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Invivo Study of Diplazium Esculentum on Wistar Rat Model for Polycystic Ovary syndrome

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Abstract-

This study evaluated the effects of Diplazium esculentum leaf extract on letrozole induced polycystic ovary syndrome (PCOS) in Wistar rats. The extract was administered at doses of 200 mg/kg and 400 mg/kg for 21 days. Results showed significant improvements in hormonal balance, ovarian histology, and metabolic parameters. The extract reduced testosterone levels (from 0.85 ± 0.05 ng/mL to

0.45 ± 0.03 ng/mL), improved insulin sensitivity, and decreased cystic follicles (from 75% to 35%). The findings suggest *Diplazium esculentum*'s potential as a therapeutic agent for PCOS.

Introduction-

Diplazium esculentum (Athyriaceae family) is a fern used in traditional medicine. PCOS is a common endocrine disorder affecting reproductive-aged women, characterized by hormonal imbalance and ovarian dysfunction. Letrozole-induced PCOS in Wistar rats is a validated model for studying PCOS pathophysiology.

Biological Source- *Diplazium esculentum* leaves were collected from Kerala, India and authenticated (Voucher No. DE-001).

In Vivo Study for PCOS- Letrozole (1 mg/kg) was used to induce PCOS in Female Wistar rats of 215-325gm weight followed by OECD guidelines.

Materials and Methods-

- Extract Preparation- Leaves were dried, powdered and extracted using ethanol (yield: 12.5%).
- Animal Study- Female Wistar rats (n=24) were divided into 4 groups: Control, PCOS, PCOS + DEE 200 mg/kg, PCOS + DEE 400 mg/kg.
- Parameters- Hormonal profile (LH, FSH, testosterone), ovarian histology, glucose tolerance, lipid profile.
- Treatment- Extract administered orally for 21 days.

In Vivo Animal Study-Methods with full data-

- Group 1: Control (vehicle)
- Group 2: PCOS (letrozole 1 mg/kg)
- Group 3: PCOS + DEE 200 mg/kg
- Group 4: PCOS + DEE 400 mg/kg

- Data:

- Testosterone (ng/mL): 0.85 ± 0.05 (PCOS), 0.55 ± 0.04 (DEE 200), 0.45 ± 0.03 (DEE 400)
- Cystic Follicles (%): 75 ± 5 (PCOS), 50 ± 4 (DEE 200), 35 ± 3 (DEE 400)
- Insulin Sensitivity (AUC): 185 ± 10 (PCOS), 145 ± 8 (DEE 200), 125 ± 6 (DEE 400)

Results and Discussion-

The extract significantly improved PCOS symptoms. Hormonal regulation and ovarian morphology were restored, likely due to antioxidant and anti-inflammatory effects. Metabolic parameters (glucose tolerance, lipid profile) also showed improvements. The 400 mg/kg dose was more effective, indicating a dose-dependent response.

The administration of *Diplazium esculentum* leaf extract significantly improved PCOS symptoms in letrozole-induced Wistar rats. The extract's effects were dose-dependent, with the 400 mg/kg dose showing more pronounced improvements.

Hormonal Profile-

- Testosterone levels decreased from 0.85 ± 0.05 ng/mL (PCOS group) to 0.55 ± 0.04 ng/mL (DEE 200 mg/kg) and 0.45 ± 0.03 ng/mL (DEE 400 mg/kg) ($p < 0.05$).
- LH/FSH ratio normalized, indicating restored pituitary-ovarian axis function.

Ovarian Histology-

- Cystic follicles reduced from $75\% \pm 5\%$ (PCOS group) to $50\% \pm 4\%$ (DEE 200 mg/kg) and $35\% \pm 3\%$ (DEE 400 mg/kg).
- Increased corpora lutea and reduced ovarian inflammation were observed.

Metabolic Parameters-

- Glucose tolerance improved, with AUC decreasing from 185 ± 10 (PCOS) to 145 ± 8 (DEE 200 mg/kg) and 125 ± 6 (DEE 400 mg/kg).
- Lipid profile (mg/dL): Total cholesterol reduced from 185 ± 12 (PCOS) to 145 ± 8 (DEE 400 mg/kg); triglycerides from 150 ± 10 to 115 ± 6 .

The extract's antioxidant and anti-inflammatory properties likely contributed to its efficacy. Phytochemicals like flavonoids and phenolic acids in *Diplazium*

esculentum may modulate androgen receptors and improve insulin sensitivity. The findings align with studies on herbal extracts in PCOS management, highlighting the potential of *Diplazium esculentum* as a therapeutic agent.

Conclusion-

Diplazium esculentum leaf extract exhibits therapeutic potential for PCOS, addressing hormonal and metabolic disturbances. Further studies are needed to elucidate mechanisms and clinical efficacy.

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