Hypoglycemic Effect of *Parkia speciosa, Leucaena leucocephala and Laurus nobili* in Oral Glucose-loaded Rats

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ABSTRACT

Traditional plants have been used as a cure for diabetes for a long time before the introduction of modern medicine. A few examples of plants that are commonly known for their hypoglycemic activity are Parkia speciosa (Petai), Leucaena leucocephala (Petai Belalang) and Laurus nobilis (Daun Selom). The society today does not aware the ability of these plants to prevent diabetes. The purpose of this experiment is to investigate the hypoglycemic effect of those three plants. Effects of daily feed of Parkia speciosa, Leucaena leucocephala and Laurus nobilis on (a) normal feed rats, (b) oral glucose-loaded rats, (c) oral glucose with Parkia speciosa extract–loaded rats, (d) oral glucose with Leucaena leucocephala extract–loaded rats, and (e) oral glucose with Laurus nobilis extract– loaded rats have been studied. Results show that all of these traditional plants potentially reduced the blood glucose level of all rats with Parkia speciosa is the most effective followed by Laurus nobilis and Leucaena leucocephala.

Keywords: *Hypoglycemic, Parkia speciosa, Leucaena leucocephala, Laurus nobili*

Introduction

Diabetes mellitus is usually a lifelong (chronic) disease in which there is high level of sugar concentration in blood. It is caused by patient's pancreas which does not make enough insulin or their cells do not respond to insulin as in normal person. The incidence of diabetes is on the rise and estimated to be over 150 million worldwide (Wild et al., 2004). The World Health Organisation (WHO) has estimated that in 2030, Malaysia has a total number of 2.48 million diabetics compared to 0.94 million in 2000 - a 164% increase (Mafauzy, 2006). However, there still no effective cure for diabetes and the available drugs cause several undesirable side effects to patients. The world-wide chronic disease thus shares global response and reaction, medically and financially.

Apart from currently available therapeutic options, there are tremendous ongoing researches in discovering plants with hypoglycemic properties which are hopefully can be a good solution for diabetic person. Hypoglycemia is a condition that occurs when our blood sugar is low. More than 400 plant species have hypoglycemic activity are available in literature, however, searching for new antidiuretic drugs from natural plants is still an ongoing research because they contain substances which demonstrate alternative and safe effects on diabetes mellitus (Patel et al., 2012). A few of plants that are commonly known for their hypoglycemic activity are *Parkia speciosa* (Petai), *Leucaena leucocephala* (Petai belalang) and *Laurus nobilis* (Daun selom). According to Anderson et al (2009), *Laurus nobilis* reduce glucose serum, increased HDL cholesterol levels in people with type 2 diabetes. According to Simanjuk et al (2010), *Leucaena leucocephala* seeds have capability to reduce the level of blood glucose. A study by Abdalrahim et al (2012) showed that *P. speciosa* is an edible legume believed to have medicinal property including antidiabetic. The hypoglycemic properties of plants related to the present of compound such as flavonoid, tannins, glycosides, alkaloids, polysaccarides and terpenoids (Benariba et al., 2013; Gomathi et al., 2013; Ahmed et al., 2005).

The purpose of this study is to investigate the hypoglycemic effect of *Parkia speciosa* (Petai), *Leucaena leucocephala* (Petai belalang) and *Laurus nobilis* (Daun selom) on blood glucose level. These three plants were selected as it is easily found and commonly consume as salad in Malaysia.

Materials and Methods

Preparation of Crude Plants Extract

Parkia speciosa and *Laurus nobilis* were bought at the market where as *Leucaena leucocephala* was collected from wild grow at Bandar Pusat Jengka, Pahang. All these three plants, *Leucaena leucocephala* (both seed and seed coat), *Parkia speciosa* (only seed) and *Laurus nobilis* (leaves) are crushed to ground and blended with water. Each of the samples in the form of juice prepared using 500g grounded samples in 500 ml water. All juices were filtered and were mixed with glucose to achieve the final concentration of 50% (v/v) glucose and to be supplied to the rats as drinks. Glucose used to induce diabetes in this experiment instead of using chemical injection since it is easy to conduct and standardized the diet of all the rats in each group throughout the experiment.

Experimental Animals

The experiments were performed in accordance with the rules of Introduction Laboratory Animal Care Unit (LACU), Faculty of Medicine, UiTM. Experiments were carried out in laboratory rats (*Mus musculus*) in the quantity of 30 adult rat female and male with an average body weight of 177 ± 35 g. The rats were housed for 1 week to allow adaptation prior to experimental studies. The animals were maintained on a regular 12-h light/dark cycle (6:00 PM to 6:00 AM) and feed with pellet as a food and water unless otherwise noted.

The rat is divided into 5 groups and each with mixed sexes. All the groups have 3 males and 3 female rats. Group A is the negative controlled group where all rats were feed with distilled water, group B is the positive control which feed with glucose (50% v/v). Group C, D and E which are feed with glucose and extract of "daun selom", glucose and "petai", glucose and "petai belalang" respectively. The treatment was started on the 8th day after adaptation and this was considered as 1st day of treatment. The solution is given each day for two weeks.

Sample Collection

Blood samples were collected from coccygeal veins during day 1, 7 and 14. The tip of the tail was snipped with sharp scissors and gently squeezed for a drop of blood. Experiments were performed in rats deprived of food for 24 h. The blood glucose is measured with glucometer (Accu-Chek Advantage (Roche). The weights are measured on day 1, 7 and 14.

Results and Discussions

Figure 1 show that all of these traditional plants can potentially reduce the blood glucose level of all rats but the *Parkia speciosa* is the most effective followed by *Laurus nobilis* and *Leucaena leucocephala.* As compared to group A (negative control) and B (diabetic control), group C treated with *Laurus nobilis* extract, the group D treated with *Parkia speciosa* extract and group E treated with *Leucaena leucocephala* extract show positive effect in reducing blood glucose level. All those tested group are in the normal condition as their average blood glucose level are similar to the normal group which is Group A. Group B represents the rats that in diabetic condition with the average blood glucose level of 8.35mmol/L. According to Simanjuk et al (2010), if the level of blood glucose is higher than 8.0 mmol/L, the rats are in diabetes condition. From the observation, rats in group B look exhausted and hungry even after comsumptin of the constant amount of food. The symptoms of diabetes include the need to urinate often, extreme thirst or hunger, look tired, anxious and fatique (Besser and Thorner, 2002). Therefore it is proven that our experimental design successfully induce diabetic to rats in group B and showed significantly hypoglycaemic properties in three selected plants extract.

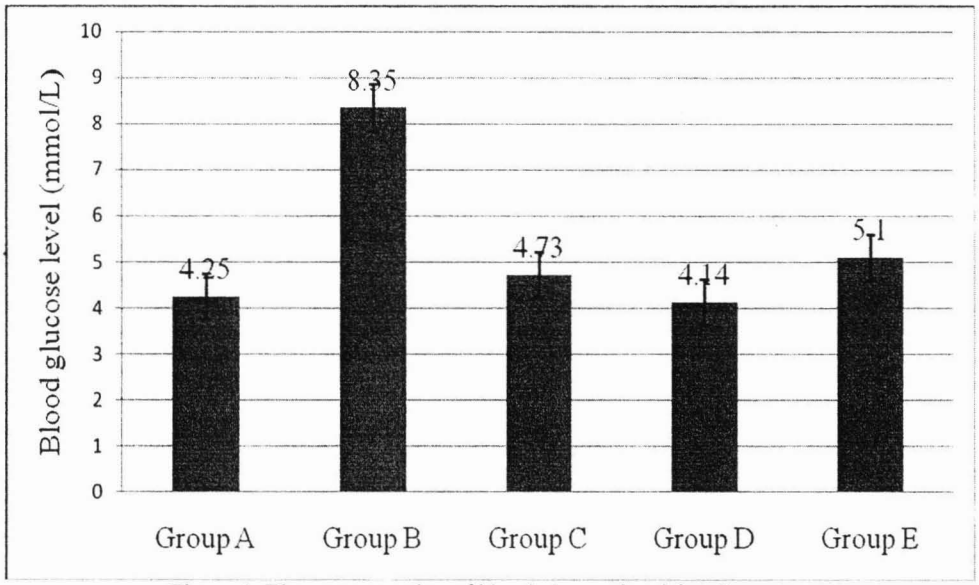

Figure 1: The average value of blood glucose level for all groups.
(Values are expressed as mean for six animals in each group)

Table 1: The reduction percentage of blood glucose level in tested group

Groups	Percentage (%)
C	43.35
D	50.42
E	38.32

Table 1 indicates the percentage of blood glucose level reduction for all tested groups to group B. All of the three plants extract potentially reduce blood glucose level but *Parkia speciosa* is the most potential herbs followed by *Laurus nobilis* and *Leucaena leucocephala* with 50.42%, 43.35% and 38.32% respectively. *Parkia speciosa* contains peripheral-acting compounds act directly on all the cells in general, enabling more glucose to enter the cells (Fathaiya and Suhaila, 1993). This eventually has a strong effect to reduce glucose level in blood.

The average weight of the rats also proved that all these traditional plants have potential to reduce blood glucose level where all the rats in the tested group maintained their weight except for Group B which was experiencing diabetes condition (Figure 2). Rats in Group B are experiencing weight loss by 10-15% in average. Body weight of rats in a hyperglycemic state will normally decrease (Simanjuk *et* al., 2010).

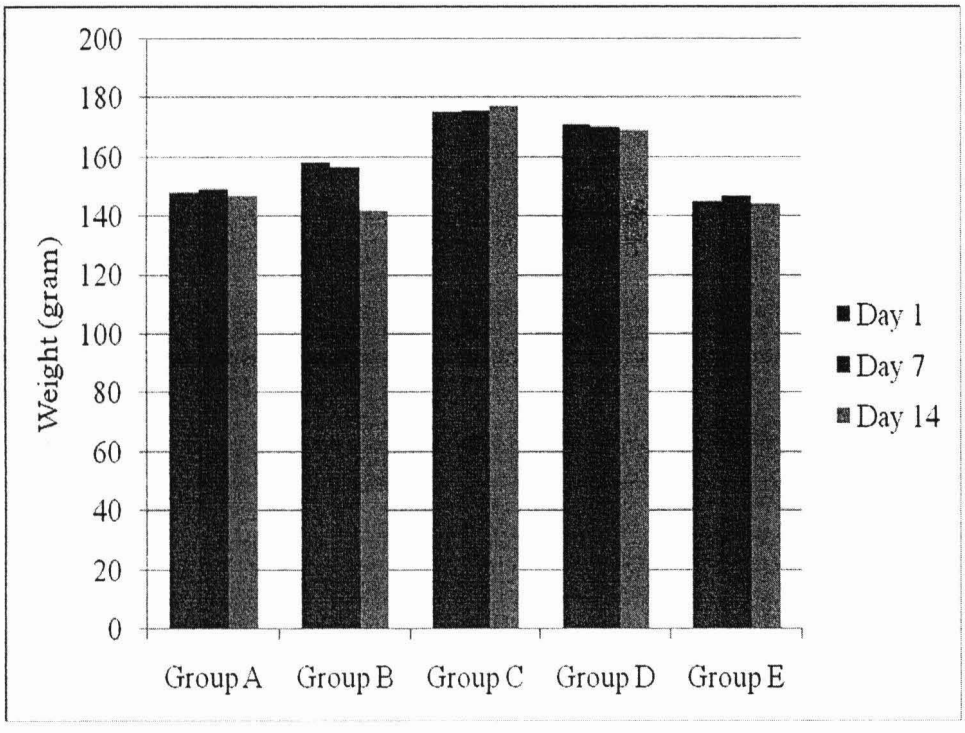

Figure 2: The average weight of rats on day 1, 7 and 14.
(Values are expressed as mean for six animals in each group)

Conclusion

All the plants which are *Parkia speciosa*, *Laurus nobilis* and *Leucaena leucocephala* have a hypoglycemic effect on blood glucose level where the *Parkia speciosa* is the most effective in reducing blood glucose level followed by *Laurus nobilis* and *Leucaena leucocephala*. Suggested daily consume of the three plants, possibly can prevent us from diabetes. Nevertheless, further investigation is necessary to elucidate phytochemical properties of these three plants.

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