OVERVIEW OF BLOOD GLUCOSE LEVELS IN FISHERMEN WORKING AT NIGHT IN SUMALATA DISTRICT

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ABSTRACT

Fishermen are among the professions that work at night, so fatigue often occurs. Sleep quality is an important factor for a person's well-being. Poor sleep quality can cause increased stress, which in turn can increase blood glucose levels. The aims of this study were to determine the description of blood glucose levels in fishermen working at night. This study uses a quantitative approach and descriptive research. The data used are primary in the form of research results and secondary data in the form of data from literature, books, and journals. The sampling technique used was Accidental sampling, assuming the number of samples was 30. The results showed that most respondents had normal glucose levels, namely 18 people (60%) and abnormal 12 people (20%). The elderly category has high blood glucose levels, namely one person, and normal, namely 4, with 5 people. As for adults, high blood glucose levels were 11 and regular 14, with a total of 25 people.

Keywords: Blood Glucose, Fishermen, Work, Night

INTRODUCTION

The body absorbs a lot of carbohydrates in the blood forming glucose and other sugars.The liver converts these carbohydrates into glucose to produce energy. Blood sugar is more than 200 mg/dL, Diabetes mellitus is associated with polyphagia, polydipsia, polyuria, and obesity. [1].

Oneofthe most important monosacchar ide sugars to provide energy for plants and animals is blood glucose, Glucose is a simple sugar with six carbons. The portion of energy used by the body is produced through oxidative metabolism of glucose. The enzymes disaccharides, maltose, sucrose, and lactase break down

Disaccharide sugars into monosacchari des in the mucosa of the small intestine during the digestive process. This enzyme breaks down only one type of disaccharide, so the small intestine can absorb sugar in the form of monosaccharides. [2]

When glucose is metabolized, lactic acid, pyruvic acid, and acetyl coenzyme A (acetyl-CoA) produce energy. The liver is responsible for most of the glucose metabolism. To keep glucose in the blood normal, the liver's glycogen stores provide glucose. In addition, the liver produces glycogen from non-carbohydrate sources such as amino acids or fatty acids, which leads to gluconeogenesis. This can be caused by diabetes, hunger, or low carbohydrate intake. Hypoglycemia can occur in severe liver damage because the remaining liver tissue cannot produce glucose. According to Sacher and Mcpherson (2012) Foods high in nutrients such as carbohydrates, sugar, protein and fat can cause diabetes mellitus. Not following a healthy diet can lead to diabetes mellitus, coronary arteries, osteoporosis, hypercholesterolemia, cancer, cirrhosis, and a number of heart diseases [2].

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The more food you consume, the more likely you are to get the disease [1].

Diabetes is a long-lasting metabolic disorder that is categorized into type 1 diabetes or type 2 diabetes. Increased blood glucose levels that increase over time are a sign of diabetes, which can result in serious damage to blood vessels, heart, kidneys, eyes, and nerves. Type 1 diabetes is a long-term condition in which the pancreas produces small or equal amounts of type 2 diabetes occurs when the body does not produce sufficient amounts of insulin. become resistant to insulin [3].

As stated by Astutisari et al. (2022), the activity patterns and eating habits of people with type 2 diabetes mellitus affect their blood glucose levels [4]. The results of other studies have shown that excessive eating habits and poor physical activity patterns result in increased blood sugar levels in the body and make it easier for complications to occur [5]

Data shows that about 422 million people worldwide have diabetes. By 2022, diabetes is expected to be one of the top ten global causes of death [3]. According to the International Diabetes Federation (IDF, 2021), Indonesia ranks seventh out of ten countries with the highest number of diabetics, namely 10.7 million people in the age range of 20 to 79 years [6]. In 2020, the Ministry of Health of the Republic of Indonesia (Kemenkes RI) reported that Indonesia was in seventh position out of ten countries with 10.7 million diabetic patients and recorded 1.5 million deaths from this disease [7].

According to secondary data from the Gorontalo Provincial Health Office, the number of diabetes cases in Gorontalo has increased every year. In the last three years, the prevalence has increased by 2017, 3.5%, 2018, 5.1%, and 2019, 7.4% In addition, in 2019, Gorontalo City ranked second nationally in the number of diabetics.

The Gorontalo province Riskesdas report shows that the number of Diabetes Mellitus cases is increasing every year. This is evidenced by research showing that Diabetes Mellitus is commonly diagnosed in people of all ages. Gorontalo City has the highest prevalence with 2.87%. North Gorontalo Regency is in second place with 1.73%, and Bone Bolango Regency is in third place with 1.33% [8].

The fishermen's livelihood depends on the catch of fish, which is the main source of their family's economic livelihood. They usually leave "to sea" in the afternoon or evening, then return in the morning with fish and other marine products [9].

Fishermen are one of the jobs that work at night, so they are often exhausted. Many people who work in human services such as health nurses, transportation, police, and fishermen experience a stress called work burnout. [9].

In relation to the number of fishermen in Gorontalo Province in 2022, North Gorontalo Regency is the most with 9,032 fishermen, followed by Pohuwato Regency with 4,264, then Gorontalo Regency with 4,148, Boalemo Regency with 3,684, Bone Bolango Regency with 2,565, and Gorontalo City with 1,762 fishermen. [10]

According to Rahmayanti et al. 2022, 35 respondents (43.2%) who had difficulty sleeping had hypertension, while 18 people who answered (22.2%) reported good sleep quality. have a normal blood sugar level [11].

An overview of blood glucose levels in fried rice sellers conducted by Rasyidah Safitri in 2020 is in line with this study. A fried rice shop is one of those jobs that has less sleep time because they have to work at night. As a result, they are unable to sleep and feel tired at night, so their sleep time is reduced. Fried rice shops in Bengkulu are prone to blood sugar because they work late at night [9]. Therefore, the researcher plans to conduct a study on the description of blood

glucose levels in night fishermen in Sumalata District.

Glucose metabolism, Various enzymes that promote glucose catabolism in cells play a role in glucose metabolism, including glycolysis, gluconeogenesis, glycogenolysis, and glycogenesis. One of these enzymes, glucokinase, allows the liver to sense serum glucose levels and utilize them when serum glucose levels rise, such as after a meal. Gluconeogenesis occurs during fasting periods, when glucose is not consumed, such as when sleeping at night. [12].

The synthesis of glucose from non-carbohydrate materials in the mitochondria of liver cells is known as gluconeogenesis. In addition, during the fasting period, the pancreas secretes glucagon, which initiates glycogenolysis. In glycogenolysis, glycogen, the stored form of glucose, is released as glucose. This process is known as glycogenesis, and it occurs when the liver has an excessive amount of carbohydrates [12].

Sleep quality plays an important role in the health of individuals, including for those with diabetes mellitus. For people with diabetes mellitus, having quality sleep is very important because good sleep can help maintain blood glucose levels. Conversely, poorly controlled blood glucose levels can negatively impact their sleep quality. Quality sleep can help control blood glucose levels and reduce diabetes-related risks. [13].

People with diabetes mellitus can improve their sleep quality through healthy sleep habits and relaxation techniques such as meditation, which help keep blood glucose levels within a healthy range and reduce the risk of diabetes-related health problems [13]. Lifestyles that include diet and portion sizes, as well as sleep duration, affect blood glucose levels, while shorter daily meal windows and early dinner can improve glucose control. [13]

People who live off fishing are called fishermen, and the Puger people are fishermen for the most part. One of the informal jobs is fishermen. Fishermen are a group of people whose livelihood depends on marine products, both for fishing and cultivation. In general, they live in coastal settlements close to their activities. The livelihood of fishermen includes everything related to fisheries, such as how to build a fish house, buy fishing equipment, catch, sell, and so on. As a result of their work, these fishermen are susceptible to diseases. Low back pain and contact dermatitis are the most common occupational diseases. [14].

Diabetes mellitus is a metabolic disorder that causes an increase in blood sugar due to abnormal insulin production or problems with insulin response. This condition can lead to a variety of chronic problems that affect the patient's health. [15].

Part of Musculosceletal Disorders (MSD) is low back pain. Pain in the lower back can originate in the spine of the lower back area, muscles, nerves, or other adjacent structures. Work period is one of the causes of low back pain. The time that a worker spends doing his or her job is known as the employment period. The risk of experiencing low back pain complaints increases with longer working hours. [16].

Fishermen are a group of people whose livelihood depends on marine products, both for fishing and cultivation. As a result of their work, these fishermen are susceptible to diseases. Low back pain and contact dermatitis are the most common occupational diseases [14].

Compared to other types of work, IRTs (housewives) and fishermen experience poorer sleep quality. The results showed that IRT workers and fishermen had more responsibilities and worse sleep quality than other types of work. Those who work at night, such as fishermen, are very tired. People who work in fields that provide services to others, such as health nurses, transportation, police, and so on, often

experience stress called work burnout, also known as "bournout". [9].

They have to wake up early, work at night and spend a considerable amount of time in the open ocean, which causes difficulty sleeping. Due to fishermen's activities that are usually carried out at night and in the open ocean for a long time, as well as changes in the weather and body temperature of fishermen, their sleep quality is poor. In addition, fatigue caused by waiting and pulling catches at any time while working can lead to sleep disturbances. [17]

People who experience sleep problems, such as sleep quality or sleep quantity, experience a decrease in insulin sensitivity, which in turn leads to an increase in blood glucose, which in turn worsens their diabetic condition. [18].

The secretion of some hormones is linked to changes that occur in the endocrine system during the nighttime sleep period, and lack of sleep has an impact on endocrine system function, especially with impaired glucose tolerance, insulin resistance, and reduced insulin response. Insulin resistance can increase with a decrease in the duration of exercise and physical activity. [19]. Lack of sleep can increase levels of the hormone ghrelin, which is responsible for increasing appetite, and decrease levels of the hormone leptin, which is responsible for sending satiety signals. Thus, a greater appetite clearly contributes to the risk of DM in conditions where insulin action is not optimal. [20].

Those who sleep less than five to six hours each night are twice as likely to develop diabetes mellitus, while those who sleep more than eight hours each night are three times more likely [20].

For the examination using the POCT (Point of Care Testing) method. POCT (Point-of-Care Testing) is a rapid testing method that measures blood glucose levels using test strips with dry reagents. The test uses capillary blood, which then reacts with the enzyme glucose dehydrogenase to convert glucose into gluconolactone. The results are available as soon as the test is complete, aiding in clinical decision-making. The tool is primarily used for glucose monitoring, not for definitive diagnosis. [21]. There are advantages and disadvantages of the POCT method. The advantages of this method are that it is easy to use, does not require the use of blood specimens, is affordable, and the test results are fast. The disadvantage of this method is that the measurement is limited, and care and calibration must be observed [22].

RESEARCH METHODOLOGY

This study uses a quantitative method. Where blood glucose is measured on fishermen who work at night in Sumalata District. The type of research is descriptive with the aim of describing blood glucose levels in fishermen who work at night in Sumalata District. This research was conducted from July to July 2024. The place for taking and examining samples was carried out in one of the villages in Sumalata District. The reason for taking the research location in this place is because the location is one of the sub-districts in North Gorontalo Regency where the number of fishermen is more than other districts based on data from the 2022 KKP Pusdadin, which is 9,032. Based on the information above, the sample used in this study is 30 people with the provision of fishermen who work at night. This study uses statistical analysis. univariate, which means checking one variable or feature at the same time. This univariate analysis used a frequency distribution table to determine how fishermen's blood glucose levels worked at night.

RESEARCH RESULTS

1. Univariate Analysis

Table 4.1 Data Analysis of Blood Glucose Level Examination in Fishermen

Up to Glukosa Darah	Frequency	Presented
Normal (≤ 110)	18	60 %
Abnormal (≥ 110)	12	40 %
Total	30	100 %

Source : Primary Research Data June-July (2023)

Based on the data analysis table of blood glucose level examination in fishermen, it was found that almost most of the respondents as many as 18 respondents (60%) and 12 respondents (40%) showed normal results.

Table 4.2 Distribution of Sleep Quality Characteristics to Fishermen Working at Night

Sleep Quality	Frequency	Presented
Orderly	-	-
Irregular	30	100 %
Total	30	100 %

Source : Primary Research Data June-July (2023)

There were 30 respondents who showed irregular sleep quality, according to the distribution of sleep quality characteristics to fishermen who work at night, shown in Table 4.2.

Table 4.3 Distribution of Food Type Characteristics to Fishermen Working at Night

Type of Food	Frequency	Presented
Balanced	27	90 %
Unbalanced	3	10 %
Total	30	100 %

Source : Primary Research Data June-July (2023)

According to Table 4.3, the distribution of food type characteristics to fishermen who work at night shows that 27 of the respondents consider the food type to be balanced, while the other 3 consider the food type to be unbalanced.

DISCUSSION

Both aerobically and anaerobically, glucose can produce ATP through a number of chemical reactions. However, aerobic glycolysis produces more energy by using glucose and oxygen than the anaerobic glycolysis of the lactic acid system. Glucose is produced from the transformation of carbohydrates consumed. Blood glucose and blood glucose will be stored in the liver and muscles as a source of energy [23].

Glucose, which is found in human blood, bee honey, and fruits as a source of energy, is a type of carbohydrate that circulates in the body and in cells as a source of energy. Glucose is also a carbohydrate that has not been hydrolyzed or broken down into fewer saccharides.

"Blood glucose" is a term in medical science that refers to the level of glucose in the blood. The body controls blood sugar, or serum glucose, very well. As a source of energy, the body uses glucose that is delivered through the blood. Typically, blood sugar levels remain between 4 and 8 mmol/l (70-150 mg/dl). This level is usually lowest before breakfast [23]. One of the most common checks is blood glucose because it plays an important role in the body's metabolism. Blood glucose is a source of human energy, consisting of carbohydrates that are consumed and stored in the muscles

and liver as glycogen, and are mostly absorbed into the bloodstream as glucose. [24].

This research was conducted in Sumalata District from May 15 to July 10, 2024, with 30 samples collected from fishermen who worked at night. After the capillary blood draw, the researcher used a POCT tool to check blood glucose levels.

According to research conducted on fishermen who work at night in Sumalata District. The results of 30 research samples showed that 18 respondents (60%) were normal respondents and 12 respondents (40%) were abnormal respondents. This is in line with the findings of Agung Setiyawan's 2016 study on Blood Glucose Levels During Aviation Safety Officers, which found that the most respondents had blood sugar levels that remained stable during the study. The production of the hormone insulin increases in response to increased blood sugar levels, which results in a feedback mechanism that regulates blood sugar levels. Once blood sugar levels rise, insulin further transports the sugar further to muscles, liver, and other cells, restoring blood sugar levels to normal levels [25].

According to the results of the questionnaire, several factors can affect the results of respondents who have abnormal glucose. These include lack of sleep, the habit of eating sweets or eating something two hours before the examination, and finally, having a history of diabetes mellitus (DM).

Poor sleep habits are the first factor that can affect high blood glucose levels. All respondents in this study experienced sleep deprivation, only 1-2 hours, even one of the fishermen did not sleep at all. Lack of sleep can increase the risk of diabetes because it leads to an increase in blood sugar. Research by Meti Kusmiati (2014) showed that poor sleep patterns can cause blood sugar to be up to 20% higher than normal in the samples tested. Sleep deprivation can also reduce the hormone insulin and increase the stress hormone, which interferes with insulin function [26].

Because eating two hours before the exam and eating and drinking habits are additional factors that can affect high blood glucose levels. In this study, all respondents who ate before the screening, i.e., all those who underwent the screening, had abnormal glucose levels because they had a family history of diabetes mellitus. This supports the findings of the Hifayah (2018) study, which found that there was a correlation between the consumption of sweetened beverages in Nyatnyono Village, West Ungaran District and their blood sugar levels. With a correlation value (r) of 0.382, the category of weak relationships shows a more positive direction. It can also be caused by a high intake of sugar or carbohydrates and a low intake of fiber. Improving your diet by eating healthy foods is one way to prevent diabetes mellitus [27]. The last factor Sweet eating habits can affect high blood glucose. In this study, some respondents considered consuming sweets to increase the risk of developing diabetes.

This is in line with a study conducted by Wicaksono (2011), which found that consuming sugary foods and drinks increased the risk of developing type 2 diabetes by two times compared to individuals who did not. But this is not statistically significant. There is little evidence of a relationship between gender, health, history of hypertension, dyslipidemia, smoking habits, and high sugar consumption with high blood sugar levels. However, a history of diabetes mellitus (DM) can affect blood glucose levels [28]. Research shows that individuals with DM are more at risk than those without DM. The study of Nuraisyah Fatma et al. (2020) also found that people with a family history of DM type 2 (DMT2) were 3.78 times more likely to experience abnormal blood sugar levels than those without a family history (p-value=0.04;

95% CI: 0.89-22.30). This suggests that a family history of DMT2 may increase the risk of developing DMT2 [29].

CLOSING

Conclusion

The results of the study showed that the majority of fishermen who worked at night had blood glucose levels below 110; 18 people (60%) and 12 people (20%). The characteristics of the respondents (fishermen) in Sumalata sub-district are the lack of quality sleep where they sleep ≤ 8 hours as many as 30 respondents. In addition, there were also 27 respondents with balanced food and 3 respondents with balanced food

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