Physical Education, Health and Social Sciences

https://journal-of-social-education.org

E-ISSN: 2958-5996

P-ISSN: 2958-5988

Risk Factors of Polycystic Ovarian Syndrome Associated with Miscarriages and Diet

Asma [1], Shaukat Iqbal Malik [2]

[1] MS Scholar, Capital University of Science and Technology, Islamabad
[2] Professor, Department of Bioinformatics & Biological Sciences, Capital University of Science and Technology, Islamabad Email: asmakhankakar44@gmail.com

DOI: https://doi.org/10.63163/jpehss.v3i2.344

Abstract

Polycystic Ovary Syndrome (PCOS) is a multifactorial disorder influenced by genetic, environmental, and lifestyle factors. It often leads to various reproductive and metabolic complications, including menstrual irregularities, obesity, and infertility, with growing concerns about its association with miscarriages. This study aims to assess the prevalence of PCOS-related miscarriages and explore potential contributing factors among women in a specific population. Data were collected from 400 participants, focusing on demographic, dietary, and clinical characteristics. Results indicate that a significant percentage of women with PCOS experience reproductive challenges, with factors such as obesity, lack of exercise, and family history playing a critical role. These findings highlight the importance of early diagnosis and lifestyle modifications in managing PCOS and reducing the risk of miscarriages. The study provides valuable insights into the regional prevalence and impact of PCOS, which can aid future research and interventions aimed at improving women's reproductive health.

Keywords: Polycystic Ovary Syndrome (PCOS), miscarriage, obesity, reproductive health, lifestyle factors, family history, early diagnosis**.**

Introduction:

Polycystic Ovary Syndrome (PCOS) is a most reported disease in women that typically revolves around three core features: clinical and biochemical hyperandrogenism (HA), ovulatory dysfunction (OD)—often manifesting as irregular menstruation or amenorrhea—and the presence of polycystic ovaries (PCO) on ultrasound. PCOS is recognized as a leading disorder, but it can be treated. It is affecting approximately 2% to 40% of women of reproductive age and between 6% to 13% of the overall female population. The variation in prevalence rates can be attributed to differing diagnostic criteria, ethnicity, study methodologies, and other factors (McCartney & Marshall, 2016; Ndefo et al., 2013; Deswal et al., 2020; Goh et al., 2022). For example, a 2018 study reported that the prevalence of PCOS in the United States, based on the National Institutes of Health (NIH) criteria, was comparable to that observed in some European countries. However, geographical differences have been noted in other research. No definitive conclusion has been drawn regarding a clear relationship between regional differences, ethnicity, and PCOS prevalence (Wolf et al., 2018). In summary, the clinical manifestation of PCOS varies significantly across different regions, ethnicities, and populations, highlighting the diversity of HA, endocrine, and metabolic disturbances associated with the condition.

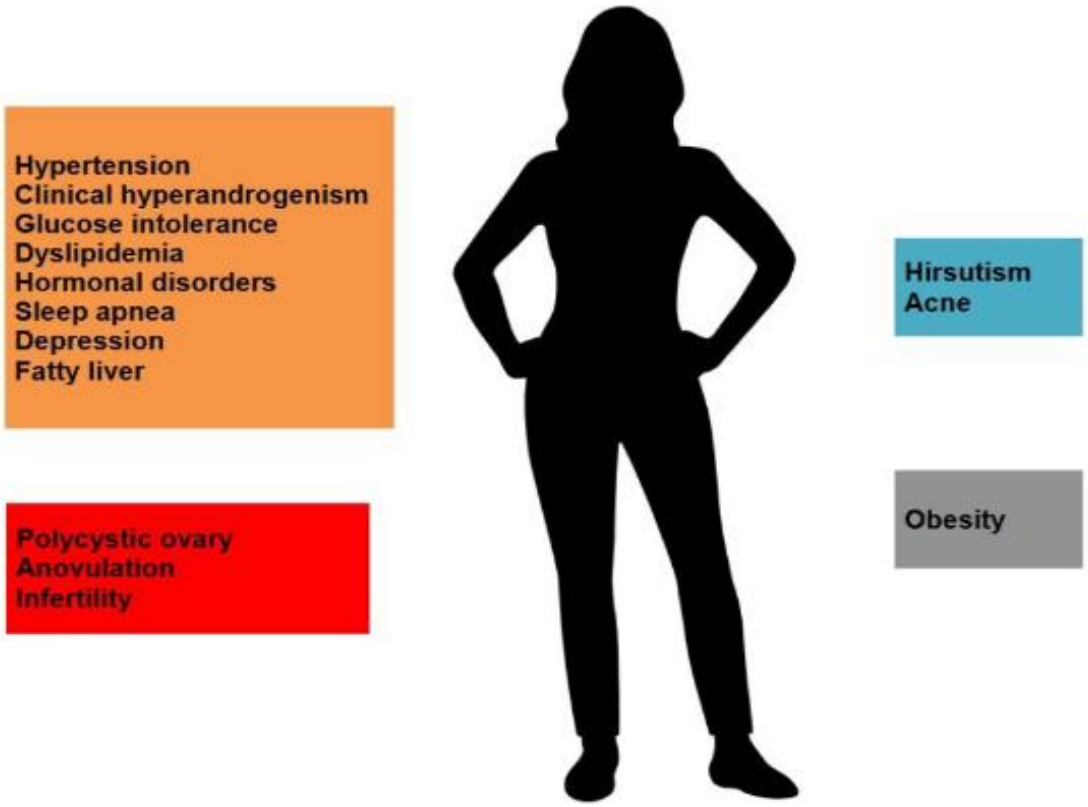

Figure 1: The clinical Presentation and Comorbidities of PCOS (Source: Chang et al., 2024)

Figure 2 provides a brief overview summarising PCOS's aetiology, pathophysiology, and key features. The condition is often diagnosed during adolescence or early adulthood. However, there is limited evidence and few established criteria for diagnosing PCOS post-menopause (McCartney et al., 2016; Pena et al., 2022).

Patients may visit healthcare providers for a variety of symptoms or complications linked to PCOS, sometimes without a prior diagnosis. Most reported symptoms are irregular menstrual cycles, chronic pelvic pain, signs of androgen excess (e.g., acne, alopecia, hirsutism), and infertility (Ndefo et al., 2013). Diagnosing PCOS can be challenging, as some symptoms overlap with other conditions, leading to potential under- or over-diagnosis. Therefore, it is recommended to follow established guidelines or consensus standards for diagnosis. Although criteria vary, the Rotterdam criteria, introduced in 2003, are widely considered the most commonly used diagnostic standard for PCOS (McCartney et al., 2016; Christ & Cedars, 2023).

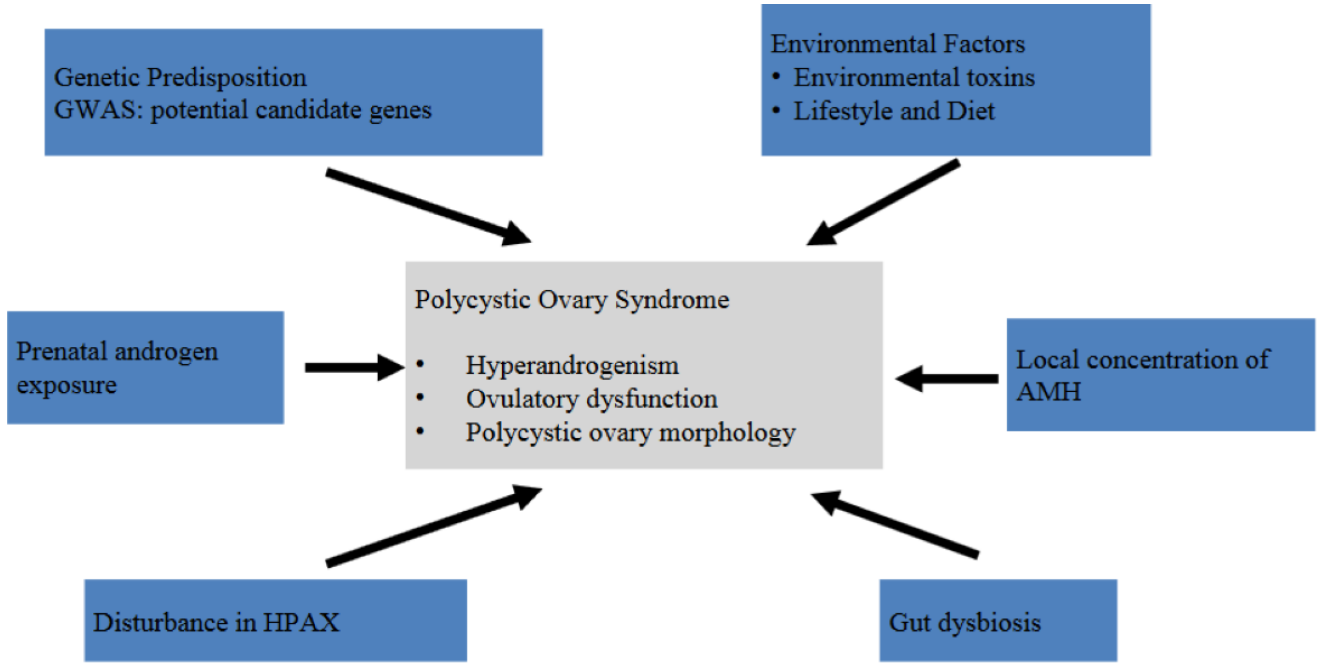

Figure 2: The Hallmark of PCOS (Source: Chang et al., 2024)

Polycystic Ovary Syndrome (PCOS) is becoming increasingly prevalent, contributing to a rise in miscarriages, yet many women lack adequate knowledge about the condition. Additionally, there have been no prior studies addressing this issue in our region. The primary aim of this study is to gather comprehensive data and determine the incidence of miscarriages associated with PCOS. The study also aims to identify key symptoms associated with PCOS, such as menstrual irregularities, obesity, hirsutism, diabetes, and acne. Our findings will emphasize the importance of early prevention and provide a foundation for future research efforts aimed at managing and preventing PCOS.

Objectives of the Study

The objectives of the study are (1) to assess the incidence of miscarriages among women diagnosed with PCOS, (2) to identify the main factors contributing to the development of PCOS in women, including dietary habits, lifestyle, and genetic predisposition, (3) to analyze the prevalence of Risk factors (such as menstrual irregularities, obesity, hirsutism, acne, and diabetes) among women with PCOS, (4) to investigate the relationship between PCOS and other comorbidities, including hypertension, metabolic syndrome, and type 2 diabetes, (5) to examine the role of lifestyle factors, including diet, exercise, and smoking, in the progression and management of PCOS.

Materials and methods:

Sample Collection

A composite methodological approach was employed, incorporating both questionnaire-based assessments and information gathering. The study was conducted across several hospitals in Quetta, specifically targeting female patients. Data collection took place at Combined Military Hospital (CMH) Quetta, Civil Hospital, and Rehman Medical Clinic. The study period spanned from March to August. A stratified sampling technique was utilized, and participants were selected based on availability within the predefined criteria. A total of 400 questionnaires were distributed to female patients who consented to participate. The participants were between the ages of 18 and 45 years, as patients outside this age range were excluded from the study due to reliability concerns.

Instrument and Procedure

The questionnaire, developed specifically for this research, was reviewed and validated by a gynaecologist. It was divided into three sections: The first section captured the participants' demographic data. The second section, consisting of 15 questions, focused on assessing the awareness and knowledge of Polycystic Ovary Syndrome (PCOS). The third section was dedicated to the clinical evaluation of PCOS, including observations related to its prevalence. All questionnaires were completed by the researchers with assistance from the participants. The study adhered to ethical guidelines for research involving human participants, and approval was obtained from the supervising gynaecologist. Various instruments were used for clinical assessments; a Sphygmomanometer was used to measure blood pressure. Blood Sugar Meter (Glucose Meter) was used to measure blood sugar levels. The weighing Scale was used to assess the weight of the patients. Data were collected and analyzed based on the completed questionnaires and clinical measurements, ensuring alignment with ethical research standards.

Data Analysis & Findings:

Table 1 Demographic Characteristics of Participants (N = 400)

The demographic table shows that the majority of the participants are housewives (68.8%), with a significant portion being from the Pathan (38.3%) and Punjabi (32.8%) ethnic groups. Most of the women are married (91.8%), and nearly half (41.5%) have consanguineous marriages, highlighting potential genetic and cultural factors influencing the study population.

Table 2 Dietary Information of PCOS (N = 400)

CHARACTERISTICS	FREQUENCY	PERCENTAGE
Working Status		
Housewives	275	68.8%
Working	125	31.2%
Ethnicity		
Pathan	153	38.3%
Baloch	64	16%
Punjabi	131	32.8%
Hazara	28	7%
Others	24	6%
Marital Status		
Married	367	91.8%
Unmarried	33	8.3%
Consanguinity		
Yes	166	41.5%
No	201	50.25%
Not Applicable	33	8.3%
CHARACTERISTICS	**FREQUENCY**	**PERCENTAGE**
Home-made Food		
Yes	388	97%
No	12	3.0%

Junk Food		
Yes	309	77.3%
No	91	22.8%
Meat/Beef		
Yes	108	27.0%
No	292	73.0%
Chicken		
Yes	345	86.3%
No	55	13.8%
Vegetable		
Yes	379	94.8%
No	21	5.3%
Fruits		
Yes	339	84.8%
No	61	15.3%
Cold Drinks		
Yes	345	86.3%
No	55	13.8%

The dietary habits of participants show that a vast majority consume home-made food (97%) and a significant portion (77.3%) regularly consume junk food. High consumption of chicken (86.3%) and cold drinks (86.3%) is prevalent, while the intake of fruits (84.8%) and vegetables (94.8%) is relatively high, suggesting a mixed dietary pattern with both nutritious and less healthy elements.

Table 3 Risk Factors of PCOS (N = 400)

CHARACTERISTICS	FREQUENCY	PERCENTAGE
Menstrual problem		
Yes	277	69.25%
No	123	30.75%
Miscarriage		
Yes	238	59.5%
No	130	32.5%
Not Applicable	32	8.0%
Abortion		
Yes	31	7.8%
No	33	84.2%
Not Applicable	32	8.0%
Growth of Facial Hair		
Yes	218	54.5%
No	182	45.5%
Normal Birth		
Yes	125	31.25%
No	243	60.75%
Not Applicable	32	8.0%
Smoking Status		
Yes	111	27.7%
No	289	72.3%
Obesity		

Yes	389	97.3%
No	11	2.8%
Exercise		
Yes	59	14.8%
No	341	85.3%
Stress		
Yes	393	98.25%
No	7	1.75%
Family history		
Yes	274	68.5%
No	126	31.5%

The table reveals that a significant majority of participants experience menstrual problems (69.25%) and high rates of miscarriage (59.5%), with obesity being prevalent in 97.3% of the women surveyed. Additionally, stress is notably high, affecting 98.25% of the participants, while a considerable portion also reported growth of facial hair (54.5%) and a family history of related issues (68.5%). Overall, these findings highlight the common clinical manifestations associated with PCOS among the population studied.

TABLE 4 Clinical Presentation of PCOS (N = 200)

CHARACTERISTICS	FREQUENCY	PERCENTAGE
Hypertension		
Yes	235	58.9%
No	164	41.1%
Diabetes		
Yes	72	18%
No	328	82.2%
Medication		
Yes	390	97.5%
No	10	2.5%
PCOS		
Before marriage	50	12.5%
After marriage	350	87.5%

The table indicates that more than half of the participants (58.9%) suffer from hypertension, while diabetes is less common, affecting 18% of the women. A significant majority (87.5%) of the participants reported developing PCOS after marriage, and almost all of them (97.5%) are on medication for their condition. This suggests that PCOS is often diagnosed post-marriage and is commonly associated with hypertension, necessitating medical intervention.

Discussion:

A single-center, retrospective, observational cohort study conducted by Chen et al., (2022) included 948 females diagnosed with PCOS where these women underwent their first embryo transfer (both fresh and frozen transfer cycles), reported the notion that the rates of early miscarriage, macrosomia, and gestational diabetes mellitus increased significantly with increasing HOMA Insulin Resistance whereas the rate of live births decreased significantly. After adjusting for confounders (Chen et al., 2022).

Polycystic Ovary Syndrome (PCOS) is a heterogeneous disorder characterized by clinical or biochemical hyperandrogenism combined with ovulatory dysfunction. Its diagnostic criteria have evolved (Azziz et

al., 2006; Dewailly, 2006). In the present study, a significant number of women, both housewives and working women, were found to experience PCOS complications. As shown in Table 4.1, among the 400 women surveyed, 275 were housewives, and 25 were employed. In this study, 33 participants were unmarried, while the remaining were married and diagnosed with PCOS. South Asian women, including those from India, Pakistan, Sri Lanka, Bangladesh, and Nepal, have been shown to have a higher prevalence of PCOS (Tziomalos et al., 2008). A community-based study conducted in the United Kingdom found that polycystic ovaries were particularly common in 52% of women of South Asian descent (Rodin et al., 1998). This study, conducted in various hospitals in Quetta, included participants from different ethnic groups. According to the results, PCOS was more prevalent among the Pathan and Punjabi ethnic groups.

The study also found that diet plays a significant role in the development of PCOS. Common contributing factors include the frequent consumption of chicken, soft drinks, and junk food. Variations in PCOS risk can be observed across different populations and ethnic groups, especially those at higher risk for metabolic syndrome. For instance, individuals of Asian origin in the UK and the Black population in the USA have a higher susceptibility to metabolic issues (Azziz et al., 2004). A recent study profiling the gene expression of visceral fat in PCOS patients revealed increased expression of genes linked to inflammation, immune regulation, oxidative stress, lipid metabolism, and insulin signalling (Corton et al., 2007). A Mediterranean-style diet, which includes fish, monounsaturated fats from olive oil, fruits, vegetables, whole grains, legumes, and moderate alcohol consumption, has been shown to offer numerous health benefits (Widmer et al., 2015).

This study found that 69.25% of women with PCOS experienced menstrual cycle irregularities, with most reporting longer cycle lengths due to PCOS medication. This finding is consistent with previous studies, which found that 85-90% of women with PCOS have menstrual cycles lasting more than 35 days (Hart, Hickey, & Franks, 2004). Another study reported that irregular ovulation affects 75-85% of women with PCOS (Azziz et al., 2009). Identifying women with long, irregular cycles may help in diagnosing PCOS in a broader population (Solomon, 1999). Recurrent miscarriage, defined as the loss of three or more consecutive pregnancies, affects about 1% of couples trying to conceive. Among these couples, women with polycystic ovaries are frequently found to have the condition. Research shows a higher prevalence of polycystic ovaries in women with recurrent miscarriages compared to the general population (Clifford et al., 1994). Our study found that 59.5% of women experienced miscarriages, a slight increase from earlier findings, which may be linked to factors like diet, lack of exercise, and substance use.

Women with PCOS are also at a higher risk of developing type 2 diabetes, metabolic syndrome, and cardiovascular disease (Ehrmann, 1999; Legro et al., 1999). Lifestyle factors, including smoking, further exacerbate these risks. Smoking has detrimental effects on women with PCOS, increasing cardiovascular risks and adversely impacting cholesterol levels and reproductive hormones (Craig et al., 1989). In this study, 27.7% of women with PCOS were smokers, compared to a previous study reporting 47 smokers aged 18-45 with PCOS (Pau, Keefe, & Welt, 2013). Obesity is prevalent among PCOS patients and is a key factor in insulin resistance and hyperandrogenism (Dunaif & Book, 1997). In our study, 97.3% of the participants with PCOS were obese.

The treatment of PCOS should address both the normalization of hyperandrogenism and anovulation, as well as the reduction of metabolic complications. Lifestyle modification, particularly weight loss, is one of the most effective treatments for PCOS. Weight loss has been shown to improve various parameters, including ovulation, insulin levels, and psychological well-being (Clark et al., 1995). A previous study reported that 24% of patients failed to lose weight, with only 33 patients achieving a 10% reduction in body weight (Khademi et al., 2010). In contrast, our study found that 14.8% of women with PCOS were actively engaging in exercise to manage their weight. PCOS is also associated with high levels of stress, depression, and mood disorders, particularly in obese patients (Hahn et al., 2005). Our research found

that 98.3% of women with PCOS reported high levels of stress, compared to a previous study where 35.8% had high and 14.8% had extremely high levels of stress (Trent et al., 2002). Genetics play a significant role in PCOS, with multiple studies suggesting a strong hereditary component (Ferriman & Purdie, 1979). Environmental factors, such as diet, exercise, stress, and hormonal disturbances, may also contribute to the development of the disorder. Our study supports the view that family history is an important determinant of PCOS risk. For Hypothesis 1, table 2 shows a high percentage of participants consuming junk food (77.3%) and chicken (86.3%), and Table 3 indicates a high prevalence of menstrual problems (69.25%) and miscarriages (59.5%). For hypothesis 2, table 3 reveals that 97.3% of the participants with PCOS are obese, and stress is reported by 98.25%. Additionally, Table 4 shows that a significant percentage of women with PCOS have hypertension (58.9%) and diabetes (18%). For hypothesis 3, table 3 shows that 68.5% of participants have a family history of PCOS, and Table 4 indicates that 12.5% of the participants developed PCOS before marriage.

Hypertension is another common comorbidity in women with PCOS. Our study found that 59.8% of participants had high blood pressure, consistent with previous research that links obesity and hypertension in PCOS patients (Talbott et al., 2001). Women with PCOS are also at an increased risk of diabetes. Previous studies found a 10% incidence of diabetes in obese PCOS patients (Legro et al., 1999). In our study, 18% of women with PCOS were diagnosed with diabetes. Metformin is a commonly used treatment for PCOS-related anovulatory infertility. As an insulin sensitizer, it has been widely prescribed for PCOS patients to manage both insulin resistance and infertility (Johnson, 2014).

Conclusion:

Results indicate that a significant percentage of women with PCOS experience reproductive challenges, with factors such as obesity, lack of exercise, and family history playing a critical role. These findings highlight the importance of early diagnosis and lifestyle modifications in managing PCOS and reducing the risk of miscarriages. The study provides valuable insights into the regional prevalence and impact of PCOS, which can aid future research and interventions aimed at improving women's reproductive health.

References

Azziz, R., Carmina, E., Dewailly, D., Diamanti-Kandarakis, E., Escobar-Morreale, H. F., Futterweit, W., ... & Witchel, S. F. (2006). Criteria for defining polycystic ovary syndrome as a predominantly hyperandrogenic syndrome: an androgen excess society guideline. The Journal of Clinical Endocrinology & Metabolism, 91(11), 4237-4245.

Azziz, R., Carmina, E., Dewailly, D., Diamanti-Kandarakis, E., Escobar-Morreale, H. F., Futterweit, W., ... & Witchel, S. F. (2009). The Androgen Excess and PCOS Society criteria for the polycystic ovary syndrome: the complete task force report. Fertility and sterility, 91(2), 456-488.

Azziz, R., Woods, K. S., Reyna, R., Key, T. J., Knochenhauer, E. S., & Yildiz, B. O. (2004). The prevalence and features of the polycystic ovary syndrome in an unselected population. The Journal of Clinical Endocrinology & Metabolism, 89(6), 2745-2749.

Chang, K. J., Chen, J. H., & Chen, K. H. (2024). The Pathophysiological Mechanism and Clinical Treatment of Polycystic Ovary Syndrome: A Molecular and Cellular Review of the Literature. International Journal of Molecular Sciences, 25(16), 9037.

Christ, J. P., & Cedars, M. I. (2023). Current guidelines for diagnosing PCOS. Diagnostics, 13(6), 1113.

Clark, A. M., Ledger, W., Galletly, C., Tomlinson, L., Blaney, F., Wang, X., & Norman, R. J. (1995). Weight loss results in significant improvement in pregnancy and ovulation rates in anovulatory obese women. Human reproduction, 10(10), 2705-2712.

Clifford, K., Rai, R., Watson, H., & Regan, L. (1994). Pregnancy: An informative protocol for the investigation of recurrent miscarriage: preliminary experience of 500 consecutive cases. Human reproduction, 9(7), 1328-1332.

Chen Y, Guo J, Zhang QW, Zhang C. (2022) Insulin Resistance is a risk factor for early miscarriage and Macrosomia in patients with polycystic ovary syndrome from the first embryo transfer cycle: a retrospective cohort study. Front Endocrinol.;13:853473.

Cortón, M., Botella-Carretero, J. I., López, J. A., Camafeita, E., San Millán, J. L., Escobar-Morreale, H. F., & Peral, B. (2008). Proteomic analysis of human omental adipose tissue in the polycystic ovary syndrome using two-dimensional difference gel electrophoresis and mass spectrometry. Human Reproduction, 23(3), 651-661.

Craig, W. Y., Palomaki, G. E., & Haddow, J. E. (1989). Cigarette smoking and serum lipid and lipoprotein concentrations: an analysis of published data. British medical journal, 298(6676), 784-788.

Deswal, R., Narwal, V., Dang, A., & Pundir, C. S. (2020). The prevalence of polycystic ovary syndrome: a brief systematic review. Journal of human reproductive sciences, 13(4), 261-271.

Dewailly, D. (2006). How many of the items in the polycystic ovary syndrome can be validated statistically?. Fertility and sterility, 85(2), 529.

Dunaif, A., & Book, C. B. (2013). Insulin resistance in the polycystic ovary syndrome. Clinical research in diabetes and obesity, 15, 249-274.

Ehrmann, D. A., Barnes, R. B., Rosenfield, R. L., Cavaghan, M. K., & Imperial, J. (1999). Prevalence of impaired glucose tolerance and diabetes in women with polycystic ovary syndrome. Diabetes care, 22(1), 141-146.

Ferriman, D., & Purdie, A. W. (1979). The inheritance of polycystic ovarian disease and a possible relationship to premature balding. Clinical endocrinology, 11(3), 291-300.

Goh, J. E., Farrukh, M. J., Keshavarzi, F., Yap, C. S., Saleem, Z., Salman, M., ... & Ming, L. C. (2022). Assessment of prevalence, knowledge of polycystic ovary syndrome and health-related practices among women in klang valley: A cross-sectional survey. Frontiers in Endocrinology, 13, 985588.

Hahn, S., Janssen, O. E., Tan, S., Pleger, K., Mann, K., Schedlowski, M., ... & Elsenbruch, S. (2005). Clinical and psychological correlates of quality-of-life in polycystic ovary syndrome. European journal of endocrinology, 153(6), 853-860.

Hart, R., Hickey, M., & Franks, S. (2004). Definitions, prevalence and symptoms of polycystic ovaries and polycystic ovary syndrome. Best Practice & Research Clinical Obstetrics & Gynaecology, 18(5), 671-683.

Johnson, N. P. (2014). Metformin use in women with polycystic ovary syndrome. Annals of translational medicine, 2(6).

Khademi, A., Alleyassin, A., Aghahosseini, M., Tabatabaeefar, L., & Amini, M. (2010). The effect of exercise in PCOS women who exercise regularly. Asian Journal of Sports Medicine, 1(1), 35.

Legro, R. S., Kunselman, A. R., Dodson, W. C., & Dunaif, A. (1999). Prevalence and predictors of risk for type 2 diabetes mellitus and impaired glucose tolerance in polycystic ovary syndrome: a prospective, controlled study in 254 affected women. The journal of clinical endocrinology & metabolism, 84(1), 165-169.

Legro, R. S., Kunselman, A. R., Dodson, W. C., & Dunaif, A. (1999). Prevalence and predictors of risk for type 2 diabetes mellitus and impaired glucose tolerance in polycystic ovary syndrome: a

prospective, controlled study in 254 affected women. The journal of clinical endocrinology & metabolism, 84(1), 165-169.

McCartney, C. R., & Marshall, J. C. (2016). Polycystic ovary syndrome. New England Journal of Medicine, 375(1), 54-64.

Ndefo, U. A., Eaton, A., & Green, M. R. (2013). Polycystic ovary syndrome: a review of treatment options with a focus on pharmacological approaches. Pharmacy and therapeutics, 38(6), 336.

Pau, C. T., Keefe, C. C., & Welt, C. K. (2013). Cigarette smoking, nicotine levels and increased risk for metabolic syndrome in women with polycystic ovary syndrome. Gynecological Endocrinology, 29(6), 551-555.

Peña, A. S., Codner, E., & Witchel, S. (2022). Criteria for diagnosis of polycystic ovary syndrome during adolescence: literature review. Diagnostics, 12(8), 1931.

Rodin, D. A., Bano, G., Bland, J. M., Taylor, K., & Nussey, S. S. (1998). Polycystic ovaries and associated metabolic abnormalities in Indian subcontinent Asian women. Clinical endocrinology, 49(1), 91-99.

Solomon, C. G. (1999). The epidemiology of polycystic ovary syndrome: prevalence and associated disease risks. Endocrinology and metabolism clinics of North America, 28(2), 247-263.

Talbott, E. O., Zborowski, J. V., Sutton-Tyrrell, K., Guzick, D. S., & Kuller, L. H. (2001). Evidence of an Increase in Baseline Brachial Artery Lumen Diameter Independent of Body Mass Index (BMI) among Women with Polycystic Ovary Syndrome (PCOS) Compared to Age-Matched Control Women.

Trent, M. E., Rich, M., Austin, S. B., & Gordon, C. M. (2002). Quality of life in adolescent girls with polycystic ovary syndrome. Archives of pediatrics & adolescent medicine, 156(6), 556-560.

Tziomalos, K., Weerasinghe, C. N., Mikhailidis, D. P., & Seifalian, A. M. (2008). Vascular risk factors in South Asians. International journal of cardiology, 128(1), 5-16.

Widmer, R. J., Flammer, A. J., Lerman, L. O., & Lerman, A. (2015). The Mediterranean diet, its components, and cardiovascular disease. The American journal of medicine, 128(3), 229-238.

Wolf, W. M., Wattick, R. A., Kinkade, O. N., & Olfert, M. D. (2018). Geographical prevalence of polycystic ovary syndrome as determined by region and race/ethnicity. International journal of environmental research and public health, 15(11), 2589.