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ORIGINAL: The Incidence of PCOS among Infertile Females at a Fertility Clinic in Sari during the Period of 2019-2020

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ABSTRACT

Introduction: PCOS is a common endocrine disorder affecting women, contributing to global infertility cases. It manifests with diverse clinical presentations and potential complications. Factors such as oxidative stress and hormonal imbalances contribute to its etiology. PCOS is associated with increased risks of infertility, cancer, and pregnancy complications. Timely identification and intervention are crucial for effectively managing its complications.

Material and Methods: This study assessed the prevalence of polycystic ovary syndrome among infertile women in Iran. Data were gathered from women aged 15-45 attending the Hazrat Maryam Infertility Center in Sari. The study aimed to provide valuable insights into PCOS prevalence and improve management strategies for PCOS-related infertility.

Results: The average age of infertile women with PCOS is 29.7 years, with a height ranging from 155 to 170 cm. They have a mean weight of 61.79 kg, predominantly falling in the 70-80 kg range. The majority are obese or overweight. Most experience primary infertility and have irregular menstrual cycles. Hirsutism, including facial and chest hair growth, is common among these women. Average follicular reserve values for the left and right ovary are 2.104 and 2.020 follicles, respectively. These findings emphasize the necessity for personalized treatment approaches for PCOS-related infertility.

Conclusion: The study of 171 infertile women with PCOS found a high prevalence in the 25-35 age range and high BMI. Primary infertility, irregular menstruation, and hirsutism are common symptoms. Early diagnosis and intervention are crucial for improved fertility outcomes. Overweight and obesity are prevalent in PCOS patients.

Introduction

Polycystic ovary syndrome (PCOS) is a prevalent endocrine disorder affecting women of reproductive age, characterized by chronic anovulation, hyperandrogenism, and the presence of polycystic ovaries on ultrasound. PCOS is a primary cause of infertility, accounting for around 35% of cases globally (1). The syndrome presents with various clinical manifestations such as menstrual irregularities

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(including amenorrhea and oligomenorrhea), excessive hair growth (hirsutism), and metabolic disturbances (2). Studies conducted in Iran have reported a prevalence range of 7.1% to 14.6% for PCOS (3-5). Throughout a woman's life, PCOS significantly affects her well-being. Manifestations during adolescence include amenorrhea, hirsutism, obesity, and acne. As the most common endocrine disorder in females, PCOS plays a crucial role in infertility due to its disruptive impact on ovulation. Individuals with PCOS commonly seek medical assistance to address issues related to menstrual irregularities, hyperandrogenism, and difficulties in conceiving (6). PCOS affects 5-10% of the global female population and is characterized by hyperandrogenism, chronic anovulation, polycystic ovaries on ultrasound, and frequently co-existing insulin resistance and obesity (7-9). This syndrome imposes a significant health burden, potentially leading to complications such as depression, decreased self-esteem, anxiety, and metabolic disorders like glucose intolerance, type 2 diabetes, dyslipidemia, and hypertension. Moreover, PCOS is linked to heightened risks of infertility, endometrial cancer, and delayed menopause (10,11). The diagnosis of PCOS is established based on the Rotterdam criteria, requiring fulfillment of at least two out of three criteria: oligo- or anovulation, clinical or biochemical signs of hyperandrogenism, and ultrasound evidence of polycystic ovaries. As the primary cause of ovulatory dysfunction, PCOS impacts approximately 4-6% of women globally (12-14). The precise etiology of PCOS remains uncertain, with factors such as oxidative stress, chronic low-grade inflammation, endothelial dysfunction, hormonal imbalances, and elevated luteinizing hormone (LH) levels contributing to its development. Additionally, zinc deficiency may play a role (15-17). Insulin also stimulates androgen secretion in the ovaries, disrupts follicular maturation, and ultimately leads to a hormonal imbalance characterized by hyperestrogenism and hyperandrogenism (18). PCOS is linked to various pregnancy complications, including higher rates of preterm labor, gestational diabetes, and gestational hypertension. Pregnant individuals with a history of PCOS face an increased risk of developing gestational diabetes, preeclampsia, and hypertension, potentially necessitating additional monitoring and management strategies (19-21). Therapeutic strategies for PCOS encompass non-surgical interventions such as weight management, anti-androgenic medications, ovulation induction therapy, and insulin resistance management (22). Surgical options like ovarian surgery and wedge resection may be considered in specific cases, particularly those with elevated LH levels, to enhance fertility outcomes (23,24). PCOS represents a prevalent and intricate endocrine disorder with substantial health and reproductive implications for women. Early detection and appropriate intervention are vital for effectively managing PCOS and its associated complications (25,26). Extensive research has explored the prevalence of PCOS across various populations, revealing a wide range of estimates fluctuating between 12.1% and 55%. This variability underscores the potential impact of factors like ethnicity, diagnostic criteria, and study design on reported prevalence figures. Despite the fluctuations, a consistent observation is the significant prevalence of PCOS, emphasizing the critical importance of timely identification and intervention (27-36). This study seeks to ascertain the prevalence of PCOS among infertile women in Sari, Iran, aiming to offer valuable insights for developing strategies to address PCOS and its consequences in this population.

Methods

Study Design and Participant Selection Criteria

This cross-sectional study aimed to evaluate the prevalence of polycystic ovary syndrome (PCOS) among infertile women seeking treatment at the Hazrat Maryam Infertility Center in Sari, Iran. The study was conducted from late 2019 to early 2020. Adherence to ethical guidelines, including obtaining informed consent, was strictly observed

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throughout the study. Data collection involved using a checklist developed by the researcher to compile demographic information, infertility history, and PCOS diagnostic criteria, which included clinical manifestations, hormonal levels, and ultrasound results. Inclusion criteria targeted women aged 15 to 45 years, the age group most susceptible to PCOS-related infertility. Exclusion criteria aimed to minimize potential confounding factors from conditions such as thyroid disorders, hyperprolactinemia, hypogonadotropic hypogonadism, and non-classic congenital adrenal hyperplasia. Through rigorous participant selection, this study aimed to provide valuable insights into PCOS prevalence among infertile individuals in this specific setting, thereby enhancing understanding and management approaches for PCOS-related infertility.

Data Collection and Analysis

This pilot study aimed to explore the correlation between hirsutism and ovarian function in women experiencing infertility. Data were collected using a researcher-developed checklist comprising four sections:

1. **Collection of Demographic Data:**

This section focused on obtaining fundamental demographic details such as age, weight, height, body mass index (BMI), and details of infertility.

2. **Menstrual Cycle Details:**

Information regarding menstrual regularity, cycle length, and duration of menstruation was documented.

3. **Assessment of Hirsutism:**

This section evaluated the presence and distribution of excessive hair growth in specific areas such as the chin, chest, inner thighs, mid-abdomen, and below the navel. A scoring mechanism was employed to quantify the severity of hirsutism.

4. **Evaluation of Ovarian Function:**

This component recorded the assessment of follicular reserve within the ovaries.

Data collected were entered into SPSS software version 16 for analysis. Descriptive statistical methods, including frequencies, percentages, means, and standard deviations, were utilized to summarize the data.

Results

Examination of Research Hypotheses

Age Distribution and PCOS

The average age of infertile females diagnosed with Polycystic Ovary Syndrome (PCOS) was 29.7 years with a standard deviation of 3.54. Their ages ranged from 21 to 41 years. Within the group of individuals affected by PCOS, the distribution of ages was delineated as follows: 12.8% (n = 22) were situated within the 20-25 year age bracket, 46.8% (n = 80) fell between the ages of 25 and 30, 32.2% (n = 55) were in the 30-35 year range, 7.6% (n = 13) pertained to the 35-40 year age category, and 0.6% (n = 1) were above the age of 40 (Table 1).

Height Distribution and PCOS

The mean stature of infertile women who had been diagnosed with PCOS was 161.7 cm, with a standard deviation of 2.77. Heights varied from 155 cm to 170 cm. The breakdown of heights among the subjects afflicted with PCOS was elucidated as follows: 0.6% (n = 1) were within the 150-155 cm range, 36.3% (n = 62) were found between 155 and 160 cm, 57.3% (n = 98) belonged to the 160-165 cm cohort, and 5.8% (n = 10) were taller than 165 cm (Table 2).

Table 1. The prevalence of polycystic ovary syndrome (PCOS) among infertile women by age.

Age Group	Frequency	Frequency Percentage
20 to 25 years	22	12.8%
25 to 30 years	80	46.8%
30 to 35 years	55	32.2%
35 to 40 years	13	7.6%
Over 40 years	1	0.6%
Total	171	100%
Mean ± SD	Minimum Age	Maximum Age
3.537 ± 29.66	21	41

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Table 2. The frequency of Polycystic Ovary Syndrome among infertile women by height.

Height Category	Frequency	Frequency Percentage
150 to 155 cm	1	0.6%
155 to 160 cm	62	36/3%
160 to 165 cm	98	57/3%
Above 165 cm	10	5/8%
Total	171	100
Mean ± SD	**Minimum**	**Maximum**
2.769 ± 161.70 cm	155	170

Weight Distribution and PCOS

The average weight of infertile individuals diagnosed with polycystic ovary syndrome (PCOS) was recorded at 61.79 Kg with a standard deviation of ± 9.86. Weight varied from 47 Kg to 98 Kg. The distribution of weight among subjects with PCOS was categorized as follows: 0.6% (n = 1) had a weight below 50 Kg, 2.3% (n = 4) fell within the 50-60 kg range, 16.4% (n = 28) belonged to the 60-70 Kg category, 38.46% (n = 66) weighed between 70 and 80 Kg, 19.3% (n = 33) were in the 80-90 Kg group, and 28.3% (n = 39) had a weight exceeding 90 Kg. Notably, the highest proportion of weight (38.46%) was observed among females with PCOS in the 70-80 Kg range (Table 3).

Body Mass Index (BMI) and PCOS

The mean Body Mass Index (BMI) of infertile women diagnosed with PCOS was calculated to be 30.43 with a standard deviation of ± 3.51. BMI ranged from 18.59 to 38.05. The distribution of BMI among participants with PCOS was delineated as follows: 5.8% (n = 10) were classified as having a normal weight (BMI < 25 kg/m²), 38.0% (n = 65) were categorized as overweight (BMI 25-29.9 kg/m²), 46.8% (n = 80) were identified with obesity class 1 (BMI 30-34.9 kg/m²), and 9.4% (n = 16) were classified under obesity class 2 (BMI ≥ 35 kg/m²) (Table 4). These results indicate a tendency towards elevated BMI levels among infertile women with PCOS.

Table 3. Prevalence of Polycystic Ovary Syndrome (PCOS) Among Infertile Women Based on Weight.

Weight Category	Frequency	Frequency Percentage
Less than 50 kg	1	0.6
50 to 60 kg	4	2.3
60 to 70 kg	۲۸	16.4
70 to 80 kg	66	38.46
80 to 90 kg	33	19.3
More than 90 kg	39	28.3
Total	171	100
Mean ± SD	**Minimum Weight**	**Maximum Weight**
9.862 ± 61.79	47 kg	98 kg

Table 4. Frequency of polycystic ovary syndrome among barren women according to body mass index

Body Mass Index (BMI) Category	Definition	Frequency	Frequency Percentage
18.5 – 25	Normal	10	5.8%
25 – 30	Overweight	65	38.0%
30 – 35	Obesity Type 1	80	46.8%
35 and above	Obesity Type 2	16	9.4%
Total		171	100
Mean ± SD		**Minimum**	**Maximum**
3.514 ± 30.425		18.59	38.05

Table 5. Prevalence of Polycystic Ovary Syndrome (PCOS) Among Infertile Women Based on Type of Infertility and Menstrual Cycle Regularity

Type of Infertility	Frequency	Frequency Percentage	Menstrual Cycle Regularity	Frequency	Frequency Percentage
Primary	111	64.9%	Regular	50	29.2%
Secondary	60	35.1%	Irregular	121	70.8%
Total	171	100%	Total	171	100%

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PCOS Prevalence in Infertile Women by Type of Infertility and Menstrual Cycle Regularity

PCOS and Infertility Subtypes

The prevalence of Polycystic Ovary Syndrome (PCOS) was evaluated based on the type of infertility. Within the cohort of infertile women diagnosed with PCOS, 64.9% (n = 111) exhibited primary infertility, while 35.1% (n = 60) manifested secondary infertility (Table 5). This observation hints at a plausible association between PCOS and a heightened incidence of primary infertility within this infertile demographic.

PCOS And Menstrual Cycle Regularity

The relationship between Polycystic Ovary Syndrome (PCOS) and the regularity of menstrual cycles was also scrutinized. Among the PCOS cohort, 29.2% (n = 50) reported having regular menstrual cycles, whereas 70.8% (n = 121) encountered irregular cycles (Table 5). These data signify a substantial correlation between PCOS and irregular menstrual cycles in the population under study.

PCOS Prevalence in Infertile Women by Cycle Length and Bleeding Duration

PCOS and Menstrual Cycle Length

Irregular menstrual patterns are a key characteristic of PCOS, and this research aims to outline the menstrual cycle features in infertile women with PCOS seeking treatment at the Hazrat Maryam Infertility Center. An analysis of medical records of infertile women diagnosed with PCOS was carried out. Menstrual cycle length data were collected and classified into three categories: less than 21 days, 21 to 35 days, and over 35 days. Descriptive statistics were employed to summarize the distribution of cycle length. The average cycle length in this group was 12.656±39 days, ranging from 20 to 90 days. The majority of women (8.39%) had cycles longer than 35 days, indicating oligomenorrhea. A small percentage (0.59%) fell within the normal range (21-35 days), and a low prevalence (2.1%) was seen in cycles shorter than 21 days (polymenorrhea). The results highlight a significant burden of irregular menstrual cycles in infertile women with PCOS at the Hazrat Maryam Infertility Center, with oligomenorrhea being the predominant pattern.

Bleeding Duration Characteristics in Infertile Women with PCOS

The characteristics of bleeding duration in infertile women with PCOS at the Hazrat Maryam Infertility Center were also investigated. This study involved a retrospective analysis of medical records of infertile women diagnosed with PCOS to examine bleeding duration patterns. The data were categorized into less than 2 days, 2 to 7 days, and over 7 days (considered menorrhagia). The average bleeding duration in this cohort was 1.330±5.69 days, ranging from 1 to 9 days. A notable percentage of women (8.8%) experienced bleeding lasting more than 7 days, suggestive of potential menorrhagia. A minority (0.90%) had bleeding durations within the typical range (2-7 days), and a low prevalence (2.1%) was observed for durations shorter than 2 days. The findings indicate a significant variation in bleeding duration among infertile women with PCOS at the Hazrat Maryam Infertility Center, with prolonged bleeding potentially linked to PCOS.

High Prevalence of Regular Menstrual Cycles in Infertile Women with PCOS

Oligomenorrhea and amenorrhea are typical symptoms affecting fertility in women with PCOS. This research explores the distribution of these menstrual irregularities in infertile women with PCOS at the Hazrat Maryam Infertility Center. An unexpected outcome was revealed from the review of medical records. Contrary to expectations, a substantial portion (52.26%) of infertile women with PCOS did not exhibit oligomenorrhea, while 47.4% did report experiencing it. Likewise, the majority (86.5%) did not have amenorrhea, with only 13.5% presenting with this condition. These results demonstrate a high prevalence of regular menstrual cycles in infertile women

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with PCOS at the Hazrat Maryam Infertility Center, underscoring the diversity in menstrual patterns among this population.

Hirsutism Distribution among Infertile Women with PCOS

Hirsutism, characterized by excessive hair growth in typical male-pattern regions, represents a prevalent manifestation of Polycystic Ovary Syndrome (PCOS). The present investigation scrutinizes the prevalence of hirsutism among infertile females diagnosed with PCOS at the esteemed Hazrat Maryam Infertility Center. A comprehensive retrospective analysis of medical documents unveiled a distinctive distribution pattern of hirsutism. Within the cohort of infertile women afflicted with PCOS, 53.80% exhibited hirsutism in the submental area, indicative of facial hair proliferation. Similarly, 46.20% encountered hirsutism in the mid-chest region, implying hair development on the chest. Furthermore, 53.22% displayed hirsutism in the inner thigh zone, while 36.26% and 23.93% demonstrated hirsutism in the mid-abdominal and infraumbilical areas, respectively. These outcomes underscore the variability in hirsutism distribution among infertile women affected by PCOS at the Hazrat Maryam Infertility Center. Although facial and chest hair growth prevailed, the occurrence of hirsutism in other regions exhibited notable disparities.

Follicular Reserve Distribution in Infertile Women with PCOS

Follicular reserve, denoting the quantity of antral follicles within the ovaries, serves as a pivotal marker of ovarian functionality. The current study delves into the distribution of follicular reserve among infertile women diagnosed with PCOS at the prestigious Hazrat Maryam Infertility Center. Scrutiny of medical archives unveiled a diverse spectrum of follicular reserve values. The mean values for left and right ovarian reserves stood at 2.104 ± 22.45 and 2.020 ± 21.82 follicles, respectively. Noteworthy is the observation that the minimum follicular reserve recorded was 15 follicles in both the left and right ovaries, while the maximum tallied 35 follicles (left) and 32 follicles (right). Intriguingly, the distribution of follicular reserve exhibited a clustering within a specific range. Roughly 88.3% of individuals showcased a left follicular reserve falling between 20 and 25 follicles, with 79.0% displaying a right follicular reserve within the same interval. These findings intimate a plausible concentration of follicular reserve within a specific range among infertile women grappling with PCOS at the Hazrat Maryam Infertility Center. Nevertheless, the considerable standard deviation accentuates the marked variability witnessed in this demographic.

Discussion

Polycystic Ovary Syndrome (PCOS) is a significant cause of infertility, characterized by anovulation, hyperandrogenism, and the presence of polycystic ovarian morphology. Clinical presentations include irregular menstrual cycles, hirsutism, and acne (1-3, 37-39). The prevalence of PCOS varies among different demographic groups and based on diagnostic criteria (6-26%) (3-5). It stands out as the most prevalent endocrine disorder among females and a primary cause of infertility, marked by dysfunctional ovulation, hyperandrogenism, and polycystic ovarian morphology. Irregular menstruation and clinical signs of hyperandrogenism, such as hirsutism and acne, are commonly observed in females with PCOS, imposing substantial health and economic burdens. A research effort was undertaken in Sari to determine the occurrence of PCOS and provide essential insights for strategic planning. A retrospective analysis was conducted on the medical records of 171 infertile females diagnosed with PCOS at the Hazrat Maryam Infertility Center. The average age of infertile females with PCOS was 29.66 years (range: 21-41 years), with the majority (80.4%) falling within the 25-35 year age bracket (40,41). The study also examined the body mass index (BMI) of females with PCOS, revealing a mean BMI of 30.425, indicating that a significant

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proportion were overweight or obese. This finding aligns with previous studies showing an association between PCOS and weight gain. Research has highlighted that excess weight and obesity increase the risk of PCOS in adolescents (42). Primary infertility was diagnosed in 64.9% of females, while 35.1% experienced secondary infertility. Primary infertility refers to females who have not previously given birth, whereas secondary infertility pertains to those who have had children but encounter challenges conceiving again. The high incidence of primary infertility in this study corroborates findings from other research (7-9, 30). The study also assessed menstrual bleeding patterns and cycle duration among females with PCOS. The average duration of menstrual bleeding was 5.69 days, with the majority of females experiencing bleeding within the typical 2-7 day timeframe. The average cycle length was 39 days, with over 70.8% of females having cycles longer than 35 days, indicative of oligomenorrhea (30). Hirsutism was prevalent, affecting various body regions including the submental area, chest, inner thighs, mid-abdomen, and subumbilical region. Ovarian ultrasound assessment of follicular reserve revealed an average of 20-25 follicles in both ovaries, consistent with the multifollicular ovaries often seen in PCOS.

This study confirms PCOS as a prevalent contributor to female infertility, with an estimated prevalence in our study cohort ranging from 7.1% to 14.6%, depending on the diagnostic criteria used. The findings are consistent with established associations between PCOS and hormonal imbalances, enlarged ovaries, and symptoms such as irregular menstruation and hirsutism. Importantly, the study identified a higher frequency of primary infertility, overweight/obesity, and irregular menstrual cycles. Timely detection and intervention are crucial for managing PCOS and improving fertility outcomes (43).

Conclusion

This study explored the relationship between Polycystic Ovary Syndrome (PCOS) and various health indicators. It revealed a high prevalence of overweight and Class 1 obesity among participants, with primary infertility emerging as a predominant issue in this cohort. Although occurrences of oligo-menorrhea and amenorrhea were relatively low, irregular menstrual patterns were prevalent. Additionally, a majority of participants exhibited extended menstrual cycle lengths exceeding one month. Hirsutism primarily manifested in the submental region and inner thighs. Interestingly, the mean follicular reserve in the left ovary was slightly higher than in the right. These findings underscore the significant impact of PCOS on body weight, menstrual regularity, and hirsutism. Early detection and effective management strategies are crucial to mitigate the resulting health and economic implications.

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Conflicts of interest

The authors declare no conflict of interest.

Authors' contributions

All authors were involved in the conception and design, analysis and interpretation of the data, drafting of the manuscript and revising it critically for intellectual content, approved the final version for submission, and agreed to be accountable for all aspects of the work.

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References

1. Neven AC, Laven J, Teede HJ, Boyle JA. A summary on polycystic ovary syndrome: diagnostic criteria, prevalence, clinical manifestations, and management according to the latest international guidelines.

[Downloaded from tbsrj.mazums.ac.ir on 2025-06-08]

[DOI: 10.22034/6.1.44]

Semin Reprod Med. 2018;36(1):5-12.
2. Alchami A, O'Donovan O, Davies M. PCOS: diagnosis and management of related infertility. Obstet Gynaecol Reprod Med. 2015;25(10):279-82.
3. Salari N, Nankali A, Ghanbari A, Jafarpour S, Ghasemi H, Dokaneheifard S, Mohammadi M. Global prevalence of polycystic ovary syndrome in women worldwide: a comprehensive systematic review and meta-analysis. Archives of Gynecology and Obstetrics. 2024 Jun 26:1-2.
4. Wolf W, Wattick R, Kinkade O, Olfert M. Geographical prevalence of polycystic ovary syndrome as determined by region and race/ethnicity. Int J Environ Res Public Health. 2018;15(11):2589.
5. Musmar S, Afaneh A, Mo'alla H. Epidemiology of polycystic ovary syndrome: a cross sectional study of university students at An-Najah national university-Palestine. Reprod Biol Endocrinol. 2013;11:47.
6. Yilmaz B, Vellanki P, Ata B, Yildiz BO. Metabolic syndrome, hypertension, and hyperlipidemia in mothers, fathers, sisters, and brothers of women with polycystic ovary syndrome: a systematic review and meta-analysis. Fertil Steril. 2018;109(2):356-64.
7. Le MT, Nguyen VQ, Truong QV, Le DD, Le VN, Cao NT. Metabolic syndrome and insulin resistance syndrome among infertile women with polycystic ovary syndrome: a cross-sectional study from Central Vietnam. Endocrinol Metab. 2018;33(4):447.
8. Al-Jefout M, Alnawaiseh N, Al-Qtaitat A. Insulin resistance and obesity among infertile women with different polycystic ovary syndrome phenotypes. Sci Rep. 2017;7(1):1.
9. Zhao J, Liu S, Wang Y, Wang P, Qu D, Liu M, Ma W, Li Y. Vitamin D improves in-vitro fertilization outcomes in infertile women with polycystic ovary syndrome and insulin resistance. Minerva Med. 2019;110(3):199-208.
10. Deniz A, Kehribar DY. Evaluation of sexual functions in infertile Women with Polycystic Ovary Syndrome. Niger J Clin Pract. 2020;23(11):1548-54.
11. Huang S, Du X, Wang R, Li R, Wang H, Luo L, O'Leary S, Qiao J, Mol BW. Ovulation induction and intrauterine insemination in infertile women with polycystic ovary syndrome: A comparison of drugs. Eur J Obstet Gynecol Reprod Biol. 2018;231:117-21.
12. Dastorani M, Aghadavod E, Mirhosseini N, Foroozanfard F, Modarres SZ, Siavashani MA, Asemi Z. The effects of vitamin D supplementation on metabolic profiles and gene expression of insulin and lipid metabolism in infertile polycystic ovary syndrome candidates for in vitro fertilization. Reprod Biol Endocrinol. 2018;16(1):1-7.
13. Chitme HR, Al Azawi EA, Al Abri AM, Al Busaidi BM, Salam ZK, Al Taie MM, Al Harbo SK. Anthropometric and body composition analysis of infertile women with polycystic ovary syndrome. J Taibah Univ Med Sci. 2017;12(2):139-45.
14. Zhou W, Fang F, Zhu W, Chen ZJ, Du Y, Zhang J. Bisphenol A and ovarian reserve among infertile women with polycystic ovarian syndrome. Int J Environ Res Public Health. 2017;14(1):18.
15. Shaaban Z, Khoradmehr A, Shirazi MR, Tamadon A. Pathophysiological mechanisms of gonadotropins–and steroid hormones–related genes in etiology of polycystic ovary syndrome. Iran J Basic Med Sci. 2019;22(1):3.
16. American College of Obstetricians and Gynecologists. ACOG practice bulletin No. 194: polycystic ovary syndrome. Obstet Gynecol. 2018;131(6):e157-71.
17. Barber TM, Franks S. Genetic and environmental factors in the etiology of polycystic ovary syndrome. In: Strauss JF, Barbieri RL, editors. InThe Ovary. Academic Press. 2019: 437-59.
18. Dahan MH, Reaven G. Relationship among obesity, insulin resistance, and hyperinsulinemia in the polycystic ovary syndrome. Endocrine. 2019;64(3):685-9.
19. Faghfoori Z, Fazelian S, Shadnoush M, Goodarzi R. Nutritional management in women with polycystic ovary syndrome: A review study. Diabetes Metab Syndr. 2017;11(32):8429-33.
20. Witchel SF, Oberfield SE, Peña AS.

[Downloaded from tbsrj.mazums.ac.ir on 2025-06-08]

[DOI: 10.22034/6.1.44]

Polycystic ovary syndrome: pathophysiology, presentation, and treatment with emphasis on adolescent girls. J Endocr Soc. 2019;3(8):1545-73.
21. Peña AS, Witchel SF, Hoeger KM, Oberfield SE, Vogiatzi MG, Misso M, Garad R, Dabadghao P, Teede H. Adolescent polycystic ovary syndrome according to the international evidence-based guideline. BMC Med. 2020;11(32):754-63.
22. Gorsic LK, Dapas M, Legro RS, Hayes MG, Urbanek M. Functional genetic variation in the anti-Müllerian hormone pathway in women with polycystic ovary syndrome. J Clin Endocrinol Metab. 2019;104(7):2855-74.
23. Bordewijk EM, Ng KY, Rakic L, Mol BW, Brown J, Crawford TJ, van Wely M. Laparoscopic ovarian drilling for ovulation induction in women with anovulatory polycystic ovary syndrome. Cochrane Database Syst Rev. 2020;(2):CD001122.
24. Hashim HA, Foda O, El Rakhawy M. Unilateral or bilateral laparoscopic ovarian drilling in polycystic ovary syndrome: a meta-analysis of randomized trials. Arch Gynecol Obstet. 2018;297(4):859-70.
25. Turgut GD, Mulayim B, Karadag C, Karadag B, Tatar SA, Yuksel BA. Comparison of the effects of bilateral and unilateral laparoscopic ovarian drilling on pregnancy rates in infertile patients with polycystic ovary syndrome. J Obstet Gynaecol Res. 2021;47(2):778-84.
26. Mogili KD, Karuppusami R, Thomas S, Chandy A, Kamath MS, Aleyamma TK. Prevalence of vitamin D deficiency in infertile women with polycystic ovarian syndrome and its association with metabolic syndrome–A prospective observational study. Eur J Obstet Gynecol Reprod Biol. 2018;229:15-9.
27. Akpata CB, Uadia PO, Okonofua FE. Prevalence of Polycystic Ovary Syndrome in Nigerian Women with Infertility: A Prospective Study of the Three Assessment Criteria. Open J Obstet Gynecol. 2018;8(12):1109.
28. Jalilian A, Kiani F, Sayehmiri F, Sayehmiri K, Khodaee Z, Akbari M. Prevalence of polycystic ovary syndrome and its associated complications in Iranian women: A meta-analysis. Iran J Reprod Med. 2015;13(10):591.
29. Dargham SR, Ahmed L, Kilpatrick ES, Atkin SL. The prevalence and metabolic characteristics of polycystic ovary syndrome in the Qatari population. PLoS One. 2017;12(7):e0181467.
30. West S, Lashen H, Bloigu A, Franks S, Puukka K, Ruokonen A, Järvelin MR, Tapanainen JS, Morin-Papunen L. Irregular menstruation and hyperandrogenaemia in adolescence are associated with polycystic ovary syndrome and infertility in later life: Northern Finland Birth Cohort 1986 study. Hum Reprod. 2014;29(10):2339-51.
31. Baqai Z, Khanam M, Parveen S. Prevalence of Pcos In Infertile Patients. Med Channel. 2010;16(3).
32. Zafar U, Memon Z, Moin K, Agha S, Hassan JA, Zehra D. Prevalence of PCOS with associated symptoms and complications at Tertiary Care Hospital of Karachi. J Adv Med Med Res. 2019:1-9.
33. Hussein B, Alalaf S. Prevalence and characteristics of polycystic ovarian syndrome in a sample of infertile Kurdish women attending IVF infertility center in maternity teaching hospital of Erbil City. Open J Obstet Gynecol. 2013;2013.
34. Joham AE, Teede HJ, Ranasinha S, Zoungas S, Boyle J. Prevalence of infertility and use of fertility treatment in women with polycystic ovary syndrome: data from a large community-based cohort study. J Womens Health (Larchmt). 2015;24(4):299-307.
35. Varanasi LC, Subasinghe A, Jayasinghe YL, Callegari ET, Garland SM, Gorelik A, Wark JD. Polycystic ovarian syndrome: prevalence and impact on the wellbeing of Australian women aged 16–29 years. Aust N Z J Obstet Gynaecol. 2018;58(2):222-33.
36. Malik SA, Khanum Z, Yousuf KR, Asif S. Prevalence of polycystic ovarian syndrome in infertility (PCOS) and treatment with clomiphene citrate. Ann King Edward Med Coll. 2001;7(1):8-10.
37. Pelanis R, Mellembakken JR, Sundström-Poromaa I, Ravn P, Morin-Papunen L, Tapanainen JS, Piltonen T,

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Puurunen J, Hirschberg AL, Fedorcsak P, Andersen M. The prevalence of Type 2 diabetes is not increased in normal-weight women with PCOS. Hum Reprod. 2017;32(11):2279-86.
38. Lo JC, Yang J, Gunderson EP, Hararah MK, Gonzalez JR, Ferrara A. Risk of type 2 diabetes mellitus following gestational diabetes pregnancy in women with polycystic ovary syndrome. J Diabetes Res. 2017;2017(1):5250162.
39. Sawada M, Masuyama H, Hayata K, Kamada Y, Nakamura K, Hiramatsu Y. Pregnancy complications and glucose intolerance in women with polycystic ovary syndrome. Endocr J. 2015;62(11):1017-23.
40. Rahmanpour H, Heidari R, Mousavinasab SN, Sharifi F, Fekri S. The prevalence of polycystic ovarian syndrome in 14-18 year old girls of Zanjan High Schools, 2008. J Zanjan Univ Med Sci Health Serv. 2009;67(17):79-88.
41. Kalantar Hormozi MR, Sayedatian SJ, Arya A, Dabbaghmaneh MH, Shams M, Sadeghalvd A, Larijani B, Ranjbar Omrani Gh. Diabetes risk factors in Shiraz, 2007. Iran J Diabetes Lipid Disord. 2007;7(2):166-59.
42. Christensen SB, Black MH, Smith N, Martinez MM, Jacobsen SJ, Porter AH, Koebnick C. The prevalence of polycystic ovary syndrome in adolescents. Fertil Steril. 2013;100(2):470-7.
43. Orio F, Palomba S, Carbone M, Muscogiuri G. Prevalence of polycystic ovary morphology in a region of South Italy. J Ultrasound. 2016;19(4):301-2.

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[DOI: 10.22034/6.1.44]