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Technology Based-Nursing Intervention on Oral Health Literacy, Self-Perceived Oral Health and Dental Neglect Among Older Adults

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Abstract

Background: Oral health affects people physically, psychologically and influences how they grow enjoy life, look, speak, chew, taste food and socialize, as well as their feelings of social well-being. **Aim:** To evaluate the effect of Technology Based Nursing Intervention on oral health literacy, self-perceived oral health and dental neglect among older adults. **Design:** A quasi-experimental design with (pre- post) test was utilized. **Setting**: The study was conducted in Al-Taqwa charity club of elderly population at Menoufia governorate, Egypt; affiliated to the Ministry of Social Solidarity. **Subjects**: The study subjects were selected by systematic random sample (every 7th older adult). A total of 50 older adult (males and females) were recruited. **Instruments:** Four Instruments were used to gather the data for this study: Structured interviewing questionnaire, Health Literacy in Dentistry scale, Self-perceived oral health questionnaire and Dental Neglect Scale. **Results:** The finding of the study points to a statistically significant difference between pre and post technology-based nursing intervention regarding older adult's oral health problems such as tooth pain, bad mouth odor, mouth ulcer and dry mouth. There is a statistically significant difference in hygiene behaviors items pre and post technology-based nursing intervention. In addition, that there is significant improvement in older adults' dietary habits post technology-based nursing intervention. Post intervention revealed significant improvement in the mean total health literacy scale, among studied older adults compare to pre intervention (48.8±3.86 vr 25.1±10.8). **Conclusion:** After receiving a technology-based nursing intervention for three months. The scores of oral health literacy and self-perceived oral health among studied older adults was improved post intervention than pre intervention. While lowering in dental neglect score post intervention was appeared post intervention than pre intervention. **Recommendation:** Utilize digital or e-health interventions to prevent oral and teeth problems of older adults that conducted via social network with activating the mobile health clinics.

Key words: *Oral health literacy, Self-perceived oral health, dental neglect and older adults*

Introduction

Oral health is essential to general health and quality of life. According to the World Health Organization, oral health is "a state of being free from mouth and facial pain, oral and throat cancer, oral infection and sores, periodontal (gum) disease, tooth decay, tooth loss, and other diseases and disorders that limit an individual's capacity in biting, chewing, smiling, speaking, and psychosocial wellbeing" **(Mcgrath, 2020).**

According to the WHO, the global population is increasing at the annual rate of 1.7%, while the population of those over 65 years is increasing at a rate of 2.5%. Both the developed, as well as the lesser-developed countries, are expected to experience significant shifts in the age distribution of the population by 2050. The fastest growing population segment in most countries is the elder people than 80 years, which according to the United Nations estimates will make up nearly 20% of the world's population **(Mohsen et al., 2020).** In Egypt, The Central Agency for Public Mobilization & Statistics has reported that number of elderly people (60 years and over) in Egypt reached 6.8 million, representing 6.7% of the total population. This percentage is expected to rise to 17.9% in 2052 **(CAMPS, 2022).**

Oral health status is one of the key components of general health and well-being, especially in older adults. Oral diseases, including dental caries and periodontal disease, can cause functional impairment and tooth loss. Previous studies have shown that poor oral health status presenting with loss of teeth is associated with loss of physical activity and mortality especially in elderly **(Watanabe et al., 2020).**

With ageing, changes in oral cavity including decreased salivary gland function, wearing of the enamel of teeth, reduce size of the pulp chamber and canals, Changes to the mucosal tissue as well as a range of systematic diseases as cardiovascular diseases, respiratory diseases, and strokes with adverse effects of their treatments increase susceptibility to oral diseases in older adults. Fortunately, many of these oral diseases can easily be prevented by adequate access to preventive/ restorative dental care and compliance with daily oral hygienic practices **(Das et al., 2020).**

Oral health literacy (OHL) has proved to be critical in reducing oral health disparities and in promoting oral health. Individuals with limited OHL were reported to be at higher risk for oral diseases and the problems related to those diseases **(Batista et al., 2021).** People with poor oral health literacy are more likely to have missed dental appointments. Non-adherence to dental recommendations and has been reported to cause higher caries experiences and poor periodontal status (**Baskaradoss, 2022).**

Self-perceived oral health is highly associated with the patient's perception of treatment needs and the demand for dental services. Those who regularly visit a dentist for routine dental check-ups are more likely to assess their oral health as good **(Andrade, 2021).** Older adults present with poor oral conditions, they do not always accurately perceive their own oral health conditions and poor oral health has been shown to negatively impact both the oral health- and systemic health-related quality of life of older adults **(Mariana, 2020).**

Dental neglect as being failure to take precautions to maintain oral health, failure to obtain needed dental care and physical neglect of the oral cavity. High dental neglect scores were associated with more decayed and missing teeth, high levels of plaque, irregular use of dental services, low self-ratings of oral health. Dental caries, periodontal diseases, and other oral conditions, if left untreated, it can lead to pain, infection and loss of functions **(Sarkar et al., 2020).**

Nurses play an essential role in enhancing elderly oral health and be an important component of a successful oral hygiene program. The knowledge and skills of nurses make them act as

counselors for procedure and program development, determine oral care needs of elderly, develop individualized care plans, provide clinical hygiene treatment, make referrals to dentists, and implement oral health programs **(Abd–Allah et al., 2021).**

Significance of the study

Maintaining adequate oral health is important for elderly quality of life **(Tenani, 2021).** Elderly people need to eat and talk comfortably, feel happy with their appearance, stay pain-free, maintain self-esteem, and maintain habits/standards of hygiene **(Boynes, 2021).** With aging, elderly individuals may have oral problems such as tooth loss, dental caries, dry mouth, periodontal disease, and cancerous lesions. These oral problems may affect food selection and nutritional intake and may finally lead to frailty, malnutrition, and sarcopenia **(Goldstein, 2022).**

There is a growing interest of oral health status of older persons as the size of this population is increasing around the world. Literature suggests that as many as 78% of elderly have edentulism which can impact the health of other organs **(WHO, 2021).** Poor oral health conditions affect 3.9 billion people worldwide. About 2 in 3 (68%) adults aged 65 years or older have gum disease. Tooth loss. Nearly 1 in 5 of adults aged 65 or older have lost all of their teeth. Complete tooth loss is twice as prevalent among adults aged 75 and older (26%) compared with adults aged 65-74 (13%) **(Nogueira et al., 2022).**

Aim of the study:

To evaluate the effect of technology based- nursing intervention on oral health literacy, self-perceived oral health and dental neglect among older adult

Study Hypotheses

- Older adults who receive technology-based nursing intervention exhibit higher oral health literacy post intervention than pre intervention.
- Older adults who receive technology-based nursing intervention will have higher self-perceived oral health score post intervention than pre intervention.

Older adults who receive technology-based nursing intervention will have a lower dental neglect score post intervention than pre intervention.

Materials and Methods

Research design:

A quasi-experimental design with (pre- post) test was utilized.

Research Setting.

The study was conducted in Al-Taqwa charity club of elderly population at Menoufia governorate, Egypt that affiliated to the Ministry of Social Solidarity.

Sample

A multistage random selection was used to select one district from Menoufia Governorate, which composed of nine districts; the selected district was Shebien EL Kom district. Then the researcher randomly selected one club from the clubs of the selected districts, which were 3 clubs, Al-Taqwa charity club of elderly population was selected. Total capacity of elderly people in the club was 495, the researcher excludes elderly people over 70 years (as they have many loss of their teeth and most of them have dentures), elderly with abnormal cognitive ability, unable to use smart phones, they were 120. The study subjects were selected by systematic random sample (every 7th older adult). A total of 50 male and female older adult subjects were chosen based on the following inclusion criteria: age (60 -70 years), perform independently oral care, have and able to use smart phones, have normal cognitive ability according to Mini-Mental-State-Examination (MMSE) test, able to download and deal with related software applications, accepted and interested to participate in the study.

Study Instruments:

The following four instruments were used in the present study:

Instrument I: Structured interviewing questionnaire: the researchers created a structured interviewing questionnaire that based on the previous related literatures that has two main parts:

Part I: The demographic characteristics of the studied older adult such as age, sex, marital status, educational level, job before retirement and income.

Part II: questions related to oral health disorders and practices:

- Questions to assess oral hygiene practices of the studied elderly common dental problems, frequency and duration of tooth brushing and use of dental floss.
- Questions to assess the impact of oral health problems on the subject's ability to masticate, communicate, and to consume hot and cold drinks.

Instrument II: - Health Literacy in Dentistry scale (HeLD) : It developed by Jones et al., (2013). It is designed to measure oral health literacy among elderly. It is a 5-point Likert-type scale ranging from without any difficulty (4), with little Difficulty (3), with some Difficulty (2), Very Difficult (1) to unable to do (0). The scale has seven subscales: receptivity, understanding, support, economic barriers, access, communication, and utilization. The total score range was 0–56, the higher score indicates higher level of oral health literacy.

Instrument III: - Self-perceived oral health questionnaire: it developed by Carla et al., (2017) to assess self-perceived oral health. It was assessed in two ways: first, by means of a self-rating of the health of the teeth and mouth scored on a five-point scale ranging from "excellent" = 1 to "poor" = 5; second, by means of an oral health scale constructed from 13 questions derived from the subjective oral health status indicators. The questions asked about oral symptoms in the past month (toothache, teeth sensitive to hot and cold, pain in jaw joints, other pain in the mouth or face, bleeding gums, dry mouth, bad breath), functional limitations (difficulty in chewing firm foods, difficulty in biting/chewing fresh apple, difficulty in chewing boiled vegetables, difficulty in speaking clearly), and the social impact of oral disorders (avoiding conversation, avoiding laughing or smiling). Each question was scored using a dichotomous scale (no = 0; yes = 1), while the last two were scored using a Likert frequency scale ranging from "never" = 0 to "often" = 3. The response codes were summed so that the higher score indicates poorer oral health.

Instrument IV: Dental Neglect Scale: developed by Edwards, (2017). It was 6-questions of the DNS. The 5-point scale had answers ranging from "Definitely no" to "Definitely yes" for each item. The scores ranged from 6 to 30, the higher score indicates greater dental neglect.

Validity of the instruments: Experts translated the study's instruments into Arabic language. Any differences in meaning were taken into account. Five professionals in the fields of Geriatric Nursing, Family and Community health nursing, and Community Medicine validated the Arabic version of the instruments to confirm the accuracy of the translated version's contents (content validity). In accordance with the panel's recommendations, changes were made to improve the clarity of the questions and the relevance of the contents.

Reliability of the instruments: Reliability was estimated among 10 studied older adult by using test- retest method with two weeks apart between them. Then correlation coefficient (Cronbach's alpha) was calculated between the two scores for each instrument. Correlation coefficients range from 0.82 to 0.89 which indicates that the instruments are reliable to detect the objectives of the study.

Pilot Study: A pilot study was conducted in order to evaluate the clarity of the study instruments and establish the amount of time needed to complete the questionnaire. It was carried out on 10% (5 subjects) and then excluded from the total sample size.

Ethical considerations

- Official approval was obtained from the Research and Ethics Committee of the Faculty of Nursing, and then the researchers obtained official approval from the relevant authorities in Al-Taqwa charity club of elderly persons at Menoufia. The purpose of the study was explained and the methods used to gather data for the current study.

- Written consent was obtained from the studied older adults after being informed of the study goals and receiving assurances regarding the confidentiality of the information collected. The studied older adults were informed that they could withdraw from the study at any time.

Study procedure

Preparation phase:

- A review of available and related past and current literatures covering the various aspects of the topic was done using books, articles, magazines and studies related to oral health, changes in the oral cavity, oral health problems and how to manage.
- The researcher constructed the study instruments that achieve aim of study.
- Each elderly were interviewed according time scheduled for data collection and baseline assessment phase was conducted to collect data.
- It was important for the researcher to introduce herself and assured that the collected data will be confidential. The researcher provided full explanation about the purpose and the significance of the present study. The objectives of the current study were discussed and contents were scheduled. Then the researcher Constructed What'sApp group after taking contact numbers under confidentiality.
- Electronic educational booklet in a simple Arabic language with colored images and clear font to accommodate age-related visual changes to improve the learning process was developed by the researchers. The booklet was forwarded and distributed to older adult through what's app.

Implementation phase:

- The period of data collection starting from June 2022 to the end of December 2022 with continuous follows up during this period.
- An eight-week educational intervention was presented in 8 sessions (one session per week for each group). Each of these sessions took about 20-30 minutes maximum using very simple statements and techniques to be understood and taken into consideration the attention span of older adults.
- The researcher distributed older adult into small groups (7 groups in total; each group composed of 7-8 elderly). The older adults were assigned to the corresponding groups randomly and explain the plan of intervention to each group through What's app.
- The sessions flowed as the following; **1st session:** covered items related to fill base line assessment data, importance of oral health, its indicators, **2nd session** basic components of the oral cavity, **3rd session:** Age-related changes in the oral cavity, **4th session:** risk factors for oral health problems in older adults and how to manage,**5th session:** Tooth decay; causes, stages, complication, and how to prevent it, **6th session**: First aids for tooth fractures, mouth ulcer; causes, manifestations, and management, **7th session:** Steps of tooth brushing, how to care for tooth brush and components of healthy food to maintain oral health, **8th session:** guidelines to prevent oral health problems in older adults, steps of self-examination to oral cavity.
- During the sessions, the researcher represented the content via audio presentation of the theoretical parts for 10 minutes average, then, the practical sections such as (tooth brushing, steps of tooth flossing, how to care for tooth brush, self-examination to oral cavity) sent digitally in form of brief recorded educational videos of no more than 5 minutes duration across the smart phone Bluetooth app.
- Each older adult had a chance, after that, to watch the sent file to learn the procedure, re-demonstrated of each main practice 5 minutes post-session to ensure mastering, then take a time to ask questions for more clarification and correction of malpractice through scheduled What's App meeting at time suitable for all group members. Group discussion and feedback through messages and voice messages were allowed between all members.

Evaluation phase

- For creating a motivational education environment for older adults, the researcher checked the learning outcome of the older adult after each session through oral feedback and demonstration.
- Collect post intervention data
- Comparison was done between pre- and post- tests using proper statistical analysis to evaluate the effectiveness of the intervention on oral health literacy, health perceived oral health and dental neglect among studied older adults.

Statistical analysis

Data were collected, tabulated, statistically analyzed using an IBM personal computer with Statistical Package of Social Science (SPSS) version 19 (SPSS, Inc, Chicago, Illinois, USA). Quantitative data were presented in the form of mean, standard deviation (SD), range, and qualitative data were presented in the form numbers and percentages. Mc Nemar and Marginal homogencity test was used to study association between related qualitative variables .Wilcoxon test was used to study association between two related quantitative variables not normally distributed. Spearman's correlation was used to study relation between two quantitative variables not normally distributed. P value of <0.05 was considered statistically significant.

Results and Discussion

Table (1): Socio demographic data of the studied older adults (N =50)

Socio demographic data	No.	%
Age / years		
Mean ±SD	71.2±7.33	
Range	62.0 – 85.0	
Gender		
Male	22	44.0
Female	28	56.0
Marital status		
Single	1	2.00
Married	25	50.0
Divorced	24	48.0
Educational level		
Preparatory	24	48.0
Secondary	18	36.0
High education	8	16.0
Occupation		
Housewife	26	52.0
Employee	22	44.0
Skilled worker	2	4.00
Family Income		
Enough	28	56.0
Not enough	17	34.0
Enough and save	5	10.0

Table 1: illustrates the socio-demographic characteristics of the studied older adults. The mean age was 71.2±7.33 years. Females represent more than half of the sample (56.0%). For 48% of the older adults were preparatory educational level, and 56 % with enough income.

Table (2): Oral health problems pre and post technology based nursing intervention among studied older adults (N=50)

Oral health problems	Pre program	Post program	McNemar test	P- value
Problems related to tooth				
Tooth decay	22(44.0)	19(38.0)	0.37	0.541
Yes	28(56.0)	31(62.0)		
No				
Tooth pain				
Yes	27(54.0)	17(34.0)	4.06	**0.043***
No	23(46.0)	33(66.0)		
Bad color of tooth				
Yes	21(42.0)	0(0.00)	26.5	**<0.001***
No	29(58.0)	50(100)		
Tooth fracture				
Yes	13(26.0)	10(20.0)	0.51	0.475
No	37(74.0)	40(80.0)		
****Problems related to mouth***				
Bad mouth odor	12(24.0)	4(8.00)	4.76	**0.029***
Yes	38(76.0)	46(92.0)		
No				
Mouth ulcer				
Yes	6(12.0)	0(0.00)	6.38	**0.011***
No	44(88.0)	50(100)		
Dry mouth				
Yes	7(14.0)	1(2.00)	4.89	**0.026***
No	43(86.0)	49(98.0)		
Effect on taste and smell				
Yes	22(44.0)	22(44.0)		
No	28(56.0)	28(56.0)	0.00	**1.00**
Healing of mouth wound				
Yes	32(64.0)	45(90.0)		
No	18(36.0)	5(10.0)	9.54	**0.002***
****Problems related to gum***				
Gum bleeding	9(18.0)	3(6.00)	3.41	0.064
Yes	41(82.0)	47(94.0)		

No				
Gum tissue damage				
Yes	25(50.0)	3(6.00)		
No	25(50.0)	47(94.0)	24.0	**<0.001***

***Significant**

Table 2: represents oral health problems among the studied older adults pre and post technology based nursing intervention. The table points to a statistically significant difference between pre and post technology based nursing intervention regarding older adult's oral health problems such as tooth pain, bad mouth odor, mouth ulcer and dry mouth.

Table (3): Hygiene behaviors among the studied older adults pre and post technology based nursing intervention (N=50)

Hygienic behaviors items		**Pre program**	**Post program**	**McNemar test**	**P- value**
▪ Follow regular tooth brushing	Always	22(44.0)	47(94.0)	29.2	**<0.001***
	Rarely	28(56.0)	3(6.00)		
▪ Perform inter-dental cleaning	Always	2(4.00)	23(46.0)	23.5	**<0.001***
	Rarely	48(96.0)	27(54.0)		
▪ Practicing water mouth rinsing	Always	35(70.0)	50(100)	17.6	**<0.001***
	Rarely	15(30.0)	0(0.00)		
▪ Frequent tooth brushing	Nothing	12(24.0)	7(14.0)		
	Once	32(64.0)	10(20.0)	31.5#	**<0.001***
	twice	6(12.0)	33(66.0)		
▪ Duration of tooth brushing	None	12(24.0)	0(0.00)		
	One minute	25(50.0)	12(24.0)	28.9#	**<0.001***
	Two minutes	11(22.0)	34(68.0)		
	More than two min.	2(4.00)	4(8.00)		
▪ Types of tooth paste	None	13(26.0)	0(0.00)		**<0.001***
	Fluoride	30(60.0)	41(82.0)	14.9#	
	Gargling lotion	7(14.0)	9(18.0)		

Table 3: shows that there is a statistically significant difference in hygiene behaviors items pre and post technology based nursing intervention (as regular tooth brushing, inter-dental cleaning, water mouth rinsing, tooth brushing frequency and duration of tooth brushing, and types of tooth paste).

Table (4): Dietary habits items among studied older adults pre and post technology based nursing intervention (N=50)

Dietary habits items		**Pre program**	**Post program**	**McNemar test**	**P value**
		No (%)	**No (%)**		
Eat healthy number of meals per day	Correct answer	41(82.0)	48(96.0)		
	Incorrect answer	9(18.0)	2(4.00)	5.01	**0.025***
Drinks soft drinks and juices moderately	Correct answer	12(24.0)	50(100)		
	Incorrect answer	38(76.0)	0(0.00)	61.2	

					<0.001 *
Drinks tea and coffee moderately	Correct answer Incorrect answer	24(48.0) 26(52.0)	50(100) 0(0.00)	35.1	**<0.001 ***
Avoid eating dried fruits	Correct answer Incorrect answer	24(48.0) 26(52.0)	50(100) 0(0.00)	35.1	**<0.001 ***
Avoid eating between meals	Correct answer Incorrect answer	21(42.0) 29(58.0)	47(94.0) 3(6.00)	31.7	**<0.001 ***
Eat suitable amount of sugar and sweets	Correct answer Incorrect answer	9(18.0) 41(82.0)	50(100) 0(0.00)	69.4	**<0.001 ***
Eat allowed amount of carbohydrates	Correct answer Incorrect answer	37(74.0) 13(26.0)	50(100) 0(0.00)	14.9	**<0.001 ***
Chew food well	Correct answer Incorrect answer	5(10.0) 45(90.0)	36(72.0) 14(28.0)	39.7	**<0.001 ***
Drink chilled liquids	Correct answer Incorrect answer	34(68.0) 16(32.0)	48(96.0) 2(4.00)	13.2	**<0.001 ***
Drink enough water	Correct answer Incorrect answer	30(60.0) 20(40.0)	43(86.0) 7(14.0)	8.57	**<0.001 ***
Eat healthy(quality and quantity) food	Correct answer Incorrect answer	39(78.0) 11(22.0)	50(100) 0(0.00)	15.2	**<0.001 ***
Eat food high in fibers	Correct answer Incorrect answer	35(70.0) 15(30.0)	47(94.0) 3(6.00)	9.76	**<0.001 ***
Eat food rich in calcium	Correct answer Incorrect answer	29(58.0) 21(42.0)	44(88.0) 6(12.0)	11.4	**<0.001 ***

Marginal homogeneity test *Significant

Table 4: indicates dietary habits items among the studied older adults . The table shows that there is significant improvement in older adults' dietary habits post technology based nursing intervention

Table (5): Effect of technology based nursing intervention on health literacy scale among the studied older adults (N =50)

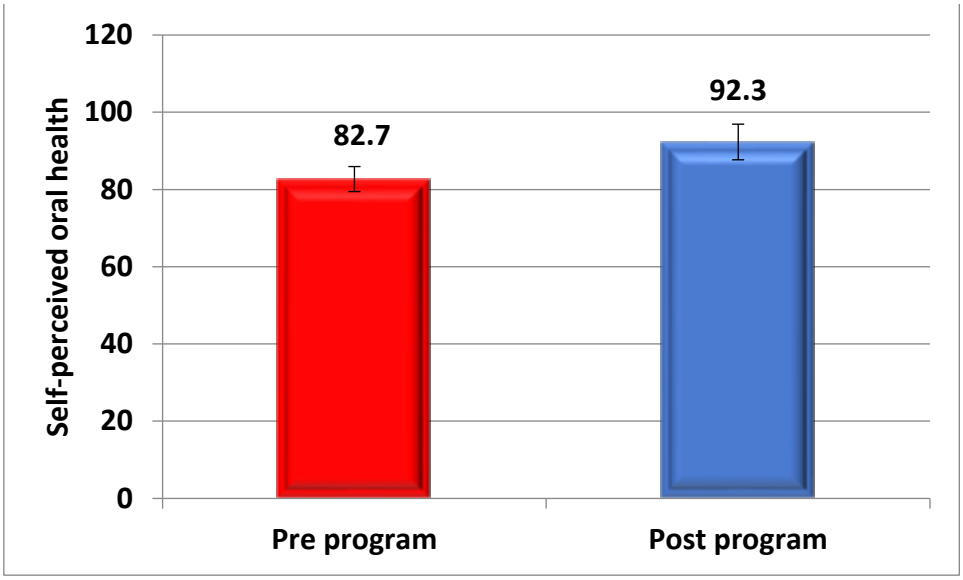
Health literacy scale	Pre program	Post program	Wilcoxon test	P value
	Mean±SD	Mean±SD		
Receptivity	2.30±1.85	6.74±0.59	6.21	**<0.001***
Understanding	2.42±1.34	6.18±1.27	5.94	**<0.001***
Support	4.54±2.54	7.62±0.56	5.20	**<0.001***
Economic barrier	4.46±2.27	6.82±1.13	5.68	**<0.001***
Access	4.10±2.55	7.26±1.12	5.31	**<0.001***
Communication	4.08±2.04	7.20±1.04	5.88	**<0.001***

Utilization	3.28±1.82	6.98±0.76	6.06	**<0.001***
Total Health literacy	25.1±10.8	48.8±3.86	6.16	**<0.001***

***Significant**

Table 5: highlights the effect of technology based nursing intervention on health literacy among the studied older adults .Post intervention revealed significant improvement in the mean total health literacy scale, among studied older adults compare to pre intervention (48.8±3.86 vr 25.1±10.8).

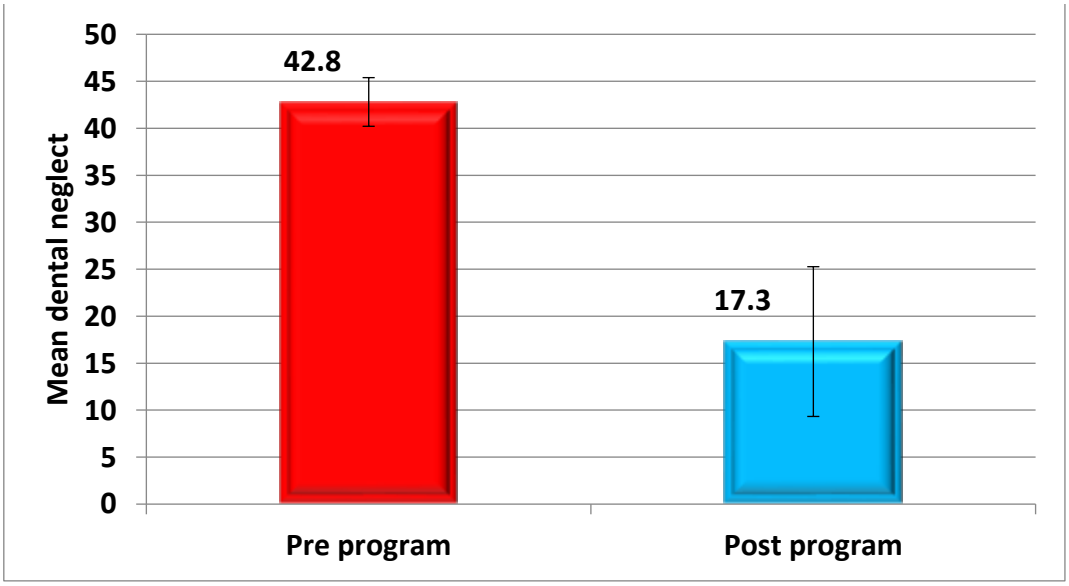
Figure (1): Effect of technology based nursing intervention on self-perceived oral health among the studied older adults (N =50)



Mean self-perceived oral health pre and post technology based nursing intervention among the studied older adults

Figure 1: reveals that there is significant improvement in self –perceived oral health among studied older adults post intervention than pre intervention (92.3±4.62 vr 82.7±3.24).

Figure (2): Effect of technology based nursing intervention on dental neglect among the studied older adults (N =50)



Mean dental neglect pre and post technology based nursing intervention among the studied older adults

Figure 2: shows that there is significant decrease in total mean score of dental neglect scale among studied older adults post intervention than pre intervention (17.3±7.97 vr 42.8±2.59).

Table (6): Correlation between health literacy subscale and self-perceived oral health and dental neglect scale among the studied older adults post intervention (N =50)

Variables	Health literacy	
	r	P value
Self-perceived oral health	0.428	**0.002***
Dental neglect scale	-0.340	**0.016***

*Significant r: Spearmans correlation

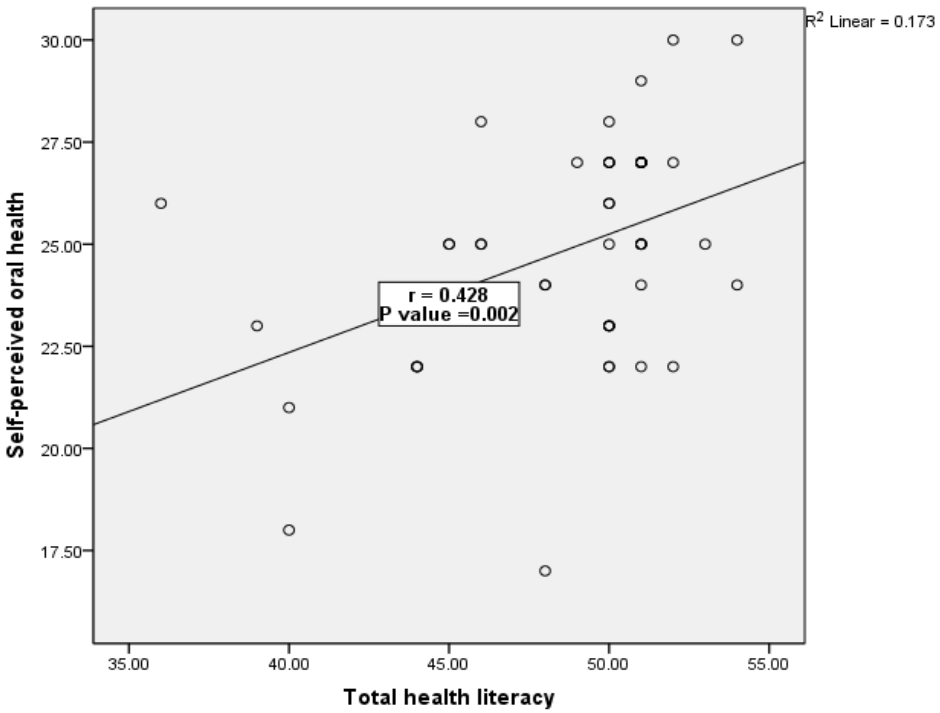


Figure (3) Correlation between health literacy scale and self-perceived oral health among the studied older adults post intervention

Table 6 or Figure 3: reflects significant positive correlation between health literacy scale and self-perceived oral health among studied older adults regarding post technology based nursing intervention(r = 0.428, p = 0.002).

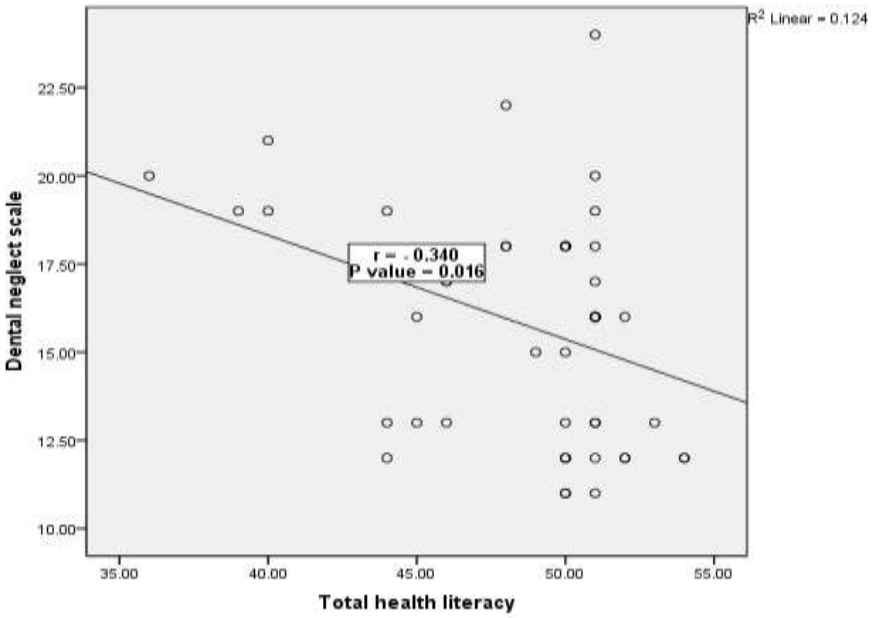


Figure (4) Correlation between health literacy and dental neglect scale among the studied older adults post intervention

Figure 4: demonstrates significant negative correlation between health literacy scale and dental neglect scale among studied older adults regarding post technology based nursing intervention(r = - 0.340, p = 0. 0.01).

Discussion

Evidence suggests that, oral disease is equally as important as other diseases, on individual and older adults quality of life and has psycho-social and emotional outcomes, including isolation, depression and unemployment (Baniasadi et al.,2021).The demand for visiting oral care management has increased, due to increase the number of elderly people, as public health care policies, receive increased attention to overcome the limitations in the care of the elderly in care hospitals (Lee et al., 2019). After COVID- 19 pandemic era there was increase the need for non-face-to-face video education programs, highlighting the importance for video-based oral health education especially among elderly. These educational programs provides educational content and does not have time or space constraints (Jang et al., 2019).Therefore, this study was conducted to evaluate the effect of technology based nursing intervention on oral health literacy, self-perceived oral health and dental neglect among older adults.

Regarding the effect of technology based nursing intervention on oral health problems, the current study showed that the older adults suffered from tooth decay, tooth pain, bad mouth odor, mouth ulcer and dry mouth pre intervention. After applying technology based nursing intervention, there was statistically significant difference between the most of the oral health problems. This result was supported by Alagamy et al., (2021) who reported that there was statistically significant difference between most items (changed lips, tongue, gums, saliva, teeth, oral cleanliness, and mild dental pain) of oral health assessment during the evaluation periods after the nursing interventions. Also, this result was supported by Manchery et al., (2020), who reported that the oral health of elderly improved significantly following a carer oral education program. Additionally, this finding was consistent with Ki et al.,(2021). who found that oral dryness reduced after intervention.

Considering hygienic behaviors among the older adults, the present study revealed that hygienic behaviors was improved after technology-based nursing intervention. This result was in the same line with Tuuliainen et al., (2020), who indicated that the elderly had the benefit of preventive oral health intervention, and a positive change was observed in the prevalence of twice-daily tooth brushing and denture cleaning and especially in denture hygiene. Also, this finding was congruent with Khalil et al.,(2020) who reported there was statistically significant difference in dental hygienic habits pre and post applying educational program. Moreover this result in line with Pirograd & Keeratisiroj, (2019) who revealed that at post-test period, the intervention group had an average score of dental health care behaviors more than pre-test group and the difference was statistically significant.

Concerning dietary habits items among the studied older adults, the present study revealed that there was improvement of dietary habits items post intervention such as eat healthy number of meals per day, chew food well, eat suitable amount of sugar and sweets, and eat food high in fibers and calcium (all of these dietary habits should be lead to improve nutritional status of the older adults). This finding was consist with Zhu et al.,(2022) ,who reported that there was relation between the oral health awareness of elderly and their nutritional status that enhancing the oral health quality of life. Also, this finding was consistent with Hussein et al .,(2022), who reported that elderly people with chewing problems, lack of tooth/denture cleaning, lack of autonomy for oral care, no access to the dentist had higher risk of malnutrition. So malnutrition should be considered to be closely associated with poor oral health. In contrast Nepper et al.,(2019) ,who indicated that There were no significant changes in the intakes of relevant nutrients after intervention. This discrepancy may be attributed to different circumstances, culture and habits of studied group.

In relation to the effect of technology based nursing intervention on health literacy, the recent study findings indicated that post intervention revealed significant improvement in the mean total health literacy scale. Similar results were reported by Khalil et al.,(2020) in their study, who stated that the total mean percent score for health literacy in dentistry was improved instantly post- implementation of the program with an observed statistically significant difference .Also, the present study findings was consistent with Shokry, et al., (2018), who found that oral educational program is effective in improving oral health knowledge and subsequent oral health-related quality of life among community-dwelling elderly.

Regarding the effect of technology based nursing intervention on self-perceived oral health among the studied older adults, the present study revealed that significant improvement in self – perceived oral health among studied elderly post intervention than pre intervention. This result was in the same line with with Pirograd & Keeratisiroj, (2019) who revealed that at post-test period, the intervention group had higher self-confidence and dental health care behaviors more than pre-test group and the difference was statistically significant .These results are inconsistent with Ghayth et al .,(2019), who stated that more than half of the studied elderly had poor self-perceived oral state and more than two fifth of them had normal and good self-perceived oral state. This discrepancy may be attributed to the neglect of tooth brushing, tooth flossing and routine dental checkup among elderly.

Concerning Correlation between health literacy and self-perceived oral health among the studied older adults, the present study revealed that significant positive correlation between health literacy. Self-perceived oral health. This finding was consist with Khalil et al.,(2020), who reported that a strong positive significant correlation between oral health literacy, values and the perceived ability of the elderly to manage their oral problems. Also these results was consistent with Abd Allah et al.,(2020), who showed that the total knowledge was statistically significant predictor of total oral self-care practice of the studied elderly.

Regarding Correlation between health literacy and dental neglect scale among studied older adults. The recent finding revealed that significant negative correlation between health literacy and dental neglect scale. This result was in the same line with Min & Jung (2022) who indicated that the quality of life related to oral health increased when they had oral health education experience according to oral care behavior and had high level of oral health knowledge. Also these results consistent with Gomez-Rossi, et al., (2020) who revealed that post intervention elderly had improved their knowledge about oral health oral hygiene, denture care, use of fluorides and importance of regular dental check-ups.

Furthermore , the current finding was supported by Abd Allah et al.,(2020), who revealed that statistically significant negative correlation between oral health knowledge (oral health literacy) of the studied elderly and oral health status so, the elderly with low oral health literacy had a poor oral hygiene status, high dental caries prevalence, periodontitis .Finally these results means that after application of technology based nursing intervention on health literacy , the self – perceived oral health increase due to improve dental hygienic habits which lead to decrease dental neglect among older adults.

Conclusion

After receiving a technology based nursing intervention for three months. The scores of oral health literacy and self-perceived oral health among studied older adults was improved post intervention than pre intervention. While reduction in dental neglect score post intervention was appeared than pre intervention.

Recommendations

- Tele-health nursing for oral health care that directed to improve health literacy and self-perceived oral health as well as optimal maintenance of oral hygiene practices.
- Establish the importance of regular oral health checks for the elderly needed to be widely promoted in the community that reinforced by gerontological/ community nurses.

Utilize digital or e-health interventions to prevent oral and teeth problems of older adults that conducted via social network with activating the mobile health clinics.

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