Cognitive Function And Falls Among Elderly

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Abstract
Falls among the elderly are one of the major causes of morbidity and mortality worldwide. One that causes falls is impaired cognitive function.The aim of the study was to find out the relationship between cognitive function and the risk of falling among the elderly. Method : a cross-sectional analytical study was conducted in the elderly. The population in this study is the elderly who live in the work area of Community Health Center in Banda Aceh, totaling 1,043 elderly scattered in 5 villages. The study sample size was estimated according to the Slovin formula, the sample size was estimated 91 respondents but 100 elderly adults were studied . The sample size in each village was proportional technique sampling. The sampling was done by non-random sampling and accidental sampling technique.The data collection technique was done by guided interview using questionnaire translated into Indonesia language, that is, Short Portable Mental Status Questionnaire (SPMSQ) which measure the cognitive function and Time Up and Go Test (TUG Test) measuring the risk of falling in the elderly. It showed that there is a correlation between the cognitive function and the risk of falling in the elderly with P value= (0.00<0.05), it indicates that there is a correlation between the cognitive function and the risk of falling in the elderly. The value of correlation coefficient (r) is 0.811. Conclusion: Generally, the falling correlates significantly with the impaired cognitive function. Therefore, it needs to plan and develop health awareness programs to improve cognitive good to prevent falls in the elderly.
Keywords: Elderly, cognitive function, falls

I.   Introduction

The aging process occurs since conception and its manifestations are very visible in the elderly. The number of elderly people is increasing in both developed and developing countries, this can be seen in the increase in life expectancy. The increase in life expectancy in Indonesia occurs because along with the advancement and improvement of science and technology in the field of health that is able to improve nutrition, sanitation, slow down death and improve quality of life (Ministry of Health, 2017). Life expectancy in Indonesia increased from 70.06 to 71.20 years old (Central Statistics Agency, 2018).

According to the United Nation (2017), the elderly population aged 60 years or more in the world reaches 962 million. Based on the estimated elderly data made by the Ministry of Health of the Republic of Indonesia in 2017, it is estimated that the number of elderly people in Indonesia is 23.66 million. It is predicted that the number of elderly people in 2020 will increase by 27.08 million, in 2025 there will be 33.69 million, in 2030 it will be 40.95 million and in 2035 it will be 48.19 million. Based on data from the Profile of the Aceh Population in 2018, the elderly in Aceh reached 374,343 elderly. While the number of elderly people in Banda Aceh is 11,903 in 2017 (Central Statistics Agency of Banda Aceh, 2018). If the number of elderly people increases, the vulnerability of the elderly to the emergence of various health problems also increases. This is because aging is a natural process that will be experienced by every disease and results in the emergence of various health problems, one of which is a decrease in cognitive function.

Cognitive impairments and dementia are expected to increase globally and are expected to increase proportionally in developing countries (Mavrodaris, Powell, & Thorogood, 2013). According to the Directorate General of Medical Services Unit of the Ministry of Health (2010) in Lestari, Fikrani, and Maryanti (2015), the prevalence of MCI (Mild Cognitive Impairment) decline in Indonesia was 32.4%.

Decreasing cognitive function due to aging can have an increased risk of falling, balance disorders, slow and stiff movements, decreased muscle resilience and strength and decreased traction (Santoso & Ismail,

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2009). One result of aging in the brain that regulates cognitive function is an increased risk of falling which can cause injury to the elderly (Ministry of Health, 2013).

Falling is one of the leading causes of death in the elderly and ranks sixth in death in elderly people aged 75 years and over (Beers & Berkow, 2013). The fallingranked second to cause mortality due to accidents worldwide (WHO, 2018). The prevalence of falling every year in the elderly in Indonesia is categorized by age, that is, age 65 years and over by 30%, age 80 years and over by 50% (Mupangati, 2018). In the community, as many as one-third of the elderly aged 65 years or older experience at least fall once in a year and, of the 40 elderly who fall, one elderly must be hospitalized (Sudoyo, Setiyohadi, Alwi, Sinadibrata, & Setiati, 2015).

Based on a study conducted by Ramlis (2018) in Bengkulu, the results showed that most of the elderly in the Senior Citizens Guidance at the Bengkulu Center for Senior Citizen Services and Supports (BPPLU) as many as 56.7% of the elderly experienced intrinsic disorders that were the cause of the risk of falling. One of the intrinsic disorders that cause the risk of falling is a nervous system disorder which includes cognitive function.

Based on the description above which explains that the decline in cognitive function and falling events that occur in the elderly, as well as the effects of these, falls, the researchers want to see the relationship between cognitive function and the level of risk of falling in the elderly in the work area of Community Health Center in Banda Aceh.

II. Method

This study used a descriptive method with a cross-sectional study design in which data collection was carried out on April 24-May 20, 2019 in the work area of Community Health Center in Banda Aceh.

2.1 Participants

The population in this study is the elderly who live in the work area of Community Health Center in Banda Aceh, totaling 1,043 elderly scattered in 5 villages. The study sample size was estimated according to the Slovin formula, the sample size was estimated 91 respondents but 100 elderly adults were studied. The sample size in each village was proportional technique sampling. The sampling was done bynon-random sampling and accidental sampling technique. Respondents involved in this study were voluntary, aged 60 years and over, able to communicate well, physically and mentally healthy and lived in the work area of the puskesmas, exclusion criteria included a medical diagnosis of dementia and severe illness.

2.2 Setting

Data was collected from April to Mei 2019. Data collection was carried out after having an Ethical Test Pass Letter from the Research Ethics Committee of the Nursing Faculty of Syiah Kuala of University. Written inform concernt was obtained from all participant.

2.3 Measures

The data collection was done by questionnaire and guided interviews by using a questionnaire consisting of three parts, that is demographic data of respondents, SPMSQ questionnaire and TUG observation.

2.4 Sosio demographic of respondent

The first part of questionnaires concist of sosio demografhic data of respondent; age, sex, marital status, income, education, occupation, medicine of terapy, history of falling and smoking.

2.5 Cognitive funtion

Questionaire used to measure cognitive funtion; Short Portable Mental Status Questionnaire (SPMSQ). SPMSQ has reability with alpha value; 0.82 (Pfeiffer, 1975).

2.6 Falls among elderly

Time Up and Go Test (TUG Test) Questionaire used to measure falls among elderly. The validity of the English version of TUG correlates well with the Berg Balance Scale score (r = -0.72), the gait speed (r = -0.55) and (r = -0.51) on the Barthel Index (Podsiadlo & Richardson, 1991) . The Indonesian version of TUG has a validity value of r = 0.754 (Utomo & Takarini, 2009). TUG reliability with cronbach alpha value = 0.99 (Podsiadlo & Richardson, 1991). This assessment format only instructs the elderly to get up from their seats then walk 3 meters further, the road turns back to the chair and sits back on the chair. The interpretation of the Time Up and Go Test (TUG) is as follows: full independence (normal) = <10 seconds, risk of light fall = 10 - <20 seconds, risk of moderate fall = 20-29 seconds and risk of high fall = ≥ 30 seconds (Fitzpatrick, 2007).

2.7   Data Analysis

Data analysis was conducted using computer program to determine certain objectives as follows: (1) To estimate the prevalence of falls of the elderly use of descriptive statistics, (2) To To estimate the prevalence of cognitive function of elderly use of descriptive statistics, (3). To investigate the relationship between the cognitife function and falls among elderly using Rank Spearman statistical testing.

III.   Result

3.1   Sosio demographic data

Based on the research that has been done, the results are as follows:

Table 1. Respondent Demography(N= 100)

No	Demographic Data		F	%
1.	Age (WHO, 2018)			
	a.	*Elderly* (age 60 and above)	86	86,0
	b.	*Oldest* (age 80 and above)		
			14	14,0
2.	Sex			
	a.	Male	40	40,0
	b.	Female	60	60,0
3.	Marital Status			
	a.	Married	80	80,0
	b.	Widower	8	8,0
	c.	Widow	12	12,0
4.	Income (Aceh Minimum Wage, 2019)			
	a.	High Income(≥ Rp. 2.916.810)		
	b.	Low Income(< Rp. 2.916.810)	26	26,0
	c.	No Income		
			21	21,0
			53	53,0
5.	Level of Education (Law No. 20 of 2003)			
	a.	No School		
	b.	Elementary	20	20,0
	c.	High School	41	41,0
	d.	Higher Education	10	10,0
			29	29,0
6.	Occupation			
	a.	Not Work	53	53,0
	b.	Laborer	3	3,0
	c.	Farmer	2	2,0
	d.	Fisherman	3	3,0
	e.	Private Sector	12	12,0
	f.	Retired	27	27,0
8.	Medicine Therapy			
	a.	Yes	47	47,0
	b.	No	53	53,0
	Medicine Therapy			
	a.	AngiotensinReceptor II Receptor Blocker		
	b.	Antidiabetic oral (Biguanide)		
	c.	Insulin	2	2,0
	d.	Insulin, Antidiabetic (Biguanide) dan Vasodilator (Calcium Channel Blocker)		
			1	1,0
	e.	Statin		
	f.	Vasodilator (AngiotensinReceptor Blocker)	2	2,0
	g.	Vasodilator (Calcium Channel Blocker)		
	h.	Vasodilator (Calcium Channel Blocker) dan Antidiabetic oral (Biguanide)		
	i.	Vasodilator (Calcium Channel Blocker) dan Statin		
	j.	No Therapy		
			5	5,0
			1	1,0
			1	1,0
			27	27,0
			2	2,0

No.				F		%
					6	6,0
					53	53,0
9.	History of Falling			21	79	
	a.	Yes				21,0
	b.	No				79,0
10.	Smoking			11	89	
	a.	Yes				11,0
	b.	No				89.0

Based on table 1 regarding demographic data. The highest age range was Elderly's category (age 60 years and above) with 86 respondents (86.0%). The majority of respondents were women as many as 60 respondents (60.0%). The most marital status is married as many as 80 respondents (80.0%). Most respondents in this study did not have any income as many as 53 respondents (53.0%). The highest level of education is inelementary education as many as 41 respondents (41.0%). No work dominates in employment status as many as 53 respondents (53.0%).

The average respondents in this study had more than one disease (multimorbidity) as many as 53 respondents (53.0%) and the most diseases suffered by the study population were Cardiovascular System diseases as many as 43 respondents (43.0%). Respondents who did not use medicine therapy dominated, more than 53 respondents (53.0%). On average, 79 respondents (79.0%) never had a history of previous falls and no smoking dominates the result of the respondent demography in this study as many as 89 respondents (89.0%).

3.2 Cognitive funtion among elderly

Table 2. The prevalensi cognitive funtion among elderly (N = 100)

No.	Cognitive Function	F	%
1.	Good Cognitive Function	65	65,0
2.	Mild cognitive /intellectual function impairment	22	22,0
3.	Moderate cognitive/ intellectual impairment	12	12,0
4.	Severe cognitive/ intellectual impairment	1	1,0

Based on table 2, it shows that as many as 65 respondents have a good cognitive function (65.0%).

3.3 Falls among elderly

Table 3. The prevalence of level falls among elderly

No.	The Level of the Risk of Falling	F	%
1.	No risk of falling (full/ normal independence)	52	52,0
2.	Mild Risk of Falling	33	33,0
3.	Moderate Risk of Falling	14	14,0
4.	Heavy Risk of Falling	1	1,0

Based on table 3, it shows that as many as 44 respondents were not at risk of falling (44.0%).

3.4 The Relationship cognitive funtion and falls among elderly

Table 4. The relationship cognitive funtion and falls among elderly

	Cognitive Function	Cognitive Function	Falls
Spearman's rho	Correlation Coefficient	1.000	.811[**]
	Sig. (2-tailed)	.	.000
	N	100	100
	Risk falls Correlation Coefficient	.811[**]	1.000
	Sig. (2-tailed)	.000	.
	N	100	100

Based on table 4, it shows that 65 respondents (65.0%) had good (normal) cognitive functions and 52 respondents (52.0%) did not risk falling. Through the Spearman Rank statistical test, the value of p-value = 0.00 (<0.05) so that H0 is rejected, which means there is a relationship between cognitive function and the level of risk of falling elderly in Banda Aceh.

IV.   Discussion

Based on the results of statistical tests about the correlation between cognitive function and the level of risk of falling in the elderly in Banda Aceh, it is known that the value of p is 0.00. This p-value<0.05 so that the null hypothesis (Ho) is rejected which means that there is a correlation between cognitive function and the level of risk of falling in the elderly in Banda Aceh.

Based on the results shown in table 4, it shows that cognitive functions and the level of risk of falling have a very strong relationship, this is indicated by the value of the correlation coefficient obtained which is 0.811.

The results of this study are supported by the research of Eni & Safitri (2018) which states that there is a close correlation between severe cognitive impairment and a high risk of falling. Cognitive disorders occur with age. As age increases, the function of the human body decreases. This is in line with the theory of aging, namely Stochastic theory proposed by Beers & Berkow (2013), which states that every episode of events that occur throughout a person's life causes damage to body cells randomly and accumulates over time, causing aging (Mauk, 2006). The aging process affects all systems in the human body including cardiovascular system, respiratory system, integumentary system, musculoskeletal system, reproductive system, gastrointestinal system, urinary system, endocrine system, immune system, nervous system and neurological system (Saxon, Etten, & Perkins, 2015) One of the effects of aging that occurs in the neurological system is atrophy (shrinkage) in the brain, so that cognitive functions experience interference. The cognitive function consists of aspects of attention, language, memory, coordination of motion, visuospatial and executive functions (Ministry of Health, 2010).

Aspects of cognitive function show various changes as the age is increasing, including memory problems (easy to forget), difficult to recognize objects so it is also difficult to use things even though they are actually easy to use. Besides that, the visuospatial problems that arise often make the elderly arevulnerable to being lost in their neighborhood. Then the disrupted executive aspects cause disruption of elderly activities in daily life (Ministry of Health, 2010). The executive functions have an important role in cognitive function in that the executive functions play a role in the balance of the elderly. In addition, research conducted by Siswo, Arsyad, Waluyo, M, & Susilowati (2017) states that the attention aspect is also a major factor of falling in the elderly. Another impact of the decline in other cognitive aspects is the decrease in the level of psychomotor abilities, neuromotor coordination,and flexibility of the elderly so that the elderly have a risk of injuries such as falls while walking and limited physical activity (Eni & Safitri, 2018).

This is also in line with Sari's study (2015) which shows that there is a relationship between cognitive status and elderly balance disorders. The balance of the elderly is disturbed due to changes in the nervous, motor and central nervous system, especially in the vestibular nerve which regulates balance (Zhou et al., 2013). The disturbed balance is very likely to cause the elderly to fall. In addition, changes in the nervous system due to the aging process affect the entire body system including coordination ability, mobility, vascular system, visual activity and cognitive function abilities (Dewi, 2014).

The study can be used as a reference and information about cognitive functions and the risk of falling in the elderly in work area of Health Center in Banda Aceh , so nurses can socialize ways to maintain cognitive function is one methode toprevent falls in the elderly and to increasing the goverment programe (Elderly Posyandu), such as holding elderly brain exercise activities and cognive training.

V.   Conclution

Based on the results of the study, the conclusions obtained are that there is a correlation between cognitive function and the level of risk of falling in the elderly in Banda Aceh. Therefore, it needs to plan and develop health awareness programs to improve cognitive good to prevent falls in the elderly.

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