

EFFECT OF ANTI DIABETIC POWDER (FENUGREEK LEAVES + BITTER GOURD) AND GREEN TEA ON BLOOD SUGAR STATUS OF DIABETIC PATIENT

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Abstract: *Diabetes mellitus, often simply referred to as diabetes – is a group of metabolic disease in which a person has high blood sugar, because the body does not produce enough insulin. The present study was planned to perform in three parts to fulfill the objectives that is prevalence rate of type-2 diabetes mellitus in middle age group, Vadodara. Product preparation, supplementation, Bio-clinical assessment before and after supplementation to know it's effectiveness on glucose present in the body and effect of pancreas to produce insulin in proper amount. Study indicated that most of the middle age persons have high blood glucose level. When they were supplemented with diabetic powder (fenugreek leaves + bitter gourd) and Green Tea i.e. for 30 days, their blood glucose level was reduced, demonstrating positive effect in middle age group. We can conclude that for prevention of type-2 diabetes mellitus it is very essential to modify the meal pattern and increase the physical activity.*

Key words: Diabetic powder, Green Tea, Diabetes Mellitus,

INTRODUCTION

Diabetes mellitus, often simply referred to as diabetes—is a group of metabolic diseases in which a person has high blood sugar, either because the body does not produce enough insulin, or because cells do not respond to the insulin that is produced. This high blood sugar produces the classical symptoms of polyuria (frequent urination), polydipsia (increased thirst) and polyphagia (increased hunger) [1].

Characterized by an excess of glucose in the bloodstream, diabetes is a terrible disease that weakened nearly every part of the body. It's characterized by the inability to utilize glucose (or “blood sugar”) properly. The glucose builds up in the bloodstream and damages tissues and organs throughout the body [2].

Special foods for diabetics are Bitter gourd (*karela*) which contains a high dosage of 'plant insulin' and

lowers the blood-sugar levels effectively [3]. Fenugreek (*methi*) and Indian blackberry (jamun), are very effective in preventing and controlling diabetes. Powder the stone of the fruit and eat it — it contains glucoside, which prevents the conversion of starch into sugars [4,5]. Garlic is used to lower blood-sugar levels & is rich in potassium and replaces the potassium which gets lost in urine. It also contains zinc and sulphur, which are components of insulin. Take about three to four flakes of freshly crushed garlic daily. Onion because of its diuretic and digestive properties, onion works against diabetes. Flaxseed is the richest source of Omega 3 fatty acids. It helps control diabetes because it maintains the sensitivity of the cell membrane, facilitates insulin, and thereby the uptake of glucose by the cells. Soluble fibres, found in apples, kidney beans, oatmeal, soyabean etc, are quite helpful to control diabetes [6].

Green tea also helps to burn those extra calories and when combined with caffeine augments the

calorie burning. Starch in any form is converted into sugar and this is done with the help of an enzyme called amylase. The polyphenols present in green tea extract reduces the production of amylase, thereby decreasing the level of sugar in the blood (7-9).

MATERIALS AND METHODS

The study was planned to decrease the blood glucose level and divided in three parts to fulfill the objectives like find out the prevalence rate of diabetes in middle age group in general public, Vadodara. Preparation and supplementation of antidiabetic powder and green tea to middle age group.

The diabetes powder was made up by mixing 2 products [fenugreek leaves + bitter gourd] which were easily available in market at cheaper rate. The green tea was little bit costly compare to antidiabetic powder. Both the products are very effective to reduce blood glucose level.

In the first part of the study deals with the anthropometry measurements which include weight and the Bio-clinical parameter i.e. blood glucose level (Glucometer) was analysed.

The second part of the study was deal with the analysis of the products i.e. antidiabetic powder and green tea. The nutrient analysis was done on both products which were Ash (10), Calcium (11), phosphorus (12), Iron (13), Total phenol, Tannin (14), β -carotene (15), Ascorbic acid (16).

Then the third part of study deals with the supplementation of antidiabetic powder to 10 subjects and Green Tea to 10 subjects and other 10 subjects were not supplemented anything for one month. After that their blood glucose level was checked.

RESULTS AND DISCUSSION

In the first part of study total 30 diabetic patients were randomly selected and they were assessed for nutritional analysis. Initially their weight was note don than they were clinically assessed for blood sugar levels before supplementation. Out of 30 selected subjects there were 11 female subjects and 19 were male subjects. The average value for weight (N=30) was found 67.4kg. The Fasting blood sugar (FBS) level for 30 subjects was 125.3mg/dl and the Post - prandial blood sugar (PP₂BS) level was 180.4mg/dl

for 30 subjects. The normal range of blood sugar for diabetic patients for FBS is 90-100mg/dl and for PP₂BS it is 110-160mg/dl. The results of FBS and PP₂BS indicated that both the values were higher than the normal range.

Based on this data the 30 subjects were divided into three groups. The subjects with normal range of blood sugar were put in the control group (n=10) and the another 20 subjects were divided in two experimental groups i.e., 10 subjects were supplemented with antidiabetic powder {fenugreek leaves + bitter gourd (50:50)} and 10 subjects were supplemented with green tea. Before supplementation both the experimental products were nutritionally analyzed.

The powder content of experimental product A [Fenugreek leaves + Bitter Gourd] powder was 1.50 gm % and the experimental product B [Green tea] was 2.02 gm %. Thus the green tea had higher ash content as compared to antidiabetic powder. The calcium content of experimental product A was 205.833 mg % and the 5 gm supplementation of powder contained 10.29 mg % calcium. The RDA value for calcium is 400 mg/day. So the supplemented A product fulfill 2.57 mg % of requirement. The calcium content of experimental product B was 4.92 mg % and the 5 gm supplementation of green tea contended 0.24 mg % calcium. The RDA value for calcium is 400 mg/day. So the supplemented B product fulfill 0.061 mg % of requirement. Thus the antidiabetic powder had higher calcium content compared to green tea. The phosphorus content of experimental product A was 12.56 mg % and the 5 gm supplementation of powder contained 0.63mg% phosphorus.

The phosphorus content of experimental product B was 8.39 mg % and the 5 gm supplementation of green tea contained 0.42 mg % phosphorus. Thus the antidiabetic powder had higher phosphorus content compared to green tea. The Iron content of experimental product A was 8.82 mg % and the 5 gm supplementation of powder contained 0.44mg % Iron. The RDA value for iron is 30 mg/day. So the supplemented A product fulfill 1.47 mg % of requirement. The iron content of experimental product B was 5.69mg % and the 5 gm supplementation of green tea contained 0.28 mg % iron. The RDA value for iron is 30 mg/day. So the supplemented B product fulfill 0.95mg % of requirement. Thus the antidiabetic powder had higher

Table 1: Nutrient Content of Experimental Product A and B. A = Fenugreek leaves + Bitter gourd Powder (50:50) for supplementation. B = Green tea juice for supplementation. • Mean of three replication ± SEM

No.	Parameter	A		B		RDA/day
		Analytical	5g/day	Analytical	5g/day	
1.	Ash (gm%)	1.500 ± 0.029	-	2.017 ± 0.044	-	-
2	Calcium (mg%)	205.833 ± 3.005	10.290	4.917 ± 0.363	0.245	400
3	Phosphorus (mg%)	12.556 ± 0.484	0.628	8.389 ± 0.387	0.419	-
4	Iron (mg%)	8.816 ± 0.532	0.441	5.698 ± 0.767	0.284	30
5	β-carotene (µg%)	115.440	5.772	71.900	3.595	2400
6	Ascorbic acid (mg%)	20.619 ± 1.053	1.031	5.795 ± 0.665	0.289	40
7	Tannin (mg%)	1.100	0.055	18.700	0.935	-
8	Total Phenol (mg%)	83.571 ± 0.825	4.178	38.571 ± 1.649	1.928	-

Table 2: Weight and Blood Glucose content of Control and Experimental Groups. • Mean of three replication ± SEM, • n = No. of Subjects.

No.	Groups	n	Weight (Kg)		Blood Glucose (mg/dl)			
			Before	After	FBS		PP ₂ BS	
					Before	After	Before	After
1. Control group								
	Female	4	76.750 ±1.008	78.250 ±1.081	73.500 ±1.636	98.500 ± 0.929	123.750 ±1.773	158.750 ±2.902
	Male	6	60.000 ±0.876	61.000 ±0.843	106.500 ±2.728	124.000 ± 5.465	168.677 ±1.747	166.000 ±5.948
2. Experimental Group A								
	Female	2	58.000 ±1.131	57.000 ±0.989	149.000 ±7.212	93.000 ±1.414	119.500 ±4.030	107.000 ±3.959
	Male	8	70.500 ±1.344	70.375 ±1.212	132.000 ±5.373	93.000 ±1.548	200.875 ±4.394	141.125 ±3.337
Experimental Group B								
	Female	5	64.800 ±1.392	61.000 ±1.302	155.800 ±3.187	100.600 ±1.076	227.200 ±6.244	128.400 ±0.808
	Male	5	70.200 ±3.394	67.200 ±3.758	138.600 ±1.889	74.800 ±1.225	184.600 ±3.031	104.200 ±1.223

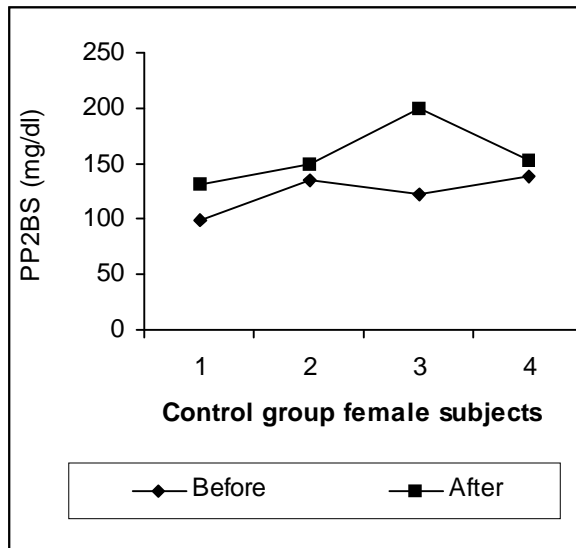
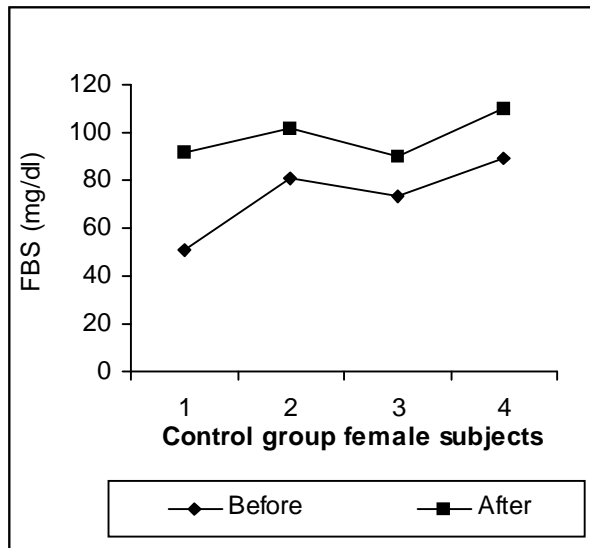
iron content compared to green tea. (Table 1).

The β-carotene content of experimental product A was 115.44 µg % and the 5 gm supplementation of powder contained 5.77µg % β-carotene. The RDA value for β-carotene is 2400 µg/day. So the supplemented A product fulfill 0.24 µg % of requirement. The β-carotene content of experimental product B was 71.90 µg % and the 5 gm supplementation of Green tea contained 3.59 µg % β-carotene. The RDA value for β-carotene is 2400 µg/day. So the supplemented B product fulfill 0.15µg % of requirement. Thus the antidiabetic powder had higher β-carotene content compared to green tea. The ascorbic acid content of experimental product A was 20.62 mg % and the 5 gm supplementation of powder contained 1.03 mg ascorbic acid %. The RDA value for ascorbic acid is 40mg/day. So the

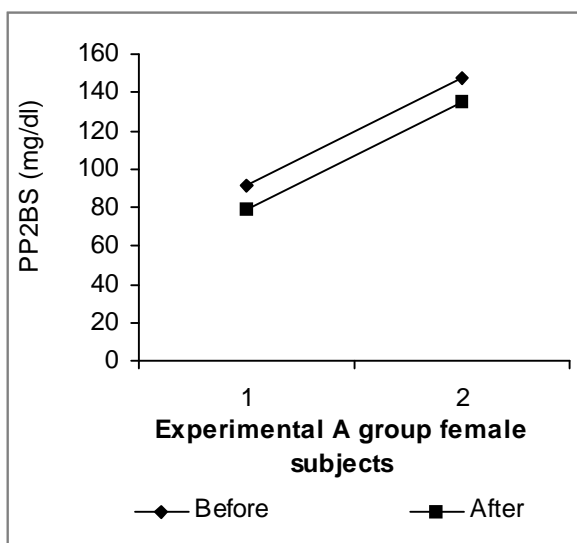
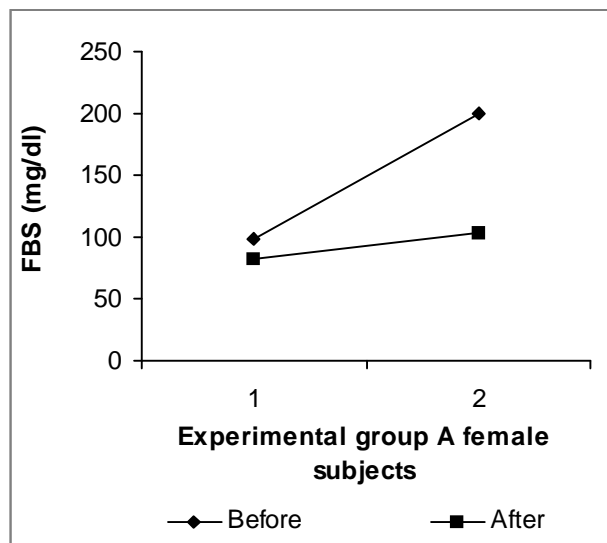
supplemented A product fulfill 2.58mg % of requirement. The ascorbic acid content of experimental product B was 5.79mg % and the 5 gm supplementation of green tea contained 0.29 mg % ascorbic acid. The RDA value for ascorbic acid is 40 mg/day. So the supplemented B product fulfill 0.72mg % of requirement. Thus the antidiabetic powder had higher ascorbic acid content compared to green tea (Table 1).

The Tannin content of experimental product A was 1.10 mg% and the 5 gm supplementation of powder contained 0.05mg% tannin. The tannin content of experimental product B was 18.70 mg % and the 5 gm supplementation of green tea contained 0.93 mg% tannin. Thus the green tea had higher tannin content compared to antidiabetic powder. The total phenol content of experimental product A was 83.57 mg %

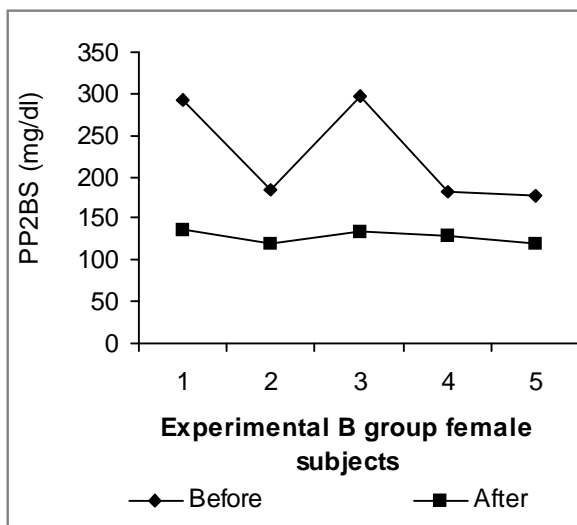
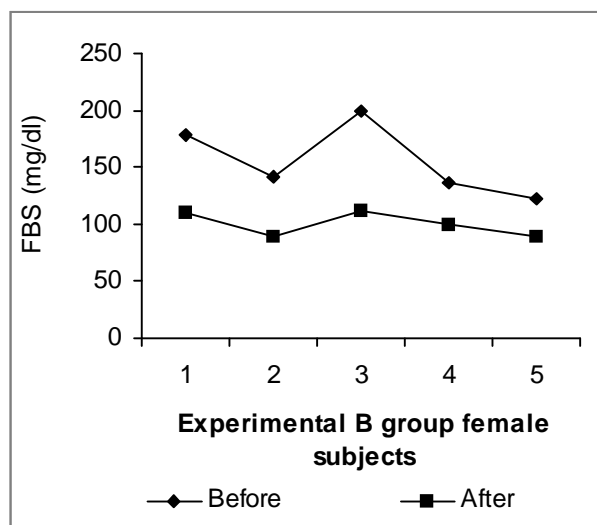
Control female group



Experimental female group A fed with Antidiabetic powder

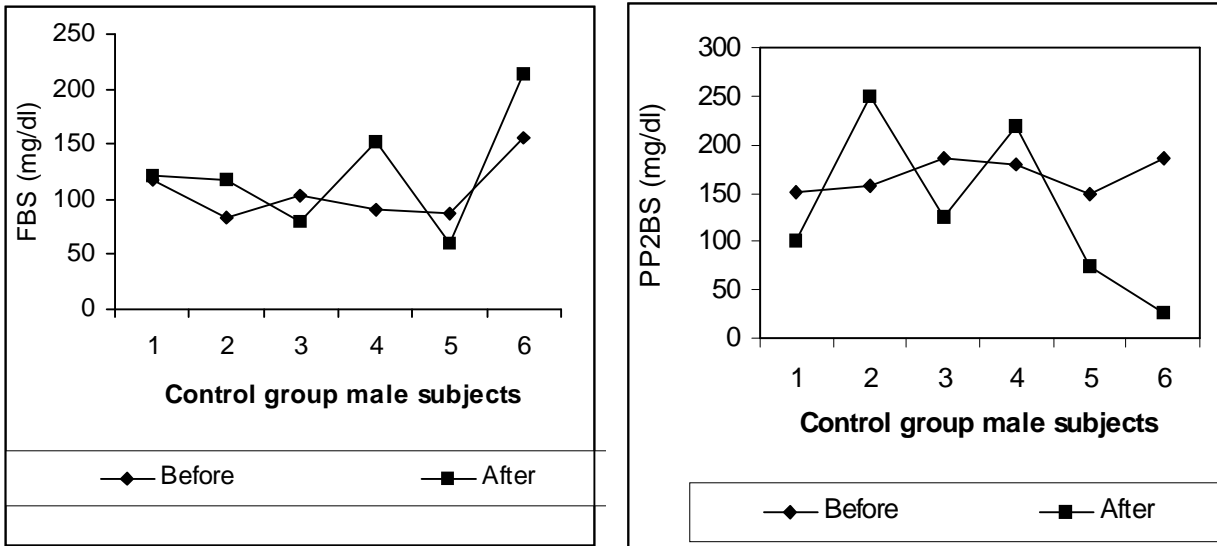


Experimental female group B fed with Green tea

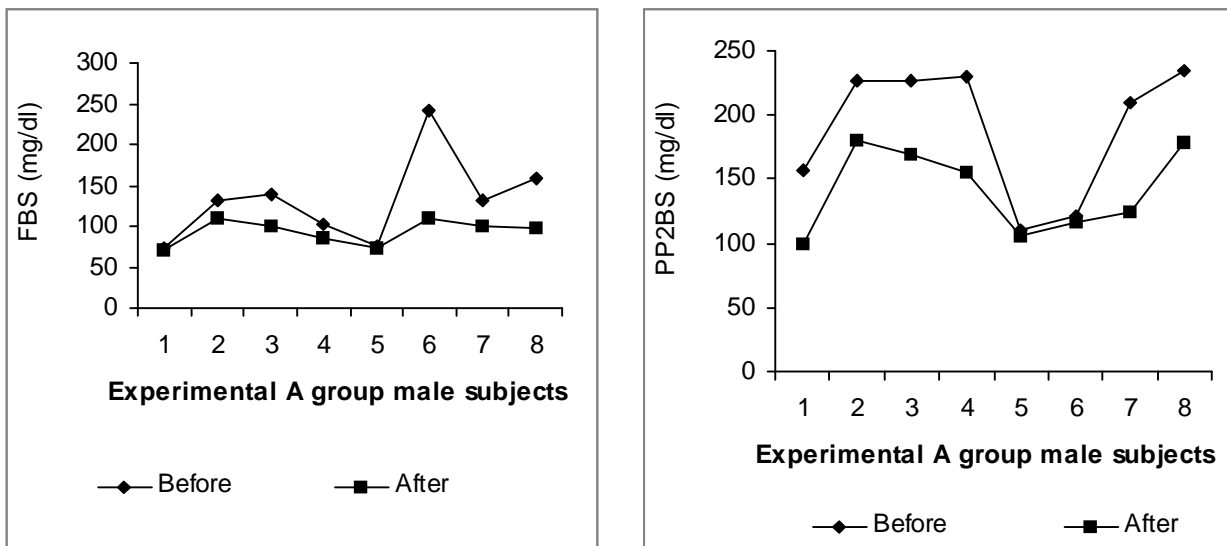


Figs. 1: Comparison of FBS & PP2BS level of individual experimental female subjects before & after supplementation

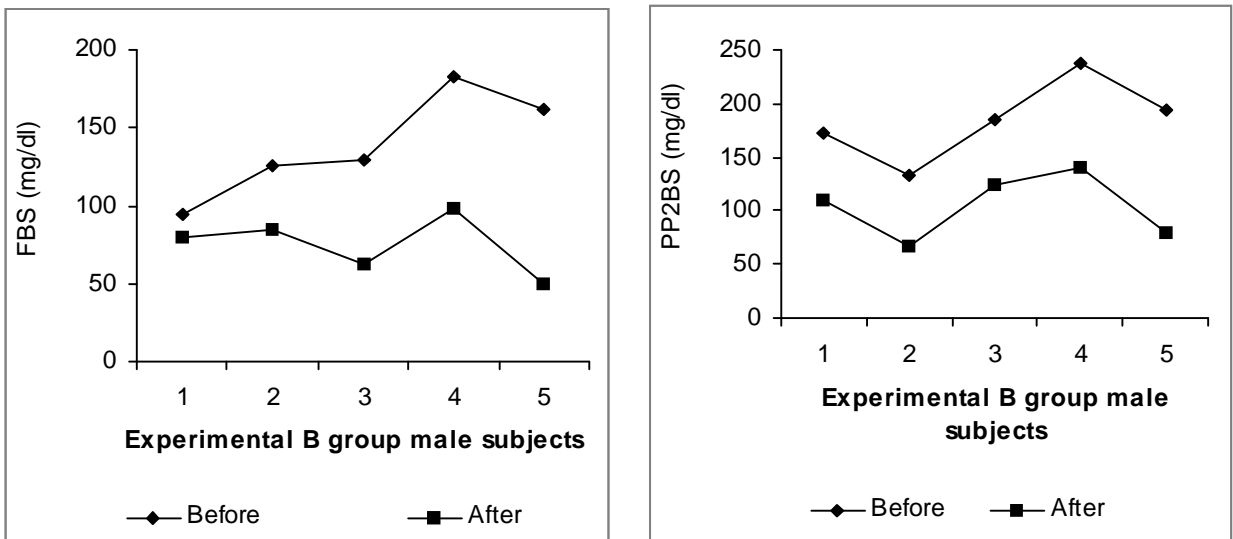
Control male group



Experimental male group A fed with Antidiabetic powder



Experimental male group B fed with Green tea



Figs. 2: Comparison of FBS & PP2BS level of individual experimental male subjects before & after supplementation

and the 5 gm supplementation of powder contained 4.18 mg % total phenol. The total phenol content of experimental product B was 38.57 mg % and the 5 gm supplementation of green tea contained 1.93 mg % total phenol. Thus the antidiabetic powder had higher total phenol content compared to green tea (Table 1).

Based on the nutritional content of the experimental products they were supplemented to the diabetic patients in different groups and the blood glucose level was analyzed to find out the effect.

Table 2 shows the weight and blood glucose content of control and experimental groups. In control group there were 10 subjects out of them 4 females subjects and 6 males subjects. The weight of females subject before and after supplementation was higher than the male subjects. The FBS level of female subjects before supplementation was lower than the male subjects. Same way the PP₂BS level was lower before and after supplementation compared to male subjects. The results indicated that the weight was higher in female subjects before and after supplementation than the male subjects. Whereas the FBS and PP₂BS level were higher in male subjects of control group than the female subjects.

In experimental group A there were 10 subjects out of them 2 females subjects and 8 males subjects. The weight of males subject before and after supplementation was higher than the female subjects. The FBS level of female subjects before supplementation was higher than the male subjects same way after supplementation in FBS level was lower than the males subjects. Same way the PP₂BS level was lower before and after supplementation compared to male subjects. The results indicated that the weight of females subjects of experimental group A was lower than the male subjects before and after supplementation. The FBS level were higher in female subjects before and after supplementation than the male subjects were as PP₂BS level was lower in females subjects as compared to male subjects before and after supplementation of antidiabetic powder.

In experimental group B there were 10 subjects out of them 5 females subjects and 5 males subjects. The weight of females subject before and after supplementation was lower than the male subjects. The FBS level of female subjects before suppleme-

ntation was higher than the male subjects. Same way the PP₂BS level was higher before and after supplementation compared to male subjects. The results indicated that the weight of females subjects of experimental group B was lower than the male subjects before and after supplementation. The FBS level was higher in female subjects before and after supplementation than the male subjects were as PP₂BS level was higher in female subjects compared to male subjects before and after supplementation of green tea.

Figures 1 and 2 show the comparison of FBS and PP₂BS levels of individual experimental female and male subjects before and after supplementation. All the graphs indicated that after supplementation of antidiabetic powder and green tea to both the male and female subjects they had decreased their FBS and PP₂BS level as compare to control.

SUMMARY AND CONCLUSION

Based on these results of the weight and blood glucose level were higher in experimental subjects before starting the supplementation. After the supplementation the weight and blood glucose level showed vast decrease in experimental subjects.

The calcium, phosphorus, iron, total phenol, β -carotene, ascorbic acid were higher in antidiabetic powder where as tannin, and ash were higher in green tea.

The blood glucose contained by the subjects of both the experimental groups after supplementation was reduced. Which indicates that pancreas produces enough insulin to the body and use insulin effectively. In comparison of both the experimental products the green tea shows more effective results compared to antidiabetic powder.

Recent studies indicate that the intervention decreases the type-2 diabetes but the incidence still remains very high in all groups. Therefore, changed dietary pattern, increase in physical activity and medication are the other factors that can help to reduce the blood glucose level.

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