

## Hypoglycemic activity of bio-tea in mice

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Administration of bio-tea (1.71 ml/kg) to normal albino mice caused hypoglycemia after 30 min which reached to maximum after 2 hr with a significant decrease in blood sugar level (BSL) and became normal beyond 8 hr. In alloxan-induced diabetic albino mice, repeated treatments of bio-tea for 3 days (five doses) brought about a significant fall in mean BSL. Continuous decrease in BSL was observed after 4 hr of administration of last dose of bio-tea. Hypoglycemic effect was persistent in alloxan-induced diabetic mice. Effect on glucose tolerance test showed a significant fall in BSL of bio-tea treated animals after 1 hr of glucose treatment indicating hypoglycemic effect of bio-tea.

Tea fungus, Kombucha, is a symbiosis of *Acetobacter xylinum* and *Saccharomyces ludwigii*. Kombucha is mainly cultivated in black tea with sugar to produce a slightly acidulous effervescent beverage namely, bio-tea that is said to have several curative effects<sup>1,2</sup>. Bio-tea contains small amounts of alcohol and various acids including acetic acid, gluconic acid and lactic acid, as well as some antibiotic substances<sup>1</sup>. Diabetes mellitus is a metabolic disease for which complete cure is unknown. In the present study bio-tea has been tested for its hypoglycemic and antidiabetic activity.

Bio-tea was prepared by subjecting tea decoction to fermentation with the starter culture containing a symbiotic association of *Saccharomyces ludwigii* and *Acetobacter xylinum* at room temperature as per the standard procedure described by Hegde<sup>3</sup>. A minimum oral dose of 1.71 ml/kg body weight was found to be significantly active. In all the three models used to screen the hypoglycemic and antidiabetic action of bio-tea, groups of 10 mice (each weighing 25-30g) of either sex were used for each treatment, that is for control and for experimental groups.

In each model when the experimental group was treated with the drug, the control group was given an equivalent amount of distilled water. Blood sample (0.2 ml) was taken from the jugular vein by sacrificing the animal and the blood sugar level (BSL) was estimated by Folin Wu method<sup>4</sup>.

**Effect on blood sugar level of normal albino mice**—Bio-tea was administered orally<sup>5</sup> to normal albino mice fasted for 18 hr at a dose level of 1.71 ml/kg body weight and their BSL was estimated after 1/2, 1, 2, 4 and 8 hr intervals.

**Effect on alloxan-induced diabetes in albino**

**mice**—Albino mice fasted for 18 hr were injected with alloxan (150 mg/kg; ip) to induce diabetes<sup>6</sup>. After 48 hr of alloxan treatment, one set of diabetic animals were administered bio-tea (1.71 ml/kg) orally as before with appropriate controls. After 2 hr of administration of bio-tea, that is 50 hr after alloxan treatment, BSL was estimated. This was considered as acute treatment. Since this did not show any significant fall in BSL, in another set of experiment bio-tea was administered at 24, 28, 48, 52 and 72 hr after alloxan treatment (five doses). At two hour interval after last dose, blood sugar level of control and treated animals were estimated.

**Effect on glucose tolerance test (GTT)**—Albino mice were fasted for 18 hr. A group of mice was administered bio-tea (1.71 ml/kg) and appropriate controls were also maintained. After 30 min of treatment, glucose (10% solution) at the rate of 1.5 g/kg was given orally<sup>6</sup> to treated and control mice. Blood samples were collected after 30, 60 and 90 min and estimated BSL.

Table 1—Effect of bio-tea (1.71 ml/kg body wt) on the blood sugar level of fasting mice

[Values are mean  $\pm$  SE of 10 animals]

Treatment	Blood Sugar level (mg/100 ml)					
	A	B	C	D	E	F
Control	120 $\pm 1.5$	120 $\pm 1.9$	123 $\pm 1.0$	122 $\pm 1.2$	124 $\pm 1.6$	120 $\pm 1.7$
Bio-tea	120 $\pm 1.2$	109* $\pm 1.6$	94* $\pm 1.6$	84.0* $\pm 1.5$	98.2* $\pm 1.2$	115.8 $\pm 1.3$

\* $P < 0.05$

Blood sample collected after : A - 0; B - 1/2; C-1; D-2; E-4 and F-8 hr.

Table 2—Effect of bio-tea (1.71 ml/kg) on alloxan (150 mg/kg) -induced diabetes of albino mice

[Values are mean  $\pm$  SE of 10 animals]

Treatment Alloxan + No. of doses of bio-tea	Blood sugar level (mg/100 ml)			
	Control (Alloxan treated)	Experimental (Alloxan & bio-tea treated)		
		A	B	
One dose	267.43 $\pm$ 1.23	263.6 $\pm$ 1.57	-	
Five doses	270.4 $\pm$ 2.5	148.62* $\pm$ 1.6	132.62* $\pm$ 1.26	

\*  $P < 0.05$

Blood sample collected at : A-74 and B-76 hr.

When bio-tea (1.71 ml/kg) was administered to normal albino mice fasted for 18 hr, hypoglycemia was observed after 30 min which was maximum at 2 hr with a significant decrease in BSL which gradually recovered to normal after 8 hr (Table 1).

In alloxan - induced diabetic albino mice, although treatment with a single dose of bio - tea (1.71ml/kg) did not show any significant effect, repeated treatments with it for 3 days (five doses) brought about a significant fall in mean BSL (Table 2). Continuous decrease in BSL was observed after 4 hr of administration of last dose of bio-tea. It indicated that hypoglycemic effect was persistent in alloxan induced diabetic mice. There was significant fall in BSL of bio-tea treated animals after 1 hr of glucose treatment indicating hypoglycemic effect of bio-tea (Table 3).

Table 3—Effect of bio-tea (1.71 ml/kg body wt) on glucose (1.5g/kgbody wt) tolerance test in mice

[Values are mean  $\pm$ SE of 10 animals]

Treatment	Blood sugar level (mg/100 ml)			
	A	B	C	D
Control (given glucose only)	107.00 $\pm$ 0.68	146.43 $\pm$ 1.31	123.00 $\pm$ 1.6	120.00 $\pm$ 1.5
Bio-tea + glucose	108.00 $\pm$ 1.76	124.00* $\pm$ 1.0	112.38* $\pm$ 1.08	100.00* $\pm$ 1.20

\*  $P < 0.05$

Blood sample collected at : A - 0; B - 30; C-60 and D-90 min.

It is concluded that bio-tea has a significant hypoglycemic effect in normal as well as alloxan-induced diabetic mice.

#### References

- 1 Maysen P, Fromme S, Leitzmann C & Gründer K, The yeast spectrum of the 'tea fungus Kombucha', *Mycosis*, 38 (1995), 289.
- 2 Hegde S V, All for a cuppa Bio-T, *Deccan Herald*, 26 June 1995.
- 3 Hegde S V Bio-Tea: A New wholesome Tea for your good health and long life, *Tea Today*, 256 (1995) 25.
- 4 Folin O & Wu H, A colorimetric method for determination of blood sugar, *J Biol Chem*, 41 (1920) 367.
- 5 Matin M A, Masih A H & Kar P P, Paraoxan-induced changes in the level of cerebral acetyl-cholinesterase activities in diabetic mice, *J Pharm Pharmacol*, 34 (1982) 457.
- 6 Duncan L J P & Baird J D, Compounds administered orally in the treatment of diabetes mellitus, *Pharm Rev*, 12 (1960) 91.
- 7 Geigy J R, Scientific tables, 5th edition (Basle, Switzerland) 1956, 39.