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Analyzing the Link between PCOS and Metabolic Disturbances and their Combined Impact on Long-Term Health Outcomes

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Abstract: The ill effects of metabolic disorders in women suffering from polycystic ovary syndrome (PCOS) have a major influence on their reproductive health and general well-being. This study aims to enroll and analyze the health outcomes related of metabolic disorders impact on 92 women with polycystic ovary syndrome (PCOS). According to the aim of the study, this current study documented the clinical outcomes of 92 women with polycystic ovary syndrome (PCOS) and analyzed the impact of metabolic disorders on these patients. Demographic data, characteristics, and examinations were determined for female patients at hospitals in Basrah, Iraq, during the follow-up period. This study conducted several questionnaires to assess the severity of PCOS symptoms and evaluate the patient's general health and quality of life. Our outcomes shown that most women with PCOS were obesity above > 35 kg/m2 include 76.09%, irregular menstrual cycles included, 73.91% as symptoms prevalence in women, and poor diet have 71.74%. In an aspect of PCOS severity, we found emotional distress had 3.1 ± 1.1, menstrual Problems had 3.8 ± 0.7, and infertility concerns had 3.5 ± 0.4. In labrotery examinations, this current outcomes enrolled diastolic BP (80–89) mm Hg included 58.7%, Systolic BP (120 - 139) mm Hg included 69.57%, insulin levels was 23.4 ± 2.7 mIU/ml, Triglycerides was 1.68 ± 0.15 mmol/l, cholesterol was 4.92 ± 1.52 mmol/l, HDL was 0.94 ± 0.18 mmol/l, and LDL was 2.97 ± 0.72 mmol/l. Acrrodding to the general health questionnaire, we found the two domains lowest in scores were physical function, which was 55.35 ± 5.41, and physiological function, which was 52.40 ± 8.67. The influence of metabolic irregularities on females with polycystic ovary syndrome (PCOS) is serious since metabolic disorders influence reproductive health and general well-being.

Keywords: Polycystic Ovary Syndrome; Metabolic Disturbances; Symptoms; and Quality of Life (PCOSQ) Questionnaire.

INTRODUCTION

The category that includes cardiovascular risk factors known as metabolic disorder (MS) includes elevated blood pressure, central obesity, dyslipidemia, and impaired fasting glucose (Escobar-Morreale, H.F., 2018). Despite ongoing discussion, its significance stems from the possibility that MS might predict cardiovascular event risk that is larger than the sum of its individual components' risks. In fact, it has been thought that many coexisting disorders share a common denominator: insulin resistance (Lizneva, D. *et al*., 2016).

Multiple sclerosis has become more common among the general population during the past 10 years, especially among women—mostly very young women. This development causes concern due to the possible impact it may have on women's cardiovascular morbidity and death (Yildiz, B.O. *et al*., 2012).

The percentage of women who suffer from this disorder ranges from about 10–18%. Metabolic syndrome in women with PCOS has prevalence rates up to 33%. On the other hand, metabolic syndrome may lead to other complications in the long run, like cardiovascular disorders, type 2 diabetes mellitus, cancer, sleep apnea, and mental issues (The Rotterdam ESHRE/ASRM-Sponsored PCOS Consensus Workshop Group, 2004; Moghetti, P. *et al*., 2013).

Obesity, type 2 diabetes, and other conditions have been linked with the rise in metabolic syndrome throughout continents. Nonetheless, research carried out in different countries yields different results. My observations show that the incidence of MS in the US rises sharply with age, rising from 19.5% for the 20–39 age group through 48.6% in the 60+ age group (Mykhalchenko, K. *et al*., 2017).

Women with PCOS are more than twice as likely to suffer from coronary heart disease (CHD) as well as stroke as the general population. Moreover, women with MS had a 12% higher risk of dying young and a 3- to 6-fold increased risk of having CHD. These risks get worse whenever MS and PCOS coexist (Apridonidze, T. *et al*., 2005).

Women diagnosed with PCOS show an increased prevalence of depression relative to the general population of women, independent of BMI (Bil, E. *et al*., 2016). Women are also known to be

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vulnerable to disorders such as anxiety, eating disorders, and poor relationships, aside from having PCOS (Daan, N.M. *et al*., 2014). Individuals with metabolic syndrome appear to manifest depressive features with clinical symptoms like fatigue. Though inflammation relates to the onset of depression, the exact mechanisms behind it remain unclear (Diamanti-Kandarakis, E. & Dunaif, A., 2012).

PATIENTS AND METHODS

We conducted a cross-sectional study on 92 women with polycystic ovary syndrome (PCOS) aged 20 to 36 years. All women participating in this study were diagnosed in hospitals in Basrah, Iraq, during the follow-up period between January 2023 and January 2025. Obesity indicators were recorded, measured by body mass index (BMI), and categorized as underweight (<20), normal weight (20-25), overweight (26-35), and obese (>35). Clinical data and demographic characteristics were recorded, including age, BMI, smoking, alcohol consumption, family history of PCOS, and educational, social, and work status. Health outcomes of women with PCOS were analyzed and evaluated using SPSS 22.0 software. Selection of women followed the inclusion and exclusion criteria for this study. According to the inclusion criteria, this study included women aged 20-36 years, some smokers and alcoholics, women with morbid obesity, women with polycystic ovary syndrome (PCOS), women with metabolic disorders, and women with poor diet and lack of physical activity. Regarding the exclusion criteria, this study excluded women who were exhausted or elderly, women who had undergone previous abdominal surgery, women with cancer, thyroid disease, lymphoma, or other diseases, and pregnant and breastfeeding women. Furthermore, the female patients were diagnosed with PCOS during medical examinations in hospitals, where the severity and prevalence of PCOS were determined (including irregular or prolonged menstrual cycles, severe acne, excessive hair growth, weight gain, mood disorders, and fatigue). All patients underwent a complete ultrasound examination of the ovaries. We applied the Polycystic Ovary Syndrome Questionnaire (PCOSQ), a self-report validated questionnaire measuring acute health-related quality of life for women suffering from PCOS. In total, the questionnaire measures five aspects, as mentioned above, with each item rated on a Likert scale typically numbered from 1 (very dissatisfied) to 7 (very satisfied). The higher the score, the better the quality of life.

In addition, we conducted secondary examinations that assessed the health outcomes experienced by the patients. We assessed both physical and psychological aspects, including dietary patterns, physical activity, smoking, depression, and anxiety. All women underwent laboratory testing for metabolic disorders in women and their impact on health, including type 2 diabetes, cardiovascular risk, hypertension, dyslipidemia, infertility, obesity, polycystic ovary syndrome (PCOS), insulin resistance, elevated triglycerides, low levels of HDL (good) cholesterol, and high levels of LDL (bad) cholesterol. We also conducted a comprehensive questionnaire to assess the overall health quality of life for women with PCOS using the SF-36 questionnaire, which included physical function, psychological function, social and emotional function, and daily activity, with a scale of 0-100, with higher scores indicating better quality of life for women.

RESULTS

Table 1: Baseline demographic features of women with PCOS

Characteristics	Variables	No. of women, {92}	Percentage, %
Age			
	< 30	32	34.78%
	≥ 30	60	65.22%
BMI, {kg/m2}			
	Underweight, < 20	4	4.35%
	Normal weight, {20 – 25}	14	15.22%
	Overweight, {26 – 35}	30	32.61%
	Obesity, { > 35}	44	47.83%
Smoking status			
	Smokers	14	15.22%
	Never smoking	78	84.78%
Alcohol use			
	Present	4	4.35%

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	Absent	88	95.65%
Medical history of PCOS			
	Present	34	36.96%
	Absent	58	63.04%
Education status			
	Primary school	15	16.30%
	Secondary school	29	31.52%
	University	48	52.17%
Marital status			
	Single	11	11.96%
	Married	65	70.65%
	Widow/ Divorced	16	17.39%
Job-status			
	Housewife	25	27.17%
	Employer	67	72.83%

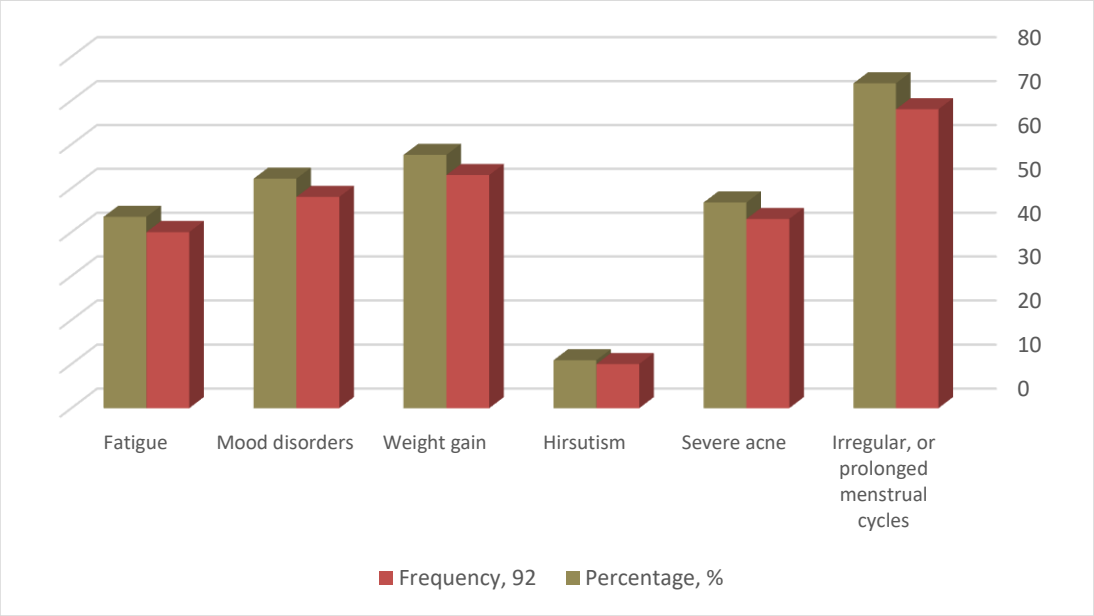

Figure 1: Frequency distribution of PCOS Symptoms on patients.

Table 2: Diagnoses of physical aspects at women with PCOS

Items	Frequency, {92}	Percentage, %
Poor diet		
Present	66	71.74%
Absent	26	28.26%
Lack of exercise		
Present	59	64.13%
Absent	33	35.87%
Severity of PCOS		
Emotional Distress	3.1 ± 1.1	
Hirsutism	2.6 ± 0.6	
Weight Concerns	1.8 ± 0.2	
Menstrual Problems	3.8 ± 0.7	
Infertility Concerns	3.5 ± 0.4	

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Table 3: Enroll examination data of women in the hospitals.

Items	Variables	Frequency, {92}	Percentage, %
Blood pressure			
	Diastolic BP, mm Hg		
	< 80	15	16.3%
	80–89	54	58.7%
	> 89	23	25.0%
	Systolic BP, mm Hg		
	< 120	12	13.04%
	120 - 139	64	69.57%
	> 139	16	17.39%
Liquid profile			
	Insulin levels, mIU/ml	23.4 ± 2.7	
	Triglycerides, mmol/l	1.68 ± 0.15	
	Cholesterol, mmol/l	4.92 ± 1.52	
	HDL, mmol/l	0.94 ± 0.18	
	LDL, mmol/l	2.97 ± 0.72	
	HbA1, %	6.23 ± 0.25	
Waist circumference	> 86.0 cm, 87.4 ± 0.13		

Table 4: Health outcomes of metabolic disturbances in women who participated in this study

Variables	Frequency, {n = 92}	Percentage, %
Type II diabetes mellitus	22	23.91%
cardiovascular disease risk	32	34.78%
Arterial hypertension	36	39.13%
Dyslipidemia	39	42.39%
Infertility	57	61.96%
Obesity	70	76.09%
Polycystic Ovary Syndrome	92	100.0%
Insulin resistance	40	43.48%
High Triglycerides	44	47.83%
Low HDL	60	65.22%
High LDL	34	36.96%

Table 5: Determining psychological problems of women with PCOS

Items	No. of patients, {n = 92}	Percentage, {%}
Depression	46	50.0%
Anxiety	25	27.17%
Bipolar disorder	7	7.61%
Autism	1	1.09%
Attention deficit hyperactivity disorder	2	2.17%
Schizophrenia	1	1.09%
Eating disorder	10	10.87%

Table 6: Assessment of general health quality of life at women with PCOS

Items	SF – 36, QOL
Physical function	55.35 ± 5.41
Physiological function	52.40 ± 8.67
Social and emotional functions	61.14 ± 4.56
Daily activity	66.80 ± 2.33

DISCUSSION

A complicated endocrine system illness, polycystic ovarian syndrome (PCOS), usually impacts 6–12% of women of reproductive age (Diamanti-Kandarakis, E. & Papavassiliou, A.G., 2006). It targets problems such as polycystic ovarian morphology, ovulatory dysfunction, and

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hyperandrogenism. However, because it is not always only a reproductive issue, it has been recognized as a metabolic condition with significant long-term health consequences. Metabolic illnesses such as insulin resistance, obesity as well as type 2 diabetes, dyslipidemia, along with cardiovascular diseases are closely related to PCOS (Rosenfield, R.L. & Ehrmann, D.A., 2016).

Regardless of their BMI, as many as 70% of women having this illness have insulin resistance as a common feature in their lifestyle. It is replaced by compensatory hyperinsulinemia, which suppresses SHBG and increases ovarian androgen synthesis in response to hyperandrogenism. Insulin resistance deteriorates as an outcome of hyperandrogenism (Dong, L. *et al*., 2019). Overall, insulin resistance has significant metabolic effects since it raises the chance of developing type 2 diabetes and metabolic syndrome. Those with PCOS are four times as likely to get type 2 diabetes than those without the disorder (Zhang, C. *et al*., 2020).

Women with polycystic ovary syndrome (PCOS) are at risk for obesity, and 60% are considered overweight or obese. The dysfunction of adipose tissue in cases of PCOS entails increases in adipocyte hypertrophy, inflammation, and altered secretion of adipokines, all of which eventually lead to systemic insulin resistance and other metabolic disturbances (He, F.F. & Li, Y.M., 2020). The presence of obesity further aggravates PCOS symptoms like menstrual irregularities, hirsutism, and infertility. Therefore, weight management by lifestyle measures, that is, diet and exercise, is a major component in the treatment of PCOS (Peng, Y. *et al*., 2020).

LDL (low-density lipoprotein) cholesterol, high-density lipoprotein (HDL) cholesterol, and increased triglycerides are all hallmarks of an atherogenic lipid profile that is frequently seen in women with PCOS (Peng, Y. *et al*., 2020). This dyslipidemia puts women with PCOS at higher risk for cardiovascular disease (CVD), particularly when associated with insulin resistance along with chronic inflammation. According to studies, even at an early age, women with PCOS are more inclined to develop endothelial dysfunction and preclinical atherosclerosis. Consequently, evaluating cardiovascular risk needs to be a crucial component of PCOS treatment (Carmina, E. *et al*., 1992; Lumeng, C.N. & Saltiel, A.R., 2011).

PCOS metabolic disorders exert a significant amount of psychological and quality-of-life implications. The physical manifestation of PCOS—here, weight gain, hirsutism, and acne—correlates with body image dissatisfaction, poor self-esteem, and depression. Metabolic disorders can be chronic, and their related conditions become risk factors for anxiety and a decreased quality of life; treatment should be holistic in view and include psychological support and counseling (Ouchi, N. *et al*., 2011; Song, J. & Deng, T., 2020; Cao, H., 2014).

CONCLUSION

Especially in the case of women, as a syndrome with metabolic implications in their health. Metabolic disorders make the lives of women with polycystic ovary syndrome (PCOS) miserable by messing with their reproductive health and holistic existence. These women suffer from many metabolic dysfunctions like insulin resistance, obesity, and dyslipidemia, resulting in complications like infertility, alterations in normal hormonal levels, and an increased risk for metabolic syndrome. Early detection and intervention play a crucial role in stopping the cataclysmic damage caused by the metabolic and cardiovascular effects of the syndrome. Future research must go ahead and investigate mechanisms that are associated with polycystic ovary syndrome with regard to metabolic disorders and find nominees or targeted therapies which interrupt the cycle of metabolic failure occurring in such an individual population.

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