ORIGINAL RESEARCH

THE RELATIONSHIP BETWEEN BODY MASS INDEX AND THE DEGREE OF DEMENTIA IN ELDERLY PATIENTS WITH MEMORY IMPAIRMENT AT MEMORY CLINIC SILOAM HOSPITALS LIPPO VILLAGE

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Abstract

Introduction: Body mass index (BMI) can describe the level of nutrition and vitality of a person. Monitoring BMI values prevents elderlies from various risks of disease, one of which is dementia. The development of neuropathological lesions in the olfactory bulb has been proposed to cause symptoms which affect dementia patients' appetite and thus resulting in weight loss.

Methods: A cross-sectional study was conducted among 55 memory impairment patients from ages ≥65 years at Siloam Hospitals Lippo Village Memory Clinic. Data was obtained using Montreal Cognitive Assessment – Indonesian Version (MoCA-INA) and Clinical Dementia Rating Scale (CDRS) and BMI was measured using Seca 703 instrument.

Results: A significant relationship was found between body mass index and the degree of dementia with a value of p = 0.046 for MoCA examination and p = 0.039 for CDRS examination. The results of the analysis shows that underweight-normal (BMI <23kg/m^2) patients have 3.8 times (95% CI 1.2-12.5) and 4.6 times (95% CI 1.2-17.0) the risk of having a moderate-severe degree respectively compared to overweight-obese (BMI ≥23kg/m^2) patients.

Conclusions: Lower late life BMI is related to higher degree of dementia

Keywords: Body mass index, Dementia degree, MoCA-INA, CDRS

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Introduction

Dementia is a progressive condition that affects memory, cognition, behavior, and social functioning, ultimately interfering with daily activities. The most common cause is Alzheimer's disease, followed by vascular dementia, Lewy body dementia, and frontotemporal dementia. Clinical manifestations include cognitive impairment and neuropsychiatric symptoms, collectively known as

behavioral and psychological symptoms of dementia (BPSD).

Globally, dementia ranks among the top ten most burdensome conditions in the elderly and is the seventh leading cause of death. In 2015, there were approximately 46.8 million individuals living with dementia worldwide, and this number is projected to double every 20 years. In Indonesia, the number of people with dementia is expected to rise from 1.2 million to 3.9 million by 2050. The disease also imposes significant physical, psychological, and economic burdens on caregivers.

Body Mass Index (BMI) reflects the nutritional status of older adults and has been associated with cognitive function. A high BMI during midlife increases the risk of developing dementia, whereas obesity in late life appears to have a protective effect, possibly due to reverse causation. Conversely, being underweight has consistently been linked to a higher risk of dementia.

However, the association between BMI and the severity of dementia remains unclear, particularly in the Indonesian population. This study aims to examine the relationship between body mass index and cognitive impairment in elderly at the Memory Clinic of Siloam Hospitals Lippo Village.

Materials and Methods

This study was a cross-sectional, unpaired categorical analytic study. Primary data, including BMI measurements, were collected using the Seca 703 scale. Secondary data on cognitive impairment and dementia severity were obtained from medical records based on MoCA-INA and CDR-S scores. Participants were recruited from the Memory Clinic at Siloam Hospitals Lippo Village according to inclusion criteria.

Data collection involved structured questionnaires and direct assessments. Collected data were tabulated using Microsoft Excel and analyzed using SPSS version 25.0. The Chi-square test was employed for statistical analysis. Ethical approval was obtained from the Research Ethics Committee of the Faculty of Medicine, Pelita Harapan University prior to study implementation.

Results

Subject characteristic

Based on the demographic data presented in Table 1, a total of 55 patients were included in the study, consisting of 30 males (54.5%) and 25 females (45.5%). The patients' ages ranged from 65 to 90 years, with a mean age of 73 years. Body Mass Index (BMI) was categorized according to the Asia-Pacific classification: underweight (9.1%, n=5), normal (38.2%, n=21), overweight (25.5%, n=14), and obese (27.3%, n=15). Cognitive status based on MoCA scores showed that 6 patients (10.9%) were within the normal range, 30 (54.5%) had mild impairment, 12

(21.8%) had moderate impairment, and 7 (12.7%) had severe impairment. In addition to MoCA, the Clinical Dementia Rating Scale (CDRS), considered a more accurate indicator of dementia severity, classified patients as follows: questionable (45.5%, n=25), mild (27.3%, n=15), moderate (16.4%, n=9), and severe (10.9%, n=6).

Body Mass Index and Dementia Severity All data obtained were collected and analyzed using a bivariate analytical model with the chi-square method. The analysis was conducted to examine the relationship between Body Mass Index (BMI) and the degree of dementia in elderly patients at the Memory Clinic of Siloam Hospitals Lippo Village.

Table 1. Subject Characteristics

Variable	n	Percentage
Sex		
Males	30	54,5%
Females	25	45.5%
Age	Range 65-90	Mean 73
Body Mass Index		
Underweight	5	9,1%
Normal	21	38,2%
Overweight	14	25,5%
Obese	15	27,3%
MoCA		
Normal	6	10,9%
Mild	30	54,5%
Moderate	12	21,8%
Severe	7	12,7%
CDRS		
Questionable	25	45,5%
Mild	15	27,3%
Moderate	9	16,4%
Severe	6	10,9%

Table 2 shows the data results, which indicate a significant relationship between body mass index and the degree of dementia, based on MoCA (Montreal Cognitive Assessment) examination indicators, with a P-value of 0.046. In the underweight-normal BMI group, 13 patients (50%) showed moderate-severe results, while 13 patients also showed normal-mild results.

Meanwhile, in the overweight-obese BMI group, there was a substantial difference in examination results, with 23 patients (79.3%) showing normal-mild results and 6 patients (20.7%) showing moderate-severe results. Additionally, the obtained odds ratio was 3.833 (95% CI = 1.175–12.506). From the odds ratio, it can be interpreted that patients with an underweight-normal BMI are 3.833 times more likely to have a moderate-severe degree of dementia compared to patients with an overweight-obese BMI.

Another indicator used is the CDRS (Clinical Dementia Rating Scale), which is considered more effective in assessing the severity of dementia. Based on the analysis results in Table 3, a significant relationship was again found between body mass index (BMI) and the degree of dementia, with a P-value of 0.039. A greater difference in percentages was again observed between patients with an overweight-obese BMI, with 25 patients (86.2%) showing normal-mild results and 4 patients (13.8%) showing moderate-severe results.

In the underweight-normal BMI group, 11 patients (42.3%) had moderate-severe results and 15 patients (57.7%) had normal-mild results, out of a total of 26 patients. The analysis yielded an odds ratio of 4.583 (95% CI = 1.235–17.008).

Table 2. The Association Between Body Mass Index and Dementia Severity (MoCA).

BMI	MoCA				Total	OR (95%CI)	P-Value
	Normal-Mild		Moderate-Severe				
	n	%	n	%			
Overweight-Obese	23	79,3	6	20,7	29	3,833 (1,175-12,506)	0,046
Underweight-Normal	13	50	13	50	26		
Total	36	65,5	19	34,5	55		

Table 3. The Association Between Body Mass Index and Dementia Severity (CDRS)

BMI	CDRS				Total	OR (95%CI)	P-Value
	Normal-Mild		Moderate-Severe				
	n	%	n	%			
Overweight-Obese	25	86,2	4	13,8	29	3,583 (1,235 - 17,008)	0,039
Underweight-Normal	15	57,7	11	42,3	26		
Total	40	72,7	15	27,3	55		

Discussion

Research on BMI and dementia shows conflicting results. A 2015 study by Nawab Qizilbash et al. found that being underweight was linked to a 34% higher dementia risk, while the Whitehall II study showed that obesity at age 50 increased risk, but this link weakened at older ages. Given the limited research in Indonesia, our study provides new evidence. Our findings show a significant link between BMI and dementia severity in elderly Indonesian patients. A low BMI appears to increase dementia risk, while a higher BMI may be protective, especially in older age. This aligns with findings from other countries and highlights the importance of maintaining a healthy BMI to help manage dementia progression.

However, the study has limitations. Its cross-sectional design prevented us from studying the effects of weight changes. Physical activity was an uncontrolled factor, and a purposive sampling method created potential for bias due to a limited sample size and timeframe. For future studies, we recommend using a longitudinal design to track weight changes over time. Researchers should also use a larger sample size, control for confounders like physical activity, and use more specific variable categories to obtain more robust results. This will help doctors and patients use BMI monitoring as a tool to improve the quality of life for those with dementia.

Conclusion

The findings highlight the importance of maintaining a healthy BMI, particularly in the elderly, as a potential strategy for mitigating the progression of dementia. Further research is encouraged to examine the relationship with weight gain or loss, explore the underlying mechanisms, and to confirm these findings in other populations.

Conflict of Interest

The authors declared no conflict of interest.

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