Magnitude of Elderly Falls in the Rural Community of Bangladesh

*Choudhury S,[1] Imtiaz KS,[2] Sarkar T,[3] Sharmin T,[4] Hayat SS,[5] Rahman H[6]

Population ageing, which entails an increasing share of older persons in the population, is a major global demographic trend which will intensify during the twenty-first century. The number of elderly persons in Bangladesh was projected to double from 7.8 million in 2001 to 16.2 million by 2025. The elderly represent more than one third of all hospital injury admissions and more than 80% of these injuries are caused by unintentional falls. A secondary analysis was done on a cross sectional study of Bangladesh Health and Injury Survey (BHIS) data which was obtained from Centre for injury prevention and Research, Bangladesh to estimate prevalence and proportional morbidity and mortality of fall related injury in elder people in rural areas of Bangladesh. The field activities were conducted between January and December 2003 from twelve districts of Bangladesh. In each district, one upazila and in each upazila, two unions were selected randomly. **A**ll the elderly population aged 60 years and above residing in rural area of Bangladesh were included and among them 46157 elderly people were indentified by case selection with the help of SPSS. Data were collected by face to face interview using five sets of pretested and revised questionnaire. Prevalence was calculated considering midyear population of the surveillance area as denominator and number of falls identified in surveillance area in previous year as numerator. In secondary analysis it was found that the prevalence of elderly fall was 9.9/1000 population and death due to fall was 1.6/1000 population, in rural area of Bangladesh. Fall rate was increased by age, that is above 70 years old people fall more than that of others age group and it was 20/1000 population. Female are more vulnerable than male regarding fall among all the age group. The prevalence of elderly fall among male is 7.3/1000 which is almost double among female that is 13.1/1000 population. Majority (64%) of fall occurred at home. The second most common location was the streets (18%). Among 60 to 64 age group prevalence of death due to fall is 0.5/1000 and among 65 to 69 it is almost triple that is 1.6/1000 and above 70 years it was 4.1/1000 population. The prevalence of elderly death due to fall was more in female than male in above 70 years age group but between 65 to 69 years elderly death due to fall was almost similar in both sex. It is surprising that death due to fall was less in female than male in 60 to 64 age group. Death due to fall among female was 1.8/1000 population which was more than male that was 1.4/1000 population. Fall prevention is a challenge to population ageing. Special attention should be given on female elderly person in all age group and provide expertise and advocacy to them regarding fall concerning the multiple independent risk factors. There is very little data on actual causes of fall related injury at the community level which is truly nationally representative. Knowledge of the epidemiology of falls may assist public health authorities to implement prevention strategies among individuals at higher risk of falling.

[Shaheed Syed Nazrul Islam Med Col J 2018, Jan; 3 (1):101-108]

Key words: Elderly fall, Prevalence, Morbidity, Mortality

1. **Dr. Shamima Choudhury, Assistant Professor, Department of Community Medicine, Green Life Medical College. dr_shama@ymail.com*
2. *Dr. Khondokar Saif Imtiaz, Associate Professor & Head, Department of Community Medicine, Care Medical college, Dhaka.*
3. *Dr. Tanusree Sarkar, Assistant Professor, Department of Community Medicine, North East Medical College, Sylhet.*
4. *Dr. Tanima Sharmin, Assistant Professor, Department of Community Medicine, Green Life Medical College.*
5. *Dr. Syed Muhammad Shahin ur Hayat, Registrar, ICU, Dr. Sirajul Islam Medical College & Hospital Ltd.*
6. *Dr. Homayera Rahman, Associate Professor, Department of Physiology Green Life Medical College*

**For correspondence*

Introduction

Population ageing, which entails an increasing share of older persons in the population, is a major global demographic trend which was first noticed since the end of 19th Century and will intensify during the twenty-first century.[1] Since 1950, the proportion of older persons has steadily risen from eight percent of the human population in 1950 to eleven percent in 2009. This number is expected to reach 22 percent in 2050.[2] The demographic transition, a process whereby reductions in mortality are followed by reductions in fertility. Together, these reductions eventually lead to smaller proportions of children and larger proportionate shares of older people in the population.[1] The number of elderly persons in Bangladesh was projected to double from 7.8 million in 2001 to 16.2 million by 2025.[3] Based on data from scientific report of ICDDR,B of Bangladesh, life expectancy at birth is expected to be 76.9 years for men and 85.1 years for women in 2015.[4]

Falls are major causes of unintentional injuries among the elderly people.[5,6,7] According to WHO one commonly used definition is: 'An event, which results in a person coming to rest in advertently on the ground or other lower level'.[8]

Every year, one-third to one-half of the population age 65 and over experience falls. An estimated 424,000 fatal falls occur each year, making it the second leading cause of unintentional injury death, after road traffic injuries.[8] Over 80% of fall-related fatalities occur in low and middle-income countries, with regions of the Western Pacific and South East Asia accounting for more than two thirds of these deaths.[2] In 2000, 1.6 million seniors were treated in emergency departments for fall-related injuries and 353,000 were hospitalized.[8]

Fall prevention is a challenge to population ageing.[9] An epidemiological transition has taken place in Bangladesh and fall related injury is now one of the major causes of morbidity and mortality. The official statistics on fall related injuries are difficult to interpret as there is a wide variation among the many figures. There is very little data on actual causes of fall related injury at the community level which is truly nationally representative. It is important to estimate the magnitude of the elderly falls to convince policy makers to take necessary measures to address the problem and to design appropriate interventions for prevention of elderly falls in Bangladesh.

Methods

A secondary analysis was done on a cross sectional study of Bangladesh Health and Injury Survey (BHIS) data which was obtained from Centre for injury prevention and Research, Bangladesh to estimate prevalence and proportional morbidity and mortality of fall related injury in elder people in rural areas of Bangladesh. The field activities of Bangladesh Health and Injury Survey (BIHS) for data collection were conducted between January and December 2003 from twelve out of 64 districts of Bangladesh were randomly selected for the survey. In each district, one upazila (rural sub-district) and in each upazila, two unions were selected randomly for the study. A total number of 24 unions were selected for the study. Multi-stage cluster sampling was used to select 171,366 household; 88,380 from rural areas. **A**ll the elderly population aged 60 years and above residing in rural area of Bangladesh were included, covering 819,429 surveyed population and among them 46157

elderly people were identified by case selection with the help of SPSS for windows version 16. Data were collected by face to face interview using five sets of pretested and revised questionnaire by 48 data collectors and six supervisors who were university graduates with previous experience in community research. After collection, each questionnaire was sorted for its consistency and comprehensiveness. Then cleaned data were analyzed through computer based software SPSS v. 16 and Microsoft Excel 2007. Then various tables were made and analyzed according to the objectives. Prevalence was calculated considering midyear population of the surveillance area as denominator and number of falls identified in surveillance area in previous year as numerator.

The formula of prevalence is given below:

$$\frac{\text{Number of existing cases (old \& new) of a specified disease during a given period of time interval}}{\text{Estimated mid-interval population at risk}} \times 1000$$

Consent was sought from each of the respondents of the study after reading to them the reasons of the study. Confidentiality was maintained throughout by ensuring that no name or number would be used that can identify the respondents.

Results

Among 46157 elderly people fall related injury experienced by 456 elderly people. The prevalence of fall had been calculated by using the formula of prevalence which is already mentioned in methodology. The prevalence of elderly fall in rural area of Bangladesh was 9.9/1000 population.

Table I: Distribution of prevalence of elderly fall by age group

Age group(years)	Population at risk	No of fall	Age specific rate/1000	95% CI	
				Lower	Upper
60 to 64	17019	139	8.2	6.9	9.6
65 to69	9749	77	7.9	6.3	9.9
70+	11785	240	20	17.9	23.0
Total	46157	456	9.9	9.0	10.8

From BHIS data it was found that above 70 years old people fall more than that of others age group. Among the 60 to 64 age group and 65 to 69 age group the prevalence of fall was almost same. Among 60 to 64 age group it was 8.2/1000 population whereas above 70 years old, the prevalence of fall more than double that was 20/1000 population.

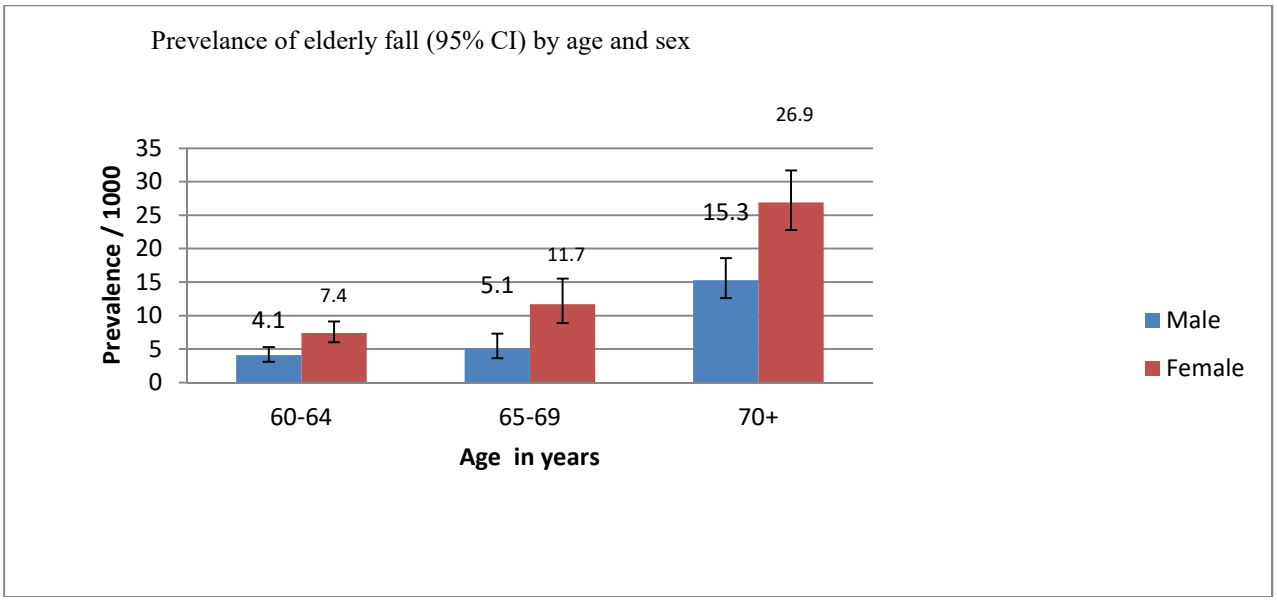

Figure 1. Distribution of prevalence of elderly fall by age and sex

This figure shows that elderly fall is more among female than male in all age group. In BHIS data among the total number of elder people, 25470 were male and 20687 were female and among the total number (456) of elderly fall, 185 were male and 271 were female. The prevalence of elderly fall among male is 7.3/1000 which is almost double among female that is 13.1/1000 population.

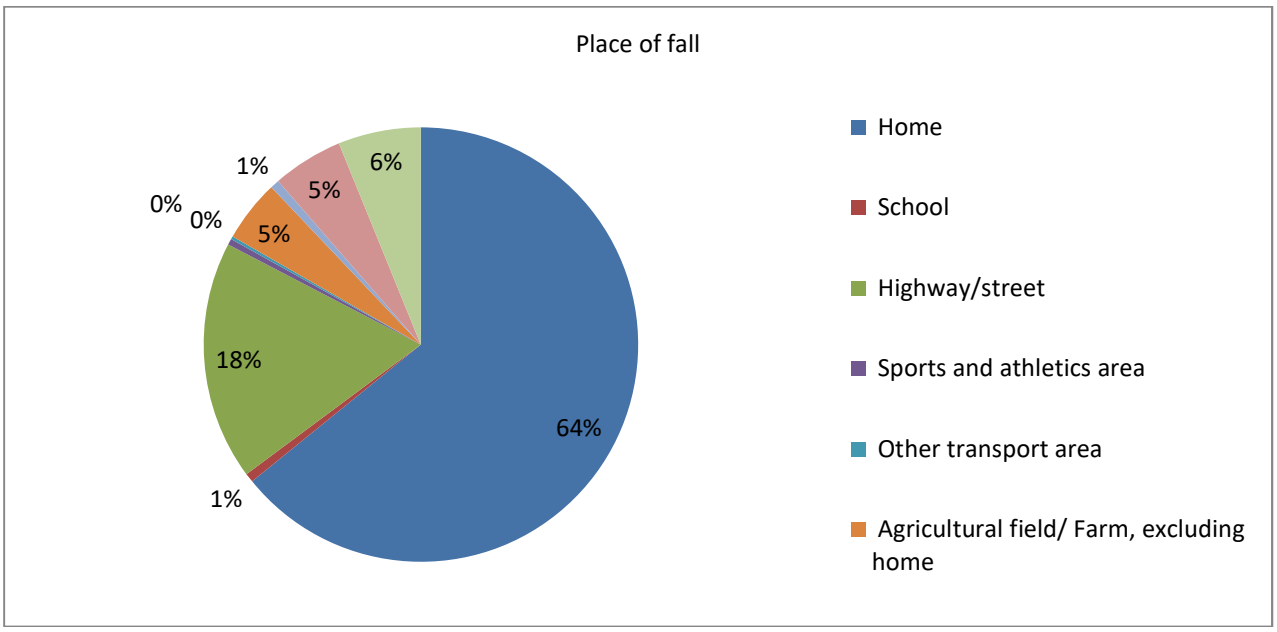

Figure 2. Distribution of location of fall

This figure shows majority (64%) of fall occurred at home. The second most common location was the streets (18%)

Mortality pattern of elder people due to fall

The total number of 46157 elderly people (60 years and above) were identified in the BHIS data where fall related injury followed by death were 73. The prevalence of elderly fall related death in rural area of Bangladesh was 1.6/1000 population.

Table II: Distribution of prevalence of fall related death by age group

Age group	Population at risk	No. of death due to fall	Prevalence/1000 pop^{n}	95% CI	
				Lower	Upper
60 to 64	17019	8	0.5	0.2	0.9
65to 69	9749	16	1.6	1.0	2.7
70+	11785	49	4.1	3.1	5.5
Total	46157	73	1.6	1.3	1.9

From BHIS data it was found that above 70 years elderly death due to fall more than that of 60 to 69 age group. The above table shows that, among 60 to 64 age group prevalence of death due to fall is 0.5/1000 and 65 to 69 it is almost triple that is 1.6/1000 and above 70 years it was 4.1/1000 population.

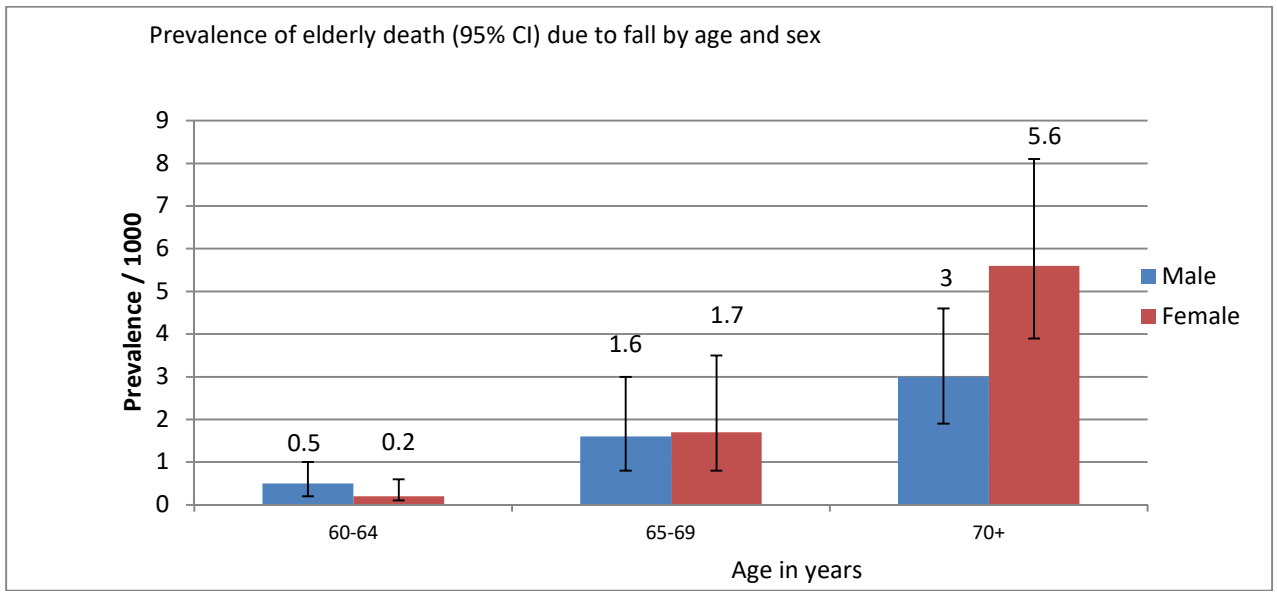

Figure 3. Distribution of prevalence of elderly death due to fall according to age group with the relation of sex

This figure shows that the prevalence of elderly death due to fall was more in female than male in above 70 years age group but between 65 to 69 years old death due to fall was almost similar in both sex. It is surprising that fall death was less in female than male in 60 to 64 age group. In BHIS data among the total number of elder people, 25470 were male and 20687 were female and the prevalence of elderly death due to fall among female is 1.8/1000 population which is greater than the prevalence in male that is 1.4/1000 population.

Discussion

In this secondary analysis the prevalence of elderly fall in rural area of Bangladesh was 9.9/1000 population. WHO published a report on October 2012 where they report that globally, an estimated 424000 fatal falls occur each year, making it the second leading cause of unintentional injury death, after road traffic injuries.[8] In a Multi-centric Community Study, in 10 states across India, covering a total population of 10,200 elderly, the incidence of elderly falls was found to be 14%.[10] In another study fall rate was 2.4% (95% CI, 2.04-2.82) per person-year.[11] Those findings are almost similar with our findings. But in Sweden the incidence of falls in the past six months was almost one in five (19.1%).[12] The Kerala Aging Survey (KAS) published that they had 51.5% elderly fall[13] and in Ecuador, the elderly fall reported as 37.4% (95% CI, 35.7–39.2) representing an estimated 445,000 older adults [5] which is very high from our findings.

In this study it was found that above 70 years old people fall more than that of others age group. Among the 60 to 64 age group and 65 to 69 age group the prevalence of fall was almost same whereas above 70 years old the prevalence of fall more than double that was 20/1000 population. This finding is coinciding with other studies that we reviewed about elderly fall. Most of study revealed that fall proportion increased by age like in Ecuador they recognize that One-third of people over the age of 65 years who live in the community fall each year this proportion increases to 50% by the age of 80 years.[14,15,16,17] Statistically significant differences were found between the mean age of the elderly who had fallen (76.76 years, ±9.17) and those who hadn't fallen (71.05 years, ±8.67)[1]Another study showed that among 733 elderly fall, mean age of 83.4 years (95% CI, 82.6-84.1).[11] in Sweden, falls were almost four times more common in 90-year-olds than in 60-years olds at the 6-year assessment[12] Krishnaswamy and Shanthi (2005) evaluated the incidence of falls increases with advancing age and more prevalent in people >70 years. It is one of the leading causes of death in elderly. More than 90% of hip fractures are associated with falls in persons above 70 years of age and is associated with greater mortality.[13]

The secondary analysis showed that female were more vulnerable than male. Fall rates were highest in female (almost double) in all age group and majority female were in age of above 70 years. Death due to fall among female also more than male. This finding is almost similar with that of other study like in Ecuador fallers were more likely to be older & women.[5] Another study in Brazil, they also found that women are prioritized than man for fall.[1] In Thailand, Prince of Songkla University, they also revealed that women fell almost twice as often as men.[1] In Sweden, women fell almost twice as often as men.[12] In Kerala Fractures among females (26.4%) were reported more frequently compared with males (16%)[10] and in Northern India the situation was almost same.[13] Falls were a highly prevalent source of injury for women in Mexico, India and the Russian Federation except South Africa. In some countries, it has been noted that males are more likely to die from a fall, while females suffer more non-fatal falls.[8] Possible explanations of the greater burden seen among males may include higher levels of risk-taking behaviours and hazards within occupations.

In this study majority (64%) of fall occurred at home. The second most common location was the streets (18%). Similarly in Kerala most falls result from a complex interplay of predisposing and precipitating factors in a person's environment. One half to two thirds of falls occur in or around the patient's home.[10,13,18]

Conclusion

Special attention should be given on female elderly person in all age group and provide expertise and advocacy to them regarding fall concerning the multiple independent risk factors. Elimination of environmental risk factors can be achieved by home modification. Different technology is proved to be useful by designing interventions to reducing risk of fall. The government should making efforts to ease the discomfort of its senior citizens by formulating old age security schemes and allocating its expenditure. The lack of a designated agency for elderly people (there is for example UN agency that deals specifically with older persons) translates into a lack of action and advocacy in respect to elderly people's needs in emergencies. The official statistics on fall related injuries are difficult to interpret as there is a wide variation among the many figures. There is very little data on actual causes of fall related injury at the community level which is truly nationally representative. It is important to estimate the magnitude of the elderly falls to convince policy makers to take necessary measures to address the problem and to design appropriate interventions for prevention of elderly falls in Bangladesh.

References

1. Rebelatto JR, Castro AD, Chan A. falls in institutionalized elderly people: general characteristics, determinant factors and relationship with handgrip strength actaortop bra, 2007; 5(3: 151-154).
2. United Nations, Department of Economic and Social Affairs, Population Division (2013).World Population Ageing 2013. ST/ESA/SER.A/348.
3. RahmanMustafizur KM. Preparing for an elderly population. Tuesday, October 4, 2011, The Daily Star.
4. KhanamMasuma, Streatfield Peter et al. Prevalence and patterns of multimorbidity among elderly people in rural Bangladesh: a cross sectional study. J Health Popul Nutr, Aug 2011; 29(4): 406–414.
5. Carlos H. Orces. Prevalence and determinants of falls among older adults in Ecuador: an analysis of the sabei survey. Current gerontology and geriatrics research; volume 2013, article id 495468, 7 pages.
6. Gibson, M.J., Andres, R.O., Isaacs, B., Radebaugh, T., Worm-Petersen, J. [1987]. The prevention of falls in later life. A report of the Kellogg International Work Group on the prevention of falls by the elderly. Danish Medical Bulletin 34 (Suppl 4): 1-24.
7. Wolf, S., Barnhart, H., Kutner, N., McNeeley, E., Coolger, C., Xu, T. et al. [1996]. Reducing frailty and falls in older persons: An investigation of Tai Chi and computerised balance training. Journal of the American Geriatrics Society*,* 44: 489-97.
8. WHO global report on falls prevention in older age 2008.
   [Cited from: http://www.who.int/iris/handle/10665/43811]
9. Tinetti, M., Baker, D., Dutcher, J.,Vincent, J., Rozett, R. [1997]. Reducing the risk of falls among older adults in the community. Berkeley, C.A.: Peacable Kingdom Press. This definition has also been cited in Feder, G., Cryer, C., Donovan, S., Carter Y. 2000. Guidelines for the prevention of falls in people over 65. British Medical Journal*,* 321: 1007-11.
10. Krishnaswamy B, Usha G. Falls in older people ,National/Regional review India. Madras Medical College and Government General Hospital. Department of Geriatric Medicine. Chennai City, Tamil Nadu State, India.

11. Damián J**,** Roberto Pastor-Barriuso**,** EmilianaValderrama-Gama and Jesús de Pedro. Factors associated with falls among older adults living in institutions. Cuesta BMC Geriatrics 2013, 13:6 doi:10.1186/1471-2318-13-6.
12. Stenhagen M**,** Ekström H**,** Nordell E**,** Elmståhl **S**. Falls in the general elderly population: a 3- and 6- year prospective study of risk factors using data from the longitudinal population study 'Good ageing in Skane'. BMC Geriatrics 2013, **13**:81 doi:10.1186/1471-2318-13-81.
13. Balzer K, Bremer M, Schramm S, Lühmann D, Raspe H. Falls prevention for the elderly. GMS Health Technol Assess. 2012;8:Doc01. doi: 10.3205/hta000099.
14. M. E. Tinetti and C. S.Williams, "Falls, injuries due to falls, and the risk of admission to a nursing home," New England Journal of Medicine, vol. 337, no. 18, pp. 1279–1284, 1997.
15. K. A. Hartholt, J. A. Stevens, S. Polinder, T. J. van der Cammen, and P. Patka, "Increase in fall-related hospitalizations in the United States, 2001–2008," Journal of Trauma, vol. 71, no. 1, pp.255–258, 2011.
16. P. Kannus, J. Parkkari, S. Koskinen et al., "Fall-induced injuries and deaths among older adults," Journal of the American Medical Association, vol. 281, no. 20, pp. 1895–1899, 1999.
17. C. H. Orces, Trends in hospitalization for fall-related injury among older adults in the United States, 1988–2005, Ageing Research, vol. 1, no. 1, pp. 1–4, 2010.
18. M. E. Tinetti, M. Speechley, and S. F. Ginter, "Risk factors for falls among elderly persons living in the community," New England Journal of Medicine, vol. 319, no. 26, pp. 1701–1707, 1988.