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## Pharmacological Studies of A "Kushta Just" Suspension Formulation

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A suspension formulation of 'Kushta just' has been prepared and evaluated for sedimentation volume, viscosity, pourability and redispersibility. When orally administered to hyperglycemic rabbits, blood glucose levels were found to be decreased and the plasma zinc levels were significantly increased.

**K**USHTA just' is a unani medicine containing zinc oxide and is traditionally given in the form of tablets or powder<sup>1</sup>. A suspension of 'Kushta just' has the potential of greater patient acceptability and improved bioavailability. The concentration of zinc in plasma, leucocytes and erythrocytes is significantly reduced in diabetics because of high rate of excretion of zinc in urine. This increased excretion of zinc leads to tissue depletion and consequent lowering of circulating levels of metal<sup>2</sup>. The failure of ulcers of the foot to heal in some diabetics is also related to zinc deficiency. Healing of such ulcers in diabetics has been reported subsequent to zinc therapy<sup>2</sup>. Sathe et al<sup>3</sup>. and Khosa and Dixit<sup>4</sup> have reported antihyperglycemic activity of Jasad Bhasma an ayurvedic medicine obtained after incineration of zinc.

### EXPERIMENTAL

'Kushta just' (Hamdard Waf), fine white powder had a density of 2.1318 g/cc and contained 1.64 mg elemental zinc per g of the drug. Particle size analysis by 'Seishin' automatic particle size analyzer gave 19.23  $\mu$  as mean particle size and the range was 10-40  $\mu$ .

Five suspension formulations were prepared each containing 0.5 g of **Kushta just** in 50 ml. Carboxymethylcellulose sodium (I, 0.5; II, 1.0; III, 1.5; IV,

2.0 and V, 2.5% w/v) was used as suspending agent. The suspensions were evaluated for sedimentation volume, viscosity, pourability and redispersibility.

Formulation IV was selected for pharmacological screening for hypoglycemic activity. Male albino rabbits weighing 1.8-3.4 kg were used. They were maintained on Lipton's rabbit feed and water was given ad libitum. Hyperglycemia was induced by intraperitoneally injecting alloxan monohydrate aqueous solution (80 mg/ml) to fasting rabbits. This was followed by oral administration of 'Kushta just' suspension (IV) 5mg/kg body weight once daily for two weeks. Animals were divided into following four groups a) normal control group b) normal rabbits treated with 'Kushta just' suspension c) hyperglycemic rabbits and D) hyperglycemic rabbits treated with 'Kushta just' suspension.

Blood glucose determination was done using 'Gluzyme' (J. Mitra Bros.) reagent set based on enzymatic method using glucose oxidase/peroxidase. Fifty  $\mu$ l of whole blood was mixed with 450  $\mu$ l of 4% trichloroacetic acid (TCA) solution. After 5 minutes the sample was centrifuged for 10 minutes at 3000 r.p.m, 0.2 ml of the clear supernatant was treated with 1.0 ml of 'Gluzyme' working reagent. A standard solution containing glucose (100 mg/dl) was prepared and 0.01 ml was used as control. The test tubes were shaken to mix well and kept for 30 minutes. The absorbance was measured at 520 nm against an appropriate blank.

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\*For correspondence

Table-1 Effect of 'Kushta just' suspension on blood glucose and plasma zinc levels in rabbits :

Group	Blood Glucose level*, (mg/dl) $\pm$ S.D.	Plasma Zinc level, (p.p.m.) $\pm$ S.D.
a. Control (Untreated)	54.00 $\pm$ 15.63	0.43 $\pm$ 0.027
b. Control (Treated with 'Kushta just' suspension for 2 weeks)	54.67 $\pm$ 3.18	0.64 $\pm$ 0.025
c. Hyperglycemic rabbits	136.33 $\pm$ 10.75	0.33 $\pm$ 0.28
d. Hyperglycemic rabbits (Treated with 'Kushta just' suspension for 2 weeks)	94.33 $\pm$ 12.0	149 $\pm$ 0.17

\* An average of four determinations.

Zinc levels in plasma were determined by atomic absorption spectrometry. 1 ml of the whole blood was centrifuged at 2500 r.p.m. for 5 min. The separated plasma was heated to dryness and to it 0.5 ml of H<sub>2</sub>O<sub>2</sub> solution was added and the sample was again heated to dryness. The residue was dissolved in 10 ml water. The absorbance of the sample was determined at 213.9 nm on atomic absorption spectrophotometer (AAS Video II) using zinc lamp.

## RESULTS AND DISCUSSION

'Kushta just' suspensions were prepared using carboxymethyl cellulose sodium as suspending agent since it is inert and soluble in water at all temperatures. Moreover, it is not precipitated by heavy metals and also it exhibits pseudoplastic flow which is desirable for easy pourability of suspension.

Fig. 1. shows the sedimentation behaviour of various suspensions formulated. Formulation IV and V had a high Hu/Ho ratio whereas other formulations showed considerable settling. The viscosity of the suspensions was determined by Brookfield viscometer. Again formulation IV (249 cps) and V (968 cps) had good viscosity which also hinders settling of dispersed particles. The pourability and redispersibility on shaking was good for formulation IV when compared with other formulations, hence this was selected for further studies.

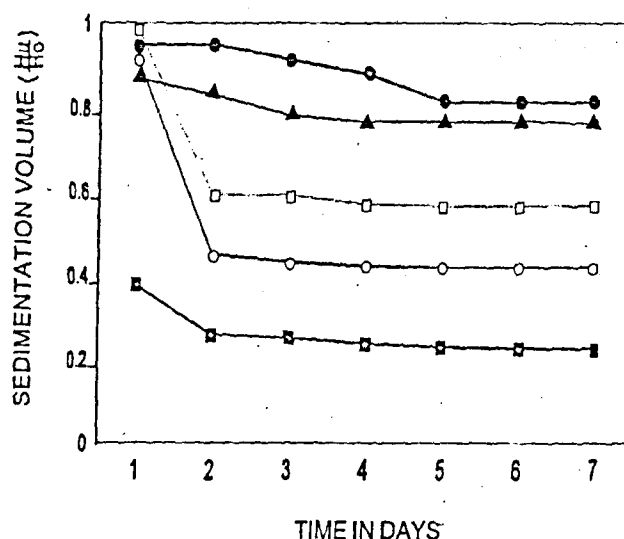


Fig. 1 : Sedimentation volume study of formulations of 'Kushta just' I.(■ □); II (○); III (□ □); IV (• •); V (● ●)

Table 1 gives the data obtained upon administering 'Kushta just' suspension to normal and hyperglycemic rabbits. The blood glucose levels of normal rabbits did not show any appreciable change upon the administration of 'kushta just'. However, the plasma zinc levels were significantly higher. In hyperglycemic rabbits the blood glucose levels were significantly decreased upon the administration of 'Kushta just' suspension and the plasma zinc

level which had decreased due to zinc depletion in tissues was found to be significantly higher.

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