

Prevalence of Polycystic Ovarian Syndrome among Women Approaching Healthcare Facilities in the UAE: A Cross-Sectional Study

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Abstract

Background

Polycystic Ovarian Syndrome (PCOS) is a highly prevalent hormone problem in women of childbearing age that is manifested with irregular menstruation. Our research intended to find the prevalence of PCOS in the United Arab Emirates (UAE) and to highlight the psychological burden of PCOS. Our goal was to contribute data that could help healthcare providers in the UAE develop more informed screening practices and offer better support, both medically and emotionally, to women living with PCOS.

Methodology

A cross-sectional survey was conducted among 1695 respondents and data was collected from female participants, of any nationality in the age range 18–49 years who accepted to participate in the study, in the form of a self administered and validated questionnaire from the approved hospital sites. The Depression, Anxiety, and Stress Scale – 21 questions (DASS-21) was used in our questionnaire to measure the states of depression, anxiety, and stress. The data was then analysed using SPSS version 29 with Chi Square and Logistic Regression.

Results

This study found a PCOS prevalence of 30.3% among women seeking healthcare in the UAE, with African females exhibiting the highest rate (48.7%). Significant associations were identified between PCOS and factors such as ethnicity, family history, obesity, diabetes, lifestyle habits, and menstrual irregularities. Key predictors of PCOS included family history, irregular periods, obesity, and hormonal drug use. Additionally, the study highlighted a strong link between PCOS and mental health, with affected individuals reporting high levels of severe stress ($p = 0.01$), anxiety ($p = 0.005$), and depression ($p = < 0.001$).

Conclusions

In conclusion, we were able to assess the prevalence of PCOS in women approaching healthcare facilities in UAE as 30.3% with African females showing the highest prevalence. Various aspects such as lifestyle factors, smoking, family history, certain chronic illnesses and issues with maintaining body weight were also found to be associated with the prevalence of PCOS. Significant associations were found between participants diagnosed with PCOS and its effects on their mental wellbeing. Through our results, we recommend a national study with a representative sample and a community-based awareness campaign to educate the population more about PCOS.

BACKGROUND

Polycystic ovarian syndrome is a very frequent, endocrinological indisposition with an estimated global frequency of 4–20% and a potential range of 15–21%. According to statistics, PCOS affects at least 20–25% of females in the Gulf region [1].

Studies carried out in American and European nations estimated that 6–8% of the population had PCOS. The prevalence in the Middle east was found to be around 7% in two significant studies carried out in Iran [2].

The frequency of PCOS was similar throughout the world, with figures for Australia at 8.7%, Spain at 6.5%, Greece at 6.7%, the US at 4%, Sweden at 4.8%, and China's south, (2.4%). India's New Delhi (46.8%), and Kerala (26.4) [2].

Estimates of the prevalence of PCOS in 2016 were made for 42 nations and 3 regions of Europe. The prevalence was on average 276.4 cases/100,000 people in all of Europe. The prevalence varied significantly between European nations and regions, with Sweden having the lowest prevalence (34.1/100,000) and the Czech Republic having the highest prevalence (460.6/100,000). In the Czech Republic, PCOS prevalence was between 420 and 440 /100,000 in the majority of the remaining nations. Turkey and Albania had the lowest prevalence rates (258.5 and 373.9 per 100,000, respectively). A low prevalence of PCOS (between 115 and 120 instances per 100,000 people) was also observed in Andorra, Germany and the Netherlands, but Austria had a prevalence that was nearly twice as high (211.7 per 100,000) [3].

Between January and June, in 2012, the University of Sharjah in the United Arab Emirates, conducted a study, according to which PCOS was prevalent in females of reproductive age at a rate of 20% [2].

Various factors are related to the prevalence of PCOS among different women. These factors can be internal or external and include insulin resistance, hyperandrogenism, environmental factors and genetic factors. Through a cascade of pathways, hyperandrogenism, and hyperinsulinemia both play a role in ceasing follicle growth, which is attributed to irregular menstruation, anovulatory infertility, and accumulation of immature follicles [4]. Ethnicity can also play a major part in determining the presence of the disease [5]. Chronic stress is also said to possess a role in PCOS. Although nutritional contributions to PCOS are uncertain, studies indicated an association between PCOS indices and some nutrient levels [4]. The key nutritional deficiency is a deficiency of Vitamin D, which can aggravate PCOS, or the comorbidities brought about by it [4]. Environmental variables associated with PCOS (e.g., obesity) might be aggravated by bad food choices and lack of physical activity; pathogenic agents and chemicals may also play a role [6]. With dietary changes and exercise, the reproductive and metabolic symptoms of PCOS can frequently be reversed [6].

PCOS most frequently manifests as hyperandrogenism with ovarian dysfunction, chronic oligo-anovulation, and/or multiple polycystic ovaries of varying sizes [7].

PCOS symptoms that patients typically report include irregular or absent menstruation, hirsutism, acne vulgaris, acanthosis nigricans, unexplained weight gain and androgenetic alopecia [8].

Since PCOS is a multisystem disorder, it's associated with multiple metabolic abnormalities, including insulin resistance, hyperinsulinemia, hyperlipidemia, hypercholesterolemia, and an increase in homocysteine levels. Hormonal Imbalances such as elevated estrone and disproportionate levels of luteinizing hormone when compared to follicle-stimulating hormone. As well as other diseases and conditions e.g., infertility, miscarriages, obesity, hypertension, cardiovascular diseases, type 2 diabetes mellitus, endometrial dysfunction, adipose tissue hypertrophy, and chronic low-grade inflammation [7, 9]. Which can all be correlated to an excess of androgen levels in PCOS patients. Hyperandrogenism is the most probable cause of insulin resistance in PCOS patients [9–11].

Psychological stress has been linked to PCOS. Women with and without PCOS experienced different psychological burdens, which Barry et al analyzed in a plethora of studies. In comparison to women without the disease, researchers hypothesized that women suffering from the disease were prone to score higher on depression and anxiety scales. Veltman-Verhulst concluded in another meta-analysis that females with PCOS tended to show notably increased emotional discomfort than those without it. In a comprehensive appraisal, Cooney found that the

assessed research unambiguously demonstrated that PCOS was a significant determinant of an elevated risk of mental disorders like depression and anxiety (12–14).

A study was conducted in Oman to scrutinize the prevalence and severity of depression, anxiety, and stress including the link between PCOS. The presence of intellectual burden (including anxiety, depression, and tension) was measured utilizing The Depression, Anxiety, and Stress Scale-21 (DASS-21) (40). Test findings demonstrated that females with PCOS had a higher risk of depression, anxiety, and tension than did controls. Owing to the social impact of PCOS, psychological burdens can arise. Patients suffering from PCOS frequently experience decline in sexual satisfaction, obesity, body image issues, feminal identity issues, all of which contribute to psychological stress. One alternation of PCOS is considered to be infertility, especially patients with PCOS were more likely to experience anxiety and depressive symptoms. Women who are trying to conceive tend to place the greatest emphasis on this symptom; for example women in the Arab countries, where their identity is defined in terms of procreation (15).

Despite possible ethical and cultural lifestyle disparities, the majority of females with PCOS are overweight. PCOS patients face a variety of difficulties connected to their physical appearance. Dissatisfaction with one's physical appearance also served as a useful explanation for depressive and anxiety symptoms. Additionally, it seems to be (unfavorably) correlated with a keenness to socialize and worries that an individual's appearance will prevent them from forming relationships. Similar to this, the majority of worries—outside of weight gain—concern hair growth. Previous research suggests that PCOS-affected women experience a sense of masculinity as a result of their hirsutism, particularly in regions that are easily seen, such as their faces and see their bodies as a failing of their femininity. Significant lifestyle changes and suicidal thoughts may also manifest in these people as a result of the chronic suffering caused by hirsutism (14).

MATERIALS AND METHODS

Study Design, Population and Duration:

This study is a Cross-sectional based study. The study population included women of any nationality who approached health care facilities in the UAE (selected facilities from the Northern Emirates) who were within the age range of 18 to 49 years and accepted to participate in the study with Signed informed consent. The exclusion criteria of this study included those who refused to give informed consent and women who were not in the selected facilities. The duration of study lasted 8 months, from January 16, 2023 till September 9, 2024

Sample Size Calculation:

$$n = z^2 \cdot p \cdot q / d^2$$

$$z = \text{standard normal value } 1.96$$

$$p = 0.2 \text{ [2]}$$

$$q = 0.8$$

$$d = (0.02) = d^2 = (0.0004)$$

$$n = 1,536.64$$

add 10% for probability of refusal

therefore, $n = 1536.64 + 153.66 = 1,690$

Instrument for data collection & Validation Procedure:

A self administered questionnaire was developed by the research team. The questionnaire included the following domains: sociodemographic, medical history, family history, obstetric history, menstrual history, psychosocial impact related questions. The questionnaire included a Depression, Anxiety and Stress Scale – 21 Items (DASS-21) which is a set of three self-report scales designed to measure the emotional states of depression, anxiety and stress. Each of the three DASS-21 scales contained 7 items, divided into subscales with similar content. The DASS-21 was based on a dimensional rather than a categorical conception of psychological disorder. The questionnaire developed by the research team was validated by two experts (content validity) in the field for comprehensiveness of the content. Validated tools were pilot tested among 5 to 10 women with the same eligibility criteria to check for clarity of the questionnaire and the time required to fill each questionnaire.

Methodology

Eligible participants were approached after getting the IRB and official site approval. Physical and soft copies of the questionnaire and the consent form were available in both English and Arabic (Arabic version was translated using a certified service, and the Arabic version of DASS-21 was taken from The University of New South Wales, Australia official website). Those who accepted to participate were given a consent form to sign after explaining to them the objectives of the study and their right to refuse participation in the study or answering any question if they don't like. After signing the informed consent the questionnaire was handed to them. The research team was available to clarify any doubts.

Data Analysis:

Data was entered in excel sheet and imported to SPSS version 29. Data was presented in descriptive and inferential statistics. Chi square test was used to assess the association between the independent and dependent variables. Logistic regression analysis was used to assess predictors.

RESULTS

Our research included 1695 participants with a response rate of 97.2%. Participant distribution across sociodemographic factors were noted as follows: primarily, 16.5% were under 20 years old, mostly from the Eastern Mediterranean (40.5%). A majority were college graduates (52.8%), with most being unemployed (58.1%) and married (58.5%). The data we collected has been analyzed and organized into the following distribution figures and tables.

Figure 1 demonstrates the prevalence of Polycystic Ovarian syndrome. Out of the 1695 participants in our study, 30.3% ($n = 514$) were diagnosed with Polycystic Ovarian Syndrome.

Among the 1695 female participants in our study, the predominant majority (81.9%) did not encounter any fertility issues, and a significant portion (91.2%) were not presently pregnant. A notable proportion of participants (56.6%) had never experienced pregnancy before.

Upon categorization of participants based on their menstrual history, we found that out of 1695 participants, the majority of them had regular periods once a month (73.6%) with a normal blood flow (60%).

Furthermore, with relation to lifestyle habits, 58.2% of the participants were physically active but the majority of them were irregular with their exercise (58.6%) and followed a moderate workout routine (79.6%). 68.9% of the participants did not follow any special type of diet. Further, the data showed that around 10.3% of the participants were smokers.

Figure 2 vividly illustrates the prevalence of various chronic illnesses among our participants revealing a predominant occurrence of back problems among participants and a notably lower prevalence of stroke.

Table 1
The association between Polycystic ovarian syndrome and sociodemographic factor

Variable	Subcategories	Polycystic Ovarian Syndrome				Total	P-Value
		Yes		No			
		Number	%	Number	%		
Age	< 20	80	28.7	199	71.3	279	0.874
	20–24	85	32.7	175	67.3	260	
	25–29	79	29.8	186	70.2	265	
	30–34	72	28.5	181	71.5	253	
	35–39	85	32.9	173	67.1	258	
	40–44	65	29.3	157	70.7	222	
	> 45	48	30.4	110	69.6	158	
Nationality	Eastern Mediterranean	181	26.3	506	73.7	687	0.006
	European	52	32.1	110	67.9	162	
	South-East Asia	201	34.5	382	65.5	583	
	Region of the Americas	32	29.6	76	70.4	108	
	Western Pacific	29	25.2	86	74.8	115	
	African	19	48.7	20	51.3	39	
Education Level	Illiterate	13	40.6	19	59.4	32	0.251
	High school	82	34.5	156	65.5	238	
	College	262	29.3	633	70.7	895	
	Postgraduate	157	29.7	372	70.3	529	
Employment	Yes	209	29.4	501	70.6	710	0.245
	No	316	32.1	669	67.9	985	
Marital Status	Single	218	31.0	485	69.0	703	0.605
	Married	296	29.8	696	70.2	992	

Table 1 outlines the link between Polycystic Ovarian Syndrome (PCOS) and sociodemographic factors like age, nationality, education, employment, and marital status. Most PCOS cases are in the 35–39 age group (32.9%) with a notable representation from South-East Asian countries (35.5%). Also, around 29.3% are college graduates, while 32.1% are unemployed. About 29.8% diagnosed with PCOS are married.

Table 2
The association between Menstrual factors, obstetric factors and Polycystic Ovarian Syndrome

Variable	Subcategories	PCOS				Total	P-value
		Yes		No			
		Number	%	Number	%		
Regularity of menstrual cycle	Once a month	253	20.3	993	79.7	1246	< 0.001
	Once every 2–3 months	155	58.7	109	41.3	264	
	Once every 4–12 months	51	70.8	21	29.2	72	
	I don't have periods for more than 12 months	12	60.0	8	40.0	20	
	Multiple times a month	36	50.0	36	50.0	72	
	Others	7	38.9	11	61.1	18	
Menstrual Flow	Light	124	46.3	144	53.7	268	< 0.001
	Normal	182	17.9	835	82.1	1017	
	Heavy	208	50.7	202	49.3	410	
History of pregnancy	Yes	220	29.9	516	70.1	736	0.734
	No	294	30.7	665	69.3	959	
Fertility issues	Yes	158	52.1	145	47.9	303	< 0.001
	No	354	25.8	1019	74.2	1373	

Table 2 depicts the association between menstrual factors like regularity of the menstrual cycle, menstrual flow and Polycystic Ovarian Syndrome. 70.8% of the participants who had Polycystic Ovarian Syndrome got their periods once every 4–12 months and the predominant majority of them experienced heavy menstrual flow (50.7%). A significant portion of individuals diagnosed with PCOS, comprising 30.7% of the participants, had not undergone pregnancy previously. Additionally, 52.1% of those diagnosed with Polycystic Ovarian Syndrome reported facing fertility issues.

Table 3
The association between Family history and Polycystic Ovarian Syndrome

The association between Family history and Polycystic Ovarian Syndrome							
Variable	Subcategories	PCOS				Total	P-value
		Yes		No			
		Number	%	Number	%		
Family History	Yes	308	57.1	231	42.9	539	< 0.001
	No	217	18.8	939	81.2	1156	
Degree of relation [If yes for family history]	First	209	63.9	118	36.1	327	< 0.001
	Second	72	45.6	86	54.4	158	
	Third	31	57.4	23	42.6	54	

Table 3 depicts the association between Polycystic Ovarian Syndrome and the family history and degree of relationship of the participants. The result shows a significant association between family history and PCOS as well as for degree of relation and PCOS. 57.1% of the participants who were diagnosed with Polycystic Ovarian Syndrome had a relative who was also diagnosed with the same, and 63.9% of them were first-degree relatives.

Table 4
The association between Body Mass Index, Lifestyle factors and Polycystic ovarian syndrome

Variable	Subcategories	PCOS				Total	P-value
		Yes		No			
		Number	%	Number	%		
Body Mass Index	<18.5	30	29.1	73	70.9	103	0.167
	18.5–24.9	229	29.0	561	71.0	790	
	25–29.9	168	30.8	377	69.2	545	
	> 30	84	36.7	145	63.3	229	
Special diet	Yes	198	38.0	323	62.0	521	< 0.001
	No	307	26.6	845	73.4	1152	
Issues with maintaining body weight	Yes	319	44.1	404	55.9	723	< 0.001
	No	195	20.1	777	79.9	972	
Smoking history	Yes	67	38.5	107	61.5	174	0.014
	No	447	29.4	1072	70.6	1519	
Exercise	Yes	326	33.1	660	66.9	986	0.028
	No	199	28.1	510	71.9	709	
Regularity of exercise	Regular	118	29.1	288	70.9	406	0.029
	Irregular	205	35.7	369	64.3	574	
Intensity of exercise	Vigorous	57	29.1	139	70.9	196	0.135
	Moderate	265	34.7	498	65.3	763	

Table 4 illustrates the correlation between Body Mass Index and various lifestyle factors like nutrition, Issues with body weight, smoking history and polycystic ovarian syndrome. Among those with Polycystic Ovarian Syndrome, 44.8% have a body mass index between 18.5–24.9. Additionally, 38.0% of the participants with polycystic ovarian syndrome are following special diets. 38.5% of participants diagnosed with PCOS are smokers. The table also indicates that 29.1% of participants consistently engage in regular and vigorous exercise, underscoring a significant portion of the population committed to maintaining an active lifestyle.

Table 5
The association between chronic conditions and polycystic ovarian syndrome

Variable	Subcategories	PCOS				Total	P-value
		Yes		No			
		Number	%	Number	%		
Heart disease	Yes	17	28.8	42	71.2	59	0.797
	No	497	30.4	1139	69.6	1636	
Diabetes	Yes	80	43.7	103	56.3	183	< 0.001
	No	434	28.7	1078	71.3	1512	
Hypertension	Yes	73	34.1	141	65.9	214	0.197
	No	441	29.8	1040	70.2	1481	
Arthritis	Yes	28	32.9	57	67.1	85	0.590
	No	486	30.2	1124	69.8	1610	
High cholesterol	Yes	52	34.9	97	65.1	149	0.203
	No	462	29.9	1084	70.1	1546	
Chronic Respiratory Disease	Yes	14	34.1	27	65.9	41	0.590
	No	500	30.2	1154	69.8	1654	
Obesity	Yes	64	39.0	100	61.0	164	0.011
	No	450	29.4	1081	70.6	1531	
Asthma	Yes	59	46.5	68	53.5	127	< 0.001
	No	455	29.0	1113	71.0	1568	
Back Problems	Yes	152	33.6	300	66.4	452	0.074
	No	362	29.1	881	70.9	1243	
Chronic Kidney Disease	Yes	8	29.6	19	70.4	27	0.937
	No	506	30.3	1162	69.7	1668	
Irritable Bowel Syndrome	Yes	67	35.4	122	64.6	189	0.104
	No	447	29.7	1059	70.3	1506	

Table 5 presents an analysis of the correlation between chronic conditions and polycystic ovarian syndrome. Notably, the data reveals a significant association between Diabetes, Obesity and Asthma with PCOS accounting for 43.7%, 39.0% and 46.5% respectively.

Table 6
The association between psychological burden and polycystic ovarian syndrome

Variable	Subcategories	PCOS				Total	P-value
		Yes		No			
		Number	%	Number	%		
Stress	Normal	204	27.3	544	72.7	784	0.010
	Mild	144	31.4	315	68.6	459	
	Moderate	109	34.8	204	65.2	313	
	Severe	54	36.5	94	63.5	148	
	Extremely severe	12	50.0	12	50.0	24	
Anxiety	Normal	244	28.7	607	71.3	851	0.005
	Mild	30	26.5	83	73.5	113	
	Moderate	82	29.1	200	70.9	282	
	Severe	55	34.4	105	65.6	160	
	Extremely severe	114	39.9	172	60.1	286	
Depression	Normal	220	26.3	618	73.7	838	< 0.001
	Mild	94	34.9	175	65.1	269	
	Moderate	102	37.0	174	63.0	276	
	Severe	50	37.9	82	62.1	132	
	Extremely severe	59	33.1	119	66.9	178	

Table 6 shows the strong correlation between psychological challenges like anxiety, stress, and depression with Polycystic Ovarian Syndrome (PCOS). Stress is notably linked ($P = 0.010$) with half of PCOS patients experiencing severe symptoms. Anxiety ($P = 0.005$) affects 39.9% severely, and depression ($P = < 0.001$) impacts 37.9% significantly among those diagnosed with PCOS.

Table 7
Predictors of Polycystic Ovarian Syndrome.

Variable	Subcategory	No.	COR	C.I.		P value	AOR	C.I		P value
Family history	Yes		5.770	4.604	7.230	< .001	1.867	1.247	2.794	0.002
	No		1				1			
Menstrual Flow	Light	268	0.253	0.190	0.338	< 0.001	0.392	0.231	0.664	< 0.001
	Normal	1017	1.154	0.848	1.571	0.361	1.048	0.596	1.841	0.872
	Heavy	410	1				1			
Issues with maintaining body weight	Yes	723	2.120	1.605	2.801	< 0.001	1.540	1.025	2.314	0.037
	No	972	1				1			
Obesity	Yes	164	1.485	1.066	2.071	0.021	0.535	0.288	0.993	0.047
	No	1531	1				1			
Asthma	Yes	127	2.199	1.527	3.167	< 0.001	3.293	1.647	6.586	< 0.001
	No	1568	1				1			
Smoking history	Yes	174	1.491	1.079	2.061	0.016	1.205	0.630	2.303	0.573
	No	1519	1				1			
Hormonal drugs	Yes	251	11.311	8.215	15.574	< 0.001	2.561	1.415	4.633	0.002
	No	1431	1				1			

Table 7 outlines predictive factors of PCOS occurrence. Significant associations include family history (P = 0.002), heavy menstrual bleeding (P = < 0.001), irregular menstrual cycles, changes in body/facial hair growth (P = 0.001), weight maintenance issues (0.037), obesity (0.047), Asthma (P = < 0.001), use of hormonal drugs (P = 0.002), prior hormonal testing (P = 0.002), and diagnostic testing like PCOS-specific ultrasounds (P = < 0.001).

DISCUSSION

The findings of the present research are based on categorical responses on whether the participants have ever been diagnosed with PCOS and the results show that out of the total sample of 1690, 514 individuals, constituting 30.3% of the respondents, reported having received a diagnosis of PCOS. This suggests that nearly one-third of the surveyed population that approach healthcare facilities in the United Arab Emirates has been diagnosed with PCOS.

Our findings align closely with those of a separate study conducted in the RAKMHSU, Ras Al Khaimah, United Arab Emirates, which reported a PCOS prevalence of 27.6% [16].

Another study done in UAE that included participants from a single site, showed a lower prevalence- 13%, which is in contrast with our study. It should be noted that the previous mentioned studies had a smaller sample size [250

and 493 respectively], with data collected from a single site in both studies, whereas our study had a wider and multi-center approach [17].

Similarly, a systematic review calculated pooled mean prevalence of PCOS to be 21.27%. This figure represents the average prevalence across these diverse surveys, each likely employing different methodologies and diagnostic criteria [18].

In comparison with a cross-sectional study conducted at a multiethnic university, approximately 28.5% of respondents reported having received a formal diagnosis of PCOS which shows a close correspondence with the prevalence of our research. Notably, among those without a formal diagnosis, a substantial 40.5% exhibited two or more symptoms that align with PCOS [19].

In Iran, two distinct studies on PCOS revealed varying prevalence rates of 11.7% and 7%, respectively. Contrastingly, a recent evaluation in North India found a PCOS prevalence of 3.7%, while a study among Palestinian subjects reported a prevalence of 7.3% [20, 21].

Our statistical analysis revealed a discernible association between ethnicity and the prevalence of PCOS. Notably, the highest prevalence of PCOS was observed in African females, with a prevalence of 48.7%, followed by South-East Asian women at 34.5%. Conversely, women from the Western Pacific exhibited the lowest prevalence at 25.2%. These findings align with a meta-analysis conducted which corroborated the ethnic disparities in PCOS prevalence. The meta-analysis indicated that Chinese women had the lowest prevalence at 5.6%, while Middle Eastern women followed closely with a prevalence of 6.1%. Notably, African women displayed the highest prevalence at 6.1%. [5]

Regarding the history of comorbid conditions, this study showed that 43.7% of the participants who were diagnosed with Polycystic Ovarian Syndrome also had diabetes and there was a significant association between diabetes and Polycystic Ovarian Syndrome ($p < 0.001$). This is similar to the research conducted in China by Long et.al where they found the overall prevalence of PCOS in women with diabetes was approximately 21%. Another research conducted in the United Kingdom by Ding et al also showed an association between Type 2 diabetes and PCOS with a prevalence of 26.5%. [5, 22]

Another chronic illness that showed a significant association is obesity ($p = 0.011$), where 39% of the participants who took part in our study had obesity and were diagnosed with PCOS. This is similar to a meta-analysis done in Australia by Lim et al, in which it was deduced that women with PCOS had an increased prevalence of overweight [RR (95% CI): 1.95 (1.52, 2.50)], obesity [2.77 (1.88, 4.10)] and central obesity [1.73 (1.31, 2.30)]. Likewise, A meta-analysis of the results of the case-control study design subgroups and cross-sectional studies showed that obese women had a 1.14-fold increased risk of developing PCOS compared to non-obese women (aOR = 1.14; 95% CI = 1.03 to 1.26; $p = 0.010$), [23, 24, 25, 26]

Asthma emerged as a significant factor ($p < 0.001$), establishing an association with the prevalence of Polycystic Ovarian Syndrome (PCOS). Within our study cohort, 46.5% of participants diagnosed with PCOS also carried a concurrent diagnosis of asthma. This analysis is supported by research done in the UAE by Abdulle et al, in Australia by Hart et al (10.56%), in Norway by Underdal et al (19.31%), and in Denmark by Zierau et al (19.59%). [27, 28]

Analysis of our study also revealed a significant association between various lifestyle factors and the prevalence of PCOS. Of the 1695 participants from our study, 38% of the PCOS-diagnosed females were found to be following a special type of diet ($p = < 0.001$), while 38.5% of them were found to have a smoking history ($p = 0.014$), and 33.1%

of them were engaged in physical activity like exercise ($p = 0.028$). A few research were conducted to find a correlation between lifestyle changes like physical activity and diet and Polycystic Ovarian Syndrome, including research done by Ahmadi et al in Iran, which found a result of greater nutrient intake in individuals with PCOS than those without, showing significance ($P < 0.05$) and thus supporting our hypothesis. However, the research study also showed a result of insignificant association between physical activity and PCOS, which contradicts the outcome of our research. [29]

Additionally, through our research, we found a significant association between PCOS and the prevalence of the disease among other family members, predominantly first-degree relatives. Of the 1695 participants, 57.1% of them had a diagnosis of PCOS and also had a relative who was diagnosed with the same. This is also proven by other research like the one done in the USA by Melissa et al that states a result of 24% of prevalence of PCOS among individuals with first-degree relatives having PCOS. A positive family history of PCOS was identified in 58.3% of students through research done in India by Aggarwal et al.[30, 31]. This strong association between PCOS and family history observed in our study underscores a likely genetic predisposition and familial clustering could also be driven by shared lifestyle and dietary patterns within households. This dual mechanism suggests that screening should not only be individualized but also family-oriented, with preventive education targeted at first-degree relatives of women diagnosed with PCOS. In a multicultural society such as the UAE, where both consanguinity and diverse ethnic backgrounds coexist, such strategies may prove particularly important.

Lastly, the Majority of participants in our study, who had a diagnosis of PCOS were found to be taking hormonal medications. Of the 1695 participants in our study, 76.5% of the participants who were on hormonal drugs had PCOS, thus giving a significant association between hormonal drug intake and Polycystic Ovarian Syndrome.

In our study, we discovered that 70.8% of the women diagnosed with PCOS reported that they have an irregular menstrual cycle occurring once every 4–12 months along with heavy menstrual flow. Similarly a cross-sectional research conducted in South Korea revealed that 48.9% of the women reported irregular menstruation with an estimated 55.9% of the participating women having heavy menstrual bleeding. [32] Our findings also indicate that only 20.3% of the women diagnosed with Polycystic ovarian syndrome have a normal menstrual cycle.

Infertility among women with Polycystic ovarian syndrome is associated with oligomenorrhea or amenorrhea which refers to an irregular or absent menstrual cycle. Our research uncovered that 18.1% of women diagnosed with polycystic ovarian syndrome experience fertility issues. There is a significant positive correlation between fertility issues and polycystic ovarian syndrome (P value of $< .001\%$). A cross sectional study conducted in Australia revealed a self-reported Polycystic ovarian syndrome prevalence of 5.8% (95% confidence interval [CI]: 5.3%-6.4%). Among 309 women diagnosed with Polycystic ovarian syndrome, 72% experienced infertility, whereas only 16% of 4547 women were not diagnosed with PCOS ($p < 0.001$). Infertility risk was 15 times higher in women reporting PCOS (adjusted odds ratio 14.9, 95% CI 10.9–20.3), regardless of their body mass index. [33]

Clinical characteristics commonly linked with polycystic ovarian syndrome include increase in facial or body hair growth, hyperpigmentation, hair loss or receding hairline and increase in facial acne or oily skin. Our Research shows 56.1% of women diagnosed with Polycystic ovarian syndrome reported increased facial or body hair growth. These observations align with a study conducted in Brazil that showed a prevalence of 65–75% in women with Polycystic ovarian syndrome. Additionally, 53.7% of the cases of hyperpigmentation that our research shows are comparable to a study that looked at 175 female PCOS patients (mean age of 16.8 ± 1.7 years) and found that 77.7% of the sample population had hyperpigmentation. [34] According to our study, 40.5% of women with PCOS reported having receding hairlines or hair loss. Interestingly, a P -value of less than .001 indicates a strong

correlation between PCOS and hair loss, in contrast to a different study in which 472 women with female pattern hair loss were diagnosed with PCOS, but only 8% of them reported having PCOS. [35] We found that 43.7% of women with polycystic ovarian syndrome reported having more oily skin or facial acne. Similarly, 208 patients with a mean age of 31.8 ± 7.1 years had persistent, late-onset, and recurrent acne in that study (47.1%, 26.9%, and 26%). [36] All of these PCOS-related symptoms had P-values less than .001, indicating a strong association between hyperpigmentation, hair loss or receding hairlines, increased facial or body hair growth, and a rise in oily or acne-prone skin in people with polycystic ovarian syndrome.

Our findings extend beyond the physical manifestations of PCOS, highlighting its profound psychosocial burden. The relationship between polycystic ovarian syndrome (PCOS) and mental health is receiving increased attention, with stress, depression, and anxiety emerging as significant factors influencing the psychological well-being of individuals with PCOS [15]. A self-reported screening tool called DASS-21 is used in our research to evaluate the negative emotional states of stress, anxiety, and depression. The DASS-21 consists of 21 questions, seven questions for stress, anxiety, and depression respectively.

In our investigation, we observed a notable association between stress and individuals diagnosed with PCOS, with a significant p-value of 0.010. Among the participants, 27.3% reported experiencing no/normal levels of stress, 31.4% reported mild stress, 34.8% reported moderate stress, 36.5% reported severe stress, and 50% reported extremely severe stress. These findings highlight a positive correlation between stress levels and PCOS.

Similarly, conducted in Chennai, India, a study by Benjamin et al. (2023) aimed to find any significant difference in stress levels between PCOS and healthy controls. The study encompassed 250 female participants aged 18–35, comprising 100 cases. Utilizing the Perceived Stress Scale (PSS). The comprehensive PSS scores were observed to be higher among women with PCOS (19.74 ± 5.54) than in the control group (16.56 ± 6.04), demonstrating statistical significance with a p-value < 0.001. Additionally, the incidence of moderate stress was higher among PCOS women compared to controls [37].

Anxiety in participants with PCOS has also been found to be significant ($P = 0.005$), with 28.7% experiencing no anxiety, 26.5% experiencing mild anxiety, 29.1% experiencing moderate anxiety, 34.4% experiencing severe anxiety and 39.9% experiencing extremely severe anxiety. Indicating that participants diagnosed with PCOS show progressively increased anxiety.

Likewise, a research investigation conducted by Pawel et al. (2022) in Poland aimed to assess the degree of anxiety. This study involved 230 women diagnosed with PCOS all within the age range of 20 to 40 years. The study utilized the Hospital Anxiety and Depression Scale (HADS). The findings of the study validated elevated levels of anxiety. Anxiety was found to be absent in only 25% of the examined women with PCOS, while 74.4% reported experiencing anxiety symptoms [38].

There has also been substantial evidence of depression in PCOS subjects, as it is significant ($P = < 0.001$), with 26.3% experiencing no depression, 34.9% experiencing mild depression, 37% experiencing moderate depression, 37.9% experiencing severe depression and 33.1% experiencing extremely severe depression. This suggests a higher occurrence of mild to moderate depression in women with PCOS.

Similarly, psychological alterations of patients suffering from PCOS were evaluated in a study conducted in Karnataka, India, by Satish et al. (2021). Involving 125 participants, the study utilized the PCOSQL questionnaire, affirming that women with PCOS are more prone to mild to moderate depression. Notably, the findings indicated that 39.51% of women reported mild depression, and 17.74% reported moderate depression [39].

Even though the significant prevalence of stress, anxiety, and depression among women with PCOS in our study mirrors international evidence, yet the severity levels reported here appear higher. This may reflect sociocultural pressures specific to the UAE, where issues such as infertility, weight gain, and cosmetic symptoms (hirsutism, acne, hair loss) may carry heightened stigma. Such stigma may exacerbate psychological distress, creating a vicious cycle in which mental health deteriorates and worsens PCOS outcomes through poor lifestyle adherence or irregular medical follow-up.

Limitations

In spite of the relatively large sample size used in this study, we cannot generalize these findings for the entire population of women approaching healthcare facilities in the UAE. There is a possibility of self-selection bias. There is a possibility of Recall bias.

CONCLUSIONS

In conclusion, we were able to assess the prevalence of PCOS among women approaching healthcare facilities in the UAE. The findings of the study revealed a prevalence rate of 30.3% with African females showing the highest prevalence (48.7%). Significant associations were found between PCOS and the following factors: Ethnicity, family history, degree of relation for family history, depression, diabetes, obesity, asthma, special diet, smoking, exercise, hormonal drugs, hormonal testing, history of investigations done for PCOS, fertility issues. Menstrual irregularities, menstrual flow variations, and issues with maintaining body weight were also found to be associated with the prevalence of PCOS. Women who were diagnosed with PCOS were found to have increased facial and body hair growth, hyperpigmentation, receding hairline, and facial acne and/or oily skin.

We found the predictors of PCOS to be: Family history, Regularity of periods, Facial and body hair, Light menstrual flow, participants that face issues with maintaining body weight, Obesity, Asthma, Hormonal drugs and testing, History of investigations for PCOS and facial acne and/or oily skin. Significant associations were found between participants diagnosed with PCOS and its effects on their mental wellbeing. The study revealed that the participants diagnosed with PCOS were showing symptoms of extremely severe stress and anxiety and severe depression (50%, 39.9% & 37.9% respectively). Our findings suggest that screening for mental health disorders should be integrated into PCOS management in the UAE healthcare system, rather than focusing solely on metabolic control.

Abbreviations

PCOS - Polycystic Ovarian Syndrome

UAE - United Arab Emirates

DASS-21 - Depression, Anxiety, and Stress Scale-21

Declarations

Ethical consideration and Human Subject protection:

The major ethical issues in conducting our research are as follows: this study was conducted in accordance with the Declaration of Helsinki. Data collection was started after getting approval from the Institutional Review Board of

Gulf Medical University, Ajman, UAE, and official ethical approval was obtained. Eligible participants were approached and informed about the objective of the study and their right to refuse participation. Only those who accepted and signed the informed consent form were included. In the case, if a participant was unable to make an informed decision on their own (illiterate), the legal guardian or an appropriate representative of these participants provided informed consent on their behalf. Privacy and confidentiality of the information was respected. Data collection sites were asked to provide a private place for data collection. The questionnaire was anonymous. Contact information was not taken from participants. Data was analyzed groupwise so there was no link between the results and any participant. There was no access to the data except by the research team and the IRB committee.

Consent for Publication:

Not Applicable

Availability of data and materials:

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests:

The authors declare that they have no competing interests.

Funding:

There was no funding for this research.

Author's contributions:

Writing the background, the literature review, and creating the questionnaire based on their individual objectives were done by all the authors. In addition to gathering pertinent data and writing about the general and psychosocial aspects of PCOS, AFUA and ITK also used the SPSS program to analyze and evaluate patient data. AZ was involved in gathering pertinent data, writing about the general aspects associated with PCOS, and compiling the findings into tables and graphics. AH participated in gathering pertinent data and writing about the prevalence of PCOS. Every author participated in the data collection procedure. Finally, SAS supervised the research and also played a major role in the scientific writing and guided through the data analysis process.

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Figures

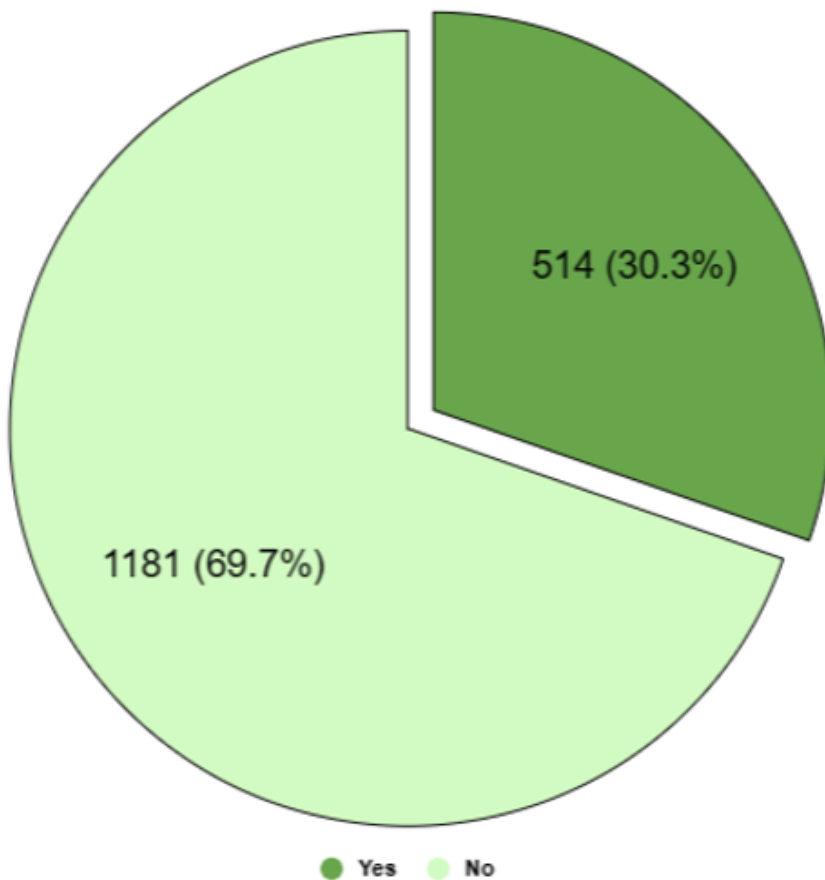


Figure 1

Prevalence of Polycystic Ovarian Syndrome.

Figure 1 demonstrates the prevalence of Polycystic Ovarian syndrome. Out of the 1695 participants in our study, 30.3% (n=514) were diagnosed with Polycystic Ovarian Syndrome.

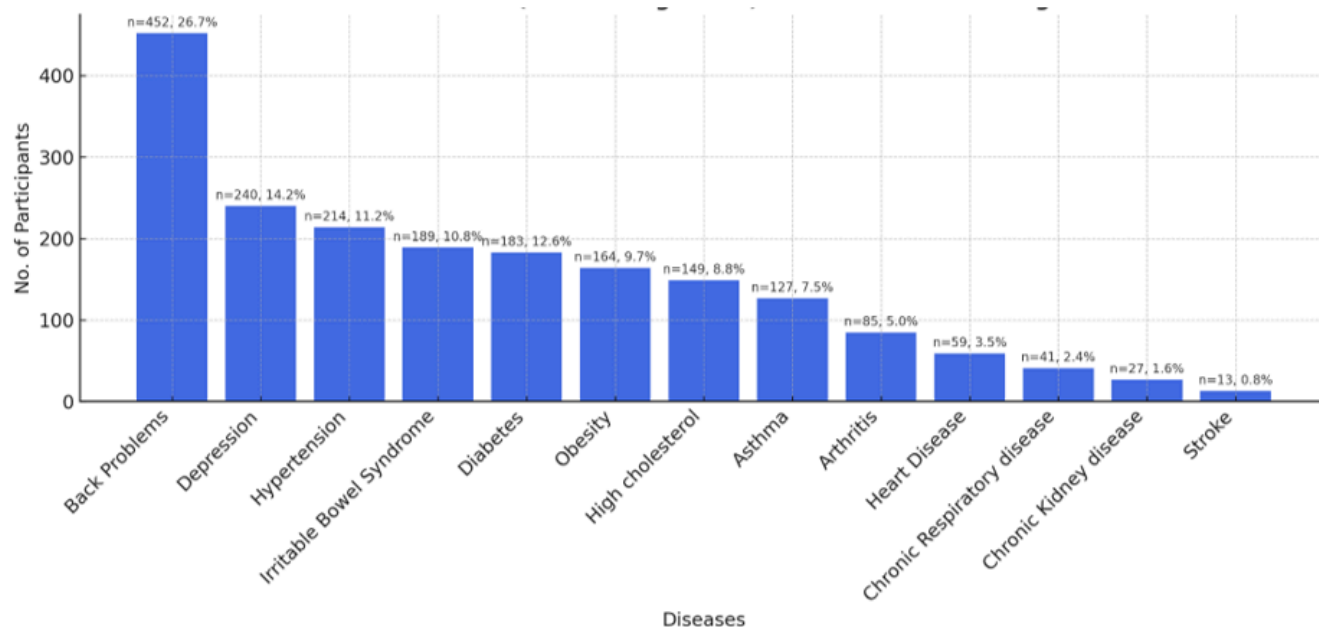


Figure 2

Frequency of chronic illness among participants

Figure 2 vividly illustrates the prevalence of various chronic illnesses among our participants revealing a predominant occurrence of back problems among participants and a notably lower prevalence of stroke.

Supplementary Files

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- [grandfinaldistributableenglishquestionnaire1.docx](#)