

## **Study of the effect of Gliclazide and Carrot Juice 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 carrot juice 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 carrot juice, gliclazide and carrot juice+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 carrot juice, gliclazide and carrot juice+gliclazide decreased ( $p<0.05$ ) glucose concentration compared with diabetic group. This effect of carrot juice is related to antioxidant effects. However, these properties are needed to be more investigated in human.

**Key words:** Hyperglycemia, Carrot Juice, 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 [12,13]. 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 [12,13]. It is determined that using antioxidants and some foods can reduce incidence of Diabetes in man and laboratory animals [1,3,4,6,8,9,10,11,16,17,18,20]. Edible carrot, with scientific name: *DaucusCarota L. Sativus*, is a two year old plant form Umbelliferae family, having direct root and fuzzless stem, that its nurtured type is cultivated in most of places. Carrot has different compounds. Carrot has 87% water, 1.5% azote, 0.02% Lipid, 8% Glucid, about 1.5%

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cellulose, some carotene (Vitamin A), different minerals, vitamin A, B, C, D, E and calcium pectate and pectin. This foodstuff has different medicinal properties. There is herbal insulin in carrot that reduces blood sugar. Eating carrot raises body resistance against infectious diseases. Carrot has a great role in removing edema, failure of urination, stimulation of Gastrointestinal and respiratory system, constipation treatment, appetizer, removing gall bladder stones, resistant cough and asthma [1,7,8,9, 14,15,17,18]. Eating carrot with its peel increases therapeutic properties and removing peel reduces its nutrients and vitamins. Experts believe carrot peel is full of minerals and vitamins. Carrot has antioxidant role too [1,6,10,11,16,17,18]. Carrot is useful for recovering anemia and gastric ulcer. These experts are convinced that consumption carrot is good for constipation, Rheumatism and gout. Carrot is an important resource of beta-carotene and fibers. Both of these materials help preventing cancer and heart attacks. Eating carrot is one of the ways to reduce blood cholesterol and increase blood antioxidants. Carrot is full of beta-carotenes, alpha-carotenes, phytochemicals, glutathione, vitamins and poly phenols. Carrot has a carotenoid like lycopene and this pigment is found in tomato and water melon too-lycopene prevents cardiovascular disease, diabetes and cancers. Carrot has varied pigments like anthocyanin that is one of the strongest antioxidants and repels body's free radicals. A group of researchers have deduced that Rooty vegetables have an important influence on reducing blood sugar and lipids [1,4,6,7,8,9,10,11,17,18,20,23,24]. Therefore the aim of present study was to determine the effect of Gliclazide and Carrot Juice 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. The rat dose was calculated on the basis of the surface area ratio.

- 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 +Carrot Juice (10 ml/kg, *orally*) (n=10)
- Group IV Streptozocine +Gliclazide (1 mg/kg, *orally*) (n=10)

#### Group V Streptozocine +Carrot Juice+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 group II 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 Carrot Juice and gliclazide respectively shows a significant decrease in comparison with diabetic group (p<0.05). In group IV with administration of Carrot Juice and gliclazide with them a significant different with control group were not observed, therefore the administration of gliclazide and Carrot Juice with them have strongly anti-diabetic effect in comparison with single administration of them.

#### Conclusion:

In this study carrot reduced serum glucose, compared with diabetic group. Various researchers have shown its effect on serum glucose in laboratory animals. Swanston-flattet al (1989) inspected the effect of 12 kinds of plants including carrot on glucose values in normal and diabetic mice and suggested that in normal mice. These plants don't have any meaningful effect on blood sugar, insulin and glycoziled hemoglobin value but in diabetic mice, blood glucose was decreased [19]. have reprinted that carrot in C57BL/6] mice can change Vit E, Carotenoid and isoprostane values. They suggested that diet containing carrot has protective effect against diabetes and atherosclerosis, and this is because of synergistic effects between fiber and antioxidants found in carrot [11]. researched in a similar case on rats and confirmed these results and showed that after eating carrot, Vit E, FRAP (ferric Reducing Ability of plasma), alfa carotene, beta carotene and lutein (as antioxidants) values changes [10]. in patients with Hyperglycemia, diabetes mellitus and alcoholic or smoker patients showed that increase in alfa and beta carotene and cryptoxantine has an protective role. They reported that serum values of these compounds increases after eating carrots and may have a protective part [18]. in a

research, after prescribing carrot juice and to mato juice, measured serum values of carotenoids, Vit A, alfa and gamma tocopherols, ubiquinone 10, lutein and lycopene (trans and cis) and showed that pre-prescription of these two, can increase these useful antioxidants values which have protective role [8]. suggested that foods having fiber have antidiabetic effects in diabetes mellitus [21]. Some researchers represent opposed results, for example Avesani et al. (2003) suggested that transgenic plants like transgenic carrots can increase probability of diabetes mellitus (type I) incidence via glutamic acid decarboxylase enzyme (GAD 65) (in mankind [2]. showed that there is a close relationship between antioxidants found in foods and vegetables and hypoglycemia. They showed that there are substances like alfa and beta carotene, lycopene, beta cryptoxanthine, zixanthine and lutein, found in vegetables and fruits like carrot, and if there is more of these materials in food, there will be more of them in blood serum and they have antioxidant and

anti hyperglycemic properties as well [17]. Also in a similar research in year 2000 in Japan, they reported that there is a relation between carotenoid serum value and hyperglycemia and increase in antioxidant values may reduce hyperglycemia incidence [18]. based on an accidental clinical study, suggested that may be eating vegetables can reduce diabetes incidence, but they didn't report any meaningful difference [5]. showed that eating carrot doesn't have any significant effect on blood glucose [22]. Different researchers have reported the connection between eating carrot and diabetes [9]. Some mechanisms reported for anti-diabetic effects of carrot are: anti-diabetic effect of fiber [21], alfa and beta carotenoid and lycopene [17], poly phenols [16] and antioxidental effects of this foodstuff [17, 18]. Briefly the result of different researches is that carrot can reduce blood glucose and we achieved the same results and this may be because of mentioned mechanisms. According to results of present study Carrot Juice causes reduce the blood sugar.

**Table 1:** Effect of Gliclazide and Carrot Juice 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     | Carrot Juice   | Gliclazide    | Carrot Juice +Gliclazide |
|-----------------------|------------|--------------|----------------|---------------|--------------------------|
| Glucose level (mg/dl) | 91.56±7.63 | *183.19±12.3 | *#130.78±10.47 | *#123.37±9.29 | #95.15±5.35              |

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