



## FACTORS RELATING TO FALLS RISK AMONG COMMUNITY-DWELLING ELDELY PEOPLE IN JAMBI, INDONESIA

**Loriza Sativa Yan**

*Master Nursing Student of Kasetsart University, (Harapan Ibu Nursing College of Jambi, Indonesia) Bangkok, Thailand*

**Anchaleeporn Amatayakul**

*Borromarajonani College of Nursing Nopparat Vajira, Bangkok, Thailand*

**Yupawan Thongtanunam**

*Borromarajonani College of Nursing Changwat, Nothanburi, Thailand*

### ABSTRACT

*Facing aging societies, falls risk of elderly people was an urgent public health concern leading to severe injury, decreased functioning, and mortality. Particularly susceptible was elderly people living in the community. The aim of this study was to determine factors related to falls risk among community-dwelling elderly. A descriptive correlation design was performed with 166 elderly people in Kota Jambi district. Female or male, of aged 60 years or above were interviewed at five public health centers, following the instruments; 1) Falls Risk Assessment Tools (FRAT) assessed the risk of falls and 2) Time Up and Go Test (TUGT) recorded the Physical function level among elderly people. The primary outcome was a falls risk incidence within six months. The majority (83%) of elderly people who were high risk of falls performed a fair physical function level. The results showed that age, gender, educational level, living arrangement, and occupation were not significant relationships with falls risk. However, physical function was moderately associated with falls risk among community-dwelling elderly people. The results emphasized that elderly who had a chance to improve physical function were less likely to exposure falls risk.*

© 2014 Pak Publishing Group. All Rights Reserved.

**KEYWORDS:** Falls risk, Elderly people, Physical function, Community, Aging, Factors related

### INTRODUCTION

Population aging is increasingly becoming an crucial issue which has been imposed of the health problem among elderly people (Ribeiro *et al.*, 2013). The World Health Organization (2012) stated that one third of people over 60 years old suffered in falls risk problem in many developing countries around the world, including Indonesia. The prevalence of falls among the Indonesian elderly reached from 5.6% in 2010 to 8.2% in 2012 (Ministry of Public Health, 2012). Accordingly, the amount significant of falls incidence have been growing from public health concern and going through the potential problems of elderly people. As one of the capital city, the prevalence falls in Jambi also has been rising rapidly; it was 7.6% per years. More frequent of recurring falls faced the elderly females with serious injuries of 2.57 times (Ministry of Public Health, 2012). However, falls and their consequences should be prevented even though they have been injured (Ambrose *et al.*, 2013). Therefore, among community-dwelling elderly people was identified in public health priority at falls risk group.

Falls risk defined as the unconditional event with any intentional movement, any major internal events, or external force (World Health Organization, 2012). Many factors have been investigated (Swannenburg *et al.*, 2010). Several factors identified by age, gender, living arrangement, educational level, and occupation. However, these factors still were inconsistent findings associated with falls risk. (Akyol, 2007) studied that falls experiences between male and female were different. As the result, empirical investigation of these factors is needed.

A comprehensive geriatric assessment showed lower level integration with health service to promote falls risk prevention among elderly people living in the community (Touhy and Jett, 2012;

World Health Organization, 2012), because of more factors were still complicated to identify (Dogan *et al.*, 2010). Accordingly, elderly people who aged over 60 years were more likely to expose higher risk because age related to physical and physiological changes. Different characteristic of elderly people predicted many risk factors of falls in a variety community setting (Touhy and Jett, 2012). In fact, the earliest sign of awareness level among community dwelling elderly people was carried out their falls risk impact to the health service still low (World Health Organization, 2012). However, that is the one reason has been not easy prevented falls among community dwelling elderly people.

Physical function has been interesting factors in the several studies. Study by Alexandre *et al.* (2012) reported that unsteady gait and poor balance were in physical function outcomes to increase falls risk. However, limited study known which related factors of physical function changes among community-dwelling elderly people in Indonesia. Consequently, further study should be explored more attention towards these factors.

The aim of this study was to examine factors relating to falls risk among community-dwelling elderly. The multi-factorial causes of falls risk was a good model to guide selecting factors of demographic characteristics, physical function and falls risk among community-dwelling elderly people in Kota Jambi as the selected variables of the study.

## LITERATURE REVIEW

The multi-factorial causes of falls risk model have been framed the prior risk factors (Rubenstein and Josephson, 2006). To link between intrinsic, extrinsic factors, and precipitating causes, the aging process has been changed the physiologic, pathologic and environmental conditions. Intrinsic factors were combined the effects of normal aging as related to physical and mental changes (Rubenstein and Josephson, 2006). Individuals who advanced age of 60 years or older became more susceptible to decrease physical functioning. Household keeping and furniture management were amounted of the external hazards such as clutter, electrical cords on the way, inadequate lighting, floor-rugs, low chairs, soft chairs, uneven surfaces, raised threshold and slippery surfaces (Rubenstein and Josephson, 2006). When in and around the home condition having poor furniture management, that was emerged in the mobility of elderly people. Therefore, the necessity of the study pointed out the intrinsic factors to evaluate causes of falls risk among community-dwelling elderly people who had high risk of falls group.

Several studies also were adopted of its model to predict falls risk factors among the elderly. When elderly people having the sign of gait disorder, unstable balance, misstep length, impaired ADLs and muscle weakness were increased high risk (Rubenstein and Josephson, 2006; Cook *et al.*, 2009; Ambrose *et al.*, 2013; Ribeiro *et al.*, 2013). Otherwise, since no specific time, day, or years was proved risk falls among elderly people (Akyol, 2007; Bergland and Wyller, 2009; Chelly *et al.*, 2009; Ambrose *et al.*, 2013). The most significant of falls has been given consideration that showed by the amount of previous studies about the indoor condition (Hiura *et al.*, 2012; Kamel *et al.*, 2012; Ambrose *et al.*, 2013). Nearly 45% of elderly people often faced with walking to the bathroom, bedroom, kitchen, and on stairs (Cook *et al.*, 2009). Even though the intrinsic factors of falls risk were widely studied, but the impact of elderly people while less caring for their physical function was not given much attention and this should be received more consideration.

## METHOD

### Design

A descriptive correlation study designed by a cross sectional study to determine factors relating to falls risk among community-dwelling elderly in Jambi, Indonesia. The time of study conducted from July to August, 2014 at five Public Health Centers (Koni PHC, Putri Ayu PHC, Paal Merah I PHC, Pakuan Baru PHC, and Simpang Kawat PHC).

### Population

Kota Jambi district was selected an area of the study with the highest falls risk incidence among elderly people in 2013. Kota Jambi was amounted of 600 elderly people population, that divided into

five areas and twenty Public Health Centers, covering of three PHCs in the North Jambi (117 elderly people), five PHCs in the South Jambi (108 elderly people), three PHCs in the East Jambi (103 elderly people), three PHCs in the West Jambi (112 elderly people), and six PHCs in the South-East Jambi (150 elderly people).

The study employed cluster sampling technique to select each cluster of area and the pre-selected PHC unit, in which Kota Jambi district had similar characteristic among elderly people. The characteristics were age, gender, occupation, living arrangement and health service policy from PHC. And also, Kota Jambi has been large numbers of the elderly population as it presented a variety of falls in 2013. Further, elderly people who met the inclusion criterias were randomly selected as the potential participants, that based on a list name of elderly people who got services at the data collection period in each PHC. The potential participants' name obtained via the head nurse of the elderly care program in each PHC after elderly people were registered at data collection period.

### Sample

The study sample size was estimated using sample size calculation formula:  
$$n = P(1-p) z^2 / d^2$$

Where "d = the degree of precision (assumed to be 10%)", "z = the value of a error (assumed to be 90%) according to Naing *et al.* (2006) who found a prevalence of falls of (p) 50%. The calculated sample size was 138 and by adding 20% allowance made for drop out due to incomplete data. Finally, 166 elderly people recruited as participants in this study.

The inclusion criteria of the study were; (1) male or female who aged 60 years or above, (2) having health service registration in PHC, (3) agreed to participate in the study, and (4) able to write, reading and speaking the Indonesian language. Elderly people who aged 60 and above included in the study as the age of elderly people qualification for admission into Public Health Centers in Jambi. Furthermore, several other studies carried out in community-dwelling Indonesian elderly also considered those aged 60 and above as elderly. However, elderly people who suffered cognitive impairments in the Mini Mental State Examination (MMSE) of 24-score were excluded.

### Data Collection

The study gathered by interview method. Before data collection, the Ethics Review Board (ERB) committee, the Board for National Unity and People's Protection of Jambi province, and Health Department of Kota Jambi district undertaken for approval permission letter. The participants were given their time to decide before participating in this study. The participant' rights and the data confidentiality assured during data collection. The purpose of this study, the data collection process, and participant's rights also explained, after the participants agreed to participate in this study and the participants had signed out an informed consent. The participants followed a structured-interview procedure around 25-45 minutes covering demographic characteristic sheet and Falls Risk Assessment Tools (FRAT), for the Time Up-Go test (TUGT) taken time of 5 minutes in the elderly care room at five Public Health Centers in Kota Jambi. The confidentiality of the data has been assured in the secure place by the researcher that was destroyed after two years the completion of the study.

### Measurement Tools

Instruments were permitted to use in this study and it has been back translated to Indonesian language version. Three experts who experienced working with elderly people in Jambi validated the questionnaire content. In this study, the nurses who took responsibility in the elderly care program at Five Public Health Centers (PHCs) also checked each item questionnaire that understood words for elderly people. Thirty elderly people were tested by using a pilot study on the outside of the PHC selecting area study.

Three questionnaires were applied in this study;

#### 1. Demographic Characteristics

The Demographic sheet was developed by the researcher to record data including age, gender, educational level, living arrangement, and occupation.

## 2. Physical Function

Physical function among elderly people was examined by Time Up and Go Test (TUGT) (Podsiadlo and Richardson, 1991). TUGT measured gait speed and chair rising ability. In several studies, TUGT has been showed high inter-rater and intra-rater reliability in the elderly population (ICC = 0.99) (Cook *et al.*, 2009; Alexandre *et al.*, 2012; Lee *et al.*, 2013; Ribeiro *et al.*, 2013). Participants were performed two times of TUGT to identify the best mobility performances by the time taken in seconds. The total times (seconds) indicated level of physical function, covering “good” (0s-10s), “fair” (11s-20s), “poor” (21s-30s), “impaired” (31s-40s). In this study, those who spent more than 14 seconds were associated with high risk of falls arising out of mobility disorder among elderly people.

## 3. Falls Risk

Falls Risk Assessment Tools (FRAT) consisted of 6-item to measure the posture and stability as interference risk during activities of daily living (Ambrose *et al.*, 2013), covering falls history, medication history, any symptom of musculoskeletal disorders and cardiovascular diseases (arthritis rheumatoid, stroke, and Parkinson), any balance problems and the inability of chair rising. There are two descriptions of risk assessment as follows: 0 (no) or 1 (yes). The total score of participants indicated that high falls risk ( $\geq 3$ ), and low falls risk ( $< 3$ ). In this study, FRAT was applied to assess the interference risk during six months at years 2014. For each item, the researcher checked for a positive response to three or more of the questions on the form, then the researcher was guided for further assessment, referral options and interventions for certain risk factors. FRAT used Kuder-Richardson (K-R 20) Coefficient of Reliability test, reporting (KR-20) of the study was 0.88.

## Ethical Approval

The Ethics Review Board (ERB) Committee for involving human research subject, Boromarajonani College of Nursing Nopparat Vajira, Bangkok, Thailand was approached in the study, obtaining permission letter from the Board for National Unity and People’s Protection of Jambi province (BNUPP), Head of Health Department of Kota Jambi district, and Head of five PHCs in Kota Jambi. The potential participants were provided information about the study. They were assured of their right to withdraw from the study at any time without repercussion, the study was no harm for their health condition, and also they informed about anonymity and confidentiality issues. Those people who were willing to participate signed consent form prior to data collection.

## Data Analysis

Statistical analysis was performed by using Statistical Packages for the Social Science (SPSS) version 15.0 (SPSS Inc., Kasetsart University, Thailand). The Kolmogorov-Smirnov test was used to confirm the normality of the distributions. Descriptive among demographic characteristics, physical function and falls risk were presented by the frequencies, percentages, mean, standard deviation and range. The Bivariate analyses applied by Spearman’s Rank Correlation coefficients to examine the relationships between variables.

## RESULT

One hundred sixty and six elderly people participated in this study. The mean of age among participants were 67.16 years, ranging from 60-80 years (SD = 5.52). Half (50.6%) of the participants were male and female (49.4%). Most (57.8%) of participants were graduated at elementary school. Almost thirty seven percent of elderly people lived alone. Nearly (32.5%) of elderly people were trader. The data is undertaken as total picture in the community dwelling elderly people in Jambi, Indonesia.

**Table-1.** Physical Function Among Elderly People (N=166).

Physical function	N	%
Fair	97	58.4
Poor	34	20.5
Impaired	35	21.1

(M = 20.30 seconds, SD = 7.72, Range = 11-34)

\*SD = Standard Deviation, M = Mean

Regarding Table 1, the results showed that the mean score of physical function level among elderly were 20.30 seconds (SD=7.72). The physical function level of the participants was fair (58.4%), poor (41.6%), and impaired (20.5%), respectively. These results revealed that most elderly people in this study had a fair level of physical function.

**Table-2.** Falls Risk Among Elderly People (N=166).

Fall risk	N	%
Low	28	16.9
High	138	83.1

(M = 4.20, SD = 1.69, Range = 1-6)

\*SD = Standard Deviation, M = Mean

According to Table 2, the mean score of falls risk were 4.20 (SD=1.69). These findings reported that the majority (83.1%) of participants were high risk of falls and low risk of falls (16.9%). This result found that mostly elderly people in this study had high falls risk

**Table-3.** Frequency and Percentage of Falls Risk Assessment among Elderly People (N=166)

Risk	No n (%)	Yes n (%)
Falls history	80 (48.20)	86 (51.80)
Medicine history	34 (20.50)	132 (79.50)
Symptoms of dizziness	35 (21.10)	131 (78.90)
Diseases history of arthritis rheumatoid, stroke, and Parkinson	36 (21.70)	130 (78.30)
Balance problem	52 (31.30)	114 (68.70)
Ability to maintain balance	62 (37.30)	104 (62.70)

According to Table 3, the results presented falls risk assessment in sub domains. The most common of falls risk among elderly people in this study were medicines history (79.5%), symptoms of dizziness (78.9%) and symptoms of diseases (78.3%), respectively. This result indicated that the elderly people who had medical history were at higher falls risk.

**Table-4.** The Relationships between Demographic Characteristics, Physical Function, Environment and Falls Risk (N=166)

Variables	Falls risk	
	Correlation value	p-value
Gender	.147	.059
Age	.155	.046
Educational level	.046	.138
Living arrangement	.036	.559
Occupation	.039	.616
Physical Function	.435	.000

As shown in Table 4, a correlation of data revealed that gender, age, educational level, living arrangement and occupation were not statistically significant relationship with falls risk. However, physical function and falls risk was statistically significant relationship ( $R = .435$ ,  $p < .001$ ), meaning those who fair physical function level was more likely to get falls risk than they were not. In this study, physical function was positively moderate associated with falls risk among community dwelling elderly people.

## DISCUSSION

### Demographic Characteristic

Out of 166 elderly who range aged 60-80 years were male (50.6%) and female (49.4%). Most of the participant's age was 67.16 years. These findings are similar to the [Ministry of Public Health \(2012\)](#) and [Ambrose et al. \(2013\)](#) reported that the most falls risk faced elderly people who aged more than 65 years, which related to physiologic and pathologic changes. Women had been shown to be at high risk of fall rate ([Akyol, 2007](#)). The women were more likely to suffer in nonfatal injury than male, but most of fatality rate was injured male ([Ministry of Public Health, 2012](#)). Therefore, age and gender investigated the most factors of falls risk.

On the other hand, most of the participant's educational level was graduated at elementary school (57.8%). Participants who had educated had a better understanding of falls risk factors and falls risk prevention ([Alexandre et al., 2012](#)). In addition, the participants still had their work, that almost twenty three of elderly people were trader. Previous studies found that type of worker was associated with falls risk ([Akyol, 2007](#); [Alexandre et al., 2012](#); [Ambrose et al., 2013](#)). Whereas, in this study, these factors were not related to falls risk.

The findings of this study found that the demographic characteristics, such as age, gender, educational level, living arrangement, occupation and falls risk were not statistically significant relationships. These finding were differences findings with previous studies ([Naing et al., 2006](#); [Alexandre et al., 2012](#); [Tuunnainen et al., 2013](#)), indicating the participant' characters had a positive relationship with falls risk. One of the reasons related to the nature condition of this study, it was described by the diversity of culture and the demographic characteristics among participants. So, these conditions also had an impact into difference findings of the current study.

### Physical Function

The physical function assessed individual's gait speed and chair rising ability ([Podsiadlo and Richardson, 1991](#)). Regarding to Table 3, the result showed that most elderly people in this study had high falls risk (58.4%). These results indicated that fair physical function were more likely to have falls risk. The findings were consistent with previous studies ([Rubenstein and Josepshon, 2006](#); [Alexandre et al., 2012](#); [World Health Organization, 2012](#)). Physical function was revealed gait, balance, stride length, and sway among elderly people ([Akyol, 2007](#)). However, in this study, elderly people who worse level of physical function was exposed more falls risk. Then, elderly people who were declined physical function had any of gait and balance problems. This condition has been faced high falls risk group ([Bergland and Wyller, 2009](#)).

### Falls Risk

According to the falls risk assessment in sub domains, the majority of elderly people in this study had high falls risk (83.1%). Most elderly people in this study were in high score medication history of falls risk. Based on [Ambrose's](#) study, elderly people who reported medication history with fair physical function were more likely to be at risk more than elderly at a fair physical function without medication history ([Ambrose et al., 2013](#)). Interaction of more than prescription drugs and the initiation of a new drug treatment in the preceding two weeks has been contributed risk of falling among elderly people ([Swannenburg et al., 2010](#); [Ambrose et al., 2013](#); [Lee et al., 2013](#)). However, the lower risk domain of falls history was 51.8% of elderly people. This finding similar to previous studies had high falls risk related to falls recurrent experiences ([Alexandre et al., 2012](#); [Hiura et al., 2012](#)). Falls history in this study has been affected by lacking awareness of falls risk factors and that is still happening in Indonesia ([Leung et al., 2010](#)).

The relationships between demographic characteristics, physical function and falls risk among community-dwelling elderly people.

Physical function and falls risk was moderately positive relationship, assuming elderly people who worse physical function were more likely to increase falls risk. This result was consistent with previous studies have proven that physical function decline has been imposed to fall risk (Nandy *et al.*, 2004; Naing *et al.*, 2006). One factor to consider in concerning physical function was the musculoskeletal system (Ribeiro *et al.*, 2013). In addition, the reason for this study might be necessary assessed the independence of physical function among elderly people when they walk away on the floor or moving position. In other words, the findings were important issues to assess any impairments of the musculoskeletal system, including bones, joints, muscles and tendon might be taking an adverse effect on stability (Ministry of Public Health, 2012). Elderly people with poor mobility displayed more gait and balance problems (Polit and Beck, 2012). Therefore, physical function was the necessity factor relating to falls risk among community-dwelling elderly people and it should be more attention in the study.

In contrast, finding by Leung *et al.* (2010) describing gait disorder was not associated with falls risk. The findings pointed out that one factor significantly related to falls risk was the condition' in and around home of elderly people (Lee *et al.*, 2013). Another study by Kamel *et al.* (2012) also investigated that among Egyptian Elderly people had their falls risk of outdoor home (36%) and indoor (24%). In addition, those who had one or more environmental hazards in their home were more likely to have reported falling in the last 3 months. Consequently, these interesting findings should be involved for health care providers to improve physical function among elderly people focusing balance exercise on a fall risk prevention program.

## CONCLUSION

The purpose of this study was to determine factors relating to falls risk among community dwelling elderly people. Gender, age, educational level, living arrangement, occupation was not related to falls risk. There was a statistically significant relationship between physical function and falls risk. The result concluded that elderly people who had a chance to improve physical function was more likely to consider falls risk. Moreover, other factors were not included in this study important to explore for further research in the elderly population.

## IMPLICATION STUDY

This study contributes the existing literature for nursing practice to improve physical function among community-dwelling elderly people. Prospectively, a longitudinal study and experimental design should be emphasized the consequence of falls risk resulting in a falls prevention program

## LIMITATION

The participants were elderly people who came to PHC for treatment of falls and other health services, such as health check up, so these elderly might be reported higher concern of falls risk better than elderly who were not prepared coming to PHC.

## ACKNOWLEDGMENT

We would like to thank all of the participants in this study. Our thanks to the Ministry Public Health of Kota Jambi and Five Public Health Centers in Kota Jambi. Highest appreciation is directed to Director of Borromarajonani College of Nursing Nopparat Vajira and staffs who gave many facilities during the study period of the principal investigator in Thailand.

## REFERENCES

Akyol, A.D., 2007. Fall in elderly: What can be done? *International Nursing Review*, 54(12): 191-196.

- Alexandre, T.S., D.M. Meira, N.C. Rico and S.K. Mizuta, 2012. Accuracy of time up and go test for screening the risk of falls among community dwelling-elderly people. *Revista Brasileira Fisiotherapy*, 16(5): 361-368.
- Ambrose, A., G. Paula, M. Jeffrey and Hausdorf, 2013. Risk factors for falls among older adults: A review of the literature. *Maturitas Journal*, 75(1): 51-61.
- Bergland, A. and T.B. Wyller, 2009. Risk factors for serious fall related injury in elderly women living at home. *Injury Prevention*, 9(9): 308-313.
- Chelly, J.E., L. Conroy, G. Miller, M.N. Elliot, J.L. Horne and M.E. Hudson, 2009. Risk factors and injury associated with falls in elderly hospitalized patients in a community hospital. *Journal of Patient Safet*, 4(3): 178-183.
- Cook, S.A., A.C. Marcia, H. Jeanne, Briam, J. Dudgen, Y. Kathryn and Leighton, 2009. Falls in the medicare population: Incidence, associated factors and impact on health. *American Physical Therapy Association*, 89(5): 324-332.
- Dogan, H., C. Sevgi, T. Berna, P. Yildiz, C. Frank and O.L. Nime, 2010. The prevalence of home injuries among elderly people in Samsun, Turkey and the influence factors. *Turkey J Med Sci*, 12(6): 1-9.
- Hiura, M., H. Nemoto, K. Nishisaka, K. Higashi and T. Katoh, 2012. The association between walking ability and falls in elderly Japanese living in the community using a path analysis. *Community Health*, 37(1): 957-962.
- Kamel, M.H., Abdulmajeed, H. Abdulmajeed and S.I.S. Ismail, 2012. Risk factors of falls among elderly living in urban suez – Egypt. *Pan African Medical Journal*, 14(3): 1607-1617.
- Lee, H.C., C.K. Chang, J.Y. Tsauo, J.W. Hung, Y.C. Yu-Ching Huang and S.I. Lin, 2013. Effects of a multifactorial fall prevention program on fall incidence and physical function in community-dwelling older adults with risk of falls. *Archives of Physical Medicine and Rehabilitation*, 49(2): 606-615.
- Leung, A., I. Chi, V.Q. Lou and K.S. Chan, 2010. Psychosocial risk factors associated with falls among Chinese community-dwelling older adults in Hong Kong. *Health and Social Care in the Community*, 18(3): 272-281.
- Ministry of Public Health, 2012. About the health Indonesian population for elderly people population. Available from [http://www.depkes.go.id/index/Buletin%lansia\(1\).pdf](http://www.depkes.go.id/index/Buletin%lansia(1).pdf) [Accessed Desember 17, 2013].
- Naing, L., T. Winn and N. Rusli, 2006. Practical issues in calculating the sample size for prevalence studies. *Archives of Orofacial Sciences*, 1(2): 9-14.
- Nandy, S., S. Parsons, M. Cryer, M. Underwood, M. Rashbook, Y. Carter, S. Eldridge and G. Feder, 2004. Development and preliminary examination of the predictive validity of the falls risk assessment tool (FRAT) for use in primary care. *Journal of Public Health*, 26(2): 138-143.
- Podsiadlo, D. and S. Richardson, 1991. The timed "Up & Go": A test of basic functional mobility for frail elderly persons. *Journal American Geriatric Society*, 39(2): 142-148.
- Polit, D.F. and C.T. Beck, 2012. *Nursing research; generating and assessing evidences for nursing practices*. 9th Edn., China: Lippincott Williams and Wilkin.
- Ribeiro, E.A.M., E.E. Ribeiro, K. Viegas, F. Teixeira, G.F.F.D.S. Montager, K.M. Mota, F. Barbisan, I.B.M.D. Cruz and J.A.D. Paz, 2013. Functional, balance and health determinants of falls in free living community amazon riparian elderly. *Archives of Gerontology and Geriatrics*, 56(4): 357-359.
- Rubenstein, L.Z. and K.R. Josephson, 2006. Falls and their prevention in elderly people; what does the evidence show. *The Medical clinic of South America*, 13(5): 804-824.
- Swannenburg, J., E.D.D. Bruin, D. Uebelhart and T. Muder, 2010. Falls prediction in elderly people: A 1-year prospective study. *Gait and Posture Journal*, 31(10): 317-321.
- Touhy, T.A. and K. Jett, 2012. *Toward healthy aging*. 8th Edn., China: Elsevier.
- Tuunnainen, E., J. Rasku, P. Jantti and I. Pyykkö, 2013. Risk falls in community dwelling elderly people. *Auris Nasus Larynx*, 10(3): 7-13.
- World Health Organization, 2012. About the WHO global report of falls for older people. Available from <http://www.who.int/publications/2008/9789241563536eng.pdf> [Accessed August 17, 2013].