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KNOWLEDGE, ATTITUDE, AND PRACTICE OF POLYCYSTIC OVARY SYNDROME AMONG FEMALE QASSIM REGION, SAUDI ARABIA

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ABSTRACT

Introduction: Polycystic Ovarian Syndrome (PCOS) is one of the most endocrine disorders in young women during their reproductive years. PCOS is associated with the incidence of type 2 DM and infertility, which in turn increases the financial burden to healthcare system. The aim of this study is to determine the knowledge, attitude, and practice of polycystic ovary syndrome among female Qassim region.

Methods: An observational, cross-section study recruited young women age between 18 and 50 years from September 2019 to November 2019 in Al Qassim region. The data is obtained through an online survey that is posted in commonly used social media applications: namely, Instagram, Snapchat, Telegram, WhatsApp, and twitter. EPI INFO 7 is used to determine the association among demographical factors and knowledge, attitude, and practice of polycystic ovary syndrome.

Results: Over 400 participated women there is 84% have knowledge about PCOS, 73% know the correlation between PCOS and obesity, 46% know that PCOS is heredity. At the same time, 63% did not realize that PCOS can cause type 2 DM. Moreover, knowledge has a significant association with age, social status, and education level with P-value 0.003, 0.02, 0.018, respectively. In terms of prevalence, 22% of participants have PCOS, while 17% of their mother or sister has PCOS.

Conclusion: Knowledge of PCOS is a significant association

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with age, social status, and education level. To increase awareness of women related PCOS, these factors should keep in mind to produce an effective education program/campaign.

Keywords: Polycystic ovarian syndrome; Knowledge; Attitude; Practice; Qassim region

LIST OF ABBREVIATIONS

Abbreviations	Used For
PCOS	Polycystic ovary syndrome
NIH	National Institutes of Health
DHEA	Dehydroepiandrosterone hormone
NICHD	National institutes of child health and human development
LH	Luteinizing hormone
DM	Diabetes mellitus

INTRODUCTION

Polycystic ovarian syndrome (PCOS) is a combination of symptoms and signs of ovarian dysfunction and androgen excess in the absence of other specific diagnoses, and it is one of the most common metabolic and endocrine disorders in premenopausal women. PCOS is frequently associated with abdominal adiposity, obesity, insulin resistance, metabolic disorders, and cardiovascular risk factors (HF, 2019).

PCOS is now recognized by the National Institute of Child Health and Human Development as one of the most common endocrinopathies in women of reproductive age, with a prevalence of 4–10% (Diamanti-Kandarakis and Dunaif, 2012). Moreover, it affects approximately 5 million women of childbearing age in the U. S, according to the National Institutes of Health Office of Disease. Prevention, which costs the U.S. healthcare system for the identification and management of PCOS approximately $4 billion per year. PCOS is the most common endocrine abnormality among women of reproductive age in the U.S as research suggests that 5% to 10% of females between the age of 18 to 44 years of age are affected by PCOS (Uche Anadu Ndefo, 2019).

Thus, the aim of this study is to determine the knowledge, attitude, and practice of polycystic ovary syndrome among the female Qassim region, Saudi Arabia. In turn, this will lead to decreases in the incidence of PCOS, as well as the cost.

REVIEW OF LITERATURE

POLYCYSTIC OVARY SYNDROME:

polycystic ovary syndrome is the association of chronic anovulation with hyperandrogenism in women without specific underlying diseases of the pituitary or adrenal glands (Franks, 1995).The etiology of this syndrome remains largely unknown, but mounting evidence suggests that PCOS might be a complex multigenic disorder with strong environmental and epigenetic influences, including lifestyle and diet factors. (HF, 2019).

PCOS was first reported in 1935 by Stein and Leventhal and has been the most common cause of oligo ovulatory infertility (Knochenhauer et al., 1998). The significant endocrine disruption is excessive androgen secretion or activity, and a large proportion of women also have abnormal insulin activity. Many body systems are affected in polycystic ovary syndrome, resulting in several health complications, including infertility, menstrual dysfunction, hirsutism, obesity, acne, and metabolic syndrome. Women with this disorder have an established increased risk of developing type 2 diabetes and a still debated increased risk of cardiovascular disease. It is affected by about one in 15 women worldwide (Norman et al., 2007).

The prevalence of PCOS in premenopausal women ranges from ~6% to ~20%, possibly making this syndrome the most common endocrine and metabolic disorder in women of reproductive age (HF, 2019). The first studies to

determine prevalence in a medically unselected (unbiased) population were reported PCOS prevalence ranging from 4% to 6.6% using the NIH 1990 criteria among unselected reproductive-age women residing in the southeastern region of the United States (Lizneva et al., 2016).

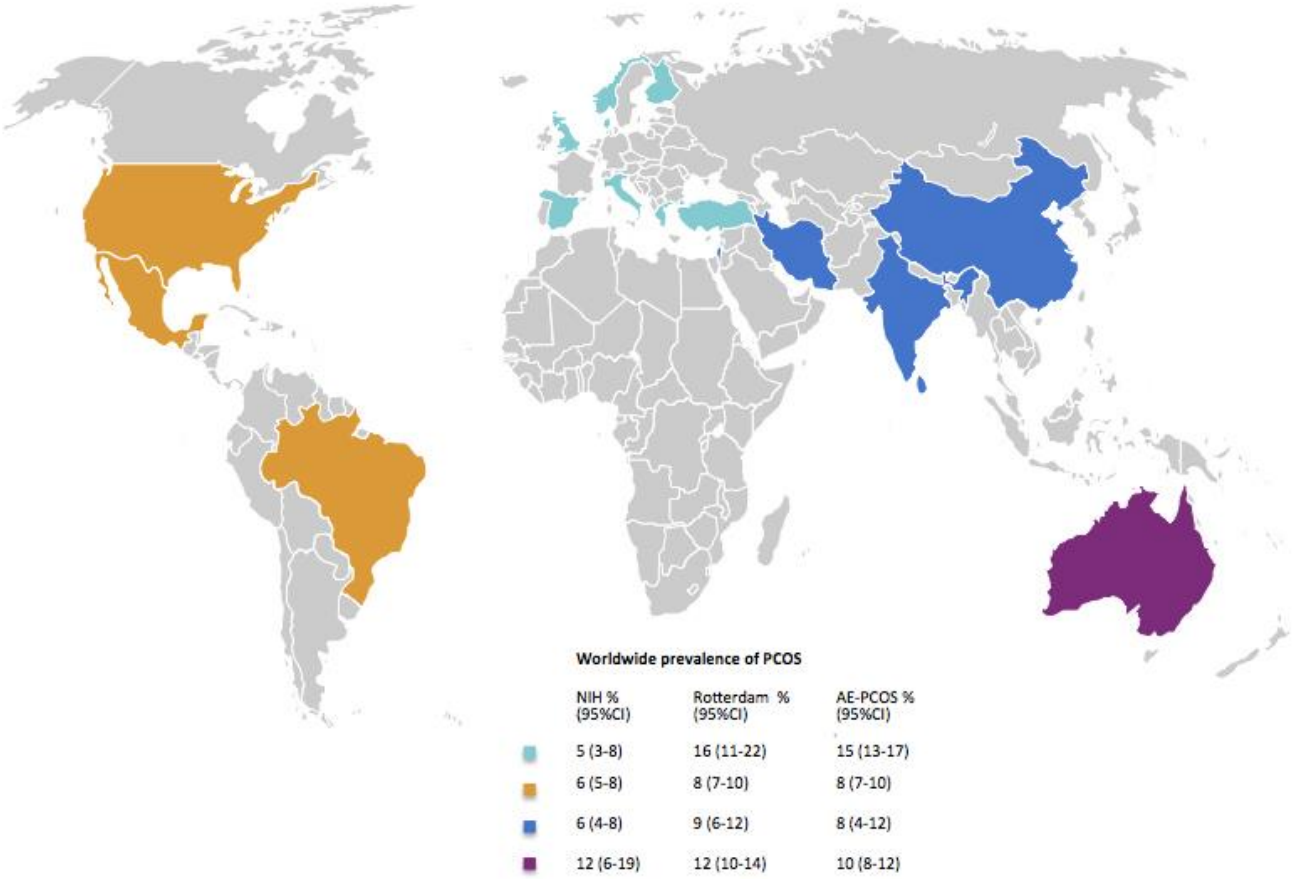


FIGURE1: The distribution of PCOS (Bozdag et al., 2016).

Until recently, the PCOS diagnosis was based on the criteria established by a 1990 NIH/National Institutes of Child Health and Human Development (NIH criteria) conference and Rotterdam Criteria. (Sam, 2007).

NIH/NICHD Criteria	Rotterdam Criteria
Diagnosis requires both features:	Diagnosis requires 2 of 3 features:
1. Oligo and/or anovulation	1. Oligo and/or anovulation
2. Hyperandrogenism Clinical or biochemical	2. Hyperandrogenism Clinical or biochemical
	3. Polycystic ovary morphology

Table 1: Diagnostic Criteria for PCOS (Sam, 2007).

Androgen hormone:

The androgens androstenedione, dihydrotestosterone, and testosterone are primarily synthesized from cholesterol and are produced by the ovary in a sequential manner together with other progestogens, sex steroids, and estrogens. Hyperandrogenism, a typical feature of polycystic ovary syndrome, is often associated with disturbed reproductive performance, androgens have been shown to promote ovarian follicle growth in shorter exposures (Gervásio et al., 2014).

Hyperandrogenism is defined by the state caused or characterized by excessive production and/or secretion of androgens, which is usually manifested by hirsutism, frontal alopecia, or

acne. Hyperandrogenemia also refers to increased blood levels of androgens, hyperandrogenism is the main feature of PCOS, because up to 70–80% of PCOS women exhibit hyperandrogenism's clinical manifestations. Ovaries will directly secrete androgens in the circulation, mainly as androstenedione and testosterone. Adrenal glands are the primary source of circulating testosterone in postmenopausal women because, at this stage, ovaries progressively diminish their androgen production. The cortex of the adrenal gland comprises three layers, and each has distinct enzymatic cascades resulting in three different types of steroids. The outer part of the adrenal gland (zona glomerulosa) has the capacity to secrete mineralocorticoids, such as aldosterone. The inner parts of the adrenal cortex (zona fasciculata and zona reticularis) produce androgens such as DHEA and androstenedione. In women, adrenal gland contribution to androgen production is very important. Indeed, ovarian and adrenal glands contribute approximately half and half to circulating testosterone in women of reproductive age they each contribute directly to approximately 25% of total testosterone production and to 25% of total androstenedione secretion, which is in turn converted peripherally to testosterone. In PCOS, the ovaries produce up to 60% of androgens, while the adrenals contribute the remaining 40%. It is established that androgens incoming from both the ovary and the adrenal are the underlying sources of hyperandrogenemia in PCOS women (Baptiste et al., 2010).

Acne and Hirsutism:

Skin and hair disorders can be substantial in women with polycystic ovary syndrome and are physically and psychologically very damaging (Norman et al., 2007)., hirsutism in women is defined as excessive facial and/or body terminal hairs in a male like distribution, hirsutism is present in 60–80% of American women with PCOS but in only 20% of Japanese PCOS patients. Acne vulgaris is the most common skin disorder and affects almost 17 million people in the United States, However, up to 50% of women with hyperandrogenism will have acne lesions on the neck, chest and upper back (Archer and Chang, 2004). the frequency of acne and alopecia in women with polycystic ovary syndrome is higher than in the general population (Norman et al., 2007).

Hirsutism is usually classified as mild, moderate or severe as determined by a clinical estimate. In effort to objectively quantify the degree of hirsutism, the Ferriman – Gallwey scoring system to assess hair growth was introduced in 1961. The original system was based on the presence of hair in 11 areas of the body but has since been modified to include just nine regions. The scale is from 0 (absence of terminal hairs) to 4 (extensive terminal hair growth) and the numbers are added together to reach a maximum score of 36 Most researchers have defined hirsutism as a modified F–G score of 8 or above, although others use a cutoff of 6 (Archer and Chang, 2004).

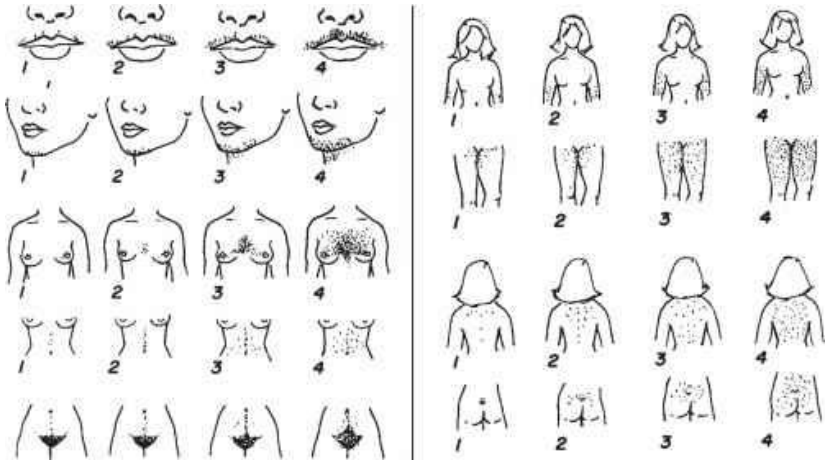


FIGURE2: Modified Ferriman–Gallwey (F–G) hirsutism scoring system for nine body areas (Archer and Chang, 2004).

Antiandrogens are the treatment of choice for androgen-dependent hirsutism, but a satisfactory cosmetic result is not often achievable, and the complete reversal of symptoms is rare. Acne can be treated by broad-spectrum antibiotics in the first instance, but if these prove unsatisfactory further options include retinoic acid derivatives and antiandrogens both of which are effective. (Franks, 1995).

Obesity:

Since its original description in 1935 by Stein and Leventhal, obesity is a common finding in PCOS and aggravates many of its reproductive and metabolic features. In the United States, some studies report that the prevalence of overweight and obesity in women with PCOS is as high as 80% (Sam, 2007). In recent studies it has also been shown that obese subjects have a higher prevalence of menstrual disorders and, consequently, infertility and hirsutism than normal weight women with PCO (KIDDY et al., 1992). Obese PCOS women also have more severe insulin resistance and hyperandrogenism when compared with either normal weight PCOS women (Pasquali and Casimirri, 1993).

Most women with PCOS become overweight just before or during puberty and several lines of evidence suggest that the onset of obesity in this period of life could represent a specific factor for the subsequent development of PCOS (Pasquali and Casimirri, 1993).

Insulin resistance:

PCOS is a common and well-defined clinical model of pre-diabetic state and insulin resistance. Insulin sensitivity is decreased by an average of 35% to 40% in women with PCOS, like what is seen in women with non-insulin-dependent diabetes mellitus. Thus, most women with PCOS are insulin resistant and develop compensatory hyperinsulinemia which seems to play a critical role in the syndrome pathogenesis. PCOS is also characterized by insulin-related hyperandrogenemia, which implies an important role of insulin in the regulation of ovarian androgen biosynthesis in fact, multiple studies have shown that insulin stimulates androgenesis in normal ovarian. Studies suggest that hyperandrogenemia is related to insulin action even in normal body weight PCOS women with normal insulin sensitivity and levels (Baptiste et al., 2010).

There is a higher prevalence of hyperinsulinemia and insulin resistance together with raised LH levels in PCOS, Insulin and LH appear to be key hormones in the stimulation of androgen production by the ovary. (Huber-Buchholz, Carey and Norman, 1999).

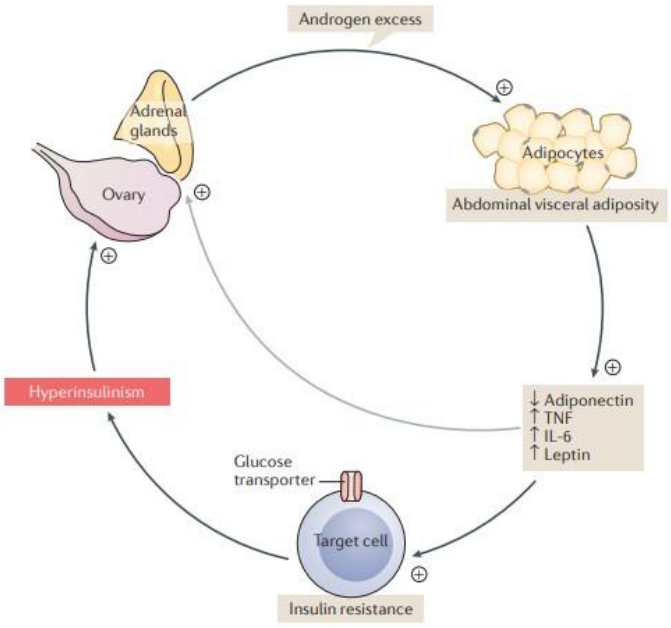


FIGURE3: Hyperinsulinism and hyperandrogenism in PCOS (HF, 2019).

Insulin resistance is a common finding independent of obesity. Insulin-mediated glucose disposal, reflecting mainly insulin action on skeletal muscle is decreased by 35–40% in women with PCOS compared to weight comparable reproductively normal women, this defect is independent of but substantially worsened by obesity (Sam, 2007). A small reduction of bodyweight was enough to restore ovulation and increase insulin sensitivity by 71% in obese anovulatory women (Norman et al., 2007).

Genetic:

The polycystic ovary syndrome is a familial disorder, but the genetic basis of the syndrome remains controversial. Determining the mode of inheritan- ce of this syndrome is difficult because there has been no clearly described male phenotype and because it is a disorder that affects principally women of reproductive age. However, a recent study of women with the PCOS revealed evidence of an autosomal dominant mode of inheritance (Franks, 1995).

To date, the genes responsible for PCOS have not been clearly identified. Considering the close association between PCOS and obesity, it is likely that similar or interrelated genes may also predispose to obesity in affected women. No doubt environmental factors (reduced exercise and high-caloric diets) also play a major role in the high prevalence of obesity in women with PCOS (Sam, 2007).

Infertility:

PCOS is the primary cause oligo-anovulation at the reproductive age and is often associated with infertility, the prevalence of infertility in women with PCOS varies between 70 and 80%. According to the American Society for Reproductive Medicine. Treatment of infertility initially lifestyle changes (weight loss) (Melo, Ferriani and Navarro, 2015).

Studies:

One study was done in Saskatoon SK, Candia about knowledge of PCOS among 68 women, while only 43 agreed to participation. The study shows that high number of participants have knowledge about PCSO (28.4%) and infertility knowledge (27%), while participants know that PCOS can lead to insulin resistant and have higher risks for chronic diseases such as diabetes (33%), and participants learning about the interrelatedness of their symptoms were (10%) (Colwell et al., 2010).

Another study done to improve knowledge and treatment of PCOS in Australia among 46 women participants 24 diagnosed with PCOS and 22 without diagnosed PCOS), both women with PCOS and without PCOS have knowledge about hair growth (47%), while the acne was (56%), infertility (50%), prediabetic (34%), obesity (26%) and knowledge for Irregular periods (41%) as symptoms of PCOS. Obesity present in 5 who diagnosed with PCOS, while acne present in 18 of participants with PCOS and only 1 was prediabetic and diagnosed with PCOS. The study suggests that young women where excess weight was significantly greater in PCOS compared to non PCOS women (Moran et al., 2010).

A cross sectional study was done in India to measure awareness among young women of central India among 400 participants, study shows that only (41%) of the women were known of the term PCOS, knowledge about problem of excess hair growth present in PCOS (13%) of participants, (74 %) for acne problem,(46%) of the people did not know about the role of lifestyle changes like diet, lack of physical activities, stress and obesity are that are involved in the pathogenesis of the disorder, majority of them (63.5%) did not know that PCOS is one of the major causes of infertility among females, Only (61.5%) of the subjects know that regular exercise could be a treatment for PCOS (Patel and Rai, 2018).

Study about prevalence and knowledge of polycystic ovary syndrome in Pakistan among 451 participants, (100%) of participants heard about the term polycystic ovary syndrome, (94.5%) heard about androgen hormone and (5.1%) did not heard, while (87.8%) known that in PCOS there is increased level of androgen hormone and (8.6%) they did not know, (87.1%) known that obesity may cause PCOS ,(4.0%) did not know that obesity may cause PCOS and (8.9%) did not know if obesity may cause PCOS or not,

(97.1%) known that irregular of menstrual cycle is a symptom of PCOS and (1.8%) did not know, (92.2%) known that unusual amount of hair growth on different body parts is a symptom of PCOS and (5.1%) did not know if it is a symptoms or not, (89.6%) have knowledge of severe acne problem during menstrual is a symptom of PCOS , (80.9%) know that PCOS may leads to diabetes,while (92.2%) known PCOS may leads to infertility and (5.8%) they did not know if PCOS lead to infertility or not (Tahir et al., 2016).

RESEARCH OBJECTIVES

GENERAL OBJECTIVE:

To determine the knowledge, attitude, and practice of polycystic ovary syndrome among the female Qassim region, Saudi Arabia.

SPECIFIC OBJECTIVES:

To select the study, subjects that include all Qassim female who is 18 years to 50 years.

To prepare a structured survey questionnaire consisting of questions related to the knowledge, attitude, and practice of polycystic ovary syndrome among the female in Qassim region.

To publish the questionnaire online to the study subjects using Google Forms and distributing the URL of this questionnaire across multiple multi-media platforms (WhatsApp, Twitter, Telegram, Snapchat, and Instagram).

To measure the knowledge about polycystic ovary syndrome among Qassim females.

To assess attitude towards polycystic ovary syndrome among Qassim females.

To evaluate the practice of polycystic ovary syndrome among Qassim females.

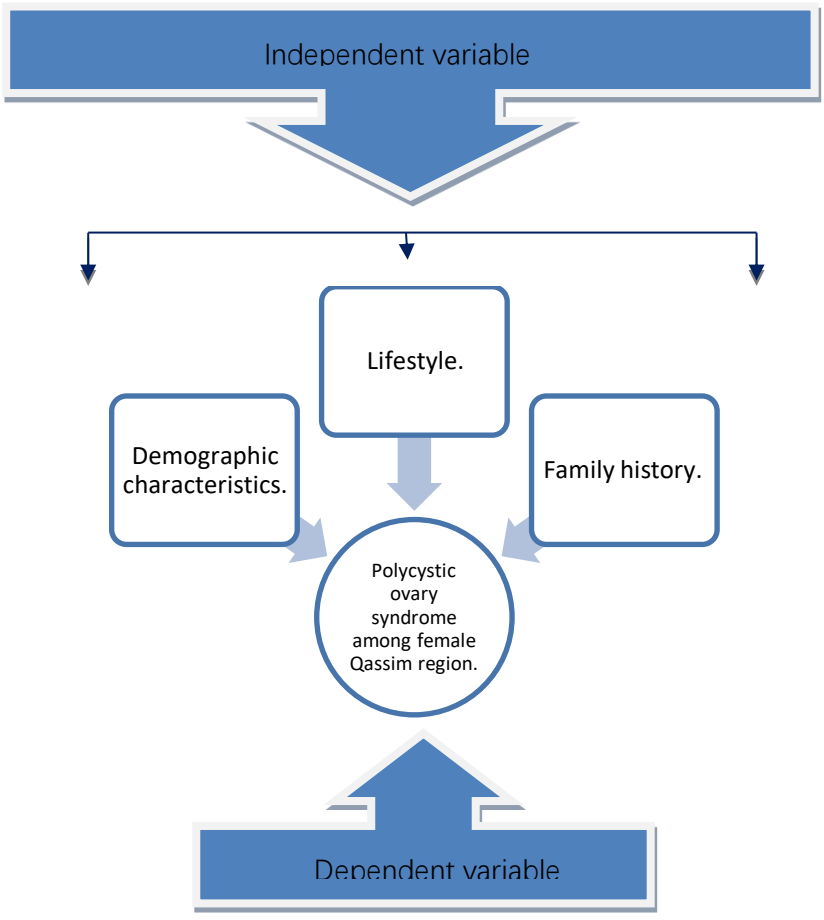
To estimate the associations between the knowledge, attitude, and practice about polycystic ovary among Qassim females.

METHODOLOGY

Study Design:

The design of this study was an observational, cross-sectional study on the data obtained from the online self-administered questionnaire about the knowledge, attitude, and practice about polycystic ovary syndrome. Participants who were female in age between 18 and 50 years old in Qassim region. The study was conducted from September 2019 to December 2019**.**

Conceptual Model of the Study:



Study Sample:

This study sample was a group of Qassim females age between 18 and 50 years old. This group of people who were randomly selected with size being 150 female or more.

Inclusion criteria:

Qassim female participants.

18 to 50 years old participants.

Agreed to participate.

Exclusion criteria:

Non- Qassim female participants.

Under 18 or above 50 years old participants.

Declined to participate.

Data Collection:

Data was collected and obtained by the online questionnaire that has been created in the google form and then published on different social media platforms (Twitter, Telegram, WhatsApp, Snapchat, and Instagram). Participants filled an Arabic version of the online questionnaire, which were simple and direct and well designed in order to elicit the knowledge, attitude, and practice of polycystic ovary syndrome, and it spans about 5-10 minutes to answer by participants.

Operational Definitions:

Demography: was defined as various variables which are included in all human research, like age, sex, education, and occupation.

Knowledge: was defined as what and how much Qassim females know about polycystic ovary syndrome.

Attitude: was defined as feelings and thoughts toward polycystic ovary syndrome in Qassim females.

Practice: was defined as the action taken in the case of polycystic ovary syndrome in Qassim females.

Ethical Considerations:

Ethical approval for this study was obtained from the Department Research Review Committee at the College of Applied Medical Sciences at Qassim University. Informed consent was given to the participants before they fill the questionnaire, as well as providing an explanation with the study objectives. All the data collected in this study was kept confidential and used for research purposes only.

Data Analysis Plan:

Collected data were entered in Microsoft Excel 2016 and then analyzed by EPI INFO 7 to get descriptive statistics with mean, proportion, percent, and frequency distribution. The results were interpreted in Microsoft Word 2016 in the form of tables and graphs.

RESULTS

Demographic characteristics:		Frequency (%) n=500
Age:	18-22	198 (39.60%)
	23-27	129 (25.80%)
	28-32	64 (12.80%)
	33-37	40 (8.00%)
	38-42	24 (4.80%)
	43-47	22 (4.40%)
	48-50	23 (4.60%)
Social status:	Single	293 (58.60%)
	Married	203 (40.60%)
	Widow	4 (0.80%)
Location:	Buraydah	336 (67.20%)
	Unaizah	44 (8.80%)
	Ar Rass	24 (4.80%)
	Bukayriyah	18 (3.60%)
	Al-Badayea	20 (4.00%)
	Riyadh Al-Khbra	21 (4.20%)
	Al-Muthnib	5 (1.00%)
	Asyah	7 (1.40%)
	Uyun Al-Jiwa	15 (3.00%)
	Nabhaniyah	7 (1.40%)

	Alshamasiah Uglat Asugour	1 (0.20%) 2 (0.40%)
Educational level:	High school student University student Bachelor Master Ph.D.	51 (10.20%) 252 (50.40%) 181 (36.20%) 14 (2.80%) 2 (0.40%)

Table 2: Description of demographic characteristics of the study sample.

Table 2, the highest participants regarding the age criteria were 18-22 years old (39.60), and most of the participants were single (58.60), and more participants from Buraydah city (67.20%), while university students were the most in education criteria (50.40%).

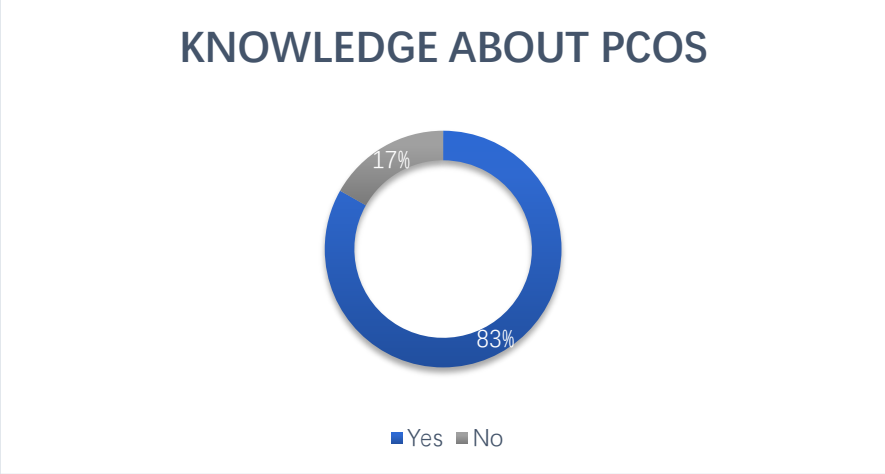


FIGURE 4: Description of Knowledge About PCOS.

The figure shows, more than half of the participants (83%) have some knowledge about polycystic ovary syndrome, while (17%) of participants have lake knowledge about polycystic ovary syndrome.

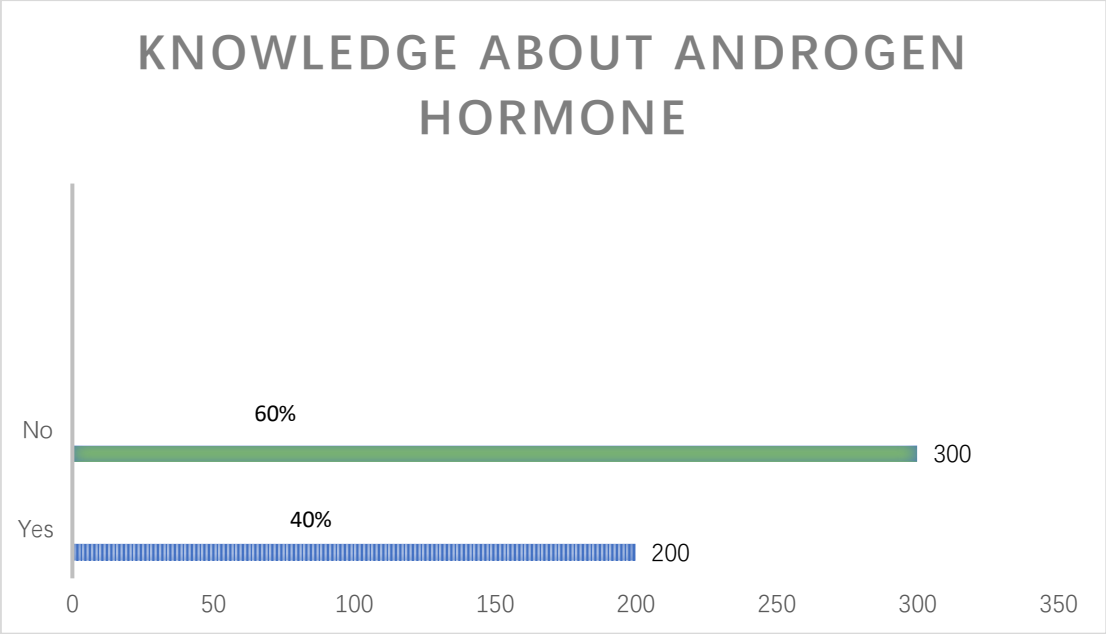


FIGURE 5: Description of Knowledge of Androgen Hormone.

The figure shows, most of the participant (60%) have some knowledge about androgen hormone, while (40%) of participants they do not have knowledge about androgen hormone.

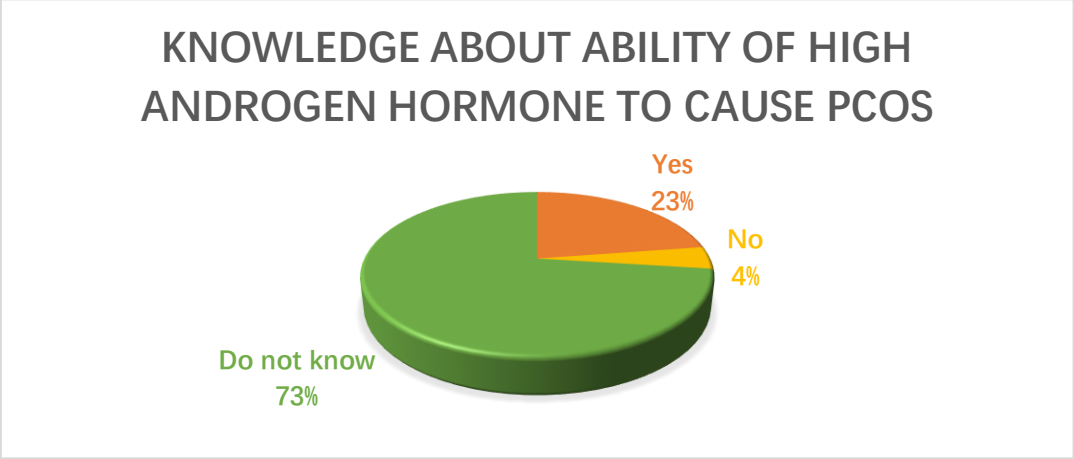


FIGURE 6: Description of Knowledge of the ability of Androgen Hormone to Cause PCOS.

As the figure shows, (73 %) of participants did not know about the ability of high androgen hormone to cause PCOS, while (23%) think it is cause PCOS and the least, (4%), said high androgen hormone did not cause PCOS.

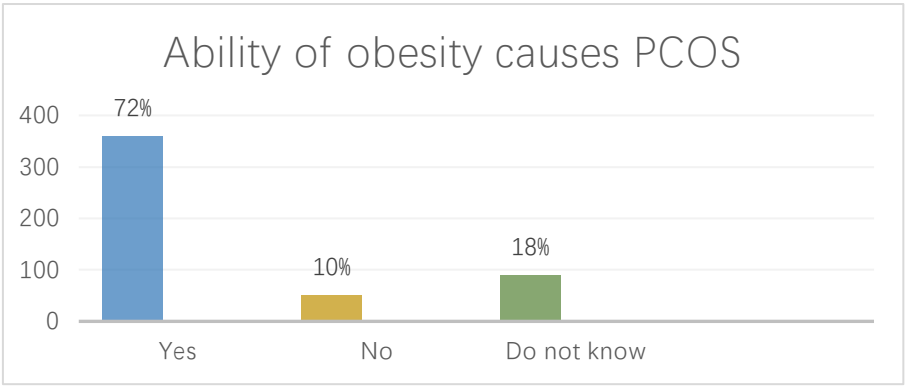


FIGURE 7: Description Ability of Obesity to Cause PCOS.

The figure depicts that most (72%) of participants think that obesity can cause PCOS, while (18%) of participants didn't know, and the least, (10%) of participants, don't think it is causing PCOS.

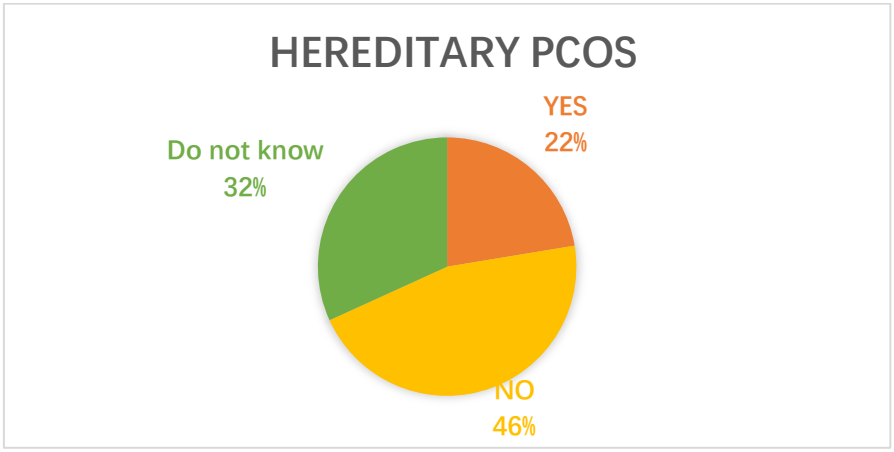


FIGURE 8: Description of Knowledge of Hereditary PCOS

As figure 8 shows, (46 %) of participants, they did not think PCOS can be hereditary, while (32%) did not know, and the least (22%) said it could be hereditary.

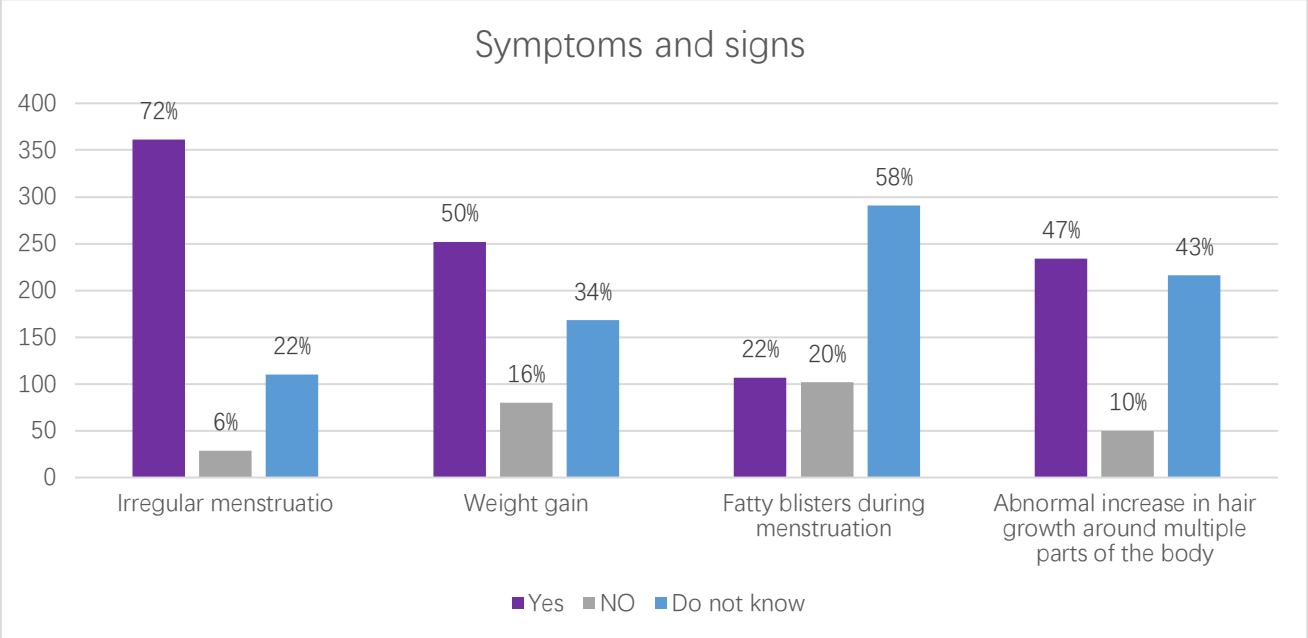


FIGURE 9: Description of Signs and Symptoms Of PCOS.

The chart shows that more than half of participants (72%) choose that irregular menstruation is a symptom of PCOS, while (22%) they did not know and the least (6%) they did not think that irregular menstruation is a symptom of PCOS, and most of the participant (50%) think weight gain is a symptom of PCOS, while (34%) they did not know and (16%) did not think that, and more than half of participant (58%) they did not know that fatty blisters during menstruation are a symptom of PCOS, while (22%) they think it is the symptom and (20%) they did not that, (47%) of participant choose that abnormal increase in hair growth around multiple parts of the body is a symptom of PCOS, while (43%) they did not know and the least (10%) they choose no it is not a symptom of PCOS.

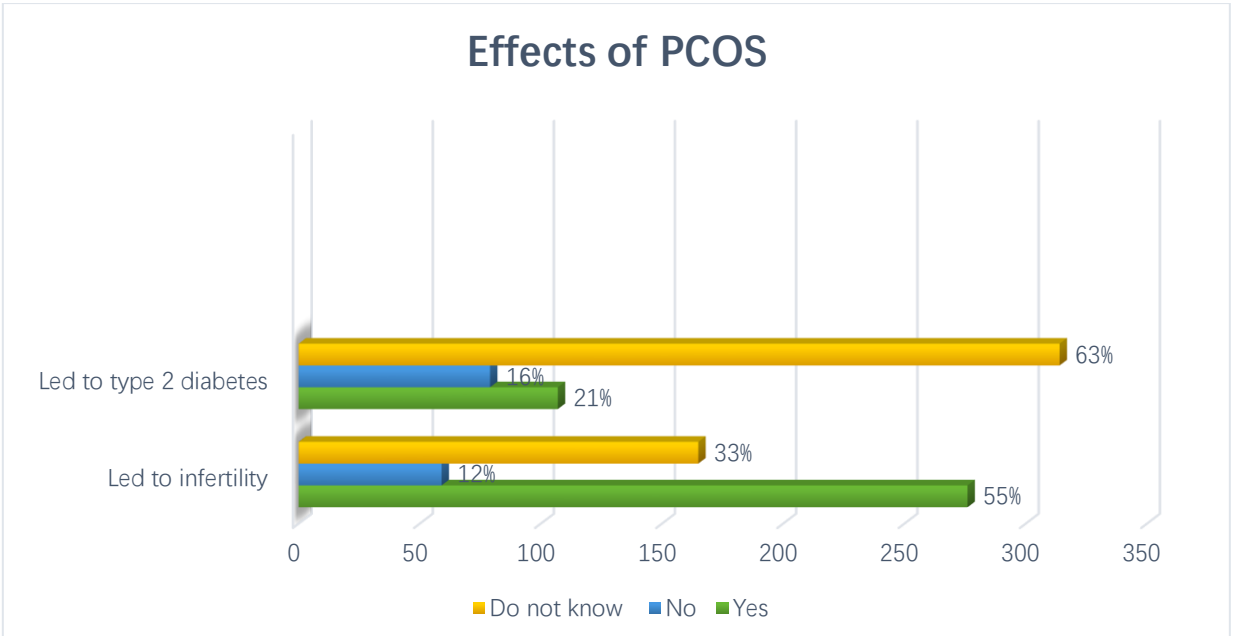


FIGURE 10: Description of Knowledge About the Effects Of PCOS.

The chart shows that most of the participants (63%) they did not know if PCOS led to type 2 diabetes, while (21%) choose yes it led to it and the least (16%) said no it did not lead to type 2 diabetes, and most of the participant (55%) said yes PCOS led to infertility, while (33%) they did not know and the least (12%) choose no it did not lead to infertility.

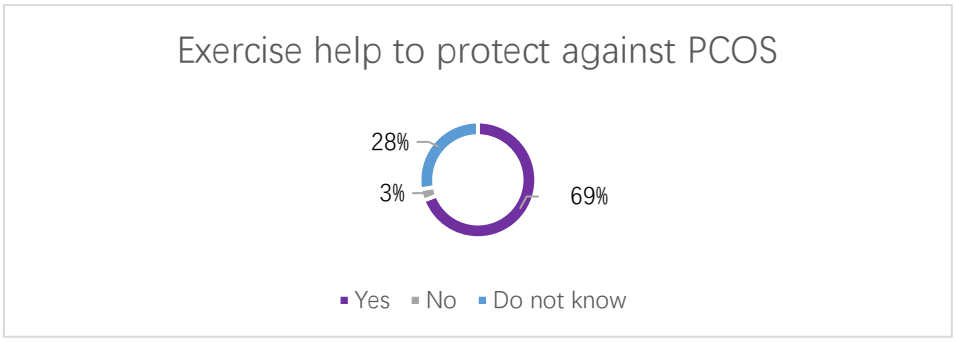


FIGURE 11: Description of Knowledge About Exercise Help to Protect Against PCOS.

Figures show that (69%) of the participants know that exercise helps to protect against PCOS, and (28%) did not know if it is help against PCOS, and the least, which account for (3%) said that exercise did not help against PCOS.

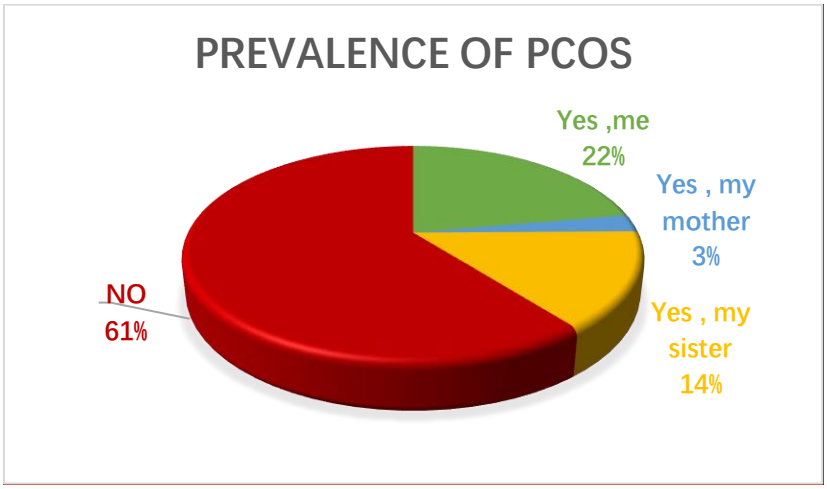


FIGURE 12: Description of Prevalence Of PCOS.

The figure shows that (22%) of participants were diagnosed with PCOS, while (14%) of their sisters were diagnosed with PCOS, the least (3%) of their mothers were diagnosed with PCOS, and the majority did not diagnose with PCOS.

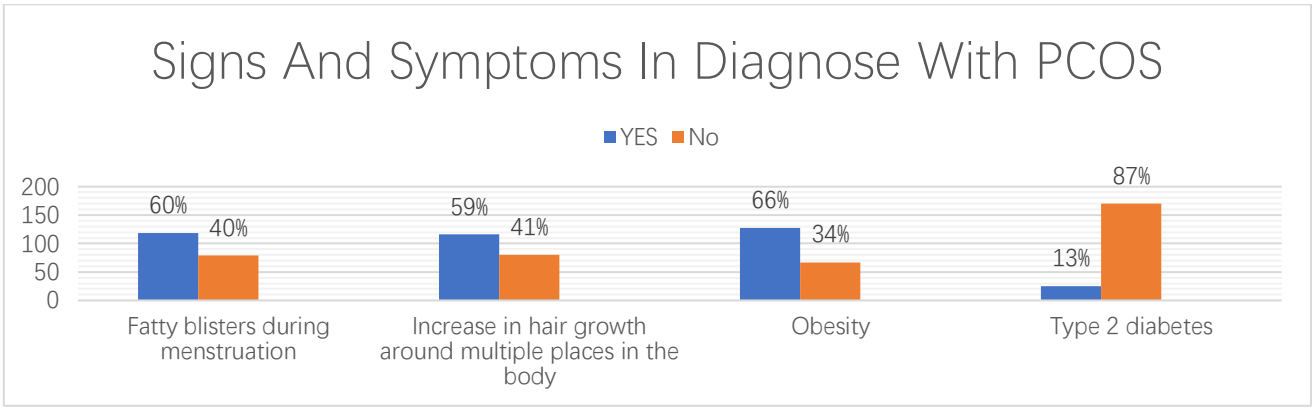


FIGURE 13: Description of Signs and Symptoms in Diagnosed With PCOS.

This figure shows that (60%) of participants who diagnosed with PCOS suffer from fatty blisters during menstruation and (40%) did not happen to them, while (59%) of participants who diagnosed with PCOS suffer from increasing hair growth around the body and (41%) did not suffer from that, in the other hand, (66%) of participants who diagnosed with PCOS suffer from obesity and (34%) they were not obese, and the majority (87%) of participants who diagnosed with PCOS did not suffer from type 2 diabetes and (13%) suffer from type 2 diabetes.

	Knowledge About PCOS Frequency (%) YES	NO	Total Frequency (%) N=500	P-Value
Age:				
22	163 (82.32%)			0.003
27	118 (91.47%)	35 (17.68%)	198(100)	(P < 0.05)
32	52(81.25%)	11(8.53%)	129 (100)	
37	36(90.00%)	12 (18.75%)	64 (100)	
42	17(70.83%	4 (10.00%)	40 (100)	
47	14 (63.64%)	7 (29.17%)	24 (100)	
50	16(69.57%)	8 (36.36%)	22 (100)	
		7 (30.43%)	23(100)	
Social Status:				
Single	251 (85.67%)	42(14.33%)	293 (100)	0.02078
Married	162 (79.80%)	41(20.20%)	203(100)	(P < 0.05)
Widow	3 (75.00%)	1(25.00%)	4 (100)	
Educational Level:				
High School				0.0186
University Student	36(70.59%)	15(29.41%)	51 (100)	(P < 0.05)
Bachelor	218(86.51%)	34(13.49%)	252 (100)	
Master				
Ph.D.	146 (80.66%)	35(19.34%)	181 (100)	
	14 (100.00%)	0(0.00%)	14(100)	
	2 (100.00%)	0(0.00%)	2(100)	

Table 3: association between knowledge about PCOS and demographic characteristics.

From the table, it is shown that there is an association between age, social status, and education with the knowledge about PCOS.

	Knowledge About Androgen hormone Frequency (%) YES	NO	Total Frequency (%) N=500	P-Value
Age:				
22	63 (31.82%)			0.001
27	52 (40.31%)	135 (68.18%)	198(100)	(P < 0.05)
32	18 (28.13%)	77(59.69%)	129 (100)	
37	25 (62.50%)	46 (71.88%)	64 (100)	
42	14 (58.33%)	15 (37.50%)	40 (100)	
47	12 (54.55%)	10 (41.67%)	24 (100)	
50	16 (69.57%)	10 (45.45%)	22 (100)	
		7(30.43%)	23(100)	
Social Status:				
Single	105 (35.84%)	188 (64.16%)	293 (100)	0.0378
Married	92 (45.32%)	111 (54.68%)	203(100)	(P < 0.05)

Widow	3(75.00%)	1 (25.00%)	4 (100)	
Educational Level: High School University Student Bachelor Master Ph.D.	 24 (47.06%) 83(32.94%) 82 (45.30%) 9 (64.29%) 2(100.00%)	 27 (52.94%) 169 (67.06%) 99 (54.70%) 5 (35.71%) 0(0.00%)	 51 (100) 252 (100) 181 (100) 14(100) 2(100)	 0.0186 (P < 0.05)

Table 4: association between knowledge about androgen hormone and demographic characteristic

From the table, it is shown that there is an association between age, social status, and education with the knowledge about androgen hormone.

	Knowledge of the ability of Androgen Hormone to Cause PCOS. Frequency (%) YES NO		DO NOT KNOW	Total Frequency N=500 (%)	P-Value
Age: -22 -27 -32 -37 -42 -47 -50	 37(18.69%) 34 (26.36%) 11 (17.19%) 14 (35.00%) 6 (25.00%) 6 (27.27%) 5(21.74%)	 9 (4.55%) 5 (3.88%) 3 (4.69%) 3 (7.50%) 0 (0.00%) 1 (4.55%) 1(4.35%)	 152(76.77%) 90 (69.77%) 50 (78.13%) 23(57.50%) 18 (75.00%) 15 (68.18%) 17(73.91%)	 198(100) 129 (100) 64 (100) 40 (100) 24 (100) 22 (100) 23(100)	 0.5972 (P >0.05)
Social Status: Single Married Widow	 72 (24.57%) 41 (20.20%) 0(0.00%)	 13(4.44%) 9(4.43%) 0(0.00%)	 208(70.99%) 153(75.37%) 4(100.00%)	 293 (100) 203(100) 4 (100)	 0.5879 (P >0.05)
Educational Level: High School University Student Bachelor Master Ph.D.	 10(19.61%) 53 (21.03%) 44 (24.31%) 4 (28.57%) 2(100.00%)	 0 (0.00%) 14(5.56%) 6 (3.31%) 2 (14.29%) 0(0.00%)	 41 (80.39%) 185(73.41%) 131(72.38%) 8 (57.14%) 0(0.00%)	 51 (100) 252 (100) 181 (100) 14(100) 2(100)	 0.0442 (P < 0.05)

Table 5: association between Knowledge of ability of Androgen Hormone to Cause PCOS and demographic characteristic

From the table, it is shown that there is an association between education with the knowledge about androgen hormone, while there is no association between age and social status because the P value is more than (0.05).

	Knowledge of the effect of PCOS to cause type 2 diabetes. Frequency (%) YES NO		DO NOT KNOW	Total Frequency N=500 (%)	P-Value
Age: -22	 31 (15.66%)				 0.0313

27	27 (20.93%)	37 (18.69%)	130	198(100)	(P < 0.05)
32	19 (29.69%)	23 (17.83%)	79	129 (100)	
37	14 (35.00%)	9 (14.06%)	36	64 (100)	
42	6 (25.00%)	4 (10.00%)	22	40 (100)	
47	6 (27.27%)	0 (0.00%)	18	24 (100)	
50	4(17.39%)	0(0.00%)	16	22 (100)	
		6 (26.09%)	13	23(100)	
Social Status:					
Single	54 (18.43%)	56 (19.11%)	183(50.00%)	293 (100)	0.0107
Married	53 (26.11%)	21 (10.34%)	129(63.55%)	203(100)	(P < 0.05)
Widow	0(0.00%)	2(50.00%)	2(62.46%)	4 (100)	
Educational Level:					0.0005
High School	7 (13.73%)	7 (13.73%)	37 (72.55%)	51 (100)	(P < 0.05)
University Student	45(17.86%)	41 (16.27%)	166(65.87%)	252 (100)	
Bachelor	44 (24.31%)	30 (16.57%)	107(59.12%)	181 (100)	
Master	9 (64.29%)	1 (7.14%)	4 (28.57%)	14(100)	
Ph.D.	2(100.00%)	0 (0.00%)	0(0.00%)	2(100)	

Table 6:
association between knowledge of the effect of PCOS
to cause type 2 diabetes and demographic characteristic.

From the table, it is shown that there is an association between age, social status, and education with knowledge of the effect of PCOS to cause type 2 diabetes.

	Knowledge About Exercise Help to Protect Against PCOS. Frequency (%) YES	NO	DO NOT KNOW	Total Frequency (%) N=500	P-Value
Age:					
22	137(69.19%)				0.3293
27	90 (69.77%)	8 (4.04%)	53(26.77%)	198(100)	(P > 0.05)
32	49 (76.56%)	3 (2.33%)	36 (27.91%)	129 (100)	
37	28 (70.00%)	1 (1.56%)	14 (21.88%)	64 (100)	
42	18 (75.00%)	3 (7.50%)	9 (22.50%)	40 (100)	
47	12 (54.55%)	0 (0.00%)	6 (25.00%)	24 (100)	
50	12(52.17%)	1 (4.55%)	9 (40.91%)	22 (100)	
		0(0.00%)	11(47.83%)	23(100)	
Social Status:					
Single	201(68.60%)	11(3.75%)	81 (27.65%)	293 (100)	0.0256
Married	144(70.94%)	5 (2.46%)	54(26.60%)	203(100)	(P < 0.05)
Widow	1(25.00%)	0(0.00%)	3(75.00%)	4 (100)	
Educational Level:					0.5262
High School	34(66.67%)	0 (0.00%)	17 (33.33%)	51 (100)	(P > 0.05)
University Student	176(69.84%)	7 (2.78%)	69 (27.38%)	252 (100)	
Bachelor	122 (67.40%)	9 (4.97%)	50 (27.62%)	181 (100)	
Master	12(85.71%)	0 (0.00%)	2 (14.29%)	14(100)	
Ph.D.	2(100.00%)	0(0.00%)	0(0.00%)	2(100)	

Table 7:
association between knowledge about exercise help
to protect against PCOS and demographic characteristic

From the table, it is shown that there is an association between social statues with the knowledge about exercise helping to protect against PCOS, while there is no association between age and education because the P value is more than (0.05).

DISCUSSION

Participants have knowledge about PCSO (28.4%) in Colwell et al. study which done among 43 women (Colwell et al., 2010), while Patel and Rai study among 400 participants shows that only (41%) of the women were known of the term PCOS (Patel and Rai, 2018) and Tahir et al. study shows that (100%) of participants heard about the term polycystic ovary syndrome (Tahir et al., 2016).

In this study, more than half of participants (83%) have some knowledge about polycystic ovary syndrome, while (17%) of participants have lake knowledge about polycystic ovary syndrome. Most of the participants show good knowledge about PCOS.

Colwell et al. study show that participants learning about the interrelatedness of their symptoms were (10%) (Colwell et al., 2010). While in Moran et al., study participants have knowledge about hair growth (47%), while the acne was (56%), obesity (26%) and knowledge for Irregular periods (41%) as symptoms of PCOS (Moran et al., 2010). In Patel and Rai study, the knowledge about the problem of excess hair growth present in PCOS (13 %) of participants (74 %) for acne problems (Patel and Rai, 2018). In Tahir et al. study, (92.2%) known that unusual amount of hair growth on different body parts is a symptom of PCOS, (97.1%) known that irregular of a menstrual cycle is a symptom of PCOS and (89.6%) have knowledge of severe acne problem during menstrual is a symptom of PCOS (Tahir et al., 2016).

In this study, more than half of participants (72%) know that irregular menstruation is a symptom of PCOS, and most of the participant (50%) think weight gain is a symptom of PCOS, while more than half of participant (58%) they did not know that acne during menstruation is a symptom of PCOS, (47%) of participant know that abnormal increase in hair growth around multiple parts of the body is a symptom of PCOS. Unfortunately, participants show poor knowledge for acne as one of the symptoms of PCOS, while good knowledge regarding other symptoms.

The study of Tahir et al. (80.9%) of participants know that PCOS may lead to diabetes, while (92.2%) known PCOS may lead to infertility (Tahir et al., 2016). But Colwell et al. study the infertility knowledge (27%), while participants know that PCOS can lead to insulin resistance and have higher risks for chronic diseases such as diabetes (33%) (Colwell et al., 2010). In Moran et al. study, which is done among 46 women participants, infertility (50%) and prediabetic (34%) (Moran et al., 2010). Patel and Rai study show that majority of participants (63.5%) did not know that PCOS is one of the major causes of infertility among females (Patel and Rai, 2018).

In this study, most of the participants (63%) they did not know if PCOS led to type 2 diabetes, and most of the participants (55%) they know that PCOS led to infertility. The result shows poor knowledge about the effect of PCOS to cause type 2 diabetes, while good knowledge about infertility.

CONCLUSION

Age, social status, and education level have a significant association with PCOS knowledge. Interestingly, even though 83% of participants know about PCOS, more than 50% did not know that PCOS is a risk factor of type 2 DM and infertility incidence,63%, and 55% for each. These results may be helpful in identifying the effect of age, social status, and level of education on increasing awareness of PCOS among young women.

In addition, it could help to improve women health and change their attitude toward exercise and diet. Moreover, the Healthcare system should have a programmed for the prevention of PCOS among women at a productive age regarding their marital status. Such the program may lead to early diagnosis and treatment of PCOS, which in turn decrease the coast of treatment of complication, especially type 2 DM and infertility.

Further study is required in order to investigate the impact of early intervention to prevent PCOS and the impact of nutrition on PCOS and make prevention programs for PCOS, such as breast cancer program and DM program, to educate women and enhance early intervention.

DEDICATION

I would like to dedicate this work to myself and my mother and my family all Mona childrens and my friends who have always been supporting of my academic endeavors and thought me to never give up.

And I am also dedicating this project to my supervisor, Dr. Entisar Abd Al-Farag Ahmed for help and give me a time to complete this work.

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