

Hypoglycaemic Effect of *Gymnema Sylvestre* on Diabetic Patients

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Summary

Gymnema sylvestre (*T. Sirukurincha*) is used in indigenous medicine for the control of glycosuria. In this work the hypoglycaemic effect of *Gymnema sylvestre* leaves was tried on seven mild diabetic patients. The leaves were sun-dried, powdered, packeted (10g) and was administered orally one per day for twenty one days. The glucose tolerance test was carried out before the intake of the *Gymnema sylvestre* leaf powder and on the 11th and 21st days of its administration. The glucose tolerance of the patients had improved significantly and 50% of them showed an increase in their body weights. The SGPT levels were normal, indicating that their liver functions were not affected by the orally administered *Gymnema sylvestre* leaves and probably had no toxic effects.

Introduction

Diabetes mellitus is the most common endocrine disorder and nearly 25 billion people are affected by diabetes mellitus in the world.¹ This clinical syndrome is characterized by hyperglycaemia due to the deficiency or diminished effectiveness of insulin. Diabetes mellitus affects the metabolism of carbohydrates, proteins, fats, electrolytes and water and is frequently associated with irreversible structural changes in the cells of the vascular system which lead to complications like coronary heart disease, cerebrovascular disease and peripheral vascular disease.^{3, 5} The blood glucose level in 50% of the diabetic patients can be controlled adequately by diet alone while 30% need hypoglycaemic drugs and the rest need insulin treatment.¹

Gymnema sylvestre (Tamil-Sirukurincha) is recommended for the control of glycosuria and is also prescribed as a diuretic in many systems of indigenous (Indian) medicine. The hypoglycaemic effect of *Gymnema sylvestre* was investigated as early as 1924 - 1929 by Mhaskar and Caius⁴. In 1981, Shanmugasundaram et al⁵ have studied its hypoglycaemic effect on normal healthy volunteers, diabetic patients and diabetic rats and rabbits.

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In our laboratory, Mohan⁶ had studied the effect of *Gymnema sylvestre* on a diabetic patient and indicated its hypoglycaemic effect.

Chemical analysis of the leaf of *Gymnema sylvestre* had shown that it contained a bitter principle, albuminous colouring, calcium oxalate, glucose, carbohydrate and tartaric acid but no tannin. It also contained an organic acid believed to be a glycoside with hypoglycaemic effects called gymnemic acid⁴.

This paper describes the hypoglycaemic effect of *Gymnema sylvestre* on blood glucose levels of eight insulin independent or maturity onset diabetic patients. The possible toxic effect on liver of orally administered *Gymnema sylvestre* leaves was assessed by estimating the SGPT levels.

Methodology :

Preparation and administration of *Gymnema sylvestre* leaf powder

Gymnema sylvestre leaves were collected and dried. The dried leaves were powdered by a domestic grinder. The powder was divided into 10g portions and packeted in polythene bags. All seven patients were given one packet (10g) daily of *Gymnema sylvestre* leaf powder to be taken orally for twenty one days.

Glucose tolerance test and SGPT assay

Glucose tolerance test⁷ was done on the zero day which is before the administration of *Gymnema sylvestre* leaf powder and the modified glucose tolerance test was done on the 11th and 21st days from the commencement

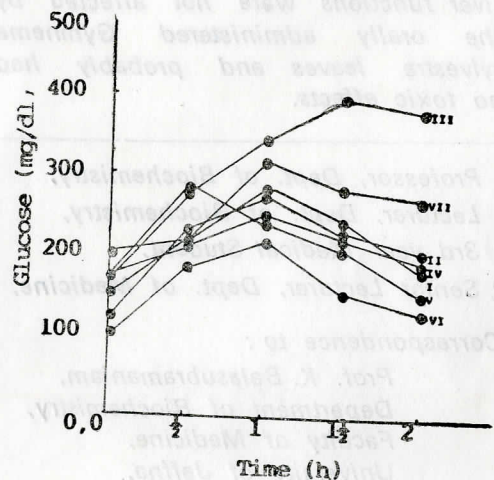
of the oral administration of *Gymnema sylvestre* leaf powder. In the modified glucose tolerance test the blood glucose was estimated on the zero and two hour blood samples while the urine glucose was assessed on every half hour urine samples.⁷

The SGPT levels were estimated colorimetrically on the 21st day blood samples. The body weight of these patients were recorded on zero, 11th and 21st days.⁹

Results and Discussion

Fasting blood glucose levels of the six patients before the oral administration of *Gymnema sylvestre* leaf powder were above 120 mg/dl and the mean blood glucose was 152 mg/dl. One patient (VI) had a normal fasting blood glucose level (97.1 mg/dl) but the 1 hour blood glucose level was 217 mg/dl. The

Figure 1: Glucose tolerance curve of the seven diabetic patients, before the administration of *Gymnema sylvestre*,



mean blood glucose level of these diabetic patients at 2 hours was 216 mg/dl and did not return to fasting levels. Out of these 7 patients, 2 of them had over 240 mg/dl at 2 hours (Figure 1).

In normal individuals, an increase in blood glucose level stimulates insulin secretion which enhances the entry of glucose into peripheral cells and thereby helps to bring back the blood glucose level to the fasting level in two hours. In diabetes mellitus, the two hour blood glucose level is well above the fasting level. Any treatment for diabetes mellitus should aim not only in controlling the fasting blood glucose level but also in bringing back the two hour

blood glucose level to the fasting level. Oral administration of *Gymnema sylvestre* seems to have both these desired effects. On the eleventh day from the commencement of the daily oral administration of *Gymnema sylvestre* (10g), the number of patients with normal fasting blood glucose levels (i.e below 120 mg/dl) increased from one to six. The mean fasting blood glucose level of the 7 patients was 104 mg/dl and at 2 hour was 121 mg/dl as determined by the modified oral glucose tolerance test (Table 1). These results show that the 2 hour blood glucose levels were returning towards the fasting levels. This is a very significant improvement (P<0.05) on the corresponding blood glucose level

Table 1 Blood glucose levels (mg/dl) in diabetic patients before, and during the intake of *Gymnema sylvestre*.

Patient	Blood glucose (mg/dl)					
	Before treatment		After treatment			
	Zero day		11th day		21st day	
	Fasting	2 hours.	Fasting	2 hours	Fasting	2 hours
I	151	184	119	118	86	108
II	119	205	97	108	108	194
III	173	378	162	184	148	161
IV	171	192	100	106	ND	ND
V	151	151	108	10	119	148
VI	97	130	43	48	54	54
VII	200	270	101	177	92	184
Mean	151.7	215.7	104.3	121.3	101.2	141.5
SD	34.7	84.2	35.1	46.6	31.9	52.5

Table 2: Effect of oral administration of *Gymnema sylvestre* on body weight and SGPT levels.

Patients	Body weight (Kg)			SGPT (L u)
	Before treatment	During treatment		
		11th Day	21st Day	
I	51	52	56	07
II	62	62	62	12
III	60	61	61	06
IV	64	64.5	ND	ND
V	77	77	76	10
VI	57	60	60	06
VII	58	57	58	07
Mean	61.3	61.9	62.2	08
SD	8.1	7.8	7.11	2.5

before commencement of the administration of *Gymnema sylvestre* leaf powder.

Shanmugasundaram et al, have studied the effect of *Gymnema sylvestre* on 8 normal individuals and on 4 diabetic patients⁵. The mean fasting blood glucose level of the normal individuals after the administration of *Gymnema sylvestre* was reduced from 79.8 mg/dl to 64.5 mg/dl, whereas for the diabetic patients the mean fasting blood glucose level was decreased from 117 mg/dl to 85.0mg/dl.

The recorded body weights (Table 2) show that 50% of the patients had increased body weights after the oral administration of *Gymnema sylvestre*. The difference was not sta-

tistically significant. Mean body weights before the treatment and on the 11th and 21st days of administration of *Gymnema sylvestre* were 61.3 Kg and 62.2 Kg respectively.

The SGPT levels of all the patients remained normal on the 21st day. The patients who had lost their weights also showed a normal SGPT level. These observations show that no toxic effects were caused by the orally administered leaf powder of *Gymnema sylvestre* on these diabetic patients (Table 2). It may be noted that the *Gymnema sylvestre* leaves are used as leafy vegetable which probably indicates that it has no toxic effects.

The deviations of the blood glucose levels and weight loss on patient V was due to his irregular intake of *Gymnema sylvestre* which the patient himself admitted on questioning.

Conclusion

From these results we could conclude that *Gymnema sylvestre* has a definite hypoglycaemic effect on diabetic patients and reduced not only the fasting blood glucose level but also had almost returned the 2 hour blood glucose level to fasting level. These effects could have been brought about by increased secretion of insulin or by the increased peripheral utilization of glucose by increasing the active receptors of insulin or by both these mechanisms (Even the severe diabetic patients (III & VII) have benefited with this two weeks of treatment). The oral administration of *Gymnema sylvestre* had probably no toxic effect as seen by the SGPT levels, which was supported by the observed increase in body weight. Further studies should be undertaken to confirm these results and to determine the mode of its action.

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