Recurrent Falls in Elder Patients: Risk Factors and Effect on Care Giving Family Members

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Abstract

Background: Care giving produces great amounts of caregiver burden and stress. Falls are a common and complex geriatric syndrome that cause considerable mortality, morbidity, reduced functioning, and premature nursing home admissions.

Aim: To evaluate the risk factors of recurrent falls and effect on care giving family members.

Materials and methods: Case control study, performed with structured questionnaire conducted in an outpatient geriatric unit on 150 elder patients, divided into 2 groups; first: cases (100 subjects), second: controls (50 subjects). Comprehensive geriatric assessment and Timed Up and Go test (TUG) were applied. Caregiver burden and potential determinants were measured in all participant partners using Caregiver Burden Questionnaire.

Results: The mean age of the cases was 69.6 ± 6.8, while for controls was 67.2 ± 4.7, [P: 0.02]. Sex did not show a significant difference between cases and controls [P: 0.123]. The mean BMI of the cases was 26.03 ± 6.4, and of controls: 29.1 ± 6.8, [P: 0.007]. The functional state assessed by ADL showed significant difference between cases and controls, [P: <0.001]. Also the use of assistive device was more among cases than controls, [P: 0.01]. Depression and polypharmacy were significantly found in cases more than controls, [P: 0.006, 0.01 respectively]. The mean value of TUG test in cases was 23.9 sec ± 11.1 while for controls was 19.6 ± 11.3, [P: 0.02], and the number of subjects with impaired TUG test was significantly higher in cases than controls [P: 0.002]. Table 3 showed that caregiver stress was significantly prevalent and more severe in cases (84%) than controls (54%), [P: <0.001, 0.002 respectively], also the mean value of ZBI test in cases was 31.9 sec ± 22.8 while for controls was 18.5 ± 21.4, [P: 0.001]. Table 4 displayed possible determinants of severity of caregiver stress in cases. It was found that presence of depression and functional impairment in the cases group were significant determinants of caregiver stress [P: 0.006, 0.003] respectively, also the number of falls significantly determined the severity of caregiver stress; the more the number of falls, the more severe caregiver stress score [P: <0.001].

Conclusion: Age, lower BMI, functional impairment, polypharmacy, depression and use of assistive device are risk factors for recurrent falls in older adults, and the caregiver stress is more prevalent in those with recurrent falls especially with increase in the number of falls, the presence of depression and functional impairment. So we recommend assessment of these risk factors for falls in all older patients and also assessment of caregiver stress especially in the elders with recurrent falls.

Key words: recurrent falls, elderly patients, care giving family members

Introduction

Falls are a common and complex geriatric syndrome that cause considerable mortality, morbidity, reduced functioning, and premature nursing home admissions. Falls have multiple precipitating causes and predisposing risk factors, which make their diagnosis, treatment, and prevention a difficult clinical challenge. A fall may be the first indicator of an acute problem (infection, postural hypotension, cardiac arrhythmia), may stem from a chronic disease (Parkinsonism, dementia, diabetic neuropathy), or simply may be a marker for the progression of ''normal'' age-related changes in vision, gait, and strength. Moreover, most falls that are experienced by older persons have multifactorial and interacting predisposing and precipitating causes (e.g., a trip over an electrical cord contributed to by a gait disorder and poor vision). [1]

Posture control in humans depends on the interaction between the individual's intrinsic characteristics, his surroundings and the demands of the task he is performing. Posture maintenance is mediated by information from the sensory systems, by the Central Nervous System (CNS) programming and by the execution of the musculoskeletal system. The aging process affects the components of postural control, and it is difficult to differentiate the effects of age from those caused by disease and lifestyle. Regardless of the cause, however, the accumulation of alterations in body balance reduces the individual's compensatory capacity, increasing instability and, consequently, the risk of falling. [2]

The adoption of a definition is an important requirement when studying falls as many studies fail to specify an operational definition. For example, older people tend to describe a fall as a loss of balance, whereas health care professionals generally refer to events leading to injuries and ill health. [3]

Another definition that describes a fall is any event that leads to an unplanned, unexpected contact with a supporting surface, while recurrent falls is defined as two or more falls in a 12-month period. [4]

The Royal Society for the Prevention of Accidents (ROSPA) estimates that one in three people aged 65 years and over experience a fall at least once a year - rising to one in two among -80 year-olds and older. Although most falls result in no serious injury, approximately 5 percent of older people in community dwelling settings who fall in a given year experience a fracture or require hospitalization. [5] Approximately 28-35% of people aged 65 and over fall each year increasing to 32-42% for those over 70 years of age. The frequency of falls increases with age and frailty level. [6]

Falls lead to 20-30% of mild to severe injuries, and are an underlying cause of 10-15% of all emergency department visits, with more than 50% of injury related hospitalizations among people over 65 years and older. Falls account for 40% of all injury deaths. [7] In addition, falls may also result in a post fall syndrome that includes dependence, loss of autonomy, confusion, immobilization and depression, which will lead to a further restriction in daily activities. Loss of confidence in the ability to ambulate safely can result in further functional decline, depression, feelings of helplessness, and social isolation. [8]

Recurrent falls are a major public health issue. Around 25% of adults aged over 75 years suffer at least two falls a year. Recurrent falls usually occur during basic activities of daily living such as walking and body transfer positions from sit-to-stand or stand-to-sit positions. Compared to a single fall, recurrent falls lead to more injuries, hospitalizations and nursing home admissions, which impose high costs on public health and social services. [9]

Providing care to someone, especially the elders, whether full time, part time, formal, informal or long distance takes a huge toll, both physically and emotionally. Few people are prepared for the responsibilities and tasks involved in caring for the aged because of the stress involved in it. [10]

Caregivers provide many kinds of help to the care receivers ranging from assistance with shopping to help with daily tasks such as bathing, dressing, feeding, lifting, turning him or her in bed, cooking, shopping, paying of bills, running errands, giving medicine, keeping him or her company, providing emotional support and so many other things. All this help rendered by caregivers can be time consuming and emotionally, physically and psychologically draining. [11]

Care giving produces great amounts of caregiver burden and stress; when stress builds up it can result in poor health and depression of the caregiver. [12]

For almost three decades, more attention has been given in the literature to family caregivers of older persons with physical or mental disability, especially in the study of the impact the disease has on their lives. The diagnosis of a severe disease, not only affects the patient but also the whole family. In this way, the person with the disability as well as the family group goes through a process of loss and grief. [13]

As mentioned, recurrent falls can increase caregiver stress but there is a lack of studies assessing that. So we are aiming in this study to assess presence of caregiver stress in caregivers of older adults with recurrent fall and its related factors.

Subjects and Methods

Subjects:

This is a case control study. The study included 150 older patients, 60 or more years old, and their caregivers, who accompanied them to the outpatient clinics in Ain Shams University Hospitals. The data were collected between March and August 2010.

A. Older participants:

The sample included 150 older subjects divided into 2 groups:

Cases group (100 subjects):

Inclusion criteria:

1. History of 2 or more falls within the past 12 months. [4]
2. Older patient 60 or more years old.
3. Able to walk with or without an assistive device but without the assistance of another person.
4. Able to follow simple instructions.
5. Living with a caregiver.
6. Can see and hear properly.
7. Without foot problems.

Controls group (50 subjects):

Includes elder subjects without history of recurrent falls.

Exclusion criteria:

1. Any bed ridden patient.
2. Patients with known systemic problems causing caregiver stress e.g.: renal failure, liver failure, COPD, respiratory failure, stroke, delirium and moderate to severe dementia and traumatic fractures.
3. We excluded falls resulting from unavoidable environmental hazards known as the extrinsic fall risks e.g: poor lighting, slippery floors, uneven surfaces, footwear and clothing, inappropriate walking aids or assistive devices.

Tools:

- **Comprehensive Geriatric Assessment:** with detailed history and physical examination including:
- **Age:** the incidence of falls increases with age. [14]
- **Gender:** for the younger old, fall rates for men and women are similar, but among the older old, women fall more often than men, and are far more likely to incur fractures when they fall. [15]
- **Medicines:** risk is increased significantly if a person is on more than four medications, irrespective of type. The use of four or more medications is associated with a nine-fold increased risk of cognitive impairment, and fear of falling. [16]
- **Nutritional deficiencies:** A low body mass index suggesting malnutrition is associated with increased risk. [17]
  Evaluating the global nutritional status of the subject by calculating the Body Mass Index (BMI) (weight [kg]/height [m2]: a value ‹ 21 being considered as a malnutrition criterion), and by assessing for a recent weight loss (a weight loss > 5% in a month or > 10% in six months indicating malnutrition) [18]
- **Assessment of functional state using ADL:** [19]
  The subject was considered assisted if more than one daily activity is assisted and dependent if the subject was dependent in all the activities of daily living.
- **Screen for depression using GDS 15:** [20]
  Geriatric Depression Scale 15 items: It is used for screening of depression; patients who score more than 5 positive items were considered to be depressed. It had been translated into Arabic slang language suitable for illiterate subjects concerning the meaning of each depressive item included, and validated for detection of cases of depression, because its results significantly correlate with the results of Beck Depression Inventory (B.D.I.)
- **Assessment of cognitive function using MMSE:** [21]
  It is well known that dementia is associated with caregiver stress, so any patient with dementia was excluded from the study.
- **Evaluation of gait and balance was done by timed up and go test (TUG test):** [22]
  It is a basic evaluation of functional mobility that has been used extensively in geriatric medicine in order to evaluate gait and balance performance.

  TUG was developed to assess balance, the risk of falls and the functional capacity of older adults. It consists of observation while the subject gets up from a chair, walks three meters in straight line, comes back to the chair and sits down. This course is timed in seconds, and the subject's performance is scored according to the time taken to completion.

Interpretation:

< 14 seconds = normal. Results correlate with gait speed, balance, functional level, the ability to go out, and can follow change over time.
>14 seconds is indicative of impaired functional mobility in community-dwelling older adults.

B. Caregiver participants:

Caregivers were eligible if they were a family caregiver, defined in this study as a family member or friend of the patient who helps the patient at home with self-care activities and is not paid to do so, were able to speak Arabic and hear at a conversational tone, were alert and oriented as determined by the interviewer, and had access to a working telephone.

The interviewer read all questions to the caregivers during the interviews in order to standardize data collection.

Assessment of caregiver burden:

We applied Zarit Burden Interview (ZBI) [23] for all caregivers; it is the most widely referenced scale in studies of caregiver burden.

Zarit Burden Interview

- **Variations/Translations:** Originally a 29-item scale, the 22 item version is more commonly used. Shorter versions of the ZBI have been developed with 18 and 12 items. Translations of the ZBI are available in French, Japanese, Chinese, Korean, Spanish and Brazilian. The test is known under two different names, the Zarit Burden Interview (ZBI) and the Burden Interview (BI). [24]

- **Setting:** Can be used in either a clinical or a community setting.
- **Method of Delivery:** Self-report questionnaire.
- **Description:** The Zarit Burden Interview (ZBI) was developed to measure subjective burden among caregivers of adults with dementia. Items were generated based on clinical experience with caregivers and prior studies resulting in a 22-item self-report inventory that examines burden associated with functional/behavioural impairments and the home care situation. The items are worded subjectively, focusing on the affective response of the caregiver.
- **Scoring/Interpretation:** Each question is scored on a 5 point Likert scale ranging from: - {never to nearly always present}. Total scores range from 0 (low burden) to 88 (high burden). Score values and interpretation are guidelines only.
- **Quantitative/Qualitative:** Quantitative.
- **Validity (Quantitative):** Good construct validity. The items possess content validity as they were derived from clinical and research experience with caregivers of individuals with dementia and reflect common areas of concern, namely, health, finances, social life, and interpersonal relations. Spearman's rho correlations include: .32 with activities of daily living, .32 with social life restrictions, .41 with the Brief Symptoms Inventory, .71 with the global index of burden, and -.57 with the quality of relationship between the caregiver and the recipient.
- **Reliability (Quantitative):** Excellent internal consistency; Cronbach's alpha = 0.83 and 0.89. A test-retest reliability of 0.71 was obtained.
- **Linguistic validation of the Arabic ZBI:**

1. Translation to Arabic and confirmation of the linguistic validity and reliability of the Arabic version was made for the current study.
2. The translation of the ZBI was done according to international methodological recommendations for the linguistic and cultural adaptation of questionnaires [25] using the English version as the source.
3. Six steps of the translation process were followed: forward translation by 2 translators, meeting with the coordinator of the translation, a check by a bilingual expert to evaluate the scientific correctness of the wording, a backwards translation, meeting among the translators with the coordinator, and finally a pretest with a chosen sample. The translated questionnaire was tested on 15 volunteers who were allowed to comment on their understanding on each question.
4. A few statements were changed in the Arabic translation to reflect the same correct meaning in the English version. The stability of the Arabic ZBI questionnaire was examined by the test-retest method and the Pearson correlation coefficient between the 2 measures, done on the same group of 15 participants 1 week apart, revealed 90% test-retest agreement.

Statistical Analyses:
All data were entered into the 21st version of SPSS (Statistical Package of Social Science) and analyzed using frequency and descriptive statistics to analyze the study population. Frequency and percentage was calculated for all qualitative variables. Description of all data in the form of mean (M) and standard deviation (SD) was done for all quantitative variables. Comparison of qualitative variables was done using Chi-square test; it is a test that determines the extent that a single observed series of proportions differs from a theoretical or expected distribution of proportions, or the extent that two or more series of proportions or frequencies differ from one another based on the chi-square distribution.

Comparison between quantitative variables was done using t-test to compare two groups, and ANOVA (analysis of variance) to compare more than two groups.

The level of significance for Chi-square test, t-test and ANOVA was taken at P value < 0.05 is significant, otherwise is non significant.

Results

The study was conducted on 150 older patients and their caregivers; the sample was divided into 2 groups: cases (n= 100) who were the older adults with recurrent falls, and controls (n= 50) who were the older adults with non recurrent falls. Table 1 showed the demographic and characteristics of the older adults: The mean age of the sample was 68.8 ± 6.3 (range: 60 - 86). The sample included 80 (53.3 %) males and 70 (46.7 %) females. Among the 150 older subjects; 77 (51.3 %) were not using any assistive devices, 59 (39.3 %) were using canes and 14 (9.3 %) were using walkers. 80 (53.3 %) of the sample were depressed and 70 (46.7 %) were not depressed. 34 (22.7 %) were dependent in ADL, 81 (54 %) were assisted and 35 (23.3 %) were independent. 88 (58.7 %) were taking 4 or more medications and 62 (41.3 %) were taking less than 4 medications. The mean value of BMI of the sample was 27.07 ± 6.7 (range: 16 - 54). 55 (36.7 %) had TUG test normal and 95 (63.3 %) had TUG test impaired. Table 2 showed the mean age of the cases was 69.6 ± 6.8, while for controls was 67.2 ± 4.7, [P: 0.02]. Sex did not show a significant difference between cases and controls [P: 0.123]. The mean BMI of the cases was 26.03 ± 6.4, and of controls: 29.1 ± 6.8, [P: 0.007]. The functional state assessed by ADL showed significant difference between cases and controls, [P: <0.001]. Also the use of assistive device was more among cases than controls, [P: 0.01]. Depression and polypharmacy were significantly found in cases more than controls, [P: 0.006, 0.01 respectively]. The mean value of TUG test in cases was 23.9 sec ± 11.1 while for controls was 19.6 ± 11.3, [P: 0.02], and the number of subjects with impaired TUG test was significantly higher in cases than controls [P: 0.002]. Table 3 showed that caregiver stress was significantly prevalent and more severe in cases (84%) than controls (54%), [P: <0.001, 0.002 respectively], also the mean value of ZBI test in cases was 31.9 sec ± 22.8 while for controls was 18.5 ± 21.4, [P: 0.001]. Table 4 displayed possible determinants of severity of caregiver stress in cases. It was found that presence of depression and functional impairment in the cases group were significant determinants of caregiver stress [P: 0.006, 0.003]

respectively, also the number of falls significantly determined the severity of caregiver stress; the more the number of falls, the more severe caregiver stress score [P: <0.001].

Table 1: Demographics and characteristics of older subjects sample:

Age: Min:	60
Max	86
Mean & SD	68.8 ± 6.3
Sex: Males:	80 (53.3 %)
Females:	70 (46.7 %)
Assistive device used:	
No:	77 (51.3 %)
Cane:	59 (39.3 %)
Walker:	14 (9.3 %)
Depression	
Present:	80 (53.3 %)
Not present:	70 (46.7 %)
ADL: Dependent:	34 (22.7 %)
Assisted:	81 (54 %)
Independent:	35 (23.3 %)
Polypharmacy:	
Present:	88 (58.7 %)
Not present:	62 (41.3 %)
BMI: Min:	16
Max	54
Mean & SD	27.07 ± 6.7
TUG:	
Normal:	55 (36.7 %)
Impaired:	95 (63.3 %)

(Tables 2-4 are on pages 16-17)

Discussion

Among the highly heterogeneous risk list including age-associated changes, neuro-sensory impairments, muscular weakness, co morbidities, cardiovascular mediated problems, polypharmacy, and environmental hazards, we investigated the association between some of these risks and the recurrent falls and also the possible determinants of severity of caregiver stress in patients with recurrent falls.

We found that the cases had significant higher mean age value and lower BMI value than the controls, also the cases suffered functional impairment, polypharmacy and depression more than the controls, also the use of assistive device, especially the walker, was more prevalent among the cases.

This was supported by many studies which were conducted to investigate the risk factors of recurrent falls, like Masud and Morris, 2001 [26] who stated that falls are extremely common among older adults, and that each year about one out of three people older than age 65 years who was living in the community, suffered falls, and that rate increased with advanced age and was higher among people who were living in institutional settings.

Also Hogue et al., 1982 [27] reported that falls were extremely common among older adults, and that each year about one out of three people older than age 65 years who was living in the community fell; this rate increased with advanced age and was higher among people who were living in institutional settings. They added that falls caused considerable mortality and morbidity, and that the risk for falls was nearly double for individuals who were older than the age of 80, and added that this was probably due to the increasing prevalence of multiple risk factors associated with age.

Siqueira et al., 2007 [28] stated that many studies had pointed to the female sex and the increase in age as highly relevant risk factors for the occurrence of falls in older adults.

Also Ooi et al., 2000 [29] studied the association between orthostatic hypotension and recurrent falls in nursing home residents and found that the risk for falls was nearly double for individuals who were older than the age of 80. And they explained this by the increasing prevalence of multiple risk factors associated with age.

So the higher age among the cases group could be attributed to the age-associated changes in posture control, muscle strength, and step height that could impair a person's ability to avoid a fall after an unexpected trip or while reaching or bending.

Many studies revealed that falls were more common among females, for example; Perell et al., 2001 [30] conducted a study for fall risk assessment measures and found that among nursing home residents many factors including the female sex and low BMI were associated with increased risk for an injurious fall and they attributed this to the relation to osteoporosis, and higher activity level.

Unfortunately in this study we found that among 70 females, the number of female cases was 51 and controls was 19, yet not significant, but it was considerably different and might be statistically non significant because of the small sample size.

Also we agreed with Ooi et al., 2000 [29] who found a strong relationship between the use of three or more medications and the risk for falls, and Ray et al., 2000 [31] and Friedman et al., 2002 [32] who reported that medicines like benzodiazepine use in older people was associated with an increase of as much as 44% in the risk of hip fracture and night falls, and added that there was a significant increased risk of falling with use of medications such as psychotropics, class 1a anti-arrhythmic

	Cases N = 100	Controls N = 50	
Age	M: 69.6 SD: 6.8	M: 67.2 SD: 4.7	*t: 2.2* *P: 0.02*
Sex	Male: 49 (49 %) Female: 51 (51 %)	Male: 31 (62 %) Female: 19 (38 %)	*X: 2.26* *P: 0.132*
ADL: Dependent: **Assisted:** **Independent:**	27 (27 %) 60 (60 %) 13 (13 %)	7 (14 %) 21 (42 %) 22 (44 %)	*X: 18.2* *P: <0.001*
Assistive device used: No: Cane: Walker:	 47 (47 %) 39 (39 %) 14 (14 %)	 30 (60 %) 20 (40 %) 0	 *X: 8.1* *P: 0.01*
BMI:	M: 26.03 SD: 6.4	M: 29.1 SD: 6.8	*t: 2.7* *P: 0.007*
Depression Present: Not present:	 61 (61 %) 39 (39 %)	 19 (38 %) 31 (62 %)	 *X: 7.05* *P: 0.006*
Polypharmacy: Present: Not present:	 66 (66 %) 34 (34%)	 22 (44 %) 28 (56 %)	 *X: 6.6* *P: 0.01*
TUG: Normal: Impaired:	 28 (28 %) 72 (72 %)	 27 (54 %) 23 (46 %)	 *X: 9.7* *P: 0.002*
TUG in sec.	M: 23.9 SD: 11.1	M: 19.6 SD: 11.3	*t: 2.21* *P: 0.02*

Table 2: Comparison between cases and controls regarding risk factors of falls

	Cases N = 100	Controls N = 50	
Caregiver stress **Present** **Absent:**	 84 (84 %) 16 (16 %)	 27 (54 %) 23 (46 %)	 *X: 15.5* *P: <0.001*
Caregiver stress severity: **No stress** **Minimal** **mild** **Moderate** **Severe**	 16 (16 %) 19 (19 %) 30 (30 %) 23 (23 %) 12 (12 %)	 23 (46 %) 5 (10 %) 12 (24 %) 8 (16 %) 2 (4 %)	 *X: 16.7* *P: 0.002*
Caregiver stress value	M: 31.9 SD: 22.8	M: 18.5 SD: 21.4	*t: 3.4* *P: 0.001*

Table 3: Comparison between cases and controls regarding prevalence and severity of caregiver stress

Table 4: Possible determinants of severity of caregiver stress in patients with recurrent falls:

Caregiver stress degree	No N = 16	Minimal N = 19	Mild N = 30	Moderate N = 23	Severe N = 12	
Patients' age	M: 69.8 SD: 7.3	M: 65.9 SD: 5.2	M: 70.1 SD: 6.6	M: 71.6 SD: 7.4	M: 70.3 SD: 6.8	*F:2.004* *P: 0.1*
Patients' sex: Male: Female:	 10 6	 7 12	 16 14	 11 12	 5 7	 *X: 2.7* *P: 0.59*
ADL: Dependent: Assisted: Independent:	 6 9 1	 6 12 1	 4 17 9	 14 7 2	 3 9 0	 *X: 22.9* *P: 0.003*
Number of falls: 2 falls: 3 falls 4 falls:	 12 3 1	 14 1 4	 14 14 2	 9 11 3	 1 4 7	 *X: 32.9* *P:* *<0.001*
Depression: Present: Absent :	 11 5	 6 13	 16 14	 17 6	 11 1	 *X: 14.4* *P: 0.006*

medications, digoxin, diuretics and sedatives, and mentioned that with the expanding evidence base for medications in chronic disease management, the number of prescribed medications had increased. They mentioned that risk was increased significantly if a person was on more than four medications, irrespective of type.

Regarding depression, Biderman et al., 2002 [33] reported that depression was associated with about a twofold increased risk for falling, and he explained this as depression might result in inattention to the environment, or cause more risk-taking behaviours. Besides he added that depression might be a reaction to previous fall-related morbidity and not be an actual causative risk at all. They reported also that fear of falling had been recognized as a negative consequence of falls.

And Cumming et al., 2000; [8] stated that post fall anxiety syndrome could result in self-imposed activity restrictions among home-living and institutionalized older fallers, and loss of confidence in the ability to ambulate safely could result in further functional decline, depression, feelings of helplessness, and social isolation.

Also Biderman et al., 2002 [33] reported that mild depressive symptoms occurred in close to one quarter of the older population, and about 5% of that population suffered major depression.

Feder et al., 2000 [34] stated that depression, fear of falling and other psychological problems - "post-fall syndrome" - were common effects of repeated falls, and added that loss of self-confidence as well as social withdrawal, confusion and loneliness could occur, even when there had been no injury.

This was going with our study as we found that depression was a significant risk factor for fall in cases group and the association between falls and depression could be explained by the presence of common risk factors identified for depression and falls i.e., poor self-rated health, cognitive impairment, functional impairment, slow gait speed, etc.

In our study we found that TUG test values were higher in the cases than the controls group, as older adults who took longer than 14 seconds to complete the TUG had a high risk for falls.

This was supported by a study conducted by Gonçalves et al., 2009 [35] to compare the functional balance among community dwelling older adults according to their history of falls. They found that the older non-fallers completed the task in less time than the other groups, which showed that the fallers demonstrated higher mobility deficit.

Also many studies supported this finding; Günter et al., 2000 [36] found that older non-fallers were significantly faster in the execution of the TUG test when compared to the older one-time fallers or recurrent fallers ($p<0.01$).

Another; Shumway-Cook et al., 2000 [37] applied the TUG test to community-dwelling older adults with no falls and with two or more falls in the six previous months, and the results suggested that older adults who completed the task in over 14 seconds had a high risk of falls.

And this could be explained by the fact that any musculoskeletal disorder would affect mobility and increase the chance for fall and therefore would lengthen the time for the task performance.

The study revealed that functional impairment assessed by ADL was a significant risk factor for fall, and this was supported by many studies; Sahyoun et al., 2001 [38] stated Gait and balance impairments were a significant risk factor for falls, and were associated with about a threefold increased risk for falling, they added that functional impairment, usually indicated by the inability to perform basic activities of daily living (ADLs; e.g., dressing, bathing, eating), doubled the risk for falling and in the community, ADL impairment affected 20% of persons who were older than age 70.

In this study the use of assistive device was found to be associated with recurrent falls; this was supported by Sahyoun et al., 2001 [38] who reported that the use of an assistive device for ambulation was associated with a 2.6-fold increased risk for falling.

In this study malnutrition assessed by BMI was found to be associated with fall risk, also Tinetti et al., 1996 [39] stated that nutritional deficiencies determined by a low body mass index suggesting malnutrition is associated with increased risk.

It is expected that recurrent falls in elders can be associated with caregiver stress, and in the literature, hardly any studies investigated the association between recurrent falls in elders and caregiver burden. So in this study we investigated the prevalence of caregiver stress among patients with recurrent falls and the possible determinants of severity of caregiver stress in patients with recurrent falls.

The study displayed that caregiver stress was more prevalent in the caregivers of cases (84%) than in the caregivers of the controls (54%) [P< 0.001] and the questionnaire values were higher in the caregivers of cases [mean: 31.9 ± 22.8] than in the caregivers of the controls [mean: 18.5 ± 21.4] [P: 0.001]

Also in the study, we found some significant determinants of severity of caregiver stress in patients with recurrent falls which were functional impairment, number of falls and presence of depression. So, the more the number of falls, the more dependent and depressed patient, the higher the severity of caregiver stress.

In our community, family caregivers provide a variety of kinds of support; they help with transportation and household activities, caregivers also help some care providers, for example; every time a new home care provider enters the home, a caregiver needs to explain the care recipient's routine and preferences, and help orient the provider. In addition, a caregiver may help a home care provider by organizing medications to be given to the older patient, or with tasks such as lifting or moving the patient from a bed to a wheelchair (which can place the caregiver at risk for injury). Caregivers also monitor the care that is provided to ensure that home care meets their needs and preferences-both the patient's and caregiver's-and that tasks are completed effectively.

Although most caregivers said that care giving offered rewards such as personal satisfaction and a closer relationship with the older patient in their care, the proportion of distressed caregivers increases steadily as the patients move from low to high levels of need, and spikes when they have very high needs. So caregivers may report experiencing difficulties in care giving. For many it is emotionally demanding, creates stress, and takes away time from other activities.

Family caregivers can sometimes find themselves in a difficult predicament when caring for a senior-aged family member. While they are concerned for their loved one's wellbeing, they want to respect their independence and lifestyle. They may believe that assisted living and long-term care are undesirable or unattainable. Even when a senior moves in with a family caregiver, it may be impossible for that caregiver to look after the senior at all times - a situation which many seniors find unnecessary in the first place! These tough decisions can create tension between seniors and their loved ones. However, there are new advances in technology to ease these tensions and lower the "burden of care" for a family caregiver.

It is well known that falls are dangerous for older adults, because they can easily cause a disabling injury, such as a broken hip. Fear of falling can also seriously affect an aging adult's quality of life, and can keep a person from being active and so increase the dependency on the caregiver.

Conclusion

Age, lower BMI, functional impairment, polypharmacy, depression and use of assistive device are risk factors for recurrent falls in older adults and caregiver stress is more prevalent in those with recurrent falls especially with increase in the number of falls and the presence of depression and functional impairment. So we recommend assessment of these risk factors for falls in all older patients and also assessment of caregiver stress especially in the elders with recurrent falls.

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