


**Tikrit Journal of Pharmaceutical Sciences**

ISSN: 1815-2716 (print) -- ISSN: 2664-231X (online)

Journal Home Page: <https://tjphs.tu.edu.iq> -- Email: tjops@tu.edu.iq**Evaluating Different Medications Used in the Treatment of Polycystic Ovarian Syndrome in Tikrit City Women****Rabei Abdullah Salih**

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<p>Keywords: Poly Cystic Ovary Syndrome, Metformin, Insulin sensitivity.</p>	<p>Abstract</p> <p>Background: One of the most common endocrine disorders that impacts reproductive-aged women is Polycystic Ovary Syndrome (PCOS). There are various pharmacological agents used to manage the condition, such as antiandrogens, aromatase inhibitors, metformin, thiazolidinediones, and ovulation-inducing medications. Such medications focus on increasing insulin sensitivity and restoring ovulatory function. The clinical characterizations of polycystic ovary syndrome include hyperandrogenism, menstrual irregularities, and polycystic ovarian morphology.</p> <p>Objectives: The objective of this research is to estimate the effectiveness of different medications on the signs and symptoms of polycystic ovary syndrome.</p> <p>Materials and Methods: From October to December 2024, a cross-sectional study was performed on 204 women in Iraq aged between 15 and 45 years to assess the therapeutic practices for PCOS. To acquire the relevant data, private gynecological consultations were held, including laboratory measurements and a questionnaire, which were analyzed using Microsoft Excel 2021.</p> <p>Results: The findings showed that the commonly-prescribed medications are Metformin (35.2%) and Diane 35 (34.8%). Furthermore, menstrual interruptions, hirsutism, and acne were the most commonly-reported symptoms. Hormonal evaluations show that there was heterogeneity between participants, especially regarding the levels of androgen and reproductive hormones. The findings are reflective of typical polycystic ovary syndrome clinical manifestations and the personalized pharmacological approaches used to manage symptoms and regulate hormones.</p> <p>Conclusions: Polycystic ovary syndrome is an intricate condition that can have different manifestations, including menstrual irregularities, obesity, acne, and hirsutism. Moreover, it can have significant metabolic and psychological implications. Despite being the most commonly administered drugs for the condition, Diane-35 and Metformin were found to impact quality of life. In turn, this highlights the need to develop treatment approaches that integrate pharmacological management with lifestyle changes in order to achieve the best possible outcomes.</p>
<p>Article history:</p> <p>-Received: 24/10/2025 -Received in revised: 27/11/2025 -Accepted: 13/12/2025 -Available online: 16/01/2026</p>	
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<p>Citation: Salih R A. Evaluating Different Medications Used in the Treatment of Polycystic Ovarian Syndrome in Tikrit City Women. Tikrit Journal of Pharmaceutical Sciences. 2025; 19(2):37-48. http://doi.org/10.25130/tjphs.2025.19.2.3.37.48</p>	

تقييم الأدوية المختلفة المستخدمة في علاج متلازمة تكيس المبايض لدى النساء في مدينة تكريت

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فرع الأدوية والسموم، كلية الصيدلة، جامعة تكريت، تكريت، العراق.

الخلاصة

تُعدّ متلازمة تكيس المبايض (PCOS) من أكثر الاضطرابات الغددية شيوعاً بين النساء في سن الإنجاب. ويُستخدم في علاجها عدد من العوامل الدوائية، من بينها الميتفورمين، ومثبطات الأروماتاز، ومضادات الأندروجين، والثيازوليدنديونات، والأدوية المحفزة للإباضة، وجميعها تهدف إلى تحسين حساسية الإنسولين واستعادة الوظيفة الإباضية الطبيعية. من الناحية السريرية، تتميز هذه المتلازمة بعدم انتظام الدورة الشهرية، وفرط الأندروجين، ووجود مظهر متعدد الكيسات في المبايض. أُجريت دراسة مقطعية على (204) امرأة عراقية تتراوح أعمارهن بين (15-45) سنة خلال الفترة من تشرين الأول إلى كانون الأول لعام 2024، بهدف تقييم الممارسات العلاجية المتبعة في معالجة متلازمة تكيس المبايض. جُمعت البيانات من خلال استشارات نسائية خاصة، وتم تحليلها باستخدام برنامج Microsoft Excel 2021. أظهرت نتائج التحليل أن دوائي Diane-35 و Metformin كانا الأكثر وصفاً بين المشاركات. وكانت الأعراض الأكثر شيوعاً هي حب الشباب، واضطرابات الدورة الشهرية، وكثرة نمو الشعر (الشعرانية). كما أظهرت التقييمات الهرمونية وجود تباين ملحوظ بين المشاركات، خصوصاً في مستويات الأندروجينات والهرمونات التناسلية. وتعكس هذه النتائج المظاهر السريرية النموذجية لمتلازمة تكيس المبايض، إضافةً إلى اختلاف النهج العلاجي الدوائي المستخدم للتحكم بالأعراض وتنظيم الهرمونات. تُعدّ متلازمة تكيس المبايض اضطراباً معقداً يرتبط بتنوع في المظاهر السريرية يشمل حب الشباب، واضطراب الدورة الشهرية، والسمنة، وكثرة الشعر، إلى جانب مضاعفات أيضية ونفسية ملحوظة. وعلى الرغم من أن دوائي ميتفورمين وديان-35 كانا الأكثر استخداماً بين النساء اللواتي شملتهن الدراسة، فإن تأثيرهما في تحسين جودة الحياة كان محدوداً. وتُبرز هذه النتائج الحاجة إلى اعتماد استراتيجيات علاجية متكاملة تجمع بين التدخلات الدوائية وتعديل نمط الحياة لتحقيق أفضل النتائج العلاجية الممكنة.

الكلمات المفتاحية: مشتقات البيكولينو هيدرازيد، مركبات حلقيّة غير متجانسة، عوامل مضادة للبكتيريا، الالتحام الجزيئي، بروتين AJ01، تصميم الأدوية القائم على البنية.

Introduction

Polycystic ovary syndrome (PCOS) is clarified as a prevalent endocrine, reproductive, metabolic, psychological and hypermetabolic situation that mainly has more than one key illustration, specifically clinical and biochemical hyperandrogenism (HA), Ovulatory dysfluency (OD) (typically expressed as menstrual irregularities or amenorrhea), with the presence of structural criteria as polycystic ovary^(1,2).

PCOS has been documented to have an average between 6-13% for females all over the world, despite estimates on its popularity fluctuating remarkably, starting from 2 to 40% subject to circumstances like ethnicity, diagnostic criteria, and the research methodology⁽³⁾. It can be difficult to make a diagnosis given the complexity and overlapping nature of symptoms⁽⁴⁾.

Describing the pathophysiology of PCOS, an issue can be expressed by irregularities in the level of insulin, growth hormone(GH), and the

luteinizing hormone/follicle-stimulating hormone (LH/FSH) ratio. Androgens and estrogens also play a critical role in the disease⁽⁵⁾.

Such endocrine changes are associated with obesity, insulin resistance, and chronic low-grade inflammation, which renders the clinical presentation even more complex⁽⁶⁾.

The first line treatment for PCOS is typically lifestyle changes (i.e., change to diet and physical activity). Nonetheless, Pharmacological therapy is critical for addressing persistent clinical issues, such as hirsutism, Acne, menstrual disruption, and ovulation. Treatment includes progestin-only contraceptives, combined oral contraceptives (COCs), ovulation induction agents (i.e., Letrozole and clomiphene citrate), and insulin sensitizers such as metformin and antiandrogen (i.e., Spironolactone)⁽⁷⁾.

Metformin has been found to be effective in lowering serum androgen levels, increasing

insulin sensitivity, inducing ovulation, and restoring menstrual regularity⁽⁸⁾.

Pharmacological drugs such as pioglitazone, clomiphene, and metformin are commonly prescribed to manage the condition, either individually or in combination, in women experiencing PCOS-related infertility. Such treatments focus on increasing insulin resistance while also promoting ovulation⁽⁷⁻⁹⁾. Initially, metformin was developed for use as an oral antihyperglycemic agent to treat type 2 diabetes mellitus (T2DM). Moreover, the US Food and Drug Administration (FDA) approved its use for diabetes management. Clinical investigations have also shown that it is effective in addressing reproductive and metabolic outcomes in PCOS sufferers, irrespective of whether they have diabetes. Weight loss is also a clinical benefit of the drug⁽¹⁰⁾.

Multiple aspects can contribute to the development of the condition, including delayed diagnosis, poor diets, insufficient awareness, sedentary lifestyle, and insufficient awareness of the condition. Performing diagnosis, adequate lifestyle modification, and applicable treatments are consequently needed successful prognosis in persons with the conditions. Additionally, new research indicates that herbal extract could reduce PCOS symptoms⁽¹¹⁾.

The principal objective of this research is to assess the evaluation of different pharmacological treatments on the signs and symptoms of polycystic ovary syndrome. This inquiry convergences on estimating the value of several drugs administered to treat PCOS, examining their efficiency to address hormonal dissymmetry and clinical outcomes.

Methods

This cross-sectional study examines the pharmacological treatment prescribed to 204 women suffering from polycystic ovary syndrome (PCOS). The research took place in Iraq's Tikrit city between October and December 2024. The sample includes 204 women aged between 15 and 45. Individuals below 15 years of age are excluded due to the

absence of signs and symptoms of PCOS, above 45 years of age are excluded due to unavailability. This sample size depends on Slovin's Formula, which estimates as: $n = N / (1 + Ne^2)$.

Structured questionnaires administered by an obstetrician and gynecologist were used to collect data. This questionnaire includes 23 questions and is valid for 90 days. Moreover, questionnaires were translated into Arabic to ensure full comprehension and accuracy. The clinical information sought included patient demographics, symptoms, administered medications, and treatment outcomes.

After collecting the data were coded, organized, and analyzed using Microsoft Excel 2021. Additionally, to summarize the percentages frequencies and distributions of medications used by participants and to assist the incidence of single-drug treatment versus combined drug approaches, descriptive statistics were employed.

Ethical Approval

This research was approved by the Scientific Research Ethics Committee of the College of Pharmacy, Tikrit University (Ref. No. SREC19/2024-04-24).

Results

In Figure 1, the distribution of PCOS cases between different age groups can be seen. The results show that most respondents were aged between 15 and 30, with a smaller number falling within the 31 to 45 age range. In turn, this shows that PCOS is most often diagnosed in adolescence and early adulthood, which aligns with the pattern identified in existing studies.

In Table 1, the different types of medication administered as well as their prevalence among PCOS sufferers can be seen. the results showed that Metformin (35.2%) and Diane-35 (34.8%) were the most commonly prescribed drugs, highlighting their importance in addressing insulin resistance and androgen-related symptoms, respectively. Other prescribed medications included Pioglitazone (13.7%), Progyluton (which is a combination hormone

medication including estradiol + norgestrel (10.3%), MFS Plus (combination for PCOS) (8.3%), and Cystomin (combination for PCOS) (6.9%). Meanwhile, less frequently prescribed drugs included Fertab (clomiphene) (4.4%), Ova-Max (combination for PCOS) (6.4%), and Forte Choline (1.5%). Some patients reported being given Dostinex (cabergoline) (0.98%), Aminor (norethisterone) (0.98%), and other agents such as Aldacton (spironolactone), Thyroxin, Claritte (cyproterone+ ethinyl-estradiol), Primolute-N, and Procreation formula (each constituting less than 1%).

These findings indicate that insulin-sensitizing drugs (metformin, pioglitazone) and hormonal regulators (Diane 35, Progyluton) are preferred treatments, which is consistent with international standards for PCOS treatment.

In Table 2, the incidence of single drug treatment is compared with combined drug treatment. The analytical findings showed that most patients (76.96%, n=157) were given a single medication, while a smaller number (23.04%, n=47) received combined drug treatment.

The most common medications administered for single-drug treatment were Metformin or Diane-35, while combination treatment typically involved the use of Diane-35 with Progyluton or other agents that simultaneously address metabolic and hormonal imbalances.

On the whole, the findings indicate a strong dependence on monotherapy. However, combination therapy was used in some cases, primarily those that require more comprehensive symptom management, and including those with androgen-related manifestations and menstrual disruptions.

Figure 2 shows the distribution of Anti-Mullerian Hormone (AMH) levels between women suffering from polycystic ovary syndrome (PCOS).

The findings showed that there are evident changes to AMH levels in the research population according to the reference range of

AMH 1.0-4.0 ng/ml. Patients with AMH levels ranging between 1.05-2.03 ng/ml and 4.97-5.95 ng/ml demonstrated the highest frequencies of such changes (approximately 50 patients). Moderate frequencies were revealed in the 2.03-3.01 ng/ml and 3.01-3.99 ng/ml ranges, constituting approximately 40 and 30 patients, respectively. On the other hand, a few respondents exhibited AMH levels between 3.99-4.97 ng/ml (only 20 and 10 patients, respectively).

As evidenced in the cumulative percentage curve, almost 90% of respondents exhibited AMH levels lower than 6.93 ng/ml, indicating that markedly elevated AMH values were uncommon according to the reference range of AMH 1.0-4.0 ng/ml.

Figure 3 shows the distribution of serum prolactin levels between women suffering from polycystic ovary syndrome (PCOS).

The findings indicate that some participants (around 70 patients) demonstrated prolactin levels between 4.3 and 9.2 ng/ml, whereas 42 individuals had levels between 14.1 and 19 ng/ml. The 23.9-28.8 ng/ml and 9.2-14.1 ng/ml groups, which included roughly 30 and 27 patients, respectively, showed moderate frequencies. Higher prolactin levels between 19 and 23.9 ng/ml (about 22 patients) and 28.8 and 33.7 ng/ml (around 13 patients) were revealed in fewer cases according to the normal level of prolactin, which is 2-30 ng/ml.

According to the cumulative percentage curve. Almost 90% of participants showed prolactin levels below 28.8ng/ml, indicating that hyperprolactinemia is somewhat uncommon in the research group.

In Figure 4, the distribution of glycated hemoglobin (HbA1c) levels in women experiencing polycystic ovary syndrome (PCOS) can be seen.

The data show that most respondents exhibited HbA1c levels within the 4.9-5.3% range, constituting around 85-patients. This was followed by 4.5-4.9% (around 36-patients) and

5.7-6.1% (approximately 29-patients). Fewer participants displayed levels in the intermediate and higher HbA1c categories: 6.1-6.5% (around 20-patients), 5.3-5.7% (about 15-patients), 6.5-6.9% (approximately 10-patients), 6.9-7.3% (around 8-patients), and 7.3-7.7% (less than 5-patients).

As can be seen in the cumulative percentage curve, almost 90% of participants exhibited HB A1C values lower than 6.5%, suggesting that most patient had normal or prediabetic glycemic levels, with just a few demonstrating poor glycemic control.

In Figure 5, the distribution of testosterone hormonal levels in the research participants is presented. The histogram shows that the distribution is skewed to the right, implying that most respondents had a load of this serum testosterone concentration. To be more precise, the highest frequency was observed in the interval (6.3-27.3) ng/dl (involving around 140 patients), reflecting the dominant group in the

research sample. In turn, this implies that most participants' testosterone levels were much lower than the anticipated physiological range according to the reference range of testosterone, which is 15-70 ng/dl.

In the subsequent categories, a significant reduction in the frequency can be seen. The second interval,(48.3-69.3)ng/dl, involved significantly fewer cases, approximately 20 to 25 patients, followed by further reduction across a higher hormonal range. Hardly any respondents were replaced in the upper categories (90.3-111.3) ng/dl and (111.3-132.3) ng/dl, implying that high testosterone levels were relatively uncommon in this research.

This is reinforced by the cumulative percentage curve, plotted alongside the histogram, The former of which and decreases steeply within the lower hormonal range, exceeding 80% of the cumulative percentage in the 1st two categories

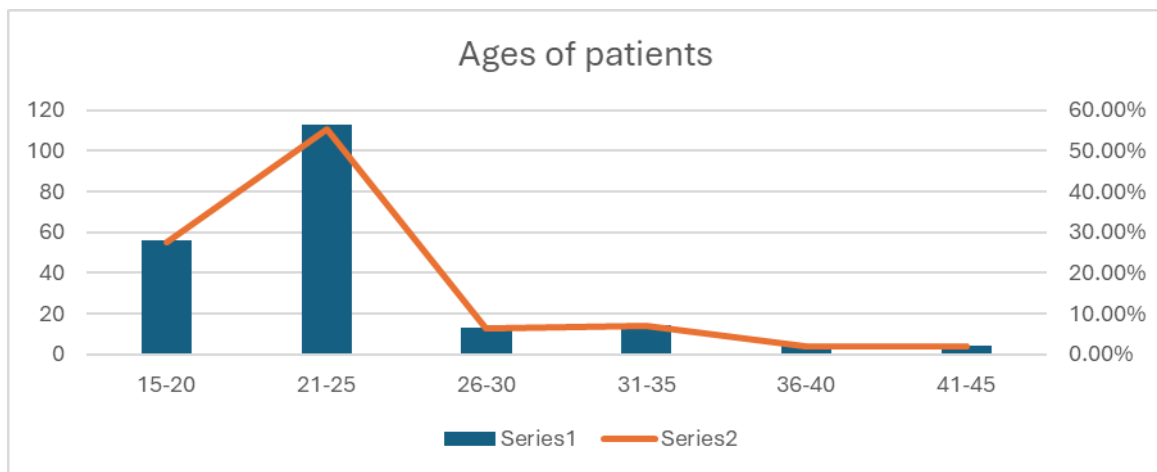


Figure 1: PCOS case distribution between different age groups.

Table 1: Prescribed Medications

Drugs	Percentage of patients	Number of patients
Diane35	34.80%	71
Metformine	35.20%	72
Cystomin	6.86%	14
Progylaton	10.29%	21
MFS plus	8.33%	17
Pioglitazon	13.73%	28
Fertab	4.41%	9
Ova_max	6.37%	13
Thyroxin 50Mg	0.50%	1
Dostinex	0.98%	2
Aldactone	0.50%	1
Procreation	0.50%	1
Cholin	0.98%	2
Forte	0.50%	1
Clairette	0.50%	1
Aminor	0.98%	2
Primlout tab	0.50%	1

Table 2: Prevalence of single-drug treatment versus combined drug treatment

Drugs	Percentage	Numbers
single drug	76.96%	157
Combinations	23.04%	47

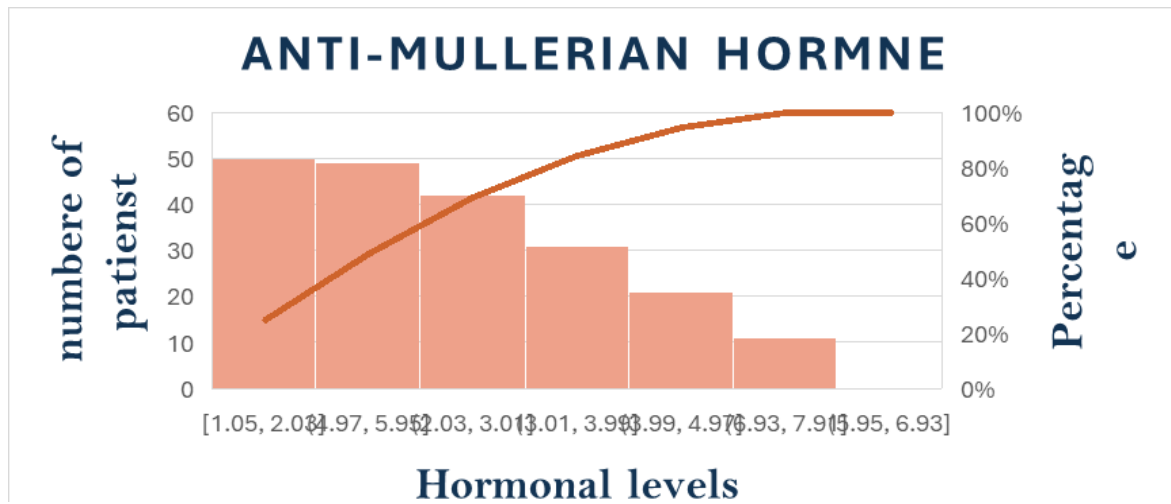


Figure 2: Differences in Anti-Müllerian Hormone (AMH) Levels Between Women with PCOS

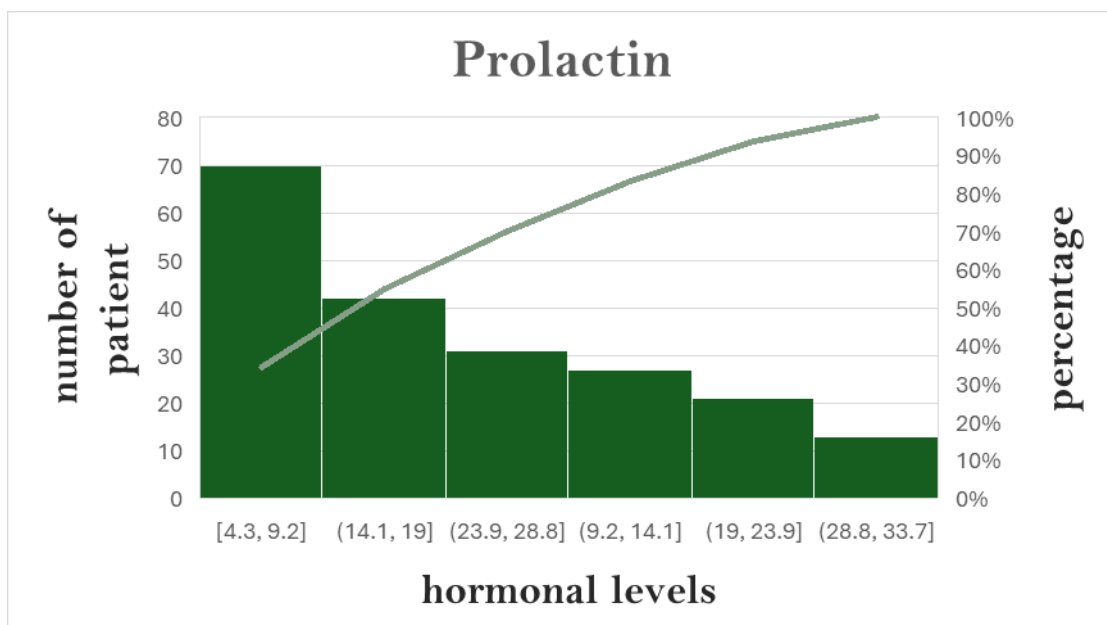


Figure 3: Differences in Prolactin Levels Between PCOS-Suffering Women.

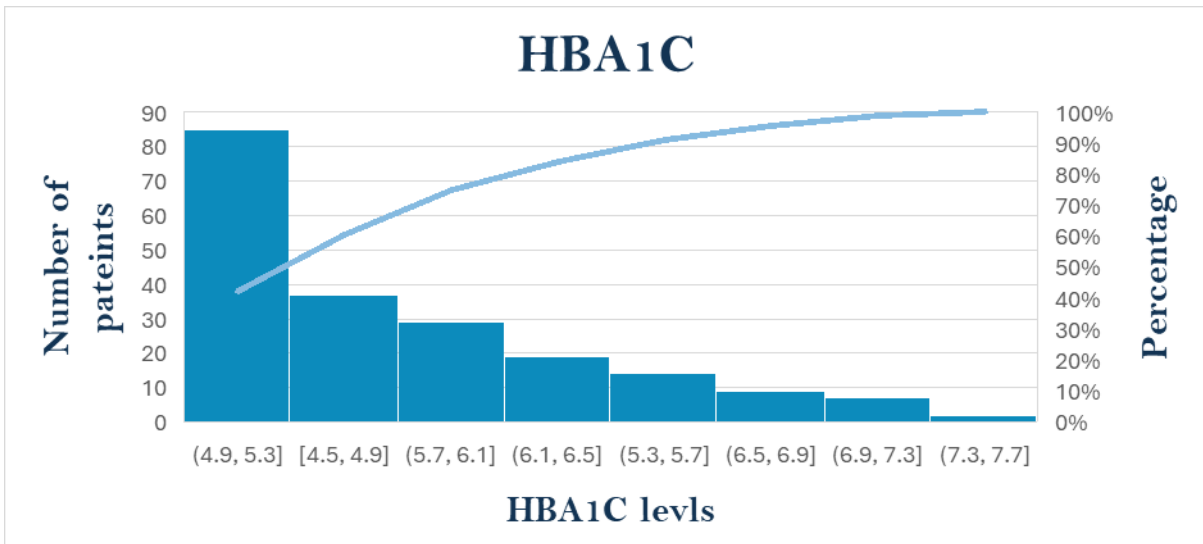


Figure 4: Variation in HbA1c Levels among PCOS Patients

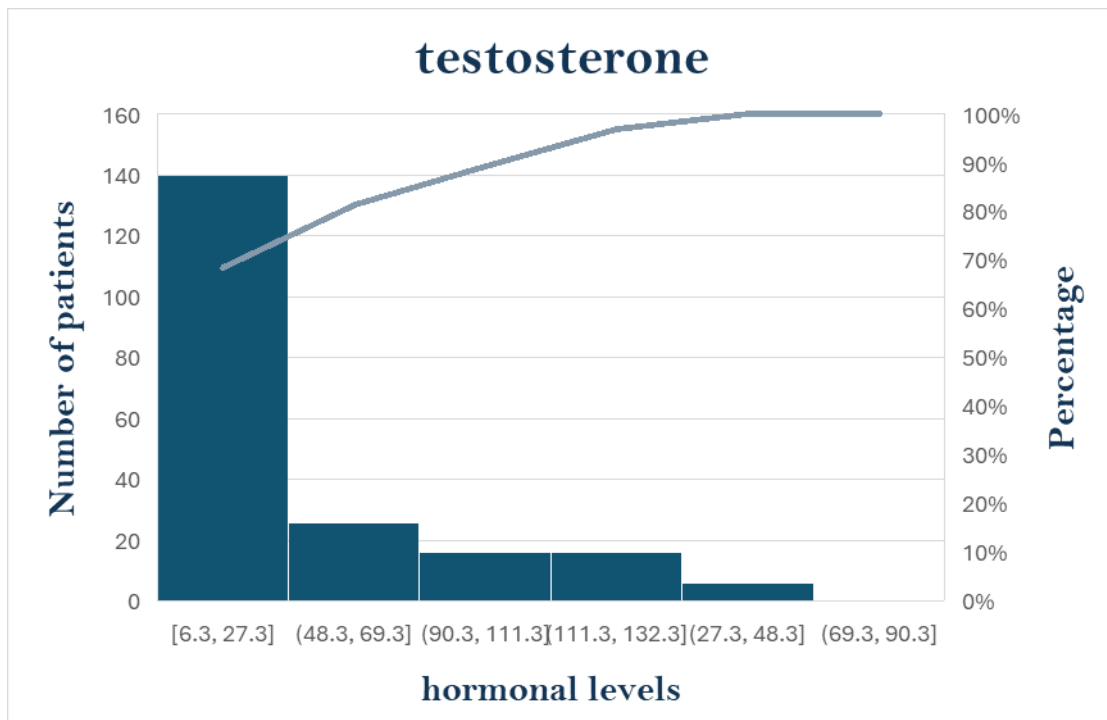


Figure 5: Distribution of Serum Testosterone Levels in Patients.

Discussion

Polycystic ovary syndrome nowadays is considered an almost public multifactorial endocrine situation which can affect females of reproductive lifetime, and it includes a different of metabolic, psychological, and reproductive anomalies. The present research offers valuable insights into common clinical procedures in PCOS management, as well as an overview of the treatment approaches employed in Tikrit, Iraq. The result underscores the importance of developing tailored treatment plans, as it indicates that a patient's clinical presentation and hormonal profile have a substantial impact on treatment choices. This is compatible with a fresh article displaying that PCOS is a heterogeneous condition that needs an individualized therapy regimen rather than a single, homogeneous disorder⁽¹²⁾. Most participants in this research were aged 15-30, and this is in line with global research, which has shown that PCOS is most often diagnosed during adolescence and early adulthood⁽¹³⁾. The condition must be diagnosed and treated early to avoid long-term complications such as infertility, cardiovascular disease, and metabolic syndrome. The symptom clustering (especially hirsutism, menstrual irregularities, and acne) reflects the characteristic clinical image portrayed in the relevant literature and demonstrates the global PCOS presentation pattern in young females. Thus, early recognition of the condition and swift interventions on the critical in preventing long-term reproductive, metabolic, and psychological issues⁽¹⁴⁾. According to the research findings, metformin(35.2%) and Diane 35 (Ethinylestradiol Cyproterone acetate) (34.8%) are the most commonly prescribed medications for PCOS. Metformin has a well-documented role in improving insulin sensitivity, restoring ovulatory cycles, and reducing hyperinsulinemia. Moreover, researchers have found that it positively influences menstrual regulation and androgen levels, especially in insulin-resistant PCOS phenotypes. This standardizes with international clinical guidelines, especially those recommended by the international PCOS network, which shine up metformin as a largely advisable treatment in overweight

females or those with metabolic monstrosities⁽¹⁵⁾. In like manner, Diane 35 is mainly administered due to hormonal change-up, and it has a conflict on the symptomatic relief of highly androgen levels. Diane 35, together with cyproterone acetate and ethinyl estradiol, is highly recommended for the management of acne, hirsutism, and menstrual irregularities. Diane 35 abolishes ovarian androgen production and depresses testosterone levels. Thus, it amplifies the cosmetic and the reproductive fractions of the situation⁽¹⁶⁾. According to an article published by Zhang *et al.* (2020), which explained similar findings, namely that Diane 35 and metformin together enhanced ovulatory transformation in a diseased person, which may be due to the automatic regulation of the glucose metabolic procedure⁽¹⁷⁾. In addition to, the research explained that pioglitazone (13.7%) and Progyluton (10.3%) are nominally given, highlighting therapeutic change toward targeting both metabolic and hormonal components. Pioglitazone is a thiazolidinedione that suppresses the sensitivity of insulin by PPAR- Gamma stimulation. It is used adjunctively and is considered a good option for patients with substantial insulin resistance, whereas many safety issues can be applicable. Meanwhile, the combined estrogen progestin drug Progyluton is primarily administered to achieve menstrual regulation, not androgen suppression, implying that doctors consider menstrual cycle control to be a significant indicator of hormonal balance and reproductive restoration⁽¹⁸⁾. In addition to MFS Plus (8.3%), Cystomin (6.9%), the remaining less common medications were mentioned in the research, reflecting the diverse pharmacological pathways utilized. Their administration illustrates an increasing possession in complementary or integrative approaches in PCOS regimen treatment line, although the clinical efficacy is not as clear, particularly in areas with varied patient responses to conventional treatment⁽¹⁹⁾. The advantage of a single-drug approach treatment (76.9%) against combination treatment (23.1%) was also emphasized in this study, advising that most physicians preferred single-drug treatment (usually metformin or

Diane 35). Nonetheless, the article signifies that combined drug treatment (e.g., Metformin with oral contraceptives) is more efficient in the therapy of the multifaceted nature of PCOS, particularly in long-suffering persons who have both metabolic and reproductive issues. For instance, research from the Journal of Clinical Endocrinology and Metabolism (2020) shows that dual-drug treatments may lead to better outcomes in terms of androgen reduction, ovulation induction, and menstrual regularity ⁽²⁰⁾. The management of PCOS is based on three principal ingredients, which can be summarized as patient symptom hardness, metabolic outline, and hormonal level situation. It is not advised to adopt a one-size-fits-all all approach given the intricate relationship between environmental, genetic, and lifestyle factors. Additionally, despite pharmacotherapy being critical for relieving symptoms, lifestyle changes (i.e., Weight control, regular exercise, and healthy diets) are also vital in ensuring long-term treatment success. In the same time, drugs in this article are principally possible for eradicating many conditions; many sufferers exhibited little to sensible improvements in their quality of life ⁽²¹⁾.

Conclusion

In comparison to other research, there is a quite connection according to the apparent results in the study that pharmacological treatment is not the sole solving issue for treating emotional and psychological aspects of PCOS (e.g., depression, anxiety, and body overweight). In the last, some boundaries could be highlighted in future suggestion projects, like the study of various drug effectiveness and their outcomes, fertility and its implications, and possible metabolic adverse effects. Furthermore, examining herbal and nutraceutical alternatives could be beneficial in identifying promising adjunctive options for patients who prefer more holistic approaches ⁽¹⁸⁾.

The Tikrit City data are mainly compatible with the global PCOS management regimen; likewise, they indicate a critical need for an

interdisciplinary framework that fuses pharmacotherapy, lifestyle intervention, and psychosocial components to yield more durable management outcomes.

Alongside this study, the main limitations can be enumerated as the sample size was relatively small and limited according to women from Tikrit city, which may restrict the generalizability of the findings. Additionally, the study relied on available medical records and patient self-reporting, which may introduce reporting bias. Differences in treatment duration and patient adherence were not fully controlled and could have influenced the outcomes.

Limitations

This study has certain limitations. The cross-sectional designs preclude causal and fairness between pharmacological intervention and the clinical outcomes in PCOS patients. The symbol was confined to women from a single city, which may limit the external validity of the findings. Furthermore, reliance on self-reported data and medical records may introduce recall and reporting bias. Variation in the treatment duration and patient adherence we're not fully controlled. Future multi center, longitudinal studies with the standardized treatment protocols are warranted to confirm these findings.

Acknowledgment

The author gratefully acknowledged the cooperation of the medical staff and gynecologists involved in data collection, as well as the participants for their valuable contributions. Appreciation is also extended to the College of Pharmacy, University of Tikrit for providing academic and institutional support.

Conflict of Interest

The author declares that there is no conflict of interest regarding the publication of this article.

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