

# Effect of Fenugreek on Type2 diabetic patients

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**Abstract-** In this study we tried to develop an optimum amount of dose and a effective as well as convenient dosage form of fenugreek seed and to observe its' effect on type2 diabetic patient. At the same time, we also tried to find out stability of fenugreek seed through preserving it into pure water. We also focused on any change of effect while boiled or unboiled seed solution administered to the type2 diabetes affected patients.

## I. INTRODUCTION

Diabetes mellitus (DM) is in the top 5 of the most significant diseases in the developed world, and is gaining in significance there and elsewhere. Present number of diabetics worldwide is 171 million and this is likely to increase to 340 million or more by the year 2030. Synthetic hypoglycemic agents can produce serious side effects and in addition they are not suitable to use during pregnancy. Therefore, the search for more effective and safer hypoglycemic agents has continued to be an important area of active research. For a long time diabetics have been treated with several medicinal plants or their extracts based on the folklore medicine.

Furthermore, after the recommendation made by WHO on diabetes mellitus, investigation on hypoglycemic agent from medicinal plants has been more important.(1) *Trigonella foenum-graecum*, commonly known as fenugreek, is extensively used in many preparations of Ayurveda and also against antiulcer action and hypocholesterolaemic effects . Fenugreek (*Trigonella foenum-graecum*) is commonly used as a condiment and seasoning in food preparations; is assumed to possess nutritive and restorative properties and has been used in folk medicine for centuries for a wide range of diseases including diabetes, fever and abdominal colic as a poultice for abscesses, boils, and carbuncles 10. The hypoglycemic property of fenugreek was observed in diabetic patients(1).

Fenugreek is an annual plant under the family of **Fabaceae** and the scientific name of fenugreek is *Trigonella foenum-gracium* . It is cultivated worldwide as a semiarid crop. Its' seeds are a common ingredient in dishes from the Indian subcontinent and now used also in other continent as a famous well-known spicy.(6)

Others names of Fenugreek are Alholva , Birds foot, Chandrika Greek Clover ,Greek Hay Seed, Hu IU Ba, Medhika Methi,Trigonella,Woo LU Bar.(7)

From time immemorial Fenugreek is used all over the world for its' various significant medicinal effect .In case of digestive problem such as loss of appetite, constipation and inflammation of the stomach/Gastritis it is widely used .It is also used for the conditions that affect the health of heart like hardening of arteries/atherosclerosis and for high blood cholesterol and triglycerides level.

Some extent of its' use in kidney ailments, Beriberi/Vitamin deficiency disorder, mouth ulcers, boils, bronchitis,infection of the tissue beneath the surface of the skin/cellulitis, tuberculosis,chronic coughs chapped lips Baldness ,cancer are also known.(7)

Women who are breast-feeding sometimes use fenugreek to promote milk flow and get a significant response. So we can assume that fenugreek has an effect on hormone regulation.(7)

Sometimes used as a poultice by means of wrapping in cloth warming and applying directly to the skin for the home treatment of local pain, swelling, muscle pain, swelling of lymph nodes/lymphedinitis pain in the toes/gout leg ulcers and eczema also well-known.(7)

In a few cases of medicine preparation it has been used to mask the taste of medicines.(7)

Use as a flavoring agent in imitation maple syrup, foods, beverages and tobacco is very popular.

Mythologically,the use and therapeutic effect of fenugreek is recognized and established, mainly by asian myths.

Fenugreek extracts and raw fenugreek is used in soaps and cosmetics products like shampoo and hair oil.(7)

The effect of fenugreek on type2 diabetes has been trying to be established all over the world and for this purpose researchers has been conducting a lot of projects.

Type2 diabetes is a endocrine and metabolic dysfunction and a major health risk factor in human population.Non-Insulin Dependent Diabetes Mellitis(NIDDM)/Type2 diabetes is a rapidly growing health concern not only in developing countries but also in developed countries.

World Health Organization(WHO) declared in 2011 that approximately 364 million people globally suffers from diabetes ,with projection that diabetes associated deaths will double from 2005 to 2030.(2)

Fenugreek is an age old tried and tested herbal medicine.There are reports about the health benefits of fenugreek ,includes,

- It is appetite suppressant ,so it facilitates weight loss.
- It reduces cholesterol.
- It reduces cardiovascular risk.
- It helps to control diabetes.
- It is a good relief for sore throats.
- It cures acid reflux or heartburn.
- It relieves constipation.
- It prevents colon cancer.
- It is good for kidney trouble.
- It is good for skin infection.
- It increases the milk production.
- It reduces menstrual discomfort.
- It minimizes symptoms of menopause.(8)

Besides, due to the increasing rate of side effect or adverse effect of synthetic medicine now a days people are rushing to the nature for their medication purposes Fenugreek as a natural and herbal product may fill this desire and predicted as a very rich hypoglycemic agent.

Number of compounds have been isolated from fenugreek seed extract and their action on blood sugar reduction has been reported. Even the effect of certain compounds has been tested on protein kinase. Those results showed protein kinase inhibited by seed crude, semi crude extract, semi purified extract as well as purified extract. This suggests that certain compounds of fenugreek interferes with signal transduction. Because the protein kinase participate in this process.

Although the mechanism of action of fenugreek is not known accurately, various researcher assuming various route of mechanism. Some of them has tried to shown it interferes with signal transduction, while some of them says that it influences ligand-receptor interaction. Many of them also believes that fenugreek inhibits the absorption of sugar from gut to blood to reduce blood sugar level. Many researcher believes fenugreek has the effect to increase the secretion of insulin from Beta Cell of the pancreas.

Diosgenin, present in fenugreek improves glucose metabolism by promoting adipocyte differentiation and inhibiting inflammation in adipose tissue, proposed by reputed researcher T Uemura,S Hirai,N Mizoguchi,T Goto .(4)

T Uemura ,T Goto,MS Kang,N Misoguchi also proposed that diosgenin,the main aglycon of fenugreek,inhibits LXR $\alpha$  activity in HepG2 cells and decrease plasma triglycerides in obesediabrtic mice.(9)

DKABT,an online based organization informs that Galactomannan in fenugreek seeds is helpful to slow down the rates of sugar absorption into blood.Fenugreek also contains some specific amino acids responsible for inducing production of insulin.

Due to limited facilities we could not observe the mechanism of action of fenugreek. Since it has almost known that fenugreek reduces blood sugar level,so we have tried to develop a dosage form and find out the hypoglycemic effect within our psycho-demographic territory.

This factor is well-established that liquid dosage form has a rapid action as it does not require any disintegration or dissolution factors. Liquid dosage form while orally administered reaches the site of action very fast with compare to other dosage. Moreover,our main concern was also to observe the stability of liquid dosage form with or without preservatives.

It has been observed that liquid dosage form has a very well action though it is less stable without preservative.

It has been also observed that to exert a hypoglycemic effect fenugreek in liquid dosage form more faster than other dosage form of fenugreek.

## II. METHODS AND MATERIALS

### **Extraction. :**

**10grms of seeds soaked in 40 ml of water of night(12 hours). Filtered through cheese cloth the seeds were removed. Water extract was preserved for further work.**

**In some case the seeds were boiled at 100°C for 30 minutes. The extract was collected and preserved as before.**

### **Materials :**

**500ml conical flasks,  
Funnel,  
Cheese cloth ,  
Gas-Burner,  
Methyl Paraben(3mg) and Propyl Paraben(.9mg).**

### **Blood sugar estimation:**

**Glucometer: "CLEVER CHEK"TD-4226A**

### **Unit:**

**mg of glucose/dl.**

### **Selection of Subjects:**

**Type 2 diabetic patients were selected from different areas of Mirpur, Dhaka and Lakshmpur.**

**20 diabetic patients age between 40 and 70.**

**Most of the patients were only diabetic however, one of them was suffering from asthma an two of them had hypertension.**

**10 the patients had no previous medication report while the rest took Metformin + sulbutamol and Metformine+atenelol.**

**Blood samples were tested before administration of Fhenugreek extract .....**

**The study was continued for three months.**

### **Data table of fenugreek liquid dosage form stability:**

**10 gm of fenugreek soaked into 40 ml of water:**

| Preparation feature  | Observed days | Comments  |
|--|---------------|---|
| Without boiling  | 1 day         | Effervescent forms                                    |
| While boiled   | 12 days       | Effervescent forms                                    |
| With perfect ratio of preservatives(Methyl paraben and propyl paraben) | 6 months      | No effervescent or discoloration,odor change observed |

So it can be stated that without preservatives liquid dosage form of fenugreek is stable only for maximum 2 days. Second steps we have dealt with patients and administered them without preservative. We have soaked fenugreek overnight and delivered them to consume for finding out the effect. Our findings are given as below:

| Patients /volunteer seial no: | Dibetes level before fenugreek administration (mg/dl) | Blood sugar level after 15days Mg/dl | Blood sugar level after 30 days Mg/dl | Blood sugar level after 60 days Mg/dl | Blood sugar level aftye 90 days Mg/dl | Comments                           |
|-------------------------------|---|--------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|------------------------------------|
| 1                             | 222   | 160                                  | 114                                   | 137                                   | 123                                   | Blood sugar reduced                |
| 2                             | 175   | 167                                  | 158                                   | 143                                   | 132                                   | Significantly reduced              |
| 3                             | 179   | 161                                  | 156                                   | 147                                   | 134                                   | Reduced significantly              |
| 4                             | 185   | 176                                  | 163                                   | 145                                   | 137                                   | Significantly reduced              |
| 5                             | 200   | 181                                  | 175                                   | 159                                   | 142                                   | Blood sugar reduced                |
| 6                             | 177   | 163                                  | 156                                   | 149                                   | 134                                   | Reduced significantly              |
| 7                             | 168   | 157                                  | 141                                   | 135                                   | 127                                   | Blood sugar reduced                |
| 8                             | 196   | 187                                  | 175                                   | 159                                   | 137                                   | Significantly reduced              |
| 9                             | 173   | 166                                  | 152                                   | 143                                   | 131                                   | Blood sugar reduced                |
| 10                            | 189   | 171                                  | 161                                   | 144                                   | 133                                   | Blood sugar significantly reduced  |
| 11                            | 173   | 165                                  | 153                                   | 139                                   | 131                                   | Reduction of blood sugar observed. |

To determine blood sugar level we have used glucometer "CLEVER CHEK"TD-4226A (certified by Bangladesh Institute of Research and Rehabilitation in Diabetes Endocrine and Metabolic Disorders/BIRDEM) and other methods and materials.

We have given another 9 patients with boiled and liquid extract of fenugreek. Before administering we estimated their blood glucose level and after that for consequent 30 days we have given them boiled fenugreek extract. Their blood glucose level has been estimated in 15 days ,30 days,60 days and 90 days interval.

Findings are given below:

| Patients /volunteer seial no | Dibetes level before boiled fenugreek extract administration (mg/dl) | Blood sugar level after 15 days Mg/dl | Blood sugar level after 30 days Mg/dl | Blood sugar level after 60 days Mg/dl | Blood sugar level afty 90 days Mg/dl | Comments                           |
|------------------------------|--|---------------------------------------|---------------------------------------|---------------------------------------|--------------------------------------|------------------------------------|
| 1                            | 187  | 175                                   | 169                                   | 147                                   | 131                                  | Blood sugar reduced                |
| 2                            | 176  | 168                                   | 159                                   | 144                                   | 133                                  | No change in blood sugar reduction |
| 3                            | 173  | 165                                   | 151                                   | 141                                   | 129                                  | Significantly blood sugar reduced  |
| 4                            | 203  | 191                                   | 187                                   | 169                                   | 143                                  | Blood sugar reduced                |
| 5                            | 183  | 172                                   | 161                                   | 149                                   | 130                                  | Blood sugar reduced significantly  |
| 6                            | 167  | 153                                   | 148                                   | 139                                   | 125                                  | Reduction of blood sugar occured   |
| 7                            | 196  | 181                                   | 173                                   | 159                                   | 137                                  | Significantly blood sugar reduced  |
| 8                            | 179  | 167                                   | 159                                   | 146                                   | 132                                  | Blood sugar reduced as before      |
| 9                            | 174  | 162                                   | 153                                   | 141                                   | 127                                  | Blood sugar level reduced          |

The observation ensures that if fenugreek is boiled and the boiled extract is given to the patients no change happens in the reduction of blood sugar level. The boiled fenugreek extract is capable of reducing blood sugar level as well as the unboiled fenugreek extract. No drustical change either physical, physiological or in mathematical value happens while fenugreek boiled extract have been applied to the patients.

So, it has been demonstrated that whether boiled or not boiled, no change has been reported in the blood sugar reduction phenomenon for fenugreek extract. Both cases fenugreek extract reduces blood sugar. Thus it can mitigate NIDDM.

Most of the patients have been treating with various hypoglycemic agents including Metformin, Glibencamide, Glipizide and other drugs.

Almost all patients have shown a positive outlook and satisfactory approach to this particular dosage form of fenugreek, though some of them informed some unusual effect and side effects include:

- Gener al weakn ess
- Consti pation

- Bitter taste
- Inconv enient odor

### III. CONCLUSION

Last of all, it has been observed that 10 gm/40ml liquid dosage form of fenugreek seed has a significant effect on reducing the blood sugar level and it is proven as better than other dosage form of fenugreek. From some other study it has been seen that it requires minimum ten consequent days to have a physical effect of fenugreek in case of other dosage form like tablet, capsule, Crushed-seeds, powders etc. But we have observed effect within five days which ensures the outstanding strength of fenugreek liquid dosage form.

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