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The Relationship between Anxiety Levels and Blood Sugar Levels in the Elderly



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Abstract

The increasing age, the more problems faced both physically and mentally such as loneliness, anxiety and depression. The prevalence of anxiety in the elderly is increasing. The increased release of the hormones cortisol and epinephrine in someone who is experiencing anxiety can affect an increase in gluconeogenesis and glycogenolysis which results in an increase in blood sugar levels. This study was to analyze the relationship between anxiety levels and blood sugar levels in the elderly. The research design uses a cross sectional approach. The sample for this research was 87 respondents who were taken by purposive sampling from 111 elderly people. The results of the Pearson correlations test showed that there was a relationship between anxiety and blood sugar levels in the elderly. Therefore, the elderly can control their anxiety to reduce the risk of increasing blood sugar levels which have an impact on the health of the elderly.

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INTRODUCTION

Elderly is a biological phenomenon that cannot be avoided by everyone, Law no. IV of 1965 article 1, states that the elderly is where someone who has experienced the age of 55 years, where his ability decreases, the elderly do not have or are unable to earn a living by themselves only receiving gifts from other people. According to Law no. 13 concerning the welfare of the elderly says that an elderly person is someone who is over 60 years old (Ratnawati, 2017). According to the Directorate General of Population and Civil Registration (Dukcapil) (Kusnandar, 2022), there are 30.16 million elderly people in Indonesia in 2021. The elderly population is those aged 60 and over. This group accounts for 11.01% of Indonesia's total population of 273.88 million people. East Java is the province with the largest elderly population, reaching 5.98 million people. This number is equivalent to 14.56% of the total population of East Java, which amounted to 41.06 million people at the end of last year (Ministry of Home Affairs, 2022). Meanwhile, in Blitar City, the percentage of the elderly population in 2020 is 13.44 people (Central Bureau of Statistics, 2022).

As age increases, the elderly experience more and more health problems, apart from physical illness they also often experience mental problems such as loneliness, anxiety and depression. The increasing number of elderly populations in the world results in changes in family structure, psychosocial values, forcing the elderly to live alone and live in orphanages, with this it will cause the elderly to feel isolated, lonely and also anxious. The prevalence of anxiety at the age of 55-65 years is 6.9%, while at the age of 65-75 it reaches 9.7% and ages 75 and over has a rate of 13.4% (Adawiyah et al., 2022)

According to Chatuvedi SK's research in 2019, it has a significant value ($p < 0.002$) that anxiety disorders can increase blood sugar levels. Anxiety disorders can result in high blood sugar levels or hyperglycemia which causes diabetes mellitus, if high blood sugar levels cannot be controlled it will cause complications. In 2019 the International Diabetes Federation (IDF) stated that 425 million worldwide or around (8.8%) people aged 20 to 79 years are diabetics. The IDF stated that the number of DM sufferers in Indonesia in 2017 reached 10.3 million and is expected to increase to 16.7 million in 2045. WHO 2018 explains that in the world there are 1.6 million or (4%) people who die from DM (Wardani et al., 2022). Blood sugar level is the amount of glucose content in blood plasma. Factors

that can affect blood sugar levels in the elderly include increased consumption of foods that contain sugar, increased stress, emotional factors, and age (Jiwintarum et al., 2019).

Anxiety can cause an increase in blood pressure which if it persists will become hypertension, increase in blood sugar levels and increase in cholesterol levels (Husna & Ariningtyas, 2019). Anxiety can cause a physiological response, namely the hypothalamus-pituitary will release the hormone ACTH, where this hormone will stimulate or trigger the adrenal glands to release hormones (epinephrine) and glucocorticoids (cortisol) which will cause an increase in the hormones cortisol and epinephrine in the blood. The increase in these hormones will result in the process of gluconeogenesis and glycogenolysis to increase the energy needed by the body when experiencing anxiety. Blood sugar levels are sugars found in the blood that come from carbohydrates in food and can be stored in the form of glycogen in the liver and skeletal muscles (Suryati, 2021). Blood sugar levels increase due to the process of removing glucose by the liver and the process of glycogen being converted into glucose (Jeharu et al., 2021).

Based on a preliminary study, the number of elderly people at the Posyandu in Gedog Village was 1,638 people and the number of elderly people who experienced high blood sugar levels at the Posyandu in Gedog Village was 450 people. The results of 10 elderly, there are 4 elderly who have a level of severe anxiety with blood sugar levels > 200 mg/dl. Whereas 4 elderly who experienced moderate anxiety with blood sugar levels > 160 mg/dl and 2 elderly experienced mild anxiety with blood sugar levels of 93 mg/dl. Based on the description above, the researcher wanted to identify the relationship between anxiety levels and blood sugar levels in the elderly. The general objective of this study was to determine the relationship between anxiety levels and blood sugar levels in the elderly. While the specific objectives of this study were to identify the anxiety level of the elderly, identify blood sugar levels in the elderly and analyze the relationship between anxiety levels and blood sugar levels in the elderly.

METHOD

This study was a quantitative research using a correlation research design with a cross sectional approach. The population in this study was 111 elderly people at the Brontoseno and Puntodewo elderly Kelurahan Gedog Sananwetan, Blitar City.

The sampling technique in this study was purposive sampling with a sample size of 87 respondents using the slovin formula. Data collection was carried out on March 16, 2023 using the Geriatric Anxiety Scale (GAS) questionnaire and measuring blood sugar

levels. Data analysis in this study used univariate and bivariate, statistical tests were carried out using Pearson correlation with a degree of significance $\alpha > 0,05$.

RESULTS

Univariate analysis.

Table 1: The Distribution of Respondents Characteristics

Characteristics	Amount	
	Frequency (f)	Percentage (%)
Age		
45-59	6	6,9
60-69	54	62,1
70-79	23	26,4
>80	4	4,6
Gender		
Male	35	40,2
Female	52	59,8
Education		
Elementary school	12	13,8
Junior High School	13	14,9
Senior High School	30	34,5
Bachelor	32	36,8
Work		
Unemployed	30	34,5
Private	6	6,9
Entrepreneur	10	11,5
TNI/POLRI	1	1,1
Retired employees	40	46

Characteristics of respondents in this study is 62.1% (54) of respondents aged 60-69 years, 26,4% (23) of respondents aged 70-79 years, 6,9% (6) of respondents aged 45-59 years and 4,6% (4) of respondents aged >80 years. Based on gender 59.8% (52) of female respondents and 40.2% (35) of male respondents. Based of educations 36.8% (32) of respondents have a bachelor's degree , 34,5% (30)) of respondents have a senior high school and based of work 46.0% (40) of respondents are retired civil servants.

Table 2: The Relationship between Anxiety Levels and Blood Sugar Levels in the Elderly

		Anxiety levels	Blood sugar levels
Anxiety levels	Pearson Correlation	1	.858
	Sig. (2-tailed)		.000
	N	87	87
Blood glucose levels	Pearson Correlation	.858	1
	Sig. (2-tailed)	.000	
	N	87	87

Correlation test results p value = 0.000, which means there is a relationship between anxiety levels and blood sugar levels, and the correlation coefficient is 0.858, which means that the degree of closeness is very strong where the higher the level of anxiety, the higher the blood sugar level.

DISCUSSION

Anxiety Level in the Elderly

The results of research conducted at the Brontoseno and Puntodewo elderly Posyandu in the Gedog village, it was found that the average anxiety

experienced by the elderly was 27.91, whereas if grouped based on the classification value of the elderly who experienced anxiety, the majority aged 60-69 years were 54 (62.1%) respondent. According to (Kurniawan, 2018), the elderly are very

susceptible to emotional disturbances so that as they get older they are more likely to experience anxiety or emotional disorders in their lives. Factors that influence anxiety are age, stressor, environment, gender and education. From the results of the data, it was found that 16 respondents experienced a moderate level of anxiety and 6 respondents experienced a moderate level of anxiety, while 18 respondents experienced a moderate level of female anxiety and 9 respondents experienced a severe level of anxiety..

Females have a higher level of anxiety than males because women's psychology is more influenced by hormones, these hormones help control the body's reaction to stress, namely corticotropin releasing hormone (CRH) which helps stimulate the release of adrenocorticotrophic hormone (ACTH). The ACTH hormone is found in the adrenal cortex and helps stimulate the release of cortisol which has a role and increases during anxiety disorders which stimulates gluconeogenesis in the liver which results in an increase in blood sugar levels (Nafiah, 2020).

Researchers argue that, someone who is experiencing anxiety every time there is a problem cannot tell his family it will cause a person to experience high stress to cause anxiety. Age factor is also very influential on the process of occurrence of anxiety in a person. As someone gets older, their emotional status will increase which is caused by several factors of physiological changes (Kurniawan, 2018). Anxiety can be expressed through physiological responses, in which the body responds by activating the autonomic nervous system (sympathetic and parasympathetic). The sympathetic nervous system will minimize the body's response, while the parasympathetic nervous system will activate the body's response. Anxiety is a subjective feeling regarding mental tension which is disturbing as a general reaction to the inability to overcome a problem or a lack of security (Fikriana, 2018).

Blood Sugar Levels in the Elderly

The results of research conducted at the Brontoseno and Puntodewo elderly Posyandu in Gedog Village showed that the average blood sugar level experienced by elderly respondents was 141.94. Blood sugar level is the amount of glucose content in blood plasma. Factors that affect blood sugar levels are stress, physical activity, consumption of carbohydrates and consumption of dietary fiber (Shoufika, 2018). The increase in blood

sugar levels is caused by organ systems that have aged with age, decreased physical activity which causes biological decline, consuming lots of foods that contain high glucose, irregular eating patterns and not accompanied by regular exercise so that the process of carbohydrate metabolism is disrupted and results in a lack of the insulin hormone produced (Hutagalung, 2019).

In a study conducted by (Ekasari & Dhanny, 2022), it was found that more of the research subjects experienced severe levels of stress with uncontrolled blood glucose levels. The high level of stress on the subject can be caused because the subject is old. The subject is still burdened with thoughts about children, decreased physical ability and also workload so that it affects the subject's emotions. When a person experiences excessive stressors it will cause anxiety. In theory, anxiety can cause a physiological response, namely the hypothalamus-pituitary will release the hormone ACTH, where this hormone will stimulate or trigger the adrenal glands to release hormones (epinephrine) and glucocorticoids (cortisol) which will cause an increase in the hormones cortisol and epinephrine in the blood. The increase in these hormones will result in the process of gluconeogenesis and glycogenolysis to increase the energy needed by the body when experiencing anxiety. Blood sugar levels are sugars found in the blood that come from carbohydrates in food and can be stored in the form of glycogen in the liver and skeletal muscles (Suryati, 2021).

The Relationship between Anxiety Levels and Blood Sugar Levels in the Elderly

The results of the study found that there was a significant correlation between anxiety levels and blood sugar levels. These results indicate a correlation coefficient with a very strong correlation between anxiety levels and blood sugar levels. This study aimed to see the relationship between anxiety levels and increased blood sugar levels, as has been explained that an increase in the hormones cortisol and epinephrine can cause increased gluconeogenesis and glycogenolysis so that blood sugar levels increase.

As we get older, the functions of organs in the body will decrease, but not only decrease in organ function. Mental decline also occurs with age which can result in feelings of sadness, changes in sleep patterns, decreased appetite, decreased concentration and fatigue which can cause worry. Increasing age also focuses more on one thing in detail and creates

bad impulses and results in bad perceptions as well, this can cause threats and anxiety to someone (Nafiah, 2020). From the results of research conducted by (Ludiana, 2017), it was explained that anxiety has been shown to be related to blood sugar levels. From the results of his research towards a positive correlation with the strength of the relationship is very strong, meaning that the higher the anxiety score, the blood sugar level will increase. This happens because of worry so that it will cause anxiety which causes activation of the Hypothalamus Pituitary Adrenal (HPA) axis and the sympathetic nervous system (sympathetic-adrenal-medullary axis). HPA-axis activation by stress, anxiety, depression and impaired cognition causes an increase in the release of stimular hormone concentrations, namely corticotropin-releasing hormone, which stimulates the synthesis and secretion of glucocorticoids from the hypothalamus. Glucocorticoids themselves function as regulators of glucose synthesis in the adrenal cortex. Corticotropin-releasing hormone acts on the anterior pituitary gland, and releases adrenocorticotropin hormone (corticotropin), a hormone that stimulates the adrenal cortex or stimulates the secretion of glucocorticoids which activates the convection of proteins into glucose through the gluconeogenesis pathway in the liver.

The results of this study are also in accordance with research conducted by (Wijayanto & Widya, 2019), in Lampung using 81 respondents in the study it was found that there was a relationship between anxiety and blood sugar levels. Anxiety stems from the perception of uncontrollable events. Sustained anxiety will cause stimulation of the autonomic nervous system which causes involuntary activity in the body including the body's defense mechanisms, and changes in vital signs. According to research (Purba, 2019), a significant relationship was found between anxiety levels and increased blood sugar levels. The results of his research were that most of the respondents who experienced moderate anxiety had blood sugar levels > 200 mg/dl. Anxiety can affect blood sugar levels and insulin metabolism by increasing cortisol, which has an impact on eating habits, weight gain and diabetes. Anxiety is one of the causes of an increase in the hormone cortisol, epinephrine. The physiological responses involved in anxiety disorders can affect the action of the hypothalamus and pituitary which have an impact on endocrine functions such as

increasing cortisol levels which have an impact on the excretory function of insulin, and can stimulate gluconeogenesis and inhibition of glucose absorption, thus triggering an increase in blood sugar levels. The hormones epinephrine and norepinephrine also have an important role in increasing blood sugar levels. Epinephrine, also known as adrenaline, works as a neurotransmitter. The transfer of signals between neurons and body cells is regulated by noradrenergic neurons and acts as a neurotransmitter in the central and sympathetic nervous systems. Elevated norepinephrine levels are associated with anxiety, stress, high blood pressure and hyperactivity. The release of adrenaline and noradrenaline increases heart rate and respiration. This leads to inhibition of insulin excretion thereby causing an increase in blood sugar levels. (Nafiah, 2020).

According to the researchers, the results of this study indicate that the higher the anxiety level of the elderly, the higher the blood sugar level, conversely, the lower the anxiety level, the lower the blood sugar level. This is because in someone who experiences anxiety it will cause various changes that occur in the body, one of which is the process of gluconeogenesis, namely the breakdown of glucogen into glucose into the blood.

CONCLUSION

Based on the results of the study, the anxiety level showed an average of 27.91 included in moderate anxiety and blood sugar levels showed an average of 141.94 included in normal blood sugar levels. There is a relationship between anxiety levels and blood sugar levels in the elderly at Posyandu Lansia Brontoseno and Puntodewo, Gedog Sananwetan Village, Blitar City with a p value of 0.000 ($p < 0.05$).

SUGGESTION

It is hoped that the elderly can control their anxiety by telling their families if there are problems, they face so they don't burden their minds, and also so that the elderly behaves in a healthy life by doing daily physical activities. In addition, the elderly also needs social support, both from their families and their environment.

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CONFLICTS OF INTEREST

The authors declare that they have no conflict of interest.

AUTHOR CONTRIBUTIONS

In this research, the main author is in charge of collecting data assisted by a third author, while the second author is the corresponding author.

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