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Role of seeds of *Cucurbita maxima* and *Legenaria siceraria* Plants of Family Cucurbitaceae in Management of Type 2 Diabetes

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ABSTRACT

Type 2 diabetes has become a global epidemic. Modern medicines, despite offering a variety of effective treatment options, can have several adverse effects. Ayurveda, a science that uses herbal medicines extensively, originated in India. From ancient times, some of these herbal preparations have been used in the treatment of diabetes. This paper reviews the accumulated literature for two Indian herbs that have antidiabetic activity and that have been scientifically tested. The name of these herbs, are Cucurbita maxima and Legenaria siceraria have been reported to be beneficial for treating type 2 diabetes. Mechanisms such as the stimulating or regenerating effect on beta cells or extra pancreatic effects are proposed for the hypoglycemic action of these herbs.

Keywords: diabetes; indian; herb; ayurveda; Cucurbita maxima; type 2;

1. INTRODUCTION

Cucurbitaceae is a plant family commonly known as melons, gourds or cucurbits and includes, crops like cucumbers, pumpkins, luffas, melons and watermelons. The plant family with 120 genera and over 800 species, a medium sized predominantly tropical family. The life form spectrum is very broad; most of which are lianas, which climb (annuals or perennial), with the help of leaf tendrils .Many plants of family Cucurbitacea has been well known for their antidiabetic activity, here the plant Cucurbita maxima and Legenaria siceraria methanolic seeds extracts have been evaluated for their antidiabetics activities[1].

2. MATERIALS AND METHODS

The seeds of Cucurbita maxima plant of family cucurbitaceae were collected in month of july from local farmers of Bhopal,M.P,India.The seeds were dried in shade ,crushed and successive solvent extraction was performed and methanolic extract has been chosen for Antidiabetic study.

Mice were made diabetic by overnight fasting followed by a single i.p. injection of Streptozotocin (SIGMA) 150mg/kg in sterile,saline (Day 1). Mice with blood glucose level >140mg/dl (Day 5) were used for the study. Numerous studies have been performed with the aim of exploring anti-inflammatory properties of 1, 3, 4 oxadiazole analogues [7-13]. These studies had shown that 1,3,4-oxadiazole analogues are equipotent with Phenylbutazone, Naproxen and other NSAID's. Keeping these above facts in view we considered, it of interest to synthesize novel 1,3,4-oxadiazole analogues for their anti-inflammatory activities.

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Blood Collection

Blood was drawn by tail prick method & and evaluated for glucose levels using a glucometer.[2-5]

Animals: Swiss albino mice of either sex, weighing 30-35 g maintained under Individually ventilated cage system (temperature 23 ±2 °C relative humidity 55 ± 10 % and 12 h light: 12 h dark cycle) were used for all experiments. The animals were fed with acommercial diet (Sanghli Feed: Pune) and water ad libitum. The experimental protocols were approved by the Institutional animal ethics committee. Induction of Streptozocain induced diabetes -2 in animals.5 groups were made, each group consist of 5 Spawque wistar rats , same sex having same age group and almost same weight.

Table No 1: Showing groups of animal and their dose regimen

Group	**Treatment**	**Dose**	**Duration**
Untreated Control	saline	0.5ml p.o	14days
Test 3	Methanolic extract of *Cucurbita maxima* seeds	200mg/kg	14 days
TEST 4	Aqueous extract of *Legenaria siceraria* fruit	0.5 ml p.o	14 days
Standard Drug	Glimperamide	10mg/kg p.o.	14 days

The parameters used for study are blood glucose fasting, body weight and histopathological study

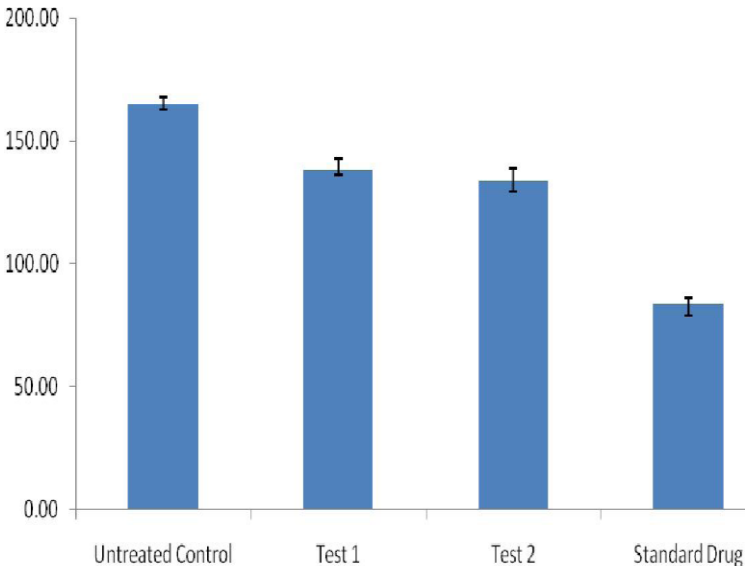

Figure 1: Blood Glucose Levels after 7 days of treatment

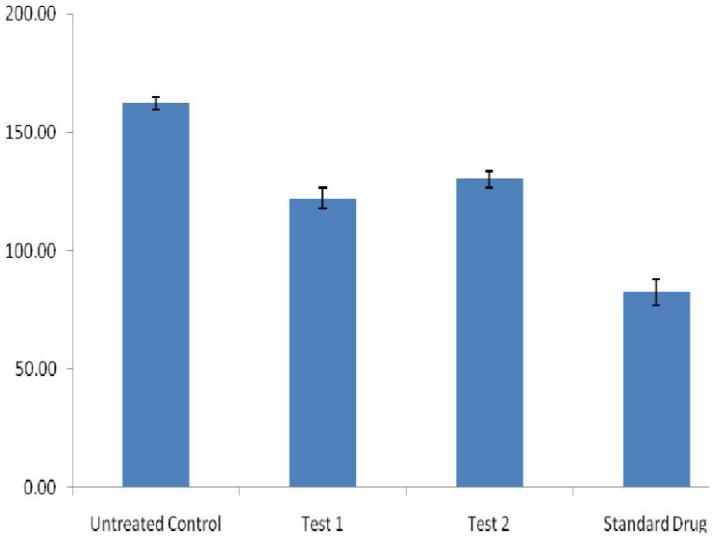

Figure 2: Blood Glucose Levels after 14 days of treatment,Test 3-Methanolic extract of *Cucurbita maxima* seeds,Test 4-methanolic extract of *Legenaria siceraria* fruit

Repeated administration of glibenclamide (10 mg/kg) had prevented the reduction in body weight on 4th, 7th, 14th and 21st day in diabetic rats, whereas fasting glucose (200 mg/kg) has

significantly decreased the bodyweight on 21st day whereas the other groups have shown significance on 14th and 21st day but not on the 4th and 7th day as compare to normal animals. The result concluded that the Test 3-Methanolic extract of *Cucurbita maxima* seeds,Test4- Aqueous extract of *Legenaria siceraria* fruit and at higher dose was able to significantly inhibit the body weight only after 14 and 21st day, whereas Test 4- 200 mg/kg was able to significantly prevented the decrease in body weight only after 21st day but not before. The results are summarized in the Table no 4.[6-9]

Change in body weight of animal treated with methanolic extracts for 20 days

Histopathological studies-*Histopathological studies.* Slices of the left liver lobe (from all the five animals of each group) were fixed in 10% formalin for 24 h, and were embedded in paraffin; 5–6 µm sections were routinely stained with haematoxylin and eosin (H&E) and assessed in a light microscope (Nikon Eclipse E400). All alterations from the normal structure were registered.

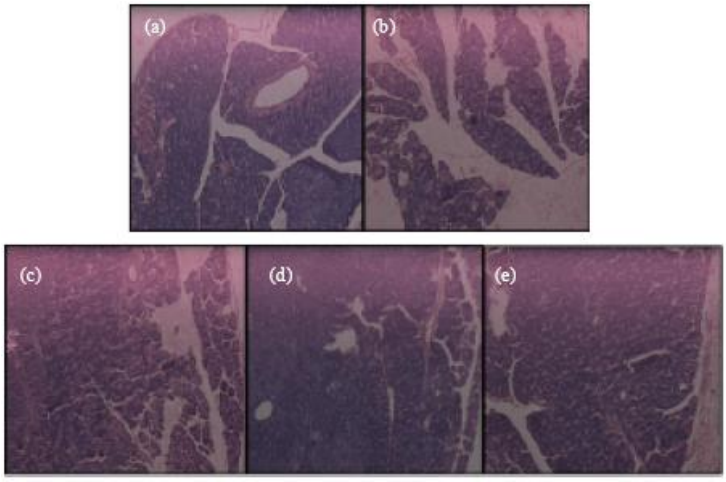

Figure 3: Histopathological studies of *Cucurbita maxima* seeds methanolic extract and aqueous extract on pancreas of spraque wistar rats

3. RESULTS AND DISCUSSION

The effect of methanolic extract of seeds and aqueous extract of fruit of *Cucurbita maxima* shows positive results for treatment for diabetes type 2.The mean Glucose tolerance was best observed with *Cucurbita maxima* methanolic seeds extract and then with Methanolic extract of *legenaria siceraria seed*.The Histopathologiacl section studies shows positive response of *Cucurbita maxima* methanolic seeds extracts.

The present study was carried out to evaluate the antidiabetic activity of MELS on streptozotocin (STZ)induced diabetes in rats. STZ-induced hyperglycemia is a useful experimental model for studying antihyperglycemic activity. Because of its structural features, STZ gets selective entry into the β cells of the islets of Langerhans *via* the low affinity glucose transporter GLUT2 in its plasma membrane and causes destruction of β cells, which leads to a reduction in insulin release, which in turn results in a rise in blood glucose concentration, i.e. hyperglycemia(12) Accordingly, significantly high levels (P<0.001)of FBG were observed in STZ control group rats and remained high throughout the experimental period.STZ-induced diabetic rats treated with the extract showed a significant reduction in blood sugar levels compared to STZ control group. This decrease in blood sugar levels may be attributed to stimulation of the residual pancreatic mechanism or to a probable increase in the peripheral utilization of glucose .Out of methanolic extract of both the plants –*Cucurbita maxima* and *Legenaria siceraria* ,*Cucurbita maxima* showsbetter effect.[15-21]

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Animal Weight	1st day Body weight	4th Day (%)	8 th Day (%)	12th day (%)	20th day (%)
1	32	30	28	27	27
2	34	33	33	30	28
3	36	32	30	32	29
4	34	31	28	27	27
5	31	28	27	27	25
6	53	52	50	44	43
7	44	42	42	38	39
8	51	52	49	48	48
9	35	36	32	32	29
10	42	40	36	38	39
11	52	51	48	44	42
12	43	44	41	42	43
13	38	39	37	37	34
14	46	44	42	41	38
15	52	53	53	47	48
16	57	54	54	44	49
17	46	52	53	49	52
18	57	54	51	50	48
19	48	47	46	42	43
20	41	43	42	42	43

Table No 3: Showing Blood Glucose fasting mg/dl at day 1st,5th ,12th and 21th day for untreated control,test1,test2,Standard drug

		Day 1	Day 5	Day 12	Day21	Hb1A1c
Untreated control	**1**	73	157	162	159	1.43%
	2	57	166	158	163	
	3	64	152	173	160	
	4	53	172	166	171	
	5	71	158	167	158	
	Avg	63.60	161.00	165.20	162.20	
	Stdev	8.65	7.94	5.63	5.26	
	SEM	3.87	3.55	2.52	2.35	
Test 3		6	58	165	143	
***Cucurbita maxima* seed methanolic extract**	**7**	76	157	133	121	3.05%
	8	67	164	124	121	
	9	58	164	124	121	
	10	77	176	142	121	
	Avg	66.60	163.20	138.40	122.20	
	STDEV	9.37	8.53	10.06	10.03	
	SEM	4.19	3.81	4.50	4.49	
Test 4-aqueous extract of *legenaria siceraria* fruit	**11**	74	182	142	122	3.04%
	12	66	167	144	138	
	13	58	177	122	125	
	14	74	153	141	138	
	15	68	159	121	128	
	Avg	68.20	167.60	134.00	130.20	
	STDEV	6.57	12.07	11.47	7.43	
	SEM	2.94	5.40	5.13	3.32	
Standard drug	16	56	163	86	88	4.29%
	17	64	155	91	101	