

EFFICACY OF THE BITTER PRINCIPLES ON POST-GLUCOSE BLOOD GLUCOSE VALUES

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Bitter principles of swertia chirata (chiretta) and momordica charantia (karela) have been widely in use for treatment of diabetics in the indigenous system.

The indigenous drugs employed have conceptually based effectiveness, depending on their taste (rasas) and since diabetes is considered to be a disease of sweets, sugary, foods, agents with bitter and astringent effect have been in vogue for centuries. In the natural or extract forms, better principles exist in the followings^{1, 2} (i), (ii).

Natural

Azadirachta indica (neem)

Momordica charantia (karela)

Cocinia indica (Kundra)

Swertia chirata (chiretta)

Aegle marmelos (Begl root)

Extracts

Colocynthis - apple

bitter cucumber

bitter gourd

Benzaldehyde - bitter almonds.

Quinine from cinchona officinalis.

Study was planned to evaluate the effect of bitter principles from Momordica charantia (karela) and swertia chirata (chiretta) on glucose tolerance in normal and diabetic subjects. The characteristics of these agents used are as follows :

Swertia-chirata-Buch-Bean (Chiretta)³.

The leaf grows abundantly in temperate Himalayas as from Kashmir to Bhutan and between an altitude of 1200 M to 3000 M. It has long been used as a bitter tonic, the bitter glycoside mainly being charatin. which on hydrolysis yields two bitter principles ophelic acid and chiratogenin.

Momordica-charantia-Linn⁴ (karela or bitter gourd), is a monoecious climber found throughout India, often under cultivation upto an altitude of 1500 M. Plant is cultivated

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throughout India, as a vegetable crop and bears a fruit 5.0-25.0 cm long. It is commonly cultivated during summer and bears abundant fruit in monsoons.

The fruit is bitter and contains a bitter principle known as momordicine. Fruit has following composition: Moisture 83.2%, fibre 1.7g; mineral matter 1.4%; calcium 50 mg; phosphorous 140 mg, iron 9.4 mg/100 G, ascorbic acid 188 mg/100 G.

The subjects screened in the study included the following groups :

Group-I 10 normal subjects, both male and female, between the age group of 20-50 years.

Group-II 15 NIDDM patients, both male and female, between the age group of 35-55 years.

In Group-I, glucose tolerance (100 G) was carried on in each subject, fasting and 2 hour blood glucose values were estimated, 2-3 days later, these subjects were given 200 ml extracted juice of swertia chirata (prepared, after soaking overnight and boiling it for 10 minutes). This concoction was taken in fasting state and 2 hour later 100 G glucose tolerance carried on, blood samples taken fasting, 1 hour and at 2 hours intervals.

Group II 100 G. glucose tolerance was done after withdrawing the prior antidiabetic medication. 2-3 days later, extracted juice of 250 g of fresh Momordica charantia was administered in fasting state, 1½ hour later 100 G GTT repeated. Blood glucose values were assessed at fasting; 1 hour and 2 hours intervals.

Results

Analysis of the data is as follows :

Group I (Normal subjects-Swertia chirata) showed no reduction in blood sugar in 8 instances, while in 2 instances there was 5 % drop in the blood sugar with swertia chirata. As there was lack of any significant fall in glucose values, study was not pursued in diabetics.

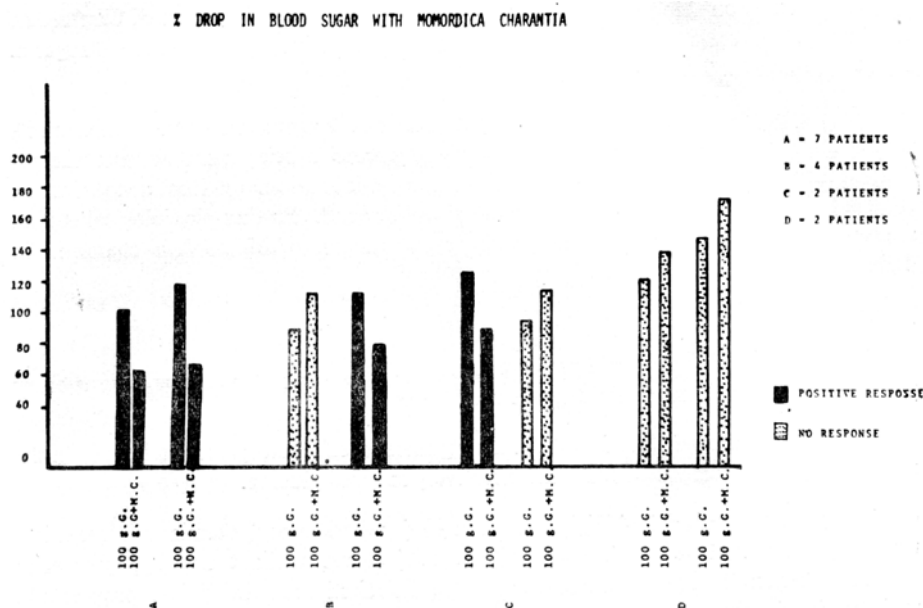
Group II (NIDDM-Momordica charantia)-A mean average percent drop in blood glucose by 15% at 1 hour level and 26% at 2 hour levels was observed.

Percentage fall of blood sugar with Momordica charantia (mc)

Diabetic subjects (No.)	100 G glucose tolerance percent rise in blood glucose		MC followed by 100 G. glucose percent rise in blood glucose		Mean percent drop in blood glucose with MC	
	1 hour	2 hour	1 hour	2 hour	1 hour	2 hour
15	103	114	88	88	15	26

Individually 7 patients out of 15 patients showed a drop of 41% at 1 hour interval and 50% at 2 hour interval with *Momordica charantia*. Another 4 patients showed a drop of 25% at 2 hour interval with no effect at 1 hour interval. Another 2 patients showed a drop of 34% at 1 hour interval with no effect at 2 hour interval.

Yet 2 patients had no effect on blood glucose with *Momordica charantia*.



Discussion

Percent fall of blood sugar with *Momordica-charantia* grouped as I-IV (depending on pattern of glucose response) may be tabulated as follows :

Sub-group	No. of subjects	100 G. glucose tolerance, percentage rise in blood glucose		MC followed by 100 C glucose percent change in blood glucose		Percent drop* in blood glucose with MC	
		1 hour	2 hour	1 hour	2 hour	1 hour	2 hour
I	7	102	118	61	68	41	50
II	4	87	103	112	78	None	25
III	2	123	93	89	112	34	None
IV.	2	119	145	136	170	None	None

* In each instance, fasting glucose value is denominated and percentage change is calculated on this value basis.

After analysing the above given data, effect of body weight and sex that might be related to response was evaluated. None of these factors have any significant role in response to *Momordica charantia*. However, duration of diabetes seemed to determine this effectiveness, i.e. patient with a mean duration of 1-2 years of diabetes, responded well whereas those with 10 years and above duration did not respond to the administration of *Momordica charantia*.

This study on *Momordica charantia* is comparable to the report of Leatherdale Bansen et al⁵ wherein 9 subjects were studied and showed 14% drop in blood sugar at 1 hour and none at 2 hours.

The hypoglycaemic effect of this type of bitter can be speculative and based on its astringent properties, or the absorptive capacity of glucose is being modified from the gut either due to gut hormones or plasma insulin response. It is also not evident as to selection criteria that may indicate likely patients who will respond. Further physiological studies are warranted for determining the exact mode of action of *Momordica charantia* in diabetics.

Summary

Two indigenous preparations were tried for their effect on glucose tolerance in normal subjects and non-insulin dependent diabetics.

Swertia chirata was found to have no significant effect on glucose tolerance in the normal subjects. *Momordica charantia* effectively lowered glucose.

(> 40% of fasting value) in 46% instances, in 40% others hypoglycaemic effect was less transitory either at 1 hour or 2 hour while in 13% it was without any hypoglycaemic effect. Further studies are warranted to evaluate its effectiveness in clinical practise and to determine its precise mode of action.

References

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