Epidemiological Analysis of Elderly Patients Admitted to Emergency Department due to Trauma and Fracture

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Abstract

***Introduction:** This study aimedto epidemiologically examine elderly patients aged ≥65 years who were admitted to the emergency department during a 1-year period due to trauma and fracture detected using radiological imaging.*

***Materials and Methods:** We enrolled 300 elderly patients admitted to the emergency department of the Medeniyet University Hospital due to trauma between 1 September 2014 and 1 September 2015. We examined patients' sociodemographiccharacteristics, radiological images, history of fracture, chronic diseases and drugs used. Finally, attained data were analysed using statistical tests and compared with the relevant literature.*

***Results:** Of the 300 patients, 75.7% (n = 227) were females and 24.3% (n = 73) were males. Falls were the leading reason for injuries in this study. As age increased, the number of females, admissions to emergency department and long bone fractures increased (P < 0.05). Furthermore, 62.7% (n = 188) of all patients were discharged and 37.3% (n = 122) were hospitalised to clinics.*

***Discussion:** In the elderly population using multiple drugs, gender and comorbid diseases are crucial factors related to morbidity and mortality. Thus, family members should be informed about protective measures to decrease multiple drug use as well as to prevent the deterioration of the life comfort of patients and the emergence of possible new cases.*

Keywords: *Trauma, fracture, geriatric patient, fall.*

INTRODUCTION

At present, the world is witnessing a steady upsurge in the ageing population, especially in developing countries. World Health Organization (WHO) stated that while 390 million population was aged over 39 years as of 1998, this number will reach 800 million by 2025, accounting for 10% of the total world population. While the life expectancy was 48 years in 1955, it increased to 65 years in 1995 and is estimated to reach 73 years by 2025 (1). In Turkey, people aged >65 years constitute 7% of the total population, and the average life expectancy is estimated to be 70 years for males and 75 years for females (2).

However, more important than the expected lifetime is the protection of the quality of life in these years. In the United States, accidents account for the fifth most common cause of death among the elderly, with fall being reported as the primary cause of such accidents (3). Fall could be attributed to several causes that are categorised into internal (intrinsic) factors (such as impaired balance, neurological disorders, sensory loss, musculoskeletal disorders, cognitive disorders, postural hypotension and drug use) and external (extrinsic) factors. Studies have revealed that impaired balance is the leading cause of fall among the elderly. In addition, a high correlation has been established between disbalance and falling frequency (4-7). Furthermore, falling story, walking or balance problems have been known to increase the risk of fall by three-fold (7).

A study reported that 10%–25% of all falls were related to poor balance and gait disturbances (8). While the incidence of gait disturbances among the elderly aged ≥65 years is 15%, it is 75% in those aged >75 years. The cause of a disorder could be a specific disease, or it might also be a combination of various factors such as muscle weakness, muscular atrophy, degenerative changes in joints, impaired neuromuscular coordination, visual loss and postural changes. In the elderly, while the step length and walking speed decreases, the step clearance and toe-to-finger version increases. Reportedly, the only factor affecting the walking speed among males is age, whereas the step length among females is affected by age, height and physical activity (9). In addition, the risk of fall increases as the number of risk factors exhibited by a person increases. Reportedly, fall due to age-related changes accounts for injuries to the tissues, fracture, fear of falling again, loss of function or even death (4,5,7). Fear of fall affects the sense of trust among the elderly in performing daily life activities and results in a less active lifestyle, increasing the risk of fall, especially in the lower extremities, and accounting for muscle atrophy and muscle weakness (10). Hence, the prevention of fall among the elderly will reduce disability, enhance the quality of life and reduce health-related costs (11).

As WHO defines health not only by disease or disability but also by the physical, psychological and social well-being of individuals, the quality of life has gained importance. Apparently, several sociodemographic characteristics, such as socioeconomic level, marital status and age, affect the quality of life among the elderly. Fall is one of the leading factors that adversely affect the quality of life in the elderly; thus, all the factors that affect fall have now begun to be considered to reduce the risk of fall and augment the quality of life while designing rehabilitation programmes (6).

We aimed to investigate age-related physiopathological changes, chronic diseases, medication usage, age distribution of patients, hours of emergency visits and any organ injury besides fracture among patients aged ≥65 years in whom fractures were detected using radiological imaging and to ascertain the etiological distribution by assessing the drug use and chronic or acute comorbidities among these patients. Furthermore, we intended to determine the demographic characteristics of patients, traumatic consequences of such disorders and their preventable causes, followed by collecting evidence-based data.

MATERIALS AND METHODS

This study was conducted in the emergency department (ED), the first-level trauma centre, of the Istanbul Medeniyet University Göztepe Training and Research Hospital Emergency Medicine Department, a third-stage hospital. We retrospectively collected data between 1 September 2014 and 1 September 2015 of 300 patients aged ≥65 years with fracture due to trauma. Notably, we excluded patients whose complete data could not be obtained because of the workload in ED or whose medical records were not stored properly.

The study protocol was approved by the Ethics Committee of the Medeniyet University Göztepe Training and Research Hospital (approval number: 2015/0124). All patients underwent resuscitation according to the advanced trauma life support guidelines and were diagnosed and treated per the existing protocols. Patients' data were obtained from their file records and hospital electronic records system. We investigated parameters such as age, gender, chronic diseases, drugs used, number of drugs used, trauma type relationship with these drugs, occurrence type of an event, application time, fracture type, injured organs and grade, injury zones, isolated or multiple occurrences of an injury, rates of hospitalisation/intensive care and clinical and treatment outcomes.

In the descriptive statistical analysis of the obtained data, we used the mean, standard deviation, median lowest and highest, frequency and ratio. We used Kolmogorov–Smirnov test to determine the distribution of variables and Kruskal–Wallis and Mann–Whitney U-tests to analyse the quantitative data. In addition, we used χ^2 test to analyse the qualitative data and Fischer's exact test when χ^2 test conditions were not met. We used the SPSS 22.0 programme for statistical analyses. in this study.

RESULTS

In this study, we examined 300 patients aged ≥65 years who were diagnosed with fractures using radiological imaging in ED. Notably, patients with inaccessible file notes, missing file information and resuscitation in ED and those brought in as ex-duhul were excluded from the analysis. The age distribution of the study cohort was 65–75 (45%; n = 135), 76–85 (35%; n =

105) and ≥86 years (20%; n = 60). Of all patients, 75.7% (n = 227) were females and 24.3% (n = 73) were males. The types of trauma were out-of-vehicle traffic accident (3.7%; n = 11), in-vehicle traffic accident (1%; n = 3), assault (0.3%; n = 1) and fall (95%; n = 285; Table 1).

Table 1. *Distribution of study parameters*

		Min–Max	Median	Mean ± SD/n%	
Age		65–98	77	77.2 ± 8.3	
	65–75			135	45.0%
	76–85			105	35.0%
	≥86			60	20.0%
Gender	Female			227	75.7%
	Male			73	24.3%
Form of trauma	Traffic accident (out-of-vehicle)			11	3.7%
	Traffic accident (in-vehicle)			3	1.0%
	Assault			1	0.3%
	Fall			285	95.0%
Chronic disease	Presence			36	12.0%
	Absence			264	88.0%

As the age of patients increased, the rate of female patients increased significantly (P < 0.05); however, the type of trauma did not differ considerably. In addition, as the age increased, the rate of hospitalisation exhibited a significant increase (P < 0.05), but the distribution of type of trauma and reference time were insignificant (P > 0.05; Table 2).

Table 2. *Comparison of parameters according to age.*

		Age						P
		65–75		76- 85		≥85		
		n	%	n	%	n	%	
Gender	Female	93	68.9	84	80.0	50	83.3	**0.042**
	Male	42	31.1	21	20.0	10	16.7	
Form of trauma	Traffic accident (out-of-vehicle)	4	3.0	4	3.8	3	5.0	0.114
	Traffic accident (in-vehicle)	0	0.0	1	1.0	2	3.3	
	Assault	0	0.0	0	0.0	1	1.7	
	Fall	131	97.0	100	95.2	54	90.0	
Conclusion	Discharge	95	70.4	65	61.9	28	46.7	**0.007**
	Admission	40	29.6	40	38.1	32	53.3	
Access time	00:00–08:00	8	5.9	7	6.7	6	10	0.692
	08:00–17:00	88	65.2	63	60.0	39	65.0	
	17:00–00:00	39	28.9	35	33.3	15	25.0	

Furthermore, while 88% (n = 224) of patients were using drugs, 12% (n = 36) were not; among the former, 53.3% (n = 160) used four or more drugs and 34.7% (n=) used three or less drugs. Notably, these drugs were cardiac (65.7%; n = 197), anti-diabetic (26.3%; n = 79) and anti-osteoporotic (25.3%; n = 76; Table 3).

Table 3. *Comparison of distribution of parameters.*

		Age	65–75	76-85		≥86		P
		n	%	N	%	n	%	
Chronic disease	Absence	12	8.9	13	12.4	11	18.3	0.171
	Presence	123	91.1	92	87.6	49	81.7	
Drug usage	No	12	8.9	13	12.4	11	18.3	0.220
	3≤	53	39.3	36	34.3	15	25.0	
	≥4	70	51.9	56	53.3	34	56.7	

Type of drug							
Cardiac	95	70.4	66	62.9	36	60.0	0.280
Anti-asthmatic	22	16.3	10	9.5	7	11.7	0.285
Anti-aggregant	28	20.7	20	19.0	18	30.0	0.235
Anti-coagulant	2	1.5	3	2.9	0	0.0	>0.05
Anti-diabetic	46	34.1	25	23.8	8	13.3	**0.008**
Psychiatric	42	31.1	44	41.9	23	38.3	0.212
Anti-cholesterol	21	15.6	15	14.3	7	11.7	0.774
Anti-goitre	8	5.9	7	6.7	2	3.3	0.662
Anti-osteoporotic	28	20.7	29	27.6	19	31.7	0.216
Anti-parkinsonian	4	3.0	1	1.0	3	5.0	>0.05

While the rate of chronic disease and drug usage were not significant ($P > 0.05$) as the age, the rate of anti-diabetic drug usage decreased significantly ($P < 0.05$) with the increasing age (Table 3). Table 4 presents fracture locations. Furthermore, the fractures of the humerus and femur increased with the increasing age, whereas the age and fracture rate in the hand and foot decreased significantly ($P < 0.05$; Table 4).

Table 4. *Comparison of anatomic locations of fracture according to age.*

	Age 65–75		76–85		≥86		*P*
	n	%	*n*	%	*n*	%	
Location of fracture							
Humerus	14	10.4	19	18.1	17	28.3	0.007
Femur	19	14.1	27	25.7	25	41.7	0.000
Pelvis	5	3.7	3	2.9	1	1.7	>0.05
Forearm	39	28.9	26	24.8	8	13.3	0.065
Hand	15	11.1	6	5.7	1	1.7	0.048
Leg	7	5.2	10	9.5	3	5.0	0.346
Foot	28	20.7	10	9.5	3	5.0	0.004
Ankle	5	3.7	2	1.9	1	1.7	>0.05
Elbow	3	2.2	2	1.9	1	1.7	>0.05
Clavicle	1	0.7	2	1.9	1	1.7	>0.05
Scapula	1	0.7	1	1.9	0	0.0	>0.05

DISCUSSION

Gender has been reported as a risk factor for fall, and several studies have shown that the rate of falls among females is higher than that among males (12). Chu et al. reported that the incidence of fall among females was higher than that among males (4). Likewise, Karataş et al. reported that the risk of fall among females aged >65 years was four times higher than that among males (5). In this study, we established a significant correlation between fall and gender, as falls were found to be markedly higher among females than among males. Regarding the cause of trauma among the elderly population, fall has been reported as the leading cause, followed by motor vehicle accident . The fact that geriatric people get on traffic less could be attributed to this low rate.

Studies have reported that the risk of femur fractures because of simple fall is higher among the geriatric population than among the young people because of osteoporosis and osteoarthritis (13). In addition, spinal, pelvic and forearm fractures in minor traumas are common due to osteoporosis. In this study, forearm and femur fractures were found to be the leading extremity fractures; furthermore, humerus and foot fractures were frequent. We found that with increasing age, the rate of humerus and femur fractures increased considerably and the rate of hand and foot fractures decreased markedly.

It is known that of the population aged ≥65 years, 90% 1, 35% 2, 23% 3 and 15% 4 have chronic health problems (14). Recently, a study revealed that 64.3% of the elderly had hypertension and congestive heart failure, 13.1% had diabetes mellitus and 15.5% had osteoporosis (15). Likewise, 88% (*n* = 264) patients had history of at least one disease along with cardiac diseases (65.7%), psychiatric disorders (36.3%),

diabetes mellitus (26.3%) and osteoporosis (25.1%).

A study conducted on patients visiting the Hacettepe University Geriatric Unit (16) reported that patients had used drugs on an average of 3.79/day. In another study, patients had used drugs on an average of 4.5/day (17). Lawlor et al. reported a considerable correlation between fall and circulatory system diseases, chronic obstructive pulmonary disease, depression and arthritis (18). Chu et al. reported that osteoarthritis, stroke and dementia affect recurrent falls and while dementia is affects both fall and recurrent fall, Parkinson's disease does not affect recurrent fall; furthermore, visual acuity disturbances did not increase the risk of fall or recurrent falls (4). Gemalmaz et al. reported that the risk of fall among patients with cerebrovascular diseases was high, but no significant association was found between hypertension and the risk of fall (3). Furthermore, Karataş et al. reported that only the presence of hypertension was more frequent in the fall group.

The increased prevalence of chronic diseases causes the elderly population to use more drugs (2). A nursing home-based study in Turkey by Arslan et al. reported that most frequently used drugs were the cardiovascular drugs (26.7%), followed by analgesics and non-steroid anti-inflammatory drugs (NSAIDs; 20.8%). Reportedly, drug use is one of the major risk factors for fall. For instance, psychotropic drugs, such as sedatives, hypnotics, anti-psychotics, benzodiazepines and anti-depressants; anti-arrhythmic drugs; diuretics; anti-hypertensives; anti-parkinsonian agents and anti-convulsants have been reported to exacerbate the risk of fall (4,12,20,21). In addition, as prescription drug increases, the risk of fall increases (4,20,21). Another study reported that the use of four or more drugs highly correlated with the increased risk of fall (7,12). In this study, 36 patients did not use drugs, 104 used three or less per day and 160 used four or more per day. Seckin et al. reported that the most commonly used drugs were NSAIDs (46.3%), followed by cardiovascular drugs (37.8%) (22). In this study, the drug usage comprised cardiac (65.7%), psychiatric (36.3%), anti-diabetic (26.3%) and anti-osteoporotic (25.3%) drugs, and we observed no significant correlation between the use of these or four or more drugs and fall among the elderly. Similarly, Gemalmaz et al. reported no significant association between multiple drug use and the risk of fall (3). However, Kosk et al. reported that the use of benzodiazepines, Ca-channel blockers and anti-inflammatory drugs correlated with the fall risk, leading to injury (23). Furthermore, Kelly et al. reported that narcotic, anti-convulsant, anti-depressant, anti-psychotic, sedative, anti-parkinsonian and anti-coagulant drugs are an independent risk factor for fall, causing injury in the Canadian elderly population (19).

Among the geriatric population, fall is the leading cause of injury, and as age progresses, the frequency of fall increases. As most patients with falls have been found to be using anti-hypertensive or anti-arrhythmic drugs, the medication history of elderly patients should be carefully obtained during the application, and the treatment of comorbid diseases should be planned accordingly.

Conclusion

The proportion of geriatric patients with trauma is increasing worldwide, and these patients are more exposed to trauma than young people. Conversely, fall among elderly patients is more frequent because of their slow motion and diminishing self-protection. We reported the increasing rate of trauma among the geriatric population due to fall or another cause, highlighting the importance of developing safety measures for older adults and informing patients' relatives about these measures. Thus, future studies are warranted for developing strategies for the safety of elderly population.

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