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# Study Of Drug Prescribed And Adverse Drug Reaction In Polycystic Ovarian Syndrome

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***Abstract*—**Polycystic ovary syndrome (PCOS) is a prevalent endocrine disorder characterized by reproductive, metabolic, and hormonal disturbances in women of childbearing age. Rational pharmacotherapy remains central to its management, yet prolonged treatment is frequently associated with adverse drug reactions (ADRs) that impair patient adherence and treatment efficacy. This prospective observational study evaluated drug utilization patterns and ADR profiles in 20 PCOS patients at a tertiary care hospital. The most frequently prescribed agents included metformin, clomiphene citrate, oral contraceptive pills, and letrozole. Commonly observed ADRs encompassed nausea, gastrointestinal disturbances, weight fluctuations, and hormone-related adverse effects. Systematic pharmacovigilance practices and evidence-based prescribing are imperative to optimize clinical outcomes and patient safety. This study contributes to the growing body of evidence supporting structured ADR monitoring and rational drug use in the management of gynecological and endocrine disorders.

***Keywords*—**PCOS; drug utilization; adverse drug reactions; metformin; clomiphene citrate; letrozole; pharmacovigilance

## I. INTRODUCTION

Polycystic ovary syndrome (PCOS) is a heterogeneous endocrine disorder affecting an estimated 6–15% of women in the reproductive age group globally [1]. Its diagnostic hallmarks encompass hyperandrogenism, ovulatory dysfunction, and polycystic ovarian morphology, frequently accompanied by insulin resistance and metabolic abnormalities [2].

Current pharmacological management of PCOS is multidimensional. Ovulation induction agents—clomiphene citrate and letrozole—are the mainstays for infertility management. Metformin, a biguanide insulin sensitizer, addresses underlying metabolic derangements and restores menstrual regularity. Hormonal contraceptives regulate the menstrual cycle and control hyperandrogenic manifestations, while anti-androgens such as spironolactone target cutaneous sequelae [3].

Prolonged pharmacotherapy carries an inherent risk of ADRs that may reduce treatment compliance and alter clinical outcomes. Systematic evaluation of prescribing patterns and ADR surveillance is therefore indispensable for evidence-based prescribing decisions and patient safety [4].

## II. ETIOLOGY AND PATHOPHYSIOLOGY

The pathogenesis of PCOS is multifactorial, involving a complex interplay of genetic susceptibility, neuroendocrine dysregulation, and metabolic perturbations [2].

### *A. Insulin Resistance*

Insulin resistance is identified in approximately 65–70% of PCOS patients and serves as a critical driver of the syndrome's metabolic and reproductive manifestations [4]. Compensatory hyperinsulinemia stimulates ovarian androgen

synthesis and suppresses hepatic sex hormone-binding globulin (SHBG) production, collectively amplifying hyperandrogenaemia. Clinical correlates include acanthosis nigricans, unexplained weight gain, and polyphagia.

*B. Genetic Factors*

Familial aggregation and twin concordance studies strongly support a genetic basis for PCOS. Variants in genes encoding insulin signaling proteins, steroidogenic enzymes, and gonadotropin receptors have been implicated in its pathogenesis [2].

*C. Androgen Excess and Neuroendocrine Dysregulation*

Hyperandrogenism disrupts the hypothalamic-pituitary-ovarian (HPO) axis, culminating in chronic anovulation and follicular maturation arrest. Elevated luteinizing hormone (LH) secretion amplifies thecal androgen production, while relatively diminished follicle-stimulating hormone (FSH) levels impede granulosa cell activity and follicular maturation [5]. This neuroendocrine imbalance, compounded by hyperinsulinemia, perpetuates anovulatory cycles and the characteristic ovarian morphology of PCOS.

## III. CLINICAL MANIFESTATIONS

PCOS presents with a broad and variable clinical phenotype. Under the Rotterdam diagnostic criteria, the presence of at least two of the following three features establishes the diagnosis: (1) oligo- or anovulation, (2) clinical or biochemical evidence of hyperandrogenism, and (3) polycystic ovarian morphology on ultrasonography [1].

Menstrual irregularities, including oligomenorrhea, amenorrhea, or dysfunctional uterine bleeding, are hallmark presentations. Some patients experience inter-menstrual intervals exceeding 35 days or fewer than eight cycles annually. Transvaginal ultrasound typically reveals bilaterally enlarged ovaries with peripherally arranged antral follicles, reflecting follicular maturation arrest. Hyperandrogenic features include hirsutism (affecting approximately 70% of patients), androgenic alopecia, and treatment-resistant acne. Obesity is reported in 40–80% of patients, substantially compounding metabolic risk [5]. Insomnia and sleep-disordered breathing show elevated prevalence in PCOS, attributable to hormonal imbalances, metabolic dysregulation, and psychological stress.

## IV. TREATMENT MODALITIES

*A. Non-Pharmacological Approaches*

Lifestyle modification is universally endorsed as the foundational therapeutic strategy for overweight and obese PCOS patients. A calorie-restricted, low glycemic index diet combined with structured aerobic exercise of at least 150 minutes per week has been shown to improve insulin sensitivity, restore menstrual regularity, and attenuate cardiovascular risk [6]. Complementary approaches, including yoga, mindfulness-based stress reduction, and acupuncture, offer adjunctive benefits in managing psychological comorbidities and sleep disturbances.

*B. Pharmacological Approaches*

*1) Clomiphene Citrate:*

A selective estrogen receptor modulator (SERM), clomiphene citrate remains the first-line agent for ovulation induction. It blocks hypothalamic estrogen receptors, increasing endogenous FSH secretion and promoting follicular development. Clinical pregnancy rates approximate 30%; however, early pregnancy loss may occur in up to 20% of cases [7].

*2) Letrozole:*

As a third-generation aromatase inhibitor, letrozole reduces peripheral estrogen synthesis, thereby increasing FSH release and promoting mono follicular development. It is increasingly preferred over clomiphene citrate due to higher live birth rates and a lower risk of multiple gestations [8].

*3) Metformin:*

This biguanide antidiabetic agent reduces hepatic glucose output and improves peripheral insulin sensitivity. In PCOS, metformin attenuates hyperinsulinemia, lowers androgen levels, and promotes menstrual regularity. Adverse effects are predominantly gastrointestinal and most notable during dose escalation [4].

*4) Gonadotropins:*

Exogenous gonadotropin therapy is reserved for patients refractory to first-line ovulation induction. While it offers higher pregnancy rates, vigilant monitoring is mandatory to prevent ovarian hyperstimulation syndrome (OHSS) [9].

*5) Oral Contraceptive Pills (OCPs):*

Combined OCPs are the preferred intervention for managing hyperandrogenic symptoms in non-pregnant patients. They suppress gonadotropin secretion and elevate SHBG, effectively reducing free androgen levels, alleviating hirsutism and acne, and providing endometrial protection against hyperplasia [3].

*6) Spironolactone:*

An aldosterone antagonist with potent anti-androgenic properties, spironolactone is commonly combined with OCPs for persistent hirsutism and acne. Reliable contraception is required during therapy due to teratogenic risk [5].

## V. METHODOLOGY

### *A. Study Design and Setting*

A prospective observational study was conducted at the gynecology outpatient department of a tertiary care hospital over a two-to-three-month period.

### *B. Study Population*

Ten female patients aged 18–40 years with a confirmed clinical diagnosis of PCOS were enrolled. Exclusion criteria encompassed pregnant women and patients with severe concurrent systemic comorbidities that could confound drug utilization assessment.

### *C. Data Collection*

A validated structured questionnaire with open-ended items was administered following acquisition of written or verbal informed consent from all participants. Collected data included demographic variables (age, weight, address, marital status), clinical diagnoses, and detailed prescription records encompassing generic and brand drug names, doses, dosing frequency, and treatment duration. Identified ADRs were systematically evaluated for severity, causality, and preventability in accordance with established WHO pharmacovigilance guidelines.

## VI. RESULTS

### *A. Age Group Distribution*

A total of 10 patients were enrolled, all between 20–35 years of age. The majority (80%) were within the 20–30-year age bracket, consistent with the peak reproductive vulnerability period for PCOS. Age distribution is presented in Table I.

**TABLE I**

*Age Group Distribution of Enrolled PCOS Patients*

| Age Group (Years) | No. of Patients | Percentage |
|---|---|---|
| 20–25 | 4 | 40% |
| 26–30 | 4 | 40% |
| 31–35 | 2 | 20% |

### *B. Drug Utilization and ADR Dataset*

Detailed prescription data and corresponding ADR profiles for all enrolled patients are presented in Table II.

**TABLE II**

*Drug Utilization and Adverse Drug Reaction Dataset*

| Pat. ID | Age | Drug Prescribed | Therapy | ADR Observed | Severity |
|---|---|---|---|---|---|
| P1 | 22 | Metformin | Mono | Nausea | Mild |
| P2 | 25 | Metformin + Clomiphene | Combo | Pelvic pain | Moderate |
| P3 | 28 | Oral Contraceptives | Mono | Weight gain | Mild |
| P4 | 30 | Letrozole | Mono | Dizziness | Mild |
| P5 | 24 | Metformin | Mono | Nausea | Mild |
| P6 | 27 | Clomiphene | Mono | Hot flashes | Moderate |
| P7 | 32 | OCP + Spironolactone | Combo | Abdominal discomfort | Mild |
| P8 | 21 | Metformin | Mono | No ADR | — |
| P9 | 29 | Letrozole | Mono | Fatigue | Mild |
| P10 | 26 | Metformin + Letrozole | Combo | Nausea | Moderate |

### *C. Drug Categories Prescribed*

Of the 10 analyzed prescriptions, metformin was the most frequently prescribed agent, either as monotherapy or in combination regimens (50%). Letrozole was prescribed in 30% of cases, while clomiphene citrate and oral contraceptive pills were each utilized in 20% of patients. The prescribing frequency by drug category is summarized in Table III.

**TABLE III**

*Categories of Drugs Prescribed*

| Drug | No. of Patients | Percentage |
|---|---|---|
| Metformin (alone/combination) | 5 | 50% |
| Clomiphene Citrate | 2 | 20% |
| Letrozole | 3 | 30% |
| Oral Contraceptive Pills | 2 | 20% |
| Spironolactone | 1 | 10% |

*D. Adverse Drug Reaction Profile*

Six distinct ADR categories were documented across the study population. Nausea was the most prevalent adverse reaction, occurring in 30% of patients receiving metformin-containing regimens. All recorded ADRs were mild-to-moderate in severity; one patient (P8) reported no adverse reactions throughout the study period. The ADR distribution is presented in Table IV.

**TABLE IV**

*ADR Assessment Summary*

| Adverse Drug Reaction | No. of Patients | Percentage |
|---|---|---|
| Nausea | 3 | 30% |
| Pelvic Pain | 1 | 10% |
| Weight Gain | 1 | 10% |
| Abdominal Discomfort | 1 | 10% |
| Hot Flashes | 1 | 10% |
| Dizziness / Fatigue | 2 | 20% |
| No ADR | 1 | 10% |

## VII. DISCUSSION

The findings of this investigation are consistent with previously published pharmaco epidemiological data, corroborating metformin and clomiphene citrate as the most widely utilized agents in PCOS management [3, 7]. Metformin's predominance reflects its dual efficacy in correcting insulin resistance and restoring menstrual cyclicity; however, the high incidence of gastrointestinal ADRs underscores the importance of a gradual dose-escalation strategy and proactive patient counseling.

Letrozole demonstrated a favorable efficacy and tolerability profile relative to clomiphene citrate, consistent with recent comparative evidence demonstrating superior live birth rates and fewer multiple pregnancies [8]. The observed ADR spectrum—predominantly mild-to-moderate in severity—suggests that current PCOS pharmacotherapy carries an acceptable risk-benefit profile when accompanied by structured clinical monitoring.

A positive association between elevated body mass index (BMI) and increased ADR occurrence corroborates earlier observations linking obesity to altered drug pharmacokinetics and heightened adverse event susceptibility [6]. This finding reinforces the therapeutic imperative of integrating lifestyle modification as an adjunct to pharmacological management in PCOS. Limitations of the present study include the modest sample size (n = 10) and restricted study duration, which constrain statistical generalizability of the findings.

## VIII. CONCLUSION

This prospective observational study provides clinically relevant evidence on drug utilization trends and ADR patterns in PCOS management. Metformin-based regimens, frequently combined with ovulation induction agents or hormonal contraceptives, constituted the predominant pharmacotherapeutic approach. The majority of identified ADRs were mild-to-moderate in severity, indicating an overall favorable safety profile for established PCOS pharmacotherapy when delivered under appropriate clinical supervision.

The study underscores the indispensable role of structured pharmacovigilance protocols, patient education, and concurrent lifestyle modification in optimizing therapeutic outcomes. Future research employing larger multicenter cohorts with extended follow-up durations is warranted to generate robust evidence regarding the long-term safety and comparative efficacy of various therapeutic regimens in the management of PCOS.

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