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Cognitive and Attention Based Differential of Falls among Elderly in Two Elderly Homes in Cengkareng Sub District, West Jakarta, 2012

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Abstract

In 2020, the number of old population in Indonesia will be 28.8 million that will make Indonesia ranked ten in the world to have elderly population. The WHO shows that around 30% of elderly older than 65 falls annually, and between 20% and 30% suffers from injury and increased risk of early death. In Indonesia there is no data on the prevalence and incidence of fall among the elderly, neither its association with cognitive and attention. This study is aimed at analyzing the difference of fall history among elderly due to cognitive and attention factors in two Elderly Homes in West Jakarta city. Descriptive analysis was done. Two instruments of cognitive assessment was used, i.e., MMSE and MoCa. The analysis is aimed at testing the possible association between cognitive and attention and the history of fall among the elderly. Chi-square test was used to see the association. Results of study showed the mean (95% CI) of the following variables: Age in the two locations was 69.6 (68.2, 71.0); fall history: 2.8 times per year (2.1,3.6); MMSE score: 19.5 (17.9, 21.1); MoCA score: 13.6 (11.9, 15.2); attention score: 3.9 (3.4,4.4). Proportion of fall in Pusaka 41 was 24%, whereas in PSTW UM was 58%, ($p<0.05$). The frequency of fall >1 was more frequent in PSTW UM (36%) than in Pusaka 41 (14%). The history of fall due to attention problem was significantly different ($p=0.022$), in which more frequent fall was observed amongst those with clinical problem than those who was normal. The history of falls regardless of causes among the two elderly groups was significant ($p<0.05$). To reduce the incidence of fall among elderly in nursing homes, physical exercise is recommended to enhance physical fitness and slowing down the deterioration of cognitive and attention functions.

Keywords: Elderly; Elderly home; Cognitive; Mmse; MoCA; History of falls

Introduction

Aging is a process of age increment regardless of chronological events. Aging terminology is however, mixed up with others such as old age and senescence even though in essence they are different [1]. World Health Organization [2] classifies old ages between 60 and 70 years old as 'young old', between 75 and 84 as 'older old' and above 85 as 'oldest-old', whereas above 100 years as 'old and older'. The term "senescence" is usually limited to chraracteristics of 'old age' from 65 years old to death [1].

As age of an individual grows, various health problems as well as social and economic problems may arise [3,4]. Old population in Indonesia in 2020 was projected to reach 11,34% of the total population or 28,8 millions people, while the number of under-fives children will be diminishing to 6,9%; it will make Indonesia ranked ten in the world to have elderly population [5].

Meanwhile, the number of old people with age older than 60 years in Jakarta region varies across districts, namely 21% in West Jakarta which was spreaded in the community and in the nursing homes [6]. Social changes in the community from an extended family to a nuclear family causes old people live appart from their children [7].

Cognitive functions according to behavioral neurology is a process whereby all sensory inputs (tactile, visual and auditory) will be changed, processed and stored, and will in turn be used to interconnect interneuron completely so that every individual may perceive and understand about the sensory inputs received [8,9]. Most dominant theory about cognitive functions has classified them into five domains, i.e., focusing attention, language, remembering or recall, space awareness and executive functions [8,10], in which its theoretical foundation has been elaborated in detail elsewhere [11-14].

Three deteriorated cognitive functions among eldery from normal stage up to pathological stage are manifested as various spectrum from very light up to severe (dementia) [8], namely from forgetfulness, Mild Cognitive Impairment (MCI) and Dementia; in which the frequency of forgetfulness is 39% among elderly aged 50 to 60 years, and rising up to 85% among eldery people older than 80 years. The cognitive symptoms consists of slow thinking, lack of memory, difficult to focus, easily shifted attention, slow learning new things, require more clues to recall memory [8]. It is believed that overall deterioration of the central nervous system functions is the main contributor of a decreased cognitive abilities and efficiency in processing the information [15,16].

During aging process, changes occur on sensory, musculoskeletal, and central nervous system in which the changes contributes to diminishing balance control [17]. Consequently, it will affect the general health condition of the elderly in terms of morbidity and mortality related to fall [18]. In the States there was around 30% of elderly older than 65 years fell, from which 50% experiences repeated falls, and another 5% suffered from broken bones and required hospital treatments [19-21]. The WHO data shows that around 30% of elderly older than 65 have frequent falls annually, and the frequency is more among elderly aged 75 years and older; in which between 20% and 30% among them who suffers from injury which reduces their mobility and independence, as well as increased risk of early death [2].

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Meanwhile, there are some intrinsic factors related to risk of falls, among others, old age, repeated falls, decreased balance, decreased muscle strength, decreased walking patterns, mobility disturbances, cognitive disturbances, visual impairement, depression, permanent habits and life style, disturbances in defecation, arthritis and phobia to falls [22-26]. There are also extrinsic factors such as, for example, using walking aids instruments, malnutrition, excessive usage of medicines such as psychotropics which affect CNS or medicine used for cardiovascular diseases, usage of foot protection, hazardous environments such as slippery floor, lack of lighting, and rough road contour [23,24,27,28].

Statistically significant evidence was also found on the association between cognitive functions and balance among elderly [29], in which the cognitive functions is a result of interaction with the environment obtained formally and informally [4]. Association between attention and balance among elderly has been known from earlier studies, in which attention has an important role in maintaining balance among the elderly; and attention is more needed in situation where imbalance happens and risk of falls increases [29].

Risk factors that are associated with history of falls and risk of falls consist of orientation, language, attention, memory, constructing function, calculation and reasoning [30]. Another important disease factor which influence a decreased cognitive functions among elderly is hypertension. Chronical hypertension amplifies the effect of aging on brain structure, including the reduction of white and grey matters in prefrontal lobus, decreased hippocampus, incresed white matter hypersensitivity in lobus frontalis. Angina pectoris, infarc myocardium, coronary heart disease and other vascular diseases are also associated with a deteriorating congnitive functions [31]. Other evidence showed that cognitive in elderly is influenced by age and levels of education [32], sex [31] and balance [1,24,33-35].

Based on these literature studies which underline this study, it can be concluded that in line with the physiological changes in elderly which affect the risk of falls, the following factors are significant risk factors, i.e., musculoskeletal system change, deteriorated sensory and nerve system (neurological deficits). This deficits include physical, functional, congnition and communication aspects. It is therefore, the eldery has risk of imbalance of five times greater than the young, which causing an increased risk of fall among 10-25% of the elderly due to imbalance and cognitive dysfunction. The risk was higher when the elderly has been moved from family situation into social communal dwelling. Research and studies dealing with cognitive functions and attention differences as a risk factor of falls among elderly has not been widely conducted, particularly in Indonesia.

This study is therefore formulate a study question: Is there any difference on history of falls due to cognitive and attention factors among elderly in Panti Werdha Elderly Home versus Pusaka 41 Elderly Home in Cengkareng Sub-district, West Jakarta in 2012?

The objective of this study is therefore to study the difference of falls history among elderly due to cognitive and attention factors in those two Elderly Homes. Specifically, it aims at: (i) Describe the characteristics of the elderly by their age, fall history, fall frequency, MMSE, MoCA and attention, and (ii) To analyze the difference of fall history based on cognitive and attention among the elderly in the two homes.

Materials and Methods

Materials (setting and sample)

This study was conducted in two Elderly Homes, namely, "PSTW Usada Mulia (PSTW UM)" and "Pusaka 41" located in Cengkareng Sub-district in West Jakarta. The target population in the two sites was 133 and 80 elderly people, respectively, which was obtained from a cross sectional study conducted from February to April 2012.

Sub-sample from the two sites was taken through a Simple Random Sampling procedure. Sample of 50 elderly people in each Elderly Home was drawn using sample formula of proportion indicated elsewhere [16]. This sampling was aimed at detecting a difference between two proportions in two elderly homes with a significant level at α=0.05, which allowed 5% probability of rejecting a true null hypothesis. The sample size formula is as follows:

$$n = (Z\alpha/2)^2 [(p1(1-p1) + p2(1-p2)]/d^2$$

Where: $(z\ \alpha/2)^2$=1.96; p1 & p2 are the expected sample proportion obtained from previous study, where p1=0.51 and p2=0.34 and d=0.2.

The inclusion criteria consists of: a) Both sexes, male and female, b) Age ≥ 60 years old; c) Willing to cooperate and communicate; whereas the exclusion criteria consists of: Having speaking difficulty; Having visual impairement based on visual test conducted, both blind and deaf, currently ill, Illiterate, and suffering from disorientation.

Methods

The study design was a Cross Sectional Study or Survey, where the collection of both dependent (outcome) and independent variable was done at once and there was no intervention to the respondents or sample in the two Elderly Homes.

The outcome variableconsists of: (i) The frequency of falls, which was dichotomized into once (1 x) and more than once (>1 x), (ii) Falls history (was dichotomized into: ever fall and never fall). The independent variables, risk factors or determinant factors consist of cognitive malfunction score, MoCA (Montreal Cognitive score) and Foreard Digit Span Test. The scoring of cognitive malfunction (MMSE score) has been formulated by Folstein elsewhere which ranges from 0 to 30 [36]. It was categorized as follows: normal if MMSE equals to 24-30; light cognitive malfunction, if MMSE equals to 18-23; if MMSE equals to 0-17, it indicates a severe cognitive malfunction. The MoCA score [37] was dichotomized into normal (MoCA ≥ 26) and abnormal (MoCA<26). Attention is assessed using Foreward Digit Span Test [38], with the score ranges from 0 to 8, where the dichotomized score consisted of normal (FDST ≥ 6) and abnormal (FDST<6, which indicates a clinical disturbance).

In this study two instruments of cognitive assessment were used, i.e., Mini Mental State Examination or MMSE [16] and Montreal Cognitive Assesment or MoCA [37]. Nasreddin et al., [36] indicated that MoCA test with a cut-off point of 26 has a sensitivity of 90%, higher than of the MMSE which is 18% less, whereas the specificity of MoCA is 87% to detect Mild Cognitive Impairment (MCI). The MoCA test that has high sensitivity and specificity for the screening of MCI requires only 10 min to complete [8,37].

The Mini-Mental Examination (MME test) is divided into several parts to assess time and place orientations, instant repetition, attention, verbal repetition, naming, repetition, steps of order, writing and copying. The score ranges from 0 to 30. Interview Procedure of MoCA test was aimed at Alternating Trail Making, and the score ranges from 0 to 30. Forward Digit Span Test is a test to measure a cognitive component, in which every subject is given a task to repeat or the order of words or number given, called as memory span. It is a measurement of short term memory frequently used in the test, in which the score ranges from 0 to 8. Scored 1 if the subject was able to repeat the test

words or numbers; scored 2 if the subject was able to repeat the second test; and scored 0, if the subject could not repeat the test. In addition, with a screening test added to assess the attention of the elderly, the test was very effective to strengthen the assumption that attention is needed when there is a decreased balance and increased risk of falls [4,29].

In other study [39] it was found that MOCA is more sensitive than MMSE in detecting cognitive disfunction 3 to 6 months after experiencing neurological deficits. There was 24 validating tests of MoCA conducted in Indonesia, in which it was found that the total Kappa between 2 physicians was 0,820. It was concluded that Indonesian version of MoCA (MoCA Ina) was valid in accord with transcultural validation norm, so it can be used and applied by neurologist and general practitioner [8,40].

Three questionnaires were used in this study, i.e., Individual questionnaire, Cognitive and attention test questionnaire derived from MMSE (Mini Mental State Examination) instrument, Montreal Cognitive Asessment (MoCA) dan Forward Digit Span Test.

Both uni- and bi-variate analysis was aimed at answering study questions, in terms of descriptive statistics of the baseline characteristics of the respondents, and test the possible association between outcome variables (cognitive and attention score) and its determinant factors, namely the history of falls among the elderly. Chi-square test was used to see the association based on the 95% level of confidence [41,42]. SPSS trial version 17 was used in the analysis.

Results

The population of elderly in "Usada Mulia 5" comprised of ill people, abandoned and homeless who did not have relatives, in which 90% were ill and suffered from aging-related diseases, Lung TB, Stroke, Cancer, Asthma and others. They could not provide their physical and social-well being by themselves. They were 135 people altogether, consisting of 71 male and 62 female. On the other hand, the population in "Yayasan Pusaka 41" consisted of intervened subjects of elderly and orphan in the community, namely 80 elderly consisting of 15 men and 65 women, as well as 80 orphans. Baseline description of the population is presented in Table 1.

Their everage age was 69.6 years old, ranges from 60 to 96. The average number of falls was 2.8 times last year, ranges from once to 9 times. Their average MMSE was 19.5, with a minimum of 0 and max of 29; meaning that on the average they suffered from light cognitive malfunction. Their average MoCA was 13.6, with a minimum of 0 and max of 30. Since the average score was 13.6, it is therefore categorized as 'abnormal' because its MoCA score was less than 26. Their average Attention score was 3.9, with a minimum of 0 and max of 8. Since the average score of FDST was 3.9, it is therefore categorized as 'abnormal' because its FDST score was less than 6. The characteristic of sample in each location is shown in Table 1 and 2.

Comparison of data between Panti Werdha (PW) and Pusaka 41 (P41) are as follows. Their everage age was identical (69.6 in PW vs. 70.1 in P41). The average frequency of falls was less than 3 times a year last year. Every person experienced 2.8 times episode of falls last year, varied from once to 9 times. Their average MMSE was 19.1 (PW) vs. 19.8 (P41), indicating that both group suffered from light cognitive malfunction. Their average MoCA was 13.6, ranged from 0 to 30. Since the average score of MoCA was less than 26 in both group, it is therefore they were categorized as 'abnormal'. Since their average score of FDST was less than 6 then they were categorized as 'abnormal'. The study question as formulated earlier was whether or not their cognitive function and attention were different.

To further breakdown the difference by age, sex, frequency of falls and other scores of MMSE, MoCA and FDST, the data are presented in the following tables. The age was categorized, as well as the falls frequency, MMSE [35,37].

Comparison of data between Panti Werdha (PW) and Pusaka 41 (P41) are as follows. Their proportion of age was identical, whereas sex proportion in both group seems markedly different. Frequency of falls of more than once/year was more frequent in PW than in P41, namely 36% vs. 14%, respectively. Subjects in PW suffers from heavy cognitive function more in proportion than in P41, i.e., 40% vs. 34%. On the contrary, the situation was reversed when MoCA and FDTS were compared, namely, the worse condition was observed among elderly in PW than P41. These difference has been tested using analysis of contingency table, namely chi-square test, in which the results are shown in the following table (Table 3); s: Significant at P<0.05.

In Table 3, it was indicated that there seems to be no 'dose response effect' of MMSE score based on falls history among sample in PW. Among elderly in PW, in other words, there was an inconsistence of frequency of fall across different score of MMSE from heavy (n=10)-light (n=7) and normal (n=12). Meanwhile, the dose response effect was observed in P41 sample. However, results of chi-square test indicated that there was no association between falls history and MMSE (p>0.05) in both groups, i.e., PW and Pusaka 41.

Variable	Mean	SD (±)	Minimum	Maximum	CI (95%)	Category
Age	69.6	7.0	60	96	(68.2-71.0)	Old
Freq of fall	2.8	2.3	1	9	(2.1-3.6)	Seldom
MMSE	19.5	8.0	0	29	(17.9-21.1)	Light cognitive malfunction
MoCA	13.6	8.1	0	30	(11.9-15.2)	Abnormal
Attention (FDST)	3.9	2.5	0	8	(3.4-4.4)	Abnormal

Table 1: Baseline characteristic of the elderly population in both locations of Panti Werdha (n1=133) and Pusaka 41 (n2=85).

Variable	n		Mean (± SD)		(Min-Max)		95% CI (L,H) of Mean	
	Panti Werdha	Pusaka 41	Panti Werdha	Pusaka 41	Panti Werdha	Pusaka 41	Panti Werdha	Pusaka 41
Age	50	50	69.2 (6.5)	70.1 (7.4)	60-90	60-96	69.2, 67.2	68.0, 72.7
Freq (Fall)	50	50	2.9 (2.3)	2.7 (2.5)	1 - 9	1 - 8	2.0, 3.8	1.1, 4.4
MMSE	50	50	19.1 (8.2)	19.8 (7.8)	1 - 29	0 - 29	16.8, 21.5	17.6, 22.1
MoCA	50	50	14.7 (7.9)	12.4 (8.2)	2 - 30	0 - 27	12.4, 17.0	10.1, 14.8
Attention (FDST)	50	50	3.6 (2.6)	3.8 (2.4)	0 - 8	0 - 8	2.8, 4.3	3.1, 4.5

Table 2: Baseline characteristic of the elderly sample in both locations of Panti Werdha (n1=50) and Pusaka 41 (n2=50), Cemgkareng, West Jakarta 2012.

Variable	Panti Werdha		Pusaka 41	
	N1=50	%	N2=50	%
Usia (WHO)				
Elderly (60-74 years old)	34	68	33	66
Old(≥ 75 years)	16	32	17	34
Sex				
Male	28	56	11	22
Female	22	44	39	78
Frequence of fall				
Never	21	42	38	76
Once	11	22	5	10
More than Once	18	36	7	14
MMSE [35]				
Normal	19	38	23	46
Light cognitive malfunction	11	22	10	20
Heavy cognitive function	20	40	17	34
MoCA [36]				
Normal	5	10	1	2
Abnormal	45	90	49	98
Atensi 2004)				
<6=Disturbed clinically	34	68	37	74
≥ 6=Normal	16	32	13	26

Table 3: Characteristic of the elderly sample in both locations of Panti Werdha (n1=50) and Pusaka 41 (n2=50), Cemgkareng, West Jakarta 2012b.

The dose response effect was indicated to occur in both locations in terms of MoCA and Attention, namely that the distribution of falls were more frequent among those who suffered from clinical disturbance and abnormal MoCA scores. However, the results of chisquare test showed that there was no association between fall history and MoCA score ($p>0.05$) in both groups, i.e., PW and Pusaka 41 ($p>0.05$).

The results of chisquare test showed that there was a significant association between falls history and Attention score among PW group ($p=0.02$), but no significant association between falls history and attention in Pusaka 41 group ($p>0.05$).

Another question is whether or not there was significant association between falls history in both groups, i.e., PW and P41? To answer the question, the following table (Table 4) was constructed to conduct a chi-square test.

Statistical evidence showed that there was a significant association between falls history among elderly in PW and P41, i.e., that fall in PW was significantly more frequent than in P41 elderly home.

Discussion

The main findings showed that Attention was the only factor which significantly contributed to the incidence of falls in Panti Werda elderly nursing home ($p=0.022$), whereas in Pusaka 41 elderly nursing home there was no association between the two. The data showed that the elderly who suffered from lack of attention, i.e., 34 people in PW, and 37 people in P41 nursing home, indicated that it was related to cognitive functions which significantly associated with balance function. Imbalance was known to be related with risk of fall [4,43].

This finding was in line with the fact that the frequency of falls in Panti Werda was more frequent than those who dwell in Pusaka 41, which was significant ($p<0.05$) [44,45]. Systematic review [46] indicated that fall incidence among elderly in nursing home are more frequent (75%) than those who live in the community (16%). Consequently, falls is the main problem due to a decreased congnitive functions as a result of alterations in neurological system [47,48].

No significant association between frequency of falls with MMSE and MoCA. It could be hypothesised due to confounding factors that was not included and analyzed in this study, which indicated the limitation of this study. The results was also supported by other studies showed that falls among elderly in the community was more of living environmental factors whereas falls among elderly in nursing homes was more of physical conditions such as weaknesses of ankle and walking difficulty, and that cognitive factor is of minor risk factor [4,46,49]. Overall, it is evident that falls was closely associated with commulative effect of disturbances related to aging. Other evidence suggested that the balance itself may be influenced by age, in which the 23.5% of elderly who are 80 years or older will suffers from imbalance than the younger ones; also as aging proceed the physical activity will be decreasing and affects the body balance [45].

This findings was in contrary with the results of study [42], who found that 50.9% elderly dwell in nursing home in Taiwan sufferes from cognitive disturbances and 47.7% suffers from cognitive disburbances plus daily physical activity limitation [44]. It was also stated that enhanced physical activity is one of the preventive factors on the risk of falls due to the fact that physical activity may improve balance and coordination.

Evidence that show the association between falls and attention in the nursing homes indicated that disturbances in attention has a potential association with cognitive due to the fact that attention is an important component of cognitive function. It is also known that attention has an important role on balance amongst elderly, and attention is more needed in circumstances which causes imbalance and increased risk of fall [4,29]. In other studies it was indicated that the elderly who has attention problem tend to have imbalance of 4.4 times higher than normal elderly ($p=0.015$), due to the fact that attention is needed to maintain balance and also is needed to recover imbalance among elderly [4].

Theoretically, the structure that has an important role in attention process are reticularis formation, limbic system, thalamus and cortex serebri lobus frontalis. The activation of circuit lobus frontalis is

Variable	Panti Werdha			Pusaka 41		
	Fall History (n=50)			Fall History (n-50)		
	Yes	No	N1	Yes	No	N2
MMSE						
Heavy cognitive malfunction	10 (50)	10 (50)	20	4 (23.5)	13 (76,5)	17
Light cognitive malfunction	7 (63.3)	4 (36.4)	11	2 (20)	8 (80)	10
Normal	12 (63.2)	7 (36.8)	19	6 (26.1)	17 (73,9)	23
Chi-sq (df=2)	0.876		-	0.145		-
p-value	0.645 (ns)		-	0.930 (ns)		-
MoCA						
Abnormal	25 (55.6)	20 (44.4)	45	12 (24.5)	37 (75,5)	49
Normal	4 (80)	1 (20)	5	0 (0)	1 (100)	1
Chi-sq (df=1)	1.104		-	0.322		-
p-value	0.923 (ns)		-	0.570 (ns)		-
Attention						
With clinical disturbance	16 (47.1)	18 (52.9)	34	9 (24.3)	28 (75,7)	37
Normal	13 (81.3)	3 (18.8)	16	3 (23.1)	10 (76,9)	13
Chi-sq (df=1)	0.522		-	0.08		-
p-value	0.022 (s)		-	0.92 (ns)		-

Table 4: The frequency distribution of various scores (MMSE, MoCA and Attention) among old people by history of fall in Panti Werdha and Pusaka 41, Cengkareng, West Jakarta 2012.

executed in the area related to ganglia basalis. Lobus frontalis acts in the selection of stimulation enter the area, program planning, evaluate the planning and adjust the execution. If lobus frontalis disfunction then the stimulation did not happen and causing distracted attention. Partr of lobus frontalis that has role in attention is in the area of dorsolateral [4,18].

Conclusion

Results of study conducted among elderly in "PSTW Usada Mulia" and "Pusaka 41" in Cengkareng Sub-district, West Jakarta in 2012 showed that the mean values (95% CI) of various indicators in those two locations are as follows: age was 69.6 years old (68.2, 71.0); the falls history was 2.8 times per year (2.1, 3.6); the average score of MMSE was 19.5 (17.9, 21.1); average score of MoCA was 13.6 (11.9, 15.2); and average score of attention was 3.9 (3.4, 4.4).

Proportion of falls in Pusaka 41 was 24%, whereas in PSTW UM was 58%, and the difference was significant ($p<0,05$). The frequency of fall greater than once was more frequent in PSTW UM (36%) compared with one in Pusaka 41 (14%).

The history of falls due to attention problem was significantly different among elderly who dwell in PSTW UM ($p=0.022$), in which more episode of falls was observed amongst elderly who had clinical problem than those who were normal.

Overall, the history of falls among the elderly who dwell in those two nursing homes was also significantly different ($p<0.05$).

Implications and Recommendation

1. To reduce the incidence of falls among elderly in nursing homes, additional physical activities needs to be implemented aimed at enhancing physical fitness and slowing down the deterioration of cognitive functions, especially attention functions.
2. For elderly who dwell in Pusaka 41 or elderly who live in the community is expected to give more attention to external living condition surrounding the nursing home to reduce the risk of fall.
3. In order to have a more reliable results, other potential risk factors, such as for example balance checks, physical activities, and environmental factors, may added in the next study.

References

1. Timira PS (2007) Physiological Basis of Aging and Geriatrics. 4th edn. New York: Informa Healthcare.
2. Health Organization (2004) World Health Report: What Are The Main Risk Factors For Falls Amongst Older People And What Are The Most Effective Interventions To Prevent These Falls? Geneva.
3. Bernice L, Dail A (1987) The Changing Meanings of Age. Psychology Today v21: 29: 4.
4. Hesti Harris S, Mayza A, Prihartono J (2008) Pengaruh Gangguan Kognitif Terhadap Gangguan Keseimbangan Pada Lanjut Usia. Neurona 25: 3.
5. World Health Organization (2002) World Health Report: Reducing Risk, Promoting Health Life: Geneva.
6. Haviland WA (1985) Anthropology: Antropologi (RG Soekanto, Trans). Jakarta: Penerbit Airlangga.
7. Ari K (2011) Hubungan Antara Retinopati Diabetika Dengan Gangguan Kognitif Pada Penderita Pasca Stroke Iskemik. Master's Thesis, Diponegoro University, Indonesia.
8. Wiyoto A (2002) Gangguan fungsi kognitif pada stroke. Dalam : Pendidikan Kedokteran Berkelanjutan; 15 Mei 2002 di Surabaya. Bag Ilmu Penyakit Saraf FK Unair, pp: 27-30.
9. Sidiarto LD, Kusumoputro S (2003) Memori anda setelah usia 50. Jakarta: Penerbit Universitas Indonesi, pp: 41-45.
10. Lumempaw S (2009) Pemeriksaan Neuropsikologi Pada Gangguan Kognitif Dan Depresi Pada Penyakit Pembuluh Darah Otak. Dalam Sjahrir H, Anwar Y, Kadri A: Neurologi Update II. Pertemuan Ilmiah Tahunan. Medan 19-21 Juli 2009. Badan Penerbit USU, pp: 253-261.
11. Markam S (2003) Pengantar Neuropsikologi. Jakarta: Balai Penerbit Fakultas

Kedokteran Universitas Indonesia, pp: 23-92.

12. Snell RS (2001) Clinical neuroanatomy for medical students. 5th edn. Washington DC: Lippincott Williams and Wilkins Inc., USA, pp: 67-70.
13. Waxman SG (2007) The limbic system. In: Lange Neuroanatomy. New York: The MacGraw-Hill Companies, pp: 28-30.
14. Papalia DE, Olds SW, Feldman RD (2005) Human Development. 10th edn. New York: McGraw-Hill.
15. http://repository.usu.ac.id/handle/123456789/21571
16. Gunarto S (2005) Pengaruh Latihan Four Square Step Terhadap Keseimbangan Pada Lanjut Usia. FKUI.
17. Chou WC, Tinetti ME, King BM, Irwin K, Fortinsky HR (2006) Perceptions of Physicians on the Barries and Facilitators to Integrating Fall Risk Evaluation and Management into Practice. J Gen Intern Med 2: 117-122.
18. American Geriatrics Society (2014) British Geriatrics Society, American Academy of Orthopaedics Surgeon Panel of Falls Prevention. Guideline for the Prevention of fall in Older Person. American Geriatrics Society, NY, USA 49: 664-672.
19. Bischoff H, Stahelin H, Andreas U, Maura D (2003) Identifying Cut Off Point for Normal Mobility: Comparison of the Time "Up And Go" Test in Community Dwelling and Institutionalised Elderly Woman. In: Age and Ageing. British.
20. Kane RL, Oslander JG, Abrass IB (2000) Essential of Clinical Geriatrics. Mc.Graw Hill. 4th edn.
21. Bellew JW, Fenter PC, Chelette B, Moore R, Loreno D (2005) Effect of a Short-Term Dynamic Balance Training Program In Health Older Women. J Geriatr Phys Ther 28: 4-8.
22. Cumming R, Salkeld G, Thomas M, Szonyi G (2000) Prospective Study of the Impact of Fear of Falling on Activities of Daily Living, Sf-36 Scores, and Nursing Home Admission. J Gerontol A Biol Sci Med Sci 55: 299.
23. Bergland A, Wayller TB (2004) Risk Factors For Serious Fall Related Injury in Elderly Women Living At Home. Injury Prevention 10: 308-313.
24. Dite W, Temple V (2002) A Clinical Test of Stepping and Change of Direction to Identify Multiple Falling Older Adults. Arch Phys Med Rehabil 83: 1566-1571.
25. Vellas BJ, Rubenstein LZ, Ousset PJ, Faisant C, Kostek V, et al. (1997) One Leg Standing Balance And Functional And Status In A Population of 512 Community-Living Elderly Person. Age and Aging 9: 95-98.
26. Karen L, Reed E, Smith LH (2005) Exercise and Fall Reduction in Asissted Living. Assisted Living Consultants 13-22.
27. Laessoe U, Hoeck HC, Simonsen O, Sinkjaer T, Voiqt M (2007) Fall Risk in An Active Elderly Population – Can It Be Assessed? J Negat Results Biomed 6: 2.
28. Sihvonen S, Sipila S (2004) Postural Balance And Health Related Factors in Middle Aged And Older Women With Injurious Falls And Non Fallers. Aging Clin Expres 16: 139-146.
29. Goldman HH (2000) Review of General Psychiatry: An Introduction to ClinicaL Medicine. 5th edn. Singapore: McGraw-Hill.
30. Myers JS (2008) Factors Associated with Changing Cognitive Function in Older Adults: Implications for Nursing Rehabilitation. Rehabil Nurs 33: 117.
31. Scanlan JM, Binkin N, Michieletto F, Lessig M, Zuhr E, et al. (2007) Cognitive Impairmen, Chronic Disease Burden, and Functional Disability: A Population Study of Older Italians. Am J Geriatr Psychiatry 15: 716.
32. Woollacott M, Shumway-Cook A (2002) Attention and the Control of Posture and Gait: A Review of an Emerging Area of Research. Gait Posture 16: 1-14.
33. Li KZ, Lindenberger U, Freud AM, Baltes PB (2001) Walking While Memorizing: Age-Related Differences in Compensatory Behavior. Psycol Sci 12: 230-237.
34. Van MB, Kessels RP, Bloem BR, Verbeek AL, Olde Rikkert MG (2008) Executive Function are Associated with Gait and Balance in Community-Living Elderly People. J Gerontol Series A: J Gerontol A Biol Sci Med Sci 63: 1333-1349.
35. Folstein MF, Folstein SE, Mchubh PR (1975) Mini Mental State: A Practical Method for Grading The Cognitive State of Patients for The Clinician. J Psychiatr Res 12: 189-198.
36. Nasreddine Z, Phillips NA, Bedrian V, Charbonneau S, Whilehead V, et al. (2005) The Montreal Cognitive Assessment, Moca: A Brief Screening Tool For Mild Cogntive Impairment. J Am Geriatr Soc 53: 695-699.
37. Husein N (2010) Uji Validitas Dan Reliabilitas Montreal Cognitive Assesment Versi Indonesia (Moca-Ina) Untuk Skrining Gangguan Fungsi Kognitif. Neurona 27: 15-22.
38. Sandjaja B, Heriyanto A (2006) Panduan Penelitian. Prestasi Pustaka Publisher, Jakarta.
39. Wu SC, Ke D, Su TL (1998) The Prevalence of cognitive impairment among nursing home residence in taipe, Taiwan. Neuroepidemiology 17: 147-153.
40. Holtzer R, Veghese J, Xue X, Lipton RB (2006) Cognitive Processes Related to Gait Velcity: 'Result From The Einstein Aging Study". Neuropsychology 20: 215-223.
41. Maryam SR, Sahar J, Nasution Y (2010) Pengaruh Latihan Keseimbangan Fisiik Terhadap Keseimbangan Tubuh Lansia Di Panti Sosial Tresna Werdha Wilayah Pemda DKI Jakarta. Jurnal Keperawatan Profesional Indonesia 2: 9-17.
42. Laurence Z, Rubenstein M, Karen R, Josephson M, Alan SR (1994) Falls in the Nursing Home. MD. Ann Intern Med 121: 442-451.
43. Salva A, Bolíbar I, Cesar GP (2004) Incidence and consequences of falls among elderly people living in the community. Med Clin 122: 172-176.
44. Setiati S, Harimurti K, dan Roosheroe AG (2006) Proses Menua dan Implikasi Kliniknya. Dalam: Buku Ajar Ilmu Penyakit Dalam. Jakarta: Pusat Penerbitan Ilmu Penyakit Dalam Fakultas Kedokteran Universitas Indonesia 1335-1340.
45. Sofyan AI (2010) Hubungan Antara Kondisi Lingkungan Fisik Rumah Dengan Kejadian Jatuh Pada Lanjut Usia Di Kelurahan Ngijo Gunung Pati, Semarang. Skripsi. Semarang: Fakultas Ilmu Keperawatan Dan Kesehatan UMS.
46. George F, Fuller Col, Mc USA (2000) Falls In The Elderly. American Academy of Family Physicians. White House Medical Clinic, Washington, DC, USA.
47. Carlson NR (2004) Physiology of Behaviour: Learning and Memory: Basic echanisms. 8th edn. Boston: Pearson education Inc.
48. Strab R, Black FW (1993) The Mental Status Examination in Neurology. 4th edn. Philadelphia: FA Davis Company.
49. Rahardjo TBW, Dinni A, Lindawati K (2015) Population Ageing and Policy Framework on Healthy Ageing in Indonesia. 2015 APRU Ageing in the Asia-Pacific Research Symposium, UNSW Sydney, Australia.

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