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DESCRIPTION OF BLOOD SUGAR LEVELS OF MALE WISTAR RATS AFTER ADMINISTRATION OF ETHANOL EXTRACT OF RAMBUSA LEAVES (PASSIFLORA FOETIDA LINN.) FROM CENTRAL KALIMANTAN

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ABSTRACT
Rambusa (Passiflora foetida Linn.) is a type of plant that is often found creeping on other plants. Usually found in watery areas such as swamps and rivers. The rambusa plant contains chemical compounds which are useful sources and can be developed as medicine. Several previous studies explained that Rambusa (Passiflora foetida Linn.) which grows in several areas shows antidiabetic properties. The aim of this study was to determine the blood sugar levels of male Wistar rats after administration of ethanol extract of rambusa leaves (Passiflora foetida Linn.) from Central Kalimantan. This research was carried out using an experimental or experimental method (experiment research) in the laboratory which was carried out with a series of experiments using the GCU Check strip. The results of this study show that ethanol extract of rambusa leaves from Central Kalimantan can reduce blood sugar levels of male Wistar rats at doses of 1.5 mg/Kgbb and 2 mg/Kgbb.

Keywords: blood sugar; central kalimantan; ethanol extract; rambusa leaves

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INTRODUCTION

Diabetes Mellitus (DM) is a metabolic disease that is chronic and test sufferers cannot produce insulin in sufficient quantities or the body is unable to use insulin effectively, resulting in excess sugar in the blood (Atun, 2010). Based on the Diabetes Atlas 6th Edition (2013), Indonesia is ranked third in the number of diabetes sufferers in the Asian region after China and India. It is estimated that 5.6 percent of Indonesia's population or around 8.5 million people suffer from diabetes. This number is estimated to increase by 14 million people or around 6.7 percent in 2035. In Indonesia currently, around 90 percent of diabetes sufferers are type II.Increased glucose levels in the blood are a clear sign in diabetes sufferers. Glucose functions as an energy source for cells and as an energy reserve stored in cells (Widiyanto, 2013). The amount of glucose content in plasma is called blood glucose level. Normal blood glucose levels are if the fasting blood glucose level is 70-110 mg/dl and low fasting blood glucose levels are < 55 mg/dl (Gaol, 2015).

Therapeutic management to lower blood sugar levels currently varies in society. Apart from chemical medicines, the use of herbal medicines and plants that are believed to have medicinal properties is also an option. Throughout the world, traditional plant-based medicine is the most commonly used form of treatment for a variety of health problems. These traditional medicines play an important role in primary health care in many developing countries. Tanzania is one of the countries where the majority of the population relies on

traditional medicines to treat their health problems, including diabetes (Nguma, 2010). Lunyera et al. (2016) reported that 77% of diabetes patients in Northern Tanzania use traditional medicines for diabetes management. Indonesia, as a country that has various ethnic groups and biodiversity, also does not fail to use medicinal plants to reduce blood glucose levels, both scientifically proven and based on empirical data.Central Kalimantan is one of the provinces in Indonesia with the majority of its people currently belonging to the Dayak tribe. Medicinal plants are nothing new to the Dayak people in Central Kalimantan. Currently, medicinal plants have become one of the choices for the Dayak people of Central Kalimantan in medical therapy (Pitoyo & Triwahyudi, 2017). Qamariah et al. (2018) in an empirical and ethnopharmacological study reported several plants used by the community to cure several diseases. One of these plants is Kemot in Dayak language and known as Rambusa (Passiflora foetida Linn.) in national and Latin languages. Rambusa (Passiflora foetida Linn.) is used by the Dayak people in Central Kalimantan for various medicinal purposes ranging from asthma, infections, hypertension, and lowering blood sugar levels. In its use as a medicinal plant, the Dayak people use parts of Rambusa (Passiflora foetida Linn.) starting from the roots, flowers, stems, fruit and leaves.

The benefits of Rambusa (Passiflora foetida Linn.) in reducing blood sugar levels in various regions have been researched. As has been reported by Siriwardhene et al. (2013) that Rambusa leaves (Passiflora foetida Linn.) which grow in Sri Lanka have anti-hyperglycemic activity. Apart from that, Khaerati et al. (2015) also reported that in vivo ethanol extract of Rambusa leaves (Passiflora foetida Linn.) which grows in Palu can reduce blood sugar levels in mice (Mus musculus) that have been induced by sugar.The growth and development of a plant (including secondary metabolites) is strongly influenced by environmental factors (Herlina et al., 2017). Therefore, researchers are interested in conducting research on the description of blood sugar levels of male Wistar rats after being given ethanol extract of rambusa leaves which grow in Central Kalimantan and to determine the which dose can reduce blood sugar levels.

METHOD

The type of research used in this study is experimental with a laboratory approach, involving a series of experiments. Experimental research aims to determine a symptom or influence resulting from a specific treatment trial (Notoadmodjo, 2010). The researchers administered ethanol extract of rambusa leaves in varying doses, comparing control and treatment groups. This research was conducted at the Pharmacology Laboratory and Pharmacognosy Laboratory, Faculty of Health Sciences, Muhammadiyah University, Palangkaraya, from March 2020 to December 2020. The population consisted of male Wistar rats, and the samples were those whose blood sugar levels decreased after receiving the ethanol extract of rambusa leaves (Passiflora foetida Linn.).The sampling technique used was Probability Sampling, giving male Wistar rats the opportunity to become research samples, with the operational definition being the reduction of blood sugar levels in male Wistar rats. Primary data was collected directly from observations of blood sugar levels, while secondary data was obtained from literature studies of previous research supporting this study, including definitions of blood sugar and test animal subjects. Tools used included analytical scales, sonde, camera, syringe, scalpel, rotary evaporator, gloves, test tube, measuring flask, GCU check and strip, cotton, and macerator or vessel. Materials included adult male Wistar rats, ethanol extract of rambusa leaves, water, 96% ethanol, BR2, wood dust, and sugar water. Procedures involved making simplicia, extraction, preparing test animals, and conducting experiments. Rambusa leaves were obtained from empty land, sorted, and dried. The extraction process used maceration with 7 liters of 96% ethanol, resulting in a thick extract

after evaporation. Experimental animals were housed in clean cages with sawdust, BR2 food, and water. Test animals were divided into 5 groups: K- (negative control), K+ (positive control), Test Group I, Test Group II, and Test Group III, each receiving different treatments involving sugar solution and varying doses of rambusa leaf ethanol extract. Metformin and rambusa leaf ethanol extract stock solutions were prepared, and blood was collected from the rats' tails for sugar level measurement using the Glucose, Cholesterol, Uric Acid Check (GCUC) tool. Data processing involved comparing blood sugar levels before and after treatment, recording in tabulation, calculating percentage reductions, and comparing the results across groups.

RESULT

Test animals are placed in a special cage separate from test animals used for other research and given regular food. Each test animal was given ethanol extract of rambusa leaves orally, according to the dose and volume that had been grouped, for 7 consecutive days, in the morning given sugar water by disonde, and given a period of 6 hours before the treatment was given ethanol extract of rambusa leaves. (Passiflora foetida Linn). And on the eighth day, blood sugar is checked. Then the next treatment is taking blood from the test animal intravenously (through the tail) and dripping it directly onto a stick and testing it on the GCU Check strip. And note down the numbers that appear on the GCU Check Strip tool as a result of the check.

Table 1.
Blood sugar levels in male Wistar rats after administration of ethanol extract of rambusa leaves (Passiflora foetida Linn.)

Group	Dose	Temporary Blood Sugar Levels (mg/dL)			
		Before	After	Decline	Percentage
K-	-	98.6 mg/dL	130 mg/dL	-31.4 mg/dL (increasing)	-31.8% (increase)
K+	1 mg/kgBW + metformin	113.3 mg/dL	84.6 mg/dL	28.7 mg/dL	25.3%
I	1 mg/kgBW	112.6 mg/dL	133.6 mg/dL	-21 mg/dL (increasing)	-18.7% (increase)
II	1.5 mg/kgBW	121.3 mg/dL	117.3 mg/dL	4 mg/dL	3.3%
III	2 mg/kgBW	133 mg/dL	107.3 mg/dL	25.7 mg/dL	19.3%

The table above explains that the blood sugar levels of mice before treatment in the K- group were 98.6 mg/dL and after treatment for 7 (seven) days it was 130 mg/dl and had an increase of 31%. An increase or decrease in blood glucose levels within the normal range is common in living creatures, due to environmental influences (body metabolism) and food intake.

DISCUSSION

The plant used in this research is Rambusa (Passiflora foetida Linn.). The part of the plant used is the leaves. Rambusa leaves themselves are often used as an efficacious medicinal plant. Rambusa in Kalimantan itself is known as cemot, people consider it a plant that grows wild in the bushes and in the highlands, and then consumes its fruit (Mulyani, 2019). Rambusa was chosen in this study based on research by Siriwardhene (2013) that rambusa has the ability to lower blood sugar in Wistar rats. The process of making simplicia begins with wet sorting of fresh rambusa leaves. The wet sorting aims to separate the dirt contained in the rambusa leaves. After wet sorting, the rambusa leaves are washed using running water with

the aim of removing dirt from the rambusa leaves which are still being washed. The rambusa leaves are drained with the aim of reducing the remaining water from washing. After washing the rambusa leaves, leave them at room temperature until they dry, then after the rambusa leaves are dry, dry sorting is carried out again to ensure that the rambusa leaf simplicia is clean from other impurities. From 3.5 kg of fresh rambusa leaves, 0.31 kg of dried simplicia was obtained. After the Rambusa Leaves are dry, dry sorting is carried out again to ensure that the Rambusa Leaf simplicia is clean from other impurities.

The extraction process in this research used 96% ethanol solvent. According to Rahmawati (2011) 96% ethanol is a universal solvent that can filter compounds that are polar, semi-polar and non-polar. The 96% ethanol solvent itself is a polar compound that evaporates easily so it is good for use as an extract solvent. The results of the maceration process are concentrated using a rotary evaporatory which aims to separate the extract from the filter liquid. The working principle of concentrating the solution by evaporation is based on the very large difference in boiling point between the dissolved substances and the solvent. In the dairy industry, the normal boiling point of water (as a milk solvent) is 100°C, while milk solids practically cannot evaporate. So, by evaporating the water and not evaporating the solids, a more concentrated solution will be obtained (Saleh, 2004). Results the evaporation was then evaporated again using a water bath at a temperature of 60˚C until a constant weight of Rambusa leaf ethanol extract was obtained 46.02 grams. From 310 grams of dried simplicia that was macerated, 46.02 grams of thick extract was obtained, so the yield of rambusa leaf ethanol extract was 14.84%.

Based on table 1, the blood sugar level of mice before treatment in the K+ group was 113.3 mg/dL and after treatment for 7 (seven) days it was 84.6 mg/dL, data shows a decrease in mouse blood sugar levels of 25.3%. This is due to the blood sugar lowering effect of metformin. Metformin is an oral antihyperglycemia from the biguanide group. The mechanism of action according to Gumantara and Oktarlina (2007) in a study comparing Monotherapy and Combination Sulfonylurea-Metformin Therapy for Type 2 Diabetes Mellitus Patients, metformin is an oral antihyperglycemia in the biguanide group. The main mechanism of action is to reduce glucose levels to cause a decrease in hepatic gluconeogenesis. Phosphorylation of the CREB (Camp Response Element Binding Protein) protein results in decreased gene expression for gluconeogenesis and reduces free fatty acids as a substrate for gluconeogenesis. Furthermore, in Group I (one), the blood sugar level of mice before treatment was 112.6 mg/dL, after treatment for 7 (seven) days it was 133.6 mg/dL and an increase of 18.7% was obtained. This shows that there was no decrease after administering rambusa leaf ethanol extract at a dose of 1 mg/kgBW. This is thought to be due to a lack of extract levels to produce an effect on lowering blood sugar, or the mice were under stress. Stress conditions in mice can result in disruption of blood sugar control carried out by hormones, so that the body will produce the hormones epinephrine and cortisol which cause blood sugar levels to increase automatically (Stumvoll et al, 2005). The blood sugar level of mice before treatment in group II was 121.3 mg/dL and after treatment for 7 (seven) days it was 117.3 mg/dL and had a percentage decrease of 3.3%, while the blood sugar level of mice before treatment in group III it was 133 mg/dL and after treatment for 7 (seven) days it was 107.3 mg/dL and had a percentage reduction of 19.3%. This is suspected to have an effect on reducing blood sugar in mice from administering ethanol extract of rambusa leaves (Passiflora foetida Linn).

Khaerati's research (2015) stated that rambusa leaves at doses of 250 mg/kgBB, 500 mg/kgBB, and 750 mg/kgBB had the effect of lowering blood sugar in mice, whereas this

study showed that at a dose of 1.5 kg/mgBB it was able to reduce blood sugar levels. rat blood. And in the author's research, it was carried out on different test animals, namely Wistar rats at various doses. It can be compared that rambusa leaf extract in this study at smaller doses was able to lower blood sugar in. In this study, the greatest blood sugar lowering effect of rambusa leaves was at a dose of 2 mg/kgBB.The benefits shown by Rambusa (Passiflora foetida Linn) in owering glucose levels in the blood cannot be separated from the content of secondary metabolites, namely alkaloids, saponins, tannins and steroids (Mulyani, 2019). Modern theory has established that secondary metabolites are expressed as a result of external stimuli, where according to this theory an organism can produce completely different groups of metabolites depending on environmental conditions, duration and intensity of stress, composition, and genetic plasticity of the plant (Zhao et al., 2006).

CONCLUSION

Based on the results of the research conducted, it can be concluded that Rambusa Leaf Extract (Passiflora foetida Linn.) from Central Kalimantan can reduce blood sugar levels in male Wistar rats using the in vivo test method. The ethanol extract of rambusa leaves can reduce blood sugar levels in Wistar rats at a dose of 1.5 mg/kgBW by 4 mg/dL and at a dose of 2 mg/kgBW by 25.7 mg/dL. Considering the shortcomings in this research, the researchers suggest conducting similar studies using other methods such as chemical and enzymatic methods. Further research should also investigate the blood sugar profile, including fasting blood sugar and 2-hour postprandial blood sugar. Additionally, research on the potential of ethanol extract of rambusa leaves (Passiflora foetida Linn.) should be developed further.

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