The Influence of the Use of Benzodiazepines in the Frequency Falls in the Elderly

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INTRODUCTION: Falls are an important factor of morbidity and mortality in the elderly. Every year falls between 30% and 40% of people over 65 years, and the consequences of injuries in this age are much severe than in the younger age groups. Most of these falls resulting from complex interactions between the external and internal factors. The causes of falls of elderly patients are most frequently accidental, limb weakness, difficulty walking and taking medication.

Material and Methods: Cross-sectional study, the control type, we analyzed the frequency of falls and individual risk factors for falls in the elderly (≥ 65 years). The dependent variable was the decline and potential risk factors were used: age, sex, use of benzodiazepines. Results: Out of 376 respondents were significantly more women 242 (64%) compared to 134 men (46%), the decline has been seen 128 (34%) were taking benzodiazepine 216 (57%) of the respondents, the most commonly used benzodiazepine is bromazepam and a positive correlation was found between the use of benzodiazepines and frequency of falls. Key words: Benzodiazepines, frequency falls, elderly.

CONFLICT OF INTEREST: NONE DECLARED

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1. INTRODUCTION

Results of gerontological analysis confirmed that falls and injuries are dominant in the elderly, as well as the consequences of injuries in this age are much severe than at the younger age groups. Every year, about a third of elderly people fall and one-third of patients who fell, does not remember falling. In addition to pain, fear and feelings of insecurity, some falls lead to physical injuries, medical complications and premature death (1).

Epidemiological data on injuries in the elderly represent significant factor in the structural causes of mortality and hospitalization of the elderly. Specifically, the data in gerontological files in Croatia for 2004 show that almost 96% of injured people were over 65 and died due to a femoral fracture. Of the total number of women who died from fractures every one were older than 65, while for men that proportion was 90.91%. The elderly are extremely exposed on the effects of injury or complications: bed sores, contractures, infection, decreased mobility and increased mortality due to hypostatic pneumonia (2).

Aging of musculoskeletal system is expressed as reducing functions of the human body and gives it specific external characteristics. The function of certain organs is changing, and sooner or later occurs physical disability. Muscular strength is directly responsible for the dynamics of the body, and decreases by aging from 30 to 40%. Regression aging processes result in reduced anatomical substrate support and other tissues, and thus changes in organ function. These changes are particularly pronounced in the joints, so that the deforming arthritis is main and most common clinical sign of musculoskeletal system aging (2,3).

Aging begins at conception and runs continuously through a complex game of hereditary and environmental factors (4). Aging leads to progressive and irreversible change in the structural functions of the body which leads to reduced possibilities for adjusting to environment and increasing the risk of death. Elderly often also suffer from more chronic diseases, and have more common complications of those diseases (4,5). Changes in body function of the elderly can occur due to pathological processes more often than the younger persons. This results in diseases such as coronary heart disease, hypertension, brain disease, cancer and diabetes mellitus. There are relatively specific health problems of older people, such as urinary incontinence, instability and falls, immobility, depression, dementia, changes in homeostasis and addiction. The use of multiple medications in older patients (polypharmacy or polypharmacy) enables the development of new diseases that may be nothing more than a side effect of drugs (6,7,8).

The average life expectancy for women is 74 and for men 68. In the third age there is significantly larger number of women (5). In Croatia, in 2001 the share of the elderly in general population was 16%, and in the 2004 the figure increases to 17% (1).
According to the definition of the World Health Organization seniors are aged 60-75 years, elderly are aged 76-90 years old, and very old people are the ones that have more than 90 years (9). This threshold is low in developed countries where the average life expectancy of about 75 years, high for poorly developed where the average life expectancy is about 45 years. There are differences in the definition of the beginning of old age. In Western countries, “old age” is usually associated with a age of 60 or 65 years, which is connected to the socially constructed concept that is based on the statutory retirement age. Old people are methodologically classified as “young old” 65-74 year medium of 75-84 years and the oldest 85 years (9,10).

Falls are an important factor of morbidity and mortality in the elderly. Every year falls between 30% and 40% of people over 65 years. The incidence of falls increases from middle age and reaches its maximum at the age of over 80 years. Recovering from a fall is often complicated, with impaired quality of life and injuries causing limited mobility and decrease life activities and functionality. People who have experienced a decline suffer serious consequences such as a hip fracture and head trauma with a prevalence of 20%–30% (11,12). Risk factors for falls are generally divided into external and internal factors. The causes of falls are usually multiple, so it is very important to know all the factors that contribute to falls in order that preventive actions be effective. However, most of the falls are a result of complex interactions between the external and internal factors (1).

Internal factors that contribute to falls include, with age related changes in posture, speed and ability to see the presence of acute and chronic diseases affecting sensory perception, central nervous system, musculoskeletal strength and coordination. This implies slower reflexes, decreased function of the extremities, decreased muscle tone, a change in the control of body position (reinforced rocker patient), slower gait, decrease in visual ability and reduced color vision. Indoor risk factors for falls are also certain diseases: arthritis (particularly knees), previous stroke, fracture, peripheral neuropathy, dementia, amputation of the foot or lower leg, Parkinson’s syndrome or postural hypotension (11). Medications that increase the risk factor for falls in this subpopulation are: antirhythmic drugs, anti-histamines, anti-hyptertensives, benzodiazepines, diuretics, muscle relaxants and tricycles antidepressants (1).

External factors that lead to falls include poor lighting, inadequate furniture, slippery floors (slippery, smooth, uneven), loose floor mats, a bathroom without holder, inappropriate footwear, slippery terrain, and other (1,6).

The causes of falls of elderly patients are most frequently accidental, caused by limb weakness, difficulty walking and taking medication. The aging process affects the systemic effects of drugs in humans: slows down the absorption, metabolism and elimination of drugs which delay the onset of effective action. As a rule, older people are more sensitive to the application of the usual doses of drugs used in the middle age of life, but in them also unwanted drug reactions (side effects) and drug poisonings is often. Over 20% of falls is caused by treatment with drugs that cause postural hypotension: sedatives, anxiolytics, antidepressants and other (3,6,13). Falls in geriatric patients can cause acute disease in 20% of cases: pneumonia, myocardial infarction, arrhythmia, stroke, etc. (3,6,11).

Particular risks are the use of benzodiazepines and other psychotropic drugs. It is now known psychometric tests and confirmed that the sensitivity of older patients to benzodiazepines is increased and their effects last longer than in young adults. Clinical experience suggests that benzodiazepines prescribed to old patients in hypnotic doses defined for young patients can cause prolonged daily confusion even after single dose.

Aging reduces the metabolism of some drugs (e.g. benzodiazepines), which was confirmed by a reduced hepatic clearance. Reduced clearance of benzodiazepines has important clinical consequences, as well as a long half-life of several active metabolites. Slow accumulation can lead to side effects that can occur after a few days or weeks of starting therapy. Benzodiazepines to older patients are commonly prescribed in order to treat insomnia and anxiety symptoms. Most often it is prescribed by family physicians and psychiatrists in primary health care. Research conducted in a nursing home in the United States (U.S.) has shown that the use of benzodiazepines or antipsychotics was associated with a high risk of fall (odds ratio = 11) (14).

The research objectives are: 1. Determine prevalence falls, the frequency and types of complications of falls in the elderly. 2. Determine the relationship between the frequency of falls with aging and by gender. 3. Determine the relationship between the frequencies of falls due to use of benzodiazepines.

2. SUBJECTS AND METHODS

Research is of retrospective-prospective, control type that was conducted in order to analyze the frequency of falls and their complications, as well as the detection and analysis of risk factors for falls in the elderly (≥ 65 years) who are treated by family medicine teams in Tuzla Canton. Reviewed was 20 medical records of patients, aged ≥ 65 years, from each of the 20 selected family medicine teams (a total of 20x20 = 400 medical records = 400 respondents). From the baseline sample we studied a group of patients who have had a medical record of falling. The control group consisted of patients which in their medical records did not have information about the fall. Exclusion factors was recorded diagnosis of epilepsy in medical records of patients, blindness, patients with lower-extremity amputation and the fact that patients did not report the doctor of the day when they turned 65.

The dependent variable is the fall, and by definition relevant fall is the one that happened suddenly, with no apparent effects of external forces or the existence of physical barriers to normal movement or existence of adverse weather or other conditions that could cause or contribute to the fall. As potential risk factors for falls are used the following independent variables: age, sex, the use of benzodiazepines and other psychotropic drugs. In addition to information about taking ben-
Benzodiazepines and other psychotropic medications were taken also the data on the type of benzodiazepines/psychotropic medications, duration of use and recommended dose of benzodiazepines. Results are presented stratified by sex, age groups, chronic diseases, according to the type and dose of benzodiazepines.

All data were analyzed by statistical software package SPSS 17.0 (SPSS Inc., Chicago, IL, USA). Standard tests of descriptive statistics were conducted with measures of central tendency and dispersion. All variables by Kolomogorov-Smirnov test showed no affiliation or normal distribution. Quantitative variables were tested by Student’s t-test if they were normally distributed, or by the Mann-Whitney test if they were distributed asymmetrically. Qualitative variables were tested by chi-square test with continuity correction. For significant differences were obtained by chi-square test was determined by odds ratio (odds ratio – OR) with 95-percent confidence interval. All tests are interpreted with the level of significance of 95% (p < 0.05).

3. RESULTS

Of the total of 376 respondents, women were significantly more present 242 (64%) compared to 134 men (36%, 134 242 36% vs. 64%, P = 0.001). Most of the respondents was aged 65-74 years, 227 out of 376 (60%) patients. Only 3 of the respondents aged after 90. The mean age of respondents was 73.66±5.89 years. Falls experience has 123 out of 376 respondents. The prevalence of falls in the geriatric population is 34% (Figure 1). We found a statistically significant difference in the incidence of falls by age subgroups of patients (χ² = 4.356, df = 5, P = 0.491) (Table 1). Also, there is no statistically significant correlation between falls and age groups (Pearson’s correlation factor = 0.58, P = 0.263) (Table 2). Significantly more falling was present among women 103: 31 (23%) vs. 145:97 (40%), χ² = 11.033, P = 0.001. (Figure 2). There was 2 times higher risk of falls in female patients aged ≥ 65 years (odds ratio = 2.22, 95% confidence interval, or 95% CI (confidence interval) = 1380-3580. 60-2917). The most common use of sedatives is the bromazepam (Table 2). There are significant differences in the choice of medication (P = 0.001). Each individual differs in composition benzodiazepine increases the risk of falls (Spearman correlation factor 0.239, P = 0.001). Patients taking sedatives in years (range 0-17). There is a positive correlation between the frequency of falls and length of continuous use of such substances (Spearman correlation factor 0.220, P = 0.001) between the frequency and duration of benzodiazepine preparations use and falls (taking sedatives) expressed in years (Spearman correlation factor 0.197, P = 0.009). Also, we found a positive correlation between the frequency of falls in relation to the prescribed or the number of daily intake of sedatives (Spearman correlation factor 0.207, P = 0.001).

4. DISCUSSION

For this study, selected 376 patients with an average age 73.66 ± 5.89 years. Falls in the elderly lead to death or injury to which the treatment is expensive and time consuming. Every year fell nearly 1.8 million older Americans, resulting in the death of 16000 (15). The mortality rate due to falls increases dramatically with age over 65 years in both sexes and in all racial and ethnic groups. Falls are the cause of accidental death, especially in people aged 75 years and over. More than 90% of hip fracture is the result of falls, and most of these fractures occur in people older than 70 years (16). Hospitalization of persons who have experienced a decline takes almost twice as long as those who are hospitalized for other reasons. In people who have experience of the fall there was a significant decline in general daily activities, and decrease in physical and social activities (17). Falls are the leading cause of death and injury in the elderly, which have the effect of disability and immobility, which often requires ongoing medical care and the high cost of treatment. Only in 2000 in the United States (U.S.) 1.8 million patients visits hospitals due to falls, including 340,000 with hip fractures. Direct medical costs on this basis amounted to 16.4 billion dollars (18). Each year, one-third of 65-year-olds and older suffer from health problems that are the result of falls. Data show that in the United States from 35 million elderly people 10 million experience fall (18). This is consistent with the results of our research. In our research experience of falls had one third of respondents. Decline in old age not only causes physical injury, health complications and premature mortality, but it is directly linked with mental health problems. The emergence of fear...
of falling even in normal situations is not uncommon in older people. About 6% of hospitalizations in older age accounted for hospitalization due to injuries (half of which is due to hip fracture) (18). The risk of falling increases with age and is higher in women than in men. Our results are contradictory. We found a statistically significant difference in the incidence of falls by age subgroups of patients ($\chi^2 = 4.356, df = 5, P = 0.491$). Also, there is no statistically significant correlation between experience falls and age groups (Pearson's correlation factor = 0.058, $P = 0.263$). Significantly more falling and hurting women 103: 31 (23%) vs. 145:97 (40%), $\chi^2 = 11.033$, $P = 0.001$. Two-thirds of those who experience the fall will fall again within six months. Osteoporosis contributes to falls and injury severity (16). Risks for falls can be found in reduced physical activity and irregular exercise resulting in poor muscle tone, decreased strength and loss of bone mass and flexibility (19). At least one third of all falls in the elderly involve environmental hazards in the home. Falls are the leading cause of injury associated with emergency room visits in the United States and the primary etiology of accidental deaths in people older than 65 years (20). Sedatives, antidepressants and antipsychotics may reduce mental alertness, cause disturbance of balance and walking, and also cause orthostatic hypotension. In addition, people who take multiple medications are at greater risk of falling (21,22). The most common used sedative is the bromazepam. There are significant differences in the choice of sedation ($P = 0.001$). Each individual difference in composition of benzodiazepines increases the risk of falls (Spearman correlation factor $0.239$, $P = 0.001$). Patients taking sedatives for years (range 0-17). There is a positive correlation between the frequency of falls and length of continuous use of such substances (Spearman correlation factor $0.220$, $P = 0.001$) between the frequency and duration of benzodiazepine preparations use (taking sedatives) expressed in years and falls (Spearman correlation factor $0.197$, $P = 0.009$). Also, we found a positive correlation between the frequency of falls in relation to the prescribing or the number of daily taken sedatives (Spearman correlation factor $0.207$, $P = 0.001$). Problem use of benzodiazepines and other drugs that may affect the gait is strong in these demographic and regional groups, and is not often explored. In our region is almost never evaluated. Toxic effects and adverse reactions to polypharmacy may seriously endanger the health and safety of elderly patients, but at the same time doing significant damage and expense to health economics.

4. CONCLUSION

Results of our study showed that the incidence of falls among elderly people in our region in line with global trends. Women more often fall in relation to men. With increasing age does not increase significantly the frequency of falls, which is not consistent with other studies in the world. Our subjects were exposed to a continuous action of benzodiazepines in a long period of time, for years. There is a significant correlation between the length and frequency of benzodiazepines use and falls. The most commonly used is bromazepam. Each differs in composition, respectively, of benzodiazepines increases the risk of falls. There is a positive correlation between the signature (intake) benzodiazepines and frequency of falls. It is evident that injuries are a major public health problem of the elderly and how essential effective prevention programs to reduce the number of hospitalizations and mortality in the elderly, due to injuries. Injuries are highly preventable and largely in old age can and must be avoided. Physicians in family medicine daily happiness with this problem and this research is at least partially elucidate this problem, and can be helpful for prevention and rationalization of prescribing benzodiazepines older patients.

REFERENCES