FALLS AMONG COMMUNITY-DWELLING ELDERLY PEOPLE IN SELECTED DISTRICTS OF UMUTARA PROVINCE, REPUBLIC OF RWANDA: THE ROLE OF THE PHYSIOTHERAPIST

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Abstract
Introduction
Falls among elderly people have been identified as a significant and serious medical problem confronting a growing number of older people.

Aim
The purpose of the study was to identify the risk factors for falls among the community-dwelling elders in the Umurara Province of Rwanda.

Method
A cross-sectional convenience survey using a self-administered questionnaire was used, with a sample of 200 elders, both male and female, aged 60 and older. Data was analyzed using SPSS. Chi-squarest and Fisher's exact tests were used to test associations between variables.

Results
Nearly a quarter (23.2%) of the community-dwelling elderly people had multiple falls in the previous year. Risk factors significantly associated with increased falling in the elderly included advanced age, gender, joint stiffness and lower extremity muscle weakness. Loss of balance and coordination, vision deficits, painful joints, multiple drug use and prolonged use of sedatives, and antidepressants were also potential risks of falling. Men fell more often than women. Men tended to suffer outdoor falls, while women were likely to sustain indoor falls. Injury rates were also high: hip, lower back and ankle injuries were the most prevalent.

Conclusion
Potential risk factors for falls include characteristics such as: physiological changes (age), chronic illnesses, chronic medication and multiple drugs.

Key Words
Epidemiology, falls, elderly, community, dwelling elderly, risk factors, recurrent falls injuries, population aging, Rwanda.
Introduction
The elderly population is growing both in size and in proportion to the total population (Daley & Spinks, 2000). One of the main features of the world population in the 20th century has been a considerable increase in the absolute and relative numbers of older people both in developed and developing countries (Daley & Spinks, 2000). As the number of older people escalates, the question of how to care for them becomes critical. Issues concerning older persons differ from one country to another and from one culture to another (Amosun, 1999). There are a number of implications for health with the increase in age and one of it being the increase in rates of falling. Falls are a common and often have a devastating occurrence for the elderly in the home and institutional settings. The physical, psychological, and economic consequences of falls are significant. Elderly patients at highest fall risk usually have a number of predisposing conditions contributing to that risk. It is generally agreed that most falls are caused by interacting factors of which some are intrinsic and others are extrinsic risk factors (Fuller, 2000). The socio-demographic variables of age, the female gender, and living status have been found to increase the older people's susceptibility to falls. Other noteworthy risks such as being physiologically or functionally impaired have also repeatedly been implicated as risk factors for falls (Fletcher, 2002). In addition, chronic illnesses, chronic medication and use of multiple drugs have been identified as intrinsic risk factors for falls among the elderly (Fletcher, 2002).

Intrinsic factors or physiological changes in the elderly include reduced stature, decreased cardiovascular function, increased risk and occurrence of cardiovascular diseases, elevated blood pressure, reduced aerobic function and decreased neuromuscular level of functioning (Daley & Spinks, 2000). Accompanying these gradual changes are changes in special senses (not associated with disease), which include decrease in vision, hearing, touch, and smell, leading to functional decline (Fuller, 2000). Extrinsic factors, on the other hand, include safety hazards within the environment that predispose one to slipping and tripping (Ellyn & Miller, 2003). Gallagher, (1994) identified slippery surfaces, defective floors, extension cords, bathtubs, shelving inadequacies, doorjams, cluttered hallways, toys or pets, low beds and toilet seats, and poorly maintained walking aids and equipment as important risk factor for falls. Thus it is evident that as the elderly are increasing the risk factors for falls needs to be investigated to prevent unnecessary health costs for the elderly. The aim of this study was to identify the risk factors for falls among the community-dwelling elders in the Umurara Province of Rwanda and highlight the role of physiotherapy.

Method
A descriptive quantitative study design was used to describe and quantify the risk factors for falls among the elderly. A cross-sectional survey was used to collect information on prevalence and risk factors at a point in time. A convenience sampling technique was used to get the elderly who were readily accessible and most easily available until the representative number was obtained. Eligible subjects were elderly persons who lived in two districts of Umurara Province of Rwanda who have experienced a fall or falls in the previous year. Two-hundred elderly people were obtained from the above districts. Because of gender, cultural, ethnic, and linguistic and wealth homogeneity within these districts of Gabiro and Kahi, one hopes that the convenience sampling provides a rough representative sample of the few remaining elderly people who fell.
Measurements
A structured, self-administered, close-ended and pre-coded questionnaire including items regarding prevalence of and risk factors for falls among community dwelling elderly people was used. Reliability of the questionnaire was done during a pilot study where participants were requested to undergo test-retest of the questionnaire to check for the same results, prior to the main study being conducted. Some corrections were made, such as excluding and modification of some of the questions for purposes of clarity in order to match the main study with the reliability co-efficient of $r^2 = 0.80$. The completed data was captured in Excel for thorough data cleaning. Double data entry was done to ensure data quality. Cleaned data was transferred to SPSS for analysis. Chi-square and Fisher’s exact tests were used to test the associations between variables.

Results
Two hundred (n=200) self-administered questionnaires were distributed to community-dwelling elderly persons in the selected districts of Gabiro and Kahi of the Umutara Province who had experienced a fall since they were 60 years old. Of the 200 community-dwelling elderly, 127 (63.5%) were males and 73 (36.5%) were females. The study participants were aged from 60 to 102 years, with the mean age for males being 69.38 years (SD= 7.66) and for females being 68.37 years (SD=8.66).

Although it was found that there was an increased prevalence of multiple falls as age increased, the association between falls and age, using the Chi-square test, was not found to be statistically significant (p=0.086). The study results show that approximately 82% of the males and 70% of the females had suffered multiple falls in their previous year. The association between falls and gender, using the Fisher’s exact test, was found to be significant (p<0.05).
Table 1: Intrinsic and extrinsic risk factors for falls.

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Yes Frequency (%)</th>
<th>No Frequency (%)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic Illness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vision deficit</td>
<td>117 (58.5)</td>
<td>59 (29.5)</td>
<td>.978</td>
</tr>
<tr>
<td>Painful joints</td>
<td>96 (48)</td>
<td>80 (43)</td>
<td>.732</td>
</tr>
<tr>
<td>Joint stiffness</td>
<td>155 (77.5)</td>
<td>19 (9.5)</td>
<td>.091</td>
</tr>
<tr>
<td>Muscular weakness</td>
<td>144 (72)</td>
<td>25 (12.5)</td>
<td>.000*</td>
</tr>
<tr>
<td>Loss of balance</td>
<td>130 (65)</td>
<td>23 (11.5)</td>
<td>.363</td>
</tr>
<tr>
<td>Loss of coordination</td>
<td>117 (58.5)</td>
<td>34 (17)</td>
<td>.115</td>
</tr>
<tr>
<td>Nocturia</td>
<td>91 (45.5)</td>
<td>41 (20.5)</td>
<td>.235</td>
</tr>
<tr>
<td>Acute illness</td>
<td>64 (32)</td>
<td>37 (18.5)</td>
<td></td>
</tr>
<tr>
<td>Chronic medication and multiple drug use among elderly</td>
<td>103 (51.5)</td>
<td>27 (13.5)</td>
<td>.006</td>
</tr>
</tbody>
</table>

The environmental factors

<table>
<thead>
<tr>
<th>Factor</th>
<th>Yes Frequency (%)</th>
<th>No Frequency (%)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wet or slippery floor surfaces</td>
<td>58 (34)</td>
<td>62 (31)</td>
<td>.097</td>
</tr>
<tr>
<td>Transferring on or off the bed</td>
<td>54 (27)</td>
<td>78 (38)</td>
<td>.787</td>
</tr>
<tr>
<td>No lighting in the house</td>
<td>37 (18.5)</td>
<td>83 (46.5)</td>
<td>.423</td>
</tr>
<tr>
<td>Fell when getting out of the bed</td>
<td>26 (13)</td>
<td>104 (52)</td>
<td>.304</td>
</tr>
<tr>
<td>Loose carpets, mats, rugs</td>
<td>23 (11.5)</td>
<td>107 (53.5)</td>
<td>.000</td>
</tr>
<tr>
<td>When walking in a straight line</td>
<td>23 (11.5)</td>
<td>107 (53.5)</td>
<td></td>
</tr>
</tbody>
</table>

Most of the participants over the age of 70 years (62%) reported falling in the evening (p=0.010). There was a significant association (p =0.045) between gender and daytime when falls were experienced. Females (45%), tended to experience more falls in the afternoon hours, whereas males (48%), fell more in the evening hours. There was a significant association (p= 0.047) between gender and indoor falls. With regard to indoor causes of falls, 63.3% of the females suffered indoor falls due to wet or slippery floor surfaces, as opposed to 45.7% of the males. Males (37.3%) were more likely to fall at some distance from home, on the footpath or in the garden or on the farm, compared to their female counterparts who accounted for 21.8%.

Discussion

Most of the falls resulted from a complex interplay of predisposing and precipitating factors in a person's environment (Shobha, 2005). In this current study, the potential risk factors for falls include characteristics such as: physiological changes (age), chronic illnesses, chronic medication and multiple drugs. Environmental hazards, host and situational circumstances and time of the day when a fall or falls were experienced. Advanced age and the high prevalence of falls are due to normal physical and mental changes related to aging, such as decreased functional reserve and physiological or functional impairments (Fuller, 2000). Simpson (1993) explains that the reason why increased age is a risk factor for
falling is that the information processing in the nervous system slows with advancing age and leads to an increase in the time needed to organize appropriate response stimuli. With increasing age comes an increased probability of experiencing chronic debilitating conditions and loss of functional capacity (Huang, Guan, Lin, & Kermooh, 2003). According to Eisenberg (2004), any condition that reduces or impairs well-being, such as painful joints, balance deficits, muscle atrophy, urinary incontinence, hearing deficits, touch deficits or reduced judgment, and high or low blood pressure are the common causes of falls among older adults. The presence of chronic illnesses has been consistently linked to falls among older persons. In this current study visual deficits and painful joints were the most prevalent chronic conditions or diseases associated with an increased risk of falling. Huang et al. (2003) adds that aging is often accompanied by a deterioration of general health. These changes increase the likelihood of illnesses and fatigue or feelings of distress (Simpson, 1993). Accompanying these gradual changes are changes in special senses, which include vision, hearing, touch, and smell, leading to functional decline (Simpson, 1993). Vision deficits were the most prevalent causes of falls of which 58.5% participants fell as a result of vision impairments. Eisenberg, (2004) contends that decrease in visual acuity is at least one factor involved in falls.

Painful joints accounted for 48% of the study participants' falls. Fletcher (2004) and Horn (2000) indicate that specific conditions or diseases of joints and arthritis were associated with an increased risk of falling. Associated with chronic illness is chronic medication use. Medication is another risk factor that has consistently been implicated in falls among the elderly population. As the human body ages, it becomes less able to tolerate medication (Gallagher, 1994). Drug effects and reactions can affect cognition and mobility, thus contributing to falls (Gallagher, 1994). It appears that the propensity for an older adult to fall increases with the number of medications consumed. With regard to medications, there was a higher statistically significant association between falls and sedative drug use (p<0.05). Among those who fell due to the side effects of drugs, 84.5% of multiple fallers and 61.3% of single fallers were taking sedatives, whereas other drug classes did not show any statistical significance.

Host and situational circumstances in association with the type of activity in progress aggravated most of the falls. This could be a reason for the high fall peaks reported in the evening. Most falls happened in the evening among males as opposed to females who tended to fall in the afternoon hours (p=0.010). This could be a result of exhaustion and tiredness, as most elderly people are returning home for rest. This may also be linked to visual impairments that were compromised by poor lighting or no light at all, which makes it difficult for elderly persons to negotiate and identify the underlying obstacle. Koski, Luukinen, Laippala, & Kiwela, (1998) reported that tiredness during the active hours of the day obviously disturbs the functioning of the protective reactions and impairs perception among the independently moving elderly, making them liable to injurious falls. The study findings are consistent with the findings of Weel (1995), which indicated that external factors (tripping and slipping) were responsible for half the falls encountered in general practice in those over 65 years.

The study participants to improve their functional independence used assistive devices. Elliot (1991) contends that assistive devices can allow a person...
with disabilities to function more independently, thus gaining self-respect and greater acceptance in mainstream society. According to Elliot (1991), assistive devices have the potential to reduce the need for expensive human help and intensive informal care.

Implications for Physiotherapy Intervention

Older people fall but not because they are old. The risk factors for falling are multi-factorial. Falling has many potential contributing factors, yet is often a preventable health condition (Robinson, Gordon, Scott & Visio, 2004). Falls are a complex interaction between intrinsic and extrinsic risk factors, there is uncertainty surrounding some of these risk factors, and one explanation is that risk of falls and injurious falls varies with functional status of an individual (Langlois, Smith, Nelson, Sattin, Stevens & DeVito, 1995; Koski et al., 1998). Physiotherapists are identified as one of the essential members of specialized falls prevention teams (Chartered Society of Physiotherapy, 1999). Physiotherapists working in all specialties, particularly acute medicine, orthopedics and neurology, should also be able to be aware of dangers of falling, be able to identify risk factors and take appropriate action (Chartered Society of Physiotherapy, 1999). The risk factors for falling that were the most consistently reported in this current study, and that all physiotherapists should be aware of were: advanced age, gender, joint stiffness, lower extremity muscle weakness, loss of balance and coordination. Chronic illnesses (vision deficits, painful joints), chronic medication (sedatives and antidepressants), multiple drug use, environmental hazards such as the presence of obstacles in the way, host and situational circumstance, assistive devices and time of the day also contributed to falls. Physiotherapists are more likely to be involved with people who are in high-risk groups. Working in primary care, physiotherapists may come into contact with a range of older people, from healthy to significantly disabled (Gillespie, Gillespie, Cumming, Lamb, & Rowe, 2001). The most frequently encountered risks are impairments of gait, balance, areas in which physiotherapists have considerable expertise (Gillespie et al., 2001). In this study, lower extremity muscle weakness, difficulty walking on a straight line perhaps due to loss of balance, loss of coordination together with lose carpets, mats, rugs and electrical extension cords and sedative drug use were statistically significant potential risk factors for fall (p<0.05). Physiotherapists are key providers of exercise interventions for elderly people and knowledge of beneficial programme components is essential for the design of appropriate exercise programmes for those considered at risk of falling (Piotrowski, 1999).

Conclusion

Various factors were found to be significantly associated with increased falling in the elderly. More investigation is required to determine which intervention strategies successfully reduce the chance of a fall or falling by reducing the risks of falling. Research also needs to address environmental factors and intrinsic factors such as age-related changes like age and gender. Prevention strategies need to be suited to the most obvious predisposing risks for an individual, with periodic assessment to determine how the mix of factors changes over time.

Recommendations

Falls generally result from an interaction of multiple and diverse risk factors and situations, many of which can be corrected. Consequently, opportunities for prevention are often overlooked, with risks becoming evident only after injury and disability have already occurred. There is a need for a multi-disciplinary
approach among the general practitioners and the nursing staff to enhance a referral system that gives older patients—optimal—opportunities to access adequate care. One goal for physiotherapists working with older people at risk of falling is to reduce that risk. As these are older people living independently, increasing their muscle strength, flexibility and bone density and improving balance and gait, through exercise have been shown to be associated with a reduction of falls or fall related injuries in older people and initiation of facilitated home environmental

The relationship between physical activity or exercise, falls and injuries due to falling is a complex. There is growing evidence that participation in regular exercise improves balance, mobility and reaction time and can reduce the risk of injury following a fall. Physiotherapists working with older people should restore their confidence in their ability to move about safely and to increase the safety of their surroundings and to help them with education and advice on how to cope with any further falls and teach them strategies for summoning help and preventing the consequences of long lie.

Limitations of the study
The study only focused on community-dwelling elderly who reported a fall or falls in the previous year. Self-reporting, especially when asking participants to recall a full year of experience, is not as reliable or accurate as observation or self-report on a monthly basis or on any other shorter period of time and, therefore, were subject to error.

References