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Fall risk profile, grip strength and quality of life status of older persons in Ibadan

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Abstract

Background: Quality of Life (QoL) is a key indicator of overall well-being in older persons and is closely linked to independence in daily activities. Fall risk and grip strength are important geriatric health indicators, but their relationship with QoL remains underexplored in among older persons.

Methods: This cross-sectional study recruited older adults in Ibadan, Nigeria. Socio-demographic characteristics were recorded. Fall risk and QoL were assessed using the Stay Independent Questionnaire and the Older People's Quality of Life Brief, respectively. Grip strength was measured using a JAMAR mechanical hand dynamometer. Data were analyzed using descriptive statistics, Chi-square, and Spearman's correlation at a 0.05 alpha level.

Results: A majority of participants were female (66.7%), with half aged 60-69 years (mean age=69.6±6.3 years). Minimal fall risk was reported in 50% of participants, with fall risk profile showing a significant association with QoL ($p<0.001$). No significant associations were found between grip strength and fall risk ($p=0.08$), or age and fall risk ($p=0.81$). QoL did not correlate significantly with grip strength ($r=-0.03$; $p=0.74$) or age ($r=0.10$; $p=0.18$). However, age was significantly correlated with grip strength ($r=-0.18$; $p=0.02$).

Conclusion: Fall risk profile, rather than grip strength, appears to be a determinant of QoL among older adults, while age significantly influences grip strength.

Introduction

Falls are events that result in an individual inadvertently coming to rest on the ground, floor, or another lower level [1]. They are regarded as one of the "geriatric giants" and represent a leading cause of injury-related visits to emergency departments, as well as the primary etiology of accidental deaths in individuals over the age of 60 years [2]. Established risk factors for falls, in order of evidence strength, include a history of previous falls, impaired balance, reduced muscle strength, visual problems, polypharmacy, and gait difficulties [3]. Beyond their immediate physical consequences, falls and fall risk exert a profound influence on Quality of Life (QoL). Quality of life reflects the overall well-being of an individual and remains a central goal of healthcare for older persons. Research indicates that older adults at increased risk of falling—even those who have not yet experienced a fall—are susceptible to declines in QoL [4]. The WHO [1] defines QoL as an individual's perception of their position in life, in the context of the cultural and value systems in which they live, and in relation to their goals, expectations, standards, and concerns.

The identification of fall risks is therefore of critical importance. Many older adults at risk of falling present with no obvious symptoms to alert them or their healthcare providers of their vulnerability. Early identification of these risk factors may reduce the likelihood of future falls and, consequently, preserve or enhance QoL [5]. Moreover, fear of falling - even in the absence of actual falls—may discourage activity and participation, resulting in reduced strength, flexibility, mobility, and independence. Given that older people often associate QoL with independence in daily activities, interventions must not only target

physical health but also foster self-esteem, satisfaction with functioning, autonomy in daily tasks, and active participation in social life, which are key components of QoL [6]. Establishing the relationship between fall risk and QoL among older adults is essential for guiding care providers toward tailored interventions. Understanding this interrelationship provides valuable insight into the healthcare needs of this population and highlights the importance of holistic strategies to promote healthy aging. As such, exploring the association between falls and QoL represents a vital area of research aimed at enhancing aging-well and improving health-related quality of life in older persons [7].

Materials and methods

Participants

The participants in this study were older persons, 60 years and above, who resided in Ibadan. Only participants who could understand English language and comprehend basic instructions were included in the study. Individuals who had visual or hearing impairments which would make it difficult to complete the questionnaires or could make communication difficult were excluded from the study. Likewise, individuals who had obvious upper limb deformity especially the dominant limb were excluded from the study. A minimum of 180 participants was calculated using a standardized equation.

Study design and procedure

This study was a cross-sectional study. A purposive sampling technique was used to recruit participants into this study. Non-probability sampling technique using sample of convenience to recruit older persons from designated venues. Ethical approval for this study was sought and obtained before the commencement of the study (UI/EC/23/0144). The purpose and procedure of the study was stated assuring participants of confidentiality by the researcher. The reasons, nature and rationale behind the study was explained to each participant and they were also be informed of their free will to refuse to take part in the study and their right to withdraw at any time. The study was conducted in offices, gatherings where older persons tend to converge in large numbers such as churches and mosques in the following Local Governments; Ibadan North, Ibadan North East, Ibadan North West, Ibadan South West and Ibadan South East.

Instruments

The following instruments were used for this study:

Stay independent questionnaire

The Stay Independent Questionnaire developed by Centre for Disease Control and Prevention (CDC) designed to measure the fall risk profile of individuals. The questionnaire comprises of 13 items. Every item on The Stay Independent Questionnaire is scored with 0 or 1 with response option of YES or NO. The highest possible score is 13 while the lowest possible score is 0. The scores are summed up for a total score of the Stay Independent Questionnaire so that higher score represent high risk of falling. A score of <4 interprets to be minimal or no risk of Falling [8].

Old people quality of life-brief (OPQOL-BRIEF)

The OPQOL-brief questionnaire has 13 items, with a preliminary single item on global QOL. This single item is not scored with the OPQOL; it is coded as Very good (1) to Very bad (5). Each of the 13 items is scored Strongly agree=1, Agree=2, Neither=3, Disagree=4, Strongly disagree=5. The items are summed for a total OPQOL-Brief score, and then positive items are reverse coded, so that higher scores represent higher QOL. The total sum score ranges from 13- 65. 13 being the lowest and 65 being the highest. The questionnaire does not provide specific categorizations or classifications of quality of life [9].

Jamar mechanical hand dynamometer

The Jamar mechanical hand dynamometer (Clifton, N.J., USA) measures grip strength based on the amount of tension generated in a steel spring and displays grip strength in kilograms or pounds. It has a measurement range of 0 to 220 pounds (0 to 100 kilograms)

Data analysis

1. Descriptive statistics of mean, frequency and proportion was used to summarize data.
2. Chi square test was used to test the association between:
   - Fall risk profile and quality of life status.
   - Age and fall risk profile
   - Grip strength and fall risk profile
3. Spearman's correlations method was used to test the relationship between:
   - Quality of life and grip strength
   - Quality of life and age

Level of significance was set at $p<0.05$

Results

Participants

One hundred and eighty older persons aged 60 years and above participated in this study. All the one hundred and eighty (180) copies of the questionnaires distributed to participants were retrieved. Efforts were made to ensure the questionnaires were properly completed at the venue of the study leading to a 100% return rate.

Table 1: Socio-demographic characteristics of participants.

Variables	Frequency (N)	Percentage (%)
Age (year)		
Mean age (±SD	**69.60±6.3**	
60-69	90	50.00%
70-79	73	40.50%
80-89	16	8.90%
<90	1	0.60%
Gender		
Male	60	33.30%
Female	120	66.70%
Religion		
Islam	66	36.70%
Christianity	114	63.30%
Others	0	0%
Ethnicity		
Yoruba	141	78.30%
Igbo	35	19.40%
Hausa	4	2.20%

Socio-demographic characteristics and fall prevalence of the participants

There were more female participants (120; 66.7%) in this study. The ages of the participants ranged from 60 to 100 years and the mean age of the participants was 69.6±6.3 years. The socio-demographic characteristics of the participants which include age, gender, religion and ethnicity are summarized in Table 1. Results shows that the age group 60-69 years had the highest number of participants representing half of the total number of participants (50%). Most of the participants were Christians 114(63.3%) and predominantly Yoruba 141 by tribe (78.3%).

Fall risk profile of participants

Majority of the participants (50%) had a score of less than 4 for fall risk profile which implies that they had a minimal/no risk of falling while minority (8%) had a score greater than 8 which depicts high to severe risk of falling. The mean risk of fall score for all participants was 1.54±0.58. The minimum score recorded was 0 and the maximum score recorded was 9. In the current study, 47 (26.1%) of the participants had experienced a fall, 70% of those reported that they had at least a minor injury. Out of the older persons that had a fall, there were more females (30) than males (Tables 2 and 3).

Level of quality of life of participants

The quality-of-life rating was classified into very good, good, alright, bad, and very bad. Results obtained showed that majority of the participants (47.8%) considered themselves to have a "good" quality of life while the least proposition (0.6%) considered themselves to have "very bad" quality of life. The mean quality of life of all participants was 2.11± 0.82 (Table 2).

Grip strength of participants

Majority of the participants (135; 75%) had grip strength of "below average" and minority of the participants (5.6%) had grip strength of "very good". The mean grip strength of the participants was 1.44±0.86. The minimum value recorded was 5 kg and the maximum value recorded was 45 kg (Table 2).

Table 2: Grip strength, fall risk profile and quality of life.

Variables	Frequency(n)	Percentage (%)
Handgrip strength		
Mean grip strength (±SD)	1.44±0.86	
Below average	135	75%
Average	20	11.10%
Above average	15	8.30%
Very good	10	5.60%
Fall Risk Profile		
Mean Score (±SD)	1.54±0.58	
<4: Minimal or no risk of falling	90	50%
4-8: Moderate to high risk of falling	82	45.60%
>8: High to severe risk of falling	8	4.40%
Quality of life		
Mean quality of life (±SD)	2.11±0.82	
Very good	41	22.80%
Good	86	47.80%
Alright	47	26.10%
Bad	5	2.80%
Very bad	1	0.60%

Table 3: Risk factors of falling among participants.

Variables	Frequency (N)	Percentage (%)
I have fallen in the past one year		
Yes	47	26.10%
No	133	73.90%
I use or have been advised to use a cane or walker to get around safely		
Yes	48	26.70%
No	132	73.30%
Sometime I feel unsteady when I am walking		
Yes	89	49.40%
No	91	50.60%
I steady myself by holding onto furniture when walking at home		
Yes	39	21.70%
No	141	78.30%
I am worried about falling		
Yes	67	37.20%
No	113	62.80%
I need to push with my hands to stand up from a chair		
Yes	85	47.20%
No	95	52.80%
I have some trouble stepping onto a curb		
Yes	68	37.80%
No	112	62.20%
I often have to rush to the toilet		
Yes	31	17.20%
No	149	82.80%
I have lost some feeling in my feet		
Yes	57	31.70%
No	123	68.30%
I take medicine that sometimes make me feel light-headed or more tired than usual		
Yes	32	17.80%
No	148	82.20%
I take medicine to help me sleep or improve my mood		
Yes	40	22.20%
No	140	77.80%
I often feel sad or depressed		
Yes	58	32.20%
No	122	67.80%

Association among fall risk profile, quality of life, grip strength and age of participants

The Pearson's chi-square test was used to test for the association between fall risk profile and quality of life, grip strength and fall risk profile and age and fall risk profile of participants. A significant association was found between the fall risk profile and quality of life (X^2=45.8, p<0.001). Most older persons with high risk of falling recorded lower quality of life. There was no significant association between the fall risk profile and each of grip strength (X^2=1.1.4, p=0.08) and age (X^2=42.9, p=0.81)

Relationship among grip strength, quality of life and age

The Spearman's correlation method was used to explore the relationship between grip strength and quality of life, grip strength and age and quality of life and age. The result of this study showed that there was a statistically significant relationship between fall risk and quality of life (r=0.3; p=<0.001). However, there was no significant relationship between quality of life and age (r=0.1; p=0.18), grip strength and quality of life (r=-0.0025; p=0.735) of older persons in Ibadan.

Discussion

This cross-sectional study was conducted to determine the association between fall risk profile and quality of life, grip strength and fall risk profile as well as the association between age and fall risk profile of older persons living in Ibadan. The relationship between quality of life and each of age and grip strength was also investigated. Majority of the respondents were aged 60-69 years and this may be because this age group is the most readily available and accessible age group that can be easily reached when it comes to older adults. They are probably the most active as the youngest category of the older persons group, since the participants were recruited from outdoor places which meant they had to come out of their homes. Engagement in active lifestyle is encouraged in older persons [10].

Socio-demographic characteristics of participants.

Majority of the participants were females and this might be because the females were more willing to take part in the study than the males. Mackenzie et al. [11] in their study also reported this as the trend. There was no particular reason that can be suggested for Christianity being the predominant religion among the participant since the participants were recruited from both worship centres. The predominance of Yorubas was because of the location of the study, that is, Ibadan. The falls prevalence in this study was relatively high compared to previous studies. The finding that almost a third of the participants had previously fallen should be of great concern to health care providers who should develop safety measures control that can be communicated to the older persons.

Association among fall risk profile, quality of life, grip strength and age of participants.

The outcome of this study showed significant association between fall risk profile and quality of life of participants. This result implies that fall risk profile of older persons impacted on their quality of life. This suggests that changes higher risk of falling of participants could lead to lower quality of life. The significant association could be interpreted that participants' fall risk profile is a reliable indicator of their quality of life as it has been observed that the lowest quality of life scores was associated with a greater risk of falls [12]. The negative effect of a fall and likelihood of falls on the quality of life of the elderly has previously been demonstrated. Older people that suffered a fall probably had fear of falling again and it has an important impact on their quality of life. The outcome of the association between grip strength and fall risk profile in this study suggests that grip strength of older persons does not have a significant effect on fall risk profile, which is consistent with earlier findings that higher levels of grip strength do not necessarily guarantee lower fall risk [13]. However, other studies reported different outcomes; for instance, Marques et al. [14] found that low hand grip strength was associated with a higher risk of falls.

Similarly, in a systematic review, Bohannon [15] reported that all 11 included studies confirmed a relationship between decreased hand grip strength and the incidence of hip fractures following a fall. Similarly, Kim et al [16] found that hand grip strength along with bone mineral density was associated with an increased risk of fragility fractures. Of course, a key cause of fractures is falls, the demonstration of an association between grip strength and falls might also be expected. The outcome of this study showed no significant association between the age and fall risk profile of participants however a previous study suggested a significant association with age being indicative of fall risk profile [4]. Increased susceptibility to falling is one of the most serious problems associated with aging, people aged 65 and older have the highest risk of falling, with 30% of people older than 65 and 50% of people older than 80 falling at least once a year [17]. The preponderance of the younger age group might have influenced the outcome of this current study. An equal distribution of the age groups might give a different prospect.

Relationship between quality of life and each of grip strength and age

The negative relationship between the grip strength and quality of life of participants might imply that as grip strength decreases, the quality of life tends to increase. However, the non-statistically significance suggests that the observed relationship was not strong enough to be considered indicative. Grip strength have been showed diverse associations with quality of life for the older adult population in the literature [18]. A previous study showed that grip strength was an indicator of general muscle strength and it was associated with fragility and propensity to fall. Moreover, the decline in grip strength is related to the loss of physical functionality [16]. In the systematic review Bohannon [15] concluded that grip strength should be considered as a useful measure for the screening of the health condition of elderly individual. The outcome of this study showed that there was no statistically significant relationship between the quality of life and age of participants. This suggests that age does not appear to have a measurable impact on quality of life among older adults.

Conclusion

The study revealed that a greater proportion of the participants were females, with most of them aged between 60 and 69 years. Overall, the majority of participants reported a good quality of life, a minimal risk of falling, and below-average grip strength. Analysis further showed that the fall risk profile had a significant association with the quality of life of older persons in Ibadan. In contrast, no significant association was found between grip strength and the fall risk profile. Likewise, age did not demonstrate any significant association with the fall risk profile of older adults in Ibadan.

Declarations

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