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Influence Zalak Fruit Skin Extract (*Salacca zalacca*) On Lipid Profiles in Type 2 Diabetes Mice

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ABSTRACT

Salak peel was found to contain various phytochemical substances, including saponins, alkaloids, flavonoids, steroids, and phenolics. There is a common belief that certain active chemicals have antioxidant properties and have the potential to reduce glucose levels in the human body (Sandhar et al., 2011). Objective study For investigate the impact skin snake fruit on lipid profile, on T2DM mice. Study laboratory experimental, with quasi-experimental, in a manner special use Pretest-Posttest design. Group Experiment: 15 mice Wistar male, which is divided become three group. Group 1 works as negative control (TP), group 2 involved metformin (M) administration, focus group 3 on delivery extract skin Salak (EKS). Treatment given for 3 weeks, obtained results happen change average lipid profile in each point measuring Where change No significant increase or decrease on TP, M, EKS groups, with $p \geq 0.05$. Regeneration of pancreatic beta cells No influenced by presence metabolites secondary, including flavonoids, phenolics, and saponin, in extract ethanol skin snake fruit. And no can hinder conversion superoxide become hydrogen superoxide through the transformation chain. Besides that, flavonoids facilitate Power pull radical free to the hydrogen atom from group hydroxyl aromatic, so No help in a way significant in elimination they from body through system deletion.

Keywords: T2DM, extract skin Salak (EKS), Wistar male, lipid profile, skin snake fruit

Introduction

Type 2 diabetes (T2DM) is a medical condition characterized by increased blood glucose levels caused by the body's limited ability to use the hormone insulin. T2DM is the most common type of diabetes (Nareza, 2023). T2DM is the most common type of diabetes, around 90-95% of diabetes sufferers are type 2 diabetes mellitus while type 1 is estimated to be no more than 2-5%, diabetes in pregnant women but will disappear when the pregnancy ends, other types of diabetes account for 1- 2% of all cases of diabetes mellitus are diagnosed (RI PERMENKES 2019, 2019).

The risk factors for type 2 diabetes mellitus include age, race, family history, fat distribution, infrequent physical activity, obesity, and prediabetes. One of the factors of type 2 DM is rarely doing physical activity. A person who is not physically active has an increased tendency to develop type 2 diabetes due to the physiological benefits associated with engaging in physical activity, such as weight management, use of glucose as an energy source, and increased insulin sensitivity in cells (Haryono & Dwi, 2019).

According to the International Diabetes Federation, the number of cases in 2019 reached 463 million, with estimates increasing to around 700 million cases in 2045. China has the highest prevalence of diabetes mellitus among the top 10 countries in the world, with a rate of 116.4. India, the United States, Pakistan, Brazil, Mexico, Indonesia, Germany, Egypt and Bangladesh have

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reported a total of one million cases. The prevalence of diabetes in Indonesia continues to increase. Indonesia currently holds the 7th position globally in terms of the number of people aged 20-79 years who are affected by diabetes mellitus, with a total of 10.7 million people affected. Projections show that this figure will continue to increase and reach 16.6 million in 2045 (IDF, 2022).

According to the World Health Organization (WHO), diabetes is the seventh leading cause of death. Given its significant impact on global health, diabetes mellitus has emerged as an urgent concern and an important contributor to mortality rates in Indonesia. About 43% of the total 3.7 million deaths were attributed to death. Diabetes has emerged as a significant concern in the public health field, attracting attention from global authorities as one of four non-communicable diseases to be monitored. The incidence and prevalence of diabetes have shown a consistent upward trend in recent decades (World Health Organization 2023).

Management of type 2 blood sugar can be categorized into four fundamental components known as PERKENI, which include education, nutritional therapy or diet, pharmacological intervention, and exercise or physical exercise. Physical activity plays an important role in the management of type 2 diabetes. Physical exercise has been found to have several benefits for people with diabetes mellitus (DM). These benefits include lowering blood glucose levels, prevention of obesity, mitigation of atherogenic consequences and blood lipid disorders, and normalization of blood pressure. Aerobic physical exercise, such as walking, is one of the prescribed physical exercises 1) (Qolbi et al., 2020). There are two distinct categories of antihyperglycemic drugs, specifically the administration of insulin by injection and the use of oral antidiabetic drugs, which include sulfonylureas and alpha glucosidase inhibitors such as glibenclamide (Yudhistina et al., 2021). However, administration of oral antidiabetic drugs can cause negative consequences, including hypoglycemia, weight gain, and liver dysfunction. As a result, a large number of individuals are choosing alternative or traditional herbal therapies as an alternative (Suyono, 2015). Diabetes treatment has been influenced by scientific advances, leading to the use of functional foods and modification of lifestyle factors such as fruit consumption, engagement in moderate-intensity physical exercise, and the adoption of intermittent fasting (IF).

According to previous investigations, snake fruit skin was found to contain various phytochemical substances, including saponins, alkaloids, flavonoids, steroids, and phenolics. There is a common belief that certain active chemicals have antioxidant properties and have the potential to reduce glucose levels in the human body (Radiati & Nuraeni, 2023).

The impact of alkaloids on the regeneration of damaged pancreatic beta cells has been demonstrated in a study conducted by Arjadi and Susatyo in 2010. The increase in pancreatic tissue causes increased insulin secretion in the body, facilitating the penetration of blood glucose into the cells and then resulting in a decrease in blood sugar levels. Sulyanti, Yaherwandi, and Ulindari 2019 conducted research. Flavonoids have the ability to capture free radicals or function as inherent antioxidants (Sandhar et al., 2011).

Material and Methods

This study is structured using normative legal study methods, is a study performed by examining the sources of library materials (secondary data) which are used as the basis for the study, in the form of legislation and associated study reports and the issues raised. The primary source of the constitution used is the 1945 Constitution of the Republic of Indonesia, Constitution no. 1 of 1946 regarding the Criminal

The preparation sample investigates the impact of skin snake fruit on the lipid profile

Laboratory experimental design and this research design is quasi-experimental research using a Pretest-Posttest Group. This research is T2 Diabetes Mellitus divided into 3 groups, namely T2 DM controls given treatment. Treatment was carried out for 3 weeks. At Pre and Post on D-21, KGDP was checked in the mice without treatment and compared with each treatment group, and the Wilcoxon test (nonparametric tests) was carried out in SPSS 22.

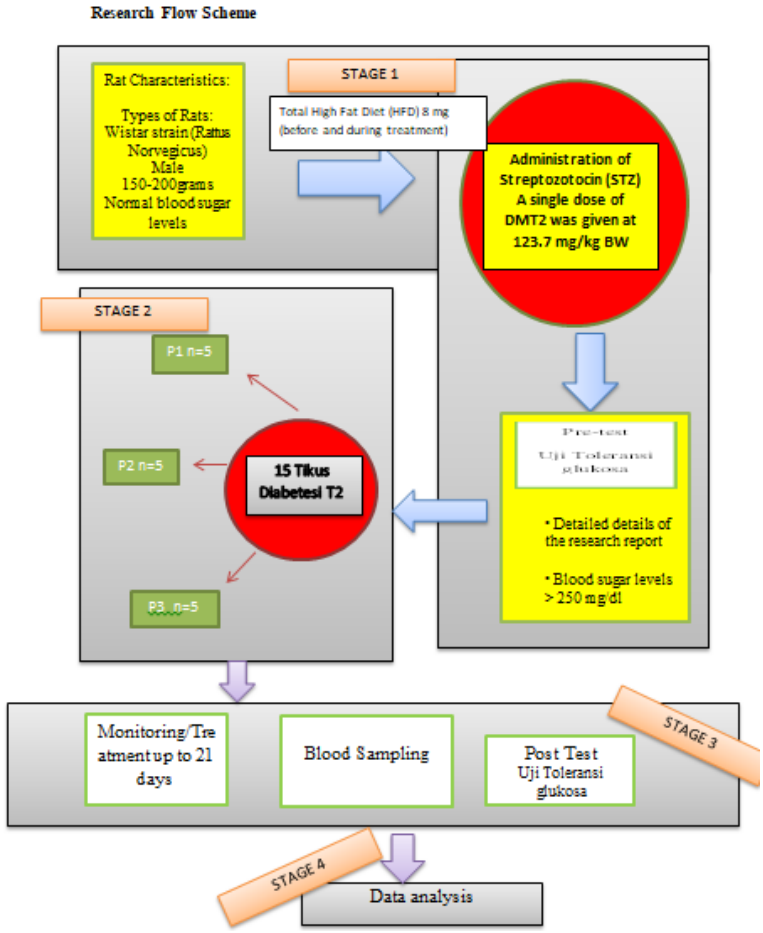


Figure 1. Research flow scheme

Results and Discussion

Mean lipid profile in T2DM Rats

Table 1. Mean lipid profile in T2DM rats

Subject	Group 1 - No Treatment		Group 2 - Metformin (Treatment 1)		Group 3 - Salak Bark Extract (Treatment 2)	
	Pre	Post	Pre	Post	Pre	Post
1	100		118		102	
2	106	115	108	169	118	159
3	115	140	105	221	102	160
4	102	121	109	187	101	136
5	106		111		108	
Average	105,80	125,33	110,20	192,33	106,20	151,67
SD	5,76	13,05	4,87	26,41	7,16	13,58

The results showed that there was a change in the average lipid profile at each measuring point where the change did not significantly increase or decrease in the group without treatment, the treatment with metformin, the treatment with snake fruit bark extract, the treatment with swimming and the treatment with intermittent fasting with $p \geq 0.05$.

Pancreatic beta cell regeneration is influenced by the presence of secondary metabolites, including flavonoids, phenolics, and saponins, in the ethanol extract of the skin. Flavonoids have antioxidant properties that help in reducing oxidative stress. In addition, they inhibit the conversion of superoxide to hydrogen superoxide through chain transformations. In addition, flavonoids facilitate the attraction of free radicals to the hydrogen atoms of aromatic hydroxyl groups, thereby aiding in their elimination from the body through elimination systems (Irwan, 2016). Saponins can lower blood pressure by limiting the movement of glucose in the intestine and promoting insulin production in pancreatic beta cells (Marzuki et al., 2022).

Conclusion

There was a change in the mean lipid profile at each measuring point where the change did not significantly increase or decrease in the group without treatment, the treatment given metformin, the treatment given snake bark extract.

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