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An Analysis of antidiabetic activity of *Stevia rebaudiana* extract on diabetic patient

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Abstract:

The research paper tried to find out the effect of *Stevia rebaudiana* extract on diabetic patient of different age group and gender. *Stevia* leaf powder was taken under normal diet and comparison has been made with medicine, without medicine and with *Stevia* intake. *Stevia* powder has been replaced with sugar and instead of sugar *Stevia* powder was consumed with tea three times a day, significant decrease in FBS and PPBS was observed.

Key words: *Stevia*, FBS, PPBS, stevioside, Antidiabetic.

1. Introduction

Stevia is grown all across the world; it is known as *stevia* for its sweet leaves. It has been cultivated since long time in china and Southeast Asia and India has been one of the major cultivators of the *stevia* in international market. The leaves are the source of diterpene glycosides, stevioside and rebaudioside. Stevioside is non-caloric and is reported to be 30 times sweeter than sugar (Kolb et.al. 2001). In India diabetic patient are increasing day by day and according to world diabetic foundation it has the world's largest diabetes population, followed by China with 43.2 million and it has major concern among health experts and national and international healthcare. World health organization (WHO) has identified diabetes as an epidemic condition (King and Rewwers, 1991) and one of the major killer of the decade. Estimation by WHO, there will be about 250 million cases of diabetes mellitus throughout the world by 2025(Friedman, 2002).

Though various drugs are available in Indian market for diabetic control like oral hypoglycemic agents and insulin for the treatment of diabetes mellitus, however the therapy with oral hypoglycemic agents is not satisfactory. Several drugs such as biguanides and sulfonylureas are presently used to reduce hyperglycemia in diabetes mellitus. Even these drugs have side effects and management of diabetes without any side effect is big a challenge to the medical community.

There are various traditional herbs are available and consumed by the Indian to control and prevent diabetics. Few of them are Methi seeds (Fenugreek), Sweet neem (Kurri patta) and *Sadabahar* (*Vinka rosia*) is good to reduce the blood sugar level. These traditional antidiabetics succeeded to provide control on diabetic up to some extent but poor availability and high cost was constraint in developing countries like India and rest of. The major reasons were the eating habits and taste of the Indian population. Methi were used to one of the alternate to control diabetes but the bitter taste of Methi has been major constraint at consumption level. Majority of Indian prefer vegetarian diets and prefer tea with sugar at least three times a day. In India Sugar is considered one of the major contributory in increasing diabetes.

And these traditional alternatives cannot take place as an alternative of the sugar as well as have taste issues while consumption, there is strong need to discover new kind of herb which can take place as a diet not as a medicine and have control over the diabetes. As discussed above and many researches has been found that *Stevia* has better antidiabetic properties as well as sweeter than sugar and which can be used as an alternate to sugar and to control diabetes.

Stevia rebaudiana is known as "Calorie free Bio sweetener of High Quality" (Preethi et.al. 2011; N.Bharati 2003) .A recent scientific trail shows that this herb has many health benefiting. *Stevia* contains phyto-

chemical compound that helps to cure blood sugar, cholesterol and blood pressure. It is used as natural sweetener and is having low calorie.

Following health benefits has been noticed about Stevia:

- Stevia is having low calorie as compared to sugar.
- Chlogenic acids reduce conversion of glycogen to glucose and reduces absorption of glucose and reduce blood sugar level. It is used as a flavor enhancer, taste enhancer and anti bacterial effect. It is heat stable at high temperature can be cooked with tea and food. Stevia can be used widely in Jams, Sauces, Jelly, Confections, Beverages, Pharmaceuticals and in Alcoholic beverages and in Dental products. It is used in tea, coffee and dairy products.

Leaf has stevioside of 10% to 12% on dry basis, even 50 gm of Stevia leaf can replace 1000g of can sugar. The sweetness of stevioside is non-fermenting and it does not display browning while cooking.

2. Material and Methods

Stevia leaf powder was replaced with sugar in tea/Coffee and Milk intake. It has been checked and scored by panel of trained judges for quality attributes such as aroma, texture, taste and appearance. Fifteen patients were introduced who were vegetarian, Out of fifteen, nine patients were women and six patients were men and the age group was 35-60 years (Table1). During the experimental period it was advised not to use drugs. Patients were advised to take balanced diet as per directed by the physician and were advised for regular check up in pathology (An ISO 9001 certified). Prior to experiment patients medical history were examined and diabetic reports were analyzed for smooth conduct of the experiment.

Feeding trial was for 45 days. First 15 days patient was given medicine e and their fasting and post prandial diabetic level were measured then for next 15 days they were not given any medicine under normal diet and their prandial and fasting glucose level were measured and then for further 15 days they were given Stevia leaf three times a day with tea and their glucose level were measured. Leafs were collected from Bioved Research Institute, from Allahabad district and dried leafs were grinded in mixer. About .5g and 1g of Stevia leaf powder was consumed with tea in place of sugar.

3. Result and Discussions

Initially patient were taking medicine to control their diabetic level, for 15 days patient were taking medicine regularly as they were taking earlier under normal diet and their Fasting blood sugar (FBS) and Post prandial (PPBS) blood sugar were taken FBS was 153.54 and PPBS was 189.56(Table 2).For next 15 days patient were asked to stop taking medicine under normal diet and in the supervision of physician and their FBS and PPBS were checked which was 208.6 and 283 respectively. There is significant difference in both FBS and PPBS which shows that while taking medicine their FBS and PPBS were under control (Table3).

For further 15 days patient were given Stevia leaf powder with tea three times a about .1g to 5g And FBS and PPBS were checked which was 195.7 and 271.3 .There was significant decrease in the FBS and PPBS level while consuming Stevia leaf powder(Table4).

Now we tried to find out how statistically significant the consumption of Stevia leaf powder in diabetic patient while considering both FBS & PPBS without medicine and with Stevia. There is significant decrease in FBS with Stevia consumption but statistically not given desired result, this may be due to sample size taken in consideration was not enough to show the significant result Table 5 and 6).

4. Conclusion

From the above discussions we can understand that Stevia leaf powder influenced blood sugar levels both FBS and PPBS positively but not statistically significant. It can be concluded that Stevia possess a potential anti diabetic effect and for more significant result large sample size should be taken in

consideration under controlled condition and for extended period of time.

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Appendix:

Table: 1

Sr. No.	Patient	Gender	Age	Diet
				Vegetarian
1	A	M	36	
2	B	M	39	√
3	C	F	41	√
4	D	F	52	√
5	E	F	43	√
6	F	F	56	√
7	G	F	36	√
8	H	F	47	√
9	I	F	49	√
10	J	F	54	√
11	K	M	55	√
12	L	M	51	√
13	M	M	42	√
14	N	F	48	√
15	O	M	50	√

Table2: Fasting blood sugar and pp under medicine for 15 days under normal diet

Code	Age	Sex	Fasting Blood Sugar(mg/dl)	Post Prandial Blood Sugar (mg/dl)
			After 15 days	After 15 days
A	36	M	91.6	121.2
B	39	M	102.2	136
C	41	M	162.6	193
D	52	M	182.6	210
E	43	M	178	201
F	56	F	194.2	235.7
G	36	F	112.6	163
H	47	F	143.7	186.3
I	49	F	115.7	156.2
J	54	F	179.3	214
K	55	M	191.5	244
L	51	M	190	214
M	42	M	128.4	191
N	48	F	147.7	169
O	50	M	183	209
Mean ± SD			153.54 ± 35.7	189.56 ± 34.87

Table3: Fating blood sugar and pp without medicine for 15 days under normal diet

Code	Age	Sex	Fasting Blood Sugar(mg/dl)	Post Prandial Blood Sugar (mg/dl)
			After 15 days	After 15 days
A	36	M	122.5	178.2
B	39	M	156	241
C	41	M	194	251
D	52	M	219	294
E	43	M	113	234
F	56	F	234	312
G	36	F	237	328
H	47	F	178	236
I	49	F	169	212
J	54	F	210	275
K	55	M	241	283
L	51	M	256	291
M	42	M	283	345
N	48	F	285.4	378
O	50	M	231	389
Mean ± SD			208.6 ± 52.7	283± 60.14

Table4: Fasting blood sugar and pp with Stevia for 15 days under normal diet

Code	Age	Sex	Fasting Blood Sugar(mg/dl)	Post Prandial Blood Sugar (mg/dl)
			After 15 days	After 15 days
A	36	M	112	162
B	39	M	142	237
C	41	M	184	231
D	52	M	201	298
E	43	M	97	227
F	56	F	212	309
G	36	F	220	295.3
H	47	F	169	229
I	49	F	170	209
J	54	F	187	256
K	55	M	234	280
L	51	M	243	298
M	42	M	276	330
N	48	F	270.2	367
O	50	M	219	342
Mean ± SD			195.7± 52.33	271.3± 55.88

Table 5: Fasting blood sugar without medicine and with Stevia

Code	Age	Sex	Fasting Blood Sugar(mg/dl) Without Medicine	Fasting Blood Sugar(mg/dl) With Stevia intake
			After 15 days	After 15 days
A	36	M	122.5	112
B	39	M	156	142
C	41	M	194	184
D	52	M	219	201
E	43	M	113	97
F	56	F	234	212
G	36	F	237	220
H	47	F	178	169
I	49	F	169	170
J	54	F	210	187
K	55	M	241	234
L	51	M	256	243
M	42	M	283	276
N	48	F	285.4	270.2
O	50	M	231	219
Mean ± SD			208.6 ± 52.7	195.7 ± 52.34

t value	0.254134 ^{NS*}
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*NS: Non Significant

Table 6: pp blood sugar without medicine and with Stevia

Code	Age	Sex	Post Prandial Blood Sugar (mg/dl)	Post Prandial Blood Sugar (mg/dl)
			After 15 days	After 15 days
A	36	M	178.2	162
B	39	M	241	237
C	41	M	251	231
D	52	M	294	298
E	43	M	234	227
F	56	F	312	309
G	36	F	328	295.3
H	47	F	236	229
I	49	F	212	209
J	54	F	275	256
K	55	M	283	280
L	51	M	291	298
M	42	M	345	330
N	48	F	378	367
O	50	M	389	342
Mean ± SD			283.14 ± 60.14	271.35 ± 55.9

t value	0.2912 ^{NS}
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