Characteristics of Older Adult with Balance Disorder in Rehabilitation Clinic of Dr. Hasan Sadikin General Hospital 2014

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Abstract

Background: Older adult population is increasing worldwide. Balance has an important role in conducting daily activity and mobility. Impaired balance can lead to negative impacts, for example falling. This study was conducted to obtain common factors and characteristics of older adult with balance disorder to provide better rehabilitation services.

Methods: A descriptive study was conducted at Physical Medicine and Rehabilitation Clinic of Dr. Hasan Sadikin General Hospital Bandung, from August to October 2014 using total sampling method and a 5 times sit-to-stand (5STS) test was conducted. The total samples obtained were 34.

Results: The characteristics of older adult with balance disorder in this study were mostly from young old (n=17), male gender (n=19), and mean 5STS test which was 18.48 seconds. Most of the patients had high blood pressure (n=29), normal body mass index (BMI) (n=22), independent activity of daily living (ADL) (n=21), and use of greater than 3 drugs (n=21).The most common disease found was musculoskeletal disease and majority of patients had one medical disease.

Conclusions: Older adult categorized as young old have the greatest frequency of having balance disorder. Increase in age, increases the duration of 5STS test conducted. The most common problem among older adult is high blood pressure, musculoskeletal disease, and hypertension, and majority of the patients consume greater than 3 drugs. Lastly, most of the BMI and the ADL of the older adults are normal. **[AMJ.2016;3(1):103–9]**

Keywords: Balance disorder, five time-sit-to-stand, older adult

Introduction

The older adult population is increasing, based on World Health Organization (WHO), it is approximated that in 2050, the population of older adults will be 16% of the total population in the world.[1] In Indonesia, the aging population increases with the country development and it is predicted to rise four times of the origin of year 2010 around 18.04 million (7.59%).[2] Older adult is defined as people who are 60 years old and above, or in some countries, are 65 years and above.[1] Older adult categorization is divided into young old (60–69 years), middle-aged old (70–79 years), old old (80–89 years), very old old (greater than 90 years).[3] Aging is a normal physiological process; increase in age causes physiological changes and may affect the ability to conduct the activity of daily living (ADL). Balance disorder is commonly faced by older adults, and they often encounter instability leading to negative impacts, for example falling.[4] This problem is often neglected among older adults and much effort is required to visit the physician's office.[5]

Balance involves a complex multisensory system which includes vision, auditory, and proprioception. Balance control is required in everyday life, which includes the ability to carry out daily activities.[4] Balance disorder is a "condition that makes you feel unsteady or dizzy, as if you are moving, spinning, or floating, even though you are standing still or lying down" as stated by National Institute on Deafness and Other Communication Disorders

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(NIDCD).[6] There are many factors that may affect balance, these include age, gender, underlying diseases, body weight, multiple use of drugs and many others.[4] Based on previous study, balance is much common among female gender and increasing age. Moreover, hypertension, diabetes, and arthritis are common among common underlying diseases.[7]

The main objective of this study was to obtain the common characteristics that present among older adults with balance disorder and to provide better rehabilitation services to patients. Early identification of older adults with balance disorder can prevent negative impacts and precautionary steps should be taken.

Methods

The study conducted was a descriptive study using total sampling methods of patients who visited the Physical Medicine and Rehabilitation Outpatient Clinic of Dr. Hasan Sadikin General Hospital Bandung from August to October 2014. Subjects were selected based on inclusion criteria where patients were 60 years old and above, signed inform consent, were willing to cooperate, and able to follow the instructions, had the ability to ambulate their household, and lastly, based on the 5 times sit-to-stand test (5STS) of 12 seconds or greater. The exclusion criteria were those who were using walking aid, numerating pain scale of 5 or above, and cognitive problems. Therefore, there were 34 older adults who met inclusion critera. The ethical clearance was obtained from the Dr. Hasan Sadikin General Hospital Bandung before the study was conducted.

Patients were approached and inform consent was done before conducting the study. Simple instructions were explained to patients in conducting the 5STS test. The patients were asked to be seated with backs leaning on the chair with arms folded throughout the test, using a standardized chair with height 43cm. Patients were asked to sit and stand as fast as possible for 5 times, and the time required to complete the task was recorded. The cut-off point used for this 5STS test was 12 second or more; patients with 12 seconds and above during test were regarded as having balance disorder. The 5STS test does not require specialized equipment and has the ability to measure balance, muscle strength, and also risk of fall.[8]

The ADL questionnaire was measured using the barthel index to assess the independence of the older adult. Blood pressure, height, and weight were measured and converted into body mass index (BMI).The numbers of drug consumed and current medical illness were asked through interviewing the patients and some were read of the charts.

The data collected were recorded in a research formula, and were transferred into Microsoft Excel. The variables of the study are age, gender, BMI, blood pressure, ADL, numbers of drug used, and current medical disease. The results are presented in table form with frequency.

Result

The numbers of sample obtained were 34 older adults aged 60 years and above. The mean 5STS test was 18.48 seconds among older adults with balance disorder with a minimum of 12.03 seconds and a maximum of 44.54 seconds. The characteristics studied were gender, age, 5STS test, blood pressure, body mass index (BMI), activity of daily living (ADL), numbers of drug used and medical disease. The table below showed the general characteristic of the data.

Table 2 shows that male older adults with balance disorder were greater compared to female older adults, whereas the mean 5STS among both genders was above 12 seconds,

Table 1 General Characteristics of Older Adult with Balance Disorder

General Characteristics		Frequency(n)
Gender (n=34)	Male	19
	Female	15
Age (n=34)	Young old (60–69 years)	17
	Middle-aged old (70–79 years)	11
	Old old (80–89 years)	6
	Very old old (>90 years)	0

Table 2 Characteristic based on Gender of Older Adult with Balance Disorder

Gender	Age (year) (mean ± SD)	5 STS (seconds) (mean ± SD)	BMI (Kg/((m)^2)) (mean ± SD)
Male (n=19)	(70 ± 8)	(16 ± 4)	(24 ± 3)
Female (n=15)	(70 ± 8)	(22 ± 9)	(22 ± 4)

Note: *SD: standard deviation

and in female older adults the mean time required to complete the 5STS was greater than males. In this study, the BMI was of a normal range in both genders.

Table 3 shows that with increasing age, the mean time required to complete the 5STS was greater, the range of the test was differed by 5 seconds from the minimum time required to the maximum time required.

Table 4 shows the majority of the older adults with balance disorder who had abnormal blood pressure which was high, whereas, BMIolder adults with balance disorder which was greater than half had normal BMI. In the

abnormal category, BMI of older adults who are overweight was 8 and underweight 4.

The results of ADL were typically independent for older adults with balance disorder and none of the older adult was presented with moderate, severely, and very severe disability. Whereas, the numbers of drug consumed among 34 older adults with balance disorder were 4 kinds or more drugs.

The table 5 shows most of the older adult present in the clinic had musculoskeletal, cardiovascular, and neurological disease. Osteoarthritis, hypertension, and past history of stroke were common among older adults.

Table 3 Characteristics of Mean 5STS Test based on Age

Age	Frequency(n)	5STS(second)
Young old (60–69)	17	17
Middle-aged old (70–79)	11	19
Old old (80–89)	6	22
Very old old (>90)	0	0

Table 4 Characteristics of Older Adult with Balance Disorder

Characteristic	Frequency (n)
Blood pressure	
Normal*	5
Abnormal**	29
BMI	
Normal (18.5–24.9)	22
Abnormal (<18.5 and 25 >)	12
ADL	
Mild disability (15–19)	13
Independent ADL (20)	21
Numbers of drug used	
4 or more (>3)	21
Less than 4 (<4)	13

Note: *normal: systolic < 120) and diastolic <80) **abnormal: (systolic >120 or diastolic >80) or (systolic <90 and diastolic<60)

Table 5 Current Medical Disease of Older Adults with Balance Disorder

Current Medical Disease	Frequency (n)
Type of disease	
Musculoskeletal disease	26
Cardiovascular disease	14
Neurological disease	11
Metabolic disease	6
Gastrointestinal disease	3
Infectious and other disease	3
Number of current medical disease/person	
1 disease	17
2 disease	9
3 disease	5
4 or more disease	3

Besides, from the results, it was shown that majority of older adults had one current medical disease compared to 3 medical diseases.

Discussion

This study aimed to observe the characteristics of older adults with balance disorders. Table 2 showed balance disorder among gender. In this study, it was found that 19 out of 34 were male (55.88%), which was more than females. In previous studies, it was stated that female possess a greater risk compared to males with an approximation of 56.9% (± 0.9%). This result differed from the previous study where the number of females is lesser than males. This is because the difference of sample size used and the numbers of patient that are limited due to the change in health referral system.[4] Table 2 showed that young older adults had an average reading of 17 seconds. Older adults categorized as old old had an average of 22 seconds. In this study, with the increase in age, the mean 5 STS test results was longer. The result is similar to previous studies where prevalence rate increases with age for balance disorder.[4,9] In mean 5STS, older adults with 12.5 seconds are categorized as non-multiple fallers and those with 14.8 second are multiple fallers based on previous study. This test not only has the ability in measuring balance, but also the fall risk, because older adults with longer test result have higher risk of having multiple falls. The test has a relative risk of 2.0 in predicting subjects of multiple falls and a reliability of 0.89.[8]

Table 3 showed that, 28 out of 34 older adults were aged from 60 to 79. The mean age from previous studies of older adults with balance disorder is 74.46 ± 0.1 years. Table 3 showed that those among young old adults had a greater frequency by 6 individual from middle-age. The total mean age of this study was 69.79 years which differed from the previous study around 4.67 years. The previous study were based on a larger population where the age used is older adults who are 65 and above. The study may vary due to sample size and variation of human samples where samples used are Asians.[4] From a study conducted by Whitney et al.[10], the mean age of the patients with balance disorder is 75 years old (SD ± 7) with an age range of 61–90 years old. The result supports this study because it is within the age range.[10] Another study found that balance disorder increases with age, with an odd ratio of 6.99 for older adults aged 80 and above, whereas dizziness do not associate with increase in age. The reason is unclear but is likely allied to physiological changes in aging. Similarly, the reason relates to the study; increase in age, increases the time required to complete the 5STS. Therefore, this condition increases the risk of balance disorder.[7]

In this study, 29 older adults had high blood pressure and balance disorder. Increase in age, increases blood pressure where the physiologic regulation of blood pressure decreases. A study conducted on orthostatic hypotension and ability to maintain balance in standing, showed that older adults have

decreased ability to maintain balance if the systolic pressure drops at least 20mmHg or 10mmHg of diastolic change from supine position to standing position. Moreover, it was found that the ability of balance from eyes open to closed, and narrower base have increased difficulty in maintaining balance for patients with orthostatic hypotension. The inability to regulate the blood pressure fluctuations causes transient hypoperfusion to the brain, where blood flow and oxygen supply to the brain is reduced, thus, ability to maintain standing balance is affected. Therefore, decrease of blood pressure from supine to standing position plays a role in maintaining balance and this can be taken into account for future study.[11,12]

In this study, the results of BMI showed that most of older adults had normal BMI which was a total of 22 older adults. Other studies showed that with weight increase during older age increases the risk of physical impairment which impairs the quality of life. it means the greater the BMI, the greater the physical mobility burden.[13,14] Individuals who are obese have lower muscle strength and more fat mass, but in this study, most patients were in range of normal BMI. Even with normal BMI, the patient's definite muscle mass is not known, with increase in age muscle mass may have been loss. Results of majority of the older adults are categorized as normal BMI.[13] In older adults, many physiological changes occur, where body weight was found to decrease after the age of 60 years and the fat free mass decreases due to loss of skeletal muscle. From the study, it was found that older adult loses 0.5% of body weight per year, and this can be due to multiple causes, for example sedentary lifestyle, decreased metabolic rate, hormones and physiologic changes of increase catabolism in older adults.[15] Obesity causes adaptation in rising and sitting where older adults tend to have greater trunk flexion when shifting position. Individual obesity also causes shift in the center of mass anteriorly, and a greater effort is required to transfer from different positions. Thus, it increases the balance impairment.[16]

Table 4 showed that 21 out of 34 older adults with balance disorder had independent ADL which was a full score of 20, and mild disability with a total of 13 older adults. The patients were still able to do their daily activities without assistance, even with balance disorder, precaution remained be taken to prevent and support them to avoid injuries and falls. There were not many studies about the impact of balance disorder on ADL. Lower scores of ADL affects the functional impact, that the daily activities will be limited and it causes increase dependency and care required.[4] In previous studies, the samples used for the balance study were based on older adults who did independent ADL as the inclusion criteria. In this study, the samples obtained were based on total sampling to avoid bias, and this study also had similar result where most of the samples had independent ADL, even without limiting patients in doing independent ADL.[7]

Older adults with balance disorder who consume 4 or more drugs are 21 out of 34 older adults. Polypharmacy, where an individual consumes 4 or more medication, causes balance problems and increases the risk of falling. Increase use of drugs may cause interactions among medication prescribed and may causesdizziness, postural instability and fall. It is important for the medications to be checked, to prevent any drug interactions. Removal or increased medication used should be assessed frequently to prevent adverse outcome.[4,17] In another study it is noted that 87% of patients consumed 1 or 2 drugs and 13% take greater than 2 medications.[7] A study conducted in Taiwan[18]; increase in medication use from 0 until greater than 4 or more medication, the odd ratio admission for fall-related fractures varies from 1 until 2.4 with the increase in numbers of drug used. The study also categorize medication used into different categories which include alimentary tract and metabolism, blood and blood forming organs, cardiovascular system, musculoskeletal system and nervous system.[18] In this study, only the numbers of drug consumed were noted. Thus, in future study, researcher can divide the types of drug into categories for comparison.

Table 5 showed that the presence of medical disease also contributed to balance disorder. The most common disease was musculoskeletal disease, cardiovascular, and neurological disease. Majority of the patients had 1 disease with a total 17 older adults from 34 older adults, and decrease in frequency with increase in numbers of disease present. In musculoskeletal disease, the most common problem was osteoarthritis. In a previous study, in gait and balance disorder, it had been found that the most common cause among older adults with balance disorder who had difficulty in walking had arthritis and postural hypotension. The presence of joint pain and stroke affects the older adult's gait. In arthritis,

there is limited range of motion and the shift of weight bearing position due to the presence of pain thus, affecting the ability in maintaining balance, showing antalgic gait in older adult. The change in gait and displacement of the posture affects the ability of balance.[16,19] In this study, cardiovascular disease is common among older adults, it is found that most patients suffers from hypertension and some interventions were done for example coronary bypass, cardiac rehabilitation and others. Patients who came to the clinic are referral patient and also patients that required physiotherapy. It is thought that increase in number of disease increases with balance disorder but in this study most of the patients had one medical disease. However this may not be accurate as some patients were unsure of their current medical problems and some patients stated they were healthy. A study conducted by Stevens et al.[7], it is found that patients with poor balance had diabetes, hypertension, hyperlipidemia, heart disease and renal disease. In the previous study, it is found that there is association between balance disorder with increasing age, diabetes (OR=1.53), arthritis (OR=1.33), eyesight (OR=1.94) this is similar to the disease present in our study.[7]

The limitations in this study were total number of sample size obtained. A small sample size was used, due to the limited time range of the study. Moreover the change in health system has decreased the number of patients present as the hospital is currently a tertiary hospital. Bias is present in the study, questionnaire were used to obtain patients information which includes the activity of daily living (ADL), numbers of drug used and current medical disease. There were difficulties in recalling the numbers of drug and current medical diseases, and some diseases were read off the medical charts. There may be human error in measuring blood pressure, height, and weight; for the 5STS test, some patient's feet were not able to reach the ground, therefore, they were seated more forward to allow the feet to be at ground level. Standardized height chairs were used in this study, the common height chairs may vary in various studies from 40 to 46 cm. Inappropriate height chairs which is too low will affect the result of the study because it requires greater trunk flexion. This does not greatly affect the test result as it showed 2% of variance in the test performance.[20]

From this study, it can be concluded that increase in age among older adults have balance disorder. The mean age of older adults with balance disorder is 70 years. The mean score of the 5 times sittostandtest is 18 seconds which exceeds the cut-off point of the test which is set at a minimum of 12 seconds or more. The most common problems among older adults are high blood pressure and majority of the patients consuming 4 or more types of drug. The most common medical diseases encountered by the older adults were musculoskeletal disease and hypertension, and patients who visited the clinic were subjected to physiotherapy. Thus, the quality of life of the older adults is important in maintaining self-independence than the quantity.

The suggestion for this study is to consider screening for older adults for their balance to allow early prevention and care to avoid falls, fractures, or even any disability. Besides, patients should be accessed constantly to attain the types of drug used as they can cause drug to drug interactions. Home saving and also support should be given to patients to build older adults' confidence. Some interventions can be done, for example, the use of walking canes or walking aids to increase balance support, and in home support, bars can be placed in bathrooms to prevent slips as well squat toilets can be replaced with seated toilets. Families, physicians, and nurses play an important role in keeping the patients motivated for more regular follow up and in increasing physical exercise, and also awareness of the current diseases and problems encountered by the older adults.

In future, the study cut-off point of the sit-to-stand-test for each age range should be determined and used as a reference for balance disorder. Patients who have fallen or have had multiple falls can be used as samples for furtherstudy as well as a reference. A larger sample size can be used for future study and use of other methods to assess balance disorder. Moreover, more study and test should be conducted to assess patients' balance problems.

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