Research Article

Impact of Balance Disorders on the Health Outcomes of Elderly People in Damanhur- Egypt

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ABSTRACT

Background: Balance disorders are a major cause of falls and the most common geriatric syndromes threatening the independence and affecting the health outcome of elderly people and it reduced level of function.

Objective: The study aimed to assess the effects of balance disorders on health outcomes of elderly people. A cross-sectional study was conducted and comprised 114 elderly (60 years and above) from the elderly home, Damanhur. Their demographic characteristics, balance measurements and health outcomes have been evaluated. Data was collected according to the Arabic version of 12-item short form of health outcomes. The Berg Balance Scale (BBS) was used to evaluate balance. The Timed Up and Go (TUG) test was used to measure basic functional mobility. Flexibility was assessed by a sit and reach test, to determine the level of fear of falling in daily life by the visual analogue scale (VAS) was used.

Results: One-third of the participants (33.3%) had a history of falls once or more. The most reported morbidities were hypertension and diabetes mellitus (43.9% and 26.3%, respectively).The BBS scores were significantly associated with physical and social health domains, (r = 0.625,p=0.042, and r =0.19, p =0.048).While it was negatively correlated with the psychological health domain (r = -0.16,p =0.087). A positive correlation was observed between the health outcome (SF-12 scores) and BBS, flexibility (r =0.016, 0.082, and 0.119).Whereas, fear of falling was negatively associated with all measured parameters except the flexibility (r = 0.063). The majority of the participants, (80.7%) had moderate health-related quality of life.

Conclusion: The assessment of falling risks and body balance of the elderly in elderly homes will guide the implementation of suitable intervention programs to improve body balance, reduce falling and its consequences among elderly.

Keywords: *Balance impairments, health outputs, (BBS) Berg Balance Scale, elderly home, Egypt*

INTRODUCTION

The number of disabled older persons is expected to increase worldwide during the coming decades. [1] The current pace of population aging varies widely. While developed countries have relatively high proportions of people aged 65years and over, the most rapid increases in older people are in the developing world. As of 2008, 62% (313 million) of the world's population aged 65 and over lived in developing countries. [2] In Egypt, there is gradual increase in the absolute and relative numbers of older people over the last few decades. Older people defined as 60 years of age and more constituted 6.1% of the total population in 1996 and is expected to reach 8.9%

in 2016 and 10.9% in 2026. [3] The last country profile of Egypt shows that the percentage of older people (more than 65 years) is 3.7% of the total population in 2009. [4] Senescence affects multi-factorial biological systems of the body. These effects extend to the psychological and social context which leads to the elderly feeling anxious, fearful and excluded from communities. Balance, together with other factors such as visual and sensory impairments, is a major contributor to the risk of falling in the elderly. The investigation into the balance status will assist in predicting the risk of falls and aid the development of a preventative rehabilitation framework thus reducing the burden on contemporary health structures. [5] Health outcome has become commonly used both as a concept

and as a field of research. There are many socio-demographic characteristics that may contribute to the quality of life such as age, socio-economic status, and marital status in older adults. Falls are one of the major health problems that affect the health outcome among older adults.[6] The Short-Form 36 (SF-36) is a widely used quality of life instrument. However, its length could affect response rates, particularly in elderly. The SF-12 has proved to be suitable for older adults because of the limited number of questions. The 12 items in SF-12 represent one physical component summary score and one mental component summary score and assess a person's perceived health outcome. Many factors were originally considered as possible risk factors for falls based on a review of currently available literature. These factors include age, number of chronic diseases, body composition, muscle strength, functional mobility and performance measures related to balance function. [7] Falls result from a complex and interactive mix of biological or medical, behavioral and environmental factors, many of which are preventable.[8,9] The risks of falling are common knowledge among most elderly care experts, but many out there still lack a full understanding of the significance of the risk facing an independently-living. Risk of falling can bear extreme consequences for older people, with modern scholars coming to the conclusion that "falls are a common and often devastating problem among older people, causing a tremendous amount of morbidity, mortality and use of health care services including premature elderly home admissions".[10] Since falls and its consequences have a major role in quality of life, rehabilitation programs, which aim to decrease the risk of falling by considering all contributing factors such as muscle strength, flexibility and balance, have the potential to both decrease the risk of falling and improve the quality of life. So, the relationship between risk factors for falls and the quality of life becomes significant. [11]

The burden of poor physical function has been studied extensively in developed countries but there is little data available for older people in developing countries. [12] The physical frailty indicators together with endurance belong to the phenotype of frailty. Nowadays the phenotype of frailty is a widely used operational definition of frailty. The phenotype was predictive of decline in ADL ability in 3- and 7-year follow-up in older people. A proper understanding of the contribution of individual indicators of physical frailty in the prediction of disability is a requisite for preventive interventions. Physical frailty encompasses a number of indicators. Well-established indicators of physical frailty are gait speed, [13] physical activity, [14] hand grip strength, and balance.[15] A proper understanding of the contribution of individual indicators of frailty in the prediction of disability is a requisite for preventive interventions. [16]Balance is

critical in the performance of normal physical activities, and balance impairment is a key risk factor for falls in older people. Functional mobility and independence level of the elderly home residents were higher than the home-dwelling elderly, but they had more depressive symptoms and their level of QoL was lower. [17] Muscle weakness and walking or gait problems are the most common causes of falls among elderly home residents. These problems account for about 24% of the falls in elderly homes. Environmental hazards in elderly homes cause 16% to 27% of falls among residents. Gerontological nurse has an essential role to reduce fall and its related injuries through providing safety measures, environmental modification, eliminating risk factors and improving the balance through exercise training program.[18]

Research question:

What is the impact of balance disorders on the magnitude of health outcome of elderly people?

The study thus aimed to assess the impact of balance disorders on health outcome of elderly people in Damanhour, Egypt.

METHODS

Study Setting & Design: A cross-sectional study was conducted at Dar Al Mogama governmental elderly home in Damanhur, El-Behaira Governorate- Egypt. It is the only one existing in governorate.

Target population: All the study participants were elderly people aged 60-years or more, resident at Al mogamaa governmental home. The study recruited a sample of 114 elderly (60 men and 54 women). All the elders accepted to participate after explanation of the nature and objectives of the study. The response of the elderly subjects was increased to participate after building a channel of trust between the researcher and the participants. Whereas, exclusion criteria, included those refused to participate and those having any communication problems, being aged less than 60-years, being unable to walk less than 10 meters, amputation, having a stroke recently, unstable medical conditions such as, 2 or more fractures due to osteoporosis, resting angina, recurrent heart failure or recurrent arrhythmias and uncontrolled seizure disorder.

Data Collection Tools: A structured pre-coded questionnaire was used to collect the data. The interview tool was divided into three parts:

Part 1: Socio-demographic characteristics and medical history, it included the following variable items, age , gender, fall in previous year, associated device, associated diseases and the number of medications.

Part 2: Health-related quality of life was assessed according to the Arabic version of 12-item short form the (SF-12), which is a subset of the SF-36 using SF-12vs Health survey scoring (version 2.0). The mean SF-12 scores are calculated according to RAND-SF-36-

item Health Survey 1.0.[19]A higher score in the respective summary scales, indicated a higher QoL.[20] The subset items included: questions as "Does limit your health do some middle activities", "carrying business less than to want," "Climbing some upstairs", "Hindered certain type of jobs",

"Become less carefully than usual", extent of pain carrying out jobs", "Pain makes you less careful than usual", "During last month do you feel calm and peace", "Do you feel energy full", "Do you fool depressed and despair" and "How your physical and psychological conflict with your social activities".

Part 3: that comprised further four parts:

A) Balance: Berg Balance Scale (BBS) is used as a clinical test of a person's ability to maintain balance. BBS is a 5-point scale (0–4) with a maximum total score of 56 (higher scores indicate better balance, 0-20 = wheelchair, 21-40 = walking with assistance and independent= 41-56) that evaluates functional balance in 14 different activities.[21]The BBS demonstrates good correlation with laboratories and clinical measures in relation to instability and falls in various populations.[22] It has been demonstrated to have a strong correlation with the Timed Up and Go test (TUG) among the elderly. TUG which is a clinical assessment for the balance and mobility performance,[23] has been highly used in a clinical setting to represent functional balance by measuring the time taken for an individual to stand up from a chair, walk 3 meters, turn around, walk 3 meters back to the chair, and sit down.[24] It is also a reliable tool to evaluate agility because it involves walking and a change of direction,[25] and the time taken to complete the TUG test has been shown to predict falls in elderly. The strongest associations were found for history of falls, gait problems, using walking aids (OR = 2.2; 3.1) this last risk factor is also found as one of the strongest in the regression analysis with OR = 1.69. [8]

B) Functional mobility: The Timed Up and Go (TUG) test was used to measure basic functional mobility. The time taken to complete rising from a chair, walking 3 meters, and turning, walking back to the chair and sitting was recorded in seconds. The starting position was standardized so that the subjects commenced the test with their feet flat on the floor and their arm resting on the armrests. No physical assistance was given. Each subject was asked to perform three test trials. The mean score was recorded. [24]

C) Flexibility: In order to assess flexibility, a sit and reach test was used. A chair 32 cm in height was used for the test. Orders were asked to sit, keeping their knees straight, and reach forward as far as possible from a seated position. The score was determined by the furthest position they reached with their fingertips on a scale. Three trials were performed and the mean score was recorded.[26]

Fear of falling: As an indication of fear of falling in daily life a visual analogue scale (VAS) was used. Subjects were asked to express their overall feelings of fear of falling by drawing a mark on a vertical line of exactly 10 centimeters connecting the two statements: "no fear of falling" (below) and "very afraid of falling"(above). The score was the number of centimeters between "no fear of falling" and the subject's mark.[27]

A pilot study was done on 10 elderly persons from the study population, that were not included later in the study sample to assess the tools for their clarity and validity. Each participant was interviewed individually face to face by the researcher after a good trust and communications. Each interview time differs from the other according to respondent mood and cooperation. The selected setting was visited two times a week, during the academic year 2014.

Statistical analysis

Data management was done by using PC computer: The SPSS for windows version "19" software package was used for statistical analysis. Qualitative variables were summarized by their frequency distribution, as well as quantitative variables were summarized by their means and standard deviations (means ± SD) and ranges were added. We considered differences of two-tailed $p < 0.05$ as statistically significant. Pearson's correlation coefficient was used to analyze the relationship between the SF-12 and balance, functional mobility, flexibility and fear of falling.

Ethical Statement

The study was approved by the institutional review board and the ethics committee of the High Institute of Public Health affiliated to Alexandria University, Egypt. The research complied with the international ethical research guidelines of declaration of Helsinki. An official permission was obtained from the authorities of elderly care home, after explanation of the concerns and objectives of the study also obtaining an informed consent from each elderly and was interviewed individually face to face by the investigator after building good trust and communications. Data sheets were coded to ensure anonymity and confidentiality of patient's data.

RESULTS

The socio-demographic characteristics and medical history of the subjects are described in Table 1. The mean age was 68.8 ± 7.1 years and a ranged between 60 and 84. More than half of the participants were males (52.6%). Those who used associated devices constituted (40.4%), and one-third of them (33.3%) had a history of falls once or more. The most reported associated diseases are hypertension and diabetes mellitus (43.9% and 26.3%, respectively). Table 2: Shows the Berge balance scale (BBS) among the elderly people to measure the balance abilities and

evaluate balance impairment, where two-thirds (66.7%) of the participants were independent, more than one fifth (21.1%) of them was wheel chair bound, and only 12.3% of them walk with assistance.

Table 3 Shows the total means± SD of (BBS), functional mobility (time up & go TUG), flexibility, and fear of falling

Table 1: Demographic characteristics and medical history of the study subjects

Socio demographic data	No. n =114	%
Age (in years)		
60-	56	49.1
70+	58	50.9
Range	60-84	
Mean ± SD	68.8 ± 7.1	
Gender		
Male	60	52.6
Female	54	47.4
Associated devices		
No	68	59.6
Yes	46	40.4
Falls in the previous year		
No falls	76	66.7
Once	30	26.3
Two or more	8	7.0
Associated Diseases ¶		
Free of diseases	10	8.8
Hypertension	50	43.9
Hepatic disease	4	3.5
Heart failure	12	10.5
Diabetes Mellitus	30	26.3
Asthma	2	1.8
Osteoarthritis	6	5.3
Thyroid diseases	2	1.8
Osteoporosis	12	10.5
Urinary tract infection	2	1.8
Glaucoma	2	1.8
Hearing impairment	4	3.5
Visual impairment	6	5.3

¶ =More than one disease may be recorded.

Table 2: Descriptive B BS among the studied elderly people

Total Score of BBS		No. n=114	%
Wheelchair bound	(0 -20)	24	21.1
Walking with assistance	(21 – 40)	14	12.3
Independent	(41 – 56)	76	66.6

Table 3: Means and SD of all measurements

Measurements	Mean	SD
Balance scale (BBS)	39.6	20.60
Functional mobility (Timed Up & Go) TUG)	12.22	4.84
Flexibility	27.71	2.93
Fear of Falling(VAS)	8.97	1.59

accounting, 39.6 ± 20.6, 12.22 ± 4.84, 27.71± 2.93 and 8.97 ± 1.59 respectively**.** The total BBS scores have negative correlations with indicators of functional mobility (TUG), fear of falling and psychological health domain scores (r = -

0.05, p =0.58, r = - 0.15, p=117 and r = - 0.16, p = 0.087 respectively). The BBS scores were meanwhile significantly associated with physical and social health domains, (r =0.625, p=0.042, and r =0.19, p= 0.048) (Table 4).

Table 4: Correlations of BBS Total Scores with, functional mobility (TUG), Flexibility, Fear of falling, SF-12 total scores, and domains of Physical, Psychological and Social health

Measurements	Total Score of BBS	
	r	P
Functional mobility (TUG)	-0.05	0.583
Flexibility	0.12	0.187
Fear of falling	-0.15	0.117
SF-12 total	0.02	0.862
Physical health	0.625	0.042*
Psychological health	-0.16	0.087
Social health	0.19	0.048*

*significant at < 0.05

Table 5: Shows the distribution of the respondents, according to the SF-12 scale of health-related quality of life levels. The majority of the participants, (80.7%), had moderate health-related quality of life, and the least proportion of them had low level, (5.3%). While the total mean ±SD was 38.2±5.0.

Table 5: Illustrates the distribution of the study sample according to SF-12 scale of the health-related quality of life (HRQoL) levels

SF-12	No. n = 114	%
Low (13-28)	6	5.3
Moderate (29-44)	92	80.7
High (45-61)	16	14.0
Mean ± SD	38.2 ± 5.0	

DISCUSSION

Falls in older people are a significant public health issue, for which the evidence clearly suggests that risk can be reduced through the identification and treatment of modifiable risk factors. Although balance impairment is neither a necessary nor a sufficient cause of falls and therefore is not present in all people who have fallen or who will fall, it has been found to increase the risk for falling, with a mean relative risk of 2.9. [28] In Egypt few studies have explored the problem of falls in the elderly. [29] Adequate physical, social and psychological rehabilitation of elderly with a history of falls and injury has been reported to prevent further falls. [30]

Frequent falls was commonly reported among the studied elderly populations. In the period from 8-2010 to 8-2011 among persons above the age of 60 in Suez city , Egypt agreed to be enrolled in a study to determine the relationship between several risk factors and falls, more than half of the studied population reported at least one incident of falling.[8] Other studies gave higher rates of falls.[31] This might be explained by the presence of multiple risk factors among the studied population.[8] Discerning a family member's fall risk foremost must take into account the age of the infirm individual, as "age affects the risk factors for falls".[11] The statistical evidence offers verification of the association between age and falling, as about 40% of the over 65 age group living at home will fall at least once each year.[10]

The findings of this study that the most reported associated diseases were hypertension and diabetes mellitus. Collectively about one third of participants was wheel chair bound, and walks with assistance. The highest mean was for the flexibility score is in congruent with the results Berg balance test, where standing on one foot test and two minute step test results of the subjects who had a fall related condition were lower than that of those without any disease. In findings, a study reported that the results of up-and-go test' in agreement to our subjects who did not have any disease were better, than that of those who had a fall related condition,[32] and also it was reported that the

BBS score showed a significant correlations with indicators of motor functioning, stage of disease, and daily living capacity.[33]

The BBS scores were significantly associated with physical and social health domains, while it was negatively correlated with the psychological health domain. In this context it was reported that, using the Berg Balance scores, there was, a correlation existed between reducing falls in the elderly and improving their quality of life that found to improve the fall risk profiles of the elderly and contributed to a sense of physical and psychological well-being in this population.[5] This study also, presented a positive correlation between the health quality of life (SF-12 scores) and BBS, flexibility. Such findings were consistence in several studies have explored the strong association and the risk of falling in older adults.[11,34] Similarly, it was found that the factors relating to the risk of falling correlated with physical and general health perception scores of SF-12.The present results of fear of falling showed ,negative association with all measured parameters except the flexibility. The majority of the participants, had moderate health-related quality of life, and the least proportion of them had low level. Fear of falling correlated with Physical Health Component and General Health Perception of SF-12, as it was stated that fear of falling is increasingly recognized as a factor that may affect activity, function and physical condition in older adults.[11]

CONCLUSION AND RECOMMENDATION

Hypertension and diabetes mellitus are the most prevalent diseases among elderly patients. A significant proportion of elderly are physically disabled and require assistance and locomotion aids, besides having a moderate health-related quality of life.

It is recommended thus to carry out periodical evaluation of the elderly falling risks, physical fitness and body balance in elderly homes. An essential role to reduce falling and its sequences by eliminating risk factors and improving the balance of elderly through training programs for gerontological nurses. Rehabilitation programs should be set to eliminate the elderly falling risks and to increase health-related quality of life. Mass media could a channel for educating elderly and their care givers about falls and their prevention.

CONFLICT OF INTEREST

All authors declare no conflict of interest

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