

Health Awareness of Polycystic Ovarian Syndrome and Its Complications in Lebanon: A Cross-sectional Study

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Abstract

Background: Polycystic Ovarian Syndrome (PCOS) is a common disorder that has many different presentations in females. However, females with this disorder, and due to their lack of awareness, usually have delayed diagnosis and treatment. The objective of this study is to assess knowledge about PCOS amongst Lebanese women in the reproductive age group.

Methods: Cross sectional study was performed on 421 women of age group 18-51 years from all governorates in Lebanon. Written informed consent and participants were included through the help of convenient sampling. A well-conducted questionnaire was constructed and the study was approved by the Institutional Review Board's Committee at Beirut Arab University (BAU) prior to data collection. Data entry was completed with SPSS (IBM version 23.1) and analyzed descriptive measurements like mean and standard deviation were used for quantitative variables, whereas percentages were used for qualitative variables. Frequencies were assessed for categorical variables. Chi-Square test and P-values, were used to compare between qualitative variables.

Results: Among 421 participants, 75% were aware of the term PCOS. More than 60% knew about the various signs and symptoms associated with PCOS but around half were aware about its complications. Around two-third agreed that exercise was one of the methods that could alleviate PCOS symptoms, and around 57% agreed that weight loss could decrease symptoms as well.

Conclusions: The results of the present study show that Lebanese women were aware of common symptoms of PCOS. On the other hand, their knowledge was minimal regarding more complex manifestations and complications of PCOS.

Background:

Polycystic ovarian syndrome (PCOS), a common complex reproductive and endocrinological disorder, is found in 6–10% of the female population. It usually comes to attention in teenage girls or in young women after menarche, who usually clinically present with oligomenorrhea, hirsutism, and infertility. PCOS is characterized by hyperandrogenism, multiple ovarian cysts, chronic anovulation, and decreased fertility (1, 2). Typically, these features are associated with excessive secretion of certain hormones such as luteinizing hormone and androgens but with normal or low serum concentrations of follicle-stimulating hormone (3, 4, 5). Not only does the polycystic ovary syndrome have reproductive consequences, but also women with this disorder are at high risk for developing metabolic and cardiovascular abnormalities, similar to that present in metabolic syndrome (6). This is mostly due to the common feature of insulin resistance in both polycystic ovary syndrome and metabolic syndrome, as an underlying pathogenic mechanism.

Numerous studies were conducted worldwide concerning the complications often associated with polycystic ovary syndrome. A study in the United States has shown that 30–40% of women with polycystic ovary syndrome have glucose intolerance, and as many as 10% have type 2 diabetes by the age of forty years. Thus, it is recommended that women with PCOS regularly undergo an oral glucose tolerance screening test (OGTT) (7). In addition, a study in Italy has shown that women with polycystic ovary syndrome are at a higher risk of developing cardiovascular diseases (8). Hypertension is also related to PCOS as was shown in a study conducted in the United States (9). Moreover, a recent study conducted on premenopausal women showed that

those with polycystic ovary syndrome had a higher risk of developing coronary-artery calcification than their counterparts (10). Increased levels of plasminogen-activator inhibitor type 1 may contribute to the development of cardiovascular diseases and anovulation, a conclusion found by a study in the United Kingdom (11). Another United Kingdom study revealed that PCOS could lead to endometrial, breast and ovarian cancers (12). A study done in Sweden showed that PCOS is strongly associated with the development of psychiatric and eating disorders (13). Furthermore, a study conducted in Chicago has documented that PCOS and obstructive sleep apnea (OSA) are related (14).

Several studies were done worldwide concerning knowledge, awareness and perception of female participants about PCOS. A study was conducted in Central India showing that among 400 participants, only 40% of the women were aware of PCOS; concluding that very few of the young women understood the nature of the disease (15). Another study done among female science students of different public universities in Quetta, Pakistan and concluded that the prevalence of signs and symptoms of PCOS are increasing yet students were not aware of polycystic ovary syndrome (16). Therefore, the studies conducted reflected the lack of knowledge and awareness amongst women regarding PCOS, despite its relatively high prevalence and its major medical consequences. There was a gap of literature noted and lack of studies in Lebanon on the awareness of Lebanese women regarding polycystic ovary syndrome and its complications, which led the conduction of this research project. Thus, this research aims to assess knowledge about PCOS amongst Lebanese women in the reproductive age group.

Methods:

This descriptive population-based cross-sectional study gathered surveys from female participants from all governorates in Lebanon between June 2019 and September of 2019. The study's inclusion criteria involved only competent Lebanese women, who were in their reproductive age group, ages ranging between 18 and 51 years. The surveys were collected from women living in all Lebanese governorate. Based on the number of population residing in each governorate in Lebanon, according percentages were taken from those areas. Samples were obtained, through the help of convenient sampling, from different public settings, including shopping malls, universities, parks, and as by-passers in a crowded street, where a total of 421 randomly selected participants completed the survey. This sample size was calculated based on a power of 80%, a 95% confidence level, 5% margin of error, and the population size of women in Lebanon which was estimated to be around four million giving our sample size an average size of 420 women. A survey, well developed by competent Endocrinologists in Lebanon, was utilized, and included questions regarding basic demographic data about the participants, assessment of applicants' knowledge regarding different aspects of PCOS, like its symptoms, risk factors, complications, diagnostic methods, and management approaches. Data entry was completed with SPSS (IBM version 23.1), using built range checks with automatic error prompts. Data analysis used descriptive measurements like mean and standard deviation for quantitative variables such as number of children. On the other hand, percentages were used for qualitative variables, such as whether candidates worked in the medical field or not. Frequencies were assessed for categorical variables. Chi-Square test and P-values, were used to compare between qualitative variables.

Results:

Four hundred and twenty one female participants took part in our study. The mean age of these women was 30 years \pm 9 years. Out of 421 participants, around 76% were found to have reached at least university level education, and 82% were not involved in the medical field. Participants were collected from all governorates of Lebanon. Half of the women were employed and around 40% were married. Table 1 has the detailed basic demographic data of the participants.

Table 1
Basic Demographic Data of Our Participants

Basic Demographic Data		Frequency (%)
Age: 29.63 ± 9.21*		
Education	Elementary school	3%
	Middle school	7%
	High school	12%
	University	65%
	Higher education	13%
Medical Field	Yes	18%
	No	82%
Governorate	Akkar	2%
	Baalback/Hermel	1%
	Beirut	15%
	Beqaa	15%
	Mount Lebanon	32%
	Nabatieh	1%
	North Lebanon	17%
	South Lebanon	18%
Marital Status	Single	55%
	Married	43%
	Divorced	1%
	Widowed	1%
Children	Yes	37%
	No	63%
Number of Children	0	63%
	1	4%
	2	16%
	3	10%
	4	6%
	5	1%
*(mean ± SD)		

Basic Demographic Data		Frequency (%)
	6	1%
Occupation	Employed	53%
	Unemployed	19%
	Retired	null
	Student	28%
Monthly Income	300–600\$	51%
	601–1000\$	25%
	1001–1500\$	15%
	1501–2500\$	6%
	More than 2500\$	3%
*(mean ± SD)		

Awareness about polycystic ovary syndrome was assessed in this study. When asked if they have ever heard of PCOS, 75% of women answered that they have heard this term before. Moreover, 77% thought that PCOS was considered a manageable disease, and 44% answered that they thought it was acquired.

When looking into participants' awareness about symptoms and complications associated with polycystic ovary syndrome, 46% of women thought that PCOS could actually lead to miscarriages, and a significant percentage thought that PCOS could lead to menstrual irregularities. However, around 50% thought that PCOS could lead to increased facial acne, while 65% thought it affected fertility. More than half of women thought that PCOS lead to weight gain, however, 64% didn't know if it led to insulin resistance or not. Seventy-eight percent thought that regulating the menstrual cycle would help in regulating ovulation. More than half of the participants thought that PCOS led to hirsutism, but only 21% thought it could lead to alopecia/hair loss. Table 2 has detailed information on awareness of participants about PCOS symptoms and its complications.

Table 2
Awareness of Female Populations about PCOS Symptoms and Complications

		Frequency (%)
Have you ever heard of polycystic ovary syndrome?	Yes	75%
	No	23%
	I don't know	2%
If yes, how did you find out about it?	I have the disease	17%
	I know someone who has the disease	41%
	I've read about the disease	42%
Do you think that polycystic ovary syndrome (PCOS) is?	Fatal	null
	Non-Curable	1%
	Manageable	77%
	I don't know	21%
Do you think that PCOS is hereditary or acquired?	Hereditary	21%
	Acquired	44%
	I don't know	35%
Do you think polycystic ovary syndrome causes miscarriages?	Yes	46%
	No	14%
	I don't know	40%
Do you think polycystic ovary syndrome causes irregular menstrual cycles?	Yes	81%
	No	2%
	I don't know	17%
Do you think polycystic ovary syndrome increases facial acne?	Yes	49%
	No	11%
	I don't know	40%
Do you think women with polycystic ovary syndrome ovulate normally?	Yes	10%
	No	63%
	I don't know	27%
Do you think polycystic ovary syndrome affects fertility?	Yes	65%
	No	9%

		Frequency (%)
	I don't know	27%
Do you think polycystic ovary syndrome causes weight gain?	Yes	56%
	No	12%
	I don't know	32%
Does polycystic ovary syndrome cause resistance to insulin action?	Yes	25%
	No	11%
	I don't know	64%
		78%
Do you think regulation of menstrual cycle helps in regulation of ovulation?	Yes	
	No	3%
	I don't know	19%
Does polycystic ovary syndrome lead to excess testosterone production in female?	Yes	35%
	No	9%
	I don't know	56%
Can polycystic ovary syndrome lead to hirsutism (abnormal hair growth)?	Yes	54%
	No	11%
	I don't know	34%
Does polycystic ovary syndrome cause baldness or frontal hair loss?	Yes	21%
	No	24%
	I don't know	56%
Do you think polycystic ovary syndrome can cause pelvic pain?	Yes	73%
	No	3%
	I don't know	24%
Do you think polycystic ovary syndrome is a risk factor for developing anxiety and depression?	Yes	59%
	No	14%
	I don't know	27%
Do you think that the symptoms of polycystic cystic ovary syndrome continue after menopause?	Yes	36%
	No	18%
	I don't know	46%

		Frequency (%)
Do you think polycystic ovary syndrome increases the risk of increased hair growth in unusual locations?	Yes	59%
	No	8%
	I don't know	33%
Do you think polycystic ovary syndrome is curable?	Yes	82%
	No	4%
	I don't know	14%

Upon assessing misperceptions of participants regarding PCOS, it was found that around 36% of women thought that PCOS symptoms persisted after menopause. Around 78% thought that the disease was not contagious, and around 70% thought that patients could live normally with the disease. Around 80% thought that PCOS was a curable disease, and 55% thought that oral contraceptives could help relieve symptoms of PCOS. Thirty-five percent of women thought PCOS could not be diagnosed based on blood tests, while 45.5% thought that surgical intervention was necessary in PCOS.

When asked about the complications of PCOS, 53% of women did not know if PCOS led to cardiovascular disease. However, more than half of the study population thought that PCOS could lead to an increased risk for developing uterine/breast cancers. Around 75% thought that PCOS led to increased risk of developing anxiety disorders, and 60% thought that PCOS increased the risk of developing psychological disorders. Table 3 has the detailed information about the misperceptions of female participants regarding PCOS.

Table 3
Misperception of female participants regarding PCOS

		Frequency (%)
Do you think that polycystic cystic ovary syndrome is contagious?	Yes	2%
	No	78%
	I don't know	20%
Do you think patients with polycystic cystic ovary syndrome can live normally with the disease?	Yes	71%
	No	8%
	I don't know	21%
Can Oral contraceptives help in cases of polycystic cystic ovary syndrome?	Yes	55%
	No	8%
	I don't know	37%
Do you think polycystic cystic ovary syndrome can be diagnosed by some blood tests?	Yes	31%
	No	35%
	I don't know	34%
Do you think vaginal ultrasound a diagnostic method for polycystic cystic ovary syndrome?	Yes	62%
	No	5%
	I don't know	33%
Do you think surgical intervention necessary in polycystic cystic ovary syndrome?	Yes	45%
	No	26%
	I don't know	29%
Do you think polycystic ovary syndrome increases risk of diabetes mellitus?	Yes	24%
	No	16%
	I don't know	60%
Do you think polycystic ovary syndrome increases risk of cardiovascular disease?	Yes	20%
	No	27%
	I don't know	53%

		Frequency (%)
Do you think polycystic ovary syndrome increases risk of breast or uterine cancer?	Yes	54%
	No	12%
	I don't know	34%
Do you think polycystic ovary syndrome increases risk of anxiety?	Yes	74%
	No	4%
	I don't know	22%
Do you think polycystic ovary syndrome increases risk of psychological disorders?	Yes	61%
	No	12%
	I don't know	27%
Does treating polycystic cystic ovary syndrome reduce the risk of cancer development?	Yes	35%
	No	15%
	I don't know	50%

In addition, when asked about the effect of lifestyle on PCOS, 66.4% of women agreed that exercise was one of the methods that could alleviate PCOS symptoms, and around 57% agreed that weight loss could decrease symptoms as well. Similarly, 58.3% agreed that a healthy balanced diet with fruits and vegetables could decrease symptoms, however 46.1% were neutral when asked the same question regarding protein-rich diets. Inversely, 52.1% disagreed when asked if fat-rich meals could improve symptoms of PCOS. Table 4 details response of participants concerning how lifestyle could affect PCOS.

Table 4
Participants' knowledge about how lifestyle affect PCOS

	Strongly Agree and agree	Neutral	Strongly Disagree and disagree
	Frequencies		
Exercise decrease symptoms of polycystic ovary syndrome.	66%	26%	8%
Losing weight decrease symptoms of polycystic ovary syndrome.	57%	28%	15%
Eating vegetables and fruits decrease symptoms of polycystic ovary syndrome.	58%	34%	8%
Eating protein rich food decrease symptoms of polycystic ovary syndrome.	42%	46%	12%
Eating fat rich food decrease symptoms of polycystic ovary syndrome.	15%	33%	52%

Correlations were assessed between educational level and awareness of different aspects of polycystic ovary syndrome. It was also assessed whether being involved in the medical field or not had an effect on awareness about PCOS symptoms and complications. Our results revealed that the awareness that PCOS led to abnormal ovulation was particularly high, and was specifically thought so among University graduates. This portion of the population was also highly aware of the fact that PCOS affected fertility as well, despite the lack of evidence of a correlation between this variable and education level ($p = 0.099$). No significant association was found between education level and association of PCOS with weight gain ($p = 0.072$), as well as with insulin resistance ($p = 0.437$).

Associations seemed to exist between being in the medical field and awareness about PCOS symptoms and complications. Around 78% of those in the medical field thought that PCOS led to abnormal ovulation, as compared to 60 % of those not in the medical field believing so; and a significant p value was noted ($p = 0.049$). Eighty-two percent of medical field participants believed that PCOS may affect fertility as compared to 60% of those not in the medical field believing so, and this again showed statistical significance with a p-value of 0.008. Significant association existed between being in the medical field and knowing that PCOS leads to insulin resistance. No significant association was noted between being in the medical field and knowing PCOS led to weight gain ($p = 0.399$). Table 5 lists details on association between education and PCOS awareness and Table 6 list the association between being in the medical field and PCOS awareness.

Table 5
Relationship between Educational Level and Awareness about PCOS symptoms and complications

Education		Elementary School	Middle School	High school	University	Higher Education	Total	P value
Do women with polycystic ovary syndrome ovulate normally?	Yes	8%	6%	8%	8%	21%	10%	0.019
	No	33%	65%	57%	65%	64%	63%	
	I don't know	58%	29%	35%	26%	15%	27%	
Do you think polycystic ovary syndrome affects fertility?	Yes	67%	55%	59%	66%	70%	65%	0.099
	No	0%	16%	4%	8%	15%	9%	
	I don't know	33%	29%	37%	26%	15%	27%	
Do you think polycystic ovary syndrome causes weight gain?	Yes	25%	52%	59%	58%	52%	56%	0.072
	No	17%	16%	10%	10%	24%	12%	
	I don't know	58%	32%	31%	32%	24%	32%	
Does polycystic ovary syndrome cause resistance to insulin action?	Yes	17%	17%	25%	26%	28%	25%	0.437
	No	25%	16%	5%	10%	13%	11%	
	I don't know	58%	67%	70%	63%	59%	64%	
Do you think regulation of menstrual cycle helps in regulation of ovulation?	Yes	42%	65%	75%	81%	85%	78%	0.003
	No	8%	0%	0%	4%	4%	3%	
	I don't know	50%	35%	25%	15%	11%	19%	
		50%	35%	25%	15%	11%	78(19%)	
Total participants		3%	7%	12%	64%	13%	(100%) 420	

Table 6

Relationship between being in Medical Field and Awareness about PCOS symptoms and complications

		Medical Field	Non-Medical Field	Total	P value
Do women with polycystic ovary syndrome ovulate normally?	Yes	9%	10%	10%	0.049
	No	77%	60%	63%	
	I don't know	14%	30%	27%	
Do you think polycystic ovary syndrome affects fertility?	Yes	82%	61%	65%	0.008
	No	7%	9%	9%	
	I don't know	11%	30%	27%	
Do you think polycystic ovary syndrome causes weight gain?	Yes	62%	54%	56%	0.399
	No	15%	12%	12%	
	I don't know	23%	34%	32%	
Does polycystic ovary syndrome cause resistance to insulin action?	Yes	60%	18%	25%	0.000
	No	8%	11%	11%	
	I don't know	32%	71%	64%	
Do you think regulation of menstrual cycle helps in regulation of ovulation?	Yes	85%	77%	78%	0.004
	No	7%	2%	3%	
	I don't know	8%	21%	19%	

Among those who have heard of PCOS, 17% were diagnosed with polycystic ovary syndrome. As expected the majority of women who heard about PCOS before were aware about the symptoms associated with this disorder. A strong association was found between having heard about PCOS before, and knowing it leads to irregular menses ($p < 0.001$). A similar association also exists between having heard about PCOS and knowing it leads to abnormal ovulation, affects fertility, causes acne, weight gain, leads to insulin resistance, increases testosterone levels, causes alopecia and hirsutism, pelvic pain and increases the risk for developing anxiety and depression (p -values < 0.001).

Only one-third of those who have PCOS thought it leads to miscarriages ($p = 0.125$). Similarly, no correlation exists between having PCOS and knowing it increases the risk of cardiovascular diseases ($p = 0.280$). This is also true for knowing it increases the risk for developing uterine/breast cancer, where only 57% of patients with PCOS thought that it did so ($p = 0.701$). There is also no significant correlation between having PCOS and knowing it increases the risk of anxiety ($p = 0.895$).

Check Fig. 1 Bar Chart for more information about the correlations between having heard of PCOS and knowing its symptoms and complications.

Discussion:

The study was conducted to assess awareness about PCOS amongst Lebanese women in the reproductive age group. The majority of our participants have heard about PCOS before, as compared to a study conducted in India consisting of 400 participants, where only 40% of the women were aware of the term PCOS. This generally reflects that Lebanese women know relatively well about the existence of this disease. Only 43.9% of our population regarded PCOS as an acquired disease while 20% thought it was hereditary, reflecting that Lebanese women have a poor conception of the risk factors/pathogenicity of the disease. The rest answered that they did not know if it was acquired/hereditary. PCOS is in fact a result of both environmental and genetic factors. Although environmental factors like obesity, smoking, and sedentary lifestyle all play a major role in the development of the disease, a genetic susceptibility due to family history is a key feature as well. Similarly, less than half of the study population thought PCOS led to miscarriages. The reality is that, women with PCOS are three times as likely to have a miscarriage in the early months of pregnancy as their normal counterparts¹⁷.

More than 80% of the population knew that PCOS led to irregular menstrual cycles, which is considered comparable to other studies assessing the same variables. One study conducted in South Australia^{18,19}, revealed that out of 57 PCOS patients, 86% of them also thought that PCOS led to irregular menses, and out of 105 primary care physicians, 90% answered the same. Yet, this value is still considered lower compared to a study conducted in the United States which revealed that almost 100% of the population thought irregular menses was one of the key clinical criteria to diagnose PCOS. Moreover, as compared to the Australian study, where only 38% of their population sample thought that PCOS decreased fertility rates, and an Indian study where 63.5% of their study population did not know that PCOS was one of the major causes of infertility among females; an impressive 68% of our population thought it was a major contributor to decreased fertility. Similarly, a greater proportion of women (56%) in our study thought PCOS increased the risk for weight gain, as compared to the Australian study where only 34% did. Regarding body hair growth patterns, more than half of our population thought PCOS led to hirsutism, as compared to the study conducted in South Australia, where only 32% of the study population thought that it leads to hirsutism. However, almost 95% of women in the American study thought hirsutism was a symptom of PCOS. On the other hand, when asked about hair loss from the head, only 20% of our population answered that it led to alopecia. It is important to note that PCOS in fact leads to hirsutism but it also leads to head hair loss, where in females it is usually abundantly present. So, while women do know it leads to hirsutism, they don't recognize that it also causes head hair loss as well.

When assessing the complications of PCOS, only 19.5% of our population thought it led to increased risk for cardiovascular diseases, as compared to an American study where approximately 70% of the population thought it did. Also, almost 98% of women in the latter study, and 72% in a Saudi Arabian study, viewed exercise and dieting as a method to decrease symptoms in PCOS, whereas only 57% regarded so in our study.^{20,21}

Amongst other variables assessed in our study were the risk of developing various cancers and psychological disorders in PCOS patients. However, they were not assessed in other studies to be able to compare with.

Despite the fact that the number of women in our study who have PCOS was minimal, it was found that their awareness was not significantly different from those who did not have the disease, and this was unexpected. This may be due to minimal guidance provided by the healthcare system regarding their disease, or due to the small population of patients in our study who actually have the disease. Maybe in future studies, awareness about PCOS could be assessed in PCOS patients only.

Limitations to our study were mainly due to political circumstances in Lebanon during the fall of 2019, and to ensure safety of our team members. Limitations included that the participants were selected by convenient sampling. Other limitations may include that participants who said they have PCOS might not have been clinically diagnosed as so, and may have self-diagnosed themselves based on common symptoms. The opposite may be true for women who might have experienced clinical symptoms but have not received a firm diagnosis for PCOS and thus identified as not having the disease whilst having it.

Conclusion:

The aim of our study was to assess awareness amongst Lebanese women regarding PCOS, having hypothesized they knew very little. Overall, it was found that Lebanese women were aware of common symptoms of PCOS like irregular menses and hirsutism. On the other hand, their knowledge was minimal regarding more complex manifestations of PCOS like insulin resistance and developing cardiovascular diseases. Awareness levels were more prominent in university graduates... In conclusion, Lebanese women are aware about certain aspects about PCOS, however their general knowledge is still considered weak as compared to other countries. Campaigns and more detailed explanations by physicians to PCOS patients in the future, are important in raising awareness about PCOS amongst Lebanese women.

List Of Abbreviations:

Polycystic ovarian syndrome (PCOS), oral glucose tolerance screening test (OGTT), obstructive sleep apnea (OSA), cardiovascular disease (CVD), Coronary artery disease (CAD).

Declarations:

Ethics approval and consent to participate:

Our questionnaire was approved by the Institutional Review Board's Committee at Beirut Arab University (BAU) prior to data collection. In addition, women were informed about the aim of the study before filling out surveys, and were asked to sign the consent form on the front page of the survey pre-hand. In addition, participants were told that they had the right to withdraw at any time during the study.

Consent for publication:

Written informed consent was obtained from all participants prior to their participation.

Availability of data and materials

All data generated or analyzed during this study are included in this published article.

Competing interests:

Not applicable

Funding:

Not applicable

Authors' contributions:

Dr Hala Ahmadih is the main corresponding author. Dr Hala Ahmadih contributed to the design and implementation of the research, to the analysis of the results and to the writing of the manuscript.

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Figures

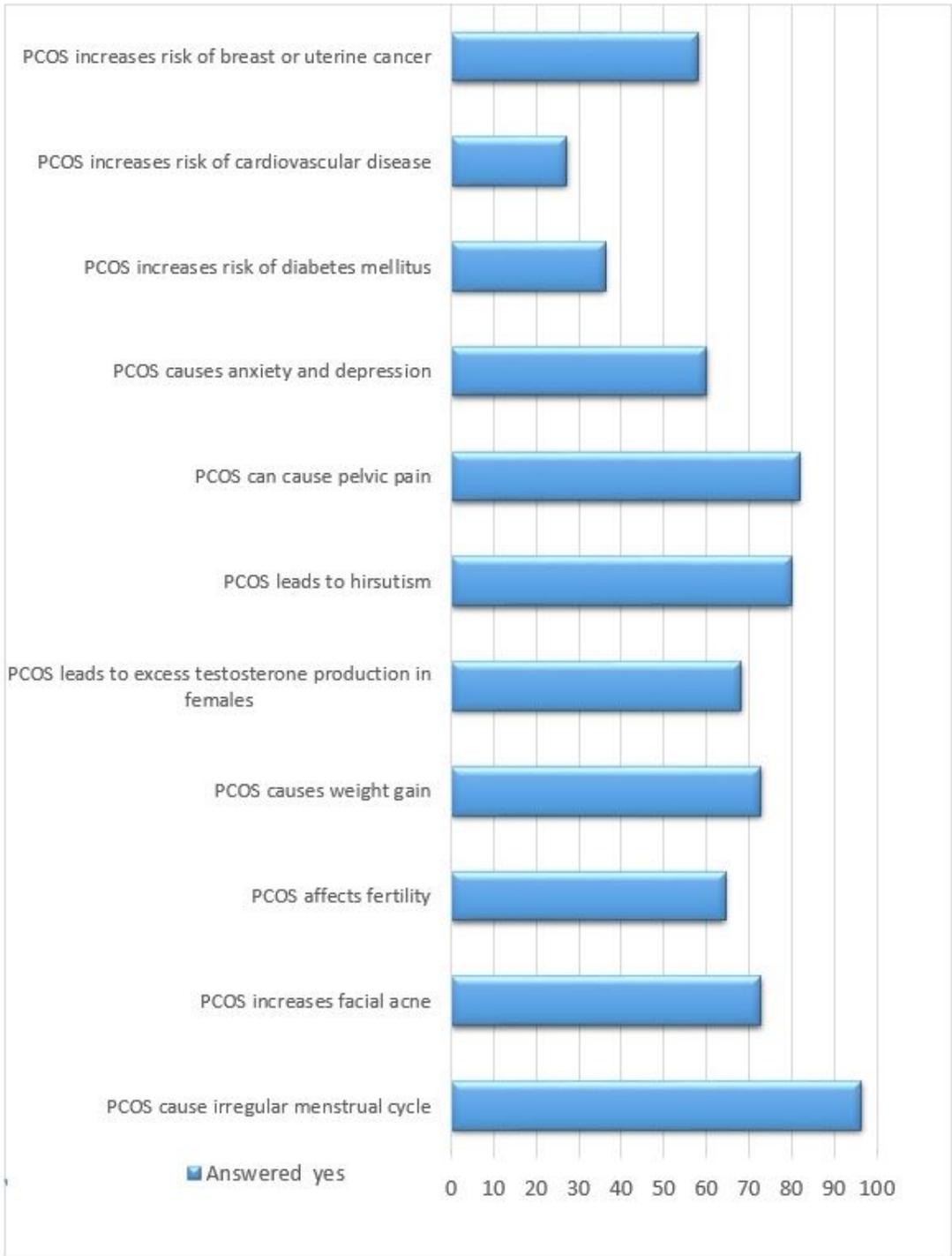


Figure 1

Correlations between having heard of PCOS and knowing its symptoms and complications