Conference Paper

The Relationship Between Nutritional Status and Cognitive Function in The Elderly In The UPT Area of The City Health Center Surakarta

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ABSTRACT

With age comes changes in the nervous system that are associated with a decline in cognitive function. Impaired cognitive function in the elderly is in the form of decreased memory, language, decision-making, and action. Nutritional status can be related to cognitive function. Measurement of nutritional status can be done by calculating body mass index (BMI) to determine the risk of malnutrition or obesity. Based on data from the Indonesian Psychogeriatric Organization (2019), states that the elderly aged 50-59 years experience a decrease in cognitive function in the form of forgetfulness with a mild category (Mild Cognitive Impairment) with a prevalence of 39%. To determine the relationship between nutritional status and cognitive function in the elderly in the UPT Puskesmas Surakarta City area. The design in this study was observational analytic with a Cross-Sectional approach. Samples in the study were taken by Simple Random Sampling of as many as 110 elderly people at the Surakarta City Health Center. Nutritional status in this study was measured by Body Mass Index (BMI) and cognitive function was carried out by interviewing the Mini-Mental State Examination (MMSE) questionnaire. Data analysis used the Chi Square test (α=0.05). In this study, there were elderly with a nutritional status less with a percentage of 50%, normal 6.4%, and more nutritional status 43.7% while elderly with moderate cognitive function decline with a percentage of 34.5%, mild cognitive function decline 49.1% and no decline in cognitive function with a percentage of 16.4%. The results of this study indicate that there is a significant relationship between nutritional status and cognitive function in the elderly in the UPT Puskesmas Surakarta City area with (p=0.001). There is a significant relationship between nutritional status and cognitive function in the elderly in the UPT Puskesmas Surakarta City area. Based on research (Dewi, 2019), states that the elderly with poor nutritional status is caused by changes in intestinal function, metabolic changes and deficiencies in nutrient intake while the elderly with more nutritional status experience changes in body composition with central fat accumulation in the abdomen so that it is related to decreased cognitive function.

Keywords: Nutritional status, cognitive function, elderly

Introduction

According to the Ministry of Health of the Republic of Indonesia (2013), the classification of the elderly is divided into Pre-elderly (45-59 years) and elderly (60 years or more). According to Ministry of Health of the Republic of Indonesia (2020), the prevalence of the elderly in 2020 was 27.08 million people and increased in 2025 to 33.69 million people. Based on the Central Bureau of Statistics (2021), data on the elderly in Central Java City in 2020 with a prevalence of 12.22% and in 2021 of 12.71%.

Surakarta City in 2020, has an elderly population of 69,631 million people (12.16%) (Surakarta City Health Office, 2020).

In the elderly, anatomical, physiological, and biochemical changes can occur which can cause long-term effects on health (Setiyorini & Wulandari, 2018). With increasing age, the body will experience the aging process. The aging process in the elderly can be related to physical changes involving various components from the cellular level to the system level such as the nervous, hearing, vision, respiration, endocrine, and gastrointestinal systems (Watson, 2013).

Changes in the nervous system in the elderly cause changes in functions such as cognitive decline (Wreksoatmodjo, 2014). The elderly who experience a decrease in cognitive function will experience memory impairment, changes in perception, difficulty in communicating, and obstacles when carrying out daily activities (Arini, 2017). Declining cognitive function is influenced by various risk factors such as age, gender, genetics, blood pressure, heart disease, diabetes mellitus, obesity, and imbalances in macronutrient and micronutrient intake. In addition to physical changes, in the elderly, there are changes related to mental or psychological health (Ministry of Health of the Republic of Indonesia, 2013).

According to Mardalena and Suryani (2017), nutritional status is a balance in the body that consumes the type of food and the processing of nutrients needed in the growth process. Good nutritional status is necessary to maintain health and fitness. Balanced food intake can help prevent cognitive function decline (Johansson et al., 2009). Elderly people with impaired cognitive function need help from others to consume food (Layla & Wati, 2017).

Calculation of nutritional status can be done with the body mass index (BMI) to determine the risk of malnutrition or obesity (Sunarti et al., 2019). Based on research conducted by Zhou (2010) in China, states that a thin BMI causes a decrease in cognitive function. Another study conducted by Gunstad et al. (2010), states that there is a relationship between obesity nutritional status and impaired cognitive function with a prevalence of 27.36%. From the above background, researchers are interested in examining the relationship between nutritional status and cognitive function in the elderly in the UPT Puskesmas Kota Surakarta area.

Material and Methods

This study is a type of *observational* analytic research to determine the relationship between nutritional status and cognitive function in the elderly. This study used a *cross-sectional* approach, where observations and measurements were made at one time and did not continue. This research was conducted in February 2024 at the Gajahan Health Center, Gambirsari Health Center, Sibela Health Center, Pajang Health Center, and Jayengan Health Center in Surakarta City. The number of respondents in this study was determined by the Slovin formula as many as 110 elderly people taken from the 5 health centers. In Surakarta, there are 17 health centers and 5 health centers were taken as research locations because of the largest number of elderly people. Sampling was done by *multistage random sampling*. The inclusion criteria for research subjects consisted of elderly 50-59 years old, able to communicate well, living with family, willing to become respondents, and filling out *informed consent* while the exclusion criteria for research subjects consisted of not being able to stand upright and taking dementia drugs.

Data collection in the form of gender and education was recorded in one unit with the informed consent form. Data on nutritional status was measured using the body mass index (BMI) which is obtained by calculating body weight (kg) divided by height (m^2). Body mass index is categorized into weight measurement using adult weight scales and height using *Microtoice.* Measurement of cognitive function in the elderly using the *Mini-Mental State Examination* (MMSE) questionnaire which consists of 11 questions including orientation, registration, attention, recall, and language tests thus the lowest total score for cognitive function is 1 and the highest is 5. According to Folstein et al. (1983), this MMSE

questionnaire is a standardized questionnaire in the *Journal of Sychiatric and* has obtained standardized validity and reliability results.

The data analysis used was univariate and bivariate. Univariate analysis to describe the characteristics of the research subjects. Bivariate analysis was used to test the relationship between IMT variables and cognitive function. The bivariate analysis used was the *Chi Square* correlation test with SPSS 26. The results are said to be significant if the p-value <0.05.

This study has obtained a research permit from the Research Ethics Commission of the Faculty of Medicine, Sebelas Maret University, with certificate number 19/UN27.06.11/KEP/EC/2024.

Results and Discussion

The number of subjects in this study was 110 elderly people with a percentage of women at 61.8% and men at 38.2%, the highest level of education was high school (SMA) as much as 24.5%. Based on nutritional status measurement data, respondents with BMI were thin by 50%, and cognitive function impairment of respondents in the mild category as much as 49.1%.

Table 1. Frequency distribution of respondent characteristics

Characteristics	Total	Percentage
Gender		
Male	42	38,2
Female	68	61,8
Education Level		
Not in School	4	3,6
SD	20	18,2
SMP	27	24,5
SMA	37	33,6
Higher Education	22	20,0
IMT		
Less	55	50,0
Normal	7	6,4
More	48	43,6
Decreased Function		
Cognitive		
Medium	38	34,5
Lightweight	54	49,1
No interference (good)	18	16,4

Source: Primary Data (2024)

Description: BMI thin <18.5, normal 18.5-25, obese 25-27, and obese >27 while cognitive function impairment is severe 0-10, moderate 11-20, mild 21-26, and no cognitive function impairment 27-30.

Subjects with nutritional status in the thin category were 55, who experienced a decrease in moderate cognitive function by 26 (43.7), a decrease in mild cognitive function by 26 (43.7), and did not experience a decrease in cognitive function by 3 (5.5). Subjects with nutritional status in the normal category amounted to 7, who experienced a decrease in moderate cognitive function by 1 (14.3), a

decrease in mild cognitive function by 2 (28.6), and did not experience a decrease in cognitive function by 4 (57.1). Subjects with nutritional status in the over category amounted to 48, who experienced a decrease in moderate cognitive function by 11 (22.9), a decrease in mild cognitive function by 26 (54.2), and did not experience a decrease in cognitive function by 11 (22.9) (Table 2).

Table 2. Cross-tabulation between nutritional status and cognitive function

	Cognitive Function			
Nutrition Status	Moderate decline	Mild Decline	No Decrease (Normal)	Total
Nutrition Undernourished (Skinny) n (%)	26 (47,3)	26 (47,3)	3 (5,5)	55 (100)
Normal Nutrition n (%)	1 (14,3)	2 (28,6)	4 (57,1)	7 (100)
Nutrition More (Fat And Obesity) n (%)	11 (22,9)	26 (54,2)	11 (22,9)	48 (100)
Total	38	54	18	110

Source: Primary Data (2024)

Data from the *Chi Square* test between nutritional status (BMI) and cognitive function are presented in Table 3:

Table 3. Chi Square test of nutritional status with cognitive function in the elderly

Variables	n	p
Nutrition Status Cognitive Function	100	<0,001

Source: Primary Data (2024)

Based on the statistical test results in Table 3, the p-value = <0.001. From the statistical test results it can be concluded that there is a significant relationship between nutritional status and cognitive function.

The results of the study obtained based on gender were mostly women (61.8%). Based on research conducted by Gale et al. (2015), states that both male and female gender will have a risk of decreased cognitive function. Other research conducted by Chiurazzi et al. (2015), states that decreased cognitive function in menopausal women is caused by the hormone estrogen. The hormone estrogen is linked to brain function in humans, so a decrease in esterogenous hormones leads to the risk of *neurogenerative* diseases.

The highest level of education in this study was senior high school (SMA) as much as (24.5%). Based on research conducted by Sundariyati et al. (2014), stated that the level of education can be related to cognitive function because respondents with low education levels will have difficulty in maintaining health. Education has benefits as a stimulus in the development of cognitive function abilities such as logic and abstract thinking (Ramadian, 2013). Based on research conducted by Wu et al. (2016), states that the elderly will experience a decrease in signaling in nerve cells and plasticity in the brain.

Nutritional status is a condition caused by the balance between the amount of food intake and the amount needed (*requirement*) by the body for growth, development, physical activity, health, and others (Suyanto, 2009). The increased need for nutritional intake in the elderly is due to the *degradation* process (destruction) which can take place more quickly. The elderly are more at risk of nutrient excess and deficiency. Factors of nutrient deficiencies are caused by decreased food intake, sensitivity, and sense of taste. Excess nutrients are related to *lifestyle* and fat intake that exceeds daily needs (Ibrahim, 2012).

Nutritional status can be assessed by measuring body mass index (BMI) so that thin, normal, fat, and obese categories are obtained. Based on the data in this study there is an elderly category with a category of less as many as 55, normal by 7, and more by 47 while the decline in cognitive function of the elderly there is a category of moderate cognitive function decline as many as 38, mild cognitive function decline as many as 54 and no decline in cognitive function by 18. In this study, there is a significant relationship between nutritional status and cognitive function ($p = <0.001$).

Thin elderly people are related to a decrease in appetite, resulting in weight loss and affecting BMI. According to Stonge and Gallagher (2010), the amount of daily nutritional intake that decreases will be related to the nervous system in the body so a decrease in nutritional intake in the elderly causes impaired brain function. Based on research by Dewi (2019), states that elderly people with thin nutritional status or malnutrition are caused by changes in intestinal function, metabolic changes, and nutritional intake deficiencies.

Nutritional status in the category of fat and obesity causes health risks such as decreased quality of life, increased morbidity and mortality (Al Snih et al., 2007). Along with age, there is a decrease in the composition of fat and bone levels which affects the function of organs that decrease (Akbar et al., 2020). The occurrence of changes in body composition is related to the accumulation of central fat in the abdomen so that it becomes obese. Elderly people who are malnourished and overweight can balance their nutritional status with protein intake. Protein has a role in *neurotransmitter* formation and *neuromodulation* related to declining cognitive function (Berdanier & Zempleni, 2009).

Conclusion

From the results of the research that has been done, there is a significant relationship between nutritional status and cognitive function in the elderly in the UPT Puskesmas Surakarta City area.

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