Falls amongst older people living in the community

Wojszel ZB, Bień B

Department of Geriatrics, Medical University of Białystok, Poland

Abstract

Purpose: **Falls (instability) – as well as immobility, incontinence, intellectual impairment, depression and visual and auditory impairment are considered to be serious problems in the field of geriatrics. They have multiple causes, tend to reoccur, have no simple cure and make the older person dependent on others for care. This paper presents the results of the study on the prevalence of falls and their determinants in communities of older people (aged 75 and over).**

Material and methods: **The study design: cross-sectional questionnaire study and survey. The studied population lived in two chosen areas (urban and rural). The questionnaire, as well as instruments to verify the respondent's skills and functional ability, were used. Doctors and nurses employed in the studied areas were interviewers.**

Results: **457 randomly selected older people (228 from the rural area and 229 from the urban one) took part in the study. Falls in the course of the last year were reported by 45.1% of the group; more frequently by people living in the rural area (58.3% versus 31.9% in the urban one), by women (66.7% versus 44.8% in the men's group) and by people with different disabilities (cognitive impairment, locomotive disabilities, ADL-dependence, visual and auditory impairment), with poor self-reported health status and living arrangements. The score according to Tinetti's test--conducted in the rural areadetermined the frequency of the falls reported.**

Conclusions: **The study has confirmed that falling is an increasing hazard for older people, especially for women, for people living in rural areas and for those with different mental and physical disabilities.**

Key words: falls, community dwelling older people.

Introduction

Falls (instability) – as well as immobility, incontinence, intellectual impairment, depression, visual and auditory impairment are considered to be serious problems in the field of geriatrics. They have multiple causes, have chronic reoccurrences, no simple cure and make the elderly person dependent on others for care, and their quality of life deteriorates [1]. This also constitutes a large problem in the area of public health due to the frequency, consequences, and cost for essential medical attention. Falls are the main cause of death caused by accidents for those over 65, and the percentage of fatalities as a result of the accidents has risen significantly, regardless of the gender. In groups of people over the age of 75, these falls constitute 70% of the fatalities caused by accidents [2]. Fractures and bruises are the most common injuries resulting from falls; in groups of older people, there is often a need to be hospitalized as a consequence [3]. Over 90% of the femoral bone fractures are the results of such falls and they occur most often in the over 70 age group [4].

The aim of this paper is to present the results of a study on falls amongst the older population living in the community, rather than health care institutions, the frequency of the falls as well as the factors that influence them.

ADDRESS FOR CORRESPONDENCE:
Beata Wojszel M.D.
Department of Clinical and Social Gerontology
Medical University of Białystok
ul. Kilińskiego 1
15-089 Białystok, Poland
Tel: 48 85 7485665 Fax: 48 85 7485666
e-mail: wojszel@amb.edu.pl

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Material and methods

This research constituted a part of the cross-sectional research devoted to the large geriatric problems in older persons. The populations studied lived in two chosen areas – urban (an urban district of Białystok) and rural (the municipality of Sokółka, not including the town of Sokółka), both with high percentages of demographic senility – those over the age of 65 and over made up 27.9% of the urban population and 18.5% of the rural population.

A representative sample of those living in the communities who were over the age of 75 was chosen: 299 people from the urban area and 313 from the rural area.

A questionnaire taking into account the following: 1) the social – demographic evaluation, 2) the occurrence of falls and other disabilities pertaining to older people, 3) the occurrence of chronic illnesses, 4) pharmacotherapy, and 5) the evaluation of the respondent's skills and functional ability with the help of a functional ability scale was used.

The following instruments were used to rate the respondent's functional ability:

- The EASY-Care questionnaire – used mostly to evaluate functional ability in the range of – ADL, Activities of Daily Living [5]. This took into account both instrumental activities ADL (I-ADL) – cleaning, meal preparation, shopping, using the telephone, taking medication, moving outside the home etc., as well as basic ADL (P-ADL) – being able to take care of oneself (eating, incontinence, using the toilet, bathtub/shower). In terms of ADL, the respondents were categorized as: able-bodied, dependent on others for care only in I-ADL (if there was an occurrence of at least one instrumental disability, but not in the self-care activities) or dependent on others for care in I-ADL and P-ADL (if there was an occurrence in at least one self-care activity). If sporadic urinary incontinence was the only disability, then the respondent was categorized as able-bodied.
- The scale of movement according to J. Piotrowski [6] – placed the respondents into 1 of 4 groups. Group I – persons able to move freely at home and outside the home; group II – persons moving freely around the home but having difficulties moving outside the home; group III – persons able to move around the home but who can not move outside the home; group IV – persons who are bedridden, in a wheelchair, or confined to an armchair.
- A questionnaire rating cognitive functions according to Katzman [7] – the test results were on the following scale: from 0 to 10 points showed a normal state or slight cognitive impairment, from 11 to 28 points – a moderate to serious cognitive impairment in the respondent.
- GDS - The Geriatric Depression Scale [8] – the emotional state of the respondent was rated in according to the following scale: from 0 to 5 points as a normal emotional state and a suspected state of depression with a rising tendency from 6 to15 points.
- Tests measuring the risk of falling according to Tinetti [9], used in the case of the urban respondents, as an element objectifying the functional impairment.

Doctors and nurses employed in the studied areas were interviewers.

The STATISTICA 5.0 [10] program was used to analyze the collected data. The Chi square Pearson test was used. A p-value of 0.05 or lower was considered to be statistically significant.

A detailed description of the research methodology was presented in an earlier publication [11].

Table 1. **Age and gender structure of examined groups in urban and rural areas**

	Urban [N=229]		**Rural** [N=228]	
	n	%	n	%
Age	p=0.02*			
75 - 79 years old	139	60.7	109	47.8
80 - 84 years old	44	19.2	67	29.4
85 - 89 years old	36	15.7	36	15.8
+ 90 years old	10	4.4	16	7.0
Average age [in years]	79.8±5.0		80.8±4.8	
Gender	NS*			
Male	82	35.8	87	38.2
Female	147	64.2	141	61.8

*Chi square Pearson test
NS – the differences are statistically insignificant

Results

463 persons took part in the research project focusing on serious problems in the field of geriatrics: 233 from the rural area (R) – 76.9% of the respondents, and 230 from the urban areas (U) – 74.4% of the respondents. Responses to the question of falls within the last twelve months were only given by 457 respondents (229 in the urban area and 228 in the rural area).

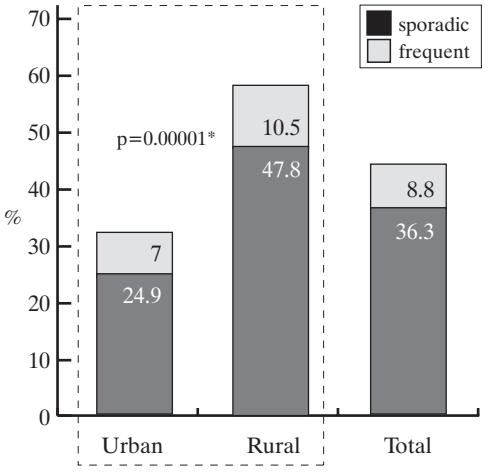
Age and gender structure of the examined groups are presented in *Tab. 1*. In both areas, most of the respondents were women (U – 64.2%; R – 61.8%), and in the case of the rural areas, there was a larger number of older sub-groups (52.2% persons 80 years of age and older versus 39.3% in the urban). The age structure in the male and female groups was similar in both of the studied areas. A detailed description of the social and demographic characteristics was presented in an earlier publication [12].

45.1% of the respondents claimed to have fallen and 8.8% of those examined stated that the falls were frequent (at least a few times during the year) – *Fig. 1*.

The frequency of falls (sporadic or frequent) was correlated with some of the socio-demographic parameters and is presented in *Tab. 2*. The evaluation of the respondent's state of health and their functional ability is presented in *Tab. 3*.

The frequency of falls increased in the older sub-groups (especially the falls rated as frequent), but not significantly. The gender of those interviewed did have an essential influence on the number of falls. 39.6% of the female respondents and 30.8% of the male respondents stated that the falls were sporadic, whereas 11.8% of the female and 3.5% respondents claimed that the falls were frequent. Significantly more often this prob-

Figure 1. **The prevalence of falls during the last 12 months in examined older people in rural and urban areas (in %)**



*Chi square Pearson test

Table 2. **Frequency of falls during the last 12 months and age, gender and living arrangements (N=457)**

Falls in the interview	None [%]	Sporadic [%]	Frequent [%]
Gender		p=0.0003*	
Male (n=169)	65.7	30.8	3.5
Female (n=288)	48.6	39.6	11.8
Age Group		NS	
75-79 years old (n=248)	58.5	351	6.4
80-84 years old (n=111)	53.2	35.1	11.7
85-89 years old (n=72)	50.0	41.7	8.3
+ 90 years old (n=26)	42.3	38.5	19.2
Place of residence		p=0.00001*	
Urban (n=229)	68.1	24.9	7.0
Rural (n=228)	41.7	47.8	10.5
Scale of living standards		p=0.006*	
Good (n=317)	60.2	31.9	7.9
Average (n=117)	45.3	43.6	11.1
Poor (n=23)	30.4	60.9	8.7

* Chi square Pearson test

Table 3. **Frequency of falls during the last 12 months and state of health / functional ability (N=457)**

Falls in the interview	None [%]	Sporadic [%]	Frequent [%]
Sight		p=0.00001*	
Fully sighted (n=284)	64.4	32.4	3.2
Partially sighted/blind (n=173)	39.3	42.8	17.9
Hearing		p=0.00001*	
Sound of hearing (n=266)	64.3	29.3	6.4
Hard of hearing/deaf (n=191)	41.9	46.1	12.0
Movement		p=0.00001*	
Group I (n=216)	74.5	25.0	0.5
Group II (n=168)	36.3	50.6	13.1
Group III (n=60)	45.0	35.0	20.0
Group IV (n=13)	15.4	46.1	38.4
Cognitive functions		p=0.00001*	
Normal state (n=361)	61.2	33.5	5.3
Suspected dementia (n=94)	30.9	46.8	22.3
Rating the state of health		p=0.0001*	
Good (n=88)	71.6	26.1	2.3
Average (n=235)	60.0	34.9	5.1
Poor (n=134)	35.1	45.5	19.4
ADL functional ability		p=0.00001*	
Able-bodied (n=107)	80.4	18.7	0.9
I-ADL dependent (n=108)	63.9	33.3	2.4
I-ADL and P-ADL dependent (n=242)	39.7	45.4	14.9
Points on the Tinetti scale (n=219 – only in the rural area)		p=0.0001*	
<19 points (n=145)	32.4	53.8	13.8
19-25 points (n=37)	59.5	37.8	2.7
>25 points (n=37)	67.6	32.4	0.0

* Chi square Pearson test

lem was reported by the respondents from the rural area then from the urban one (58.3% versus 31.9%). The unfavorable living conditions may also be a risk element in the number of falls (causes of the "outdoor" falls). Those who rated their living conditions as poorer had a significantly higher frequency of the falls.

As expected, the falls were substantially higher in those respondents who showed to be in worse mental and physical condition. This connection was also noted in both the case of functional cognitive impairments, as well as in cases of physical impairments (worse physical condition and mobility and difficulties in performing ADL tasks). Falls were also more noted amongst those respondents who rated their state of health as worse as well as an impairment of their hearing and sight skills.

As a survey objectifying the level of functional ability, the fall risk rate according to Tinetti was carried out on the group of 219-people from the rural area. The results gained from this test differentiated the respondents with regards to the frequency of noted falls during the interview were statistically significant.

The characteristics of the respondents with frequent falls is presented in *Tab. 4*. Women living in the rural areas with a low score on the Tineetti scale and persons dependent on others for care in self-care activities and rating their vision and general state of health as poor-constituted a large majority. In half of

***Table 4*. Characteristics of older persons reporting frequent falls during the last 12 months (N=40; 8,8% of the whole group studied)**

Characteristics	[%]
<19 points on the Tinetti* scale	95.2
I-ADL+P-ADL dependence	90.0
Female gender	85.0
Poor vision	77.5
Poor state of health	65.0
Residing in a rural area	60.0
Suspected dementia	52.5
III/IV movement group according to J. Piotrowski	42.5
Poor living conditions	37.5
Age - 85+	27.5

* N=21 (pertains only to the rural area)

the cases, cognitive dysfunctions and movement impairments were noted.

Discussion

The epidemiological studies conducted amongst the older persons living in the community show that at least 30-40% [4,13,14] of the respondents experience a fall at least once a year. Confirmed higher risk fall factors are: senility (advancement of age), the female gender, cognitive function impairments, as well as polypragmasy, and chronic ailments [15]. Due to the fact that most of these factors are chronic and inter-related, it is common for one person to experience more than one fall.

The frequency of noted falls in the interviews conducted with older persons were similar to other epidemiological studies [13,14,16]. A rise in the number of falls was observed as the age of the respondents increased but was not statistically significant. The study results confirmed, however, that there was a higher frequency amongst women. This is a major problem in women with fractures as a consequences of the intensified osteoporological changes.

Another important factor influencing the number of noted falls was the place of residence – there was a significantly higher number of falls noted in the older persons residing in the rural areas. Why was such a difference noted in the number of falls between the rural and urban areas? One of the possible reasons is perhaps a slightly more advanced age of the respondents interviewed in the rural areas and an objectively worse state of health and functional ability. Both the rural and urban areas differed significantly in the occurrence of the impairments. A substantially higher number of persons residing in the rural areas claimed to have sight and hearing impairments as well as being dependent on others for care in ADL tasks [17].

Two causes of falls have been accepted: the internal (organic) and the external (environmental) [18]. The second could be, for example, an untidy apartment (objects on the floor), rugs that move across the floor easily, a crooked or slippery floor, carpet skirting boards that protrude, stairs and poor lighting. These factors are responsible for over 50% of the falls noted amongst older persons [16]. One of the observed causes for the higher number of falls noted in those respondents living in the rural areas – apart from the health factors – may have been environmental causes (i.e., uneven flooring, poor lighting in the residence, uneven pavements, country roads). It is also worth noting that the respondents from the rural areas rated their living conditions as poorer than those from the urban areas (9.65% in comparison to 0.44% from the urban areas, $p<0.00001$).

A majority of the falls are caused by the overlapping of the internal and external factors, and their relative significance in a specific case is dependent on the age, state of health and functional ability of the person who fell. While the persons who experience falls within their residences are most often disabled (i.e. as shown in the prospective results – with a higher risk of death), those who experience falls outside of their residences are most often able-bodied persons and no increase in the risk of death was noted [19]. This duality in the fall factors in older persons can be confirmed by the conclusion stemming from this study that despite the fact of better movement skills and functional abilities of those interviewed in the rural region [17], where the falls noted were higher, as well as the fact that in those persons who experienced frequent falls – barely half had limited movement skills (groups III/IV according to J. Piotrowski).

The programs that are to help prevent falls in older persons should encompass screening of the persons at risk, and then an intervention aimed both at the internal and the external fall factors [20]. This type of intervention would decrease the risk of subsequent falls significantly as well as limit the negative effects of these events on the physical conditions of older persons, if they should arise [21]. An adequate pharmacotherapy needs to be coordinated [22], an instructional course on how to prevent falls needs to be conducted, the elimination of all of the environmental factors that can be eliminated should be carried out, and a program of appropriate exercises needs to be implemented [23,24]. The significance of the full geriatric evaluation in older patients hospitalized as a result of a femoral fracture as well as a subsequent intervention aimed towards eliminating the risk factors should be underlined [25]. These tests have shown that a useful tool helping to identify persons with a greater fall factor can be the fall risk factor test according to Tinetti.

Conclusions

1. The study confirmed the large prevalence of falls in older persons living in the community, outside of health care institutions.
2. The factors connected with a higher frequency of the falls in the examined groups were: living in rural areas, the female gender, and a worse mental and physical state of the respondents.
3. The fall risk factor test according to Tinetti constitutes a helpful tool in identifying of persons with a greater fall risk.

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