

The Effect of Respiratory Wellness Educational Program on Preventive Behaviors of Respiratory Tract Infections Among Community-Dwelling Older Adults

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Abstract

Background: Acute Respiratory Tract Infections (ARIs) are a major public health problem and one of the leading causes of infectious diseases' morbidity and mortality among older adults. **Objective:** is to determine the effect of respiratory wellness educational program on preventive behaviors of respiratory tract infections among community-dwelling older adults. **Materials and Methods:** This study followed a quasi-experimental research design. **Settings:** The study was carried out in three elderly clubs in Damanshour city, El-Behaira Governorate. **Subjects:** The study included 140 older adults that were selected through a convenient sampling technique. **Tools:** Four tools were used: a short portable mental status questionnaire, socio-demographic and clinical data of community-dwelling older adults; community-dwelling older adult's knowledge assessment about respiratory infection structured interview schedule and respiratory infection preventive behaviors questionnaire for older adults. **Results:** A highly statistically significant improvement in the knowledge and preventive behaviors among the studied older adults were observed after program implementation. **Conclusion:** Respiratory wellness educational program proved to be effective in increasing the ARI related knowledge and preventive behaviors among community-dwelling older adults. **Recommendations:** This study recommends the implementation of more extensive educational programs for community-dwelling older adults in different health care settings.

Keywords: Community dwelling Older Adults, Educational program, Preventive behaviors, Respiratory Infections, Respiratory Wellness.

Introduction

Acute Respiratory Tract Infections (ARIs) are the most common type of infection among older adults. ARIs in older adults can lead to serious implications such as respiratory failure, sepsis, prolonged hospitalization, and increased mortality risk (Akhtar et al., 2021; Watson&Wilkinson,2021). Recently, the unexpected emergence and global spread of the Coronavirus disease (2019) pandemic have necessitated a great deal of attention for respiratory infections (Khann et al.,2020).

The incidence rate of ARI increases significantly with age (Kumar et al., 2021).

Older people exhibit heightened susceptibility to ARI due to several health-related factors. Such factors include age-related changes that affect the respiratory and immune systems, and the presence of multiple comorbidities. Moreover, poor nutritional status, poor hygienic measures, sedentary lifestyle, smoking and polypharmacy also represent risk elements for ARI in older adults (Watson & Wilkinson,2021).

Unfortunately, the recognition and diagnosis of ARI in older adults can be elusive, because of the atypical clinical presentations and the insensitivity of current laboratory diagnostics. Such atypical manifestations include altered mental status, postural instability, restlessness, fatigue,

dehydration, and an exacerbation of chronic diseases. This vague presentation could result in delayed diagnoses, missed opportunities for treatment, and adverse outcomes among older adults (Rasheedy, 2021; Rowe & Lyer.,2016).

To avoid the drastic effects of ARI, approaches now are directed toward prevention rather than cure (Patechett et al.,2021). For this reason, designing a respiratory wellness educational program is crucially needed for older adults, especially during the outbreaks of newly emerging or remerging infectious diseases. It reflects a comprehensive package of preventative behaviors, both pharmacological and non-pharmacological approaches, based on the WHO recommendation. The efficacy of vaccinations in older adults is often attenuated due to their compromised immune systems. However, they can stop fatal complications even if they cannot prevent the disease itself (Wagner& Weinberger,2020). Conversely, non-pharmacological interventions are more efficacious and are highly recommended for the prevention of respiratory infections. These measures include personal and general hygienic measures, social and physical distancing and healthy lifestyle behaviors for boosting immunity (Storr et al.,2017; WHO,2009).

Gerontological nurses are experts in creating educational programs tailored to the needs and problems of older adults, taking into account the physiological changes that may hinder the education process, and implementing measures to overcome these barriers. Educating older adults may empower them to improve their compliance with these preventive behaviors and adopt a healthy lifestyle, thereby preventing such infections. (Boltz et al., 2020; Miller,2021).

Aims of the Study

This study aims to determine the effect of respiratory wellness educational program on preventive behaviors of respiratory tract infections among community dwelling older adults.

Research hypothesis

Community dwelling older adults who receive the proposed educational program exhibit higher respiratory infection preventive behaviors than before.

Materials and Method

Materials

Design: A quasi experimental research design (One group pre- and post-test) was used to conduct this study.

Settings: This study was carried out in three elderly clubs at Damanhur city, El-Behaira Governorate, namely, Alfady, Ahbab Allah and Alrabie clubs. These clubs are affiliated to the Ministry of Social Solidarity, El-Behaira, Egypt.

Subjects: The study older adults were selected using a convenience sampling technique and included 140 older adults who attended the previously mentioned clubs during the period of data collection for six months and fulfilled the following inclusion criteria: aged sixty years and above, with no or mild cognitive impairment, agree to participate in the study.

Tools: Four tools were used to collect the necessary data.

Tool one: Short Portable Mental Status Questionnaire (SPMSQ):”.

This tool was developed by Pfeiffer, (1975) and was utilized in the present study in order to exclude older adults with moderate or severe cognitive impairment. The Arabic version of this tool was used in the present study (Mahrous, 2012). The total score of this scale ranges from 0 to 10, with 0 to 2 indicating the absence of cognitive impairment, 3 to 4 indicating mild cognitive impairment, 5 to 7 indicating moderate cognitive impairment, and 8 to 10 indicating severe cognitive impairment.

Tool two: Socio-demographic and Clinical Data of Community Dwelling Older Adults Structured Interview Schedule:

This tool was developed by the researcher based on in-depth review of recent relevant

literatures (Kumar et al.,2021; Watson &Wilkinson,2021) and consisted of the following parts: -

- **Socio-demographic data** of older adults such as age, sex, residence, marital status and level of education.
- **Clinical data of older adults** such as co-morbid diseases and history of ARI within the last year.

Tool three: Community Dwelling Older Adult’s Knowledge Assessment about Respiratory Infection Structured Interview Schedule:

This tool was developed by the researcher based on an in-depth review of recent relevant literature (Kim et al., 2020; Goni et al.,2020; Zhong et al.,2020). This tool included items to assess the knowledge of community-dwelling older adults about ARIs. It included nine items about the meaning of respiratory infection, etiology, methods of transmission, high-risk groups, clinical manifestation, complications, and preventive measures for respiratory tract infections, including vaccinations that protect against infectious respiratory diseases. Each correct answer was given a score of (2); correct but incomplete was given a score of (1); wrong answer or don't know was given a score of (0). The total scoring of older adults' knowledge is 18 and is classified as follows: 0–8 (< 50%) of the total score indicates poor knowledge, 9–13 (50 < 75 %) of the total score indicates fair knowledge, and 14–18 (≥ 75%) of the total score indicates good knowledge.

Tool four: Respiratory Infection Preventive Behaviors Questionnaire for Older Adults:

This tool was developed by the researcher based on an in-depth review of recent relevant literature to assess older adults' respiratory infection preventive behaviors (Zhao et al.,2022, Zainab, et al.,2021; Goni et al.,2020; Park,2018; WHO,2009). It included 70 items related to the following parts: **Part I: Personal Hygiene Behaviors** involved 18 questions related to respiratory hygiene, hand hygiene, oral hygiene, and general hygienic measures. **Part II: Household Cleanliness** comprised of four questions about cleaning and disinfecting surfaces with detergent

and maintaining good ventilation. **Part III: Social and physical distancing and use of face masks** included eleven questions related to physical distancing measures and the proper usage of face masks. **Part IV: Healthy lifestyle behaviors for boosting immunity** consisted of 37 questions that addressed eight key areas of healthy lifestyle practices, including a healthy diet, exercise, rest and sleep, stress reduction techniques, high-risk behaviors, socialization, compliance with the vaccination schedule, and medical follow-up. The score of respiratory infection preventive behaviors was determined on a three-point Likert scale as follows: rarely or not done was scored as (0), sometimes done was scored as (1), and always done was scored as (2). The total scoring of respiratory infection Preventive behaviors are 140, classified as follows: 0-69 (50%) indicates poor preventive behaviors, 70-104 (50 < 75%) indicates fair preventive behaviors, and 105-140 (≥ 75%) indicates good preventive behaviors.

Methods

I- Preparation phase:

A-Study approval

- Approval to carry out the study from the Research Ethics Committee, Faculty of Nursing, Damanhour University, was obtained.
- An official letter was issued from the responsible authorities at the Faculty of Nursing, Damanhour University, to the head of study settings to obtain their permission to collect the necessary data.
- A written approval was obtained from the heads of the study settings, who were informed about the purpose, date and time of data collection.

B- Preparation of the study tools

- The Arabic version of tool I was used to assess the older adults in order to identify those who have normal cognitive function or mild cognitive impairment.
- Tool II, Tool III, and Tool IV were developed by the researcher based on a comprehensive review of relevant literature.

Validity testing: Tool II, III, and IV were tested for content validity by seven experts in the fields of the study, namely, gerontological nursing, community health nursing, and medical surgical nursing. The necessary modifications were done accordingly.

Pilot study: Following the development of the study tools, a pilot study was carried out on 14 community-dwelling older adults to assess the tools for their applicability, clarity and reliability. They were selected from the study setting; and they were excluded from the study participants.

Reliability testing: The reliability of tools III and IV was tested using Cronbach's alpha method. The Cranach's alpha test for tools III and IV was 0.859 and 0.971, respectively.

C- Preparation of the educational program: Following a review of the most recent related literature (Kim et al., 2020; Linhares et al. 2022; Miller, 2021; Storr et al., 2017; WHO, 2009) the researcher developed the proposed educational program, which comprised six sessions:

Session 1: introduction and basic information about ARI, **Session 2:** personal hygiene behaviors including cough etiquette, hand hygiene and oral hygiene., **Session 3:** general hygienic measures, household cleanliness, social and physical distancing and use of face masks. **Session 4:** healthy life style behaviors including healthy diet and exercises necessary for ARI prevention. **Session 5:** proper rest and sleep, socialization and stress reduction

techniques. **Session 6:** high-risk behaviors, ARI vaccination schedule and medical follow-up.

- A brochure and an educational booklet were developed, containing summarized and simple information with colorful and illustrative pictures in order to clarify the main and important points covered in each session.

D- Preparation of the environment:

The researcher used to ensure that the environment is safe, well prepared with adequate seating, good lighting, proper ventilation, and free from distractions, and that each older adult is physically comfortable to help them be more concentrated.

II. Implementation phase:

- The researcher conducted a survey of all older adults' attendants in the three elderly clubs to identify those fulfilling the inclusion criteria.
- Tool I was used to assess cognitive function for all older adults to identify those with no or mild cognitive impairment.
- The researcher introduced herself and the study's purpose to the older adults who met the inclusion criteria.
- The studied older adults were interviewed individually to collect sociodemographic and clinical data before the implementation of the proposed education program.
- The studied older adults were divided into groups at each club, with each group composed of around 8- 10 older adults taking into consideration the group preferences and cohesiveness.
- The proposed education program was carried out in six sessions for each group over a two-weeks period, three sessions per week for two consecutive weeks, with each session lasting approximately 30 to 45 minutes.
- Teaching methods and materials: included simple teaching methods; as lectures, discussions, PowerPoint

presentations, demonstrations, and re-demonstrations, and media such as pictures, handouts, posters, and videos.

- The data collection covered a period of nine months, from the 1st of March until the end of November 2022.

III- Evaluation phase:

The researcher evaluated the effect of the proposed educational program over two time periods, including immediately after implementing the proposed education program sessions (at the end of the second week), while the second assessment (follow-up) was done after a month of implementing the last nursing intervention session (at the end of the sixth week) using Tools III and IV.

- **Ethical considerations:** Ethical approval was obtained from the research ethics committee in the Faculty of Nursing, Damanhour University. Written consent was obtained from each older adult to obtain their acceptance to participate in the research. Assuring confidentiality and anonymity of the data through a statement on the cover page, using a code number instead of names, the studied older adults were assured that the collected data was used only for the purpose of the study and informed about their voluntary participation and withdrawal from the study.

▪ **Statistical Analysis:**

The statistical package for social sciences (SPSS) Version 20.0 was used to arrange, tabulate, and statistically analyze the acquired data. Number and percentage were used in qualitative data. Utilizing range (minimum and maximum), mean, and standard deviation, quantitative data were described. Significance of the obtained results was judged at the 5% level.

Results

Table 1 illustrates the socio-demographic characteristics of the studied older adults. The age of the studied older adults ranged from 60 to 88 years, with a mean age of 70.35 ± 7.16

years; nearly three quarters (72.8%) of the studied older adults were aged 60 years to less than 75 years. More than half (52.1%) of the studied older adults were males, 87.9% were living in urban areas, and more than half (57.1%) were widows or widowers. The table also shows that 27.9% had basic education, followed by 26.4% and 23.6% who completed their secondary and university education, respectively. Nearly two-thirds (62.1%) of the studied older adults reported insufficient income. More than one third (38.6%) of the studied older adults lived alone; the rest lived either with their partner (36.4%) or with their family or a relative (25%).

Table 2 shows that the vast majority (92.1%) of the studied older adults had one or more comorbid diseases. Also, the majority (88.6%) of the studied older adults had a previous history of ARI within the last year. Among them, more than three quarters (76.6%) had common cold, and 20.2% had COVID-19.

Table 3 revealed that the vast majority (95.7%) of the studied older adults had poor overall knowledge regarding ARI prior to the implementation of the program. Conversely, immediately after the educational program, the majority (88.6%) of the studied older adults had good overall knowledge. In the follow-up phase after one month, the studied older adult's knowledge level lessened to (82.9%) but was still better than its level prior to the application of the program, with a highly statistically significant difference between the three periods ($F = 259.313$, $P < 0.001$).

Table 4 clarifies the distribution of the studied older adults according to their preventive behaviors level about ARI before, immediately after, and four weeks after the program. It is apparent from the table the mean score in all preventive behavior domains increased significantly after program implementation when compared to the mean percent score before starting the program. The differences were statistically significant,

between the three periods ($F = 2540.704$, $P < 0.001$).

Table 5 reveals that the respiratory wellness education program had a highly significant effect on ARI-related knowledge (0.954) and preventive behaviors (0.948) among the studied older adults.

Discussion

Acute respiratory tract infections are a very prevalent, serious, and growing public health problem among older adults. ARIs in older adults can lead to serious implications such as respiratory failure, sepsis, prolonged hospitalization and increased mortality risk (Watson & Wilkinson, 2021). Therefore, ARI prevention should be a priority, particularly in caring for older adults. So, increasing the older adult's awareness regarding ARI related knowledge and preventive behaviors is the cornerstone for preventing ARI and its negative consequences. Accordingly, the present study aims to determine the effect of a respiratory wellness educational program on preventive behaviors for respiratory tract infections among community-dwelling older adults.

The study findings indicated that the educational program had a statistically significant positive effect on the studied older adults' knowledge and preventive behaviors regarding ARI. As for knowledge, the improvement was statistically significant in all areas of ARI related knowledge (Table 3).

These findings were consistent with the other studies conducted in South Korea by Kim et al. (2020) and in Mexico by Villarpanda et al. (2021) which revealed that older adults' knowledge regarding ARI prevention improved significantly after conducting educational programs. In the same direction, the findings of Abdel-Aziz & Atia (2022) in Egypt were matching with the present study findings. Conversely, Salmuna et al. (2019) in Malaysia found no significant

difference between pre- and post-Hajj knowledge and practice for the prevention of influenza-like illness in the intervention group.

The remarkable and obvious improvement in older adults' knowledge in the present study could be attributed to the comprehensive, well-developed, and structured knowledge that was supported by large printed materials and attractive colored pictures. Also, the researcher attempted to overcome the age-related changes that may impede the teaching and learning process, such as hearing and visual deficits. This is achieved by speaking clearly and loudly while using simple words and sentences. Moreover, the researcher repeated instructions and used effective communication techniques. Such techniques included allowing them extra time to respond, listening attentively, maintaining social space and eye-to-eye contact with all older adults and frequently summarizing the most important points.

As time passes, the knowledge of older adults may decrease. This is supported by the present study findings, where the knowledge in the follow-up after one month was slightly decreased but still better than its level prior to the application of the program (Table 3). This is expected due to the effect of aging on the short-term memory. These results were consistent with the findings of Barakat & Awad. (2022) in Egypt.

In the same direction, preventive behaviors among the studied older adults improved significantly, with a statistically significant difference on all ARI preventive behavior domains. (Table 4). This could be rationalized as they acquired knowledge through the educational program, which consequently heightened their awareness of ARI and resulted in an improvement in their preventive behaviors learned from the educational program (Lee and Park, 2021). Additionally, the researcher demonstrated all the preventive behaviors involved in all sessions, and older adults were allowed to

redemonstrate these skills, which assisted the researcher in correcting any misunderstandings and identifying obstacles that may hinder their applications. Moreover, multisensory stimulation was designed to stimulate older adults' senses, like vision, through watching videos about preventive behaviors. Also, touch through offering the materials necessary for performing each preventive behavior and taste through offering a drink or fruit at the beginning of each session. Furthermore, the researcher encouraged the studied older adults to practice these preventive behaviors on a regular basis as part of their daily lives to make them a habit. In the same vein, Lee & Park (2021) and Kim et al., (2020) revealed that preventive behaviors regarding ARI were significantly improved among older adults after the educational intervention. However, in the study of Salmuna et al., (2019), there was no significant difference between pre- and post-hajj practice for the prevention of influenza-like illness among hajj pilgrims in the intervention group, which could be attributed to the restricted duration of the program, which was only one week.

However, in the follow-up after a month, a notable decline occurred regarding the use of face masks and physical distancing measures, particularly among older adults who participated later (Table 4). This decrease over time could be attributed to the fact that, during the study period, the situation of the COVID-19 epidemic had greatly improved, vaccines became available, and total cases of COVID-19 morbidity and mortality decreased, making physical and social distancing and wearing face masks unnecessary for the majority of the studied older adults. These results mirror those of Alameer et al., (2023) in Saudi Arabia who found that as time went on and vaccinations became available, mask-wearing decreased.

Fortunately, the present study points out that the respiratory wellness educational program had a large effect size on ARI-related knowledge and preventive behaviors

(Table 5). This suggests that significant progress in the knowledge of the study older adults was reflected in their preventive behaviors. This is congruent with the systematic review and meta-analysis by Linhares et al., (2022) which indicated the effectiveness of educational interventions for preventing ARI, which was proved through increasing knowledge and preventive behaviors.

Conclusion

It can be concluded that the application of the respiratory wellness educational program proved to be effective in attaining its aim of positively increasing the knowledge and preventive behaviors of community-dwelling older adults regarding acute respiratory infection (ARI) prevention, with a highly significant effect size and statistically significant differences during the pre-, post-, and follow-up phases. This improvement has decreased somewhat over time (four weeks post-program), but is still better than before.

Recommendations

Recommendations geared toward older adults:

- Implementation of more extensive educational programs for community-dwelling older adults in different health care settings aiming to increase their awareness about the importance of respiratory wellness adherence.
- Educational materials about ARI prevention, including a printed handout and colored brochures, should be distributed among community-dwelling older adults and their caregivers in community and all other health care settings.

Recommendations geared toward gerontological nurses:

- In-service training program has to be planned and implemented regularly by the

faculty members of the gerontological nursing department for gerontological nurses and caregivers about importance of respiratory wellness adherence.

Recommendations for future research:

- Replication of the study considering the longitudinal impact over a longer period of time to confirm the long-term effects of the respiratory wellness educational program.

Table (1): Distribution of the studied older adults according to their socio demographic characteristics

Socio demographic characteristics	Number (No.= 140)	Percentage (%)
Age (years)		
60 < 75 years	102	72.8
75 < 85	33	23.6
≥85	5	3.6
Mean ± SD.	70.35 ± 7.16	
Sex		
Male	73	52.1
Female	67	47.9
Residence		
Urban	123	87.9
Rural	17	12.1
Marital status		
Widow	80	57.1
Married	51	36.4
Single	5	3.6
Divorced	4	2.9
Level of education		
Illiterate	17	12.1
Read and write	14	10.0
Basic education	39	27.9
Secondary education	37	26.4
University education and above	33	23.6
Adequacy of monthly income		
Not enough	87	62.1
Enough	53	37.9
Living Arrangements		
Alone	54	38.6
With his / her partner	51	36.4
With family/relative	35	25.0

Table (2): Distribution of the studied older adults according to their health history

Items	Number (no.=140)	Percentage (%)
Presence of chronic diseases		
No	11	7.9
Yes #	(129)	92.1
Previous history of ARIs within the last year		
No	16	11.4
Yes#	(124)	88.6
Common cold	95	76.6
COVID-19	25	20.2
Influenza	22	17.7
Other (Pneumonia& Bronchitis)	9	7.3

More than response allowed

Table (3): Distribution of the studied older adults according to their knowledge level about ARI before, immediately after and four weeks post program

Knowledge level	Baseline (Pre-program) (n=140)		Immediately (post program) (n=140)		4 weeks (post program) (n=140)		Fr	P
	No.	%	No.	%	No.	%		
Definition of ARI								
Incorrect / lack of knowledge	122	87.1	0	0.0	0	0.0	243.430*	<0.001*
Incomplete knowledge	16	11.4	28	20.0	83	59.3		
Complete knowledge	2	1.4	112	80.0	57	40.7		
Types of microbes that cause ARI								
Incorrect / lack of knowledge	110	78.6	0	0.0	0	0.0	242.740*	<0.001*
Incomplete knowledge	30	21.4	23	16.4	52	37.1		
Complete knowledge	0	0.0	117	83.6	88	62.9		
Methods of ARI transmission								
Incorrect / lack of knowledge	9	6.4	0	0.0	0	0.0	261.894*	<0.001*
Incomplete knowledge	129	92.1	1	0.7	7	5.0		
Complete knowledge	2	1.4	139	99.3	133	95.0		
High risk group								
Incorrect / lack of knowledge	7	5.0	0	0.0	0	0.0	252.619*	<0.001*
Incomplete knowledge	133	95.0	7	5.0	8	5.7		
Complete knowledge	0	0.0	133	95.0	132	94.3		
Typical Manifestations of ARI								
Incorrect / lack of knowledge	7	5.0	0	0.0	0	0.0	220.676*	<0.001*
Incomplete knowledge	129	92.1	0	0.0	34	24.3		
Complete knowledge	4	2.9	140	100.0	106	75.7		
Atypical Manifestations of ARI								
Incorrect / lack of knowledge	127	90.7	0	0.0	0	0.0	251.051*	<0.001*
Incomplete knowledge	13	9.3	29	20.7	73	52.1		
Complete knowledge	0	0.0	111	79.3	67	47.9		
Complications of ARI								
Incorrect / lack of knowledge	110	78.6	0	0.0	0	0.0	249.437*	<0.001*
Incomplete knowledge	30	21.4	60	42.9	78	55.7		
Complete knowledge	0	0.0	80	57.1	62	44.3		
Preventive measures of ARI								
Incorrect / lack of knowledge	14	10.0	0	0.0	0	0.0	266.271*	<0.001*
Incomplete knowledge	126	90.0	2	1.4	5	3.6		
Complete knowledge	0	0.0	138	98.6	135	96.4		
Vaccinations for ARI prevention								
Incorrect / lack of knowledge	39	27.9	0	0.0	0	0.0	205.148*	<0.001*
Incomplete knowledge	99	70.7	18	12.9	46	32.9		
Complete knowledge	2	1.4	122	87.1	94	67.1		
Total knowledge								
Poor	134	95.7	0	0.0	0	0.0	259.313*	<0.001*
Fair	6	4.3	16	11.4	24	17.1		
Good	0	0.0	124	88.6	116	82.9		

Fr: Friedman test

p: p value for comparing between the studied periods

*: Statistically significant at $p \leq 0.05$

Table (4): Distribution of the studied older adults according to the mean percent score of ARI preventive behaviors domains before, immediately after and four weeks post program (n = 140)

ARI preventive behaviors domains	Baseline (Pre-program)	Immediately (post program)	4 weeks (post program)	F	P
Personal hygiene behaviors					
Total Score	(0 – 36)				
Min. – Max.	3.0 – 31.0	27.0 – 36.0	25.0 – 36.0	2913.290*	<0.001*
Mean ± SD.	11.71 ± 4.38	33.66 ± 1.97	32.17 ± 2.06		
% Score	32.52 ± 12.16	93.49 ± 5.48	89.37 ± 5.71		
Household cleanliness					
Total Score	(0 – 8)				
Min. – Max.	2.0 – 8.0	4.0 – 8.0	4.0 – 8.0	430.290*	<0.001*
Mean ± SD.	4.94 ± 1.53	7.73 ± .76	7.29 ± 0.95		
% Score	61.70 ± 19.16	96.61 ± 9.46	91.07 ± 11.83		
Social and physical distancing					
Total Score	(0 – 14)				
Min. – Max.	0.0 – 8.0	5.0 – 14.0	5.0 – 14.0	1260.691*	<0.001*
Mean ± SD.	2.23 ± 1.71	11.85 ± 2.36	10.49 ± 2.04		
% Score	15.92 ± 12.25	84.64 ± 16.83	74.90 ± 14.55		
Using face masks					
Total Score	(0 – 8)				
Min. – Max.	0.0 – 6.0	0.0 – 8.0	0.0 – 8.0	183.237*	<0.001*
Mean ± SD.	0.34 ± 0.86	3.52 ± 2.57	2.85 ± 1.97		
% Score	4.29 ± 10.79	44.02 ± 32.10	35.62 ± 24.68		
Healthy life style behaviors					
Total Score	(0 – 74)				
Min. – Max.	8.0 – 53.0	37.0 – 69.0	38.0 – 70.0	1561.799*	<0.001*
Mean ± SD.	25.38 ± 9.99	60.55 ± 5.11	58.61 ± 6.61		
% Score	34.30 ± 13.51	81.82 ± 6.90	79.21 ± 8.93		
Total preventive behaviors	(0 – 140)				
Min. – Max	19.0 – 100.0	91.0 – 134.0	81.0 – 130.0	2540.704*	<0.001*
Mean ± SD.	44.59 ± 15.72	117.31 ± 8.35	111.41 ± 9.80		
% Score	31.85 ± 11.23	83.79 ± 5.96	79.58 ± 7.0		

F: F test (ANOVA) with repeated measures

p: p value for comparing between the studied periods

*: Statistically significant at $p \leq 0.05$

Table (5): The effect size of the respiratory wellness education program on ARI related knowledge and preventive behaviors among the studied older adults

The study older adult's knowledge and preventive behaviors	Baseline (Pre-program)	Immediately (post program)	4 weeks (post program)	Effect size eta	Level
	Mean ± SD	Mean ± SD	Mean ± SD		
Knowledge	5.18 ± 1.54	16.80 ± 1.55	15.24 ± 1.67	0.954	Large
Preventive behaviors	44.59 ± 15.72	117.31 ± 8.35	111.41 ± 9.80	0.948	Large

Effect size= 0.0- 0.2(low effect) 0.3-0.7(intermediate effect) ≥0.8 (high effect)

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