

## HYPOGLYCAEMIC AND MALE FERTILITY ENHANCING PROPERTIES OF *PLANTAGO MAJOR*

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### Introduction

*Plantago major* ('ekor anjing') has been used for treatment of various diseases, such as for anti-cancer, anti-inflammation, anti-oedema and anti-ulcer. This plant species has also been used as cough mixture, tonic and diuretic by the Chinese and Malay communities. In traditional Chinese medicine, *Plantago major* is said to be able to increase sperm counts and semen volume, and improve fertility in male. Malay traditional medicine practitioners believed that the *P. major* has hypoglycaemic properties and use this plant extracts for treating diabetes mellitus. Thus, this project is undertaken to verify the fertility enhancing and hypoglycaemic properties of *Plantago major* extract.

### Materials and Methods

**Male fertility study:** Aqueous seed extract was used and given orally to 4 groups of male rats with doses of 30, 60, 100 and 200 mg/kg body weight. Treatment was given everyday immediately after blood sampling. Blood samples were taken on day 0, 8, 16 and 20. The blood samples were centrifuged at 6500 rpm for 15 minutes and the supernatant was stored at -20°C before testosterone RIA analysis. Sperm concentrations were determined on the last day of treatment (day 20). The rats were killed and the vas deferens fluid was taken immediately using fine needle syringe. A 10 µl aliquot of the vas deferens fluid was aspirated and diluted to 2 ml in 0.95% saline solution and examined under light microscope. The sperm concentration was determined using the haemocytometer technique. **Hypoglycaemic study:** The aqueous extract was prepared by boiling dried leaves in 0.5 liter of water for 5 minutes. The extract was then concentrated and

later freeze dried at -70°C to obtain the powder form. Treatments were carried out using 6 groups of induced diabetic rats. The first two groups served as controls (saline 0.95% at 5 ml/kg body wt; glibenclamide at 10 mg/kg body wt.). The other 4 groups were treated with various doses of 100, 200, 400 and 600 mg/kg body wt. Oral glucose tolerance test (OGTT) was carried out after the rats were fasted overnight. Blood samples were collected at time -10 minute, 0 minute and followed immediately by the administration of the treatment doses. After 15 minutes, glucose load of 1.5 g/kg body wt was orally administered. Consecutive blood samples were taken at 5, 15, 30, 60, 90, 120 and 180 minutes after the glucose load. Blood glucose concentrations in the samples were determined by glucose oxidase method.

### Results and Discussion

The seed extract doses of 60, 100 and 200 mg/kg body wt. significantly increased the sperm concentrations by an average of 18% compared with the control group. The testosterone levels show a trend increase for the treated groups but not statistically significant due to high standard error and limited samples. The sperm characteristics of all treatment groups did not show any sign of abnormality. In the hypoglycaemic study, the plasma glucose levels of the induced diabetic rats were measured at 230-300 mg% as compared with 80-100 mg% in normal rats. After the glucose load, the plasma glucose levels of rats in the saline group reached a peak at 30 minutes (388.38 mg%) and gradually became lower until it reached the basal diabetic levels after 120 minutes. The peak was significantly lower (349.56 mg%) in the glibenclamide group. From the treatment groups, only the 600 mg/kg dose showed significant hypoglycaemic effect compared to control saline. However, the effect of the aqueous extracts was less pronounced compared to glibenclamide.

### Conclusions

Results from the studies suggest that the aqueous extract of *P. major* seeds was able to significantly increase sperm concentrations. There was a trend but not a significant increase in testosterone level. This suggests other factors, possibly antiestrogens contributing to the spermatogenic effect. Hypoglycaemic properties were only shown in the 600 mg/kg group and the effect is less pronounced compared to the established hypoglycaemic agent, glibenclamide.