MALNUTRITION AND FALLS RISK IN COMMUNITY-DWELLING OLDER ADULTS

E. ISENRING1,2, J. BAKER2, G. KERR3,4

1. Institute for Health and Biomedical Innovation, Queensland University of Technology, Brisbane, Australia; 2. School of Human Movement Studies, University of Queensland, Brisbane, Australia; 3. Department of Nutrition and Dietetics, Princess Alexandra Hospital, Queensland Health, Brisbane, Australia; 4. School of Exercise and Nutrition Science, Queensland University of Technology. Corresponding author: Dr Elisabeth Isenring, School of Human Movement Studies, University of Queensland, St Lucia 4072, Email: e.isenring@uq.edu.au; Ph: +61 3 07 3365 6982

Abstract: Background and Aims: Falls and fall-related injuries result in reduced functioning, loss of independence, premature nursing home admissions and mortality. Malnutrition is associated with falls in the acute setting, but little is known about malnutrition and falls risk in the community. The aim of this study was to assess the association between malnutrition risk, falls risk and falls over a one-year period in community-dwelling older adults. Methods: Two hundred and fifty four subjects >65 years of age were recruited to participate in a study in order to identify risk factors for falls. Malnutrition risk was determined using the Mini Nutritional Assessment-Short Form. Results: 28.6% had experienced a fall and according to the Mini Nutritional Assessment-Short Form 3.9% (n=10) of subjects were at risk of malnutrition. There were no associations between malnutrition risk, the risk of falls, nor actual falls in healthy older adults in the community setting. Conclusions: There was a low prevalence of malnutrition risk in this sample of community-dwelling older adults and no association between nutritional risk and falls. Screening as part of a falls prevention program should focus on the risk of developing malnutrition as this is associated with falls.

Key words: Malnutrition, falls, elderly, MNA-SF, nutritional status.

Non Standard Abbreviations: MNA-SF: Mini Nutritional Assessment-Short Form.

Introduction

Falls-related injury is a major cause of morbidity and mortality among the elderly population worldwide (1). Annually, approximately one in three individuals over the age of 65 years living in the community have a fall; a number increasing with age (2). Fall-related injuries may result in loss of function and independence along with premature nursing home admissions and significant use of health services.

Healthcare costs associated with falls is increasing annually. USA data show that in 2000 there were 10,300 fatal falls and 2.6 million non-fatal falls with direct medical costs of $0.2 billion and $19 billion respectively in the USA (3). Falls and their associated consequences are therefore a major public health and economic issue which need to be addressed.

Falls have multiple precipitating causes, such as postural instability, decreased vision and strength, poor movement coordination, and declines in balance and gait (4), making the prevention of falls through diagnosis and treatment a complex challenge (4). Nutrition might impact on falls as a result of loss of muscle mass leading to reduced strength and potentially affecting balance.

Three studies investigating nutritional status and risk of falling in the acute care setting observed that patients at nutritional risk were more likely to experience a fall than well-nourished patients (5-7). Studies in community-dwelling older adults have found that there is an association among those receiving home care or those attending multi-disciplinary falls clinics, malnutrition and falls risk (8-10). However, little is known about nutritional factors and falls risk in community-dwelling older adults.

This aim of this study was to assess the association between malnutrition risk and the number of falls in older adults within the community setting.

Materials and Methods

Study Participants

Australian residents present on the Brisbane area electoral roll aged >65 years were eligible to participate in the study. A letter inviting suitable participants to take part in the study was sent out via mail. A follow up telephone call was also conducted to check for eligibility. Participants were excluded if they had ocular disease, recent or recurrent history of musculoskeletal injury and surgery, walking aid use, neurological conditions (e.g. Parkinson’s disease) or cognitive impairment (mini mental state exam score < 24). Potential participants were invited to attend the gait clinic for assessments. Height and weight were measured. A range of baseline assessments were conducted on the subjects in order to assess their risk of falls. Retrospective falls over the past year were self reported and categorised into no falls vs. falls (including both single and multiple falls). Falls were also assessed prospectively over a one-year period. The participants were asked to report whether they experienced any falls or injuries by returning a daily falls calendar each month for the subsequent 12-month period. For the purposes of this study, a fall was defined as “an unintentional coming to the ground or some lower level not as a result of a major intrinsic event (e.g.
stroke or syncope) or overwhelming hazard” (11, 12).

Nutritional risk using the Mini Nutritional Assessment-Short Form (MNA-SF) (13) was conducted by a research assistant as a one-on-one, face-to-face interview with each of the participants at baseline. MNA-SF constitutes six questions, relating to oral intake, weight loss, mobility, stress and/or acute disease, neuropsychological problems and Body Mass Index (BMI) (13). The sample size was calculated based on the primary outcome of interest (gait) and falls risk. It was estimated that at least 238 participants were required to assess a 15% prevalence of malnutrition at the 95% confidence interval with a standard error of ± 3%. This study received ethical approval from the Human Research Ethics Committee at the Queensland University of Technology and participating individuals provided written informed consent.

Statistical Methods
Statistical analyses were performed using SPSS (Statistical package for the social sciences, version 18, 2007, Chicago, IL, USA). All continuous variables were normally distributed and presented as mean±sd. Categorical variables are presented as count (%). Chi square tests were performed to examine the association between the six nutrition screening questions within the MNA-SF and retrospective falls. These analyses were also performed with the number of prospective falls experienced over the year. Analysis of Variance (ANOVA) was used to compare the BMI of the population with retrospective falls. BMI was also categorised as at risk of malnutrition in older adults (<22kg/m2) or not at risk (>22.1kg/m2)(13). Statistical significance was set at the conventional p<0.05 level. Results were also interpreted for clinical relevance.

Results
A sample of 254 community-dwelling participants aged 65-90 years consented to participate in the study; 52.4% (133) male and 47.6% (121) female. The mean age was 74.3 years, ranging from 65-90 years with a mean BMI of 26.4kg/m2. From the sample, 73.2% (186) of subjects had no history of falls, 18.1% (46) had fallen once previously and 8.7% (22) had previously experienced more than one fall. Baseline characteristics of the study participants are presented in Table 1. According to the MNA-SF, 3.9% (n=10) of the subjects were ‘at risk’ of malnutrition and 96.1% (n=243) were identified as ‘not at risk’. There was no association between falls risk (self reported retrospective falls) and BMI (X21 = 0.910, p = 0.34), weight loss (X21 = 0.009, p = 0.92) or malnutrition risk (MNA-SF overall score) (X21 = 0.912, p = 0.34). Likewise there were no associations between prospective falls over a period of 12 months and malnutrition risk (X21 = 0.135, p = 0.714), weight loss in the past 3 months (X21 = 0.433, p = 0.510) or BMI (X21 = 1.145, p = 0.285). There were no associations found between the six MNA-SF questions and number of falls (data not presented). There were no clinically significant associations between the nutritional variables and falls risk.

Table 1

<table>
<thead>
<tr>
<th>Subject characteristics</th>
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<tbody>
<tr>
<td>Gender (M:F)</td>
<td>133 (52.4%): 121 (47.6%)</td>
</tr>
<tr>
<td>Age (Years)</td>
<td>74.3±6.0 (65-90)</td>
</tr>
<tr>
<td>BMI (kg/m2)</td>
<td>26.4±4.5 (17 - 43.5)</td>
</tr>
<tr>
<td>MNA (At risk: Not at risk)</td>
<td>10 (3.9%): 244 (96.1%)</td>
</tr>
<tr>
<td>Falls Risk</td>
<td></td>
</tr>
<tr>
<td>Nil Falls</td>
<td>186 (73.2%)</td>
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<tr>
<td>Single Falls</td>
<td>46 (18.1%)</td>
</tr>
<tr>
<td>Repeated Falls</td>
<td>22 (8.7%)</td>
</tr>
<tr>
<td>Falls measured prospectively</td>
<td></td>
</tr>
<tr>
<td>Nil Falls</td>
<td>138 (55%)</td>
</tr>
<tr>
<td>Single Falls</td>
<td>61 (24%)</td>
</tr>
<tr>
<td>Repeated Falls</td>
<td>50 (20%)</td>
</tr>
<tr>
<td>Missing</td>
<td>5 (1%)</td>
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Discussion
This study found a low prevalence of malnutrition risk and hence found no association between nutritional status and risk of falls in the past 12 months and actual falls assessed prospectively over 12 months in older adults living in the community. It has been documented that within the community setting the prevalence of malnutrition is 10-30%, rising with age and multiple health concerns (14). The current study found that 3.9% (n=10) of the sample was “at risk” of malnutrition, with no subjects identified as malnourished. This prevalence was extremely low when compared to similar studies looking at malnutrition rates in older adults within the community, probably as a result of the strict study inclusion criteria.

A number of studies using the MNA-SF screened between 2-28% of community-dwelling adults as at malnutrition risk (15, 16). Increased risk of falling has been found to be associated with decreased BMI, muscle weakness and impaired movement coordination (16). Those studies looking at older adults in the community receiving care identified 15-40% at risk of malnutrition (8, 17) with those classified as undernourished, 1.65 times more likely to fall than those identified as well nourished (8). Of the patients attending an Australian falls clinic, 12.2% were identified as undernourished (10).

Individuals within the acute care setting tend to be at greater nutritional risk than the general community population (5) and a high proportion of moderately and severely malnourished individuals in acute care become fallers (6). The prevalence of malnutrition has been found to be greater in ‘frail fallers’ when compared with both ‘active’ and ‘non fallers’ (7). Although within the acute care setting and community-dwelling older adults receiving domiciliary care, poor nutritional status is
associated with falls risk, little is known about the association between nutritional status and falls risk of community-dwelling older adults (18). However, in a study within the community setting, nutritional supplementation has been found to reduce the number of falls individuals experience (19). Although the results of the current study suggest that in the healthy community-dwelling older adult population nutritional risk is not associated with falls, it is important to determine other fall predictors e.g. balance, strength, polypharmacy etc. and determine whether these have a relationship with nutritional status.

Most of the evidence in this area is based on observational studies. A randomised controlled trial has been initiated to determine the effectiveness of an individualised multifactorial intervention to reduce falls and malnutrition in community-dwelling persons aged 85 years and over. This is a 3 year study, aiming to reduce the incidence of falls and risk of malnutrition to determine the characteristics of persons aged 85 years and over along with the rate of falls and nutritional risk (20). This will be one of the first RCTs of nutrition intervention and falls. When this study is published it will strengthen the evidence regarding whether nutrition intervention can reduce the risk of falls.

There were potential limitations with the current study. The unexpected low malnutrition prevalence, meant this study was underpowered to detect associations between falls and nutritional status. The previous falls component of the study was self reported, allowing personal bias. However, this criticism is negated by the use of including a prospective falls component. This particular study was designed specifically to assess specific factors contributing to falls, rather than to assess the nutritional status of this population group and therefore those included with nutritional concerns was lower than anticipated. The strengths of this study are the relatively large sample size and that it includes both retrospective and prospective assessment of falls risk and actual falls which is unusual in these types of studies.

In conclusion, this study found a low prevalence of malnutrition risk in a sample of healthy community-dwelling older adults, with no associations between nutritional parameters, past falls risk or actual falls assessed prospectively. Although there is some evidence of the association between falls and nutritional status in the acute care setting there are limited data available within the community. Future research needs to focus on the decline in nutritional status and its associations with falls risk along the progression between healthy older adults living in the community and those in acute and residential care, displaying the importance of rescreening malnutrition risk over time.

**References**