

DESCRIPTION OF EXAMINATION OF BLOOD SUGAR LEVELS IN CATARACTS IN TOTO KABILA HOSPITAL IN 2022

Putri Regita Katili¹, Marlia², Gayatri D. Soga³

¹Bina Mandiri University of Gorontalo, ²Faisal Islamic Hospital

³Bone Bolango Health Office

E-mail: putrikatili@gmail.com

ABSTRACT

Blood sugar is a metabolic disorder in which an inability to oxidize carbohydrates is found due to disturbances in the normal insulin mechanism. People with diabetes mellitus will usually have blood sugar levels that are higher than normal people. A rapid increase in blood sugar can cause acute lens swelling and pseudomyopia, but this phenomenon is reversible. One of the complications of diabetes mellitus is chronic microvascular complications that can attack the eyes. As for goalsof this study is to find out the results of an examination of the description of blood sugar levels when in patients with cataracts at Toto Kabila Hospital in 2022. The method in this study used a descriptive quantitative approach and a purposive sampling technique by determining certain criteria or considerations. The results showed that of the 30 samples, consisting of 11 male respondents and 19 female respondents, the average age of the respondents was 45 years to 85 years, there were 13 normal blood sugar levels or (43.3%) and blood sugar levels abnormal blood as much as 17 or (56.7%)

Keywords: Sufferers of Cataracts, Temporary Blood Sugar

INTRODUCTION

The sense of sight is one of the organs of the human body which has a very important function to enable humans to receive information from the surrounding environment. The eye is the sense of sight which is a very vital sensory organ because 80% of information is obtained from sight [10].

Eye health problems are a world health problem and cases of eye disease are always found every day in clinical practice which can end in the appearance of visual impairment. One of the most common eye diseases in clinical practice is cataracts. Cataracts are a condition in which the normally clear and clear lens of the eye becomes cloudy. this abnormality is not a tumor or tissue growth in the eye, but is a condition where the lens becomes cloudy. if the cloudiness of the lens increases, vision

will become cloudy and can end in blindness. in Indonesia, the prevalence of blindness is 1.2% and cataracts contribute 0.70% to this blindness. [2].

Blood glucose is the sugar found in the blood which is formed from carbohydrates in food and stored as glycogen in the liver and skeletal muscles, energy for most cell and tissue functions comes from glucose, the formation of alternative energy can also come from fatty acid metabolism, but this pathway less efficient than the direct combustion of glucose, and this process also produces harmful acid metabolites if allowed to accumulate [8].

Cataracts are any cloudy conditions in the lens that can occur due to hydration (addition of fluid) of the lens, denaturation of lens proteins, or due to both of these opacities that can interfere with the passage of light through the lens so that vision can

become blurred until it is completely lost. the main cause of cataracts is age, but many other things can be involved such as trauma, toxins, systemic diseases (such as diabetes) [2].

There are 38 million blind people in the world and half of them are caused by cataracts. Age-related cataracts cause approximately 48% of blindness in the world, which is about 18 million people. About 85% of cataract sufferers are elderly [25].

Indonesia is one of five countries with the largest number of people with visual impairments. Cataracts are the second most common cause of visual impairment with a rate of 25.81% and first order as a cause of blindness which reaches 34.47%. More than 75% of visual impairments are preventable visual impairments. In Indonesia alone, the prevalence of blindness due to cataracts often occurs among people aged 50 years and over at 1.9%. The highest prevalence of cataracts in Indonesia is in Lampung Province, which is 1.5%, and South Kalimantan, which is 2.0%.

Shows that the prevalence of blindness due to cataracts in Gorontalo province is 2.5% of the population with 2,098 cases. [12].

Based on initial data obtained at the Toto Kabila Hospital, Bone Bolango Regency, it shows that from 2019 to 2021 the number of cataract eye patients in the inpatient department was 49, and in the outpatient department there were 435 and there was an increase in 2022 as many as 484.

In addition to increasing cataract cases at Toto Kabila Hospital, patient complaints that need to be carried out also include an examination of type 2 diabetes mellitus at Toto Kabila Hospital, Bone Bolango District, data obtained from January to November 2021 totaled 520 cases [21].

Regarding examination of blood glucose levels in the elderly, it shows that glucose levels increase by 20 people (40%), normal glucose levels by 30 people (60%) [12].

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The relationship between cataracts and blood sugar when there is an increase in blood sugar levels is a metabolic disorder in which an inability to oxidize carbohydrates is found due to interference with the normal insulin mechanism. People with diabetes mellitus will have blood sugar levels that are higher than normal people. One of the complications of diabetes mellitus is chronic microvascular complications that can attack the eyes [2].

Based on the background above, the researchers are interested in knowing how far the description of the results of checking blood sugar levels during cataract patients at Toto Kabila Hospital in 2022

Cataracts have various languages but have the same meaning, while some of these languages, among others, if you use Greek it is called Katarrhakies, if you use English it is called Cataract, and in Latin it is called Cataracta which means waterfall, whereas if it is interpreted in Indonesian, cataracts also called as bular because of vision as if covered with water due to the cloudy lens. Cataracts are the occurrence of cloudiness in the lens caused by hydration (addition of fluid), lens protein denaturation. Lens opacities usually occur in both eyes and can progress progressively and will not change for a long time [16].

Elderly is a life stage of a life process which is characterized by a decrease in the body's ability to adapt. Elderly is characterized by a person's failure to maintain balance against physiological conditions. The aging process that occurs in the elderly linearly can be described through three stages, namely, impairment, functional limitations, disability, and handicap which will be experienced simultaneously with the process of decline. The survival and life expectancy of a person who have entered old age in a situation where mortality occurs in a society will result in an epidemiological transition in the health sector which is the result of an increase in the number of morbidity rates for degenerative diseases, one of which is cataracts [23].

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Cataracts are lens opacity that can interfere with vision and are the highest cause of visual impairment worldwide, usually occurring in the elderly because the increase in the incidence of cataracts is accompanied by an increase in one's age. Cataracts are clouding of the eye lens which can affect vision. Cataracts usually occur in association with aging, generally in the elderly [14].

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The most commonly found cataracts are caused by age. Age is the most common cause of cataracts where cloudiness occurs in the lens of the eye which can occur due to hydration (addition of lens fluid), denaturation of lens protein or both [10].

Cataracts are a condition in which clouding of the lens fibers occurs in the lens capsule. Usually occurs due to the aging process in all people over 40 years old. Lens opacities can also be caused by disturbances in the development and metabolism of the lens or secondary to lens surgery, [16].

Cataracts which usually occur in the elderly due to congenital abnormalities. There are several eye diseases that can cause cataracts, including glaucoma, retinal detachment, uveitis, retinitis pigmentosa, special toxic substances (chemical and physical) and intraocular disease. Systemic or metabolic disorders that can cause

cataracts, such as diabetes mellitus, galactosemia and motor dystrophy. Cataracts also can be found in a state without eye abnormalities or systemic eg senile cataract, juvenile, hereditary or congenital eye disorders [22].

Loss of transparency in the lens results from physical and chemical changes. Vision begins to show distortion, this is the result the occurrence of changes in the multiple fine fibers or the so-called zonula, zonula extends from the ciliary body to the outside of the lens. The path of light to the retina is obstructed due to blurred vision, this can occur due to chemical changes in the lens protein. The normal lens protein that is cut off accompanied by water influx has been mentioned by one theory. This process is capable breaks the tense lens fibers and interferes with the light transmission process. Another theory says that an enzyme has a role as a lens protector from the degeneration process. A decrease in the number of enzymes can occur with increasing age and will not occur in most patients with cataracts [24].

Management of cataract patients with surgical procedures. If cataract symptoms do not interfere with surgery, it is not necessary. Use of glasses if they do not obstruct and interfere with vision. Surgical measures are performed to get better vision [9].

The process of cataracts is due to the buildup of sugar metabolizing substances by the cells of the eye lens. In a state of normal blood sugar levels, the accumulation of these waste substances does not occur. Patients with diabetes have a high risk of developing cataracts and a higher risk of postoperative complications. A rapid rise in blood sugar can cause acute lens swelling and pseudomyopia, but this phenomenon is reversible. common types in diabetic patients are posterior subcapsular, cortical, and mixed cataracts [9].

Blood sugar is the sugar found in the blood which is formed from carbohydrates in food and stored as glycogen in the liver and skeletal muscles. Energy for most cell

and tissue functions comes from glucose. Formation of alternative energy can also come from fatty acid metabolism, but this pathway less efficient than the direct combustion of glucose, and this process also produces harmful acid metabolites if allowed to accumulate, so that glucose levels in the blood are controlled by several homeostatic mechanisms which in a healthy state can maintain levels in the range of 70 to 110 mg/dl in fasting state [11].

The concentration of glucose in normal human blood is between 80-100 mg/dl. After eating a carbohydrate source, the blood glucose concentration can rise up to 120-130 mg/dl. Then it drops to normal again. In a fasting state, the blood glucose concentration drops to 60-70 mg/dl. The condition of blood glucose is higher than normal is called hyperglycemia, and if the glucose level is lower than normal it is called hypoglycemia. If the concentration is too high, the sugar is excreted from the body through the urine. Blood sugar levels are influenced by endogenous and exogenous factors. Endogenous factors, namely humoral factors such as the hormones insulin, glucagon and cortisol, act as receptor systems in muscle and liver cells. Exogenous factors include the type and amount of food consumed and the activities carried out [19].

Metabolism is a process of chemical reactions that occur in the body of living things. A process that involves many enzymes in it, resulting in the exchange of materials and energy. Below is the metabolism that affects blood glucose levels that occur in the body [12].

Blood Sugar from carbohydrates consumed in food is absorbed and its main priority is to provide fuel to the brain which requires 100-125 grams of sugar every day. Sugar then replenishes liver glycogen and excess sugar will be stored as fat in the digestive process of food, carbohydrates undergo processing hydrolysis, both in the mouth, stomach and in the intestine. The end result of the digestive process is sugar, fructose, galactose and mannose and other

monosaccharides. These compounds are then absorbed through the intestinal wall and carried to the liver by the blood [1].

The overall sugar oxidation process takes place in two stages, namely anaerobic, the glycolysis process which breaks down glucose into pyruvic acid and aerobic, oxidizes pyruvic acid to H₂O and CO₂, as well as energy. If in the food consumed the amount of sugar intake is not sufficient, the concentration of glucose in the blood will be maintained through the destruction of glycogen in the liver [1].

The body needs to regulate its blood sugar level over time so that the cells receive enough energy to meet the needs of the cells to perform their functions. At the time of digestion the body breaks down nutrients from food and drink to form substances that the cells use as a source of energy and repair the body itself. The main source of energy is glucose (blood sugar) which is carried by the bloodstream to all cells. Excess sugar will be stored in the liver, muscles and fat as a food reserve and will be released when needed [3].

There are reduction methods and enzymatic methods for checking blood sugar. In the enzymatic method, blood sugar can be checked using the GOD-POD (sugar peroxidation) method and the Hexokinase method [9].

The factors that affect the enzyme, namely:

1. Effect of temperature

Each enzyme has an optimum temperature, which is the temperature at which the enzyme has maximum activity. Enzymes in the human body have an optimal temperature of around 37°C. Below or above the optimum temperature, enzyme activity will decrease. Temperatures close to freezing do not destroy enzymes, but they do inactivate them. If the temperature is raised, the enzyme activity will increase. However, a large increase in temperature can cause the enzyme to experience denaturation and turn off its catalytic

activity. Most enzymes experience denaturation at 60°C [9].

2. Effect of pH

Enzymes work at a certain temperature, generally at a pH of around 6-8. Each enzyme has a unique optimum pH. Some enzymes are active at high pH and some are at low pH. For example, pepsin is a digestive enzyme in the stomach which has an optimal pH 2. Conversely trypsin is a digestive enzyme found in the small intestine and has a pH of 7.7. At a pH far above the optimum, enzymes will experience denaturation. [17].

3. Effect of Enzyme Concentration

Increasing the concentration of enzymes will increase the speed of enzymatic reactions. It can be said that the speed of an enzymatic reaction is directly proportional to the concentration of the enzyme. The greater the concentration of the enzyme, the faster the reaction [17].

4. Changes in substrate concentration

At a fixed enzyme concentration, an increase in substrate concentration will increase the rate of the enzymatic reaction to a constant maximum rate. At the maximum point, all enzymes are saturated with substrate so that the addition of substrate does not increase the rate of enzymatic reactions [16].

There are 5 types of blood sugar level checks, namely:

1. Fasting blood sugar test (Nuchter)

Fasting blood glucose level is the most commonly used measure of overall sugar homeostasis. In a fasting state, where food and drink must be avoided for approximately 12 hours before the examination

Normal Value: 76-110 mg/dl

2. Examination of post-prandial blood sugar levels (2 hours after eating)

A blood sugar sample 2 hours after eating is usually done to measure the client's response to a high carbohydrate

intake 2 hours after eating (breakfast or lunch). This test is done to monitor diabetes which is recommended if blood sugar levels, restrictions on eating and fluids are higher than normal or increasing.

Normal values: <160 mg/dl.

3. Blood sugar level check

Temporary blood sugar is a test sample that is carried out instantaneously without fasting.

Normal value: 70-140 mg/dl

4. Examination of the HBA1c test

The HBA1c test is an examination carried out to determine sugar levels for three months

Normal value: <6.5%.

5. Examination test / sugar tolerance

The sugar tolerance test is an examination performed to diagnose diabetes mellitus in someone who has blood sugar levels within normal limits or slightly elevated [16].

Normal value: 76-110 mmg/dl

METHODS

This study uses a quantitative approach. Because this study obtained results in the form of numbers, namely the results of checking blood sugar levels while in cataract eye sufferers at Toto Kabila Hospital. The type of research used in this research is descriptive research with a quantitative approach. Descriptive research is what is recommended to describe or describe a situation in a community or society, this study aims to see an overview of blood sugar levels at Toto Kabila Hospital, Kab. Bone Bolango.

The population of this study were all cataract sufferers at Toto Kabila Hospital, Bone Bolango Regency. Based on data from all cataract sufferers, there were 484 people.

Data were analyzed using the SPSS 25.0 application and presented in tabular form

RESEARCH FINDINGS

Table 1. Distribution of Blood Sugar Examination Results in Cataract Eye Patients at Toto Kabila Hospital

Check up result	Frequency	Percentage (%)
Normal	13	43.3%
Abnormal	17	56.7%
Total	30	100 %

Source: Primary Data, 2022

Based on table 1 above, blood sugar examinations in patients with cataracts were declared normal in 13 samples with a percentage of 43.3% and those who were declared abnormal were 17 samples with a percentage of 56.7%.

Table 2. Age Factor Distribution of Cataract Eye Patients at Toto Kabila Hospital

Age	Frequency	Percentage (%)
45-55 Years	4	13.3 %
>56 Years	26	86.6 %
Total	30	100 %

Source: Primary Data, 2022

Based on table 2 above, the age factor distribution of cataract eye sufferers aged 45-55 was 4 samples with a percentage of 13.3% and those aged > 56 and over were 26 samples with a percentage of 86.6%.

Table. 3 Distribution of Blood Sugar Examination Results in Cataract Eye Patients Based on Gender at Toto Kabila Hospital

Gender	Check up result	Frequency	Percentage
Man	Normal	3	27.3 %
	Abnormal	8	72.7%
Woman	Normal	10	52.6%
	Abnormal	9	47.4%

Total	30	100%
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Source: Primary Data, 2022

Based on table 4.3 above, temporary blood sugar examination in cataract eye sufferers based on sex was declared normal in 3 samples with a percentage of 27.3% and those who were declared abnormal were 8 samples with a percentage of 72.7%. Meanwhile, there were 10 normal men with a percentage of 52.6% and 9 abnormal men with a percentage of 47.7%.

DISCUSSION

Cataracts are a disorder of the cloudy lens in the eyeball. Cataracts occur due to cloudiness in the lens of the eye which results in depending on the light entering the eyeball, so that vision becomes cloudy and over time can cause blindness [23].

Indonesian people's knowledge and attitudes towards eye health are still lacking in prevention. Due to the lack of access to information about the causes of cataracts and how to treat them, the success of cataract treatment does not escape postoperative care, which also greatly determines the success of cataract treatment, including knowledge and attitudes in postoperative cataract care. Cataract surgery aims to improve visual acuity so as to improve quality. patient life [19].

Family history that has a history of cataracts has the potential to run a risk of being passed on to children, this is due to inflammation in pregnancy resulting in congenital cataracts, Congenital is a condition when the lens of the eye in newborns looks cloudy, which occurs before or soon after the baby is born and the baby is less more than 1 year.

There are many risk factors for cataracts, one of which is diabetes mellitus, often consuming foods that contain too much sugar. Patients with diabetes have a high risk of developing cataracts and a higher risk of postoperative complications. Rapid increase in blood sugar can cause

acute lens swelling and pseudomyopia, but this phenomenon is reversible, therefore early control of sugar is very good to prevent complications [23].

The sampling was done by purposive sampling method. The research process lasted for 24 (twenty four) days, starting on June 24 and ending on July 17, 2022. So to measure blood sugar levels in cataract sufferers, researchers first observed patients who were at Toto Kabila Hospital.

Furthermore, these patients were met directly by the observer in providing an explanation about the purpose of this observation and asked for their willingness to participate as respondents in this study. If the patient with cataracts agreed, informed consent was given which was then filled out and signed by the respondent. After the patient agreed, the researcher took capillary blood to do a temporary blood sugar check on the respondent. The number of samples or respondents obtained was as many as 30 people presented in tabular form.

After capillary blood was taken to check temporary blood sugar levels, using the Auto Check tool, the researcher wrote or recorded the results obtained onto the result sheet that the researcher had prepared. The results of checking blood sugar levels while can be seen in table 4.1 above.

BLOOD SUGAR LEVELS IN PATIENTS WITH CATARACTS

Based on the research results obtained at the study site, that of the 30 samples taken, blood sugar checks during cataract eye patients were declared normal were 13 samples with a percentage of 43.3% and those who were declared abnormal were 17 samples with a percentage of 56.7%.

Based on table 4.2 above, the age factor distribution of cataract eye sufferers aged 45-55 was 4 samples with a percentage of 13.3% and those aged >56 and over were 26 samples with a percentage of 86.6%.

Based on table 4.3 above, the blood sugar examination in cataract eye sufferers based on sex was 11 males, 3 samples were

declared normal with a percentage of 27.3% and 8 samples were declared abnormal with a percentage of 72.7%. Meanwhile, 19 normal women were 10 with a percentage of 52.6% and 9 abnormal with a percentage of 47.7%.

From the results of examining blood glucose levels from 40 samples in cataract sufferers at the UPT Special Eye Hospital of the North Sumatra Provincial Government, temporary blood sugar levels increased by 24 people with a percentage of 60% and normal glucose levels by 16 people with a percentage of 40% [10].

This is in line with research conducted by Khairani (2019) From the results of examining blood glucose levels from 40 samples in cataract sufferers at the UPT Special Eye Hospital of the North Sumatra Provincial Government, blood sugar levels increased by 24 people with a percentage of 60% and normal glucose levels by 16 people with a percentage of 40%.

The process of cataracts occurs as a result of the accumulation of waste products of sugar metabolism by eye cells. In normal blood sugar. The accumulation of these residues does not occur when blood sugar levels increase, the conversion of sugar by Aldose Reductase to sorbitol increases. In addition, the conversion of sorbitol to fructose takes a relatively long time and is not balanced so that sorbitol levels in the lens of the eye increase. Compiled in the hypothesis that sorbitol increases intracellular osmotic pressure with the result of increasing Water Up Take and subsequently directly or indirectly forming cataracts [1].

CONCLUSION

Based on the results of this study, it can be concluded that out of 30 samples, 13 respondents had normal blood sugar levels with a percentage of 43.3% and 17 respondents had normal blood sugar levels. abnormal blood with a percentage of 56.7%.

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