Ind. J. Physiol. Pharmac., Volume 33, Number 2, 1989

EFFECTS OF LONG TERM FEEDING OF ACETONE EXTRACT OF *MOMORDICA CHARANTIA* (WHOLE FRUIT POWDER) ON ALLOXAN DIABETIC ALBINO RATS

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(Received on May 27, 1988)

Summary : Acetone extract of whole fruit powder of *Momordica charantia* a given orally daily lowered the blood sugar and serum cholesterol levels to normal range after 15 to 30 days in alloxan diabetic rats. The blood sugar once lowered after 30 days treatment did not increase even after 15 days of discontinuation of the treatment.

Key words : alloxan diabetes acetone extract of fruit *Momordica charantia* hypoglycaemic effect

INTRODUCTION

Fruits of *Momordica charantia* (family Cucurbitaceae, 'Karela') have been regarded to be hypoglyceamic since olden times, and are commonly used by diabetics in India. In recent times there are many reports (1, 2, 3, 4, 5, 6, 7, 8) on the hypoglyceamic properties of fresh juice of *Momordica charantia* fruit. Vimla Devi *et al.* (9) tested ether extract of leaves of *Momordica charantia* : powdered seeds have been tested by Kedar and Chakrabarti (10). Akhtar *et al.* (11) studied and compared the effects of dried whole fruit powder of *Momordica charantia* on alloxan diabetic and normal rabbits. Lal and Chaudhury (12) tested aqueous extract of *Momordica charantia.*

In the present paper effects of acetone extract of *Momordica charantia* fruit powder on alloxan diabetic rats have been presented.

MATERIAL AND METHODS

Whole fruits of *Momordica charantia* were collected in season, washed, cut into small pieces, and dried in shade. These were powdered and acetone extract was made with Soxhlet apparatus. It was dried at 35°C and stored at 4°C in air tight containers.

Albino rats of both sexes (100-150 g) acclimatized to laboratory, were randomly divided into five groups of 18 animals each. Group I was kept as normal control. Remaining four groups were injected i.v., 6 mg/100 g of alloxan monohydrate (Sigma Chemical Company) in citrate buffer of pH 5.0. Group II served as diabetic control group. Groups III, IV and V were given 25 mg, 50 mg and 75 mg/100 g respectively, of the extract every day in diet All the rats were weighed before and after various treatments. Caudal vein blood samples collected at specific intervals were tested for presence of sugar (13), serum cholesterol (14), urea (15) and total proteins (16).

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RESULTS

The injection of alloxan monohydrate resulted in elevation of the blood sugar level. In rats, receiving a dose of 25 mg/100 g acetone extract of whole fruit powder of *Momordica charantia* for 30 days, the blood sugar (mg/dl) was lowered from 376.90±5.44 to 190.26±6.42 ($P<0.001$;). These readings show 13.30% fall in 8 days, 27.39% fall in 15 days and 49.48% fall in 30 days.

In the rats, which were given a dose of 75 mg/100 g extract, the blood sugar dropped from 263.25±11.21 to 91.13±1.58 ($P<0.001$) in 30 days (Fig. 1). These readings show 13.30% fall in 8 days, 25.46% fall in 15 days and 61.56% in 30 days; however, in certain rats, even a fall of 70% was observed. Effect of 50 mg dose was intermediary.

Blood sugar once lowered after treatment with the extract remained so even after 15 days of discontinuation of treatment (Fig. 1).

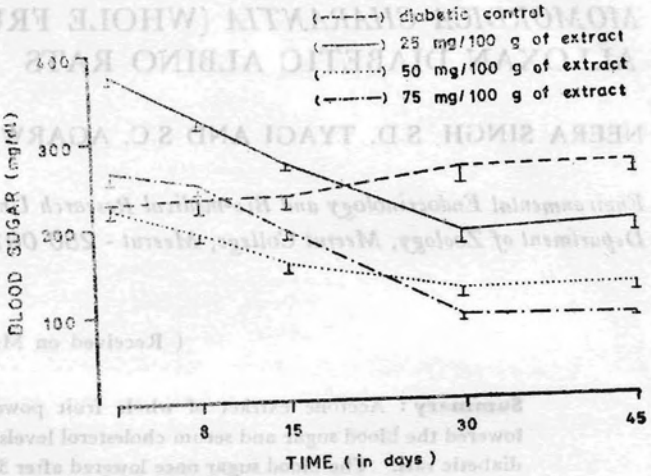

Fig. 1 : Effect of oral feeding of different doses of acetone extract of whole fruit powder of Momordica charantia (Linn.) for 30 days followed by normal diet for 15 days on blood sugar level of diabetic rals.

Value are means (n=6) : S.E.M., Vertical bars.

The cholesterol and blood urea levels were high in alloxan diabetic control rats. The different doses

TABLE I : Effects of different doses of acetone extract of whole fruit powder of *Momordica charantia* on serum cholesterol, blood urea, protein and body weight of alloxan diabetic albino rats.

S. No.	*Serum Cholesterol mg/dl*	*Blood urea mg/dl*	*Total Protein gm/dl*	*% Increase (+) or decrease (—) in Body Weight*
		Diabetic Controls		
1.	175±4.22	30±2.60	5.8±0.15	(—) 5.25±0.55
2.	240±5.45	40±2.77	5.0±0.30	(—) 18±2.52
3.	245±5.08	64±3.37	6.1±0.13	(—) 25±3.23
		Extract treatment 25 mg/100g		
1.	111±1.12*	40±2.15	7.1±0.10	(+) 6.59±0.75**
2.	115±1.33*	35±1.54	7.5±0.06	(+) 8.19±0.76**
3.	120±1.64*	41±1.77*	7.1±0.09	(+) 10.25±2.54*
		Extract treatment 50 mg/100g		
1.	110±1.32*	38±1.36	7.1±0.13	(+) 7.35±1.06**
2.	113±1.78*	41±2.15	7.3±0.06	(+) 17.70±2.32*
3.	103±1.78*	41±1.78*	7.2±0.09	(+) 26.75±3.30*
		Extract treatment 75 mg/100g		
1.	110±1.31*	44±0.92	7.8±0 14	(+) 8.85±0.49**
2.	110±2.18*	41±1.41	7.1±0.13	(+) 20±2.06*
3.	125±1.85*	38±1.09*	7.6±0.10	(+) 32±2.57*

1 and 2 : values after 15 and 30 days of feeding the extract in food (no drug in controls); 3 value 15 days after omitting drug feeding, i.e. on day 45.

Each Value is mean±SEM in mg/dl or g/dl for six rats.

* $p<0.001$; ** $p<0.01$, as compared to the respective diabetic control groups ('t' test).

of the extract brought down the serum cholesterol level to normal limits (Table I), but on the blood urea level showed no appreciable effect. The total protein level showed no change in the alloxan induced diabetic rats, however, their level was slightly higher in extract treated rats (Table I). The body weight was lowered by 5 to 25% in diabetic control groups, but was higher in extract treated rats by 6 60 to 30% (Table I). However in certain rats even upto 52% increase in body weight was observed.

DISCUSSION

Alloxan has been shown to produce permanent hyperglycaemia (17). In our experiments the diabetes was characterised by weight loss, presence of sugar in urine and hyperglycaemia, raised serum cholesterol and blood urea levels. Diabetes mellitus has been shown to be associated with atherosclerotic (18) and cardiovascular disease (19) and cholesterol is involved in atherosclerosis (18).

In the diabetic rats blood glucose was significantly decreased by feeding acetone extract of *Momordica charantia* fruit powder for 15 to 30 days Serum cholesterol also returned to normal.

Sharma *et al.* (21) and Pabrai and Sehra (5) reported 80% mortality in normal animals and 90% mortality in alloxan diabetic animals treated with fresh juice of *Momordiea charantia* (15 to 40 ml/kg iv). In the present study, we did not find any mortality with acetone extract of *Momordica charantia*.

Kirti *et al.* (20) in clinical trials with fresh *Momordica charantia* fruit powder reported no hypoglycaemic effect on diabetic patients and stated that *Momordica charantia* leads to a false negative test for sugar in urine. In contrast we observed decrease in blood sugar level of alloxan diabetic rats following treatment with the acetone extract.

The mode of action of the extract is not clear. Notably, restoration of normal levels of blood sugar by the extract was possible only in moderately alloxan diabetic rats (blood sugar not exceeding 400 mg/dl.), which seemed to retain partial β-cell activity (21, 3, 10) and ineffectiveness in severe diabetes may be due to complete destruction of β-cells by alloxan.

Marquis (22) showed that "foetidin" isolated from Momordica foetida, does not lower the blood glucose level in alloxan diabetic animals. "Charantin" isolated from *Momordica charantia* has been found to be structurally similar to foetidin but some other alkaloids (23, 24, 5, 8) have also been isolated from *Momordica charantia*, which may be responsible for lowering the blood sugar level in alloxan diabetic albino rats.

Our important observation was that the alloxan diabetic rats which were treated with extract for 30 days, maintained the blood sugar level in the normal range for a fortnight after discontinuing the treatment despite that the rats consumed normal diet. This might be due to the longer lasting stimulant effect on β-cells of pancreatic islets or due to pancreatic β-cell regeneration as reported for epicatechin isolated from *Pterocarpus marsupium* (21).

ACKNOWLEDGEMENTS

We are indebted to the ICMR, Delhi for the award of JRF research grant to one of us and to the authorities of Zoology Department, Meerut College, as well as to the Principal, Meerut College, Meerut for providing necessary facilities to carry out this research.

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