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Impact of *Momordica Charantia* (Karela) on the Body Weight in the Streptozotocin-Induced Diabetic Rats.

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Abstract:

Context: *Scientific studies revealed the increase body weight properties of Momordica charantia (Karela). The present study was carried out to find out macroscopically whether momordica charantia (Karela) has got any impact of gain in body weight in diabetes mellitus.*

Study Type*: An experimental study.*

Setting: *Anatomy department of the IPGMR (Institute of Post Graduate Medicine and Research) at present BSMMU (Bangabandhu Sheikh Mujib Medical University) and BIRDEM (Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine & Metabolic Disorders).*

Subjects: *Sixty five healthy young Long Evans rats of male sex weighing 150 to 280gm aged between 10 to 12 weeks were used in this study.*

Main Outcome Measures: *Variation of differential body weights in different groups of rat.*

Result: *Mean 'initial' and 'final' (on day 7 and day 51 from Streptozotocin/vehicle injection) body weight in the nondiabetic control group (Group-A) was 203.00 ± 12.52g and 229.00 ± 16.63g respectively. Therefore, the mean body weight increased by about 13% which is higher than that of the initial value. In untreated diabetic group (Group B), the mean initial body weight was 181.00 ± 15.95g and the mean final was 153.90 ± 12.20g. So here the body weight decreased by about 13%, which is more or less similar. On the other hand, in the insulin-treated diabetic rats the mean initial body weight was 222.50 ± 51.17g and the mean final was 245.00 ± 45.77g, which is about 11% gain & in the karela-treated diabetic rats, the initial body weight was 194.00 ± 13.50g and the mean final was 212.90 ± 13.45g which is about 10% gain. The value in the insulin-treated diabetic rats & the karela-treated diabetic rats were significantly higher than that of the untreated diabetic rats. But there was no significant difference between the insulin-treated diabetic rats & the karela-treated diabetic rats in this regard.*

Conclusion: *Karela showed a tendency of acting against body weight lowering effects of Streptozotocin-induced diabetes mellitus. However, further investigations are recommended for establishing karela as a safe, useful effective agent to minimize the lowering of body weight in diabetes mellitus as well as antidiabetogenic agent.*

Key Words: Diabetes mellitus, Body weight, *Momordica karantia* (karela).

Introduction:

Diabetes is a one of the major disease for morbidity and mortality through out the world. According to recent estimates the prevalence of diabetes mellitus is 4% worldwide and that indicates 143 millions people are affected which will increase to 300 millions by the year 2025[1].

Diabetes mellitus (DM) is the most common endocrine disorders and a major global health problem today. Main feature of DM is chronic hyperglycemia as a result of a relative or absolute lack of insulin or the actions of insulin on its target tissues or both[2].

Many herbal medicinal plants have been recommended for the treatment of diabetes. The ethno botanical information report that 800 plants

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may have anti-diabetic activities. Among these herbal products *Momordica charantia* ('karela' or bitter gourd) is one of such natural products, cultivated in the many parts of Africa, South America & Asia. The fruit is very popular as a vegetable in Bangladesh. In Sri Lanka the fruit juice of *M. charantia* is considered as an effective hypoglycemic agent in management of diabetes mellitus [5]. In the other parts of the world it is used as the folk medicine to the treatment of diabetes[2]. 'Karela's hypoglycemic property has also been shown experimentally in the diabetics as well as in normal laboratory [6, 7, 8]

Effects of long term feeding (10 weeks) of Momordica charantia fruit extract showed hypoglycemic, strong hypolipidemic properties in streptozocin induced diabetic rats. Momordica charentia increases the body wt. and reduces blood sugar levels[1].

Bitter melon or karela reduced weight gain and body fat without affecting energy intake and apparent fat absorption in rats fed with a high fat diet.[4]

As because diabetes mellitus causes lowering the body weights[9]. Present study was carried out to observe the protective role of 'karela (bitter gourd) against the lowering of the body wt. in Strreptozotocin-induced diabetes mellitus.

Materials and Methods:

The experiment was carried out on a total number of 65 young rats of male Long evans strain. They were 10 to 12 wks old, weighing between 150 and 280gm. Among them 10 rats were treated with vehicle (citrate buffer solution 1 ml/ kg body weight intraperitoneally) only used as control rats (Group A) and 45 rats were treated with vehicle and Streptozotocin (STZ) found as diabetics, 15 of which were treated as untreated diabetic group (Group B), 15 were treated again with insulin at a dose of 1 – 3 units/ kg body weight/ day, were treated as the insulin-treated diabetic group (Group C) & 15 were treated with karela at a dose of 10 mi/ kg body weight/ day orally through tube to control the diabetes mellitus and was called as 'karela'- treated diabetic group (Group D)..

Body weight of the rats was measured in gm on a mechanical balance on the 7th day, termed as 'initial' and on the day 51, termed as 'final' from day of STZ/Vehicle injection.

Observations and results:

Body weights were estimated in all rats in two occasions on day 7 and day 51 from day of STZ/ vehicle injection shown in Table- I.

The body weight was measured in gm. In control group (Group A) the initial mean body weight was 203.00 ± 12.52 and the mean final was 229.00 ± 16.63. Therefore, the mean body weight increased by about 13% (P = 0). In untreated diabetic group (Group B) the initial mean body weight was 181.00 ± 15.95 and the final mean was 153.90 ± 12.20. So, here the body weight decreased by about 13% (P = 0.884). In the insulin- treated diabetic rats (Group C) the initial body weight was 222.50 ± 51.17 and the final mean was 245.00 ± 45.77, which was about 11% gain (P = 0.001) & in the karela–treated diabetic rats, the initial body weight was 194.00 ± 13.50 and the mean final was 212.90 ± 13.45 which is about 10% gain (P = 0). The value in the insulin-treated diabetic rats & the karela-treated diabetic rats were significantly higher than that of the untreated diabetic rats (P = 0). But there was no significant difference between the insulin-treated diabetic rats & the karela-treated diabetic rats (P = 0.605) in this regard.

When statistically analyzed, the mean final body weight of the control rats was found to be significantly lower (P= 0) than that of the control rats, insulin-treated & karela-treated diabetic rats (P= 0). But there was no significant difference between the insulin-treated diabetic rats & the

Table I

Body weight of rats of different groups (n=10 in each group)

Group	Body weight (g) Mean±SD		
	Initial (on day 7)	Final (on day 51)	Final as a percentage (%) of corresponding initial
A(Control)	203.00±12.52	229.00±16.63	112.85±5.44
B (Untreated Diabetic)	181.00±15.95	153.90±12.20	47.36±7.02
C(Insulin-treated diabetic)	222.50±51.17	145.00±45.77	111.52±9.94
D('Karela'-treated diabetic)	194.00±13.50	212.90±13.45	109.80±2.02

Statistical analyses for significans of differences between different groups and within groups:
Initial & final body weights compared through Student's paired 't' test:
Group A : P= 0.000*
B : P= 0.000*
C : P= 0.001*
D : P= 0.000*

Final body weight as a percentage of corresponding initial body weight compared through unpaired Student's 't' test.
Group B vs A : P= 0.000*
C vs B : P= 0.000*
D vs B : P= 0.000*
C vs D : P= 0.605
*Significant at 5% level (P 0.05)

karela-treated diabetic rats (P = 0.605).

Discussion:

The body weight increased by the treatment with momordica charantia (karela) of all the diabetic rats. The increase in body weight were significantly higher than that of untreated diabetic rats but there was no significant difference between the insulin treated diabetic rats and the karela treated diabetic rats in this regard.

The body weight was significantly higher than that in the untreated diabetic rats. This impact was similar to that of the effect of insulin on STZ- Induced Diabetic rats[1]. Similar findings were also observed by Kumae Dinesh et al.[10]

Tsuji et al[11] showed that mean body wt. of the STZ-induced diabetic group was significantly lower than that of the control group.

In case of diabetes mellitus body weight are reduced and thus body weight may be an important landmark to detect the diabetic status[6,7].

References:

1. Kumar BD, Mitra A, Manjunatha M, In vitro and In Vivo Studies of Antidiabetis Indian Medicinal plants: A review, Journal of Herbal Medicine and Toxicology 3 (2) 9-14(2009)
2. Cummings E, Hundal H.S, Wackerhage H, Hope M, Belle M, Adeghate E, and Singh J, Momordica charantia fruit juice stimulates glucose and amino acid uptakes in L6 myotubes. Molecular and cellular biochemistry 261:99-104,2004. 2004 Kluwer Academic Publishers. Printed in the Netherlands.
3. Hossain M.S, Ahmed M and Islam A, Hypolipidemic and Hepatoprotective efferent fractions of methanolic extract of momordica charantia (LINN.) In alloxan induced diabetic rats. Islam et al., IJPSR,Vol.2(3):601-607 ISSN 0975-8232

4. Chen Qixuan , Chan L.Y Laureen and T.S Edmund. Bitter melon (Momordica charantia) Reduces Adiposity, Lowers Serum Insulin and Normalizes Glucose Tolerance in Rats Fed a High Fat Diet. 2003 the American society for nutritional sciences J.Nutr.133:1088-1093,April 2003.

5. Tennekoon KH, Jeevathayapuran S, Angunawala P, Karunanayake EH, Jahyasinghe KSA. Effect of *Momordica charantia* on key hepatic enzyme. J Ethnopharm 1994; 44: 93-7.

6. Karunanayake EH, Jeevathayaparan S, Tennekoon KH. Effect of *Momordica charantia* fruit juice on streptozotocin-induced diabetes in rats. J Ethnopharm 1990; 30:199-204.

7. Karunanayake EH, Welihinda J, Sirimanne SR. Sinadorai G. Oral hypoglycaemic activity of some medicinal plants of Sri Lanka. J Ethnopharm 1984; 11: 223-31.

8. Doi K, Yamanouchi J, Kume E, Yasostilma A. Morphologic changes in hepatocyte muclei of streptozotocin (SZ)- induced diabetic mice. J Expl Toxic Pathol 1997; 49:295-9.

9. Chatamara K, Daniel PM, Kendal MD, Lam DKC. Comparison of histological changes in the thymus of fasted, streptozotocin diabetic and genetically diabetic rats with evidence that the enlarged adrenals in diabetes are not the cause of the atrophy in diabetic animals, J Physiol 1985; 353: 130.

10. Kume FY. Ohmachi S, HagakiK, Tamura, K Doi. Hepatic changes of mice iri the subacute phase of stscptozotain induced diabetes Exp. Toxical. Pathol, 1994; 46: 368-374.

11. Tsuji K, Taminato T, uysami M Ishida H, Kitano N, Fukumoto H, Koh G, Kurose T, Yamada Y, yano Het W. 1988. Characteristics features of insuline screction in the streptozotucin induced NIDDM rat mode. Metabolism 1988; 1040-1044.