

Acute effect of onion (*Allium cepa*) on blood glucose level of diabetic patients

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To determine the acute effect of onion on blood glucose levels of diabetic (NIDDM) patients, a self-controlled study was done. It included 20 diabetic patients whose fasting plasma glucose concentration exceeded 126 mg/dl. After taking the fasting plasma glucose sample, 50 g of oral glucose load was given to the patients and the plasma glucose levels at thirty-minute time intervals up to two hours were taken again (OGTT). Then, the same procedure was done after one week at which glucose load and onion (50 g) were administered. The results were analyzed by using paired 't' test. The mean fasting plasma glucose concentrations of diabetic patients were 147.35 ± 17.18 mg/dl vs 149.6 ± 19.76 mg/dl, ($p=0.199$), respectively. When the glucose and onion were administered, the plasma glucose levels were found to be decreased when compared to those levels after giving glucose only; (225.60 ± 27.25 mg/dl vs 214.40 ± 33.39 mg/dl at 30 min; $p=0.099$), (282.55 ± 31.67 mg/dl vs 229.40 ± 37.61 mg/dl at 60 min; $p=0.0001$), (270.20 ± 22.48 mg/dl vs 194.45 ± 37.26 mg/dl at 90 min; $p=0.0001$) and (248.75 ± 20.13 mg/dl vs 161.65 ± 30.50 mg/dl at 120 min; $p=0.0001$), respectively. This study shows that onion has an acute effect of lowering the plasma glucose levels which could be useful in the management of patients with diabetes mellitus.

INTRODUCTION

Diabetes mellitus (DM) is a chronic disease caused by inherited and/or acquired deficiency in production of insulin by the pancreas, or by the ineffectiveness of the insulin produced. Such a deficiency results in increased concentration of glucose in the blood, which in turn damages many of the body's systems. The dietary components beneficial in the prevention and treatment of diabetes have not been clearly defined, but it is postulated that medicinal/culinary herbs may play a role [1]. The ancient physicians used onion to treat diabetes and once again modern studies proved that onion does indeed play a part in reducing blood sugar level [2]. One of the active constituents of onion is APDS (allyl propyl disulphide) and it has been shown to block the breakdown of

insulin by the liver and possibly to stimulate insulin production by the pancreas, thus increasing the amount of insulin and reducing sugar levels in the blood [3, 4]. In preliminary study of healthy male volunteers, administration of 25-50 gm of raw or boiled onion lowered blood sugar levels in people with diabetes [5]. Onion does not reduce blood sugar levels in healthy non-diabetic people [6].

In Myanmar, onion is eaten as one of the daily food ingredients in meals. Study relating to the acute effect of raw onion supplementation on blood glucose level of NIDDM patients has not been scientifically done yet. The present study was aimed to determine that whether onion can be used as a remedial ingredient for acutely lowering blood glucose levels in the management of

diabetic (NIDDM) patients. Objectives of the study were;

- To determine the blood glucose levels of NIDDM patients before and after glucose administration at specific time intervals by doing Oral Glucose Tolerance Test (OGTT).
- To determine the blood glucose levels of NIDDM patients before and after glucose with onion administration at specific time intervals.
- To compare the blood glucose levels at specific time intervals before and after glucose only and glucose with onion administration in NIDDM patients.

MATERIALS AND METHODS

Study design

A self-controlled study was used.

Subjects

Both males and females of 40-60 years old attending a private clinic in Thingangyun Township whose fasting plasma glucose concentration exceeded 126 mg/dl (WHO criteria) were recruited for the study. A total of 20 (ten males and ten females) were included in this study. Those taking insulin and/or medicine for other health conditions; those with allergic reaction to onion ingestion and those who refused to participate in the study were excluded.

Method

After taking the baseline fasting plasma glucose sample, 50 gm of oral glucose load dissolved in 200 ml of water was given to the patients and the plasma glucose levels at thirty-minute time intervals up to two hours were taken again (OGTT). Then, the same procedure was done after one week at which glucose load and onion (50 gm) were administered. Venous plasma glucose level was determined by enzymatic colorimetric method [7].

Statistical analysis

All the blood glucose levels at baseline fasting and at 30-minute intervals were expressed as mean±standard deviation (SD) and analyzed by using paired 't' test (two-tailed). Differences were considered significant at $p<0.05$ levels.

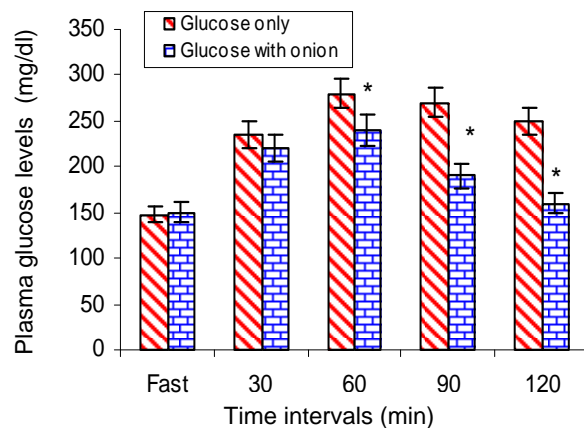
Ethical consideration

Ethical clearance was obtained from Institutional Ethical Review Committee, Department of Medical Research (Lower Myanmar) to conduct the study.

RESULTS AND DISCUSSION

An acute effect of onion on blood glucose level was determined on 20 (ten males and ten females) NIDDM patients whose mean age was 50.9 ± 4.037 years.

Figure 1 shows the acute effect of onion on blood glucose levels of NIDDM patients at different time intervals.



*= $p<0.05$

Fig.1. Comparative effect of glucose load only and glucose with onion on plasma glucose levels of NIDDM patients

The mean fasting plasma glucose concentrations at the baseline level were same for all NIDDM patients: 147.35 ± 17.18 mg/dl vs 149.60 ± 19.76 mg/dl, ($p=0.199$). At thirty minutes, the effect of onion was not found as the difference between the plasma glucose levels of the two groups (glucose only and

glucose plus onion) was statistically not significant (225.60 ± 27.25 mg/dl vs 214.40 ± 33.39 mg/dl; $p=0.099$). After that, the plasma glucose levels were found to be significantly decreased in those patients who received glucose and onion when compared to those with glucose only: 282.55 ± 31.67 mg/dl vs 229.40 ± 37.61 mg/dl at 60 min, ($p=0.0001$); 270.20 ± 22.48 mg/dl vs 194.45 ± 37.26 mg/dl at 90 min, ($p=0.0001$) and 248.75 ± 20.13 mg/dl vs 161.65 ± 30.50 mg/dl at 120 min, ($p=0.0001$), respectively. So, oral administration of onion had blood glucose lowering activity acutely in NIDDM patients.

Traditional treatments for diabetes mellitus have mostly disappeared in occidental societies, but some are prescribed by practitioners of alternative medicine or taken by patients as supplements to conventional therapy. However, plant remedies are the mainstay of treatment in underdeveloped regions. A botanical substitute for insulin seems unlikely, but traditional treatments may provide valuable clues for the development of new oral hypoglycemic agents and simple dietary adjuncts [2].

Several uncontrolled human studies [3, 5] and at least one double-blind clinical trial [4] have shown that large amounts of onion can lower blood sugar levels in people with diabetes. Two sets of compounds make up the majority of onion's known active constituents – sulfur compounds, such as allyl propyl disulphide (APDS), and flavonoids, such as quercetin. APDS has been shown to block the breakdown of insulin by the liver and possibly to stimulate insulin production by the pancreas, thus increasing the amount of insulin and reducing sugar levels in the blood. However, onion does not reduce blood sugar levels in healthy non-diabetic people [6]. It has also been shown that garlic and onion juices exerted antioxidant and anti-hyperglycemic effects and consequently alleviated liver and renal damage caused by alloxan-induced diabetes [8]. Most human studies that have shown an effect from onions used at least 25 gm per day and often two to four times that amount [3,4]. Though

some studies have found cooked onions acceptable, several studies suggest that onion constituents are degraded by cooking and that fresh or raw onions are probably most active [4, 9, 10]. Therefore, the use of 50 gm of raw onion in this study can be sufficient enough to lower the blood glucose levels in diabetic patients.

In conclusion, onion has an acute effect of lowering the plasma glucose levels which could be useful in the management of patients with diabetes mellitus as a simple dietary adjunct or a remedial ingredient.

ACKNOWLEDGEMENT

We would like to thank the Director-General of the Department of Medical Research (Lower Myanmar) for her keen interest and kind permission to conduct this project. Our heartfelt thanks are also extended to all the respondents of this study, without them our study would not have been possible.

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