THE RELATIONSHIP OF OBESITY WITH RISK OF DEMENTIA IN OLDER AGE

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Research Report

ABSTRACT

Introduction: Obesity has become a pressing global health concern in recent years, affecting individuals of all ages and backgrounds. While the detrimental effects of obesity on physical health are well-documented, its impact on cognitive function, particularly in the elderly population, is a growing area of concern. In recent research studies, a compelling association has been established between obesity and an increased risk of dementia among older adults. Purpose: To determine the relationship between obesity and the risk of dementia in the elderly. **Methods:** *This research is a quantitative study with analytical descriptive methods with a cross-sectional study approach. The sample in this study used purposive sampling totaling 35 samples with the criteria of obese elderly people who did not have chronic diseases. This research instrument used a Body Mass Index (BMI) filling sheet and a Mini-Mental State Examination (MMSE) observation sheet and the analysis used was Chi-Square.* **Results:** *Based on statistical tests, the p-value obtained was 0.049 with ($p < 0.05$), which means Ha is accepted, meaning there is a relationship between obesity and the risk of dementia in RT 01-03 RW 07, Margamulya Village, North Bekasi District, Bekasi City. 2023.* **Conclusions:** *Old age and elderly women have the greatest risk factors for developing dementia, the main cause of obesity and the risk of developing dementia is low physical activity in the elderly, so the relationship between obesity and the risk of dementia is obesity as a cause of comorbid diseases. causes vascular disorders in the brain, causing dementia.*

INTRODUCTION

Dementia, a progressive neurodegenerative disorder characterized by a decline in cognitive abilities, affects millions of individuals worldwide. As the elderly population continues to grow, understanding the factors that contribute to the development and progression of dementia becomes paramount. Obesity, with its intricate web of metabolic and inflammatory consequences, has emerged as a potential modifiable risk factor that warrants further investigation. The relationship between obesity and dementia is multifaceted. Excessive adipose tissue, particularly around the waistline, has been linked to chronic low-grade inflammation and insulin resistance, both of which play significant roles in the development of dementia. Additionally, obesity increases the risk of cardiovascular diseases such as hypertension, diabetes, and dyslipidemia, which further exacerbate the risk of cognitive decline in older adults. Moreover, obesity can have a direct impact on the structure and function of the brain. Studies have shown that individuals with obesity often exhibit structural changes in certain brain regions involved in memory, learning, and executive function. These alterations may contribute to cognitive impairment and increase the vulnerability to neurodegenerative diseases such as Alzheimer's disease.

In the current millennial era, advances in health and social welfare have become one of the factors in increasing the life expectancy of the world's population. According to data (He et al., 2022), the number of people aged 65 years and over has increased dramatically along with world progress in several decades, from 730 million people in 2020 with a percentage of 9.5% to close to 2 billion in 2060 with a percentage of 19 .4%. The number of elderly people in Asia in 2020 is around 4.1 billion million people. In Indonesia, the number of people aged 65 years and over in 2020 is almost 19 million people, and is ranked 4th in the world which has an elderly population in its population. In line with the increase in population elderly people, the increasing number of health

problems due to the aging/degenerative process. Obesity is one of the health problems resulting from the aging process that must be a concern because obesity has a large risk of various diseases that can occur in the elderly. Obesity that occurs in the elderly can be caused by lifestyle, genetics, and the aging process. Based on data from the Research and Development Agency for Health (Ministry of Health of the Republic of Indonesia, 2019), the prevalence of obesity in the elderly was 14.6% of the total elderly population in Indonesia in 2019. From this data, it was concluded that the majority of elderly people were obese. Some of the impacts of obesity are the emergence of various chronic diseases such as heart disease, diabetes mellitus, cancer, bones and joints, and the brain.

The brain, as a complex and vital organ which is the body's regulatory center and cognitive center, is very vulnerable to the aging or degenerative process. Health problems that arise occur in the brain due to aging/degenerative processes, one of which is dementia (Noor, 2020). Dementia is the cause of 10 cases of death in the world, ranking 7th according to data released by (WHO, 2019). According to research data by the Alzheimer's Association in 2023, dementia is one of the diseases that is more deadly than breast cancer or prostate cancer between 2000 and 2019 with a fantastic increase in the number of causes of death, namely up to 145%. Currently, according to the World Health Organization (WHO), 2019, the number of dementia sufferers is 55 million people out of a world population of 7.743 billion, which is around 0.7% of the world's population suffering from dementia. The number of dementia sufferers is increasing every year throughout the world, and the emergence of data that dementia is the 7th leading cause of death in the world requires us to make efforts to reduce the prevalence of dementia, especially in the elderly. According to an article obtained in (Alzheimer Disease International (ADI, 2020), there are many factors that influence the development of dementia, firstly factors that cannot be modified, such as age, genes and gender, secondly, those that can be modified, such as smoking, physical activity, alcohol consumption, air pollution, head trauma, diabetes, hypertension, depression and obesity. According to (WHO, 2018) data regarding deaths due to dementia in Indonesia reached 54,743 or 3.22% of total deaths. The large number of health, death, social and economic problems caused by dementia shows the need to prevent dementia in the elderly by knowing the risk factors for dementia that can be modified, such as obesity.

MATERIALS AND METHODS

1. Design
This research uses a quantitative analytical study approach and using the cross sectional method. This research was conducted from June to September 2023 in the area of RT 01-03 RW 07 Margamulya Village, North Bekasi District, Bekasi City

2. Population
Population is a generalization area consisting of objects/subjects that have certain quantities and characteristics determined by researchers to be studied and then conclusions drawn (Siyoto & Sodik, 2015). The population in this study was all elderly people residing in RT 01-03 RW 07, Margamulya Village, North Bekasi District, Bekasi City, totaling 152 elderly people

3. Sample
The sample is a small part of the population taken according to certain procedures so that it can represent the population (Siyoto & Sodik, 2015). In this research, the sample used was purposive sampling, namely a data collection technique with certain considerations (Siyoto & Sodik, 2015). The sample obtained in this study amounted to 35 respondents with inclusion criteria, firstly elderly in the elderly group (60-74 years), old (75-90 years), very old (>90 years), secondly elderly who suffer from obesity, thirdly elderly without comorbidities (chronic), fourth elderly who are able to communicate verbally well, fifth elderly who are willing to participate in research

4. Variable
This research consists of an independent variable and a dependent variable, the independent variable namely obesity, and the dependent variable namely the risk of dementia

5. Instruments
This research used two instruments, for the independent variable (obesity) used a form of results describing obesity in respondents which include the results of BMI measurements obtained by dividing body weight in kilograms (kg), height (m2), Body Mass Index (BMI) (Kg/m2). For dependent variable (risk of dementia) used the form of a Mini Mental State Examination (MMSE) test instrument. The MMSE was introduced by Folstein in 1975. The MMSE is widely used as a simple and fast examination to look for possible cognitive deficits as a sign of dementia. The MMSE consists of 11 questions about: time orientation, place orientation,

registration, calculation and attention, remembering, language (naming objects, repeating words, three-step command, command to close eyes, command to write sentences, command to copy pictures/visuospatial abilities). The maximum score is 30 (thirty) with a score of 24-30 not at risk of dementia, a score <24 at risk of dementia

6. **Procedure**

The stages in data collection are as follows:

a) **Preparation Stage**

In the preparation stage the researcher identifies the problem, conducts a reference study, preliminary study and prepares a proposal.

b) **Implementation Stage**

The data collection procedure begins by submitting a research permit application letter to the Head of Nursing Study Program of STIKes Medistra Indonesia, after get permit from Head of Nursing Study Program of STIKes Medistra Indonesia, it was then submitted to the Margamulya Village office, after researcher get permit from Margamulya Village Office, the researcher coordinated with the heads of RT 01-03 and RW 07 for did a research, then the researcher made a list of elderly people according to the inclusion criteria then contacted the elderly for a meeting to explain the research that would be carried out and fill out a informed consent to become respondents, then the researcher and the respondent made a time contract for data collection, then the researcher started taking respondent data door to door according to the agreed schedule.

c) **Final Stage**

At this stage the data has been collected is the processed and analyzed by the researcher so that the results of the research can be known which are then drawn conclutions.

RESULTS

The results of tabulation and data analysis based on the characteristics of the respondents are as follows:

Table 1. Frequency Distribution of Respondents by Age and Gender in RT 01-03 RW 07 Margamulya Village Bekasi Utara District in 2023

Respondent Characteristics	Frequency (F)	Percentage (%)
Age		
Elderly (60-74 Years)	34	97,1
Old (75-90 Years)	1	2,9
Very Old (90 Years)	0	0
Total	**35**	**100**
Gender		
Male	9	25,7
Female	26	74,3
Total	**35**	**100**

Based on the table, the characteristics of the respondents show that the majority of the total 35 respondents in the RT 01-03 RW 07 Margamulya Bekasi, the number of elderly people aged 60-74 years, obtained the highest results, namely 34 (97.1%) respondents and their gender. women with a total of 26 (74.3%) respondents.

Table 2. Frequency distribution of Obesity Status among the elderly in RT 01-03 RW 07 Margamulya Village Bekasi Utara District in 2023.

Obesity Status	Frequency (F)	Percentage (%)
Grade 1 Obesity	30	85,7
Grade 1 Obesity	5	14,3
Total	**35**	**100**

Based on the table 4, it shows that of the total of 35 respondents in the RT 01-03 RW 07 Margamulya Bekasi area, the obesity status is highest in the elderly, namely level 1 obesity with a BMI value of 30-34.9 with a total of 30 (85.7%) respondents.

Table 3. Frequency distribution Risk of Dementia among the elderly in RT 01-03 RW 07 Margamulya Village Bekasi Utara District in 2023.

MMSE Observation Results	Frequency (F)	Percentage (%)
Risk of Dementia	16	45,7
No Risk of Dementia	19	54,3
Total	35	100

Based on the table, it shows that of the total 35 respondents in the RT 01-03 RW 07 Margamulya Bekasi area, the majority of elderly people are not at risk of dementia with a total of 19 (54.3%) respondents.

Table 4. Frequency Distribution of the Relationship between Obesity and the Risk of Dementia in the Elderly in RT 01-03 RW 07 Margamulya Village Bekasi Utara District in 2023.

Obesity	Risk of Dementia				Total		P-Value
	Risk		No Risk				
	n	%	n	%	n	%	
Grade 1 obesity	16	45,7	14	40	30	85,7	0,049
Grade 2 obesity	0	0	5	14,3	5	14,3	
Total	16	45,7	19	54,3	35	100	

Based on the table, it can be interpreted that the majority of respondents who have level 1 obesity are at risk of dementia with a total of 16 respondents or 45.7%. The results of the Chi-Square statistical test obtained a p-value = 0.049, so it can be concluded that there is a difference in proportion (there is a significant relationship) between obesity and the risk of dementia in the elderly. In this study, the p-value = 0.05, so the P value <0, 05, then it can be said that H0 is rejected, where the results of the analysis show that there is a relationship between obesity and the risk of dementia in the elderly in RT 01-03 RW 07 Margamulya Village, North Bekasi District, Bekasi City in 2023.

DISCUSSION
a) Characteristics of the Respondent
Univariate analysis is if the number of variables analyzed is only 1 type of variable (no dependent variable and no independent variable) (Siyoto & Sodik, 2015). These parameters are presented in the form of a frequency distribution table which is processed using the Statistical Program For Social Science (SPSS) application. Version 27 then researchers presented data on obesity variables in the elderly and dementia risk variables in the elderly in RT 01-03 RW 07 Margamulya Village, North Bekasi District, Bekasi City.
1) Obesity Variable
Based on the research results, of the total of 35 respondents in the RT 01-03 RW 07 Margamulya Bekasi area, the obesity status of the majority was level 1 obesity with a BMI value of 30-34.9 with the number being 30 (85.7%) respondents, while the obesity status was a minority. is level 2 obesity with a BMI value of 35-39.9 with a total of 5 (14.3%) respondents. In the opinion of researchers, obesity is excessive fat accumulation due to an imbalance of energy intake (energy intake) with energy used (energy expenditure) over a long period of time, resulting in an increase in body weight. In this study, the majority of elderly people suffered from grade 1

obesity (85.7%) due to These elderly people still having sufficient to moderate physical activity compared to the minority elderly who suffer from level 2 obesity (14.3%) who have low physical activity.

The results of interviews conducted with respondents showed that the majority of people with level 1 obesity did physical activities, such as cooking, sweeping, morning exercises, and walking for 15-20 minutes until they were still working, while elderly people with level 2 obesity on average had a home assistant. stairs and no longer work. In line with research conducted by Nugroho et al., 2018) one of the factors that causes obesity is physical activity. A person with moderate physical activity has a tendency to become obese by 29.824 times compared to someone with high activity. In the elderly category, sufficient physical activity is also required to prevent significant weight gain.

Based on the journal (Dewanti et al., 2022) shows that there is a relationship between low physical activity and obesity. Physical activity can burn more calories and increase the body's metabolism. On the other hand, low activity will cause the body's metabolism to decrease which can result in the risk of obesity. Then other

similar research according to (Sofa, 2018) Obesity in the elderly can be caused by low physical activity and hormonal changes which are more experienced by elderly women due to experiencing menopause so There is an accumulation of fat in the body. However, as we enter old age there is a change in body composition along with aging, where lean body mass decreases so that body weight decreases. This is what causes elderly women to suffer more. obesity compared to elderly men, according to the research results obtained in this study, elderly women were the majority with 26 (74.3%) respondents, while men were the minority respondents with 9 (25.7%) respondents.

Then, the results of this study show that based on age, the majority of obese sufferers are in the elderly age range from 60 to 74 years old, namely 34 (97.1%) respondents. Meanwhile, the minority age group is in the old age range from 75 to 90 years old, namely 1 (2.9%). According to the researcher's opinion, the research results showed that elderly people (60-74 years) were the majority of respondents because in this study the criteria for respondents who could be studied were elderly people who did not have chronic diseases and were obese.

In accordance with these criteria, the elderly (60-74 years) can be the majority of respondents because there are not many elderly people who suffer from chronic diseases due to aging and many of them when they reach middle age already suffer from obesity due to lifestyle or environmental factors. , lack of physical activity, and hormones. Meanwhile, minority respondents in old age (75-90 years) have many chronic diseases that arise as a result of the aging process that occurs in the elderly, which will increase anatomical and physiological changes to their bodies resulting in the emergence of disease or pathological conditions in various organs have suffered a lot and in most old age (75-90 years) obesity sufferers have begun to decline due to various diseases suffered, decreased sense of taste and even psychological disorders in the elderly. This is in line with the theory of (Burhan et al., 2023) that as a person gets older, their physical and mental capacity tends to decrease, while the health problems they face will become more chronic and complex. This is influenced by

the decline in the function of organs that support life processes as well as the reduced ability to adapt to problems that come their way. himself, resulting in a decrease in preparing food, and buying food, and a decrease in appetite.

2) **Risk of Dementia**

Based on the research results, from a total of 35 respondents in the RT 01-03 RW 07 Margamulya Bekasi area, it was found that the majority of elderly people were not at risk of dementia with 19 (54.3%) respondents. Meanwhile, a minority of elderly people are at risk of dementia, namely 16 (45.7%) respondents. In the opinion of researchers, dementia is a disease that arises due to decreased cognitive function in the elderly which affects emotions, memory, decision-making and is usually called senile dementia.

Factors that influence the incidence of dementia are age, cognitive activity, nutritional status, gender, health status, genetics, lifestyle, trauma, and obesity. In this study, it was found from the results of examinations using the Mini-Mental State Exam (MMSE) observation sheet that the majority There is no risk of dementia with 19 (54.3%) respondents. Data was obtained that the elderly who were respondents had risk factors, especially obesity, but there were several other risk factors that dominantly influenced the occurrence of dementia in this study, such as age, cognitive activity, and gender. The results of this study show that elderly people (60-74 years) have the largest number who are not at risk of dementia. The results of the analysis of the age range between 60-66 years contribute to the largest number who are not at risk of dementia, namely 84.2%. This is influenced by factors. One of the moderate to moderate cognitive activities carried out by the elderly is that they are still working.

In accordance with research results from (Masan Leton et al., 2022), there is a relationship between age and cognitive activity on the incidence of dementia because the aging process has many impacts, such as decreased perception, sensory and motor responses in the central nervous system, and decreased proprioceptive receptors. This decrease is caused by the central nervous system in the elderly experiencing morphological and biochemical changes, these changes result in a decrease in cognitive function and a

decrease in memory formation in the elderly which results in dementia due to decreased stimulation of parts of the brain that help form memory. This is caused by low supply. oxygen and glucose in the brain when the elderly experience limited activity. It was concluded that age and cognitive activity are related to the incidence of dementia in the elderly.

According to research (Uliyah et al., 2009) in the elderly, memory loss (dementia) is one of the cognitive functions that often declines. Various types of cognitive disorders are experienced, such as consistent forgetfulness, disorientation, especially in terms of time, and disturbances in ability. opinions and problem-solving, disturbances in relationships with society, disturbances in-home activities and intellectual interests, and disturbances in self-care. In elderly people who suffer from dementia, the problem that occurs is that they cannot remember events or events that have just been experienced. Before a person experiences dementia, according to experts, there has been a process towards dementia many years before. In the age period 65-75 years, there was a decline in several abilities with wide differences between individuals. Over 80 years of age there is a decline in quite a lot of abilities. Many intellectual abilities only begin to decline at age 80.

Then, discussing gender is also one of the dominant factors in the risk of dementia. In this study, data was produced that elderly women had the largest number of respondents at risk of dementia, namely 73.6%. According to research by (Hani & Wulaningsih, 2023) line With the aging process, cognitive function during postmenopause tends to decrease compared to during the pre-and perimenopause period. Various studies show that sufficient estrogen has an impact on cognitive function that remains good. Several studies state that the decrease in estrogen levels during the menopausal transition disrupts brain bioenergy due to mitochondrial cytochrome oxidase dysfunction. which is accompanied by a decrease in cerebral metabolism, α-amyloid deposition, synaptic loss, and cognitive decline so elderly women tend to face a higher risk of developing dementia than elderly men.

b) Bivariate Analysis

Before carrying out the Chi-Square analysis test, a data normality test was carried out. The data normality test used was the Shapiro-Wilk test because the sample numbered less than 50 respondents (Aditya Setyawan, 2021). If the Shapiro-Wilk value is <0.05 then the data is not normally distributed.

Based on the results of the Shapiro-Wilk test, it was found that the obesity variable (p=0.069) and the dementia risk variable (p=0.119) were normally distributed because the Shapiro-Wilk test showed >0.05. Second, the variable has a normal distribution and a nominal scale with the categorization of obesity status into obesity 1 and obesity 2, as well as the categorization of dementia risk into at risk of dementia and not at risk of dementia. So, to test the hypothesis that has been prepared in this research, a Chi-Square Test was carried out.

1) **The relationship between obesity and the risk of dementia in the elderly.**

The Chi-Square Test results obtained a value of P=0.049. This shows statistically that the value of P<0.05 so that H0 is rejected so it can be concluded that: "There is a relationship between obesity and the risk of dementia in the elderly in RT 01-03 RW 07 Margamulya Village North Bekasi District, Bekasi City". This shows that the relationship between obesity and the risk of dementia is comorbid conditions arising from obesity such as hormonal disorders, insulin resistance, diabetes, hypertension, and cardiovascular disease which have negative consequences on the brain, thereby impacting the risk of dementia in the elderly.

This is in line with research by (Anjum et al., 2018) that obesity and dementia are factors that increase the risk of Alzheimer's disease (AD) and diseases that have underlying neurodegenerative changes. Obesity triggers vascular dementia, not only reducing blood supply to the brain but also increasing cell-fat cell damage to the white matter of the brain causing loss of cognitive and intellectual behavior. Adipocyte-secreted proteins and inflammatory cytokines explain the

association between obesity and increased risk of dementia.

Then it was also explained in research conducted by (Ma et al., 2020) The potential mechanisms by which adiposity (obesity) contributes to the risk of dementia involve comorbidities such as hypertension and cardiovascular disease as well as diabetes, genetics and inflammatory processes that cause neurovascular dysfunction, for example barrier damage. cerebral hemorrhage, exposure to toxic proteins from the blood to the brain, and reduced size of blood vessels.

However, there are other opinions regarding the relationship between obesity and the risk of dementia, according to another study written by (Natale et al., 2023) which describes the absence of a relationship between obesity and dementia and dementia-related deaths due to increasing age coupled with the risk of metabolic disorders in the elderly and There are various background factors that allow dementia to occur in the elderly and further research must be carried out in the future. Other research according to (Danat et al., 2019) shows that of the 16 cohort studies conducted in high-income countries, 13 studies showed there was no relationship between obesity and dementia and 3 studies showed a relationship between obesity and dementia, the findings showed that it was possible There is a large indirect impact of dementia on the elderly through other chronic conditions such as diabetes, cardiovascular

CONCLUSIONS

Demographic description of the elderly in RT 01-03 RW 07 Margamulya Village, North Bekasi District, Bekasi City has a majority of elderly people aged 60-74 years and the largest gender is female. The results of this study illustrate that the majority of elderly people suffer from Level 1 obesity compared to Level 2 obesity because most elderly people with Level 1 obesity have more physical activity than elderly people who suffer from Level 2 obesity, then the results study also illustrate that there are more elderly people who are not at risk of dementia because most elderly people are still working and using their cognitive activities. There is a relationship between obesity and the risk of dementia in the elderly in RT 01-03 RW 07 Margamulya Village, North Bekasi District, Bekasi City.

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