

**HYPOLYCEMIC EFFECT OF BITTER GOURD IN A HEALTHY INDIVIDUAL: A REPORT WITH BRIEF REVIEW**Prabhu N^{1*}, Ismail M², Marzuk SM¹ and Thirumalaikulundusubramanian P³¹Department of Microbiology, Chennai Medical College Hospital and Research Centre (SRM Group), Tiruchirapalli – 621 105, India²Research Cell, Chennai Medical College Hospital and Research Centre (SRM Group), Tiruchirapalli – 621 105, India³Department of Medicine, Chennai Medical College Hospital and Research Centre (SRM Group), Tiruchirapalli – 621 105, India

Received for publication: March 5, 2015; Accepted: March 18, 2015

Abstract: A Normotensive and Non diabetes individual reported of giddiness on raising from the bed and had laboratory examinations for diabetes and hypertension. The blood pressure was 120/ 80 mm hg and the blood sugar level was 60/dL. The person is having no history of diabetic but father is a known diabetic for 8 years. The individual study revealed that consumption of bitter gourd over and above during the previous night dinner. On having the breakfast, the individual did not report the giddiness and he became normal. The reasons for the giddiness at the time of awakening was attributed to the consumption of over dose of bitter gourd which is scientifically proved as having effect on the enzyme which breaks down the disaccharides to monosaccharides and thus prevent the absorption of glucose by the blood from the diet. This study revealed that, the known diabetics and pre diabetics should be cautious to have dinner with bitter gourd and the report of giddiness may be linked to the consumption of the bitter gourd in the dinner. This study showed that the giddiness was due to hypoglycemic effect caused by bitter gourd.

Key Words: Vertigo, Hypoglycemia, Bitter gourd, plant medicine.

INTRODUCTION

Diabetes or diabetes mellitus can be described as a group of metabolic disorders characterized by high blood glucose levels either due to inadequate insulin production or due to the inability of the body's cells to respond properly to insulin, or both [1,2]. Diabetes is on the raise at an alarming rate in India, due to our unhealthy lifestyle and can affect anyone, even a baby. As diabetics develop various symptoms and complications as time advances they need proper control and treatment with non-specific and specific therapy [3]. In developing and developed countries, diabetics prefer alternative medicine, once such item is a use of bitter gourd.

Bitter gourd or bitter melon is a vegetable that is hated by most of us because of its bitter taste and ugly appearance. But it is indeed a boon for diabetics [4]. *Momordica charantia* Linn. (Cucurbitaceae) is referred to as bitter melon or bitter gourd and has recently attracted considerable attention for its various physiological activities, such as its antitumor, anti-inflammatory, antioxidant, antibacterial, hypoglycemic, hypocholesterolemic, hypotriglyceridemic and immunostimulating activities [5,6]. Previous investigations have shown that the fruits and leaves of *M. charantia* had rich phenolics and exhibited a high antioxidant activity. It is an effective medicine for diabetic and anemic people and act as a good blood purifier. As it has hypoglycaemic substance, it helps in bring down the blood sugar and urine sugar levels [7]. The nutritional facts of bitter gourd are depicted in table 1.

Table 1: Bitter Gourd Nutrition Facts

Amount: 1 cup	
Total Weight: 93 g	
Nutrients	Amount
Basic Components	
Proteins	930 mg
Water	87.4 g
Ash	1 g
Fats	158 mg
Calories	
Total Calories	16
Calories from Carbohydrate	12
Calories from Fat	1.3
Calories from Protein	2.3
Carbohydrates & Fat	
Total Carbohydrates	3.4 g
Dietary Fiber	2.6 g
Total fat	0.17 g
Cholesterol	
	-
Vitamins	
Vitamin A	438 IU
Vitamin C	78 mg
Thiamin	37 mcg
Riboflavin	37 mcg
Niacin	372 mcg
Vitamin B6	40 mcg
Folate	67 mcg
Pantothenic Acid	197 mcg
Minerals	
Calcium	18 mg
Iron	400 mcg
Magnesium	16 mg
Phosphorus	29 mg
Potassium	275 mg
Sodium	4.7 mg
Zinc	744 mcg
Copper	32 mcg
Manganese	83 mcg
Selenium	0.19 mcg

[Source: USDA National Nutrient data base]

Corresponding Author:*Dr. N. Prabhu,**

Research Associate Professor,
 Research Laboratory of Leptospirosis and Microbial Nanotechnology,
 Department of Microbiology,
 Chennai Medical College Hospital and Research Centre (SRM Group),
 Irungalur, Tiruchirapalli - 621 105,
 Tamilnadu, India.



The other most active plants with hypoglycemic effect are *Allium sativum*, *Gymnema sylvestre*, *Citrullus colocynthis*, *Trigonella foenum greacum* and *Ficus bengalensis*. The individual is described in this study in which lowering the blood glucose level in a healthy individual after over consumption of the bitter gourd in the dinner. Further, a question is arising whether the use of bitter melon as an effective and safe alternative to traditional hypoglycemic agents for reducing fasting blood sugar in patients, and need to understand the complications in the normal individuals.

CASE STUDY

A 35 year middle aged man presented with sudden giddiness in the early morning and continued upto the intake of breakfast latter on. The giddiness level was very mild while awakening from the bed and gradually progressed; it is not associated with nausea, vomiting and tinnitus. There is no history of palpitation, sweating, fever and headache. This incidence never occurred in his life time. The individual gave a history of consuming over dose of processed bitter gourd (cooked with tamarind and spices) during the previous dinner. He has no history of diabetes and hypertension and father and father's mother have known to be diabetic for 8 and 11 years respectively. He has no other systemic complaints; and not under medication for any illness. The individual is a pure vegetarian. No history of consuming tobacco products and alcohol. While examining his blood pressure and pulse rate was found to be 118/ 82 mm hg and 76 beats/ minutes respectively. The respiratory rate was normal and the individual was afebrile. All the biochemical parameters and ECG recordings were also normal. Fasting blood glucose level was found to be 60/ dL.

DISCUSSION

On studying the individual, it was found that, the person had consumed over and above processed bitter gourd in his previous dinner with less amount of carbohydrate diet. On the same evening, the individual consumed some amount of sweets. Since there is no food intake during the overnight, it is believed that enzyme which breaks down the disaccharides to monosaccharides ought to have inhibited by bitter gourd and thus prevent the absorption of glucose by the blood from the diet. Hence the individual developed a state of hypoglycemia, which resulted giddiness. The individual did not take any medication for this complaint and the condition was spontaneously resolved after consuming breakfast with high calorific carbohydrate diet which confirms the suspicion that hypoglycemia was the reason for the complaint. The major adverse effects of bitter gourd are stimulating miscarriage, drug interactions, causing irregular heart

rhythm, vomiting and diarrhea, hypoglycemic coma [5] and liver inflammation.

Bitter gourd is not like most medicinal drugs, which are effective only in one target organ or tissue; rather, it influences glucose metabolism all over the body [5,8]. Bitter gourd is a commonly consumed vegetable that is found throughout the sub-tropical world (China, India, Thailand, East Africa, The Caribbean, Central and South America) and is known by various names, such as balsam pear, carilla, cerasee (wild variety), cundeamor, goo-fah and karela. Bitter melon juice has been recommended for diabetes at daily doses of 50 to 100 mL; 900 mg of fruit given 3 times/day by ayurvedic practitioners. There are insufficient clinical trials available to substantiate these doses. The plant has been well studied in animal models and several mechanisms of action have been proposed for its anti-diabetic properties (Table 2). In the latest count, approximately 228 different compounds with proven medicinal properties, acting alone or in combination with other, have been isolated from bitter melon fruit, seeds, leaves, stems, pericaps, endosperm, callus tissues and cotyledons [9]. Among these, the most actively studied constituents shown to improve glycemic control include charatin, polypeptide-p, vicine, momordin and similar derivatives (e.g., momordinol, momordicin, momorcharin, momordicin).

Table 2: Bitter gourd components isolated and studied for antidiabetic effects

Bitter gourd components	Effect	References
p-insulin, v-insulin, or polypeptide-p	Insulin-like protein Increased glucose clearance during intra-peritoneal	[10]
Momordicoside S	glucose tolerance test; increased basal metabolic rate and β -oxidation	[3]
Momordicoside T	Increased glucose clearance during intraperitoneal glucose tolerance test	[3]
3 β ,7 β ,25-trihydroxycucurbita-5,23(E)-dien-19-al	Lowered blood glucose levels	[11]
5 β ,15-epoxy-3 β ,25-dihydroxycucurbita-6,23(E)-dien	Lowered blood glucose levels	[11]
Conjugated linolenic acid, linoleic acid, conjugated linoleic acid	Intestinal GLP-1 release	[12]
19-nor-cucurbita-5(10),6,8,22-(E),24-pentaen-3 β -ol	Intestinal GLP-1 release	[12]
6,5 β ,19-epoxycucurbita-6,24-diene-3 β ,23 ξ -diol (karavilagenine E)	Intestinal GLP-1 release	[12]
Oleanolic acid	Intestinal GLP-1 release	[12]
Trehalose	Lowered postprandial blood glucose levels	[1]
Momordin	PPAR β/δ activation	[2]
9c, 11t, 13t conjugated linolenic acid	PPAR α and γ activation	[13]

CONCLUSION

Several studies confirmed that the bitter gourd consumption had good effect on diabetic patients by reducing the blood glucose level. But this

individual's report revealed a new concept of developing hypoglycemic condition while taking over and above bitter gourd diet in dinner by a normal individual. Thus diabetic and normal individuals should be cautious while over consumption of bitter gourd during night time. Further hypoglycemic individuals also to be investigated for the consumption of bitter gourd while history taking during general practice.

REFERENCES

- Matsuura H, Asakawa C, Kurimoto M, Mizutani J, α -Glucosidase inhibitor from the seeds of balsam pear (*Momordica charantia*) and the fruit bodies of *Grifola frondosa*, *Biosci Biotechnol Biochem*, 2002, 66, 1576-1578.
- Sasa M, Inoue I, Shinoda Y, Takahashi S, Seo M, Komoda T, Awata T, Katayama S, Activating effect of momordin, extract of bitter melon (*Momordica charantia* L.), on the promoter of human PPAR δ . *J Atheroscler Thromb*, 2009, 16, 888-892.
- Kochhar A, Nagi M, Effect of Supplementation of traditional medicinal plants on blood glucose in non-insulin-dependent diabetics: A pilot study, *J Med Food*, 2011, 8, 545-549.
- Han H, Renee C, Christina G, Lawrence L, Junfeng C, Myeong SL, Tianshong Z, Ling F, The safety and effectiveness of bitter melon (*Momordica charantia*) as an alternative to traditional hypoglycemic agents for the control of fasting blood sugar in patients with type 2 diabetes mellitus: a systematic review protocol, *JBI Database of Syst Rev Imple Rep*, 2013, 11, 17-32.
- Khanna P, Jain SC, Panagariya A, Dixit VP, Hypoglycemic activity of polypeptide-p from a plant source, *J Nat Prod*, 1981, 44, 648-655.
- Kumar Shetty A, Suresh Kumar G, Veerayya Salimath P, Bitter gourd (*Momordica charantia*) modulates activities of intestinal and renal disaccharidases in streptozotocin-induced diabetic rats, *Mol Nutr Food Res*, 2005, 49, 791-796.
- Ying Z, Ying D, Xiwen Q, Fengjie C, Quin G, Xinghua Z, Yun W, Yi Z, Zhiyu X, Effect of superfine grinding on antidiabetic activity of bitter melon powder, *Int J Mol Sci*, 2012, 13, 14203-14218.
- Klomann SD, Mueller AS, Pallauf J, Krawinkel MB, Antidiabetic effects of bitter gourd extracts in insulin resistant db/db mice, *Br J Nutr* 2010, doi: 10.1017/S0007114510002680.
- Singh J, Cumming E, Manoharan G, Kalasz H, Adeghate E, Medicinal chemistry of the anti-diabetic effects of *Momordica charantia*: Active constituents and modes of actions, *Open Med Chem J*, 2011, 5, 70-77.
- Dans A, Villarruz M, Jimeno C, Javelosa M, Chua J, Bautista R, Velez GG, The effect of *Momordica charantia* capsule preparation on glycemic control in type 2 diabetes mellitus needs further studies, *J Clin Epidemiol*, 2007, 60, 554-559.
- Zanker KS, Mang B, Wolters M, Hahn A, Personalized diabetes and cancer medicine: A rationale for anti-diabetic nutrition (bitter melon) in a supportive setting, *Curr Cancer Ther Rev*, 2012, 8, 66-77.
- Huang T, Lu K-N, Pai Y-P, Hsu C, Huang C-J, Role of GLP-1 in the hypoglycemic effects of wild bitter gourd, *Evid Based Complement Alternat Med*, 2013, doi: 10.1155/2013/625892.
- Chuang CY, Hsu C, Chao CY, Wein YS, Kuo YH, Huang CJ, Fractionation and identification of 9c, 11t, 13t-conjugated linolenic acid as an activator of PPAR alpha in bitter gourd (*Momordica charantia* L.), *J Biomed Sci*, 2006, 13, 763-772.

Cite this article as:

Prabhu N, Ismail M, Marzuk SM and Thirumalaikolundu Subramanian P, Hypoglycemic Effect Of Bitter Gourd In A Healthy Individual - A Report With Brief Review, *International Journal of Bioassays*, 2015, 4 (04), 3796-3798.

Source of support: Nil

Conflict of interest: None Declared