The Potential of Jamur Dewa (*Agaricusblazei Murril*) Extract to Decrease Blood Glucose Diabetic Mice (*Mus musculus*)

Misgiati[1] and Suprihatin E[2]

[1,2]*Pharmaceutical and Food Analist Academy Putra Indonesia Malang*
Jl. Barito 5 Malang Jawa Timur

Corresponding author, email: faiz219@yahoo.co.id

Abstract

Diabetes mellitus (DM) or diabetes disease is caused by abnormal function of the pancreas to produce insulin, so blood glucose level is higher than normal blood glucose level. DM is a disease caused by a complication of other diseases, such as heart disease, hypertension. Type DM I diabetes occurs because the immune system is impaired. Therapy for the immune system is the key to cure diabetes. Therefore, the DM should be addressed as early as possible. The use of jamur dewa *extract is considered effective as an alternative treatment of DM. Active substances in* jamur dewa *are linoleic acid, protein glucan, and βD glucan polysaccharides. This content will boost the immune system. Protein content in* jamur dewa *play a role in pancreatic beta cells to regenerate increase insulin production. Examination of* jamur dewa *extract in this study was done using mice induced by streptozotocin. The results showed that* jamur dewa *extract can lower blood glucose levels in streptozotocin-induced mice at a minimum dose of 400 mg. Betaglucan binds to specific receptors present in macrophage cells. Macrophage cells are master cells in the immune system.* Jamur dewa *extract may boost immunity in people with DM type 1 and 2, hence, can improve the body's cells and insulin synthesis.*

Key word: *Jamur dewa, reduction, blood glucose*

INTRODUCTION

Diabetes mellitus (DM) is a group of metabolic diseases characterized by increaseed blood sugar level that occur due to abnormalities of insulin secretion, insulin, or both. DM is classified into two types, DM type 1 and DM type 2. Type 1 diabetes occurs due to abnormal function of the pancreas to produce insulin as well as due to impaired immunity, in which lymphocytes T and NK (natural killer) cells attacks the body's own tissues and organs (Tjay & Kirana, 2003:744). Diabetes II type is caused becausethe body is unable to use insulin (insulin resistance) and or in the production of insulin (Ganong, William F, 2003).

Several synthetic antidiabetes drugs that can be used to maintain blood glucose levels are available, such as glibenclamide, which belongs to sulfonylurea class that work by improving pancreatic β cells to insulin secretion. Weaknesses of using synthetic drugs for a long therepy are the occurrences of side effects to the patient as a veiled hypoglycemia, spinal cord and pancreatic β cells damages. Therefore, it gives rise to the thought of using herbal medicines as alternatives. Herbal medicine has been widely known and used by people since long ago and passed down from one generation to the next. Based on the research, the use of herbal medicine is considered safer than the use of synthetic drugs because of the side effects of herbal medicines are relatively fewer than those

of synthetic drugs (Sari, 2006:1). Plants that have been used as antidiabetes by the community are *brotowalit*, celery, *blimbing* (starfruit), melon, and *jamur dewa*/ mushroom of gods (*Agaricus Blazei* Murill).

Chemical content in jamur dewa are linoleic acid, polysaccharides β D glucan, ergosterol, terpenes, glucan protein, minerals, vitamins (Naso, 2010; Novaes, et al., 2006). β D glucan polysaccharides and linoleic acid can enhance the immune system. The effect that causes the immune activating cells such as lymphocytes, macrophages, and NK cells. Glucan protein plays a role in pancreatic beta cells regenerate thus increased insulin production (Zakijufri, 2009). In addition, the active ingredient contained in the mushroom of gods can also lower blood pressure and cholesterol and is able to accelerate wound healing, there by reducing the occurrence of complications (Yua, et al., 2008; Lavitschka, et al., 2007)

MATERIALS AND METHODS

Jamur dewa was obtained from the cultivation of Traditional Industries ASIMAS, Lawang Malang. Experimental animals used were healthy male mice aged 2-3 weeks weighing 20-30 g Balb C strains. *Jamur dewa* extract was obtained by maceration and percolation with 50% alcohol solvent. Testing of the potential of *jamur dewa* extract in diabetic mice were done in tree stages. First stage was the preparation, including the manufacture of jamur dewa extract and preparation tools and materials. Second, the implementation phase of the selection of the research object, the object of determining the group in the study, treatment test of jamur dewa extract of the test animals, as well as the observation of blood glucose levels before and after the test treatment. The final stage is to analyze the data obtained based on the results of the study.

Preparation of a 10 gram sample of *jamur dewa* dry simplicia extracted with 75 ml alcohol 50%. The first extract was separated by a filter paper and the pulp was extracted again with 25 ml of alcohol 50%. Pulp extraction was followed by percolation. Extracts obtained as much as 100 ml was evaporated at 60°C to obtain viscous extract. Formula determination of jamur dewa extract consists of five formulas of different kinds and a formula glibenclamide dose. The dose used was 200 mg, 400 mg, 600 mg, 800 mg and 1200 mg based on the dose for humans. Making each formula by taking a jamur dewa extract as much as 1.04 ml, 2.08 ml, 3.12 ml, 4.16 ml, and 6.24 ml dose of mice, then for the formula of 1.3 mg glibenclamide.

Implementation of the research done by selecting 21 male mice strain balb C tail weight of 20-30g, 2-3 months old, and then measured their blood glucose levels. 21 mice were then conditioned DM by streptozotocin injected intra peritoneal with a dose of 50 mg/kg dissolved in citrate buffer pH 4 and left for 72 hours and then were randomly divided into 7 groups, each consisting of three mice. Mice blood glucose levels were measured after 72 hours and fasted mice between 8-10 hours in advance. Furthermore, each group were treated by giving a formula based on a predetermined dose, one group was given glibenclamide as a positive control and one group as a negative control was given distilled water. Results from each group are recorded for analysis. Data analysis in this study using the method of analysis of variants (ANAVA) in Completely Randomized Design(CRD).

RESULTS AND DISCUSSION

The result is the difference in blood glucose levels of mice after treatment and before treatment. The data obtained are in table 1.

The average differences in blood glucose levels in mice ranging from largest to smallest as shown in the table were 59 mg/dL, 54,333 mg/dL, 50 mg/dL, 46,667 mg/dL, 42,667 mg/dL, 21,667mg/dL, and 15,333 mg/dL for the 6,24 mL dose, posi

Table 1. Difference in reduction of blood glucose levels before and after treatment in mg/dL

Treatment	Replication			Total (T)	Mean(X)
	1	2	3		
A	16	22	27	65	21,67
B	48	39	41	128	42,67
C	44	54	52	150	50,00
D	60	55	48	163	54,33
E	56	61	60	177	59,00
F	47	53	40	140	46,67
G	15	12	19	46	15,33

A, B, C, D, and E, are extract's concentrations 1.04, 2.08, 3.12, 4.16, 6.24 mL, F is glibenclamide 1,3 mg, and G is aquadest 0.5 mL.

tive control, the dose and negative controls. Of the average difference of reduction shown may be said that the extract has the ability to lower blood glucose levels.

Blood glucose levels of mice as a test parameter of antidiabetic, was measured prior to first dose therapy of mice. Blood glucose levels were then compared with blood glucose levels after 14 days of drug administration. Difference in reduction of blood glucose levels reflected the effects of multiple doses of mushroom of god given.

Data of reduction in blood glucose levels obtained did not form a linear curve. As for the things that supposedly can cause it including in patients with Type I diabetes occurs because the immune system or immune system no longer helpless, or better known as an autoimmune disease that impaired immune function due to autoantibodies, which limfo-T and NK (natural killer) cells attack the body's own tissues and organs (Tjay, and Kirana Raharja, 2003:744). Therapy on the immune system is the key to cure diabetes. The immune system is the most important system in the human body in charge of maintaining the body to stay healthy. The immune system is the backbone of the other systems in the body (eg, cardiovascular, endocrine, metabol-ic, and neural). A healthy immune system is a balanced immune system that knows when to act and when to be quiet. It was attacked by multiplying the current strength of the body enter/attack germs (such as viruses, bacteria and fungi, cancer cells, damaged cells, and toxic substances in the body), then calmed down when the seeds of disease has been successfully defeated (if not then there is such thing as an autoimmune disease). He remained calm when the entry is an allergy-causing agents (such as dust, pollen, cold air, etc.). It also did not react to other normal cells. A healthy immune system is an immune system that can distinguish an enemy or not, attacking enemies with double the power, to help/protect. For the case of Type I diabetes, requiring both running simultaneously in the body. One to eradicate the virus, bacteria, and fungi that exist within the body, two for insulin-producing cells in the pancreas by the immune system is strengthened.

The working principle of beta glucan is closely related to its unique structure, which allows the glucan to bind to specific receptors present in macrophage cells. Macrophage cells are master cells in the immune system. In the presence of β glucan is a polysaccharide immune system in people with Diabetes I type will increase (Mason,2001). According to Novaes *et al.*

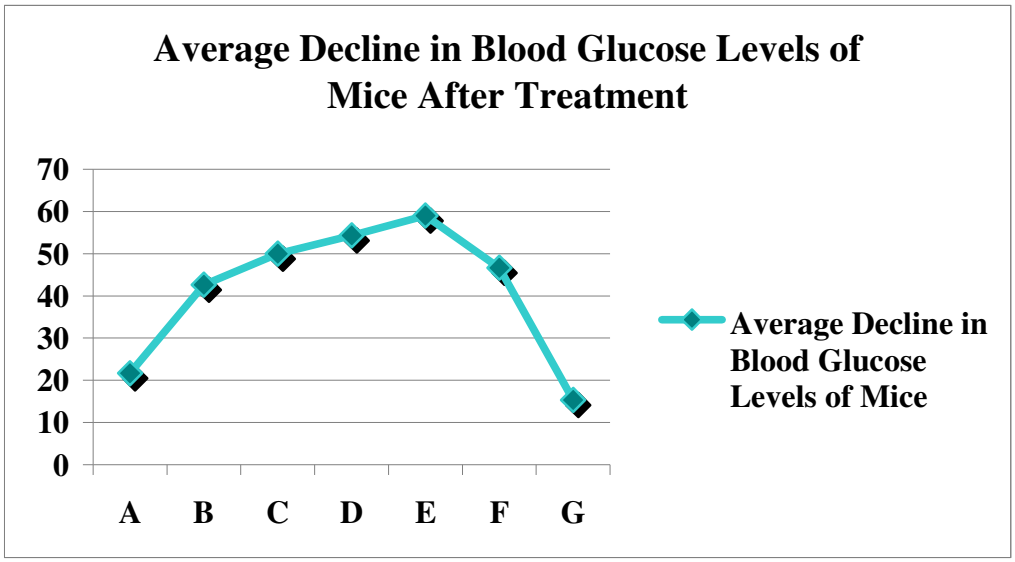

Figure 1. Graph of the average decrease in blood glucose of diabetic mice after treatment

(2007) also mentions that the poly-saccharide β 1.3 and 1.6 glucan can stimulate macrophage sand T lymphocytes are stimulated to release isoleukins. This isoleukins his will stimulate NK-cell. The effects of β glucan increased the formation of the immune system.

In patients with diabetes II type result from insulin esistance or impaired insulin secretion. Jamur dewa extract containing amino acids can rapidly regenerate damaged cells (including the beta cells in the pancreas). Arginine is one type of amino acids which are compounds of cell division and streng then stimulir protein biosynthesis. These substances are very useful for normalizing the body's cells to be responsive to insulin, a substance which is needed by people with type II diabetes. According Tjay & Rahardja (2003) mentions arginine serves toimprove glucose tolerance and stimulate insulin production and inhibits the absorption of fat and improve metabolism and accelerate wound healing. Phenylalanine is an essential amino acid also plays a role in insulin synthesis.

Jamur dewa extract may boost immunity in people with DM I type and DM II type may improve the body's cells and synthesizes insulin, but jamur dewa extract high-dose effects are less visible. Based on the description, then this is because the immune system in people with DM I type was achieve a balance where he know when to work and when to stop working. Later in the DM II type active substances that are useful to normalize the body's cells to be responsive to the insulin is working optimally.

In the negative control mice that test animals experienced only bythe provision of DM water of mice blood glucose levels decreased. It is based on the function of water in the body as a solvent. Glucoseis a monosaccharide that is soluble in water, so that the provision ofwater of mice blood glucose levels can be decreased. But the decline in blood glucose levels of mice only slightly even with the addition of water. Water will only dissolve the glucose in the singular or not bonded with other compounds.

CONCLUTION

Based on the results of research on the effectiveness of jamur dewa extract (*Agaricus blazei Murril*) to decrease blood glucose levels in diabet mice (*Mus musculus*) can be concluded that there are effects of the use of lamur dewa (*Agaricus Blazei* Murril) in lowering blood glucose levels of mice from a dose of 400mg. The effective dose of jamur dewa extract (*Agaricus blazeiMurril*) in lowering blood glucose levels of mice is 400 mg dose.

RECOMMENDATION

Need to do more research on the effectiveness of jamur dewa extract (*Agaricus blazei* Murril) to decrease blood glucose levels of mice with a view improving the structure ofthe pancreas organ.

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