



Hormone-balancing Effect of Pre-Gelatinized Organic Maca (*Lepidium peruvianum* Chacon) in Postmenopausal Women:

(I) Biochemical and Pharmacodynamic Study on Maca using Clinical Laboratory Model on Ovariectomized Rats

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ABSTRACT

Background: Roots of high Andean cruciferous plant Maca (*Lepidium peruvianum* Chacon) has been recognized by natives of Peru as herbal remedy helping to treat conditions affecting menopausal women. Recent laboratory and preliminary clinical study on Maca provide indications of its hormone-balancing properties in menopausal women.

Objective: To examine biochemical and pharmacodynamic effects of pre-gelatinized organic preparation of *Lepidium peruvianum* Chacon (Maca-GO) in a model laboratory study using ovariectomized rats.

Design: Biochemical and Pharmacodynamic effects of Maca-GO (250mg Maca-GO per kg body weight (bw) administered by intubation twice daily) were assessed in a 28-day model laboratory study on ovariectomized (by laparoscopy) Wistar rats with pharmacodynamic tests performed at the conclusion of the trial followed by blood collection for morphology and biochemical tests.

Methods: Toxicity of Maca-GO used in the study was determined in bioassay on mice and rats. Anti-depressive function (Porsolt's test) and anxiolytic sedative and cognitive effects (using elevated-plus maze, locomotor activity and passive avoidance tests) were assessed against control (laparotomized female rats with intact ovaries). In addition to blood morphology, the following blood serum constituents were analyzed: Estrogen (E2), Progesterone (PGS), Cortisol (CT), Adrenocorticotropic Hormone (ACTH), Thyroid Hormones (TSH, T3, and T4), Iron (Fe) and lipid profile (Triglycerides, Total Cholesterol, LDL, HDL).

Results: Analytically-determined non-toxic status of Maca-GO was confirmed in bioassays when applied to mice and rats at levels of 0.5 and up to 15mg/kg bw which shows it safe use in humans with the LD50 >15mg/kg bw Maca-GO showed a distinctive, ($P < 0.05$) antidepressant-like and sedative effect in ovariectomized rats only, while there was no anxiolytic activity nor disturbance of cognitive function observed in both, test and control animals.

Conclusion: Observed in this study balancing effect of Maca-GO on sex hormone levels show its potential as a safe preparation for use in correcting physiological symptoms characteristic in postmenopausal stage, with an indication of potentially even more value for its use in pre-menopausal women.

Short title: Pre-Gelatinized Maca in Postmenopausal Women: (I) Pharmacodynamic Study

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