

Study of the effect of Gliclazide and Garlic extract on Blood Sugar level in STZ-induced Diabetic Male Mice

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ABSTRACT

Increase of blood glucose continuing challenge of public health, and increase of mortality values. Several evidences suggest that antioxidants consumption decreased hyperglycemia. In this study, we compared the effect of garlic extract and gliclazide on blood glucose level in STZ-induced diabetic mice. In this study, five male mice groups (n=10 for each group) used. Control group (group 1) received normal saline and four groups received STZ (40 mg/kg). One group received STZ only, and three next group consumed garlic extract, gliclazide and garlic extract+gliclazide for one month. After one month, glucose concentration was measured. In diabetic group glucose concentration was significantly increased ($p<0.05$) compared with control group. Administration of garlic extract, gliclazide and garlic extract+gliclazide decreased ($p<0.05$) glucose concentration compared with diabetic group. This effect of garlic is related to antioxidant effects. However, these properties are needed to be more investigated in human.

Key words: Hyperglycemia, Garlic Extract, Gliclazide, Mice.

Introduction

Diabetes is a metabolism disorder that its characteristic is rising blood sugar more than normal range and it happens because of dysfunction of Insulin which regulates blood sugar. According to International federation of Diabetes assessment in year 2003, 194 million diabetic people live in the world and its estimated people live in the world and it's estimated in year 2025 this number achieves 333 million. One out of every 20 people in Iran is diabetic and half of these numbers even don't know about their illness. In every 10 seconds, one person in the world passes a way because of ignorance about Diabetes and ways to control it [25,27]. As regards in our country (Iran) Diabetes and its related diseases are prevalent, researching about it seems to be necessary. Nowadays in addition to treatment with

drugs, fiber supplements and other natural antioxidant compounds are used in this procedure because of having essential elements for diabetic people. It's shown that some fruits and vegetables can stimulate insulin secretion. Researchers have found out that eating fiber supplements in diabetic patients reduces serum cholesterol. So diabetes treatment and finding new ways to prevent and cure it is one of challenges of researchers [25,27]. It is determined that using antioxidants and some foods can reduce incidence of Diabetes in man and laboratory animals [5,6,8,9,11,12,15,16,18,21,22,26,30]. Garlic, with scientific name: *Allium sativum*, is a plant from Asparagales order, Alliaceae family and allium category. Garlic is a two year-old plant with a bulb composed of a chive and direct stem and at the end has a umbellate flower with some bulbil. Garlic has an ancient history. Man had known its

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medicinal benefits five centuries B.C. This plant has been used in china's medicine for more than 3000 years. Importance of garlic is mentioned in Islamic narrations too. 1400 years ago the dear prophet of Islam said: " Eat garlic, because it cures seventy diseases but after eating that, don't go to mosques or public places." At least 1808 scientific studies were done about chemical, pharmacological, clinical and epidemiological aspects of garlic until 1996. In the researches done by different countries about effects of garlic on Man's health, its properties are categorized in 3 parts: Anti-bacterial and antifungal peculiarity, beneficial effect on health of cardiovascular system and anticancer property. Clinical and pharmacological studies are done about antimicrobial effects, anti-cancer effect, blood sugar reduction, immune system stimulation, and anti-inflammatory and antioxidant effects. Based on report of WHO, garlic can be used for helping treatment of hyperglycemia, Hyper lipidemia, preventing atherosclerosis (age-dependent) and slight hypertension [5,10,14,19,23,28,30,31]. Garlic has different ingredients including calcium, phosphorus, potassium, sodium, Iron and vitamins A, B and C. Garlic bulbs have about 65% water, 28% carbohydrate (mainly fructans). 2.3% Organo sulfur compounds, 2% protein (mainly alliinase), 1.2% free aminoacids (mainly arginine), 1.5% fiber, 1.5% lipid, Fitic acid (0.08%), saponins (0.07%) and b-sit sterol (0.0015%). Garlic has about 1% alliin that changes to alliin in the presence of alliinase. During operations like grinding, chewing and griting, the cells break and alliinase located adjacent to alliin and rapidly changes it to allylsulphenic acid. Next level is formation of alliin. Each mg of alliin can produce 0.458 mg alliin [5,10,14,19,23,28,32]. Alliin and alliatin have germicidal effect and can reduce blood sugar and lipid. But only alliiins have notable activities. Alliin is the major germicide and it decreases blood cholesterol. May be antioxidant and antithrombotic properties of garlic is because of these substances. Pharmacological researches show that thiosulfates (allicin) capture free radicals and prevent peroxidation of lipids and platelet aggregation, and stimulate fibrinolysis and reduce blood sugar and lipid [3,5,8,10,14,18,19,21,23,26,28,30,31,32]. Some researchers have presented stimulant effect of garlic on insulin secretion in man and lab animals [1,4,13, 18,29]. Most of studies about garlic are about its effect on regulating serum lipids. Garlic reduces total cholesterol and LDL and increases HDL value [5,11, 19]. Eating garlic can protect vascular system of free radicals and has positive effects on lipids; also it can reduce high blood pressure [6,8,9,11]. The result of different studies is that can reduce LDL and rise serum HLD. LDL is an undesired blood lipid and its increase results in cardiovascular disorders and heart attack. Bu INS teak, HDL is a useful lipid and its

increase protects cardiovascular health and prevent cardiovascular system disorders [5,17,20]. Therefore the aim of present study was to determine the effect of Gliclazide and Garlic extract on Blood Sugar level in STZ-induced Diabetic Male Mice.

Material and method

50 Adult Wistar male albino rats weighing between 150 and 200 g were used for the study. They were kept under standard laboratory conditions and were fed with commercial rat pellets and drinking water ad libitum. The animals were housed in polypropylene cages. Ethical committee in accordance with animal experimentation and care has approved all animal procedures. Animals were divided randomly into five groups, consisting of 10 animals each.

- Group I Control (Normal saline 10 ml/kg, p.o) (n=10)
- Group II Streptozocine (40 mg/kg, I.p) (n=10)
- Group III Streptozocine +Garlic extract (10 ml/kg, orally) (n=10)
- Group IV Streptozocine +Gliclazide (1 mg/kg, orally) (n=10)
- Group V Streptozocine +Garlic extract +Gliclazide (n=10)

All the groups were treated for 30 consecutive days. At the end of this period, animals were kept overnight fasting and were sacrificed. Blood samples were withdrawn, serum separated and estimated for biochemical parameters. The sugar levels by use of chemical kits were calculated. Values were represented as mean±SEM. Data were analyzed by one-way analysis of variance (ANOVA) followed by Dunnett's test using statistical package for social sciences (SPSS) version 10. P<0.05 was considered significant.

Results

According to results of this study in groupII level of serum glucose shows a significant increase in comparison with control group (p<0.05). In groups of III and IV with administration of Garlic extract and gliclazide respectively showed a significant decrease in comparison with diabetic group (p<0.05). In groupIV with administration of garlic extract and gliclazide with them a significant different with control group were not observed, therefore the administration of gliclazide and garlic extract with them have strongly anti-diabetic effect in comparison with single administration of them.

Table 1: effect of Gliclazide and Garlic extract on Blood Sugar level of experimental diabetic rats (mean±SEM) *(p<0/05) in comparison with control group, # (p<0/05) in comparison with diabetic group.

Group	Control	Diabetic	Garlic	Gliclazide	Garlic+Gliclazide
Glucose level (mg/dl)	90.54±7.65	*180.59±13.24	*#130.37±6.7	*#122.28±10.44	#93.34±7.76

Conclusion:

In this study garlic reduced serum glucose, compared with diabetic group. Various researchers have represented its effect on serum glucose in laboratory animals, and the result are corresponding to results of Hasehm *et al* [12], Rajanikanth *et al* [26], Mariee *et al* [21], Islam *et al* [13], Eidi *et al* [7], Musabayane *et al* [24,7,12,13,21,24,26]. Hashem *et al* [12] showed that supplement containing garlic powder for 3 weeks in rats can reduce fatty liver severity resulting from diabetes mellitus. They showed that garlic can reduce IL-10 and INF- and the supplement with garlic can reduce tissue damage arising from diabetes type II in mice. Rajanikanth *et al* [17] represented that methanolic extract of garlic can reduce oxidative stress damages produced by streptozocine in liver and intestine tissue. Also the extract reduced blood sugar that was raised by streptozocine and increased serum antioxidants and they reported that antioxidational effects of garlic can reduce blood sugar of experimental hyperglycemia in these animals. Mariee *et al*. [26] showed that fresh garlic prevents diabetic nephropathy damages inspired by streptozocine in SD rats. They also reported that fresh garlic can reduce serum glucose, total triglyceride and total cholesterol and all of these properties are because of antioxidational effects of garlic. Islam *et al* [21] showed that garlic and ginger have positive effects on release of insulin in diabetic rats induced by streptozocine. Ginger had more effect on releasing insulin than garlic. But both of them can reduce blood sugar and serum lipids when used in high amounts. Liu *et al* [13] and Adachi *et al* [1] also confirmed stimulant effect of garlic on insulin secretion. In Iran there are some reports about influence of garlic on diabetes in laboratory animals. Eidi *et al* [7] in a study on normal and diabetic rats, showed that methanolic extract of garlic can reduce serum glucose, total cholesterol, Triglyceride, Urea, ALT and AST, and increase serum insulin only in diabetic group. Also reported this extract has more anti-diabetic effects than glibenclamide. Musa bayane *et al* [24] reported that using garlic in diabetic rats (induced by streptozocine) can reduce blood sugar. They also reported that this material has similar effects to methformine and glibenclamide in these animals. Adachi *et al* [1] in diabetic mice (diabetes type II) showed that zinc complex isolated from dried garlic like Zn (alx) 2 and Zn(tanm)2 can reduce blood sugar and decrease resistance to insulin and blood pressure [2]. There are some reports about garlic effects on mankind. Sobenin *et al* [29] in an interactive study showed that in patients with diabetes mellitus, garlic pills can reduce incidence of

cardiovascular diseases. In a drug – control interactive unaware study in mankind that was done by sobenin *et al* [29], it was determined that garlic pills have therapeutic effects in patients with diabetes type II. They reported that in 60 diabetic people, after 4 weeks of garlic prescription, serum glucose and lipids were reduced meaningfully and they suggested that maybe therapeutic properties of garlic is more than sulfonylureas drugs or they can be used with together to increase medicinal effects. Variable mechanisms are suggested for antidiabetic effects of garlic and garlic effects on reducing serum sugar are known partly. These properties are because of Allicin or its derivatives found in garlic [5,32]. Also antioxidant activity and influence on reducing blood glucose (by stimulating insulin secretion) is seen in mankind and in laboratories too [1,3,5,11,13,18,19, 21,26,29,30]. According to results of present study Garlic extract causes reduce the blood sugar.

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