

## Guidelines for Fall Prevention among Elderly People and Their Informal Caregivers

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**Abstract** More than one in three people aged 65 years or older fall each year. Between 20% and 30% of those who fall suffer injuries that reduce mobility or hip fracture, and independence and increase the risk of premature death. **The study aimed to** evaluate the effect of guidelines for fall prevention among elderly people and their informal caregivers. **Design:** A quasi-experimental study design was used. **Setting:** The study was conducted at outpatient clinics of Kobry Elkobba Military Hospital. **Sample:** All targeted elderly aged 65 years old or older in the selected outpatient clinics, with a total number of 110 elderly and their informal caregivers. **Tools:** Data were collected by using: Tool I: A structured questionnaire about: A) Demographic characteristics of elderly. B) Elderly medical history of chronic diseases C) Prescribed medications and use of walking aids, prior history of falls, and falls-related injuries D) Elderly knowledge regarding the risk of falls, 2) Fall prevention home assessment chart 3) Barthel Index; functional evaluation tool to assess independent activity. Tool 4: Observational sheet of Timed (Up and Go) test, to examine balance of frail elderly and gait speed. **Results:** The study revealed that, before implementation of the guidelines, 34.5% of the studied elderly had a total correct knowledge score level as regards risk factors of falls of the elderly, which increased to 96.4% after implementing the guidelines, the differences observed were statistically highly significant ( $X^2 = 92.953$  at  $P < 0.001$ ). Meanwhile, 40% of their informal caregivers had a total correct knowledge score level in pre-guideline implementation, regarding risk factors of falls of the elderly, which increased to 93.3% after implementing the guidelines, the differences observed were statistically highly significant ( $X^2 = 92.953P$  at  $P < 0.001$ ). **Conclusion:** The study findings indicated poor knowledge of the elderly people and their informal caregivers related to prevention and the risk of falling in pre-guidelines, while it improved after implementation of the guidelines. **Recommendation:** The study recommended health educational programs for the elderly and their informal caregivers related to elderly fall prevention.

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**Keywords:** Elderly, fall prevention, home environment, risk factors for fall.

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### Introduction

A fall is usually defined as “an unexpected event in which the participant comes to rest on the ground, floor, or lower level (WHO 2019), falls are a common cause of accidents. Every year more than one in three people aged 65 years or older fall, between 20% and 30% of those who fall suffer

injuries that impair mobility, and independence and raise the risk of premature death (Ibrahim et al, 2017). The major underlying causes for fall-related hospital admission are fracture of the hip, traumatic brain injuries and upper limb injuries, in addition, falls may also cause a post-fall syndrome that will further restrict activities of daily living and cause

immobilization, dependence, and loss of autonomy, confusion, and depression, which will lead to a further restriction in dependence activities (**American Nurse Today, 2019**).

The risk factors of falling and fall-related health problems rise with age, aging is associated with changes, risk factors can be divided into four categories: socioeconomic, behavioral, environmental, and biological (**WHO 2019**). Age, gender, and ethnicity are examples of non-modifiable biological risk variables. These are also associated with changes due to aging such as diminished physical, cognitive and affective ability, gait, balance, and increased inactivity, reduced muscle strength or reduced muscle mass (**Mohamed et al., 2019**), and chronic illnesses including medical conditions as; eyesight, hearing, and. Diabetes, heart or blood vessels disease, or problems with the thyroid, balance problems as reflexes, gait, nerves and feet, problems, or confusion can affect balance (**American Nurse today, 2019**). While cognitive impairments are widely recognized as a risk factor for falls in the elderly, additional risk factors can be altered through behavioral modifications (**Stevens and Am, 2019**).

These include taking multiple medications, some of which may cause dizziness or sleepiness, excessive alcohol consumption, personal risk factors, unsafe footwear such as high heels or backless shoes, and inappropriate walking aids or assistive devices (**Bergen et al., 2016**). The surrounding environment, including home hazards, is not itself a reason for falls but is caused by the interaction of other factors and their exposure to environmental factors. These include narrow, poor lighting, clutter, areas of disrepair, loose carpets, slippery surfaces of stairs, and lack of safety equipment (**Centers for Disease Control and Prevention, 2020**). Socioeconomic risk factors are those related to the impact of social conditions and the individual financial circumstances as well as the ability of the community to challenge them, including low income, low education, poor housing, lack of social connection, limitation to health and

social care access especially in rural areas, and lack of community resources (**Bergen et al., 2016**).

The main goals of fall prevention guidelines focus on identifying elderly risk factors for falling and assessing the elderly to determine if the elderly is more vulnerable to fall risk and implementing interventions to reduce these risk factors (**Gale et al., 2016**). The key points of modifiable risk factors for falls include factors affecting difficulty with walking and balance, muscle weakness, hazards in the home environment (i.e., clutter, inappropriate handrails, insufficient lighting), visual problems, medication taken, and orthostatic hypotension (**Guilherme et al., 2017**).

Sixty percent of care in the European Union (EU) is given by unpaid carers. Informal caring encompasses both direct caregiving and aid with everyday tasks spouses, family members, and adult children and in-laws adults tend to be the informal caregivers of older (**Stevens and Am, 2019**). These caregivers often are unique by providing accurate information besides playing a vital role in their beloved care and fall hazard prevention, because of their position to negotiate, engage, and encourage older people to participate in fall risk prevention plans, besides achieving fall prevention targets, as family caregivers are active participants in helping their beloved ones for falls prevention (**Mohamed et al., 2019**).

Guidelines are a vehicle to translate healthcare knowledge and outcomes of research into a user-friendly format and help to plan actions or to form an opinion about something, providing care recommendations that are compiled from a systematic review of evidence and data to maximize patient care (**Gale et al., 2016**).

Nurses' top priority is the safety of their elderly patients, fall prevention may be most effective when learning takes place close to daily life situations and daily living activities of the older adults, and successful in sites where older adults participate in activities (**Ganz and Latham, 2020**).

Health education is a resource by which knowledge is scientifically created in the gerontological nursing field undeniably relevant to the social practice of nursing in the framework of practice between old adults and healthcare mediators, it is a resource through which knowledge scientifically produced in the health field, mediated by healthcare professionals, affects the daily lives of the elderly (Gale et al., 2016).

### Significance of the study

Falls threaten the independence and quality of life of elderly people, about 59% of the world's elderly live in developing countries. Every year, almost one-third of people over 65 years are exposed to falls, and that number jumps to 50% by the time they're 80 years old (Gale et al., 2016). The Egyptian Central Agency for Public Mobilization and Statistics (CAPMAS) reports that fractures and falls account for around 55% of incidents involving elderly home residents in Egypt (Mohamed et al, 2019). As a result of elderly falls, hip fractures, or brain traumas from unintentional injury, are the primary cause of death for adults in this age group, accounting for 36,000 deaths, emergencies, and lengthy hospital stays, in addition to the financial expenses associated with falls in this population are significant and rising globally (Centers for Disease Control and Prevention, 2020).

### Aim of the study:

This study aimed to evaluate the effect of guidelines for fall prevention among elderly people and their informal caregivers through:

- Assessing patients and their informal caregivers' knowledge about fall prevention and fall hazards to detect their needs.
- Designing and implementing guidelines for fall prevention for elderly people and their informal caregivers.
- Evaluating the elderly and their informal caregivers after implementation of the guidelines related to their knowledge of falling prevention for elderly people.

### Research hypothesis:

Guidelines for fall prevention of elderly people and their informal caregivers will positively affect their knowledge related to elderly fall prevention.

### Subjects and Methods

**Design:** A quasi-experimental study design was used.

### Setting:

The present study was carried out at the outpatient clinics of Kobry Elkobba Military Hospital, where the administrators were very cooperative and there was the availability of facilities for data show, the hospital is affiliated to the Armed Forces, located in Cairo Governorate, medical services are provided to military personnel, their family members, and civilian patients.

### Sample:

A convenience sample of elderly patients.

### Sample size:

All the elderly patients who came to the outpatients' medicine clinic for one week, with the inclusion and exclusion criteria and agreed to participate in the study with a total number of 110 patients and their informal caregivers with a total number of 30, who were attending the outpatient clinic with the elderly, and who voluntary accepted to participate in the research after explaining the purpose of the study.

### Inclusion criteria of the participants elderly:

Elderly patients from both sexes included all targeted elderly who attended the medicine clinic and planned to visit the clinic monthly for follow-up or monthly medication over one week or had arranged counseling visits and were aged 65 and above.

### Exclusion criteria of the participants elderly:

Elderly with Parkinson's disease or cognitively intact and loss of vision.

### Inclusion criteria of the participants' caregivers:

Caregivers with a total number of 30, who were

attending the outpatient clinic with the elderly, and came with them (any relative, partner, friend or neighbor who has a significant personal relationship with and provides a broad range of assistance for the elderly).

#### **Data collection tools:**

Data were collected by the researcher using two tools:

#### **I. The first tool: A structured interviewing Questionnaire to collect data related to:**

**A-1. Demographic characteristics of the studied caregivers,** such as age, gender, educational level, and whether living with the elderly or not, it was developed by the researcher based on the review of recent literature, and experts' opinions.

**A-2. Reported health status of the studied caregivers,** categorized into fair and poor.

**B. Demographic characteristics of the studied elderly,** such as age, gender, educational level, and job, it was developed by the researcher based on the review of recent literature, and experts' opinions.

**C. Elderly's medical history,** included chronic illnesses (e.g., hypertension, diabetes mellitus, cardiovascular diseases, gastrointestinal disorders, psychiatric illness), bowel and bladder complaints, prescribed medications, such as antipsychotics, antidepressants, and sedative-hypnotics; the use of walking aids, history of falls, and injuries caused by falls.

**D. Falls risk self-assessment checklist:** To determine if the elderly are at risk for falls, (e.g. using a walker, feeling unsteady during walking, needing help to stand up, worried about falling, and feeling sad or depressed). This checklist was developed by The Greater Los Angeles Geriatric Research Education Clinical Center it is a validated fall risk self-assessment tool for the elderly (**Rubenstein et al. 2011**), and it was adopted by the Centers for Disease Control and Prevention, (2020).

#### **Scoring system:**

One point is given for every (Yes) response and two points for (no), for the two first questions,  $\geq 4$  points is considered at risk of falling. If the score  $< 4$ , ask if the patient fell in the past year (if Yes patient is at risk).

**E. Elderly and informal care giver's knowledge regarding** the risk of falls and risk factors of falls, it includes Yes/ No questions, with a total score of 23 grades. The instrument was designed by identifying published risks for falls through a literature search of Medline, and CINAHL, by developing multiple-choice questions to assess knowledge of select characteristics as possible risks for falling and it was adapted by the researchers based on the review of recent literature, and experts' opinions (**Sadowski, 2006**).

#### **Scoring system:**

One grade was given for a correct answer and zero for an incorrect one. Knowledge  $\geq 75\%$  is considered satisfied knowledge while  $< 75\%$  is considered unsatisfied knowledge.

#### **II. Fall prevention home assessment chart:**

Adopted from (The Minnesota Safety Council Fall Prevention, **2004**), to assess home environmental hazards, it includes bathroom, bedroom, outside, kitchen, living area, lighting, stairs, thresholds, corridors, floors, carpets, furniture, and availability of handrails at home, excluded were questions not relevant to the environmental conditions of the community, (e.g. snow).

#### **Scoring system:**

Any "No" answers indicate a need for home environment improvement regarding this point.

**III. Barthel Index (BI):** It is a functional evaluation tool to assess a client's level of independent activity. Adapted from **Mahoney and Barthel, (1965)**, it consists of 10 items related to the ability of the client to feed him- or herself, bathe, groom, dress, bowel and bladder management, the ability to use the toilet, ability to transfer, mobility, and ability to use stairs.

**Scoring system:**

Clients receive numerical scores based on whether they require physical assistance to perform the task or can complete it independently. Scores from (0–100) and a score of 0 - 20 suggests total dependence, 21- 60 severe dependence, 61-90 moderate dependence, 91 - 95 slight dependence, and more than 95 totally independent.

**IV. Observational timed (Up and Go) test for balance assessment of frail elderly and gait speed,**

this test is used in geriatric medicine to examine the balance, walking speed, and functional ability required for the elderly to perform basic daily living activities. It was adapted from **Podsiadlo & Richardson, (1991)** and **(Bohannon, 2006)**, it is a simple test of observing a person stand up from a chair (without the use of arms), walk 10 feet, turn around, walk back, and sit down again. The participants were allowed to use a gait assistance device.

**Scoring system:**

A normal person takes < 10 seconds when timed, > 16 seconds is considered positive and > 20 seconds is at risk of falls outside homes.

**Pilot study**

A Pilot study was done on 10 % of the study sample (11 elderly), who were interviewed face-to-face; to examine the applicability of the study tools and test the suitability and feasibility of the setting, those who participated in the pilot study were excluded from the main study sample.

**Validity of study tools:**

The content validity was tested by a jury of 3 professor's experts in the field of Community Nursing and Geriatric Nursing to ascertain that the tools were relevant, understood, and applicable; accordingly, minor modifications were carried out.

**Tool's reliability:**

The coefficient of reliability was measured by Cronbach's  $\alpha$  (alpha). Cronbach alphas were calculated for the overall tested items of the studied elderly including total knowledge and total level of performance. Furthermore, a reliability test was

conducted on the domain of knowledge and was 0.089.

**Ethical considerations:**

Each elderly were informed about the purpose and the benefits of the study then an oral agreement was obtained before starting data collection. Strict confidentiality was ensured through the study process, and they were informed about their right to refuse or withdraw at any time without giving any reason.

**Fieldwork:**

After official permission to carry out the study was obtained from the responsible personnel, the researchers interviewed the elderly and their informal caregivers in the waiting area of the clinic and distributed to them the tools questionnaires after explaining the aim of the research.

Data collection for this study was carried out within three months; the actual fieldwork was carried out from the beginning of June 2019 to the end of August 2019. According to the schedule of the Medicine Clinic, three days/week, from 8, 00 a.m. to 3, 00 p.m. after taking their oral agreement.

**The guidelines construction was designed through 3 phases:**

The preparatory phase was carried out, reviewing of the past and current available literature was done relevant to the various theoretical aspects of the problem by using books, articles, periodicals, and magazines.

**The first phase: Planning phase**

guidelines were developed for all the elderly, and their caregivers with:

**The general objective:** To improve the elderly and informal caregivers' knowledge as regards fall prevention, to prevent falls and to minimize the risk of future falls and morbidity from falls.

**The specific objectives:** At the end of the delivery of the guidelines the elderly and their informal caregivers should be able to:

- Discuss the importance of fall prevention among the elderly.
- Determine and assess the extrinsic and intrinsic risk factors that may contribute to falls in the elderly home environment.

- Evaluate the danger of falls in his or her home environment to lower risk factors.
- Empower the elderly and their informal caregivers with the knowledge and resources necessary to maintain elderly balance.
- Encourage the elderly to strengthen muscles and balance exercises to reduce the chance of falls.
- Provide elderly people and informal caregivers with the knowledge to get adapted clothing and footwear to ensure that they fit well and reduce the risk of falling.

**The content:** It was divided into a theoretical session and a practical session and revised and modified based on the related literature.

**Theoretical session:** It includes the importance of elderly fall prevention, knowledge about the causes and risk factors of falls, the personal factors that increase the risk of falls and modifiable risk factors, intrinsic factors for falls (balance, neurology, etc.) extrinsic factors or reversible and nonreversible, and how to protect the elderly from fall healthy lifestyle, the importance of appropriate clothing, footwear and walking aids and behavioral modification, use of medications, medication review and management having a professional (i.e., physician/pharmacist) review medications that affect balance and help manage medications to prevent falls the importance of periodic medical checkups for early screening, and action taken after fall, periodic medical checkups for ears, vision and balance problems. Home assessment and safety improvement: assessing and modifying the home or having someone come into the home to demonstrate ways to protect against falling, modifying the home environment, and promoting a safe home environment.

**Practical sessions:** For only the elderly who can stand on their own feet without support from others, balance exercises, strength training, and walking exercise builds leg strength and to build strength and improve balance and body mechanics.

**Teaching methods and media:** Group discussion and role play were used as a teaching method, and video film and lecture presentation hands-on sessions, group discussions, teaching and

presentations were used by the researcher as teaching media. The researcher designed a booklet in Arabic language, including exercises. It was given to each elderly to guide and enrich his/her memory, besides the content of the booklet and all the teaching media was sent to the participants via WhatsApp.

**The assessment phase:** Where the pre-guidelines, and application questions were given to the elderly and an assessment of the elderly performance was performed through observation done by the researcher in the nurses' office to ensure elderly privacy. Assessment of elderly performance of (Up and Go) test by assesses the number of seconds needed for an individual to stand up from a chair, walk 3 meters, turn around, walk back to the chair, and sit down again with the back against the chair, Participants were instructed to walk at a normal pace with or without their walking aid.

**The second phase: The implementation phase:** The theoretical session of the guidelines was delivered to all the elderly patients in the waiting room of the clinic, where there is a data show screen, in the early morning before the physicians start the patients' examination, and if any elderly patient came late, the researcher had to deliver the guidelines individually for him by using the laptop. The practical session and assessment of elderly performance of (Up and Go) test was performed through observation done by the researcher in the nurses' office to ensure elderly privacy.

**The third phase: the evaluation phase** was achieved by reassessment of the elderly and their informal caregivers' knowledge by using the same pre-test tools after the delivery of the guidelines, it was done individually for each elderly patient and his caregiver after scheduling them according to their next visit to the medicine clinic or the date of elderly receiving monthly treatment or their counseling visit, this arranged by taking the elderly phone number.

**Statistical Design:**

Data were statistically analyzed using the (SPSS) Statistical Package for the Social Sciences version 9, computer program. Description of qualitative variables was done in the form of

frequency and percentage and for quantitative variables as mean and standard deviation. Differences between variables were done using Chi-square.

## Results

Results obtained from the present study are summarized as follows:

**Concerning Demographic characteristics of the studied caregivers, Table (1)** shows that; the highest percent of the caregivers were females (83.3%) with a mean age of  $54 \pm 3.8$ , concerning educational level; 43.3% of the studied caregivers graduated from the university and no one was illiterate and 93.3% of the caregivers under the study lived with the elderly.

Concerning the relationship of the caregivers for the elderly under the study, 58% of the caregivers were the wife and 30% of them were sons or daughters **Figure (1)**.

**Table (2-A)** shows that; the highest percent of the elderly was male (97.3%) with a mean age of  $72.27 \pm 3.47$ . Concerning educational level; 54.6% of the studied elderly graduated from the university and no one is illiterate. Concerning the current health problems, **Table (2-B)**, reveals that; 78.2% and 74.5% of the elderly have osteoarthritis and weak eyesight; while 72.7%, 68.2 % and 66.4 % of the elderly (respectively), were suffering from hypertension, sleep disorders and cardiovascular diseases (respectively). Meanwhile, 58.2% complain of bowel and bladder problems, and concerning mobility, **(Table 2-C)**, clarifies that 55.5% of the studied elderly are using walking aids.

Regarding prescribed medications of the elderly **Table (3)**, reveals that 73.6% of the elderly are taking laxatives while 52.7% are taking diuretics and 30.9% are taking beta blockers and/or sedatives and hypnotics. In addition, 55.5% of them take from 5 to 8 medications per day, with a mean number of medications of  $6.25 \pm 2.08$  per day.

**Table (4):** It is noticed from the table that 10.9% of the studied elderly have a prior history of falls in the last 12 months, 54.5% of them had

repeated fall experience more than twice, within the past 12 months with a mean of  $0.15 \pm 0.49$ . As regards the effects of falls on them, 45.5% of the studied elderly suffered from fall-related injuries in the form of strains (45.5%) an equal percentage for fractures and lacerations (18.8%). The head was the most part of the body that was affected (45.5%) due to their falling.

**Table (5): As regards risk factors of falls as reported by the elderly**, it is observed from the table that, 68.2% of the studied elderly have reported that they sometimes feel unsteady when they are walking, 55.5% have been advised to use, a cane or walker to get around safely, 52.7% had reported that they often have to rush to the toilet, and 30.9% of them are worried about falling and being hurt.

**(Table 6) Regarding elderly self-reported assessment of home environments of fall risk hazards**, reveals that 92.7% and 64.4% of the elderly reported that; there are obstacles on the walkways and there are cracks or buckles on the sidewalks or driveway outside the house as well 70.9% reported that, there are no walkways.

**Concerning safety in the bathroom**, an equal percentage of 73.6% and 92.7% of the elderly reported that there are no grab bars near the toilet or in the shower and bathtub; in addition, the elderly cannot reach soap in the shower without bending down or turning too far around, and they have not a raised toilet seat if they have difficulty in standing up or sitting down **(Table 6)**.

**As regards the bedroom environment** 97.3% reported that cords are not pushed back against the wall, while 64.5% mentioned that there is clutter on the floor, and 70.9% stated that floor covering is not secured or steady **(Table 6)**.

**Concerning living area**, and as reported by 98.2% of the elderly revealed that; floor coverings are not secure or sturdy. An equal percentage of 98.2% of the elderly stated that they cannot turn on a light without having to walk into a dark room **(Table 6)**.

**Concerning the safety of fall hazards in the kitchen**, 66.4% and 64.5% of the elderly clarified that they could get regularly used items without bending down or reaching up too far and have secured throw rugs, and mats floor, respectively.

**Figure (2) Concerning assessment of the elderly according to their level of independence in performing activities of daily living**, it is observed from the figure that; no one of the elderly under study is totally dependent or moderately dependent and most of them (91.8%) are independent as regards performing activities of daily living, and only 8.2% are slightly dependent and need assistance in doing their activities of daily living.

**Table (7): Clarifies that concerning observational timed Up and Go test for assessment of elderly balance and gait speed**, and functional ability required for the performance of basic activities of daily living in elderly, 74.5% of the elderly under the current study, take more than, 20 seconds in performing the test, which indicated that they are at risk of falls outside their homes with a mean of  $20.17 \pm 2.027$  seconds.

Regarding the studied elderly correct knowledge related to fall and fall risk factors, concerning that (the risk of falling increases with age) it was 34.5% pre-implementation of the guidelines this percentage increased to 82.70 % after implementation of the guidelines, this difference in improvement was highly statistically significant ( $X^2=52.64$ , at  $P < 0.001$ ) (**Table 8**).

**Concerning the elderly correct knowledge regarding medical problems as intrinsic risk factors that may increase an older adult's chance of falling**, as well, (**Table 8**) reveals that there were significant differences between studied elderly knowledge-related balance problems, feeling dizzy, limping or difficulty walking and weak legs pre-implementation of the guidelines (52.7%, 52.7%, 73.6% and 49.1%) respectively, these percentages increased to be (94.5%, 98.2%, 96.4% and 92.7% after implementation of the guidelines, these

differences in improvement were highly statistically significant ( $X^2=49.544$ , 61.357, 22.282 and 50.769 respectively, at  $P < 0.001$ ).

**Concerning the elderly's knowledge regarding intrinsic risk factors of falls**, there were highly statistically significant differences between the studied elderly correct knowledge that standing suddenly, being sick with a cold, feeling tired or fatigued and having health problems like Alzheimer's may increase the likelihood of an older adult falling, pre-implementation of the guidelines 52.7%, 64.4%, 70.9% and 52.7% respectively, these percentages increased to 92.7%, 92.7%, 96.4% and 97.3% respectively, after implementation of the guidelines. These differences in improvement were statistically highly significant ( $X^2 = 44.36$ , 26.00, 17.60 & 58.20 respectively, at  $P < 0.001$ ) (**Table 8**).

**As regards the elderly correct knowledge regarding medications which may increase risk factors of falls**, there were highly statistically significant differences between studied elderly correct knowledge related to medications, which treat anxiety, diuretics, and a number of medications pre-implementation of the guidelines, 66.4%, 64.4%, and 31.8%, respectively, these percentages increased to be 96.4% 98.2% and 98.2% respectively, after implementation of the guidelines, these differences in improvement were statistically highly significant ( $X^2 = 32.64$ , 41.03 & 106.47 respectively, at  $P < 0.001$ ), (**Table 8**).

**Concerning elderly knowledge about other risk factors of fall**, 21.8% and 61.8% of the elderly their knowledge was correct about being concerned about falling and/or alcohol consumption may increase the likelihood of an older adult falling, 61.8% their knowledge was correct as regards difficulties in controlling bladder or bowels may lead to falls, pre-implementation of the guidelines, 34.5% of the elderly agree that older adults are more likely to fall than younger adults, these percentages increased to (97.3%, 93.6%, 93.6% & 82.7% respectively, after implementation of the guidelines, these differences in improvement were statistically



highly significant ( $X^2 = 129.99, 59.10, 59.10$  &  $52.643$ ) respectively, at  $P < 0.001$ ).

**Figure (2):** Illustrates that, in pre-guidelines implementation, 34.5% of the studied elderly had a total correct knowledge score level regarding hazards that increase the risk factors of falls of the elderly which increased to 96.4% after implementing the guidelines, the differences observed were statistically highly significant ( $X^2 = 92.95$  at  $P < 0.001$ ).

**According to the research hypothesis, (Table 9),** indicates a statistically significant difference between studied informal caregivers' correct knowledge related to fall and fall risk hazards, where the informal caregivers' correct knowledge concerning the risk of falling increases with age, being concerned about falling may increase the likelihood of an older adult falling and standing suddenly, these represented 33.3%, 20% and 30% pre-implementation of the guidelines those percentages increased to 96.6%, 90% and 93.3% after implementation of the guidelines, these difference in improvement was statistically highly significant ( $X^2 = 26.44, 29.697$  &  $25.452$  at  $P < 0.001$ ).

Concerning informal caregivers' correct knowledge regarding medications as risk hazards that may increase an older adult's chance of falling, **Table 8,** clarified that there were highly significant differences between the studied informal caregivers' knowledge related to taking more than one medication, anti-anxiety or tranquilizer and diuretics or antihypertensive pre-implementation of the guidelines (16.6%, 36.6% & 23.3%) respectively, which increased to 86.6%, 93.3% and 93.3% respectively, after implementation of the guideline. These differences in improvement were statistically highly significant ( $X^2 = 29.43, 21.17$  &  $30.240$  respectively, at  $P < 0.001$ ).

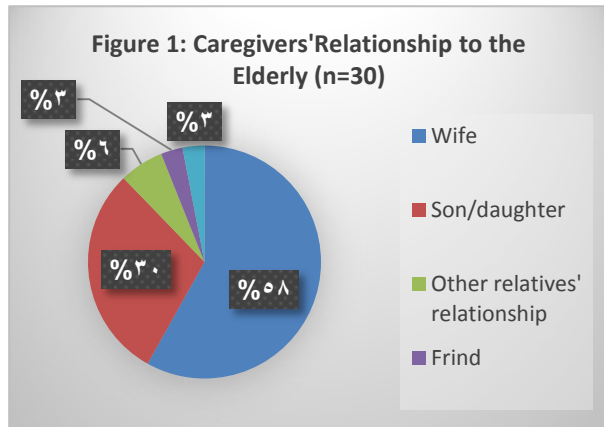
**Concerning informal caregivers' knowledge** that some medical conditions may increase the elderly chance of falling, **Table 9,** also explains that there were significant differences between the studied informal caregivers' correct

knowledge related to being deaf or having ear problems, having a stroke, difficulty controlling bladder or bowel and being sick with a cold which may lead to falls pre-implementation of the guidelines (26.6%, 26.6%, 26.6% & 36.6% respectively). These percentages increased to be, 93.3%, 90%, 96.6% & 90% respectively after the implementation of the guidelines. These differences in improvement were highly statistically significant ( $X^2 = 27.77, 32.41, 31.09$  &  $18.37$ , respectively, at  $P < 0.001$ ). As well there were highly statistically significant differences between the studied informal caregivers' correct knowledge related health problems like Alzheimer's and balance problems as risk factors of falls, where they were 16.6% and 40% pre-implementation of the guidelines which increased to reach 90% and 93.3% after implementation of the guidelines. These differences in improvement were highly statistically significant ( $X^2 = 49.544$  &  $19.20$  at  $P < 0.001$ ).

**As Figure (4),** illustrates a statistical difference between the informal caregivers' total score of correct knowledge about the risk hazards of falls pre-post implementation of the guidelines ( $X^2 = 92.953$  &  $19.20$  at  $P < 0.001$ ).

**Table (1):** Distribution of the Studied Elderly Caregivers According to their Demographic Characteristics (**n. =30**).

Socio-Demographic Data	No	%
<b>Age (in years):</b>		
20 -	3	10
30-49	9	30
50-60	16	53.3
<65	2	6.7
Mean age/year $\pm$ SD	54 $\pm$ 3.8	
<b>Gender:</b>		
Male	5	16.7
Female	25	83.3
<b>Educational level:</b>		
Read and write	2	6.7
Secondary School Diploma	15	50
University	13	43.3
Live together with the elderly		
Yes	28	93.3
No	2	6.7



**Table (2-A):** Distribution of the Studied Elderly According to their Demographic Characteristics (n. =110).

Socio-Demographic Data	No	%
<b>Age (in years):</b>		
65 -	84	76.4
75-	22	20
80 +	4	3.6
Mean age/year ±SD	72.27± 3.47	
<b>Gender:</b>		
Male	107	97.3
Female	3	2.7
<b>Educational level:</b>		
Read and write	35	31.8
Secondary School Diploma	15	13.6
University	60	54.6
<b>Working status:</b>		
Retired	86	78.2
Working	24	21.8

**Table (2-B):** Distribution of the Studied Elderly According to their Health Condition and Medical History (n. =110).

Elderly Medical History	No	%
a) Osteoarthritis.	86	78.2
b) Weak eyesight	82	74.5
c) Hypertension	80	72.7
d) Sleep disorders.	75	68.2
e) Cardiovascular disease.	73	66.4
f) Bowel and Bladder problems.	64	58.2
g) Diabetes	51	46.4
h) Hearing problems.	51	46.4
i) Gastrointestinal disorders.	51	46.4
j) Anemia	33	30
k) Psychiatric illness.	8	7.3
l) hypotension	6	5.5

\* Answers are not mutually exclusive.

**Table (2-C):** Distribution of the Studied Elderly According to their Mobility Condition (n. =110).

Mobility	No	%
Uses no walking aid	48	43.6
Uses of walking aid	61	55.5
Uses a wheelchair to mobilize	1	.9

**Table (3):** Distribution of the Studied Elderly According to their Prescribed Medications (n. =110).

Prescribed Medications	No	%
Laxatives	81	73.6
Diuretics	80	72.7
Beta blockers	15	13.6
Anticonvulsants	34	30.9
Antipsychotics	34	30.9
Sedative hypnotics	15	13.6
Insulin	13	11.8
Antihistamines	2	1.8
Antidepressants.	8	7.3
Other medications used	15	13.6
<b>Number of medications taken daily:</b>		
1- 4 / Day	13	11.8
5-8 / Day	61	55.5
More than 8 medication /Day	36	32.7
Mean ± SD of medications taken daily	6.25±2.08	

\*Answers are not mutually exclusive

**Table (4):** Distribution of the Studied Elderly According to their Prior History of Falls in the Preceding 12 Months (n. = 110).

Items	No	%
<b>Prior history of falls in the preceding 12 months:</b>		
Yes	11	10.9
<b>Numbers of falls in the preceding 12 months: n=11</b>		
Once	5	45.5
Twice or more	6	54.5
Mean ± SD (fall/year)	0.15 ± 0.49	
<b>Falls-related injuries:</b>		
yes	6	54.5
<b>If yes injury diagnosis selected *:</b>		
Fracture	2	18.8
Laceration	2	18.8
Strain	5	45.5
Internal injury	1	9
others	2	18.8
<b>Part of the body affected</b>		
Head	5	45.5
Lower trunk	1	9
Upper trunk	2	18.8
Arm/leg	1	9

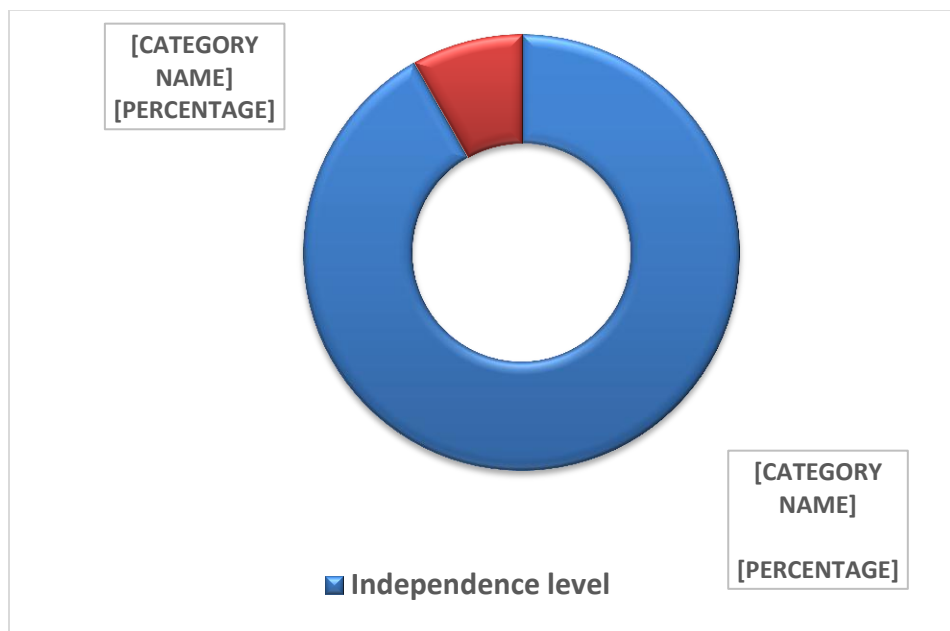
\*Answers are not mutually exclusive

**Table (5):** Distribution of the Studied Elderly According to their Risk of Fall (n. =110).

Risk of Fall	No	%
a) I have fallen in the past year.	12	10.9
b) I can, or have been advised to use, a cane or walker to get around safely	61	55.5
c) Sometimes I feel unsteady when I am walking.	75	68.2
d) I steady myself by holding onto furniture when walking at home.	13	11.8
e) I am worried about falling.	34	30.9
f) I need to push with my hands to stand up from a chair.	28	25.5
g) I have trouble stepping up onto a curb	12	10.9
h) I often have to rush to the toilet.	58	52.7
i) I have lost some feeling in my feet	13	11.8
j) I take medicine that sometimes makes me feel light-headed or more tired than usual.	15	13.6
k) I take medicine to help me sleep or improve my mood.	8	7.3
l) I often feel sad or depressed.	15	13.6

**Table (6):** Distribution of the Studied Elderly According to Self-Reported Fall Risks of Home Environments (n. =110).

Elderly's Home Environment	Elderly opinion			
	Yes		No	
	No	%	No	%
<b>The path from the bedroom to the bathroom</b>				
Is well lit?	91	82.70	19	17.30
<b>Bathroom</b>				
a. Are there grab bars near the toilet and in the shower and bathtub?	57	51.8	53	48.2
b. If you have difficulty standing in the shower, do you use a shower seat?	81	73.6	29	26.4
c. Are spills cleaned up immediately? Do your bathmats have slip-resistant backing?	108	98.2	2	1.8
d. Do you remove soap build in your shower/bathtub to avoid slipping?	106	96.4	4	3.6
e. Can you reach soap in the shower without bending down or turning too far around?	29	26.4	81	73.6
f. Do you have a raised toilet seat if you have difficulty standing up and sitting down?	8	7.3	102	92.7
<b>Outside the house:</b>				
a) Is the path from the house to the garage well lit?	54	49.1	56	50.9
b) Are there cracks or buckles on the sidewalks or driveway?	71	64.4	39	35.6
c) Are there hoses, weeds, or other obstacles on the walkways?	102	92.7	8	7.3
d) Are there walkways?	32	29.1	78	70.9
<b>Bedroom:</b>				
Is there a table close to your bed with a lamp and room to store eyeglasses and a phone?	106	96.4	4	3.6
a) Are floor coverings secure and sturdy?	78	70.9	32	29.1
b) Are cords pushed back against the wall?	3	2.7	107	97.3
b) Is there clutter on the floor?	71	64.5	39	35.5
<b>Kitchen:</b>				
a) Are throw rugs/floor mats secure?	71	64.5	39	35.5
b) Can you get regularly used items without bending down or reaching up too far?	73	66.4	37	33.6
c) Are spills cleaned up immediately?	106	96.4	4	3.6
d) Is food prepared at the kitchen table?	24	21.8	86	78.2
<b>Living area:</b>				
a) Are floor coverings secure and sturdy?	2	1.8	108	98.2
b) Can you answer the phone without getting up?	107	97.3	3	2.7
c) Are cords pushed back against the wall?	75	68.2	35	31.8
d) Can you turn on a light without having to walk into a dark room?	2	1.8	108	98.2
e) Do you have a step stool that has side rails, sturdy and in good condition?	68	61.8	42	38.2
f) Do you have a cordless or cellular phone or an emergency alarm device?	108	98.2	2	1.8
g) Is your floor free of clutter?	108	98.2	2	1.8
h) It is easy to walk around the furniture in your house?	103	93.6	7	6.4
i) Can you turn on a light without having to walk into a dark room?	68	61.8	42	38.2
j) Do you have a step that has side rails, sturdy and in good condition?	48	43.6	62	66.4



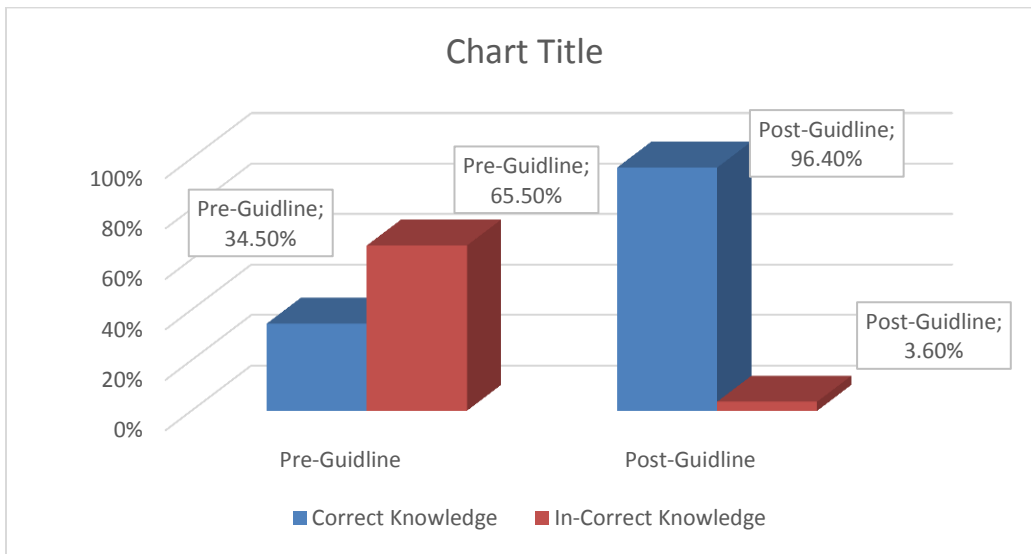
**Figure (2):** Distribution of the Studied Elderly According to their Level of Independency in Performing Activities of Daily Living (n. =110).

**Table (7):** Distribution of the Studied Elderly According to their Observational timed Up and Go Test for assessment of Elderly Balance (n. =110).

Risk of fall due to elderly Balance problems	No	%
Normal person (< 16 sec.).	1	0.9
Positive (16:19 sec.).	27	24.5
Risk of fall (> 20 sec.).	82	74.5
Mean ± S.D	20.17± 2.027	

**Table (8):** Statistical Differences between Correct Knowledge of the Elderly Regarding Hazards that Increase the Risk of Falls Pre-Post-Guidelines Implementation (n =110).

Items	Elderly's Correct knowledge				X <sup>2</sup>	P-value	Sig
	Pre-Guidelines		Post-Guidelines				
	No	%	No	%			
1. Old age increases a person's risk of falling	38	34.5	91	82.70	52.643	<0.001	HS
<b>The following may increase an older adult's chance of falling:</b>							
a) Balance problems	58	52.7	104	94.5	49.544	<0.001	HS
b) Feeling dizzy	58	52.7	108	98.2	61.357	<0.001	HS
c) Limping or difficulty walking	81	73.6	106	96.4	22.282	<0.001	HS
d) Weak legs	54	49.1	102	92.7	50.769	<0.001	HS
e) Standing suddenly	58	52.7	102	92.7	44.367	<0.001	HS
f) Being sick with a cold	71	64.5	102	92.7	26.002	<0.001	HS
g) Feeling tired or fatigued	78	70.9	106	96.4	17.600	<0.001	HS
h) Health problems like Alzheimer's	58	52.7	107	97.3	58.206	<0.001	HS
<b>Disease increases an older adult's chance to fall:</b>							
a) Having had a stroke	71	64.5	108	98.2	41.038	<0.001	HS
b) Being deaf or having ear problems	75	68.2	108	98.2	35.383	<0.001	HS
c) The risk of falling is increased by drinking alcohol	68	61.8	103	93.6	59.108	<0.001	HS
<b>The following medications may increase an older adult's chance of falling (fall related medications):</b>							
a) Anti-anxiety medications and/or tranquilizers	73	66.4	106	96.4	32.645	<0.001	HS
b) Antihypertensive medications or diuretics.	71	64.5	108	98.2	41.038	<0.001	HS
c) Taking more than one medication.	35	31.8	108	98.2	106.474	<0.001	HS
4. Difficulty controlling bladder or bowels may lead to falls	68	61.8	103	93.6	59.108	<0.001	HS
5. Being concerned about falling may increase the likelihood of an older adult falling	24	21.8	107	97.3	129.992	<0.001	HS
6. Older adults are more likely to fall than younger adults.	38	34.5	91	82.7	52.643	<0.001	HS

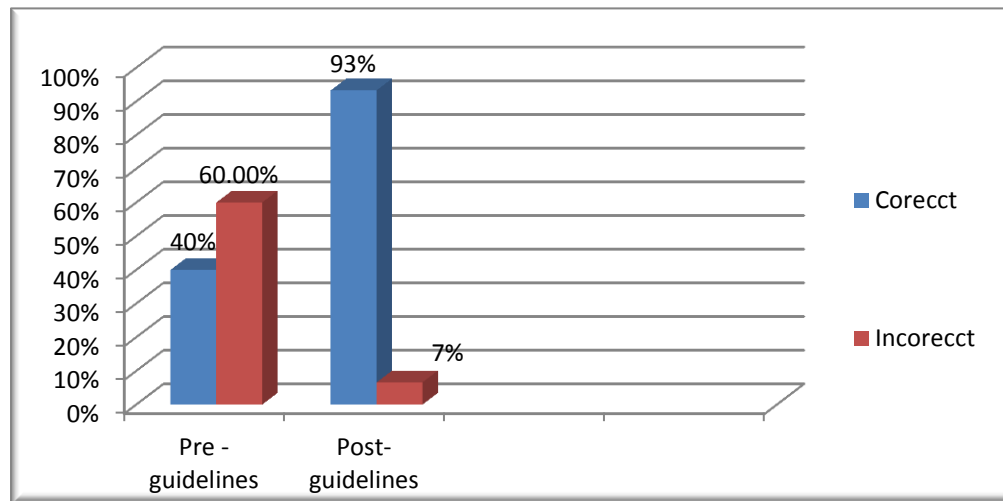


**Figure (3):** Distribution of the Studied Elderly Knowledge Total Score Regarding Hazards that Increase the Risk of Falls Pre-Post-Guidelines Implementation (n =110).



**Table (9):** Distribution of the Studied Informal Caregivers' According to their Knowledge about the Risk of Falls in the studied Elderly Pre-Post Implementation of the Guidelines (n. =30).

Items	Informal caregivers' correct knowledge				X <sup>2</sup>	P-value	Sig.
	Pre-Guidelines		Post - Guidelines				
	No	%	No	%			
1. Old age increases a person's risk of falling	10	33.33	29	96.6	26.447	0.00	HS
2. The following may increase an older adult's chance of falling:							
a) Balance problems	12	40	28	93.3	19.200	0.00	HS
b) Feeling dizzy	18	60	28	93.3	9.317	0.00	HS
c) Limping or difficulty walking	20	66.7	29	96.6	9.017	0.00	HS
d) Weak legs	14	46.6	30	100	21.818	0.00	HS
e) Standing suddenly	9	30	28	93.3	25.452	0.00	HS
f) Being sick with a cold	11	36.7	27	90	18.373	0.00	HS
g) Feeling tired or fatigued	9	30	29	96.6	28.708	0.00	HS
h) Health problems like Alzheimer's	5	16.7	27	90	49.544	0.00	HS
Disease affects an older adult's chance to fall:							
a) Having had a stroke	8	26.7	27	90	32.411	0.00	HS
b) Being deaf or having ear problems	8	26.6	28	93.3	27.778	0.00	HS
c) The risk of falling is increased by drinking alcohol	15	50	29	96.7	16.705	0.00	HS
3. The following medications may increase an older adult's chance of falling:							
a) Medicines that treat anxiety and help with sleeping or tranquilizers	11	36.7	28	93.3	21.172	0.00	HS
b) Water pills or antihypertensive medicine.	7	23.3	28	93.3	30.240	0.00	HS
c) Taking more than one medication.	5	16.7	26	86.6	29.433	0.00	HS
e) Difficulty controlling bladder or bowels may lead to falls	8	26.7	29	96.6	31.093	0.00	HS
4. Being concerned about falling may increase the likelihood of an older adult falling	6	20	27	90	29.697	0.00	HS
5. Older adults are more likely to fall than younger adults.	14	46.7	30	100	21.818	0.00	HS



**Figure (4):** Statistical Differences between the Informal Caregivers' Total Score of Correct Knowledge about the Risk Hazards of Falls Pre-Post Implementation of the Guidelines (n. =30).

## Discussion

For the elderly population, falls are a common and significant problem, many factors may cause falls. Multifactorial assessment of knowledge about fall risk factors and management of the risk factors should be a part of the strategy to reduce the risk of falls (Mohamed et al, 2019).

Knowledge of fall risk factors is important, although elderly people are aware that falls are one of the biggest health issues affecting people in their age group, they frequently do not know what habits or circumstances put them at risk for falling (Ismail, 2018).

Difficulty with walking and balance problems, muscle weakness, and home environmental hazards, are modifiable risk factors for falls in the elderly, as fall prevention efforts focus on clarifying and identifying elderly risk factors for falling and management to minimize these risk factors (Janakiraman, 2019).

**Concerning the Demographic characteristics of the studied caregivers, Table**

(1) shows that; more than half of the caregivers were females with a mean age of  $54 \pm 3.8$ , concerning educational level nearly half of the studied caregivers graduated from the university and no one was illiterate and most of the caregivers under the study lived with the elderly. Concerning the relationship of the caregivers for the elderly under the study, more than half of the caregivers were wives and near one-third of them were sons or daughters **Figure (1)**. Those results go with **Salama and Abou El-Soud, 2012**, in a cross-sectional descriptive study on 288 caregivers in one of the Egyptian governorates, aimed to identify factors related to caregiving burden among caregivers for disabled older family members, they found that the mean age was  $41.35 \pm 8.44$  years and 58.3% of the caregivers were female, 28.5% of them were spouses or daughters, and 55.2%, of them had completed secondary school.

**Concerning the demographic characteristics of the elderly, table (2-A),** clarified that; the majority of the elderly under the study, were male, with a mean age of  $72.27 \pm 3.47$ . Concerning educational level, the highest

proportion of the studied elderly representing more than half of them, have graduated from university and no one is illiterate, this may be because the studied sitting is providing medical service for military in-service personnel, retired personnel, and their male family members and civilians for both sexes, The results also are supported by those of **Mohamed et al, (2019)** at three geriatric homes in Minia City, one of the Egyptian cities, among 80 elderly aimed to evaluate the impact of an exercise program on balance and prevention of recurrent fall among elderly people, they discovered that (87.5%) of the study group between 60 and age of 75. Regarding gender, they discovered that (61.25%) of the participants were male. Also, these results were supported by **El-Rahman, (2014)** in a cross-sectional study aimed to discover the effects of balance disorders on health outcomes of 114 elderly aged 60 years and above from the elderly home, in Damamhur, one of the Egyptian cities, they found that more than half of the participants were males with a mean age was  $68.8 \pm 7.1$  years.

**The findings of this study** clarified that less than three-quarters of the elderly are taking laxatives (**Table 3**), this may be because constipation is a prevalent problem among the elderly population, and its prevalence increases with age, particularly after the age of 65. Meanwhile, about half of them are taking diuretics (**Table 3**), besides that more than half of the elderly complain of bowel and bladder problems (**2-B**), and more than half of the elderly under study often had to rush to the toilet (**table 5**), the previous results are congruent with those of **Abreu et al. (2014)**, in a prospective cohort study, in Brazil, on 221 elderly, aimed to analyze the impact of urinary problems as a predictor of frequency of falls among hospitalized elderly patients, they found that the majority were complains of urine incontinence, gait and balance

dysfunction which were associated with falls. This result also is supported by that of **Soliman et al. (2016)**, in discussing the epidemiology of falls and fractures, and the urologic comorbidities that increase their risk, they concluded that lower urinary tract symptoms represent highly prevalent chronic urinary disorders that increase sharply with age and is associated with nocturia, this may be the prevailing factor leading to nighttime falls, which is the most common etiologies of falls.

**Concerning the current health problems, the current study results revealed that table (2-B)**, the majority of the elderly under the study, have eyesight problems, this may explain that why 70% of the studied elderly had a correct knowledge pre-implementation of the guidelines that eyesight problems may increase the risk of falls (**Table 6**), this may be because of their own experience of this health problem and falls experience. This result agreed with that of **Ehrlich et al. (2018)**, in a cross-sectional study to determine the prevalence of falls among 11,558 elderly in the USA, they found that less than one-tenth of the elderly had reported vision problems and about one-quarter of the studied elderly had a history of more than one fall in the previous year, and the prevalence of all fall they added that the risk of falls continued to be considerably higher in elderly who reported having vision problems.

The current study results revealed that about three-quarters of the elderly were, suffering from osteoarthritis and hypertension (**Table, 2-B**), this seems to be acceptable and may be explained by that the mean age of the studied elderly was  $72.27 \pm 3.47$ , and that, osteoarthritis, and hypertension are common diseases in this period of age, besides, around two-thirds reported sleep disorders and cardiovascular diseases (**Table, 2-B**). These findings agreed with those of **Zheng et al. (2016)**, in-across sectional study on 117 Chinese elderly, to explore fall efficacy among elders with osteoarthritis, they found that

most elderly (83.8%) had at least one chronic condition, such as hypertension (58.1%), diabetes (27.4%), heart disease (25.6%) or osteoporosis (19.7%), they added that health conditions affecting the lower extremities, like osteoarthritis, pose a serious risk for falling.

The present study finding revealed that more than half of the studied elderly are using walking aids, **table (2-C)**, in addition, almost one-tenth of the studied elderly had a prior history of falls in the preceding 12 months, and a minority of them had repeated fall experiences within the past 12 months with a mean of  $0.15 \pm 0.49$ , (**Table 4**), this may be because the risk of falling increases after the age of 60. those results agree with those of **Tawfik (2015)**, in a cross-sectional study carried out on 200 elderly males aged 60 years and older attending outpatient clinics at a hospital, in Egypt, to determine the prevalence of falls and their common risk factors among elderly Egyptian males, he concluded that the prevalence of falls among elderly males was 27.5%, with a mean age was  $66.3 \pm 5.6$  years, this may be because the current study and this study are from the same demographic area.

As regards the medical complications of falls, minorities of the studied elderly suffered from fall-related injuries in the form of strains, fractures, and lacerations, the head was the most part of the body that was affected due to their falling (**Table 4**). These previous results disagreed with those of **Hamed et al., (2017)**, in a cross-sectional study that included 1034 elderly, to study the prevalence of elderly falls and associated factors in Sohag Governorate, in Egypt, they found that because of fall 31.4% of them suffered bruises, and 20% suffered fractures among the studied elderly. This difference may be because of the difference in the sample size.

Meanwhile, results indicated that more than two-thirds explained that sometimes they feel unsteady when they are walking, and a minority reported holding on to furniture when walking at home to be steady (**Table 4**), these previous results agreed with those of **Metteling et al. (2015)**, in a prospective study on 43 elderly,

in Belgium, to investigate the relationship between use of walking assistance by elderly residing in residential aged care facilities, they found that 68.2% elderly using walking aids reported at least one fall compared with 35.0% older adults not using walking aids and 52.4% older adults fell at least once during the 12-month follow-up period, about quarter fell once, near quarter fell twice or more and 11.9% participants had injuries because of fall.

**Regarding prescribed medications** for the elderly, the current study results revealed that about one-third of them are taking beta blockers and/or sedatives and hypnotics. More than half of them is taking from 5 to 8 medications per day and the mean number of medications taken daily is  $6.25 \pm 2.08$  (**Table 3**), this may be explained by interactions resulting from polypharmacy as well as medications affecting alertness and coordination This result is in agreement with that of **Jonathan, (2016)**, in a study aimed to compare the prevalence of falls and fall-related concerns of medication users versus non-users in U.S. elderly, he concluded that a greater percentage of medication users experienced falls and fall-related outcomes, compared with non-medication users, and elderly who use medications are more likely to fall and to be concerned about falling. Similarly, this study result was like that of **Litwin et al. (2018)**, in a survey aiming to examine the fear of falling concerning falls considering the mobility limitations of elderly Europeans, they found that about 6% reported having fallen in the previous year among those with poor eyesight, poor hearing, more medications taken weekly and were also more likely to fall.

The findings of this study clarified that about one-third of the elderly under study were worried about falling and being hurt (**Table 5**). This result also goes with that of **Zhang et al. (2018)** in a cross-sectional study on 218 elderly, in China to investigate the epidemiological characteristics and identify the factors influencing

falls in Chinese residents, they found that nearly one-third experienced 1 or more falls each year, they added that many older people who fall, even those who are not hurt, develop a fear of falling. As a result of this worry, they may restrict their activities, which increases their risk of falling because it reduces their mobility and physical fitness.

**As regards elderly self-reported assessment of home environments of fall risk hazards,** results of the current study revealed that, as regards safety in the bathroom, an equal percentage representing almost three-quarters of the elderly reported that there are no grab bars near the toilet and the shower and bathtub and the elderly cannot reach soap in the shower without bending down or turning too far around, while most of them mentioned that they have not a raised toilet seat if they have difficulty standing up and sitting down (**Table 6**). As regards bedroom environment, most of the elderly highlighted that cords are not pushed back against the wall floor in the bedroom a of cords is well, less than one-third mentioned that cords in living areas are not pushed back against the wall floor. There is clutter on the floor and coverings are neither secured nor sturdy, as reported by almost two-thirds and less than a third of the elderly respectively, and the same results were reported by the elderly concerning living areas where most of them stated that floor coverings are not secured or sturdy (**Table 6**).

These results were supported by **Mohammed, (2018)**, to determine the prevalence of falls among the elderly, in a cross-sectional study involving 408 old adults 60 years of age or older carried out in rural Sharkia governorate, Egypt, the results showed that falls happened indoors, primarily in the bedroom (22.8%), bathroom (37.2%), and stairs (22.8%).

As regards the living area, most of the elderly cannot turn on a light without having to walk into a dark room and two-thirds cannot get regularly used items without bending down or reaching up too far and have unsecured mats and

floor. These findings are consistent with those of **Tommasini et al., (2008)**, who in a retrospective, comparative study conducted in Italy, aimed to study the quantitative and qualitative characteristics of accidental falls in the elderly, they found that 50% of falls were in the bathroom and the most frequent mode of falls among elderly was by slipping.

These study results agreed with those of **Cumming et al. (1999)**, who in a randomized controlled trial of 530 Australian elderly, aimed to identify whether home visits targeted at environmental hazards minimize the risk of falls and they found that the most commonly environmental hazards for risk of falls (84%) were due to floor mats and use of slip mats, so they recommended home modifications as get rid of floor mats and use of non-slip mats.

**As regards safety outside the house,** most of the elderly reported that there are obstacles on the walkways while around two-thirds stated that, there are cracks or buckles on the sidewalks or driveway and there are no walkways. (**Table 6**).

**Concerning assessment of the elderly according to their level of independence in performing activities of daily living,** results of the current study revealed that no one of the elderly under study is totally dependent or moderately dependent while most of them are independent as regards performing activities of daily living and a minority are slight dependent and need assistance in doing their activities of daily living (**Figure,2**), this may be explained because most of the elderly under the study are military personal and use to practice physical exercises daily. This finding was explained by **Kamel et al., (2013)** in a cross-sectional study to assess the risk factors of falls conducted on 340 elders over 60 who attended two family practice facilities in urban Suez, in Egypt, they found that (75.3%) of older adults were undependable for activities of daily living and complains of impaired ability to carry out daily tasks.

**Concerning observational Timed Up and Go test for assessment of patient's balance- gait speed, and functional ability** required for the performance of basic activities of daily living in the elderly, results indicated that slightly less than three-quarters of the elderly under the current study, take more than 20 seconds in performing the test, with a mean of  $20.17 \pm 2.02$  seconds which indicated that they are at risk of falls outside their homes (Table 7). This result was in agreement with that of Topuz et al. (2014), who in a study to examine the relation between falling and mobility among elderly people in different settings, included 41 elderly, by studying mobility parameters with the Timed Up and Go test, they found it to be related to falling and fear of falling, This may be because mobility and gait are important factors for falling and fear of falling among elderly.

**Justification of this research hypothesis** results indicated that there was a significant difference between the studied elderly knowledge related to fall and fall risk factors, where the elderly correct knowledge concerning the risk of falling increases with age it represented slightly more than one-third pre-implementation of the guidelines this percentage increased to be a majority after implementation of the guidelines, this difference in improvement was statistically highly significant ( $X^2 = 52.643$ , at  $P < 0.001$ ) (Table 8).

**Concerning the elderly knowledge regarding medical problems as an intrinsic risk factor that may increase an older adult's chance of falling**, there were highly significant differences between the studied elderly correct knowledge related to balance problems, feeling dizzy, limping or difficulty walking and weak legs pre-implementation of the guidelines representing near half to less than quarter, these percentages increased to represent most for all the stated items, post-implementation of the

guidelines. These differences in improvement were statistically highly significant ( $X^2 = 49.544$ ,  $61.357$ ,  $22.282$  &  $50.769$  respectively, at  $P < 0.001$ ) (Table 8).

**Concerning the elderly knowledge as regards other intrinsic risk factors of falls**, there were significant differences between the studied elderly correct knowledge related to standing suddenly, being sick with a cold, feeling tired or fatigued, and health problems like Alzheimer's pre-implementation of the guidelines with percentages ranging between near half to around two thirds, these percentages increased to be most of them after implementation of the guidelines, these differences in improvement were statistically highly significant ( $X^2 = 44.36$ ,  $26.00$ ,  $17.60$  &  $58.20$  respectively, at  $P < 0.001$ ) (Table 8). **As regards the elderly correct knowledge regarding medication intake which may increase risk factors of falls**, there was a significant difference between the studied elderly correct knowledge related medications (which treated anxiety, diuretics, and the number of medications taken) pre-implementation of the guidelines accounting for one or two thirds, these percentages increased all mentioned items to most of them, after implementation of the guidelines. These differences in improvement were statistically highly significant ( $X^2 = 32.64$ ,  $41.03$  &  $106.47$  respectively, at  $P < 0.001$ ) (Table 8).

The previous results also agreed with those of Gamage et al. (2018), who in a cross-sectional study of 300 elderly, in Sri Lanka carried out to assess the knowledge and perception of falls, related injuries, and preventive measures among elderly considering overall level of knowledge of the elderly, 18% of individuals had poor knowledge, while 61% had average knowledge and only 21% had correct knowledge about causes of falls.

**Concerning elderly knowledge about risk factors of falls**, only nearly one-fifth and two-thirds of the elderly knowledge was correct about being concerned about falling and/or alcohol consumption may increase the likelihood of an older adult falling. Also, about two-thirds of them their knowledge was correct regards difficulties in controlling the bladder or bowel which may lead to falls, while pre-implementation of the guidelines, these percentages increased to either most or the majority, after implementation of the guidelines. These differences in improvement were statistically highly significant ( $X^2 = 129.99, 59.10, 59.10$  &  $52.643$  respectively, at  $P < 0.001$ ) (**Table 8**), these results go in the same line with (**Ott, 2018**) in a quantitative pretest–posttest quasi-experimental study followed by a qualitative interview among 20 elderly attending a clinic in Southern Georgia to assess the impact of a fall prevention educational session on fall risk knowledge, the researchers found that educational

As **Figure (3)** Illustrates, in pre-guideline implementation, almost one-third of the studied elderly had a total correct knowledge score level as regards hazards that increase the risk factors of falls of the elderly, which increased to most of them after implementing the guidelines. The differences observed were statistically highly significant ( $X^2 = 92.953$  at  $P < 0.001$ ). This result was similar to that of **Ismail, (2018)**, in a study to implement an educational intervention program for the prevention of falls for the elderly in a Geriatric Home in Cairo, Egypt, they found that the total score of correct knowledge regarding risk factors of fall of elderly, increased after implementing the guidelines, the differences detected was statistically highly significant.

**Justification of this research hypothesis** results indicated a significant difference between studied informal caregivers correct knowledge related to fall and fall risk factors, where the

intervention increases the fall risk knowledge for this group of the older adult population attending a clinic, he explained that educating clients about falls and prevention is the first step in reducing elderly falls.

**Concerning elderly knowledge about other risk factors of falls**, slightly more than one-fifth of the elderly knowledge was correct that being concerned about falling may increase the chance of an older adult falling, nearly one-third of the elderly agreed that old age increases a person's risk of falling and the older adults are more likely to fall than younger adults (**Table 8**). The results also agreed with **Sadowski (2006)**, in a cross-sectional study of two convenience samples of older adults, to assess knowledge of risks for falling, 94% of the studied sample, agreed that; older age increases a person's risk of falling, 95%, 91 % and 91% agreed that the risk of falling is increased by drinking alcohol, balance problems and older adults are more likely to fall than younger adults.

informal caregivers correct knowledge concerning related to the risk of falling increases with age, an older adult's risk of falling may increase if they have fall fear, older adult falling and standing suddenly representing one third or one-fifth pre-implementation of the guidelines. These percentages increased to reach most of the informal caregivers after the implementation of the guidelines. These differences in improvement were statistically highly significant ( $X^2 = 26.44, 29.697$  &  $25.452$  respectively at  $P < 0.001$ ) (**Table 9**).

**Concerning informal caregivers' correct knowledge as regards medications as fall risk hazards that may increase an older adult's chance of falling (Table 9) clarifies that**, there were highly significant differences between the studied informal caregivers' knowledge related to taking more than one medication, anti-anxiety or tranquilizers and diuretics or antihypertensive pre-implementation of the guidelines ranged between

less than fifth to slightly more than third, which increased to be most of them after implementation of the guidelines. These differences in improvement were statistically highly significant ( $X^2 = 29.43, 21.17 \text{ \& } 30.240$  respectively, at  $P < 0.001$ ). These results were similar to those of **Gutta et al. (2013)**, in a cross-sectional study, conducted in India, aimed to assess the knowledge and attitudes of caregivers about falls in the elderly and the prevention of recurrent falls; they found that the elderly caregivers have poor knowledge regarding prevention of falls.

**Concerning informal caregivers' knowledge that some medical conditions** may increase the elderly chance of falling down, there were significant differences between studied informal caregivers' correct knowledge related to being deaf or having ear problems, having had a stroke, difficulty controlling bladder or bowels, and being sick with a cold may lead to falls, pre-implementation of the guidelines with percentages ranging between more than one quarter and about one third respectively. These percentages increased to represent most of the items after the implementation of the guidelines. These differences in improvement were highly statistically significant ( $X^2 = 27.77, 32.41, 31.09 \text{ \& } 18.37$ , respectively, at  $P < 0.001$ ). As well there were highly significant differences between the studied informal caregivers' correct knowledge related to health problems like Alzheimer's and balance problems as risk factors of falls, where they account for less than one-fifth and two fifths respectively pre-implementation of the guidelines increased to represent most of the items after implementation of the guidelines. These differences in improvement were highly statistically significant ( $X^2 = 49.544 \text{ \& } 19.20$  at  $P < 0.001$ ) (**Table 9**).

However, these results disagreed with those of **Mackintosh et al. (2007)**, in a study on 121 Australian elderly caregivers, aimed to determine the perceptions of fall and fall-related risk factors by caregivers, they concluded that 85% of the studied caregivers their knowledge was correct in that falls are a problem for elderly, and falls can be preventable, and that balance problem and past experience of fall were important risk factors of fall. They added that family members have an important

role to talk to and support the elderly to taking fall prevention actions.

As **Figure (4)** illustrates, in pre-guideline implementation, two-fifths of the studied informal caregivers had a total correct knowledge score level as regards the risk hazards for falls of the elderly pre-guidelines implementation, which increased to most of them after implementing the guidelines, the difference observed was statistically highly significant ( $X^2 = 92.953 \text{ \& } 19.20$  at  $P < 0.001$ ), this result was congruent with that of **Avila et al. (2015)**, who in a cross-sectional study, conducted in Brazil, on 89 informal caregivers, aimed to explore the level of caregiver's knowledge regarding fall prevention, this study showed that 42.7% of caregivers have correct knowledge of fall prevention, 88.2% of the caregivers believed that falls are preventable, while 11.8% of caregivers also mentioned muscular problems as a risk factor of fall among elderly this may be because of that most the studied caregivers are educated and no one was illiterate.

### **Conclusion:**

According to the research hypothesis, the results of the study showed that the guidelines for fall prevention for elderly people and their informal caregivers have positively affected their knowledge related to fall prevention.

### **Recommendations**

The present study recommends:

- Guidelines for the prevention of falling should be available in each health care setting providing care for the elderly.
- Further research regarding how elderly people and their informal caregivers respond to guidelines for fall prevention for their elderly and includes knowledge about risk factors of falls, personal factors that increase the risk of falls, and modifiable risk factors such as modifying the home environment, healthy lifestyle, and behavioral modifications, use of medications, periodic medical checkup for early screening, and how to protect elderly from fall and action to be taken after fall.
- Further health education must focus on assisting the elderly in recognizing possible risks and altering their lifestyle health practices and habits.



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