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Training program for caregivers to prevent pressure ulcers among elderly residents at geriatric homes

Original article

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Abstract: **Objectives:** Pressure ulcer (PU) is one of the most common problem among the bedridden elderly and has significantly more burden on elderly and caregivers. This study is aimed to evaluate the effects of the training program for caregivers to prevent PUs among elderly residents at geriatric homes.

Methods: A quasi-experimental design was used to carry out the current study. A purposive sample comprised of all formal (39 nurses) or informal caregivers (39) and all immobilized elderly residents (35) who are found in all geriatric centers in Helwan district. A structured questionnaire was used to assess caregivers' socio-demographic characteristics, knowledge, attitude, and observational checklists for their practice for prevention of PU at pre- and posttest and during follow-up.

Results: After the training program, there were improvements in the level of knowledge, practice, and positive attitude of caregivers about PU prevention with a statistically significant difference between pre-, post-, and follow-up training programs ($P < 0.001$).

Conclusions: The study revealed that the training program seemed to change the knowledge, practice, and attitude of the subjects to PU prevention. This, in turn, implies that adequate knowledge affects directly the elderly caregivers' attitudes as well as practice for prevention could be important in reducing the burden of PU among the elderly. Thus, conducting a training program for caregivers at different geriatric homes about caring skills for elders can prevent PU, and using spontaneous reposition is very effective to prevent PUs.

Keywords: *caregivers • elderly residents • geriatric homes • pressure ulcers • training program*

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1. Introduction

Advanced age results in intense changes in the human body, making it more vulnerable to diseases and injuries. The profile of the elderly population is constituted of personal characteristics that may lead an individual to develop pressure ulcers (PUs) as there are changes in the structure of the skin, impaired mobility, and the cognitive pattern. The elders are highlighted among individuals with PUs because they are more affected by degenerative diseases; they have problems with urinary incontinence, and their use of medications may alter their metabolism.[1]

Geriatric homes have a common problem among their elderly residents, and they, known as PUs and also bedsores, are injuries to the skin and underlying

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tissue from prolonged pressure on the skin. This condition is more common among the elderly who spend long periods in beds or wheelchairs. Worldwide, about 60,000 people die each year due to PUs, and the incidence of PUs varies from one setting to another, which estimate to be ranged from 1.9% to 59% in elderly care settings.[2] Elderly who have conditions that limit their ability to change positions are most at risk to develop bedsores. Although different factors lead to the development of PUs, immobility is considered the most prominent risk factor. This ulcer does not only cause pain and discomfort but may lead to infections, like meningitis, cellulitis, and endocarditis.[3] According to WHO[4] the shoulder blades, tailbone, elbows, hips, buttocks, ankles, and heels are the most common sites for PUs because these areas contain little muscle and fat.

Egypt's Ministry of Health and Population, 2015, has established special geriatric care centers around 80 elderly homes all over the country to ensure the specific needs of elderly people are met. In most countries, the proportion of people aged >60 years is growing faster than any other age group as a result of both longer life expectancy and declining fertility rates. According to a report by the Central Agency for Public Mobilization and Statistics,[5] the number of elderly people in Egypt in 2017 reached 7.8% of the total population, whereas the expected percentage of the elderly population may reach 10.9% in 2026 and 12% by 2030, which shows clearly the size of the problem of the increasing number of the elderly. Despite such a high percentage of elderly people, there are less number of geriatric nursing specialists to provide adequate care for elders; this makes these homes hire nonprofessionals to care for the clients, and hence these caregivers need a training program in geriatric nursing skills.

Geriatric homes have the responsibility to ensure that PUs do not develop in elderly clients who cannot move without restriction or are confined to a wheelchair or bed. PUs are preventable with proper care of the elderly nursing home residents. Nursing home caregivers, whether formal or informal, need also to be properly trained to care for the residents to avoid this irritation. Traditionally, it has been emphasized that repositioning should be carried out at least every 2 h. More recent clinical research has evidence that spontaneous repositioning of immobile elderly had more effective in the prevention of PU.[6] Event repositioning of immobile elderly is an important nursing practice to reduce the risk of PUs. However, knowledge of how caregivers can carry out this practice among immobile elderly residents is limited. So, it is important to train caregivers in elderly institutes to perform the event reposition and therapeutic care, and these eventually will have positive implications in the prevention of PUs.

1.1. Aim of this study

This study is aimed to evaluate the effect of the training program for caregivers to prevent PUs among elderly residents at geriatric homes through the following objectives:

- Assessing elderly residents present skin integrity conditions.
- Assessing caregivers' knowledge, practice, and attitude about PU prevention to determine their needs.
- Planning and implementing a training program for caregivers to prevent PUs according to their needs.
- Evaluating the effect of a training program to prevent PUs among elderly residents at geriatric homes.

1.2. Research hypothesis

The training program will improve caregivers' knowledge, practice, and attitude to prevent PUs among elderly residents at geriatric homes.

2. Subjects and methods

2.1. Study design

A quasi-experimental design is used in carrying out this study. The study was conducted in all the three geriatric centers in Helwan district (Houda Talaat Harb, Dar Om Kolsoom, and Dar El- Sayda Nafesa).

2.2. Sample

A purposive sample composed of all formal and informal caregivers numbering around 78; there were 39 formal and 39 informal caregivers in the geriatric homes and all immobilized elderly residents who were about 35 were bedridden or in a wheelchair, had chronic diseases, and without the development of bedsores or at least in stage one.

2.3. Tools of data collection

A structured questionnaire was composed of three parts as shown below:

Tool I: Caregivers and elderly clients' socio-demographic characteristics

This tool contained items regarding caregivers' data, such as age, sex, academic level, years of experience, and received training on PU prevention, as well as items for elderly residents' such as (age, sex, BMI, duration of residence at geriatric home, and present and past medical history).

Tool II: Caregivers' level of knowledge about PUs

This tool was adapted from the knowledge assessment instrument developed by Beeckman et al.[7] to assess caregivers' knowledge about PUs. It consisted of 26 multiple choice questions and three alternative responses reflecting 7 parts: (1) skin changes in elderly people, (2) definition and causes of PUs, (3) sites of PU development, (4) stages of PU development, (5) PUs prevention, (6) pressure-relieving devices, and (7) event-based repositioning to prevent PUs.

Scoring system

Each question had one mark for each correct answer and zero for the wrong answer. The total knowledge score was 26 marks.

- The level is satisfactory if the score ≥60% of the maximum marks.
- The level is unsatisfactory if the score <60% of the maximum marks.

Tool III: Attitude toward Pressure Ulcer Prevention (APUP) tool

The APUP tool was developed by Beeckman et al.;[7] it is a 13-item questionnaire that measures subjective attitudes toward PU prevention. The questionnaire comprised five subscales: (1) personal competency to prevent PUs, (2) priority of PU prevention, (3) impact of PUs, (4) responsibility in PU prevention, and (5) confidence in the effectiveness of prevention.

Scoring system

A 3-point Likert scale was designed to collect the data (1 = disagree, 2 = neutral, 3 = agree). The sum of the scores was calculated to obtain a total attitude score. Higher scores indicated more positive attitudes whereas low scores represent negative attitudes.

- The level is positive if score ≥60% of the maximum score.
- The level is negative if score <60% of the maximum score.

Tool IV: Observational checklist about event-based therapeutic repositioning procedure

This tool was adapted from the event-based therapeutic repositioning protocol developed by Burkett[8] to assess caregivers' practice during repositioning patients. It consisted of 15 items reflecting 5 parts: skin assessment, event-based repositioning, therapeutic positioning, pressure-relieving surfaces, and repositioning obese elderly residents.

Scoring system

The score is calculated as follows: each item scored 2 if it is done correctly and completely, 1 if it is done incorrectly or incompletely, and 0 if it is not done or not applicable with a maximum score of 45 and minimum of 0; it was competent if the score ≥75% of the maximum and incompetent if the score <75% of the maximum score.

For testing the content of the validity of the tools, three experts in community health nursing and medical surgical nursing revised them and some modifications were done according to their opinion. The content of the validity of the study tools was measured to evaluate the individual items as well as their relevance and appropriateness to test what they wanted to measure.

2.4. Pilot study

The pilot study was applied to 10% of the total 8 caregivers to test the applicability of the tool, to test the arrangement of the items, and to estimate the time needed for each sheet. They were not excluded from the sample as there weren't any changes applied.

2.5. Fieldwork

In the beginning, the researchers introduced themselves and briefly explained the study objectives to caregivers and the elders who fulfill the criteria of the study. The process of data collection was carried out in the period from the beginning of February 2019 to the end of May 2019. The researchers visited the selected settings 3 days per week, 1 day for every institution from 8:00 AM to 2:30 PM. The researchers fulfilled the subsequent items of the established tools that lasted from 30 min to 45 min for each subject included in the study.

The training program construction contained 3 phases as given below:

Phase I: Preparatory phase using the assessment tools after being revised:

This training program was planned to cover the knowledge, attitude, and practice of caregivers for preventing PUs among elderly residents at geriatric homes. To gain entry to geriatric home official permission was gained through the appropriate channels. Then, the researchers started to enroll clients who fulfilled the criteria and the researchers introduced themselves, and the purpose of the study was explained briefly. Then, the baseline data (pretest) were collected from each caregiver using a questionnaire sheet, as well as the time spent with each client for about 30 min. Finally, the collected data were subjected to statistical analysis to give a solid base for designing the training program.

Phase II: Developing and implementing the training program:
In this phase, the researchers sketched the training program's general objective to improve caregivers' knowledge, practice, and attitude to prevent PUs among elderly residents at geriatric homes. The training program composed of 6 sessions in each geriatric home; *one* for objectives, introduction, acceptance of caregivers to be involved in the study, and pretest collection, *two* sessions for theoretical contents covered the following major area: definition of PUs, causes, signs, sites, stages, management, etc. The elderly's normal physiological changes of the skin and the preventive behaviors are covered (skin assessment, event-based repositioning, therapeutic positioning, pressure-relieving surfaces, and repositioning obese patients). Regarding attitude, cultivate a favorable attitude about their ability to prevent PUs among clients. Finally, practical sessions are delivered through three training sessions. Each practical session lasted for 40 min during the shift work in small groups (for every 5 nurses) debating with them in the working area to assist the meeting. Practical sessions focused on the following items: assess caregivers' practices during repositioning patients. It consists of 15 items reflecting 5 parts: skin assessment, event-based repositioning, therapeutic positioning, pressure-relieving surfaces, and repositioning obese elderly residence. Enough time was given for demonstration, re-demonstrations, discussions, clarifications, and questions related to the practical skills. Every session integrated easy training videos for practical skills linked with different measures to prevent bed ulcers using audiovisual aids. Post-knowledge questionnaire and post-observation checklist were completed after the application of the training program. Booklet and sessions were formulated from available related literature. The sessions were designed to cover the above contents, through 6 sessions in every selected nursing home. The sessions usually took place from 9:00 am to 1:00 pm; each session took approximately 30–45 min. The sessions took place in nursing rooms for theoretical sessions and in clients' rooms for clinical practices. The researchers usually started with the objective of the session and ended with the date and time and the objectives of the next session. The researchers used open discussions during sessions, videos, PowerPoint presentations, and demonstrations; also, promotional materials (booklet) were given to participants after each session.

Phase III: Evaluation phase
In order to evaluate the effect of the training program, the posttest was performed (using the same tools of the pretest) immediately after the training program and then after 2 months to determine the degree of the retention span of knowledge of the caregivers, continuous caregivers practices of event reposition strategies, and also skin assessment of clients to discover any incidence case of PU.

2.6. Statistical analysis

The collected data were organized, tabulated, and statistically analyzed using SPSS software version 23. For quantitative data, mean and standard deviation were calculated. For qualitative data, which describe a categorical set of data by frequency, percentage, or proportion of each category, Analysis of Variance (ANOVA) test (F) was used to analyze the variance throughout the training program. Correlation between variables was evaluated using Pearson's correlation coefficient (r). Significance was adopted at $P < 0.05$ for the interpretation of the results of tests of significance.

3. Results

Table 1 displayed that the elderly clients' mean ages were 74.82 ± 7.71, and more than half (54.3%) of them were males. Regarding their duration of residence at the geriatric homes, the mean was 5.08 ± 3.211 years. And, the mean and standard deviation of BMI of the elderly was 30.44 ± 5.74. Also, this table indicated that elderly clients who suffered from both urinary and stool incontinence were 65.7% and 71.4% respectively.

Table 2 illustrated that the mean and standard deviation of both formal and informal caregivers' age was 28.82 ± 9.257. And, 71.8% of the caregivers were females. About 43.6% were married. Regarding, informal caregivers' educational level, about 24.6% can read and write. While the formal caregivers 21.8% were diploma nurses and only 10.3% were nurses with bachelor's degree. Furthermore, the mean and stranded deviation of years of experience of the informal and

Characteristics	*n*	%	M ± SD
Age, years old			74.82 ± 7.71
60–	13	37.1	
71–	14	40	
≥81	8	22.9	
Gender			
Male	19	54.3	
Female	17	45.7	
Duration of residence			5.08 ± 3.21
1–5 years	22	62.9	
≥ 6 years	13	37.1	
BMI = Wt./Ht.^{2}			30.44 ± 5.74
Normal (18.5–25)	5	14.3	
Overweight (25–30)	16	45.7	
Obesity (30–40)	14	40	
Duration of chronic disease			10.42 ± 5.60
1–5 years	6	17.1	
6–10 years	16	45.7	
≥11 years	13	3.1	
Suffered from urinary incontinence			
No	12	34.3	
Yes	23	65.7	
Suffered from stool incontinence			
No	10	28.6	
Yes	25	71.4	

Note: *Total items are not mutually exclusive; M, mean; SD, standard deviation.

Table 1. Frequency distribution of the elderly clients' demographic characteristics and past medical history (*n* = 35).

Caregivers' characteristics	n	%	M ± SD
Age, years old			28.82 ± 9.257
15–	10	12.8	
21–	36	46.2	
31–	20	25.4	
≥ 41	12	15.4	
Gender			
Male	22	28.2	
Female	56	71.8	
Informal caregiver education level (n = 39)			
Illiterate, read, and write	18	23	
Moderate education	19	24.4	
University education	2	2.6	
Formal caregiver education level (n = 39)			
Diploma	17	21.8	
High institute of nursing	14	17.9	
Bachelor's degree	8	10.3	
Years of experience given by informal caregivers (No = 39)			1.79 ± 0.83
1–5 years	35	89.8	
6–10 years	2	5.1	
≥11 years	2	5.1	
Years of experience given by formal caregivers (No = 39)			3.89 ± 2.71
1–5 years	27	69.2	
6–10 years	10	25.7	
≥11 years	2	5.1	
Have you received any training on PU prevention?			
Yes	25	32.1	
No	53	67.9	

Table 2. Frequency distribution of the elderly caregivers' demographic characteristic (*n* = 78).

formal caregivers were 1.79 ± 0.83 and 3.89 ± 2.71, respectively, and almost one-third of them (32.1%) received training on PU prevention among the elderly.

According to the study hypothesis which confirmed that the training program improved caregivers' knowledge, practice, and attitude to prevent PUs among elderly residence, it will be discussed through the following parts of study results (Figures 1–3) and (Tables 3–4).

Figure 1 displayed elderly caregivers' knowledge total score levels related to the training program for caregivers to prevent PUs among elderly residents at geriatric homes. It indicated that there was a great increase in the percentage of knowledge score levels at the posttest as the figure shows that 70.5% of elderly caregivers had good knowledge than of the follow-up and pretest.

There is a highly statistically significant improvement in the reported caregivers' knowledge, attitude, and observed practices pre, post, and follow-up mean levels in the posttest than that of the pretest, $P < 0.001$ (Table 3).

Figure 2 illustrated caregivers' attitude total score levels related to the training program for caregivers to prevent PUs among elderly residents at geriatric homes. It indicated that there was a radical change in their attitude at the posttest as well as follow-up tests, as the figure shows, than of the pretest.

Figure 3 showed caregivers' observed practice total score levels related to PU prevention throughout the training program. It indicated that there was a radical change of their practice at the posttest as well as a follow-up test, as the figure shows, than of the pretest.

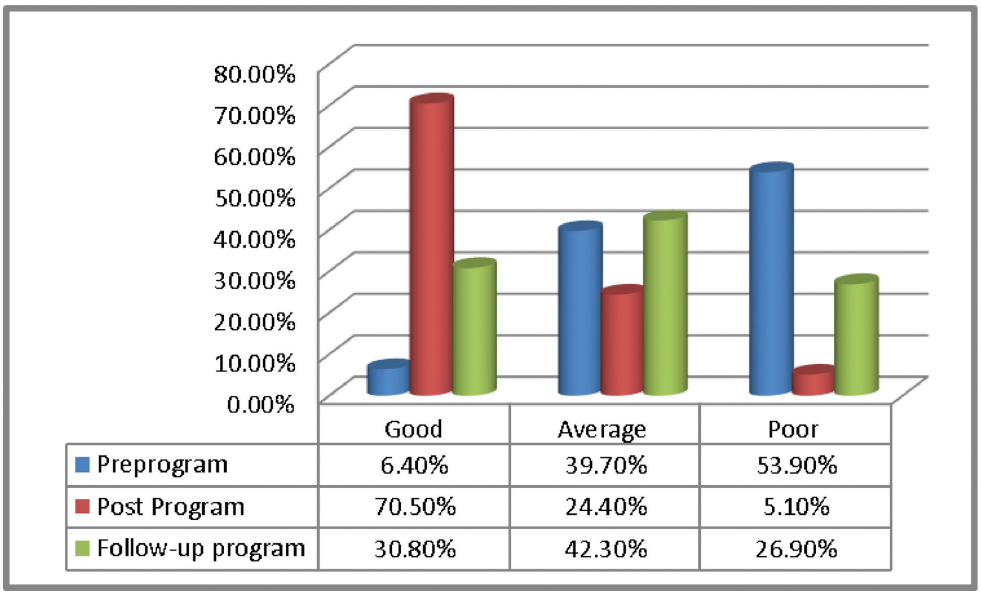


Figure 1. Frequency Distribution of Total Scores of Reported Caregivers' Knowledge about Pressure Ulcer Prevention throughout the Training Program ($n = 78$).

Items	M ± SD	*F*	*P*-value
Total scores of knowledge		82.092	0.000**
Pre-reported knowledge	7.5128 ± 2.272		
Post reported knowledge	14.000 ± 3.03657		
Follow-up knowledge	10.2436 ± 3.4535		
Total scores of attitude		0.983	0.000**
Pre-reported attitude	17.79 ± 5.31		
Post reported attitude	27.24 ± 8.41		
Follow-up attitude	27.8 ± 7.9		
Total scores of practice		14.313	0.000**
Observed pre-practice	29.17 ± 10.8		
Observed post-practice	48.01 ± 9.35		
Follow-up observed practice	44.30 ± 11.36		

Note: **Highly statistically significant at $P \leq 0.001$; PU, Pressure ulcer.

Table 3. Mean and standard deviation of total scores of reported caregivers' knowledge, attitude, and observed practice regarding PU prevention throughout the training program ($n = 78$).

Table 4 indicated a statistically positive correlation among total knowledge score levels and practice and attitude throughout the training program, which ensures that adequate knowledge affects directly the caregivers' attitudes as well as practice.

4. Discussion

PUs remain the chief complication and major burden of prolonged bedridden; specifically, elderly residents at geriatric and homes have prolonged periods of pressure at one side or position, poor nutrition, incontinence, and compromised sensory stimuli. Therefore, this study aimed to evaluate the effect of a training program for caregivers to prevent PUs among elderly residents at geriatric homes.

Regarding the demographic characteristics of caregivers, the results of the present study found that almost half of them at the age from 20 to 30, female, and half of them are formal skilled caregivers and the other half informal caregivers, and the majority of caregivers have the experience in caring of the elderly for 1–5 years. The demographic and professional profile of the caregivers is similar to that identified in other studies. The results of this study are supported by a study done by Awad et al.[9] to examine the effect of the training program on knowledge, attitudes, and practices of nurses to prevent PUs among geriatric residents in Egypt; the findings indicated that the majority of the studied caregivers are aged between 20 years and 30 years old. On the same line, a study was done in Saudi Arabia by Hefnawy and Abd El-Monem[10] to determine the impact of the training program for nurses about PU prevention, which stated the same age distribution of studied caregivers in agreement with Awad et al.,[9] who revealed that the majority of the study participants had experience ≤5 years. These findings gave a prediction of expected low knowledge and practice of caregivers regarding pressure sore management before the program.

Also, the results showed that almost one-third of the caregivers received training on PU prevention among

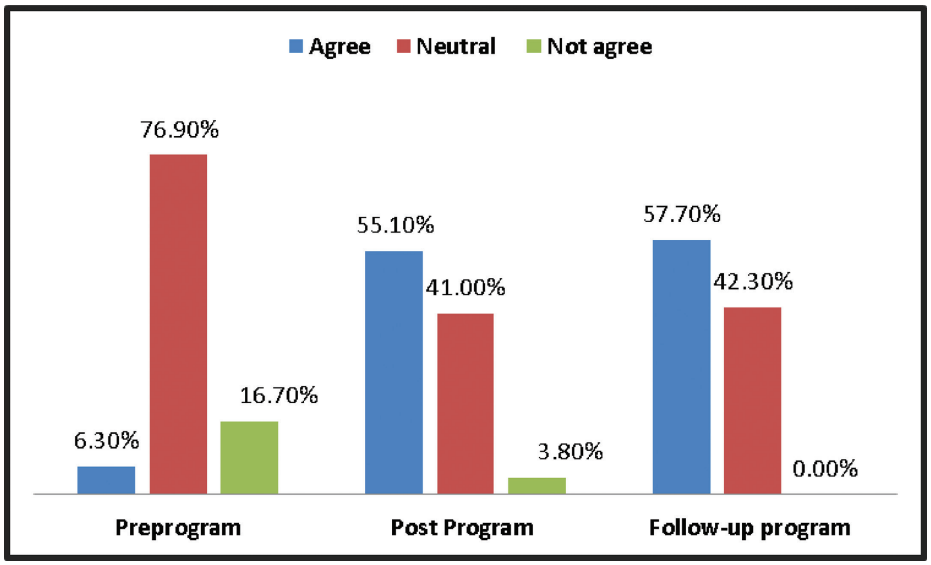


Figure 2. Frequency Distribution of Total scores of Reported Caregivers' Attitude regarding Pressure Ulcers Prevention throughout the Training Program (*n* = 78).

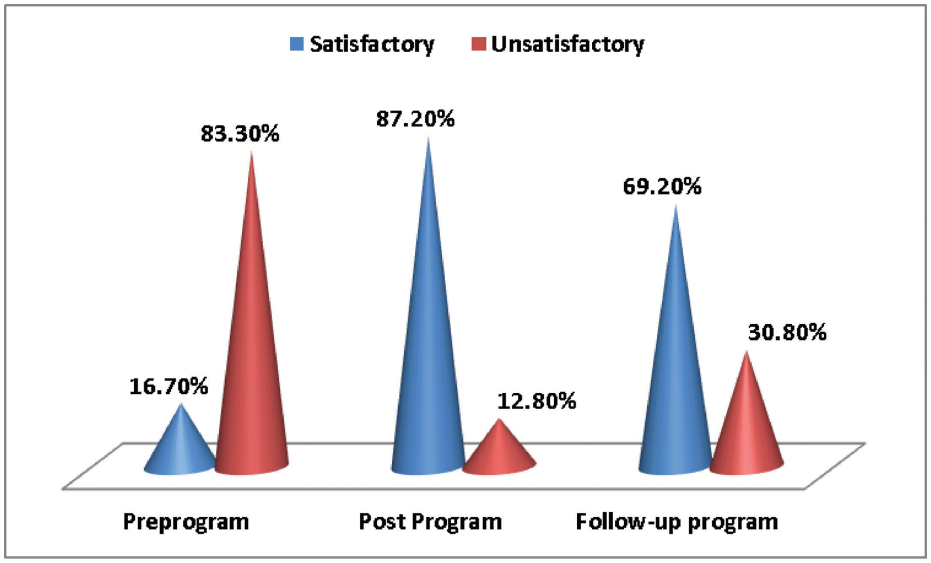


Figure 3. Frequency Distribution of Total Scores of Caregivers' Observed Practice Regarding Pressure Ulcers Prevention throughout the Training Program (*n* = 78).

Item	Total scores of knowledge					
	Pre-program		Post-program		Follow-up	
	r	*P*-value	*r*	*P*-value	*r*	*P*-value
Practice	0.424	0.000**	0.233	0.013*	0.096	0.402
Attitude	0.298	0.001**	0.199	0.033*	0.236	0.038*

Note: *Correlation is significant at the 0.050 level.

Table 4. Correlation between pre-, post-, and follow-up a total score of caregivers' knowledge, practices, and attitude throughout the training program (*n* = 78).

the elderly. Moreover, a study was done by Lavallée et al.,[11] which aimed to realize the perspective of PU prevention in nursing homes in the UK, which stated that just eight of caregivers attended training PU prevention. These were in accordance with the results of a cross-sectional study done in Japan at home care settings that aimed to evaluate knowledge of and practice for pressure injury prevention among care managers by Kohta et al.,[12] who stated that the nurse had low knowledge about PU prevention care because they did not receive sufficient training and education. From the researchers' point of view, the lack of training the caregivers about elderly PU care had a close relationship with the increased incidence of PU among elderly residents.

The results of the present study clarified that almost all of the clients under the study were at risk for the development of PUs because all had different chronic diseases from 10 years and the majority were overweight and obese and suffered from urine and stool insentience. These results were similar to a study conducted in Egypt by Mohamed and Weheida[13] to identify the effect of the training program in controlling PUs among immobilized patients and their results stated that the majority of their patients were at risk for the development of PUs. This could reflect the importance of specific PU assessment and therapeutic care precautions, especially among those who suffered from multiple chronic diseases, obesity, and urine or stool incontinence.

Concerning the knowledge of caregivers about PU prevention among elderly residence in geriatric homes, the findings of the study revealed that the knowledge of caregivers is below the minimum acceptable level, i.e. >50% of caregivers had poor knowledge about PU before the training program. This result was consistent with other studies conducted in different parts of Egypt. A study was done in Alexandria among geriatric patients by Awad et al.,[9] who found that the majority of nurses had a low level of knowledge about PUs among the elderly. Another study was done in Cairo by Mersal[14] among nurses who care for immobilized patients to assess their knowledge and practice regarding the prevention of immobilization complications, which revealed that the majority of the caregivers had unsatisfactory knowledge. In contrast, a study was done in Korea among nurses who provided long-term care for the elderly by Kim and Lee,[15] who found that 60% of nurses had a moderate level of knowledge of PU prevention. Moreover, a study done in Ethiopia by Gashaw[16] to evaluate the knowledge and practice of nurses toward PU prevention and management reported that the nurses who participated in the study had good knowledge regarding PU prevention and management. This difference may be due to different geriatric homes policies that support hiring only skilled formal caregivers. Additionally, this might be because half of the caregivers were informal and had fewer experiences in caring for bedridden elderly. Also, this might be due to a lack of training and learning resources for caregivers to improve their knowledge about PU care and its prevention. This ensures that all the caregivers, especially those who were informal, should receive training about PU caring for the elderly.

After implementing the training program, 70% of caregivers' knowledge improved and then decreased at follow-up and 30% had good and >40% had average knowledge. Also, the results illustrated that there was a statistically significant improvement in their knowledge mean level at posttest and follow-up. The results of this study are similar to many previous studies, as a study done by Awad et al.[9] found that the total mean score of knowledge of caregivers about PU improved and was statistically significantly higher than before the intervention. This is in accordance with a study done in Thailand by Chiaprasert et al.,[17] who applied a training program for caregivers of the elderly, which found the PU prevention training program should be applied to caregivers to enable them to take better care of the elderly, resulting in preventing PU risk. Therefore, the PU prevention training program should be useful for other caregivers of the elderly with bedsores. Furthermore, there was a training program on the prevention of pressure done in Uganda among caregivers of the immobilized patients by Shrestha and Khatiwada,[18] which depicted that there was a highly statistically significant difference between pre- and posttest of total knowledge mean level. This is evidence that when the caregivers took training on PUs were found to have good knowledge.

Regarding the caregivers' attitude related to the prevention of PUs among elderly residence in geriatric homes, the results of the present study revealed that the majority of the studied caregivers had a negative attitude toward PUs prevention in the pre-training program. Similarly, a cross-sectional study done in Nigeria by Ingwu et al.[19] to determine the knowledge and practice of caregivers toward PU prevention among orthopedic patients reported that the majority of caregivers had a poor attitude toward the prevention practice of PUs. Besides, Awad et al.[9] stated that the majority of the study subjects had a negative attitude toward PU prevention before the application of interventions. Contrary to this, a survey performed at the rehabilitation hospital in Saudi Arabia among health professionals to evaluate their knowledge and attitude regarding the prevention of PUs indicated that most of the nurses had a positive attitude toward bedsore prevention practice.[20] Similarly, Kim and Lee[15] found that 68.4% of the participants in a study showed positive attitudes regarding PU prevention practice; they

thought that the prevention of PU should be a priority. This, based on the researchers' field experience, relates to the difference probability that the majority of caregivers are informal and have <5 years of experience in caring for the elderly. Furthermore, there are no available guidelines or even training about caring and prevention of PUs at geriatric homes, which may affect the neutral attitude shown.

After the applied training program for caregivers, the results demonstrated that there was a radical change of their attitude at the posttest as well as a follow-up test than that of the pretest, with statistically significant improvement of mean levels in the post- and follow-up test than that of the pretest. On the same line, Awad et al.[9] found that more than three-quarters of the studied subjects had a positive attitude toward pressure sore prevention after the training program. This confirmed the fact that training increases caregivers' knowledge and gives them a chance to be more informed about PU prevention. Otherwise ensuring that good adequate knowledge was given to caregivers radically could change attitude to be positive.

This study explored the context of PU prevention within nursing home settings. As regards the practice of caregivers related to the event-based repositioning of elderly residents at geriatric homes who had PUs throughout the training program, the findings of the present study clarified that the performance of caregivers about event reposition of elderly to prevent ulcers was low. This finding is congruent with a study conducted in nursing homes in the UK by Lavallée et al.,[11] who reported that the caregivers in the nursing homes are informal caregivers. Thus, the health care provided for the resident was not of high quality. These results suggested that the participants in this study need more training about the care of the elderly's condition to prevent pressure injury development and to follow the therapeutic prescriptions. Consistently, studies done on caregivers who were working in nursing homes in Japan by Kohta et al.[12] found that the level of practice of participants for caring elderly to prevent PU was low. Also, Ingwu et al.[19] indicated that the practice of the studied sample for the prevention of PUs was inadequate. This result was supported by the study done by Hefnawy and Abd El-Monem.[10] Awad et al.[9] proved that the majority of their studied sample had unsatisfactory practices regarding PU prevention and care before the implementation of the program. This similarity might be because half of the caregivers were informal with little knowledge, which subsequently influences the quality of care for elders. Another reason for explaining the inadequate level of practice might be due to their poor attitude toward the prevention of PUs as mentioned in the results.

The home caregivers, whether formal or informal, are the key element and a positive influence in providing adequate care for elderly residents because the prevention of PUs is a high priority for caregivers. Hence, it is important for them to develop strategies to provide favor care practice to prevent PUs among elderly residents. Training programs are essential for caregivers to prevent the development of PUs. Therefore, the researchers trained the caregivers on event reposition strategies and therapeutic caring of PUs. The results of this study highlighted that there was a radical change of caregivers' practices at the post- as well as follow-up test than of the pretest, with statistically significant improvement of mean score levels in the post- and follow-up test than that of the pretest at *P*-value > 0.005. This confirmed the training program was effective and conducted in an adequate manner.

The practice of the caregivers is enhanced when they were more informed and trained about the event reposition and care of elderly residents to prevent PUs, which will have an impact on the elderly' quality of life. These findings concurred with prior studies conducted on caregivers of elderly persons. A study done by Chiaprasert et al.[17] clarified improved practices of caregivers after receiving the program about PU prevention as well as improvement in caring for ulcers and preventing complications. Moreover, Awad et al.[9] highlighted that the caregivers' practice regarding PUs improved after they applied to the training program. Additionally, the total mean score of caregivers' practices was significantly higher after the program than before. The researchers' point of view confirmed that PUs are easy to prevent by awareness of caregivers of the best practice of prevention and commitments to do it. Change position is considered a key to prevent PUs. These changes need to be frequent; event repositioning is important to avoid stress on the skin and to minimize the risk of pressure. Thus, the provision of prevention training programs is essential.

One of the main findings in the present study was that statistically significant positive correlations were found between the scores of the knowledge and attitude and practices among the studied group throughout the training program. Similarly, Mohamed and Weheida[13] found that the results were obvious to affirm that the training program had a statistically significant impact on the improvement of knowledge on PU's prevention, which had an impact on the attitude and practices of event reposition and therapeutic care among these observed elderly residents in home institutes. Moreover, a study had shown that increased PU's prevention knowledge of the caregivers of elders leads to improved compliance with PU's prevention practices.[10] This finding confirmed

that the training program for caregivers of elderly residents was likely to enhance their motivation to make decisions for behavioral change about their care of immobilized elderly residents at the risk of PU.

5. Conclusions

Based on the results of the current study and research hypothesis, it can be concluded that; This study demonstrated that the majority of the study samples had unsatisfactory knowledge regarding the practice of PUs prevention and also had inadequate practices of event reposition and therapeutic care of PUs; also, they had a negative attitude about reposition of elderly and prevention of bedsores. However, after the training program, it improved their knowledge, attitude, and practices of reposition of elderly residents with statistical significance among pre, post, and follow-up the training program. The findings confirmed that the training program was given to caregivers in geriatric homes to improve their knowledge, practices, and attitude in the prevention of PUs, also using event-based reposition and therapeutic care, can prevent PUs in nursing homes.

Recommendations

Based on the results of the current study findings and research hypothesis, the following can be recommended:

- Continuous observation of caregivers, especially informal, to determine the actual practice of PU prevention.
- Further training programs and studies in different geriatric homes to improve caregivers' practices of PU prevention care.
- Conducting a training program for caregivers in different geriatric homes on caring skills for elderly residents and using spontaneous reposition to prevent PUs.

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Ethical approval

The study was approved by the Ethical Committee of the Faculty of Nursing, Helwan University. The researchers followed the ethical rules in all stages of the study. Official permission was taken from the directors of each nursing home center and written consent was taken from every subject who participated in the study after explaining the purpose and nature of the study. They were notified that they could withdraw at any stage of the research; also, they were assured that the information would be confidential and used for research purposes only.

Conflicts of interest

There are no conflicts of interest.

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