

LETTER TO THE EDITOR :

EFFECT OF CANNABIS (BHANG) EXTRACT ON BLOOD GLUCOSE AND LIVER GLYCOGEN IN ALBINO RATS

Sir,

Cannabis is now the second most widely used intoxicant all over the world. The plant belongs to the family Cannabinaceae (3). Bhang which is composed of the dried leaves, seeds and fruits of the plant *Cannabis sativa-L* is used in India as an infusion in the form of a beverage, which produces intoxication of a senseous character (5). The study of the effect of Cannabis on blood glucose level has been the subject of several investigations. It has been reported (1,4,8) that there is no significant effect of the low doses of Cannabis on blood glucose, although there is a tendency to show slight elevation. On the other hand, it is well documented (6,10,11) that Cannabis in large doses produces hyperglycemia in men and in experimental animals. These findings, therefore, suggest that the effect of Cannabis on blood glucose is possibly dose-related. The present work was undertaken to study the effect of administering varying doses of Cannabis extract on blood glucose and liver glycogen in rats and to find out the optimal dose associated with the maximum changes.

Experiments were performed on thirty albino rats (120—180 g) of either sex. All the animals were maintained on a standard diet (consisting of wheat flour, Bengal gram and casein) and water *ad libitum* for seven days and were fasted overnight (16 hr) before they were used for experiments. Powdered Cannabis was extracted with 95% ethanol for four hr in a Soxhlet apparatus. The product of concentrated resinous extract was dried, weighed and dissolved in a mixture of propylene glycol, water and ethanol in a ratio given by the method of Bose *et al.* (2) for injecting *ip* in rats. All the animals were divided into six groups of five animals each. The test animals of groups II, III, IV, V and VI were administered Cannabis extract (100, 200, 300, 400 and 500 *mg/kg* body weight) respectively by *ip* route, while control animals of group I, were given only solvent precisely in the same way as the test groups. Animals of each group were sacrificed after two hr of Cannabis extract/solvent administration. Samples of blood were collected and blood glucose was estimated by the method of Nelson and Somogyi (9). Samples of liver tissue were rapidly removed and small portion (25-75 *mg*) was weighed and glycogen

present in the liver tissue was estimated by the method of Kemp and Vanheijningen (7) from the precipitated residue remaining after extraction of glucose with 80% (v/v) methanol in which glycogen is insoluble and glucose is soluble. Student's 't' test has been used for the statistical analysis and the results were considered significant at $P < 0.05$.

From the result presented in Fig. 1, it was observed that there was significant increase of blood glucose and a concomitant fall in the glycogen content of the liver. The maximum changes were observed with a dose of 300 mg/kg Cannabis extract in rats after two hr of its ip injection.

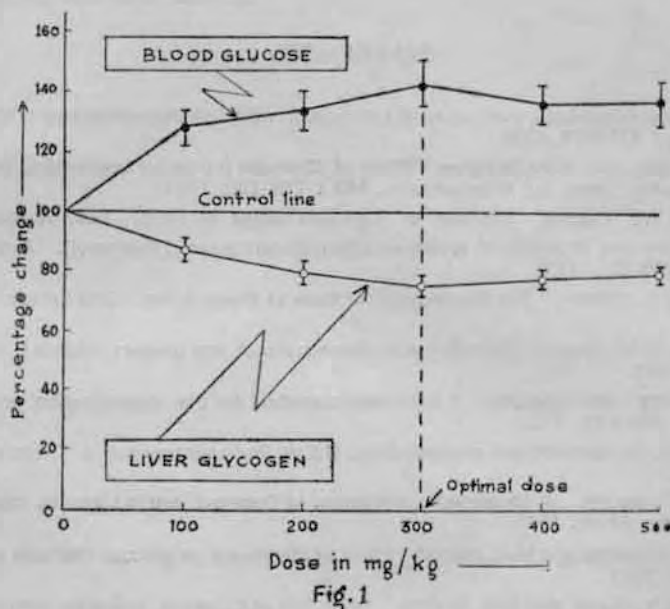


Fig. 1: Effect of ip injection of Cannabis extract on blood glucose and liver glycogen in rats. The doses of extract given have been expressed in mg/kg body weight. Each point represent the mean value of five animals. The results have been expressed as percent change with the value for control rats as 100 percent.

The results indicate that the effect of Cannabis on blood glucose and liver glycogen are related with the dose of Cannabis extract used. Our observations are in agreement with the previous findings (4, 6, 10, 11). However, the effects reported in the literature have been less marked as compared to our observations. The difference in the observations may be due to the difference in the nature of material used, the mode of its administration, the nature of experimental animals and the time of observations. In the present experiments, the observed hyperglycemia in rats treated with Cannabis extract

is mainly if not entirely due to increased glycogenolysis, as rise in blood glucose level is associated with concomitant fall in liver glycogen content. It is an interesting observation and deserves further investigation.

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REFERENCES

1. Ames, F. A clinical and metabolic study of acute intoxication with *Cannabis sativa* and its role in model psychoses. *J. Ment. Sci.*, **104** : 972-999, 1958
2. Bose, B.C., A.O. Safai and A.W. Bhagwat. Effect of *Cannabis indica* on hexobarbital sleeping time and tissue respiration of rat brain. *Arch. Int. Pharmacodyn.*, **147** : 285-290, 1964.
3. Chopra, I.C. and R. W. Chopra. The use of *Cannabis* drugs in India. *Bull. Narcotics*, **9** : 4-29, 1957.
4. Dhai, M.A.Y. Mechanism of action of synthetic tetrahydrocannabinol (Parahexyl). *Fed. Proc. Fed. Am. Soc. Exp. Biol.*, **10** : 290-291, 1951.
5. Goodman, L.S. and A. Gillman. *The Pharmacological Basis of Therapeutics*. 2nd Edition. Macmillan Co., N. Y., P.P. 171, 1955.
6. Hollister, L.E. and G. M. Reaven. Delta-9-Tetrahydrocannabinol and glucose tolerance. *Clin. Pharmac. Ther.*, **16** : 297-302, 1974.
7. Kemp, A., A.J.M. Kits Vanheijningen. A colorimetric method for the determination of glycogen in tissue. *Biochem.J.*, **56** : 646-648, 1954.
8. Miras, C.J. Hashish, its chemistry and pharmacology. G.E.W. Wolstenhome and J. Knight eds. Churchill, London. P.P. 37-47, 1965.
9. Nelson, N. and M. Somogyi. A photometric adaptation of Somogyi method for the determination of glucose. *J. Biol. Chem.*, **160** : 61-68, 1945.
10. Podolsky, S., C. G. Patarina and M.A. Amaral. Effect of Marijuana on glucose tolerance test. *Ann. N. Y. Acad. Sci.*, **191** : 54-60, 1971.
11. Sourogy, E.L.M., A. Y. Malek and H.H. Ibrahim. The effect of *Cannabis indica* on carbohydrate metabolism in rabbits. *J. Egypt. Med. Ass.*, **49** : 626-628, 1966.

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