



## Training Program for Caregivers on Prevention of Pressure Ulcers among Elderly Patients

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### Abstract

Pressure ulcers (PUs) represent a significant burden to the bedridden elderly patients, family caregivers and healthcare organization. It has a great impact on quality of life physically, psychologically and socially. Therefore, this study aimed to evaluate the effect of training program for caregivers on prevention of pressure ulcers among elderly patients. This Quasi-experimental study was conducted on orthopedic inpatient department in the surgical building at Zagazig University Hospitals. The study sample composed of 60 studied caregivers of elderly patients, purposively assigned according to study inclusion criteria. Three tools were used; a structured interview questionnaire which is consisted of two parts: Caregivers and elderly patients' demographic characteristics and medical history, Caregivers' knowledge of pressure ulcers structured interview questionnaire and Observational checklist about practice of caregivers on prevention of pressure ulcers. The results revealed post- program statistically significant improvement in caregivers' knowledge and practice regarding pressure ulcers prevention among bedridden elderly patients ( $p < 0.001$ ). The training program is effective in enhancing the caregivers' knowledge and practices regarding prevention of pressure ulcers among elderly patients. Continuous observation and follow up of family caregivers to determine the effectiveness of training program on actual practice of PUs prevention among bedridden elderly patients after application of training program.

**Keywords:** Training Program, caregivers' knowledge, practice, bedridden elderly Patients, pressure ulcers

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### 1. Introduction

The aging process of human skin is characterized by a constant deterioration in cell replacement, poor barrier function and mechanical protection, delayed wound healing and immunological responses, altered thermoregulation, and decreased production of sweat and sebum. Features including wrinkles, elasticity loss, laxity, and a rough-textured appearance are indicative of aging skin [1]. This structural and functional changes occurring in the elderly patients gives increase to skin problems and related complications such as pressure ulcers [2]. Pressure ulcers (PUs) also known as pressure sores, bedsores and decubitus ulcers are localized damage to the skin or underlying tissues that usually occur over a bony prominence as a result of pressure or in combination with shear or friction. The most common sites

are the skin overlying the sacrum, coccyx, heels or the hips but other sites such as the elbows, knees, ankles, back of the shoulders or the back of the cranium can be affected [3]. Currently, PUs has become a serious public health issue threatening the health of elderly long-term bedridden patients, bringing heavy burdens to families and health care systems [4]. Therefore, it is crucial to strengthen the prevention of PUs in long-term bedridden patients, especially the elderly, to reduce the incidence of Pus [5].

Pressure ulcer prevention is not only provided in hospitals, but should also be continued after patients discharged to home, as it can occur during hospitalization, but also after discharge to home, becoming a serious challenge for the patient and their family caregivers [6]. One important factor in preventing PU is family caregivers. Caregivers can

help patients achieve the best quality of life and pass away peacefully, comfortably, and with dignity if they are educated about PU prevention [7]. Informal caregivers are frequently ill-prepared to offer care at home, but they do need specialized training and expertise to carry out certain healthcare services. Therefore, it is necessary to educate family caregivers about PU prevention and management options in order to boost their confidence and competence in providing patient care [8]. The nurses play an important role in training the family caregivers about how to prevent and manage pressure ulcers occurrence by using precautions such as risk assessment, prevention of harm, ensuring comfort, providing safe environments to assist patients attain optimum health [2]. Training programs play a pivotal role in enhancing the knowledge and practice of caregivers as encouraged for geriatric home caregivers who play a key role in preventing pressure injury among the elderly [9]. Understanding the disease process and prophylactic methods had an impact on the reduction of pressure injuries by manipulating certain factors and developing the effective prevention plans that could prevent the pressure injuries [10].

## 2. Method

### 2.1. Study Design and Setting

A quasi-experimental study design was utilized to conduct the current study in the orthopedic inpatient department in the surgical building at Zagazig University Hospitals.

### 2.2. Sample

The sample of this study included 60 caregivers of elderly patients from the mentioned setting who fulfilled the following inclusion criteria: Caregivers are informal (family caregivers) male or female, free from disability, which may interfere with caring for their elderly patients, able to communicate and agree to participate in the study, For the elderly patients, aged 60 years who are bedridden free from pressure ulcers.

### 2.3. Sample size calculation

It was calculated by statistical computer program (Epi-Info software version 6.04). It was based on assuming the percentage of bedridden elderly patient in orthopedic department 54%, [11] among 100 elderly patients who were done orthopedic surgery and stay on bed, with power 80% and at confidence level 95%, the sample size calculated was 60 elderly.

### 2.4. Tool of data collection

To gather the required data, three tools were used.

- **Tool I**

An interview questionnaire that was developed by the researchers based on the literature review. It is composed of three parts: Caregivers and elderly patients' demographic characteristics and Medical history of the studied family caregivers and elderly patients. caregivers' data, such as (age, sex, marital status, educational level, income, occupation and relation of the family caregiver to the patient, as well as items for elderly patients' such as (age, sex, patient's diagnosis, feeding, urination and bowel movement).

- **Tool II: Caregivers' knowledge of pressure ulcers structured interview questionnaire**

This tool is adapted from the knowledge assessment instrument that was developed by [11] to assess caregivers' knowledge about PUs. It consists of 30 multiple choices questions, divided to three parts: part I, it consists of skin and its function questions (included 3 questions). Part II: it consists of questions about pressure ulcers (included 10 questions). Part III: it consists of questions about pressure ulcers prevention (included 17 questions).

Scoring system: There were five choices, out of which one was correct answer and the remaining four were wrong answers. A score was rewarded for wrong response. Thus there were 30 maximum obtainable scores. The level of knowledge was graded based on percentage of scores obtained Level of knowledge

Adequate (Above 75%)

Moderate ( $50 \leq 75\%$ )

Inadequate (Below 50%)

- **Tool III: Observational checklist about practice of caregivers on prevention of pressure ulcers**

It will be developed by the researcher and guided by [3] this checklist will be used to evaluate the practice of caregivers on prevention of pressure ulcers among elderly patients. It consisted of three parts, the first part about care of the skin that include (9 items), the second part about prevention of pressure ulcer that include (12 items) and the third part about nutrition that include (4 items).

Scoring system: The score is calculated as follows: each item scored 2 if it is done, 1 if it is done sometimes, and 0 if it is not done with a maximum score of 50 and minimum of 0; it was competent if the score  $\geq 75\%$  of the maximum and incompetent if the score.

### 2.5. Training Program

#### 2.5.1. Assessment phase

This phase involved the pre-program data collection for baseline assessment. Participants were interviewed by the researcher who introduced herself and explained the aim of the study briefly seeking their agreement in the study and reassured them that information obtained is strictly confidential and would not be used for any purposes other than research. The researcher read and explained each item of the study scales to the caregivers and the elderly and then recorded his/her response to each item. The time consumed for filling the study tools ranged from 30 to 45 minutes. The data were preliminary analyzed to provide the basis for building-up the program according to identified needs.

#### 2.5.2. Planning phase

Based on the results obtained from the data analysis of the assessment phase, and in view of the relevant literature about prevention of pressure ulcers among bedridden elderly patients, the researcher developed the training program for caregivers and session's content.

#### 2.5.3. Implementation phase

The program was implemented in the study setting in the form of ten sessions for small groups: four theoretical sessions about pressure ulcers and six practical sessions about preventive measures of pressure ulcers. This was intended to give more chance for discussions, interactions, and practical training. The total sample was divided into small groups (3 to 5 caregivers of elderly patients in each group). All groups

received the same content using the same teaching methods, media, discussions, and the same booklet. The length of each session was variable (30 to 45) minutes according to caregiver's responses and active participation, as well as time available, and content of each session. The fieldwork carried out within a period of ten months, starting from the beginning of June 2022 up to the end of March 2023. The researcher allocated 3 days weekly Sunday, Monday, and Wednesday from 9 am to 1 pm. This included the phases of assessment, planning, implementation, and evaluation of the program. Each session began with a summary of the information presented in the previous session and the goals of the new one, taking into account the use of straightforward language that suited the understanding level of the studied elderly patients' caregivers. During the session, motivational and reinforcement strategies like praise and acknowledgment were utilized to increase active involvement and promote learning. In addition to the booklet, the sessions were supported by the use of images, posters, and power point.

#### 2.5.4. Evaluation phase

The evaluation of the effectiveness of the training program (posttest) was done just after completion the program. These were done using the same data collection tools of the pre-test.

#### 2.6. Ethical Considerations

The study protocol was approved by the Research Ethics Committee at the Faculty of Nursing, Zagazig University. An informed consent for participation was taken verbally from each of the elderly subjects after fully explanation of the aim of the study. Participants were given the opportunity to refuse the participation, and they were notified that they could withdraw at any stage of the data collection interviews; also they were assured that the information would be confidential and used for the research purpose only. The researcher assured maintaining anonymity and confidentiality of subjects' data. The researcher phone number and all possible communicating methods identified to the participants to return at any time for any explanation.

#### 2.7. Statistical analysis

The collected data were organized, tabulated, and statistically analyzed using the Statistical Package for Social Sciences (SPSS) version 22. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables, and means, standard deviations, and medians for quantitative variables. Cronbach alpha coefficient was calculated to assess the reliability of the developed scales through their internal consistency. Quantitative continuous data were compared using the non-parametric Mann-Whitney or Kruskal-Wallis tests and paired t test. Qualitative categorical variables were compared using chi-square test. Whenever the expected values in one or more of the cells in a 2x2 tables was less than 5, Fisher exact test was used instead. Spearman rank correlation was used for assessment of the inter-relationships among quantitative variables and ranked ones. In order to identify the independent predictors of the scores of knowledge and practices of caregivers for preventing pressure ulcers among the elderly multiple linear regression analysis was used and analysis of variance for the full regression models was done. Statistical significance was considered at p-value <0.05.

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### 3. Results and discussion

#### 3.1. Results

##### • Demographic characteristics and medical history of the studied caregivers (N=60)

Table 1 reveals that the studied caregivers' age ranged between 25 and 66 years, with mean  $43.17 \pm 9.65$ , with more females (51.7%). In addition, 63.3%, 86.7% and 35.0% of the studied caregivers were living in rural area, married and illiterate respectively. As well, 66.7% of them were housewife. Concerning the monthly income, 60.0% of the studied caregivers had sufficient income. Also, 66.7% of the studied caregivers were sons of elderly. The same table also reveals 85.0% of the studied caregivers weren't having chronic diseases. Only 15.0% of them were having chronic diseases. Where, the most common diseases were hypertension (11.7%) and diabetes mellitus (8.3%).

##### • Demographic characteristics and medical history of the studied elderly (N=60)

Table 2 demonstrates that the studied elderly's age ranged between 60 and 85 years, with mean  $68.98 \pm 6.87$ . In addition, 60.0% of the studied elderly had hip joint replacement and 56.7% of them were staying in bed from month to 3 months and 93.3% of the studied elderly were living with family. Also, 75.0% of the studied elderly were having chronic diseases, the most commonly diseases were hypertension (55.0%) and diabetes (45.0%).

##### • Total mean score of Caregivers' knowledge of pressure ulcers pre –post training program

Table 3 demonstrates that there was highly statistically significant difference in total knowledge level of pressure ulcers among studied caregivers pre & post training program ( $p < 0.001$ ). Before program total knowledge mean score was  $9.07 \pm 5.32$  which increased to  $22.07 \pm 4.13$  at post program.

##### • Total mean score Caregivers' practice regarding Pressure Ulcer Prevention pre –post training program

Table 4 reveals that a statistically significant difference in total mean score of Caregivers' practice regarding Pressure Ulcer Prevention pre –post training program ( $p < 0.001$ ). Before the training program total mean score of Caregivers' practice were  $15.25 \pm 4.30$  which increased to  $37.17 \pm 4.41$  at the post training phase.

##### • Correlation between elderly' caregivers' knowledge and practice

Table 5 illustrates statistically the significant positive correlation between the caregivers' knowledge and the practice.

##### • Significant positive correlation with marital status and Best fitting multiple linear regression model for knowledge score

Table 6 illustrates that the educational level was the only a statistically significant independent positive predictors of knowledge score.

##### • Best fitting multiple linear regression model for practice score

Table 7 clarifies that the multivariate analysis identified the marital status and knowledge score were statistically significant independent positive predictors of practice score.

### 3.2. Discussion

The findings of the current study revealed that the majority of caregivers of elderly patients had inadequate knowledge about prevention of pressure ulcer pre the training program. This might be contributing to the majority of the studied caregivers were illiterate. These findings are in agreement with Mohammed et al. [2] in Emirate who found that an inadequate knowledge among caregivers about function and caring of skin and meaning of pressure ulcers pre- the training program. Another study in Egypt by Ibrahim & Abd El-Maksoud [13] revealed that the knowledge of caregivers is below the minimum acceptable level, i.e. >50% of caregivers had poor knowledge about PUs prevention before the training program. Similarly, Karimi et al. [14] in Iran found that family caregivers did not have sufficient knowledge about pressure ulcers. There were statistically significant improvements in caregiver's knowledge after implementation of the current study training program. This might be attributed to the current of the program, which focused on applied knowledge in simple, straightforward, understandable language with illustrations and aimed to address the studied caregivers needs and concerns. In the same stream, a study conducted by Bungsu et al. [15] in Brunei Darussalam showed that training program had better effect on caregivers' knowledge of pressure ulcers prevention.

These findings also are in agreement with Alhammadi & Ogale. [2] in Kuwaiti aimed to study the effectiveness of caregiver training program in the prevention of pressure injuries among the elderly, who reported that (74 %) of home caregivers had poor total knowledge percentage score at pre training program improved to 100% satisfactory total knowledge percentage score, post-training program with a statistically significant difference. In the same stream, a study conducted by Bungsu et al. [15] in Brunei Darussalam showed that training program had better effect on caregivers' knowledge of pressure ulcers prevention. These findings also are in agreement with Alhammadi & Ogale. [2] in Kuwaiti aimed to study effectiveness of caregiver training program in prevention of pressure injuries among elderly, who reported that (74 %) of the home caregivers had poor total knowledge percentage score at pre training program improved to 100% satisfactory total knowledge percentage score, post-training program with a statistically significant difference. In contrast with [7] in Indian who revealed that despite lack of extremes of very poor or very good pressure injury prevention knowledge, majority of home caregivers' knowledge was poor after implementation of training program.

In support of this, the same finding was revealed in multiple linear regression analysis, the educational level was the only a statistically significant independent positive predictors of knowledge score. Similarly, Farzan et al. [9] in Iran who found that Education level played a role in caregivers' knowledge of PUs prevention as well. 3

researches conducted in Iran, Nepal, and Egypt showed that caregivers' knowledge of PU prevention rises with higher educational attainment. This association may result from educated individuals' higher capacity to access knowledge from a variety of sources. Concerning Caregivers' practice toward Pressure Ulcer Prevention pre-training program, current study showed wide variation in Caregivers' practice regarding Pressure Ulcer Prevention before the program, where the total practice of studied caregivers for pressure ulcers prevention were poor.

This might be because caregivers were informal and had unsatisfactory knowledge about ways to prevent pressure ulcers, which subsequently influences the quality of care for bedridden elderly patients. In support of this, study results demonstrated statistically significant positive correlation between caregivers practice with educational level. Moreover, knowledge score were statistically significant independent positive predictors of practice score. The same finding was revealed in multiple linear progression analysis. This finding is congruent with a study conducted in UK by Lavallée et al [16] who reported that caregivers who provided care to the elderly patients was not of high quality. These results suggested that participants in this study need more training about care of elderly's condition to prevent pressure ulcers development. Similarly, Kohta et al. [17] in Japan found that level of practice of participants for caring elderly to prevent PU was low. Also, it is confirmed with Ingwu [18] in Nigeria who indicated that practice of studied sample for prevention of PUs was inadequate. This result is also supported by Hefnawy and Abd El-Monem [19] in Saudi Arabia and Awad [20] in Egypt proved that majority of their studied caregivers had unsatisfactory practices regarding PUs prevention and care before implementation of program.

Post implementation of the present study training program, there were highly statistically significant improvement in practice items. This can be explained by the effectiveness of post training program in achieving high level of caregivers practice to prevent pressure ulcers where PUs are easy to prevent by awareness of caregivers of the best practice of prevention and commitments to do it. As revealed in the present study findings, showed that most of caregivers were sons and lived with the elderly in same homes, and their ages ranged b/w (22-44 years). In addition, most of them were free from any medical illness. This might be due to family caregivers are first to provide patients [2] with care when they is living with elderly that can save time for them to provide care for elderly, also young age facilitate understanding and easy application of training program, which improved management and prevention of pressure ulcers. As long as caregivers are young, this may help in changing, turning, and caring for bedridden patients. Additionally most of them are women. This is better for application of program because females are closer to patients and more compliant to follow instructions of training program, so they are interested to train and provide proper care to elderly patients.

**Table (1):** Demographic characteristics and medical history of the studied caregivers (N=60)

| Demographic characteristics   | (n=60)                   |  |
|---|--------------------------|--|
|   | Frequency                | Percent  |
| <b>Age group: /year</b><br>25- 44<br>45- 66<br><br><b>Mean ± SD</b><br><b>(range)</b>   | 32<br>28                 | 53.3<br>46.7<br><br><b>43.17± 9.65</b><br><b>(25 – 66)</b> |
| <b>Gender:</b><br>Male<br>Female  | 29<br>31                 | 48.3<br>51.7   |
| <b>Residence:</b><br>Rural<br>Urban   | 38<br>22                 | 63.3<br>36.7   |
| <b>Education:</b><br>Not read & write<br>Read & write<br>Basic education<br>Intermediate education<br>University / postgraduate | 21<br>12<br>7<br>14<br>6 | 35.0<br>20.0<br>11.7<br>23.3<br>10.0                       |
| <b>Marital status:</b><br>Married<br>Unmarried [Widow/ divorced single]   | 52<br>8                  | 86.7<br>13.3   |
| <b>Relative degree to elderly:</b><br>Spouse<br>Sons<br>Others  | 11<br>40<br>9            | 18.3<br>66.7<br>15.0                                       |
| <b>Have chronic diseases:</b><br><b>Types of chronic diseases:@</b><br>HTN<br>DM  | 9<br>7<br>5              | 15.0<br>11.7<br>8.3  |

@ Not mutually exclusive

**Table (2):** Demographic characteristics and medical history of the studied elderly (N=60)

| Demographic characteristics  | (n=60)             |   |
|--|--------------------|---|
|  | Frequency          | Percent   |
| <b>Age group: /year</b><br>60-<br>70-85<br><br><b>Mean ± SD</b><br><b>(range)</b>                            | 35<br>25           | 58.3<br>41.7<br><br><b>68.98 ± 6.87</b><br><b>(60 – 85)</b> |
| <b>Diagnosis:</b><br>Hip joint replacement<br>Installing slats and screws<br>Pelvic joint replacement        | 36<br>11<br>13     | 60.0<br>18.3<br>21.7  |
| <b>Staying in bed:</b><br>Less than 30 days<br>Month – 3 months<br>4 months – 6 months<br>More than 6 months | 5<br>34<br>14<br>7 | 8.3<br>56.7<br>23.3<br>11.7                                 |
| <b>Living with whom:</b><br>Alone<br>With family   | 4<br>56            | 6.7<br>93.3   |
| <b>Have chronic diseases:</b><br><b>Types of chronic diseases:@</b><br>HTN<br>DM                             | 45<br>33<br>27     | 75.0<br>55.0<br>45.0  |

@ Not mutually exclusive

**Table (3):** Caregivers’ knowledge of pressure ulcers pre –post training program

| Total Knowledge                   | Pre (n=60)  |      | Post (n=60) |      | Friedman Test        | (p-value)        |
|-----------------------------------|-------------|------|-------------|------|----------------------|------------------|
|                                   | No          | %    | No          | %    |                      |                  |
| <b>Total Knowledge level:</b>     |             |      |             |      |                      |                  |
| Adequate (Above 75%)              | 0           | 0.0  | 26          | 43.3 | 60.00                | <0.001**         |
| Moderate (50 ± 75%)               | 10          | 16.7 | 34          | 56.7 |                      |                  |
| Inadequate (Below 50%)            | 50          | 83.3 | 0           | 0.0  |                      |                  |
| <b>Total Knowledge mean score</b> | <b>Pre</b>  |      | <b>Post</b> |      | <b>Paired t-test</b> | <b>(p-value)</b> |
| <b>M ± SD</b>                     | 9.07 ± 5.32 |      | 22.07±4.13  |      | 44.22                | <0.001**         |

\*: Significant

\*\*: Highly significant

**Table (4):** Caregivers’ practice regarding Pressure Ulcer Prevention pre –post training program

| Practice items                  | Pre (n=60)   | Post (n=60)  | Paired t-test | (p-value) |
|---------------------------------|--------------|--------------|---------------|-----------|
|                                 | M ± SD       | M ± SD       |               |           |
| <b>Skin care practice</b>       | 8.53 ± 2.27  | 15.45 ± 1.65 | 24.57         | <0.001**  |
| <b>Skin protection practice</b> | 4.23 ± 2.49  | 16.17 ± 2.42 | 32.08         | <0.001**  |
| <b>Healthy nutrition</b>        | 2.48 ± 0.93  | 5.55 ± 1.17  | 19.94         | <0.001**  |
| <b>Total mean score</b>         | 15.25 ± 4.30 | 37.17 ± 4.41 | 37.85         | <0.001**  |

**Table (5):** Correlation between caregivers’ knowledge and practice.

| Scores           | Knowledge | Practice |
|------------------|-----------|----------|
| <b>Knowledge</b> |           |          |
| <b>Practice</b>  | .591**    |          |

R: Pearson's correlation coefficient

(\*) statistically significant at p<0.05

(\*\*) statistically significant at p<0.01

**Table (6):** Best fitting multiple linear regression model for knowledge score

| Model           | Unstandardized Coefficients |            | Standardized Coefficients | T      | Sig. | 95.0% Confidence Interval for B |             |
|-----------------|-----------------------------|------------|---------------------------|--------|------|---------------------------------|-------------|
|                 | B                           | Std. Error | Beta                      |        |      | Lower Bound                     | Upper Bound |
| 1 (Constant)    | 1.683                       | .227       |                           | 7.422  | .000 | 1.228                           | 2.137       |
| Age             | -.061                       | .092       | -.061                     | -.658  | .513 | -.246                           | .124        |
| Setting         | .181                        | .101       | .176                      | 1.795  | .078 | -.021                           | .383        |
| Marital status  | -.202                       | .131       | -.138                     | -1.541 | .129 | -.464                           | .061        |
| Education level | .225                        | .039       | .645                      | 5.836  | .000 | .148                            | .302        |
| Monthly income  | .150                        | .094       | .163                      | 1.601  | .115 | -.038                           | .339        |

R-square=0.67 Model ANOVA

F=24.78 p<0.05

**Table (7):** Best fitting multiple linear regression model for practice score

| Model           | Unstandardized Coefficients |            | Standardized Coefficients | t      | Sig. | 95.0% Confidence Interval for B |             |
|-----------------|-----------------------------|------------|---------------------------|--------|------|---------------------------------|-------------|
|                 | B                           | Std. Error | Beta                      |        |      | Lower Bound                     | Upper Bound |
| 1 (Constant)    | .441                        | .179       |                           | 2.459  | .017 | .081                            | .800        |
| Age             | .063                        | .061       | .145                      | 1.038  | .304 | -.059                           | .185        |
| Setting         | -.041                       | .065       | -.092                     | -.632  | .530 | -.173                           | .090        |
| Marital status  | .252                        | .085       | .393                      | 2.969  | .005 | .082                            | .423        |
| Education level | -.002                       | .031       | -.013                     | -.064  | .949 | -.064                           | .060        |
| Monthly income  | -.096                       | .062       | -.236                     | -1.534 | .131 | -.220                           | .029        |
| Knowledge score | .310                        | .091       | .531                      | 3.415  | .001 | .128                            | .493        |

R-square=0.38

Model ANOVA

F=4.60

p&lt;0.05

This finding goes in line with Tharu et al. [21] in Bangladesh who found that the gender, educational level, and caregiver-patient relationship were significantly impacted by the elderly caregivers' practice and revealed that more than three quarter of the elderly caregivers lived in the same house with elderly patients. Similarly, with Njau et al. [22] in Kenya demonstrated relationship b/w caregiver and the patient, all of them had a blood relationship, where majority were granddaughters of the patients. As well as , the findings of the current study is go line with Alhammadi, &Ogale [2] in Emirates who studied effectiveness of home caregivers teaching program on prevention of pressure ulcer in bed ridden elderly patients . They found that the more than half of elderly caregivers in the age of 21 to 41. In congruence with this, Abd El-Maksoud & Ibrahim [13]in Egypt who found 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. Also the study of Chiprasert et al. [23] in Bangkok clarified improved practices of caregivers after receiving the program about PU prevention. Moreover, Awad & Hewi [20] In Egypt 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.

Also similarly, Sabaq & Mohamed [24] discovered a highly statistically significant improvement in caregivers practice with most risk assessment, skin inspection and nutrition items after program intervention. These results agree with those of Awali et al. [25] in Saudi Arabia they claimed that caregivers' level of practice in the following areas considerably increased following the implementation of an training intervention concerning PU prevention. Regarding the correlation between the studied caregivers' knowledge and practice level, result showed a statistically significant positive correlation between total caregivers' knowledge and practice in the post program implementation. This finding suggested that the practice may be quickly enhanced, especially if it were connected to an appropriate source of scientific knowledge. This finding was congruent with Sabaq & Mohamed [24] in Egypt who reported similar outcomes in their studies. Also it is confirmed with Mohammed et al. [26] in Egypt who showed that there was a positive correlation and highly significant between the studied elderly caregivers knowledge and practice toward

pressure ulcer. This may be due to elderly caregivers practice depended on the level of knowledge. For example, if the elderly caregiver's knowledge level was unsatisfactory, the practice level will be inadequate too. This was in same line with Lee & Lee. [27] in Korea who revealed that pressure ulcer prevention related care performance was found to have a significant and positive correlation with pressure ulcer-prevention-related knowledge.

#### 4. Conclusions

The study findings were concluded that pre the training program, the studied caregivers had inadequate knowledge and poor practice regarding pressure ulcers prevention among bedridden elderly patients. The applied training program is effective in improving studied caregivers knowledge and practices regarding the pressure ulcers prevention. Additionally the educational level was statistically significant independent positive predictors of knowledge score of caregivers, where the caregivers had high level of education had improvement in knowledge toward prevention of pressure ulcers. Also, there were statistically significant independent positive predictors between knowledge score and practice score.

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#### Declaration of Conflicting Interests

The Author(s) declare(s) that there is no conflict of interest.

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