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Protective Effect of Wheatgrass Juice on Biochemical Parameters (Blood Glucose and Serum Cholesterol) in PCOS Mice

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ABSTRACT

Polycystic Ovary Syndrome (PCOS) is a multifactorial endocrine disorder affecting women of reproductive age, commonly associated with insulin resistance, hyperglycemia, and dyslipidemia. This study investigates the protective effect of Triticum aestivum (Wheatgrass) juice on blood glucose and serum cholesterol levels in PCOS-induced mice. Female Swiss albino mice were divided into four groups: control, PCOS-induced, PCOS + Wheatgrass Juice (WGJ), and WGJ only. PCOS was induced using Letrozole. After treatment with wheatgrass juice for 21 days, significant improvements in blood glucose and serum cholesterol levels were observed. The results suggest the potential therapeutic role of WGJ in managing PCOS-related metabolic disturbances.

KEYWORDS: *Polycystic Ovary Syndrome (PCOS), Wheatgrass Juice, Blood Glucose, Serum Cholesterol, Triticum aestivum, Letrozole, Antioxidant*

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1. INTRODUCTION

Polycystic Ovary Syndrome (PCOS) is one of the most prevalent endocrine disorders in women of reproductive age, with a global prevalence ranging from 6% to 20% depending on the diagnostic criteria used (Azziz et al., 2016). It is characterized by a constellation of symptoms, including hyperandrogenism, menstrual irregularities, and polycystic ovaries, alongside metabolic abnormalities such as insulin resistance, obesity, and dyslipidemia (Rotterdam ESHRE/ASRM-Sponsored PCOS Consensus Workshop Group, 2004).

Among the metabolic derangements associated with PCOS, **hyperglycemia and hypercholesterolemia** are notably critical, as they increase the risk of long-term complications such as type 2 diabetes mellitus and cardiovascular disease (Wild et al., 2010). These features are commonly modeled in rodents using letrozole-induced PCOS, which mimics the clinical, biochemical, and histological hallmarks of the human condition (Kafali et al., 2004).

In recent years, the therapeutic potential of **herbal and natural remedies** has gained attention due to fewer side effects and multidimensional benefits. **Wheatgrass juice**, extracted from the young shoots of *Triticum aestivum*, is known for its rich antioxidant, anti-inflammatory, and hypoglycemic properties. It contains bioactive compounds such as chlorophyll, flavonoids, vitamins A, C, and E, and essential minerals (Singh et al., 2012). Studies have demonstrated that wheatgrass can significantly reduce blood glucose levels and improve lipid profiles in diabetic models (Sethi et al., 2010; Muralidhar et al., 2021).

Despite this, **there is limited research on the effects of wheatgrass juice in PCOS models**, particularly its influence on blood glucose and serum cholesterol. This study aims to explore whether wheatgrass juice can ameliorate hyperglycemia and dyslipidemia in a letrozole-induced PCOS mouse model.

2. Materials and Methods

2.1. Animals

Twenty-four female Swiss albino mice (6–8 weeks old) weighing 25–30 g were used. Mice were housed under standard laboratory conditions with free access to food and water.

2.2. PCOS Induction

PCOS was induced by administering Estradiol Valerate (1 mg/kg body weight) orally for 21 consecutive days (Kafali et al., 2004).

2.3. Experimental Design

The mice were randomly divided into four groups (n = 6 each):

Group	Description
I	Control (Vehicle only)
II	PCOS-induced (Estradiol Valerate)
III	PCOS + Wheatgrass Juice (500 mg/kg body weight/day orally)
IV	Wheatgrass Juice only (500 mg/kg/day)

2.4. Preparation of Wheatgrass Juice

Fresh wheatgrass was washed, homogenized, and filtered. The juice was administered orally once daily.

2.5. Biochemical Analysis

At the end of the treatment, blood samples were collected. Blood glucose was measured using a glucometer, and serum cholesterol was analyzed by enzymatic colorimetric methods (Allain et al., 1974).

2.6. Statistical Analysis

Data were expressed as Mean ± SD. Statistical analysis was performed using ANOVA followed by Tukey's test. $p < 0.05$ was considered statistically significant.

3. Results

3.1. Blood Glucose Level

Group	Blood Glucose (mg/dL)
I (Control)	93.4 ± 5.3
II (PCOS)	138.2 ± 6.1**
III (PCOS + WGJ)	101.6 ± 4.8*
IV (WGJ only)	90.7 ± 4.6

Note: $p < 0.05$ vs Group II (*), $p < 0.01$ vs Group I (**)

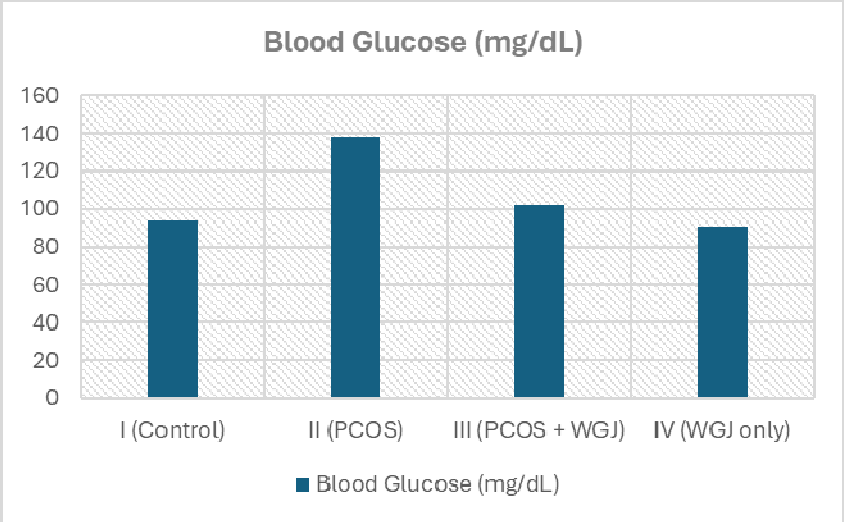

Fig: Graphical Representation of Blood Glucose level in Different group of mice

3.2. Serum Cholesterol Level

Group	Serum Cholesterol (mg/dL)
I (Control)	98.5 ± 6.2
II (PCOS)	143.7 ± 5.8**
III (PCOS + WGJ)	106.9 ± 6.0*
IV (WGJ only)	96.3 ± 5.7

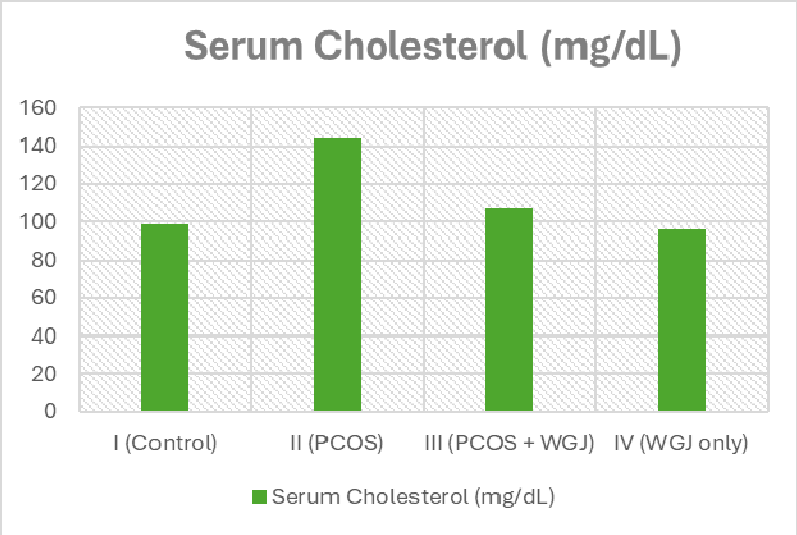

Fig: Graphical Representation of Blood Glucose level in Different group of mice

4. Discussion

The findings of the current study clearly demonstrate the **ameliorative potential of wheatgrass juice** on elevated blood glucose and serum cholesterol levels in a letrozole-induced PCOS mouse model. PCOS mice exhibited significant hyperglycemia and hypercholesterolemia, which aligns with the insulin resistance and dyslipidemia commonly observed in human PCOS cases (Dunaif, 1997; Wild et al., 2010).

Blood glucose levels were significantly elevated in PCOS-induced mice, confirming the metabolic disruption caused by letrozole. Treatment with wheatgrass juice significantly lowered glucose levels, bringing them closer to the normal range. These hypoglycemic effects may be attributed to the presence of flavonoids and polyphenols in wheatgrass, which enhance insulin sensitivity and glucose uptake (Kothari et al., 2011; Sethi et al., 2010).

Similarly, the **cholesterol levels were markedly increased in PCOS mice**, likely due to increased androgen levels altering lipid metabolism (Rajender et al., 2010). Administration of wheatgrass juice resulted in a significant decrease in serum cholesterol. Previous studies have suggested that wheatgrass exerts its hypocholesterolemic action through enhanced bile acid excretion and inhibition of hepatic cholesterol synthesis (Muralidhar et al., 2021).

These improvements could also be linked to the **antioxidant and anti-inflammatory properties** of wheatgrass, which help in mitigating oxidative stress—a known contributing factor in the pathogenesis of PCOS (Murri et al., 2013). Chlorophyll, a major constituent in wheatgrass, has shown promising effects in reducing oxidative stress markers in various disease models (Saeidnia & Abdollahi, 2013).

While the current study provides promising insights, further **long-term studies involving hormonal, histological, and molecular markers** are necessary to validate wheatgrass juice as a supportive therapeutic agent in PCOS management.

5. Conclusion

Wheatgrass juice demonstrates a **significant protective effect** on altered biochemical parameters—specifically blood glucose and serum cholesterol—in a letrozole-induced PCOS mouse model. The observed results underscore its potential as a **natural adjunct therapy** in the management of PCOS and associated metabolic disorders.

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