HYPOGLYCAEMIC ACTION OF MOMORDICA CHARANTIA IN NORMAL AND DIABETIC MICE

S. KAVIMANI, R. ILANGO, MALAYA GUPTA* AND U.K. MAJUMDAR*
Periyar college of Pharmacy, Trichy-21, Tamil Nadu
Jadavpur University, Calcutta – 700 032*

ABSTRACT: The hypoglycemic effect of the ethanolic extract of Momordica charantia (cucurbitaceae) was investigated in both normal and streptozotocin – induced diabetic mice. The ethanolic extract of Unripe fruits of M. charantia (800mg/kg) reduced the blood glucose of normal mice from 172 ±3 to 136 ± 5 mg/100ml 4 hours after intraperitoneal administration (P<0.001), and also significantly lowered the blood glucose of streptozotocin induced diabetic mice from 686± 60 to 407± 35 mg/100ml under similar conditions (p<0.01). The possible mechanism of hypoglycemic action of M.Charantia is due to the increased glucose uptake in liver cells because it markedly lowers the blood glucose levels in streptozotocin induced diabetic mice.

INTRODUCTION

The fruits, leaves and roots of Momordica charantia (cucurbitaceae) have been used as a folk remedy for diabetes mellitus1. The fruits and leaves of the plant contain momordicine, a glucoside, a saponin like substance and an anthelmintic principle(2-4). There is an experimental evidence for the hypoglycemic action of these materials, the purpose of these study was to examine the hypoglycemic effect of M.Charantia (MC) unripe fruits.

Materials and Methods

The unripe fruits of M. Charantia were collected in the month of August, shade dried and pulverized. The powder was passed through no 40 mesh. The ethanolic extract of the powder was obtained by continuous soxhlet extraction, the extract was evaporated to dryness. It was dissolved in propylene glycol and used for experiments.

Animals

Swiss albino mice (20-24gms) were used throughout the study. They were housed in an air conditioned room at 22 ± 2°C. The animals were kept in the experimental animal room for 7 days with free access to food and water. For the determination of blood glucose levels, blood samples were withdrawn by cardiac puncture. The animals were divided into two groups. One group was injected intravenously with 150mg/kg body weight of streptozotocin (STZ) freshly dissolved in citrate buffer (pH 4.5) and the other group was administered buffer alone and used as a control. Eight days after injection of STZ, the blood glucose levels of all the mice were determined. Mice with a blood glucose level above 300mg/100ml were considered to be diabetic and were used in the study. The hypoglycemic effect of ethanolic extract of M. charantia were compared with that of...
Tolbutamide in normal and STZ-induced diabetic mice respectively. Five to six animals were used for each group.

**Determination of blood glucose**

Blood glucose levels in both normal and diabetic animals were determined by the glucose oxidase method\(^5\). All the data were expressed as means ± SEM and student “t” test was used for the analysis\(^6\).

**Results and discussion**

The mean blood glucose levels of mice at various time intervals after i.p. administration of *M. Charantia* are shown in table-I these levels were compared with the values in control mice administered saline along and also with those in animals receiving 50mg/kg body weight of tolbutamide. The hypoglycemic effect of *M. charantia* was dose dependent. MC at dose level of 200 and 400 mg/kg altered blood glucose significantly, while MC at 800mg/kg lowered blood glucose form the basal value of 172 ± 3 mg/100ml to 136 ± 5mg/100ml (P<0.001), 4 hours after the administration.

The hypoglycemic effects of MC and insulin on the blood glucose of streptozotocin – induced diabetic mice are shown in table II. No differences in blood glucose were observed between the levels at times 2,4,7 and 10 hours after the administration when compared with the basal values in control mice. However, MC at 200,400 and 800mg/kg treated mice showed a significant decrease in blood glucose after 4 hours when compared with the basal values. (MC 200,800: P<0.01, MC 400; P<0.001). The hypoglycemic effect of MC in STZ mice also was dose-dependent, Insulin treated mice (5U/kg body weight) exhibited a significant decrease in the blood glucose at 2 hours, when compared with the basal values (P<0.001).

The present study clearly shows that the ethanolic extract of the unripe fruits of *Momordica charantia* (MC) produces significant hypoglycemic effects in normal mice. In addition. We have examined the therapeutic effect of MC on hyperglycemia in STZ induced diabetes. In mice. The probable mechanism, may be increased glucose uptake by the liver cell, because MC markedly lowers blod glycose levels in STZ induced diabetic mice.

### Table -I

**Effect of Momordica charantia on blood glucose in normal mice**

| Blood glucose (mg/100ml) | 0hr | 2hr | 4hr | 7hr | 10hr |
|-------------------------|-----|-----|-----|-----|------|
| Control                 | 176 ± 8 | 177 ± 5 | 172 ± 8 | 174 ± 4 | 183±6 |
| MC 200mg/kg            | 179 ± 6 | 183 ± 3 | 160 ± 8* | 159±10 | 163±8 |
| MC 400mg/kg            | 175 ± 5 | 182 ± 7 | 133± 6*** | 137 ± 8** | 137±7*** |
| MC 800mg/kg            | 172 ± 3 | 181 ± 3 | 141 ± 8** | 141 ± 8** | 147±5** |
| Tolbutamide 50mg/kg    | 190 ± 4 | 120± 2*** | 140 ± 8** | 140 ± 8** | 156±3*** |

*P<0.05 **P<0.01 ***P<.001
Table -II
Effect of Momordica charantia on blood glucose in normal mice

| Treatment          | Blood glucose (mg/100ml) | 0hr          | 2hr          | 4hr          | 7hr          | 10hr         |
|--------------------|--------------------------|--------------|--------------|--------------|--------------|--------------|
| Control            |                          | 596 ±67      | 583±90       | 567 ±64      | 517±36       | 617±60       |
| MC 200mg/kg        |                          | 656 ±17      | 544±19**     | 522±31*      | 553±39*      | 586±33       |
| MC 400mg/kg        |                          | 635±42       | 457±22**     | 418±26***    | 513± 43      | 582±33       |
| MC 800mg/kg        |                          | 686±60       | 423±29**     | 470±35       | 478± 48*     | 587±49       |
| Tolbutamide 50mg/kg|                          | 586±31       | 304±36***    | 545±47       | 523±47       | 579±40       |

*P<0.05      **P<0.01        ***P<.001

REFERENCES:

1. Anonymous, wealth of India – Raw Materials, Vol VI CSIR, New Delhi, 408 (1976).
2. Rivera, P. and Amer, S.J Pharm., 113, 281, (1941)
3. Rehm, K.J sci. Fd Agric., 8,679, (1957).
4. Rehm K and wessels ibid, 8, 657, (1957).
5. Stevens, J.F. Clin chim. Acta, 32, 199, (1951).
6. Armitage, P., Statistical Methods in medical Research, Blackwell scientific publication. 217, (1971).