at $(p>0.05)$ **(Table 8)**. This result is supported by a cross sectional study done by **Bommireddy et al.** [30] about "denture care practices and perceived denture status among complete denture wearers" in Guntur, India (n =543)

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as reported 63% of studied sample showed poor attitude about denture care. From the researcher point of view; this improvement in attitude might be due to effect of education program, adequate session

Concerning the elderly total attitude regarding dental health and denture care pre and post educational program, the recent study Illustrated that, there was statistically improvement of elderly attitude post program compared pre, with highly statistically significant relation **(figure 3)** this result is supported by **Palati et al. [31]** who studied "knowledge, attitude and practice survey on the perspective of oral lesions and dental health in geriatric patients residing in old age homes" in India (n=103) who point to a need to improve access to oral healthcare and dental health education for the institutionalized elderly population.

CONCLUSION

In the light of the study findings, it can be concluded that, the educational program were effective in improving the elderly knowledge, attitude & practice regarding dental health and denture care.

RECOMMENDATION

In the light of the findings of the current study the following are recommended:

1. Further research is needed to assess oral health status of the elderly in a large sector.

2. Health educational program required for elderly to raise awareness about dental health and denture care.

3. Dissemination of booklets on elderly attended dental clinics about importance of dental health and denture care.

Author contribution: Authors contributed equally in the study.

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