HYPOGLYCAEMIC AND ANTIOXIDANT POTENCY OF *Momordica charantia, Strobilanthes crispus* AND THEIR COMBINATION IN ALLEVIATING ALLOXAN-INDUCED INJURIES IN RATS

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BY

NOOR AZLINA BT HJ. MOHAMMAD

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirement for the Degree of Master of Science

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To my beloved mum and dad, brother and sister
….. For their patience and support

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Master of Science.

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Chairman: Associate Professor Noordin Mohamed Mustapha, PhD

Faculty : Veterinary Medicine

In an attempt to find a less toxic and easily available oral hypoglycaemic agent, two herbs were selected. The oven-dried fruits *Momordica charantia* (M) and oven-dried leaves *Strobilanthes crispus* (S) were incorporated into the feed of rats at 5% inclusion level.

A total of 72, six weeks old male Sprague Dawley rats were used whereby eight rats each were assigned to each group. The group receiving normal pellet served as the control (N) while diabetes mellitus was induced by an intraperitoneal injection of alloxan monohydrate. Thus, the groups of rats were as follows; control (N), *Momordica* only (M), *Strobilanthes* only (S), M plus S (MS), diabetic (D), D plus glibenclimide (DG), D plus M (DM), D plus S (DS) and D plus M plus S (DMS).

The experiment was carried out for 24 weeks following one week period of acclimatasation. At all instances, water and feed were given *ad libitum.* The rats

were monitored daily for the development of abnormal clinical signs. Body weight was taken triweekly and simultaneously blood was also taken.

Blood taken were subject to glucose, malondialdehyde (MDA), gluthatione peroxidase (GSH-Px), superoxide dismutase (SOD) and catalase (CAT) assays. At the end of the study, all rats were killed and the liver, kidney, heart, eye and pancreas were taken for histopathologic examination and scoring. Data obtained were subjected to the general linear model statistical (GLM) analysis.

The study showed that alloxan was able to induce hyperglycaemia in rats. Likewise, it was found that M and S were able to alleviate hyperglycaemic-induced injuries in rats. These includes a much lower blood glucose, decreased MDA levels, increased GSH-Px and SOD activities and minimal tissue changes. The changes are more pronounced when both herbs were used in combination and is believed to act synergistically. The study also showed that MDA is a reliable and sensitive indicator of peroxidation status while GSH-Px and SOD are excellent biomarkers of anti-oxidant status.

The prolong use of both herbs did not result in any deleterious effects in both the euglycaemic and hyperglycaemic groups.

Abstrak tesis yang dikemukakan pada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

KEBERKESANAN *Momordica charantia*, *Strobilanthes crispus* DAN GABUNGAN BAGI KEDUA-DUANYA SEBAGAI HIPOGLISEMIK DAN ANTI-PENGOKSIDAAN KE ATAS TIKUS DIABETIK YANG DIINDUS DENGAN ALLOXAN

Oleh

NOOR AZLINA BT HJ. MOHAMMAD

Mac 2006

Pengerusi: Profesor Madya Noordin Mohamed Mustapha, PhD

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Dalam usaha menemui agen hipoglisemik yang kurang toksik dan mudah diperolehi, dua jenis herba telah dipilih. Buah *Momordica charantia* (M) dan daun *Strobilanthes crispus* (S) dicampurkan ke dalam makanan tikus pada tahap 5%. Kedua-dua sumber herba ini, iaitu M dan S dikeringkan didalam ketuhar sebelum digunakan.

Sejumlah 72 ekor tikus jantan Sprague Dawley yang berusia 6 minggu telah digunakan di mana lapan ekor tikus ditetapkan untuk setiap kumpulan. Sekumpulan tikus menerima pelet biasa yang ditandakan sebagai kumpulan kawalan (N). Sementara itu, alloxan monohidrat telah disuntik secara intraperitoneum untuk mewujudkan fenomena diabetis melitus. Berikut adalah kumpulan tikus yang ditetapkan; kawalan (N), *Momordica* sahaja (M), *Strobilanthes* sahaja (S), M dan S (MS), diabetik (D), D dan glibenclimide (DG), D dan M (DM), D dan S (DS) dan D dan M dan S (DMS).

Eksperimen dijalankan selama 24 minggu diikuti dengan satu minggu tempoh penyesuaian iklim. Dalam tempoh ini, tikus telah diberi makanan dan air secara *ad libitium*. Perkembangan tikus-tikus ini diperhatikan setiap hari untuk sebarang tanda ketidaknormalan klinikal. Berat badan diambil setiap 3 minggu dan pada masa yang sama sampel darah juga diambil.

Darah yang diambil digunakan untuk esei glukosa, malondialdehid (MDA), glutation peroksidase (GSH-Px), superoksid dismutase (SOD) dan katalase (CAT). Di akhir kajian, semua tikus dibunuh sementara hati, buah pinggang, jantung, mata dan pankreas diambil untuk pemeriksaan histopatologi dan pengiraan. Data diperolehi berdasarkan analisis statistik general linear model (GLM).

Kajian menunjukkan alloxan berupaya mewujudkan keadaan hiperglisemia pada tikus. Dalam masa yang sama, M dan S telah dikenalpasti dapat mengurangkan kecederaan yang disebabkan oleh hiperglisemia pada tikus ini termasuklah pengurangan glukosa darah, pengurangan tahap MDA, penambahan aktiviti GSH-Px dan SOD dan perubahan tikus yang minima. Perubahan-perubahan ini lebih ketara apabila kombinasi herba digunakan dan dipercayai kedua-dua herba bertindak secara sinergi. Kajian ini juga menunjukkan bahawa MDA adalah suatu petunjuk status pengoksidaan yang sensitif dan boleh digunakan, sementara GSH-Px dan SOD adalah petunjuk anti-pengoksidan yang baik.

Penggunaan herba-herba ini untuk jangka masa yang panjang tidak menunjukkan sebarang kesan buruk kepada kumpulan euglisemia dan hiperglisemia.

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I certify that an Examination Committee has met on 2nd March 2006 to conduct the final examination of Noor Azlina Binti Hj. Mohammad on her Master thesis entitled "Hypoglycaemic and antioxidant Potency of *Momordica Charantia*, *Strobilanthes Crispus* and Their Combination in Alleviating Alloxan-Induced Injuries in Rats" in accordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulations 1981. The Committee recommends that the candidate be awarded the relevant degree. Member of the Examination Committee are as follows:

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I hereby declare that the thesis is based on my original work except for quotations and citations that been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM as other institutions.

NOOR AZLINA BT HJ. MOHAMMAD

Date:

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