LAPORAN PENELITIAN

CORRELATION MINI NUTRITIONAL ASSESMENT SHORT FORM (MNA-SF) WITH MINI MENTAL STATE EXAMINATION (MMSE) AND GERIATRIC DEPRESSION SCALE 15- ITEMS (GDS-15) IN ELDERLY AT ALZI FAIR 2017 IN MALANG CITY INDONESIA

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Abstract

Background: The nutritional and cognitive aspects are closely related to dementia. Depression is a mental disorder that often occurs in the elderly, and is also a risk factor for dementia. Mini Nutritional Assessment Short Form is usually used to assess nutritional status and Mini Mental State Examination is a validated tool for assessing cognitive status in the elderly.

Objective: To know correlation of nutritional status with cognitive function and depression score in elderly.

Subjects and Methods: The design of this study was cross sectional. This study was conducted on 159 elderly people who came at the Alzheimer Fair event September 24, 2017 in the city of Malang Indonesia. Research data were analyzed by Pearson correlation test.

Results: This study obtained 49 (31%) male subjects and 110 (69%) female subjects, with an average age of 67.43 ± 7.53 years. Of the 159 subjects based on MNA scores, there were 4 (2.5%) subjects with malnutrition, 40 (25.2%) malnutrition risks, 115 (72.3%) normal. Based on the MMSE, there were 36 (22.6%) subjects with cognitive impairment, 55 (34.6%) suspicious of cognitive impairment, 68 (42.8%) normal. Based on GDS there were 3 (1.9%) subjects with moderate depression, 27 (17%) mild depression, and 129 (81.1%) normal. The mean BMI was 24.76 ± 6.11 kg / m2 and, mean MNA 12.18 ± 2.06, mean MMSE 25.06 ± 4.46 and mean GDS 2.74 ± 2.24. Based on correlation test between MNA score with MMSE score showed significant relationship ($r = 0.335$, $p = 0.000$). MNA scores were significantly associated with GDS scores ($r = -0.174$, $p = 0.028$) indicating the higher the MNA score the lower the GDS score.

Conclusion: Nutritional status indicates a global health status in advanced age that affects cognitive function and the occurrence of depression.

Key words: Mini Nutritional Assessment, Mini Mental State Examination, Geriatric Depression Scale, elderly

Introduction

Nutritional problems are common in elderly patients, leading to disability, comorbidities and mortality. The potensial role of nutrition in preventing cognitive impairment is currently attracting interest. Malnutrition plays a major role in clinical and functional impairment in older adults. Malnutrition in elderly patients has a large number of negative consequences on health: it can often in uence the prognosis of different pathologies, reduce health-related quality of life, and increase morbidity/mortality and hospital admissions in those with mental deterioration. The nutritional and cognitive aspects are closely related to dementia. [1,2]

Depression is a mental disorder that often occurs in the elderly, and is also a risk factor for dementia. The use of validated, user-friendly and rapid screening tools for malnutrition in the

elderly may improve the diagnosis and possibly the prognosis. Mini Nutritional Assessment Short Form is usually used to assess nutritional status and Mini Mental State Examination is a validated tool for assessing cognitive status in the elderly. [3,4]

Malang city is the second largest city in East Java , its has total population 895.387 people in 2017 with a total area of 145.28 km square. The elderly population is approximately 8,5% . Malang city is a part of Malang Region include district of Malang, Malang city, and Batu city that has more than 4.5 million population.

Materials and methods

We collected data from visitors Alzheimer Fair event held in Malang Indonesia. This event was held in the framework of the world Alzheimer's Day by Alzheimer Indonesia chapter Malang, which was supported by 3 hospitals and many elements of society in Malang city. This study was conducted on 159 elderly from 700 people who came at the Alzheimer Fair event in Monday Car Free Day of Malang Indonesia, September 24th, 2017. Each subject gave inform concern to participate in examination and study, which approved by Mental Health Hospital dr Radjiman Wediodiningrat Lawang Malang Ethics Committe. A sample size of 159 elderly was selected from 310 people who followed study. Some of these people did not know their exact age. The team in charge for questioning included health care officers, consist of internist, phsychiatrist, physiatrist, psychologist, nurse, nutritionist. The questionnaire form, used for this study was the Mini Nutritional Assesment Short Form (MNA-SF), Mini Mental State Examination (MMSE), and Geriatric Depression Scale 15- Items (GDS-15).

The MNA is an assesment tool that can be used to identify patients at risk of malnutrition. It is both a screening and assessment tool for the identification of malnutrition in the elderly subjects, including those with dementia. The MNA has been validated internationally. Based on final scores, our patients were classified into three groups: score less than 7 (malnutrition), score 8-11 (at risk of malnutrition),, and score 12-14 (well nourished).[4,5,6]

The Mini Mental State Examination (MMSE) is a validated and simple method giving a score that indicates the cognitive status of elderly people; it is used in the diagnosis and follow up of demented patients. Interpretation of the MMSE for severity were classified into three groups: score 0-17 (severe cognitive impairment), score 18-23 (mild cognitive impairment), score 24-30 (no cognitive impairment). [6]

The GDS is a tool that can be used to screen the elderly patients at risk of depression. This tool has been validated. Interpretation of GDS were classified into 4 groups: score 0-4 (no depression), score 5-8 (mild depression) , score 9-11 (moderate depression), score 12-15 (severe depression). Admission and data analyzing was followed by examining the relationship between malnutrition and cognitive impairment, then the relationship beetween malnutrition and depression. [7]

Statistical analysis

Data are expressed as means±SDs for continuous variables and as frequencies and percentages for categorical variables. Pearson correlation test were calculated for linear relations between MNA score with MMSE score and GDS score. Spearmen correlation were used for categorical correlation. A $p \leq 0.05$ was considered significant. The statistical analysis has done by SPSS 15 software.

Results

At baseline, the average age was 67.43 ± 7.53 years (range 45-96). Body Mass Index (BMI) average 24.77 ± 6.11 (range 15.43-78.51). The subject height was 154.79 ± 7.73 cm (range 110-175), and the weight was 59 ± 11.66 kg (range 33-102). The subject waist circumference was 90.29 ± 9.59 cm.

As shown in Table 2, nutritional status (base on MNA) in elderly subject, 72.3% of the subjects were well nourished, and 25.2% were at risk of malnutrition, and only 2.5% of the subjects were malnourished. According to MMSE, 22.6% of the subjects had severe cognitive impairment, 34.6% with mild cognitif impairment, and 42.8% had not cognitive impairment.

According to GDS, as shown in Table 3, 1.9% of subjects had mild depression , 17% with moderate depression, and 81.1% had not depression.

Table 1 Population and Measurement Characteristics

	Number (n=159)
Males	49 (30.8 %)
Females	110 (69.2 %)
Age years (mean ± SD)	67.43 ± 7.53
Weight(kg)	59.00 ± 11.66
Height (cm)	154.79 ± 7.73
BMI (kg/m^2)	24.77 ± 6.11

Waist circumference(cm)	90.29 ± 9.59
MNA score	12.18 ± 2.06
MMSE score	25.05 ± 4.46
GDS score	2.74 ± 2.24

Abbreviations: SD, Standard Deviation; BMI, Body Mass Index; MNA, Mini Nutritional Assessment; MMSE, Mini Mental State Examination; GDS, Geriatric Depression Scale

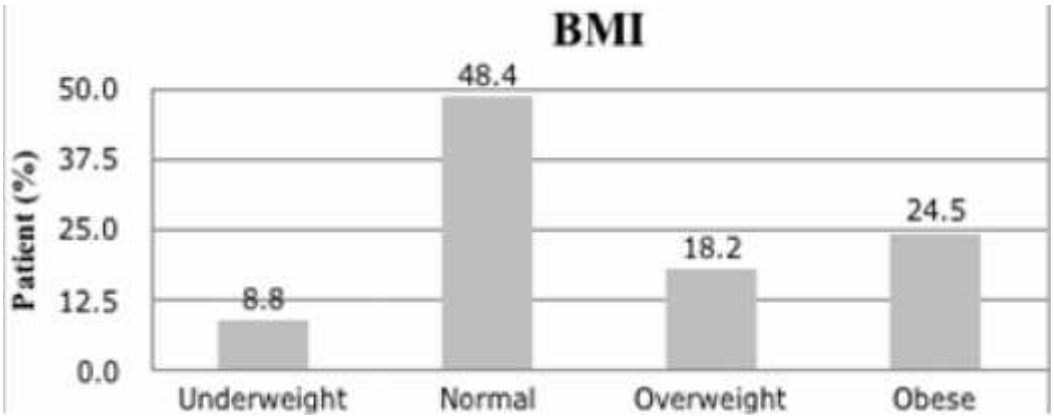

Figure 1 Evaluation of nutritional state at baseline using Body Mass Index (BMI)

Figure 2 Evaluation of nutritional state at baseline using Mini Nutritional Assesment (MNA)

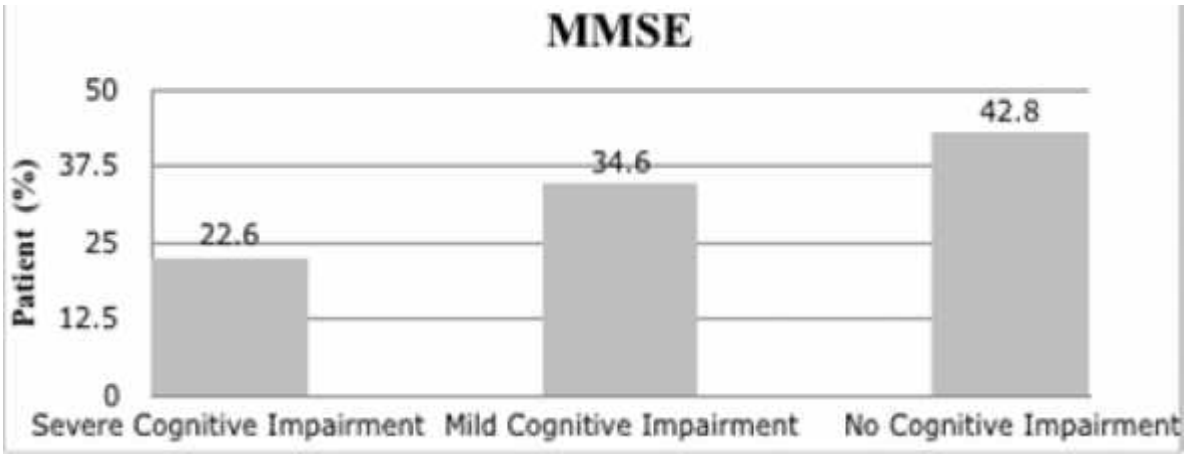

Figure 3 Evaluation of cognitive impairment at baseline using Mini Mental State Examination (MMSE)

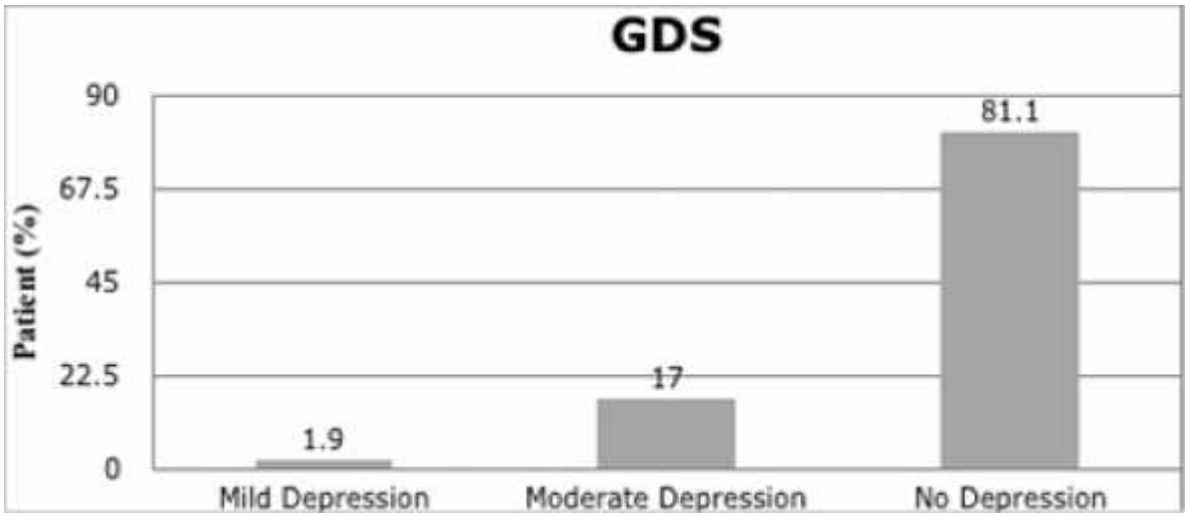

Figure 4 Evaluation of depression at baseline using Geriatric Depression Scale (GDS)

Table 2 Evaluation of and correlation beetween nutritional state and cognitif impairment

	MNA			
	Malnutrition n (%)	Risk of malnutrition n (%)	No malnutrition n (%)	Total
MMSE				
Severe cognitive impairment	3 (1.9)	13 (8.2)	20 (12.6)	36 (22.6)
Mild cognitif impairment	1 (0.6)	13 (8.2)	41 (25.8)	55 (34.6)
No cognitif impairment	0 (0.0)	14 (8.8)	54 (34.0)	68 (42.8)
Total	4 (2.5)	40 (25.2)	115 (72.3)	159 (100)
				r = 0.228
				p 0.004

Abbreviations: MNA, Mini Nutritional Assessment; MMSE, Mini Mental State Examination

Table 3 Evaluation of and correlation beetween nutritional state and depression

	MNA			
	Malnutrition n (%)	Risk of malnutrition n (%)	No malnutrition n (%)	Total
GDS				
Mild depression	0 (0.0)	1 (0.6)	2 (1.3)	3 (1.9)
Moderate depression	0 (0.0)	10 (6.3)	17 (10.7)	27 (17.0)
No depression	4 (2.5)	29 (18.2)	96 (60.4)	129 (81.1)
Total	4 (2.5)	40 (25.2)	115 (72.3)	159 (100)
				r = 0.099
				p 0.216

Abbreviations: MNA, Mini Nutritional Assessment; GDS, Geriatric Depression Scale

Table 4 Correlations between BMI, MMSE and GDS with MNA

	Mean ± SD	r	p-value
BMI (kg/m^2)	24.77 ± 6.11	0.224	0.004
MMSE	25.05 ± 4.46	0.335	0.000
GDS	2.74 ± 2.24	- 0.174	0.028

Abbreviations: BMI, Body Mass Index; MNA, Mini Nutritional Assessment; MMSE, Mini Mental State Examination; GDS, Geriatric Depression Scale

Based on spearman categorical correlation test between MNA score with MMSE score showed significant relationship (r = 0.228 p = 0.004), and MNA scores were not significantly associated with GDS scores (r = 0.099, p = 0.216). From pearson correlation test, MNA score were significantly correlated ($p<0.05$) with BMI, MMSE, and GDS (r=0.224 p=0.004; r=0.335 p=0.000; r= - 0.174 p=0.028).

Discussion

The complete tests include MNA, MMSE, and GDS performed only on subjects aged over the same age as 60 years, the average age was 67.43 ± 7.53 years. This study received 2 subjects with severe cognitive disorders who had difficulty mentioning their age correctly, who mentioned the age of 46 and 55 years, which was not in accordance with his physical appearance. Based on the results of the correlation test between BMI with MNA score above shows the correlation coefficient value of 0.224 with p = 0.004 ($p <0.05$), so it can be concluded that there is a significant relationship between BMI with MNA score. That is, the greater a person's BMI will be followed by a higher MNA score and vice versa.

Malnutrition plays a major role in clinical and functional impairment in older adults. The MNA is at the present time the instrument most widely used for nutritional evaluation in studies in elderly subjects, including those with dementia.[9,10] Based on the results of correlation test between MNA score with MMSE above shows correlation coefficient value of 0.355 with p = 0.000 ($p <0.05$), so it can be concluded that there is a significant relationship between MNA scores with MMSE, where there is a strong tendency higher MNA score someone, it will be followed by a high MMSE score as well and vice versa.

Based on the result of correlation test between MNA score with GDS score above shows correlation coefficient value of -0.174 with p = 0.028 ($p <0.05$), so it can be concluded that there is a significant

relationship between MNA scores with GDS score, where there is a strong tendency getting high one's MNA score, it will be followed by a low GDS and vice versa.

Table 2 showed that 4 subjects with MNA category belonging to malnutrition were 3 subjects who were categorized as having severe cognitive impairment, 1 subject had mild cognitive impairment,. Of the 40 subjects classified as at risk for malnutrition, 5 were cognitively impaired, 13 had cognitive impairment, 13 had mild cognitive impairment, and 14 were normal. Of the 115 subjects classified as having normal MNA scores, 20 had severe cognitively impairment, 41 had mild cognitive impairment, 54 were classified as having normal MMSE scores.

Based on the results of correlation test between the MNA category with the MMSE score category above shows the correlation coefficient value of 0.228 with $p = 0.004$ ($p < 0.05$), so it can be concluded that there is a significant relationship between the MNA category with the MMSE score category. In other words, the more normal the category of MNA a person has a certain tendency towards the normal cognitive function and vice versa. The results of the present study confirm that person affected by serious cognitive impairment are characterized by a poor nutritional state. Previous study have shown this relationship.

It showed that of 4 subjects with MNA category belonging to malnutrition, classified as having normal depression scale. Of the 40 subjects classified as at risk of malnutrition, there were 3 subject who was classified as mild depression, 27 people with moderate depression, and 129 others were normal. Of the 115 patients classified as having normal MNA scores, there were as many as 2 people who were mild depressed, 17 had moderate depression, and 96 were normal. Malnutrition and depression are both complicated and correlated so that depresion may lead to appetite loss and under nutrition. On other hand, malnutrition may deteriorate depression and apathy. The causal relationship of nutritional status and depression is inconclusive. It is not well known whether depression cause malnutrition or poor nutritional status leads to depressive disorders.[8]

Based on the results of correlation test between the MNA category with the category of depression scale (GDS) above shows the correlation coefficient of 0.099 with $p = 0.216$ ($p > 0.05$), so it can be concluded that there is no significant relationship between the MNA category with the category of depression scale. In other words, malnutrition or lack of a person's MNA category has no particular tendency toward the severity of the depression scale. It showed by 4 subject with malnutrition had no depression. Weight loss, behavioral problems, and food disorders are common in patients with Alzheimer disease.[9,11]

In patients with dementia, a state of malnutrition must be prevented or at least improved by an early and appropriate intervention strategy. The results of the present study show taht it is necessary to set appropriate nutritional interventions in patients withmild to moderately impairment cognitve. The multidiciplinary team must trained to carry out assesment of nutritional state. The MNA test is a simple, non invasive, well validated screening tool for malnutrition in elderly people and is recommended for early detection of malnutrition.[12] Since depression has a great clear effect on appetiteand eating habits in typical and atypical depressed people, it seems that having depression could be a risk factor for geriatric people to be malnourished.[13]

In another study, depression is considered a risk factor for malnutrition in institutionalized elderly. It is well known that, in geriatric population, loss of >4% body weight is an independent factor of morbidity and mortality.[14,15]

In conclusion, from the present finding, it was concluded that companionship of malnutrition and cognitive impairment and depression in community must make us vigilant enough to refer our old people to nutritionists to be fully worked up according to their nutritional status.

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