Geriatric Assessment in Elderly People by Using ABCDE (Ability Balance Cognitive Diseases Emotion) Method at *Posyandu f*or Elderly People

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ABSTRACT

Background: Elderly populations have increased in line with the increased life expectancy. Currently, the balance of disease burden on the elderly has shifted towards chronic disease. Cardiovascular disease, diabetes, cognitive impairment and depression arechronic diseases that cause suffering and death in elderly populations. Therefore, it is necessary to conduct a comprehensive and multidimensional health assessment as a preventive effort to reduce morbidity in the elderly. **Objective**: The general objective of this research was to obtain a description of elderly health status at the *Posyandu* for the elderly using a geriatric assessment called the ABCDE (Ability, Balance, Cognitive, Diseases, Emotion) method. **Method**s: This research used a cross-sectional design. The subjects were elderly persons $\geq$ 60 years old who participated in the *Posyandu* for the elderly and who had fulfilled inclusion and exclusion criteria. The estimated minimum sample size was 242 selected using stratified random sampling. The statistical analysis in this research employed univariate, and bivariate analysis using Chi square tests. **Results**: Elderly participants had light dependency (34.2%) with average activities of daily living (ADL) value of 19.39 ± 1.32, positive Romberg test 3.7%, and Sharpened Romberg Test 50%. The prevalence of cognitive impairment was 43.4%, while the average score of Mini Mental State Examination was 23.31 ± 6.08, hypertension prevalence 73.14%, hypercholesterolemia 13.22%, and diabetes mellitus 10.33%. Elderly who had depression and probable depression were 12.81%, consisting of mild depression 11.57% and moderate depression 1.24%. Balance disorders had a statistically significant correlation with ADL ($p = 0.012$; Ratio Prevalence (RP) = 1.422: 95% CI), cognitive impairment ($p = 0.039$; RP = 1.31: 95% CI), and depression ($p = 0.034$; RP = 1.63: 95% CI). **Conclusion**: The prevalences of hypertension, cognitive impairment, and balance disorder on sharpened Romberg test were high. There were statistically significant correlations between balance disorder and ADL, cognitive function, and depression. These findings support the application of geriatric assessment by using ABCDE which can be applied in primary care setting for elderly people.

Keywords: ABCDE Method, Elderly, Geriatric Assessment, Posyandu

INTRODUCTION

Health financing for the elderly above 65 years old can double in cost due to multisystem diseases and the physiologic aging process[1]. The balance between disease burden gradually has shifted towards chronic diseases which have become a major burden in elderly populations worldwide. Cardiovascular diseases, diabetes, cognitive impairment and depression are chronic diseases that cause suffering and death in elderly persons[2]. The aging process through multiple physiological disorders and its various problems result in various geriatric conditions. As many as 49.9% of the elderly population aged 65 and older have1 or more geriatric problems. Therefore, it is necessary to conduct accurate health assessments and preventive activities to reduce the morbidity conditions for the elderly[3].

However, as little as only a quarter of the elderly are screened once every year. Additionally, there are still many physicians in primary care who have not been fully aware of geriatric syndromes and their functional consequences. The examination conducted on the elderly is multidimensional with a Comprehensive Geriatric Assessment to determine the extent of problems that encompass various aspectsand to evaluate functional and cognitive ability, mental health, physical examination and the social environment[4,5]. Indonesia has life expectancy to age 70 years. Accordingto the 2013 Basic Health Research (*Riskesdas*), the chronic diseases mostly experienced by the elderly are

hypertension (57.6%), stroke (46.1%), and diabetes mellitus (4.8%). Meanwhile, mild disabilities measured by the ability to perform basic activities of daily living (ADL) are experienced by 51% of the elderly. Geriatric syndromes have emerged recently in cognitive function impairmentby 38.4%, immobilization by 21.3%, and depression by 17.3%[6].

In Poland, researchers use the term OBSTACLE in a geriatric examination. In contrast to Poland, in Germany a comprehensive examination for the elderly in primary care uses the term Manageable Geriatric Assessment (MAGIC). Another research designed an examination method withthe term Brief Assessment Tool (BAT)[7,8,9]. The Ministry of Health introduced ABCDE in order to examine the function of Intelligence in the Elderly. The examination using the ABCDE method is comprehensive including both physical and mental examinations[10]. This study is important to test the ABCDE methods of assessing geriatric health status in primary care and to apply and obtain the results. We hope to promote the use of the ABCDE methods to the Indonesian primary care system.

Context of this study:
This study was done at the Purworejo regency, which is a center for the ageing population since 2010 in which the percentage of the elderly increased by more than 10%. It is not surprising that Purworejo is called a retirement city. The increased life expectancy in Purworejo has made an added burden for primary care to perform preventive activities in the management of the elderly. However, the prevalenceof health status problems in the elderly in Purworejo is not known because there are no previous research nor adequate data.

METHODS
This research employed a cross-sectional design. Data were collected using questionnaires and laboratory checks including ABCDE (Ability, Balance, Cognitive, Disease, Emotion) assessments. The reachable population in this research was all elderly individuals aged over 60 years who were participants of the Integrated Service Post for the Elderly (*Posyandu*) in Gebang Subdistrict. Samples were taken by using stratified random sampling where stratification and subjects were selected based on the levels of the Integrated Service Post, namely *Mandiri, Purnama, Madya,* and *Pratama*. The inclusion criteria in this research were the elderly aged ≥ 60 years, willing to be a research sample by signing an inform consent form, had participated in the integrated service post and lived in Gebang Subdistrict. The exclusion criteria were those who had severe dementia, and had difficulty or were unable to communicate with others. The sample size was calculated by using the formula of sample size with 95% confidence interval (CI). A minimum of 242 sample size was obtained from the results of the formula. This research employed questionnaire forms including questionnaires of observation results and interviews with research subjects for A part: Activity Daily Living Capability using a Modified Barthel Index questionnaire, B part: Balance examination using the Romberg test, C part: Cognitive Functional Examination questionnaire using Mini Mental

State Examination (MMSE), D part: Disease risk factors were examined in the laboratory of the Public Health Center of Gebang for blood sugar and total cholesterol by using a photometer, and E part: Depression Examination questionnaire using Geriatric Depression Scale (GDS). The statistical analysis in this research employed univariate, and bivariate analysis using Chi square tests and multivariate analysis using logistic regression tests. This research was conducted after obtaining approval and ethical clearance from the Medical and Health Research Ethics Committee, Faculty of Medicine, Universitas Gadjah Mada.

RESULTS
The number of subjects in this research was 242 respondents consisting of 62 male respondents (25.6%) and 180 female respondents (74.4%). Most of respondentswere housewives (27.27%), retirees (11.98%), and self-employed (3.72%). The ages of the research subjects were ≥ 70 years (46.7%), 60-69 years (53.3%) with average age of respondents of 70.21 ± 8.36. The respondents who had low education were 49.17%, not attended school (44.21%), and had high education (6.61%). As many as 68.8% of the respondents did not have a fixed income.

Table 1. Sociodemographic characteristics of the research subjects

Sociodemographic Profile	N	Percentage (%)	Mean
Age			70.21±8.36
60-69 Years old	129	53.3	
>70 Years old	113	46.7	
Sex			
Male	62	25.6	
Female	180	74.4	
Occupation			
Labor	4	1.65	
Housewife	66	27.27	
Retiree	29	11.98	
Private Employee	1	0.41	
Not Working	1	0.41	
Parking man	1	0.41	
Self-Employed	9	3.72	
Education Level			
Low Education	119	49.17	
High Education	16	6.61	
Not Attended School	107	44.21	
Income			
Fixed	76	31.4	
Non-fixed	166	68.6	
Total Respondents	242	100	

Table 2 shows the Activity of Daily Living results. The elderly respondents with independent ADL was 65.70%, and light dependence 34.2% with an average ADL value of 19.39 ± 1.32. The elderly problems related to the functional abilities of ADL mostly were ability to climb up and down stairs, move from bed to seat and control urination.

Table 2. Percentage of Elderly Dependence Level with Activity of Daily Living (ADL)

Dependence Level	N	Percentage (%)	Mean±SD
ADL			19.39±1.32
Light Dependence	83	34.2	
Independence	159	65.70	
Total	242	100	

Description: SD: Standard Deviation, ADL: *Activity of Daily Living*

Table 3 shows the results of Balance, by positive Romberg test, by standing where there was a distance between both feet and opened eyes by 3.7%, and the results of Sharpened Romberg Test by standing with one foot in front of the other foot with heel in front of the other toe by 50%.

Table 3. Percentage of the results of Romberg Test

Romberg Test	N	Percentage (%)
Positive	9	3.72
Negative	233	96.2
Sharpened Romberg Test	N	Percentage (%)
Positive	122	50
Negative	122	50
Total	242	100

Figure 1 shows the Cognitive concerns of the survey. The 43.4% of the elderly had cognitive impairment problems and 56.6% had normal cognitive function. Out of the 242 responden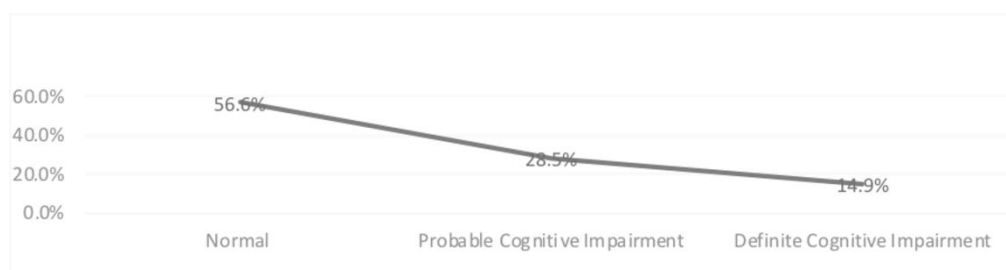ts, the least common problems were attention and counting ability followed by the ability to remember. The mean of MMSE score was 23.31 ± 6.08, meaning that the average of the elderly in the Integrated Service Post for the Elderly in Gebang Subdistrict had cognitive function within the threshold of declining cognitive function.

Table 4 shows the results of the diseases in the Elderly that 73.14% of the elderly had chronic hypertension disease, 13.22% were diagnosed with hypercholesterol and 10.33% were diagnosed with diabetes mellitus. The mean values for systolic blood pressure were 154.69 ± 25.99, and the mean values for diastolic blood pressure were 86.36 ± 16.44. The mean values for blood sugar levels were 105.44 ± 36.32, and mean values for total cholesterol were 165.35 ± 33.57. Most of the elderly in the Integrated Service Post in Gebang Subdistrict suffered from hypertension disease, with the average cholesterol and blood sugar levels still in the normal range.

Figure 1. Percentage of the results of cognitive function examination

Table 4. Percentage of hypertension, hypercholesterolemia, and diabetes mellitus

Chronic Disease	N	Percentage (%)	Mean±SD
Hypertension			
No	65	26.86	
Yes	177	73.14	
Systolic pressure			154.69±25.99
Diastolic pressure			86.36±16.44
Hypercholesterol			165.35±33.57
No	210	86.78	
Yes (total cholesterol ≥ 200mg/dl)	32	13.22%	
Diabetes Mellitus			105.44±36.32
No	217	89.67	
Yes (FBS≥126mg/dl)	25	10.33	

Description: SD: Standard Deviation FBS: Fasting Blood Sugar

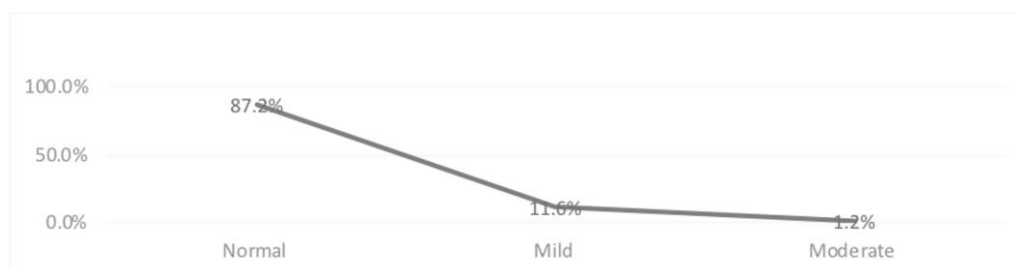Figure 2 shows the results of the emotional state that 12.81% of the elderly had depression and probable depression, 11.57% had mild depression and 1.24% had moderate depression. As many as 97.7% of respondents were satisfied with the life they lived. However, 74.4% of respondents felt that they did not have any hope for the future. The mean score of Geriatric Depression Scale (GDS) was 2.34 ± 1.91.

The results of bivariate analysis in Table 5 shows that there are three factors that have statistically significant correlation with balance disorder, namely ADL ($p = 0.012$; Ratio Prevalence (RP) 1.42; 95% CI) Cognitive Impairment ($p = 0.039$; RP 1.31; 95% CI), and Depression ($p = 0.034$; RP 1.63; 95% CI). Age, sex and hypertension did not have a statistically significant correlation with the balance disorder ($p > 0.05$).

Figure 2. Percentage of the result of depression examination

Table 5. Bivariate analysis

Variable	Romberg Test				p^*	RP	CI 95%	
	Positive		Negative					
							Lower	*Upper*
	N	%	N	%				
Age								
≥ 70 years old	63	55.75	50	44.25	0.094	1.24	0.95	1.61
60-69 years old	58	44.96	71	55.04				
Sex								
Female	91	50.56	89	49.44	0.76	1.04	0.78	1.38
Male	30	48.39	32	51.61				
Hypertension								
Yes	88	49.72	89	50.28	0.885	0.979	0.73	1.30
No	33	50.77	32	49.23				
ADL								
Light	55	60.44	36	39.56	0.012*	1.42	1.06	1.90
Independence	66	43.71	85	56.29				
Cognitive Impairment								
Yes	64	57.14	48	42.8	0.039*	1.31	1.01	1.7
No	57	43.85	73	56.15				
Depression								
Mild	21	67.74	10	32.26	0.034*	1.63	0.96	2.75
Normal	100	47.39	111	52.61				

*$p < 0.05$ (Significant), RP *Ratio Prevalence*, CI *Confidence Interval*

DISCUSSION
Description of Elderly Health Status using ABCDE method
The problem of Activity of Daily Living (ADL) with the prevalence of light dependence occurred in 34.2% of the respondents. This result is higher than other studies conducted in Jakarta with the similar characteristics of research subjects that showed light dependence occurred in 21.1% of the elderly population[11]. In a research in rural areas of Vietnam, the number of population who independently carried out basic ADL was 97.6% of the population aged above 64 years, and 86.7% of the population aged above 84 years. This proportion decreased in 10-year intervals[12]. Distinct differences from existing research results may be due to differences in ADL measurement, point of view of the elderly population, expectations of assistance from those who take care of the elderly and availability of access to health care[13].

The results of the Balance test of positive Romberg teston sharpened Romberg test was 50%. The results of this research are higher than the value of other research conducted in West Jakarta by using Romberg test to maintain balance while standing with one foot standing in front of another (29.7%), while the elderly with the risk of falling was higher by 7.8%[14]. Several factors contributing to balance in the elderly include three sensory inputs, consisting of somatosensory, visual and bilateral vestibular receptors. The elderly challenges are also correlated with reduced proprioceptive input, degenerative vestibular, muscle weakness and joint pain that interfere with postural control[11].

The prevalence of Cognitive state concerns in elderly showed by decreased cognitive function was quite high with stable cognitive impairment of 14.88%. This resultis probably due to low or no education and no permanent occupation. Education and occupation can provide cognitive protection and stimulation to memory and intelligence and help maintain cognitive functions. Several risk factors for the diseases can also decrease cognitive functions such as diabetes, obesity, hypertension and hyperlipidemia. Meanwhile, the lifestyle risk factors such as unhealthy diet, smoking, lack of physical activity, and lack of social activities in the community can also affect cognitive functions[15]. Some studies mention the role of physical activity in cognitive functions, showing that physical activity will improve heart fitness by increasing cerebral blood flow and increasing oxygen to the brain. It also increases the formation of neurons and maintains brain volume[16].

The prevalent Diseases in the elderly were hypertension, hypercholesterolemia and diabetes in this research which are higher than the data of the 2013 Basic Health Research. Hypertension in the elderly is a major risk factor for ischemic stroke and hemorrhagic stroke that usually occurs in patients with isolated systolic hypertension. Non-pharmacological management of hypertension in the elderly is often neglected. Lifestyle modification can bea primary therapy in preventing hypertension. If lifestyle changes have failed to reduce the targeted blood pressure (in the range 130-139 mmHg for systolic and 80-85 mmHg for diastolic), then pharmacologic therapy can be given[17]. Type 2 diabetes in the elderly is usually correlated with several risk factors such as increased weight gain, obesity, lack of physical activity and loss of muscle mass. This is

due to increased insulin resistance and decreased function of pancreatic ß cells that occur due to ageing factors[18,19].

Cholesterol synthesis and catabolism have been determined genetically. Such genetic errors can increase plasma cholesterol concentrations that will affect low density lipoprotein (LDL) receptors in the liver, which can lead to familial hypercholesterolemia, resulting in high cholesterol levels and premature coronary heart disease. Diet is very effective in lowering total cholesterol, LDL and triglycerides in the elderly, with reduction in total saturated fat replaced by polyunsaturated fatty acids, and foods with low calories[20].

In this research, Emotional state of the elderly showedthat only 11.57% experienced mild depression and 1.24% experienced moderate depression. This finding is in line with a number of studies that suggest that depression is between 8% to 20% of the elderly in the community. The 2013 Basic Health Research shows that the prevalence rate of depression in elderly is 17.3%[10]. Elderly is a stage of maturity of life from the previous stage. For the elderly who previously experienced a good period of life, generally they are able to accept positive and negative sides of life, and there will be no sense of disappointment about the past life and fear of future life. This outlook will provide an advantage in the later life of the elderly in fighting against various factors that trigger stress[21].

Bivariate Analysis
In bivariate analysis using chi-square tests, there wasa statistically significant relationship between balance disorder and ADL. This result is in line with Prata and Scheicher's research in 2012 that found there was a significant correlation between balance disorder and ADL with nearly identical research populations in this research, i.e. age ≥ 65 years[22]. Balance disorders involve complex interactions of visual system and somatosensory with vestibular that control the relation between different body segments and foot as an important proprioceptive input that produces good balance. A person's functional independence level is significantly affected by his ability to move and walk which requires good strength of back muscles and extremity, balance, coordination, and cognitive skills[23,24]. A well-balanced elderly person will maintain a good level of independence. The maintenance of balance and posture in the standing process is very important to perform daily activities[22].

The statistically significant correlation between cognitive impairment and balance disorder is in line with another study by Bortoli et al. in 2015 suggesting that cognitive function decline is correlated with balance function decline in the elderly which may result in falls. Tangen et al. in 2014 in their study showed that all aspects of balance control would decrease in line with increased decline in cognitive function. Cognition is a process in which all sensory inputs (tactile, visual, auditory) will be altered, processed, stored and then used perfectly for interneuron relationshipsso that it can make interpretation of the sensory input. Cognitive impairment will result in decreased ability of concentration, thinking process, perceptions and memory

disorders. Visuospatial and verbal memories have a stronger correlation with balance and gait functions. Individuals with vestibular disorders will experience interference with memory affecting cognitive functions. In addition, these parts of cognitive functions are almost similar to the balance function consisting of memory, language, visual, and executive functions (attention, planning and organizing movements) that are all interrelated[23,24,25].

This research shows that there was a significant correlation between balance disorder and depression. There are four factors that may cause falling, namely postural sway, previous history of falling, muscle strength and depression symptoms. Depression plays a direct role in falling risk. Depression is also correlated with neurocognitive changes and coordination of motor function. Psychomotor retardation is one of the characteristics of severe depression[26]. Some risk factors for falling in the elderly are correlated with deficits in old age such as decreased mobility, visual impairment, arthritis, depression symptoms, orthostasis, cognitive impairment, balance disorders, muscle weakness, use and fear of falling[27].

The results of bivariate analysis showed that there was no statistically significant correlation between age and balance disorder in the elderly. However, age is a risk factor for balance disorder (Ratio Prevalence = 1.24). This findingis consistent with research conducted by Agrawal et al. in 2012 that showed increased age will decrease the length of time in maintaining balance[28]. Increased age is associated with reduced proprioceptive input, degenerative processes in the vestibular system, slowing and weakening position reflexes of the muscle strength which is important for maintaining posture. The proprioceptive system provides information to the central nervous system about the position of the body through joints, tendons, muscles, ligaments and skin that will suffer from disorders due to aging resulting in a balance disorder. The decline in muscle mass due to age will weaken muscle strength. In addition, the decrease in vision due to the degeneration process in various tissues of the eyeball results in a sharp decrease in vision correlated with an increase in fall incidence and postural sway on a soft foothold[27,28].

The results of bivariate analysis using chi square tests showed that there was no statistically significant correlation between balance disorder and sex. This finding is consistent with a research by Nakagawa et al. in 2017 which states that there was no significant difference between malesand females in balance disorder. The analysis between sex and balance disorder is less representative of the population because the number of female respondents was larger (74.4%) than the number of male respondents (25.6%). This may cause bias due to homogeneous data. The number of female members of the integrated service post for the elderly as the samples of the research was higher than that of males. Statistically, there was also no significant correlation between hypertension in the elderlyand balance disorder. This finding is consistent with a research conducted by Acar et al. in 2015 that found there was no significant difference between balance disorderand elderly people with hypertension and control groups

without hypertension[29,30].

Geriatric assessment in the elderly using ABCDE (Ability, Balance, Cognitive, Diseases, Emotion) method in primary care is highly needed because of complex elderly problems. In addition, promotive and preventive efforts are needed by empowering the integrated service post for the elderly through geriatric assessment to prevent cognitive function decline, balance disorder, depression and reduce the risk of hypertension, hypercholesterol and diabetes mellitus in the elderly. Stakeholders' concerns both from the public and private sectors should be improved to provide support to the elderly to be healthy, independent and productive.

CONCLUSIONS

The results of the geriatric assessment of the elderly using ABCDE method show the health status of the elderly, namely 34.2% of the elderly with light dependence in ADL, Romberg's sharpened test (Sharpened Romberg test) 50%, 43.38% had cognitive impairment, 12.74% depression and probable depression, 73.14% had hypertension, 73.14%, had hypercholesterol and 10.33% had diabetes mellitus. There was a statistically significant correlation between balance disorder and ADL, balance disorder and cognitive function, and balance disorder and depression. The ABCDE methods could be effectively used in primary care settings to help assess the health status of the elderly and provide significant care that needed.

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