

Nutritional and Fall Risk in Older Women Dwelling in Long-Term Care (LTC) Facilities in India

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Abstract: *Objectives:* The objectives of the present study were to assess nutritional and fall risk of older women (aged 60 years and over) and to study the correlation between these in women living in LTC facilities of New Delhi. *Methods:* Background profile, MNA, DFRI, and FES-I questionnaires were used to gather data on nutritional and fall history. *Results:* The mean age of participants was 74.21(±5.52) years. A majority were widowed with poor educational and income level. Findings revealed that 54% of the older women were at a high nutritional risk. Fall risk was observed in 58% of the study participants and a majority of participants reported high fear of falling. MNA scores had a significant negative correlation with Downton Fall Risk Index scores ($R = -.419, p < .001$). *Discussion:* Timely nutritional and fall prevention interventions can help in management of nutritional risk and falls in LTC facilities.

Keywords: nutritional risk, fall risk, fall, older women, long-term care facilities

1. Introduction

With the accelerated pace of population aging, health care systems will be confronted with multi-faceted challenges to meet the care needs of older adults, particularly in low-and-middle income countries which will be at a greater risk of disability, due to multiple co-morbidities.¹ Most studies have focused on nutrition risk assessment of pregnant women and under-nutrition prevalence of children,² but few have focussed on the assessment of nutrition risk of older adults living in LTC facilities (also called Old Age Homes or Home for the Aged). Some research has been conducted on the prevalence of nutritional status of community dwelling older adults in India.³ Minimal research has been conducted on nutritional risk prevalence in older adults residing in LTC facilities in India.

Older adults living in LTC are a vulnerable population considered to be at a high fall risk due to the complex health challenges they face including, advanced dementia, multiple chronic diseases, and limited mobility.⁴ Falls are caused by an interaction of several factors, including a reduction in the efficacy of postural responses, sensory deficits, musculo-skeletal impairment, deconditioning related to physical inactivity, excessive polypharmacy, depression, reduction in balance self-efficacy, and neuromuscular dysfunction.⁵ Falls pose a serious public health problem with an increased economic burden not only for the affected person, but also for society.

Research focusing on fall risk factors, burden, and prevention strategies has been carried out in HICs.⁶ However, there has been insufficient research in the field of fall prevention and estimation of true burden, imposed by the high incidence of falls in LMICs. The high mortality rates associated with falls in developing countries reflect the severity of morbidity, disability, and treatment costs that follow in fall-related cases.⁷ The prevalence of falls in older Indian adults has been reported to be between 14% and 53%.⁸

Few studies have attempted to evaluate risk factors for falls that increase older adults' susceptibility to hospital admissions. Ravindran and Kutty (2016) examined the risk

factors for fall-related injuries in community-dwelling older adults that resulted in hospitalization in the city of Thiruvananthapuram in the state of Kerala in India. They noted that hip fractures were the most common injury following a fall incident. The causes of falls included intrinsic and extrinsic factors. Extrinsic causes such as slipping and tripping contributed to 66% of falls, intrinsic factors such as syncope contributed to 27% and some falls were a combination of both intrinsic and extrinsic factors.⁹ D'Souza et al. (2008) studied falls history, injuries, and hospitalization rates in older Indian adults living in the cities of Manipal and Udupi. This study found that 59% of fall cases led to injuries, 16% resulted in fractures, 47% involved physician consultation, and 19% required hospitalization.¹⁰ Kaushik and D'Souza (2008) reported a lower balance and confidence level in 40% of individuals who had a history of previous falls.¹¹ Cardona et al. (2008) studied the burden of injuries in rural areas of Andhra Pradesh and found that falls were more common in females as compared to males. The study revealed that 86% of fatal falls occurred in individuals aged 60 and over.¹²

2. Methods

Participants

A total of 85 women aged 60 years and over were selected as per the sample size calculations from six LTC facilities in New Delhi. These facilities identified from the directory of LTC facilities developed by the HelpAge International and the local telephone directories and those serving primarily women were approached for their willingness to allow for participant recruitment. Once the institutional permission was secured, the facilities were visited several times to distribute letters of invitation to women staying in these LTC facilities. The women interested in participating in the study signed the informed consent prior to participating in the study. The assessments were completed at the LTC facilities by one of the authors. The study received institutional approvals from the directors of LTC facilities and ethics approval from the Research Ethics Board at the University of Regina prior to recruiting study participants.

3. Measures

3.1 Background profile questionnaire

A background profile questionnaire was used to gather information on age, marital status, socio-economic status, level of education, annual income, and level of social support. It is important to collect this information from participants as it helps in examining the factors that contribute to a high level of nutritional and fall risk in individuals living in LTC facilities.

3.2 Nutrition risk assessment

3.2.1 Mini-Nutritional Assessment (MNA)

The MNA is the most widely used tool for nutritional risk assessment in older populations. There is currently no gold standard measurement tool for malnutrition in older adults.¹³ After its initial development and validation in 1994, the MNA has been used extensively in older adults in the community setting and in LTC facilities.¹⁴ The MNA consists of 18 items which include dietary intake, anthropometric measurements, global health assessment, and subjective assessment of nutritional state and health.¹⁵

3.2.2 Downton Fall Risk Index (DFRI)

The DFRI has been used in Sweden and Britain for older adults living in LTC facilities and hospitals. It has not been used to assess fall risk in older Indian adults living in LTC facilities. This tool consists of items that include: evaluation of fall history; intake of psychotropic medications such as anti-depressants, sedatives and anti-epileptic drugs; gait deficits; sensory deficits; and mobility status. It takes 5-7 minutes to complete and is easy to administer and has items that are associated with a greater risk of falls. The score on the DFRI ranges from 0 to 11 and participants with more than 3 on this scale were considered at high risk of falling. The researcher used this tool since it has relevant items directly linked with falls in older adults.

3.2.3 Falls Efficacy Scale International (FES-I)

The FES-I was used to assess concern of falling while performing ADLs in individuals living in LTC facilities. The participants were asked to rate their fear of falling in carrying out 16 ADLs by indicating if they were "very concerned", "fairly concerned", "somewhat concerned", or "not at all concerned" while doing the particular activity. The total FES-I score ranged from 16 to 64. A higher score indicates a higher fear of falling. Participants who obtained FES-I score greater than 23 were considered to have an intense fear of falling while performing ADLs.

3.3 Data Analysis

The data was entered and analyzed using SPSS version 21.0, and means, standard deviations, frequencies, and percentages were computed for variables such as meal intake, mode of feeding, self-perception of health status, history of falls, gait status, and fear of falling. Correlation analysis was conducted to examine the association between nutritional and fall risk.

4. Results

The participants involved in the study were older women (mean age of 74) living in six LTC facilities of New Delhi and a majority were widowed (82%) with a lower level of education and socioeconomic status (Table 1). Two LTC facilities were religious institutions which offered their services at no charge and the other four facilities were "pay and stay homes."

Nutritional characteristics of participants

The MNA Long-form was used to assess the nutritional risk profile of older women who participated in the study. The MNA includes questions on weight loss, number of medications taken daily, dietary intake, neuropsychological problems and self-perception of health status. The nutritional status characteristics of the study participants are shown in Table 2. Weight loss between 1 and 3 kg in the past few months was reported by 24.7% women and weight loss greater than 3 kg was reported by 32.9% women. Some women (20%) reported that they did not know if they had lost weight and 22.3% women had maintained the same weight status.

Three complete meals daily were consumed by 65.8% of participants and 32.9% preferred only two meals a day (breakfast and dinner). Milk, cheese, and/or yoghurt were consumed daily by a majority of women (98.8%). At least two servings of fruits and vegetables were included in the daily dietary intake of 72.9% of women. Most participants were able to eat independently without assistance provided by caregivers (85.8%). A few women were totally dependent on caregivers (4.7%) during mealtimes. Many women considered themselves to be healthy and without any nutritional problems (43.5%). Some women viewed themselves as malnourished and at a high nutritional risk (17.6%). The mean MNA Score of the participants was 18.44 (4.71). The participants were classified as "malnourished", "at nutritional risk" and having a "normal nutritional status" depending on the score obtained by adding their responses to the MNA questions. It was found that 54.1% of study participants were at nutritional risk based on the computed MNA scores. Individuals who obtained MNA Score <17 were classified as malnourished or undernourished and those who scored between 17 and 23.5 were considered to be "at nutritional risk". Individuals who scored greater than 24 on the MNA were classified as having a normal nutritional status.

Fall risk profile of participants

The fall risk of participants was assessed using the DFRI to determine the presence of factors that lead to a heightened risk of falling. The mean DFRI was computed as 3.38 (± 2.18). Using the DFRI classification, more than half of the total participants (58%) were assessed at a high risk of falling. As seen in Table 3, many women faced balance and mobility problems and an unsteady gait (45.9%). Only 32% were safe while using assistive devices and had an adequate gait status. Some women were not comfortable using walking devices (14%) and were classified as "unsafe while using assistive devices" such as cane sticks and walkers. More than half of the participants had experienced previous falls (54%) and a majority of them had visual impairment

(71%) while some had hearing impairment (21%) and limb impairment (33%).

The mean FES-I score was 34.04 (± 13.8) and 60% of older adults had an intense fear of falling as evidenced from their FES-I scores ranging from 28 to 64. Some participants were very concerned about walking on a slippery surface (20%), walking on an uneven surface (33%), walking in a crowded area (18%), and going to a social/religious event (21%). Study participants had a greater confidence level (lower fear of falling) while cleaning, dressing up, going to attend a phone call, and moving in or out of their chair and bed, but had a low confidence level (higher fear of falling) while climbing or descending stairs, walking on a slippery or uneven surface, bathing, visiting friends and neighbourhood, going to a social or religious event and walking in a crowded place or on a slope (Table 4).

Correlation Analysis

A correlation analysis was conducted to assess the interrelationship between nutritional and fall risk. It was found that MNA scores had a significant negative correlation with the DFRI scores ($R = -.419, p < .001$) which implies that higher MNA scores (lower nutritional risk) were associated with lower scores on the DFRI (lower fall risk). This suggests that older women who had a higher level of nutritional risk were at a greater risk of encountering falls.

5. Discussion

India is undergoing rapid population aging and the proportion of older adults is increasing at an unprecedented rate. Developed nations of the world have been experiencing population aging the past several decades but India is facing this phenomenon in a much shorter timeframe, and lacks the financial and managerial resources to deal with the repercussions of this public health issue.¹⁶ Long-term care LTC facilities, also known as old age homes or homes for the aged, are also expanding due to the ongoing demographic transition¹⁷ and deterioration of the traditional joint family system in India.¹⁸

A majority of the participants had a lower level of education and a lower socioeconomic status. This is not surprising given that traditional LTC in India emerged as a system to support poor and destitute older adults as a charity provided by religions organizations.¹⁸ Studies in India have also shown high rates of illiteracy (63%) among the older population.¹⁹ Although a majority of the participants (68%) had two or more children, only 35% reported having children visit them at least on a monthly basis. The residents also indicated that most of the visits were for financial reasons only, and the children did not have strong emotional ties with their mothers living in care homes. While these kinds of elder abuse are common, they are largely underestimated and under-reported by older adults.

It was found that 54% of participants were at a high nutritional risk. The findings are similar to the nutritional risk prevalence of 57% reported by Pai (2011) in a sample of older adults living in LTC homes in Mangalore.²⁰ Similar results were found by Singh & Shrestha (2016) who carried out a study in LTC facilities of Kathmandu and reported a

nutritional risk prevalence of 61% in older adults.²¹ In our study, only 66% of participants consumed three full meals per day. It was reported by 53% of women that there was a moderate decline in dietary intake due to appetite and gastro-intestinal problems. Previous research conducted by Rolland et al (2006) has shown that rapid escape of food from the fundus into the antrum results in early satiation in older adults and thus leads to a reduction in dietary intake.²² Anorexia of aging has been shown to contribute to decreased food intake in older adults.²³ It has been reported that about 15% to 30% of older individuals undergo anorexia of aging, with women, LTC residents, hospitalised older adults at a higher risk of malnutrition.²⁴

Previous research studies have shown that older adults belonging to a lower socio-economic status are at increased nutritional risk and it is useful to screen vulnerable older adults using a validated nutrition assessment tool in order to prevent co-morbidities associated with a high level of nutritional risk.²⁵ Since the MNA was initially developed for Caucasian populations and has proven validity and reliability in western populations, it may have to be modified in order to screen older Indian adults for nutritional risk. The addition of items related to risk factors that predispose older adults to malnutrition can give researchers a clear insight into the factors that are adversely affecting diet intake in care home residents. Inclusion of questions on the number of co-morbidities, quantities of various food items consumed, availability of social support networks, types of medications consumed including anti-depressants, anti-hypertensives, hypnotics, and sedatives might be useful in nutrition risk screening and assessment of older Indian women. Fall risk prevalence was higher than expected in our present study. More than half of the participants (58%) were found to be at a high fall risk. Several women faced balance and mobility problems and an unsteady gait (45.9%). This is supported by research conducted by Deandrea et al (2010) that suggests that balance deficits and gait disturbance resulting from poor muscle function is a major risk factor for falls in older adults.²⁶ In the present study, 60% of women reported an intense fear of falling. Fear of falling has been demonstrated as a strong predictor of fall risk in previous research that has been carried out in developed countries.²⁷ Poor self-perception of health status, musculo-skeletal problems, gait and balance impairment, and use of assistive devices such as walker, cane, or crutches also contributes to a higher fear of falling.²⁸

In the present study, nutritional risk and fall risk were highly correlated in older Indian women residing in homes for the aged. It was observed that MNA scores had a significant negative correlation with DFRI scores ($R = -.419, p < .001$) which implies that higher MNA scores were associated with lower scores on the DFRI. This indicates that older women who were at high nutritional risk were at a greater risk of encountering falls and fall-related injuries in future. This has been substantiated by Johnson (2003) who carried out a study to assess the association between nutritional risk and falls among frail older adults.²⁹ The study sample involved 98 older adults with a mean age of 82 years and 31% of study participants had encountered previous falls. The study showed that the nutritional risk was associated with falls, leg strength, and balance in older adults.

6. Conclusion/Recommendations for Future Research

Falls have been shown to have a multi-factorial etiology, and the presence of numerous sex-specific risk factors points towards the need for fall prevention strategies, and interventions which take gender into consideration. The present study showed that not only are seniors at risk for poor nutrition, they are also concurrently at risk for falls. As such, programs and services provided within the LTC context should address these issues through evidence-based strategies. Future intervention research should examine the efficacy of such approaches as most of the successful falls and nutritional interventions to date have been developed and evaluated from the context of high income countries. The Government of India should increase efforts to promote active and healthy aging, by developing models of health care, with a focus on preventive, curative, and rehabilitative aspects of health to improve the quality of life of older adults.

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9. Conflict of Interest

The authors declare that they have no conflict of interest.

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Tables

Table 1: Demographic characteristics of participants

Characteristic	n (%)
Marital Status	
Never married	5 (5.9%)
Separated/Divorced	11 (12.9%)
Widowed	69 (81.2%)
Educational background	
10 th grade or below	43 (50.6%)
12 th grade	17 (20.0%)
Bachelor's degree	25 (29.4%)
Annual income	
No income	26 (30.5%)
INR <50,000	23 (27.3%)
INR 50,000 to 100,000	8 (9.4%)
INR 100,000 to 500,000	26 (30.5%)

Table 2: Nutritional profile of study participants

Characteristic	n (%)
Meal intake	
Three meals	56 (65.9%)
Two meals	28 (32.9%)
One meal	1 (1.2%)
Decline in food intake	
No decrease in food intake	27 (31.7%)
Moderate decrease in food intake	45 (52.9%)
Severe decrease in food intake	13 (15.4%)
Weight loss in past 3 months	
Between 1 and 3 kg	21 (24.7%)
Greater than 3 kg	28 (32.9%)
No weight change	19 (22.4%)
Does not know	17 (20.0%)
At least one serving of dairy products/day	84 (98.8%)
≥2 servings of legumes per week	79 (92.9%)

≥2 servings of fruits and vegetables	62 (72.8%)
Mode of feeding	
Unable to eat without assistance	4 (4.8%)
Self-feed with some difficulty	8 (9.4%)
Self-feed without any difficulty	73 (85.8%)
Subjective evaluation of health status	
Self-perception of nutritional state	
Considers self as malnourished	15 (17.6%)
Views self as having no problem	37 (43.5%)
Uncertain of nutritional status	33 (38.9%)
Self-perception of health condition	
Not as good	21 (24.7%)
As good	31 (36.4%)
Not sure	27 (31.8%)
Better	6 (7.1%)
MNA Score	M (SD)
Nutritional risk classification	18.44 (4.71)
≤17 Malnourished	27 (31.7%)
17.5 to 23.5 At nutritional risk	46 (54.1%)
>23.5 Normal nutritional status	12 (14.2%)

Table 3: Fall risk assessment of Participants

Characteristic	n (%) or M (SD)
History of falls	46 (54.1%)
Use of tranquillizers	36 (42.3%)
Use of anti-depressants	20 (23.5%)
Use of diuretics	33 (38.8%)
Use of anti-hypertensive drugs	33 (38.8%)
Visual impairment	60 (70.6%)
Hearing impairment	18 (21.2%)
Limb impairment	28 (32.9%)
Gait status	
Need for assistive devices	
Normal (safe without walking aids)	45 (52.9%)
Safe with walking aids	27 (31.8%)
Unsafe without walking aids	12 (14.1%)
Unable	1 (1.2%)

Table 4: Fear of falling of participants

Preparing meals	1.68 (0.8)
Dressing or undressing oneself	1.67 (0.8)
Cleaning	1.69 (0.8)
Bathing	2.02 (0.9)
Grocery shopping	1.92 (1.0)
Moving in/or out of a chair	1.71 (0.9)
Climbing stairs	2.32 (0.9)
Walking in neighbourhood	1.99 (1.0)
Reaching for things above (in cabinets)	1.87 (0.9)
Going to answer the phone	1.76 (0.9)
Walking on a slippery surface	2.75 (0.8)
Going to visit friends	2.02 (1.1)
Walking in a crowded place	2.24 (1.1)
Walking on an uneven surface	2.89 (0.9)
Going up/down a slope	3.13 (0.9)
Attending a social event	2.35 (1.1)
FES Score (0 to 64)	M (SD)
Fear of Falling Classification	34.04 (13.8)
Low risk (score 16-19)	n (%)
Moderate risk (score 20-27)	9 (10.6)
Severe risk (score 28-64)	25 (29.4)
	51 (60.0)