


## **The Relationship between Cardiovascular System Health and Dementia Events at Ages 50-60 Years at Teluk Kuantan Regional Hospital**

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| Article Info  | ABSTRACT  |
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| <p><b>Article history:</b></p> <p>Received November 19, 2023<br/>Revised December 04, 2023<br/>Accepted December 31, 2023</p> <hr/> <p><b>Corresponding Author:</b></p> <p>Ichwan Alamsyah Lubis<br/>Faculty of Medicine, Islam Sumatera Utara University, Indonesia<br/>Email:<br/><a href="mailto:ichwan.alamsyah@fk.uisu.ac.id">ichwan.alamsyah@fk.uisu.ac.id</a><br/><a href="mailto:zaim.anshari@fk.uisu.ac.id">zaim.anshari@fk.uisu.ac.id</a></p> | <p>Dementia is a syndrome in which there is deterioration in memory, thinking, behavior and the ability to perform daily activities. Several studies have shown an association between the development of cognitive impairment and dementia with educational attainment, and lifestyle-related risk factors, such as physical activity, tobacco use, unhealthy diet and harmful alcohol use. Furthermore, certain medical conditions are associated with an increased risk of developing dementia, including hypertension, diabetes, dyslipidemia, obesity and depression. The ideal cardiovascular health score, also referred to as Life's Simple 7, consists of four behavioral indicators of health, and three biologic. This study aims to determine the relationship between the health of the cardiovascular system and the incidence of dementia at the age of 50-60 years at Teluk Kuantan General Hospital. This research was carried out in an analytical nature using a cross-sectional design, which was conducted at the Teluk Kuantan Regional Hospital, in December 2020 - March 2021 and involved 70 respondents. Data obtained by medical records and interviews. Based on the results of the study, the results of the somer s d correlation test obtained p value = 0.000 (p &lt;0.05) so that there was a significant relationship between cardiovascular system health and the incidence of dementia at the age of 50-60 years. There is a Relationship between the Health of the Cardiovascular System and the Incidence of Dementia at the Age of 50-60 Years.</p> <p><b>Keywords:</b> <i>Cardiovascular System Health, Dementia, Risk Factor</i></p> <p>This article is licensed under a <a href="https://creativecommons.org/licenses/by-sa/4.0/">Creative Commons Attribution 4.0 International License</a>.</p>  |

### **1. INTRODUCTION**

The cardiovascular system comprises of organs that collaborate to perform transport functions in the human body [5]. The American Heart Association (AHA) put forward Life's Simple 7, an ideal cardiovascular health score that includes four health behavior indicators (not smoking, body mass index <25 kg/m<sup>2</sup>, regular physical activity, and a diet that boosts cardiovascular health) and three biologic (total cholesterol <200 mg/dL without treatment, blood pressure <120/<80 mm Hg without treatment, and fasting blood glucose <100 mg/dL). [8]

Dementia is a syndrome characterized by a decline in memory, thinking, behavior and the ability to carry out daily activities, as defined by the World Health Organization (2019). Non-modifying factors that can increase the risk of dementia include gene polymorphisms, age, gender, race/ethnicity, and family history. Of these factors, age is particularly significant, as it is the strongest risk factor for cognitive decline. Numerous studies have established a correlation between the progression of cognitive impairment and dementia and educational achievement, as well as lifestyle-related hazards, such as physical inactivity, tobacco use, poor diet, and excessive alcohol consumption. Additionally, specific medical conditions, including hypertension, diabetes, dyslipidemia, obesity, and depression, are associated with an elevated risk of developing dementia.

The study's findings reveal an incidence rate of dementia of 3.2 (95% confidence interval 2.5 to 4.0) per 1000 people/year among the poor heart health group, while the corresponding absolute rate difference per 1000 people/year was -1.5 (95% confidence interval -2.3 to -0.7) for the intermediate heart health group and -1.9 (-2.8 to -1.1) for the optimal heart health group. Higher scores in cardiovascular health were linked to a decreased risk of dementia (hazard

ratio 0.89 (0.85–0.95) per 1-point increase in cardiovascular health scores). This relationship between cardiovascular health at age 50 and dementia was also observed in individuals who remained free of cardiovascular disease during the follow-up period (hazard ratio 0.89 (0.84–0.95) per 1-point increase in cardiovascular health score).

According to the World Health Organization (WHO), approximately 47 million individuals were recorded with dementia worldwide in 2015. In addition, nearly 10 million new cases are reported each year (WHO, 2019). In 2015, the death rate related to dementia more than doubled in comparison to 2010, making dementia the seventh most prominent cause of death globally. It is predicted that by 2050, the number of people affected by dementia will rise to 131.5 million, with 68% of these cases found in developing countries. It is also estimated that an additional case will arise every three seconds according to Prince et al. (2015).

Based on the information presented, there is a lack of data concerning dementia at RIAU, particularly in Kuantan Bay. Additionally, there has been no explanation provided regarding the correlation between cardiovascular health and the occurrence of dementia in individuals aged 50-60. Consequently, there is keen interest among researchers to undertake this study.

The cardiovascular system details the circulation processes occurring within the human body. The human body possesses three types of circulation: systemic, pulmonary, and special circulation. The primary task of the heart is to synergistically pump blood throughout the body. The cardiac cycle, responsible for blood circulation activities, involves contractions of the atria and ventricles in the heart. The heart's movement has two distinct phases - systole and diastole. The former refers to the simultaneous contraction of both atria or ventricles, while the latter denotes the relaxation of the same. It is through these phases that the heart will keep pumping throughout its lifespan.

However, contractions of both atria take a shorter time than those of the ventricles. In the ventricles, besides the longer contractions, the force exerted is higher compared to the main atrium in the left ventricle. The left ventricle is accountable for propelling blood to all parts of the body whilst sustaining systemic arterial blood pressure. In contrast, the right ventricle pumps an equal amount of blood, but with much lower pressure, since it solely pushes blood to the lungs.

The heart is a hollow, muscular organ approximately the size of a person's clenched fist. Positioned within the thoracic cavity, between the sternum anteriorly and the vertebrae posteriorly along the midline, this vital organ extends from a broad top base that gradually tapers down to its cardiac apex. It has an average weight of 250-300 grams and contains a right ventricular chamber and a left atrial chamber. The heart is encased by a protective membrane known as the pericardium, whose primary role is to maintain the heart's position while enabling smooth contraction free from friction.

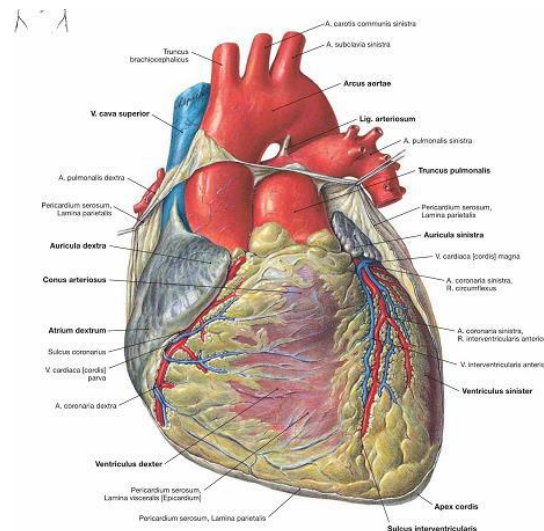


Figure 1. Heart Anatomy

In 2010, the American Heart Association (AHA) introduced Life's Simple 7, an optimal cardiovascular health scoring system. It incorporates four behaviours (smoking, diet, physical activity, and body mass index) and three biological factors (fasting glucose, blood cholesterol, and blood pressure) in the quest to prevent premature cardiovascular disease. The scores are grouped into three categories (poor, moderate, and good) in line with AHA guidelines.

Smoking involves burning tobacco and inhaling it into the body before exhaling it out. In the long term, cigarettes have extremely harmful effects. Diet refers to an individual's eating habits and making food choices that are balanced and in accordance with the body's needs. The purpose of a diet is to ensure that an individual's food consumption is appropriate, balanced, and not excessive. The purpose of a diet is to ensure that an individual's food consumption is appropriate, balanced, and not excessive.

Physical activity involves the use of energy and body parts. Body mass index (BMI) is a reliable indicator of nutritional status. BMI is calculated by comparing the body weight in kilograms with the height in square meters. Blood sugar levels, formed from carbohydrates in food and stored as glycogen in the liver and skeletal muscles, refer to the

concentration of sugar found in the blood. Blood glucose levels are the primary source of energy for body cells in muscles and tissues.

Total serum cholesterol refers to the amount of cholesterol present in the blood plasma. Cholesterol is essential for the maintenance of blood cell health and may be produced by the liver or obtained from dietary sources.

Blood pressure is the necessary force for blood to circulate throughout the human body's tissues via the blood vessels that originate from the heart (arteries) and return to the heart (veins). It is imperative to maintain a healthy blood pressure to ensure proper bodily functions. The blood that circulates throughout the body serves as a carrier of oxygen and other vital substances required by the cells.

Severine Sabia's research categorises the health score of the cardiovascular system as good (12-14), moderate (7-11), and poor (0-6). The World Health Organization (WHO) identifies dementia as a series of symptoms or syndromes that can cause a progressive or chronic decline in cognitive function, interfering with daily professional activities.

Nonmodifiable risk factors for dementia consist of gene polymorphisms, age, gender, race/ethnicity and family history. Although age is the most significant risk factor for cognitive decline, it is crucial to note that dementia is not an automatic consequence of ageing. Several studies carried out over the last two decades have shown a connection between cognitive impairment and dementia with educational attainment, as well as risk factors related to lifestyle like physical inactivity, tobacco use, an unhealthy diet, and excessive alcohol consumption. Moreover, several medical conditions are linked to an elevated risk of dementia, such as hypertension, diabetes, dyslipidemia, obesity, and depression. Polymorphism refers to a gene alteration or mutation that does not affect protein formation, but creates variations in protein function instead.

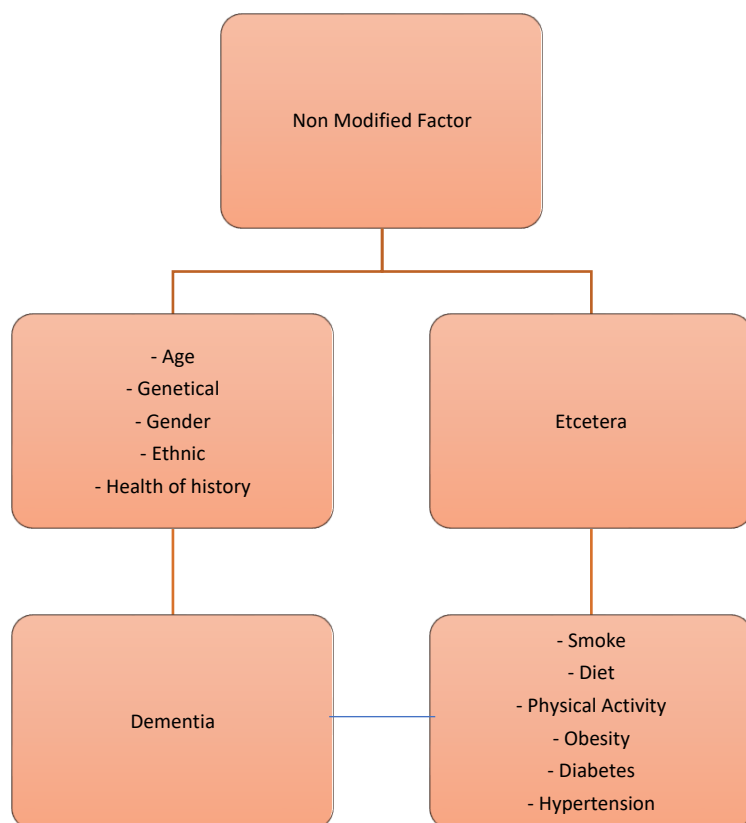
The diagnostic guidelines for dementia in Indonesia, as outlined by PPDGJ (Guidelines for the Classification and Diagnosis of Mental Disorders), are:

There is a decline in memory and thinking skills, which hampers an individual's personal activities of daily living like bathing, dressing, eating, personal hygiene, defecating, and urinating. The consciousness remains clear without any disturbance. Symptoms and incapacity persist for a minimum of 6 months.

The most commonly used evaluation to assess cognitive function is the Mini-Mental State Examination (MMSE). The MMSE evaluates various cognitive domains, namely, time and place orientation, registration, attention and calculation, recall, and language, which includes naming objects, repeating words, understanding and executing verbal and written commands, writing, and copying pictures. Multiple tests constitute each evaluation, and the score is based on the number of correct responses.

Global cognitive score guidelines (in general):

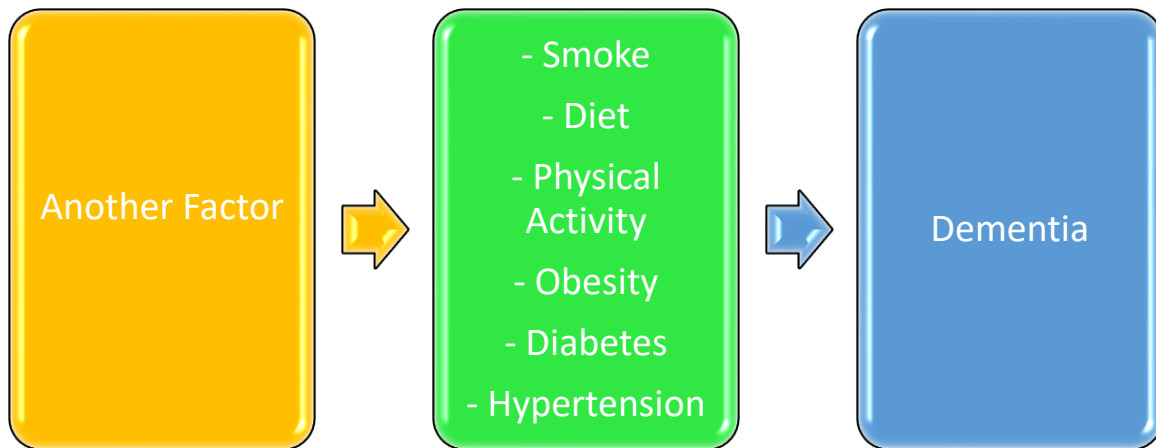
- Score: 24 -30: normal
- Score: 17-23: probable cognitive impairment
- Score: 0-16: definite cognitive impairment



Graphic 1. Theoretical framework

For Research Hypothesis

Ha: There is a relationship between the health of the cardiovascular system and the incidence of dementia at the age of 50-60 years.



Graphic 2. Conceptual Framework

## 2. METHODS

The study employed an analytical approach using cross-sectional design to investigate the correlation between the independent variable (cardiovascular health) and the dependent variable (dementia) in a synchronous manner. The study population consisted of 70 patients aged 50-60 years who suffered from cardiovascular health issues and visited the internal medicine clinic at Teluk Kuantan Regional Hospital. The sample was determined using a total sampling technique with the entire population of 70 patients being included. The sampling method used in this study was total sampling of 70 patients. The research employs the MMSE (Mini Mental State Examination) and IPAQ (International Physical Activity Questionnaire) as assessment tools. The primary and secondary data collection techniques were utilized to gather data, with medical records serving as a source of secondary data. The data was obtained directly from the source.

Conducting bivariate analysis through the use of Somers' D test analysis allowed for the determination of the relationship between the independent and dependent variables. Bivariate data analysis was managed using SPSS 16.0 software. The statistical test adopted in this study was the Somers' D test with an alpha level of 0.05. Typically, categorical or data variables are measured on an ordinal scale [23]. The significance guidelines show that if the p-value is less than alpha (0.05), it indicates significance or a relationship between the variables. According to Saryono and Mekar Dwi A (2013), the Somers' D test quantifies the association between two ordinal scale variables, which can be organized into a contingency table. Abbreviations such as TIES will be defined when first used. It is important to adhere to a formal writing style, avoid fillers, and maintain grammatical correctness throughout the text. The test evaluates symmetrical relationships, meaning that variable X and variable Y can mutually affect each other. This method is an improvement of the Gamma test and considers TIES to modify the Kendall Tau-b formula. The benefit of this formula lies in its ability to ascertain the direction of the relationship, be it that variable Y is the dependent variable, X is the dependent variable, or their relationship is symmetrical. If assessing the connection between two ordinal variables in the form of a contingency table, considering both influencing and influenced variables, then Somers' D test is a highly fitting choice. The conclusions drawn from the analysis indicate the rejection of

H<sub>0</sub> (acceptance of H<sub>1</sub>) if the p-value is less than 0.05,

and acceptance of H<sub>0</sub> (rejection of H<sub>1</sub>) if the p-value is greater than 0.05.

Table 1. Somers D Correlation Coefficient Interval

| Interval Coef | Corelation  |
|---------------|-------------|
| 0,00 – 0,199  | Very Low    |
| 0,20 – 0,399  | Low         |
| 0,40 – 0,599  | Medium      |
| 0,60 – 0,799  | Strong      |
| 0,80 – 1,000  | Very Strong |

### 3. RESULTS AND DISCUSSIONS

This study was undertaken at Teluk Kuantan Regional Hospital, situated on Jalan Kesehatan. The participants in this study comprised 70 individuals who suffer from cardiovascular conditions. The sampling method employed was total sampling, and the Somer's d method was used for testing, aiming to assess the impact of each independent variable on the dependent variable. The following section outlines the characteristics of the participants sampled

Table 2. Frequency Distribution of Respondent Characteristics Based on

| Age          | N         | %          |
|--------------|-----------|------------|
| 50-55 years  | 37        | 75         |
| 56-60 years  | 33        | 25         |
| <b>Total</b> | <b>70</b> | <b>100</b> |

Based on age categorical characteristics, it was found that the fewest respondents were in the age range 56-60 years, namely 33 people (25%), and the most were in the age range above 51-55 years, namely 37 people (75%).

Table 3. Frequency Distribution of Respondent Characteristics Based on Gender

| Gender       | N         | %          |
|--------------|-----------|------------|
| Male         | 36        | 55,2       |
| Female       | 34        | 44,8       |
| <b>Total</b> | <b>70</b> | <b>100</b> |

According to gender characteristics, 34 respondents were recorded as female (55.2%), while 36 respondents were recorded as male (44.8%).

Table 4. Frequency Distribution of Respondent Characteristics Based on Hypertension

| Hypertension | N         | %          |
|--------------|-----------|------------|
| Normal       | 13        | 27,6       |
| Hiper I      | 57        | 72,4       |
| Hiper II     | 0         | 0,00       |
| <b>Total</b> | <b>70</b> | <b>100</b> |

According to gender characteristics, 34 respondents were recorded as female (55.2%), while 36 respondents were recorded as male (44.8%).

Table 5. Frequency Distribution of Respondent Characteristics Based on Lipid

| Lipid        | N         | %          |
|--------------|-----------|------------|
| Normal       | 20        | 29,6       |
| Tinggi       | 50        | 70,4       |
| <b>Total</b> | <b>70</b> | <b>100</b> |

According to lipid characteristics, it was discovered that 50 participants (70.4%) had notable lipid levels, whereas 20 participants (29.6%) demonstrated lipid levels within the normal range.

Table 6. Frequency Distribution of Respondent Characteristics Based on DM

| DM           | N         | %          |
|--------------|-----------|------------|
| DM Stage I   | 8         | 12,7       |
| DM Stage II  | 60        | 84,5       |
| Normal       | 2         | 2,8        |
| <b>Total</b> | <b>70</b> | <b>100</b> |

According to the DM characteristics, the study reveals that 84.5% of the participants had a prior diagnosis of type II DM, with 60 individuals. In contrast, type I DM was present in 12.7% of the respondents, consisting of 8 people. Only 2 individuals presented with normal blood sugar levels, indicating the least number of cases.

Table 7. Frequency Distribution of Respondent Characteristics Based on Smoking

| Smoke        | N         | %          |
|--------------|-----------|------------|
| Yes          | 42        | 60,6       |
| No           | 28        | 39,4       |
| <b>Total</b> | <b>70</b> | <b>100</b> |

Based on smoking characteristics, it was found that the largest number of respondents had a smoking history, namely 42 people (60.6%), and 28 people (39.4%) did not have a smoking history.

Table 8. Frequency Distribution of Respondent Characteristics Based on Diet

| <b>Diet</b>  | <b>N</b>  | <b>%</b>   |
|--------------|-----------|------------|
| Good         | 52        | 74,6       |
| Not Good     | 18        | 25,4       |
| <b>Total</b> | <b>70</b> | <b>100</b> |

According to the DM characteristics, the study reveals that 84.5% of the participants had a prior diagnosis of type II DM, with 60 individuals. In contrast, type I DM was present in 12.7% of the respondents, consisting of 8 people. Only 2 individuals presented with normal blood sugar levels, indicating the least number of cases.

Table 9. Frequency Distribution of Respondent Characteristics Based on Physical Activity

| <b>Physical Activity</b> | <b>N</b>  | <b>%</b>   |
|--------------------------|-----------|------------|
| Good                     | 52        | 74,6       |
| Not Good                 | 18        | 25,4       |
| <b>Total</b>             | <b>70</b> | <b>100</b> |

Based on the characteristics of physical activity, it was found that the majority of respondents had good physical activity, namely 52 people (74.6%), and 18 people had poor physical activity (25.4%).

Table 10. Frequency Distribution of Respondent Characteristics Based on BMI

| <b>IMT</b>        | <b>N</b>  | <b>%</b>   |
|-------------------|-----------|------------|
| Thin              | 12        | 17,1       |
| Normal            | 31        | 44,3       |
| Obesity           | 8         | 11,4       |
| <i>Overweight</i> | 19        | 27,2       |
| <b>Total</b>      | <b>70</b> | <b>100</b> |

Based on BMI characteristics, it was found that the majority of respondents had a Normal BMI, namely 31 people (44.3%), and 8 people who were obese (11.4%).

Table 11. Frequency Distribution of Respondent Characteristics Based on Cardiovascular System Health

| <b>Cardiovascular System Health</b> | <b>N</b>  | <b>%</b>   |
|-------------------------------------|-----------|------------|
| Good                                | 52        | 74,6       |
| Not Good                            | 18        | 25,4       |
| <b>Total</b>                        | <b>70</b> | <b>100</b> |

Based on the characteristics of cardiovascular system health, it was found that the largest number of respondents had good cardiovascular system health, namely 52 people (74.6%), and 18 people (25.4%) had poor cardiovascular system health.

Table 12. Frequency Distribution of Respondent Characteristics Based on Dementia

| <b>Characteristic</b> | <b>N</b>  | <b>%</b>   |
|-----------------------|-----------|------------|
| Yes                   | 23        | 39,4       |
| No                    | 47        | 60,6       |
| <b>Total</b>          | <b>70</b> | <b>100</b> |

According to the characteristics of dementia, it was discovered that the majority of participants did not have a prior history of the condition, specifically 47 individuals (60.6%), whilst 23 individuals (39.4%) did report having a history of dementia.

Table 13. Analysis of the Relationship between the Health of the Cardiovascular System and the Incident of Dementia at the Age of 50-60 Years

| Cardiovascular System Health | Dementia |      |    |      | Total |      | Somers'd Test      |
|------------------------------|----------|------|----|------|-------|------|--------------------|
|                              | Yes      |      | No |      |       |      |                    |
|                              | N        | %    | N  | %    | N     | %    |                    |
| Good                         | 17       | 73,8 | 35 | 74,9 | 52    | 74,3 | p=0,000<br>r=0,960 |
| Not Good                     | 6        | 26,2 | 12 | 25,1 | 18    | 25,7 |                    |
| <b>Total</b>                 | 23       | 100  | 47 | 100  | 70    | 100  |                    |

According to the Somer's D correlation test results as presented in table 4.2, a p-value of 0.000 ( $p < 0.05$ ) was achieved. This indicates a significant correlation between cardiovascular health and the occurrence of dementia in individuals aged between 50 and 60 years old. The correlation coefficient value of  $r = 0.960$  indicates a very strong correlation between the variables, falling within the range of 0.80 to 1.000. The positive correlation suggests that as the patient's cardiovascular health system improves, their dementia level decreases and vice versa.

According to the age categories, 37 individuals (75%) aged over 51-55 years constituted the largest proportion of respondents. Age is considered the most significant risk factor for dementia even though it can emerge earlier. Only 1 out of 20 individuals develop dementia before the age of 65. However, after the age of 65, the risk of developing Alzheimer's disease or vascular dementia doubles every 5 years. It is estimated that dementia affects one in 14 individuals over the age of 65 and one in 6 over the age of 80.

The gender composition of respondents reveals that the majority were 36 females (55.2%). According to data from the 2014 Central Statistics Agency, the number of elderly females surpasses that of males, with 10.77 million elderly women and 9.47 million elderly men. This supports the notion that women have a greater life expectancy. The 2010 Population Census findings revealed that women tend to live longer than men. Women's life expectancy at birth was 71.74 years, while men's was only 67.51 (Central Statistics Agency, 2014). In a similar study conducted by Nafidah (2014) in South Jakarta, it was found that out of 118 elderly respondents, 60.2% were women and 39.8% were men.

Based on the hypertension characteristics observed, it was discovered that 57 individuals (72.4%) had stage I hypertension. Blood pressure refers to the force necessary for blood to flow through the arteries and veins from the heart and distribute throughout all human body tissues. The blood acts as a transporter, carrying oxygen and other required substances to the body cells.

Hypertension results in vascular damage that can lead to structural changes in arteries and arterioles, causing progressive blockage. Additionally, hypertension contributes to the development of atherosclerosis, which involves the formation of atheromatous plaque on the inner lining of artery walls. This plaque damages the vascular endothelium. The thickening of atheromatous plaques in the cerebral arteries decreases the diameter of the lumen in capillaries and can lead to the constriction of blood vessels. Arteries afflicted with atherosclerosis have areas where plaque bulges into the bloodstream. The irregular surface of the plaque can induce blood clotting or thrombus development, obstructing blood flow in the arteries, resulting in arterial occlusion and infarction in the adjacent brain tissue leading to cellular and even tissue fatality. The passing away of the hippocampus or cornu ammonis (CA) neurons, integral to the memory process and part of the limbic system, is the eventual outcome. The death of CA pyramidal cells results in anterograde memory loss, leading to a significant decline in cognitive processes. This is a common occurrence in individuals with dementia.

The analysis of lipid characteristics revealed that the majority of participants, specifically 50 individuals (70.4%), exhibited high levels of lipids. Total cholesterol represents the overall amount of cholesterol found in blood plasma and is essential for the well-being of blood cells. Cholesterol, in the form of fatty substances, can be synthesised by the liver.

According to Kusuma (2013), there is a correlation between specific illnesses, including heart disease, diabetes, stroke, high blood pressure, high cholesterol and low vitamin folate levels, and increased Alzheimer's disease risk. High blood pressure is capable of impairing blood vessels in the brain, therefore impacting critical areas vital for memory retention and language comprehension. This is thought to be a contributing factor leading to possible Alzheimer's disease onset. Following interviews with nurses, the researcher obtained information indicating that dementia is not solely experienced by elderly individuals suffering from diseases, but by those without as well. Therefore, it can be inferred from the research results that disease history does not affect the incidence of dementia. Nonetheless, factors such as age, gender, and recent education are more influential.

Based on the features of DM, it was discovered that the most respondents had a history of type II DM, specifically 60 people (84.5%). Glucose levels in the blood, which are formed from carbohydrates in food and stored as glycogen in the liver and skeletal muscles, are known as blood sugar (glucose) levels. Blood sugar levels are the primary source of energy for body cells in muscles and tissues.

According to Rachmawati (2015), diabetes mellitus is often related to cardiovascular disease. In diabetes mellitus, insulin resistance, surplus free fatty acids, and decreased eNOS result in endothelial dysfunction and damage to blood vessels. Additionally, atherosclerosis and the renin-angiotensin system, which contribute to hypertension, induce endothelial and vascular damage. Prolonged persistence of this condition may lead to the death of neurons in areas of the

limbic system responsible for memory, particularly the cornu ammonis (CA) or hippocampus. This can result in anterograde memory loss and significant decline in cognitive abilities, akin to those found in DVa.

It was discovered that the majority of respondents had a smoking history, with 42 individuals (60.6%) being smokers. The long-term consequences of smoking are extremely hazardous. Smoking refers to the burning of tobacco and inhalation/exhalation of the resulting smoke. According to Kusuma (2013), an unhealthy lifestyle involving smoking, excessive alcohol consumption, and lack of exercise can lead to the onset of Alzheimer's disease. Lifestyle factors have been found to have a strong correlation with non-communicable diseases, including diabetes, high cholesterol and heart problems. According to demographic data on smoking habits, it was found that 59 respondents (84.3%) do not smoke.

In terms of dietary habits, the majority of respondents (74.6%) followed a healthy pattern of eating, with 52 people reporting good dietary practices. Diet pertains to an individual's food intake and choice, taking into account the food composition to maintain balance and meet bodily needs. The objective is to promote moderate and balanced consumption. [18]. Based on the physical activity characteristics, the majority of respondents displayed good physical activity, specifically 52 individuals (74.6%).

Physical activity involves the use of energy and body parts. This definition was proposed by Utami (2017). The study found that 31 respondents (44.3%) had a Normal Body Mass Index (BMI). BMI is calculated by comparing body weight in kilograms to height in square metres, and is a useful method for assessing nutritional status (Purnama Simbolon, 2018). Based on the features of cardiovascular health, it was discovered that the greatest proportion of participants demonstrated good cardiovascular health, specifically 52 individuals (74.6%).

Based on the dementia characteristics, it was discovered that 42 individuals (60.6%) had a dementia history, making it the highest number of respondents. Similarly, Handajani (2006) conducted a study in Jakarta, whereby 62.5% of 103 respondents suffered from dementia, showing comparable results. Meanwhile, Hidayaty's (2012) study in Sukabumi indicated that 53.5% of the elderly (101 respondents) experienced dementia. These findings were derived from interviews utilizing the MMSE. Based on the MMSE score, the participants had an average score of 21.17, with the maximum score being 30 and the minimum score being 8.

Tamher and Noorkasiani (2009) reported that intellectual impairment, also known as dementia, is among the health problems experienced by the elderly. Dementia is a condition that reduces a person's intellectual abilities and may result in a decline in cognitive function (Zulsita, 2010). Polymorphism refers to genetic mutations that do not cause alterations in protein structure but result in variations in protein function

According to the findings of Somer's D correlation test presented in Table 4.2, a significant association between cardiovascular health and the incidence of dementia among individuals aged 50-60 years could be inferred as the obtained p-value was 0.000 ( $p < 0.05$ ). The correlation coefficient, with a value of  $r = 0.960$ , indicates a very strong correlation ( $r = 0.80 - 1.000$ ) between variables. The positive correlation (+) direction reveals that higher cardiovascular health levels contribute to lower levels of dementia and vice versa.

Certain risk factors, such as gene polymorphisms, age, gender, race/ethnicity, and family history, are unchangeable and increase the likelihood of developing dementia. Importantly, although age is the predominant known risk factor for cognitive decline, dementia does not necessarily occur as a result of ageing. Numerous studies over the past two decades have established a link between cognitive impairment and dementia with educational achievements as well as lifestyle-related risk factors, such as physical inactivity, tobacco use, an unhealthy diet, and harmful alcohol consumption. Moreover, hypertension, diabetes, dyslipidemia, obesity, and depression are among the medical conditions linked to a higher likelihood of developing dementia.

#### 4. CONCLUSION

Based on the findings of a study on the correlation between cardiovascular health and dementia incidence in individuals aged 50-60 at Teluk Kuantan Regional Hospital, conclusive outcomes are apparent. The research involved 70 respondents. Based on the results of the Somer's correlation test, a p-value of 0.000 ( $p < 0.05$ ) was found. This indicates a significant correlation between cardiovascular health and dementia occurrence in individuals aged 50-60 years old.

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