Prevalence of Polycystic Ovarian Syndrome among High School Students in Benghazi

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Abstract

Background: The most common endocrine condition affecting women of reproductive age is polycystic ovarian syndrome, or PCOS. Generally, prevalence of PCOS between 3% and 10%. Metabolic conditions like obesity and insulin resistance (IR) are often associated with PCOS. Many PCOS-afflicted women are overweight or obese and have insulin resistance (IR) with compensatory hyperinsulinemia. It is highly heritable to PCOS. Dietary intakes and physical activity levels that maximise symptom management and disease prevention are not being met by many women with PCOS. **Aim of study:** To determine the prevalence of PCO among the high school students in Benghazi city. **Methodology:** Cross-Sectional study, studied 385 Libyan girl aged between 15 – 19 years, **Results:** The prevalence of PCO among the participant was 5.4%, within some global studies range which (3% - 10%), the study showed that there was a statistical association (p value 0.000) between the obesity, fatty meal intake, family history of PCO and no physical exercise with PCO among the student diagnosed with it. **Conclusion:** The prevalence of PCOS was found to be similar to the previous global studies. The students with some risk factors like obesity, family history, frequent fatty meal intake and not practice physical exercises more susceptible to PCO syndrome. The modification of lifestyles, diet patterns and physical activity have been proposed.

Key words: Prevalence, Adolescents; Polycystic Ovary Syndrome, Benghazi.

انتشار متلازمة تكيس المبايض بين طالبات المرحلة الثانوية في بنغازي

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الملخص

الخلفية: تُعدّ متلازمة تكيس المبايض (PCOS) أكثر الحالات الغدد الصماء شيوعًا التي تصيب النساء في سن الإنجاب. يتراوح معدل انتشارها عمومًا بين 3% و10%. غالبًا ما ترتبط الحالات الأيضية، مثل السمنة ومقاومة الأنسولين، بمتلازمة تكيس المبايض. تعاني العديد من النساء المصابات بمتلازمة تكيس المبايض من زيادة الوزن أو السمنة، بالإضافة إلى مقاومة الأنسولين مع فرط الأنسولين التعويضي. وتُعدّ هذه الحالة وراثية بدرجة كبيرة. لا تلتزم العديد من النساء المصابات بمتلازمة تكيس المبايض بالنظام الغذائي ومستويات النشاط البدني التي تُحسّن إدارة الأعراض والوقاية من المرض. هدف الدراسة: تحديد معدل انتشار متلازمة تكيس المبايض بين طالبات المدارس الثانوية في مدينة بنغازي. المنهجية: دراسة مقطعية، شملت 385 فتاة ليبية تتراوح أعمارهن بين 15 و19 عامًا، النتائج: بلغ معدل انتشار متلازمة تكيس المبايض بين المشاركات 5.4%، ضمن نطاق بعض الدراسات العالمية التي تتراوح بين (3% و10%)، أظهرت الدراسة وجود ارتباط إحصائي (قيمة p 0.000) بين السمنة، وتناول الوجبات الدهنية، والتاريخ العائلي لمتلازمة تكيس المبايض، وعدم ممارسة التمارين الرياضية، وبين متلازمة تكيس المبايض بين الطالبات اللاتي تم تشخيصهن بها. الاستنتاج: وُجد أن معدل انتشار متلازمة تكيس المبايض مماثل للدراسات العالمية السابقة. والطالبات اللاتي لديهن بعض عوامل الخطر مثل السمنة، والتاريخ العائلي،

وتناول الوجبات الدهنية المتكررة، وعدم ممارسة التمارين الرياضية، أكثر عرضة للإصابة بمتلازمة تكيس المبايض. وقد تم اقتراح تعديل أنماط الحياة، وأنماط النظام الغذائي، والنشاط البدني.

الكلمات المفتاحية: الانتشار، المراهقون، متلازمة تكيس المبايض، بنغازي.

Introduction

Among women who are not yet menopausal, PCOS is the most common endocrine condition. According to typical estimates, the prevalence of polycystic ovarian syndrome ranges from 3% to 10%, with higher rates observed in women who are overweight or obese and in particular ethnic groups [1, 2, and 3].

A varied and complex endocrinopathy, PCOS is typified by a variety of symptoms and clinical characteristics, such as polycystic ovarian morphology, ovarian dysfunction (menstrual abnormalities), and hyperandrogenism (clinical or biochemical). Different combinations of these clinical characteristics are currently used in a number of PCOS diagnostic criteria. At least two of the three clinical characteristics listed above establish the Rotterdam criteria, which are the most commonly utilised for the clinical diagnosis of PCOS [4].

A multitude of genetic variables, including a reasonably common family history and environmental circumstances, interact to cause PCOS. Although a genetic component and dietary/lifestyle factors, such as insulin resistance and obesity, have been discovered, the exact aetiology of PCOS is unknown [5]. Metabolic conditions like obesity and insulin resistance (IR) are often associated with PCOS [6, 7]. In women with PCOS, high androgen negatively affects metabolic balance by affecting the brain and many metabolic tissues, including the liver, muscle, pancreas, and adipose tissue [2].

Missed, irregular, infrequent, or extremely light periods are the most prevalent symptoms of PCOS. Some PCOS-afflicted women experience fewer than eight menstrual cycles annually. Over 70% of women with PCOS develop hirsutism, or facial and body hair, infertility as a result of irregular or failure of ovulation, acne or oily skin, weight gain, especially around the belly. Under the breasts, near the crotch, and on the back of the neck, dark or thick patches of skin may develop, hair loss or thinning on the scalp [8].

Women with PCOS can develop serious health problems, especially if they are overweight: diabetes, gestational diabetes, heart disease, sleep apnoea, stroke, pregnancy complications, (women with PCOS have higher chance of miscarriage and premature birth), and endometrial cancer (regular periods help to prevent excess thickening of the lining of the uterus. Not having regular periods can lead to abnormal cells building up inside the womb. Women who have had absent or very irregular periods (fewer than 4 periods a year) have a higher risk of developing cancer of the womb lining). PCOS is also linked to depression and anxiety, though the connection is not fully understood [7, 8].

Women may be diagnosed with PCOS if she has at least two of the following symptoms: irregular periods, higher than normal levels of androgens in blood. Multiple cysts on one or both ovaries. In addition, also the women whether have symptoms like:

Hirsutism, acne and weight gain. Apart from women symptoms, might recommend following mentioned different tests: a pelvic exam, trans-vaginal ultrasound, blood tests: to measure the levels of androgens hormone, blood glucose levels and cholesterol levels [9].

PCOS treatment is contingent on several aspects. Age, severity, and general health are a few examples. The women's desire to become pregnant in the future may also influence the kind of treatment they receive; birth control tablets, diabetes medicine, which is frequently used to treat insulin resistance in PCOS, may also help lower testosterone levels, limit hair growth, minimise acne and help women ovulate more frequently [10]. Weight loss and symptom reduction can be achieved with a healthy diet and increased physical activity. They may also aid in women's ovulation, lower blood glucose levels, and improve the body's utilisation of insulin. Two important aspects of treating patients with PCOS and obesity are diet and exercise [10, 11].

According to global studies, which indicate an increase in the incidence of polycystic ovary syndrome among women during the reproductive stage, due to the unhealthy lifestyle followed by women, especially the target group of this study (adolescent girls), in their frequent consumption of fast food, lack of exercise, and excess weight, which are considered risk factors for this syndrome the current study aimed to determine the prevalence of polycystic ovary syndrome among the high school student, and associated risk factors (obesity, fatty food intake, lack of physical activity and family history) among students to screen and help in lifestyle modification to prevent lifelong complications.

Methods
Study design
A cross- sectional descriptive study conducted in sex high schools in Benghazi city the second one in population and importance in Libya country.

Data collection and participants

A total of 385 girls aged 15 to 19 years from sex high school students in Benghazi city during one month. A self-constructed questionnaire was designed to assemble information regarding the socio-demographic student characteristic (age, class grade and BMI), and if they diagnosed with PCO and history of some risk and protective factors (obesity, fatty meal intake, family history and physical exercise).

Data management and analysis:

Data were computed and analysis using statistical package of social science (SPSS) version 23. Descriptive statistics such as; frequency, percentage, mean, and standard deviation are used. Inferential statistics such as; chi square test is used. $P < 0.05$ will be used to denote statistical significance.

Ethical consideration; Each student was given an idea of the goal of the research, clarification of the questions in simple and easy way and taking a verbal consent. Written consent taking from the school authority. And ethical approval from Libyan international medical university research ethical committee.

Results

Distribution of students according to age in which the age group was between 15 till 19 years of age. 165(42.9%) of student with 17 old of age, 205(52.2%) in second grade in their school and 49(12.8%) had family history of PCOS, and out of 385 female students included in the study 21(5.4%) diagnosed with PCOS.

The study finding reported that 92(23.9%) participants being overweight or obese. And 222(57.7%) had no physical exercise, and at least once/twice had consumed meals with high fat content. Table 1

Table 1: Distribution of student's characteristics.

Variable	No.	%
Age/Years		
15	31	8.1
16	119	30.9
17	165	42.9
18	61	15.8
19	9	2.3
School Grade		
1st	96	25
2nd	205	52.2
3rd	84	21.8
Family History of PCOS		
Yes	49	12.8%
No	336	87.3%
Diagnosed with PCOS		
Yes	21	5.4
No	364	94.6
Students 'BMI		
< 18 Underweight	40	10.4
18-24. Normal	253	65.7
25-30 Overweight	65	16.9
> 30 Obese	27	7.0
Physical Exercise		
Yes	163	42.4
No	222	57.7
Fatty Food Intake		
Daily	89	23.1
Never	52	13.5
Once/week	143	37.1
Twice/week	101	26.2
Total	385	100

Regarding the symptoms and signs of PCOS in the students, the findings of the study reported that 107(27.9%) of students were complaint from increasing in the weight, 59(15.3%) had hirsutism, 83(21.6%) with oligomenorrhea, 205(53.3%) had acne, 184(47.8%) complaint from hair loss, 210(45.5%) had dysmenorrhea and when had examined by ultrasound 20(5.1%) of them had multiple ovarian cysts. Figure 1
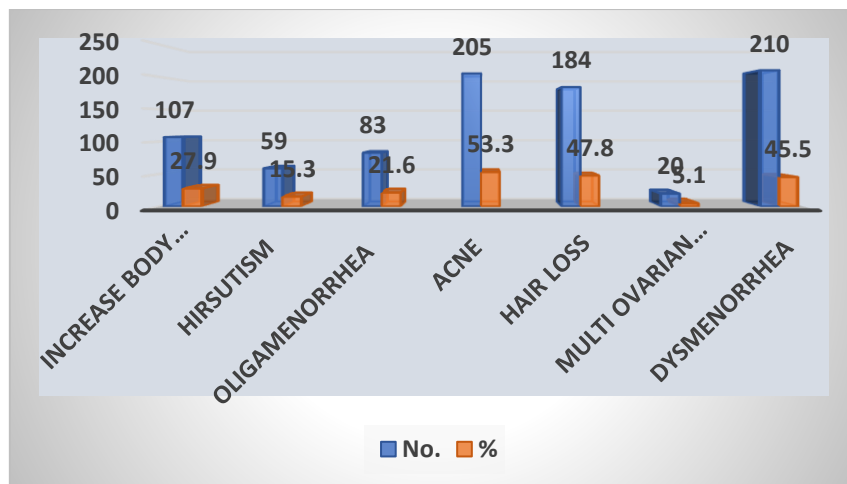
Figure 1: Distribution of student according to signs and symptoms.

The current study reported that highly statistical association (p value = 0.000) between the students' age and getting PCO, the older student had more the disease. The highest prevalence was observed in the students 19 old of age, which accounted for 11.1% of diagnosed student, followed by the 18 old age with a prevalence of 9.8%, and no cases were reported among student aged 15 years. Table 2

Table 2: The association of the students' age with PCO.

Age / Years	PCO		
	No	**Yes**	**Total**
15	31	0	31
16	114(95.8%)	5 (4.2%)	119(100%)
17	156(94.5%)	9 (5.5%)	165 (100%)
18	55((90.2%)	6 (9.8%)	61(100%)
19	8(88.9%)	1 (11.1)	9(100%)
Total	364	21	385(100%)

The findings revealed that there was highly statistical significance association p value was less than 0.05 (0.001) between some risk factors and getting PCO. Table 3

Table 3: The association of the risk factors with PCO.

Risk factor	PCO		
	No	Yes	Total
Physical Exercise			
No	208	14	222
Yes	156	7	163
Family H/O PCO			
No	319	17	336
Yes	45	4	49
BMI			
Underweight	37	3	40
Normal	246	7	253
Overweight	57	8	65
Obese	24	3	27
H/O Fatty Food			
Never	47	5	52
Daily	84	5	89
Once/week	135	8	143
Twice/week	98	3	101

The current study reported that there was highly statistical significance association p value was less than 0.05 (0.001) between some the symptoms and getting PCO. Table 4

Table 4: The association of the risk factors with PCO.

Presence of Symptom	PCO		Total
	No	Yes	
Hirsutism			
No	313	13	326
Yes	51	8	59
Oligo menorrhea			
No	288	14	302
Yes	75	8	83
Acne			
No	172	8	180
Yes	192	13	205
Increase body weight			
No	268	10	278
Yes	94	13	107
USS ovarian cysts			
No	359	6	365
Yes	3	17	20

Discussion

The PCOS has recently increased as a result of modernization-related lifestyle diseases and environmental changes. Given the severity of the disease and its effects, it's critical to determine its prevalence in young women. [12] According to the NIH, Rotterdam's diagnostic criteria and the AE-PCOS Society, the reported total prevalence of PCOS (95% CI) is 6% (5-8%) [13]. In our study, out of 385 female students included in the study 5.4% diagnosed with PCOS which less than other previous studies; in Iran, Qatar, Egypt, Nepal, South India, Nigeria, Oman and Central India 28, 12.1%, 11.3 %, 9.9% 9.1%, 8.8%, 7% and 8.2% irrespectively [14 - 21]. While more than study (Punyatoya Bej, 2022) 3.24% [22]. The findings of current study reported that 12.8% of students had family history of PCOS, however more than the study in Nepal (Kc S, 2020), 2.9% [17] and less than study among students in Kolkata (Chtterjee, 2020) 22% [12]. It is already known that PCOS has been attributed to several causes that include the change in diet and lifestyle habits changing to unhealthy ones, diet. [17, 23] Due to insulin resistance, these lifestyle changes put young women and adolescents at risk for long-term problems from conditions including PCOS and type II diabetes mellitus [18]. However, in the present study showed that 23.9% students had overweight or obese in similar to study (Kc S, 2020) 20.7% [17] while less than in the study (Dilek, O, 2022) 50.7% [19] reported being obese or overweight.

Association of risk factors with PCO

The findings reported that more than half (57.7%) of participants had lack of physical activity similar to the study by (Kc S, et al 2020) 53.3% [17]. However, students who do not perform any physical activity 33.3% of them had PCO; P value was 0.001 which shows that the relation of exercise with PCO was significant, which contradicted with study (Afsaneh Khademi, 2010) [24] implicates that exercise has no major role on the occurrence of PCOS, which conflicts the study that we have conducted.

When students were asked about their diet habits, 84 students consume fatty food on a daily basis and 65 of those students were diagnosed with PCO, 46 students cut off fatty meals, and five of them had the disease, and according to the prevalence and this statistical significance, the association between high fatty meals and PCO was highly significant.

The study showed that the distribution of students with obesity was 94 and 13 of them had PCOS whereas 268 with lesser BMI only 10 of them were diagnosed with PCOS, and from the results presented in this study, we can see that young women with obesity have higher chances of getting PCOS. Like study that was conducted by (Vibikova J and Hainer V, 2009) [25] reported that obesity's presence has a major effect expression of the syndrome therefore obesity increases the risk of comorbidities associated with PCOS the study goes along with the statistics of the current study that we had conducted. Also similar to study done by (Maryam Asgharani et al,2011) [14] where the mean BMI in high school students who had been diagnosed with PCOS was 21.1 +3.6 in Rasht, Iran, the P value of our samples collected was 0.001, and it approves the strong correlation between PCOS and obesity. While in contrast with study took place by (Bulent O. Yildiz, 2008) [26] they have reached a conclusion where PCOS is minimally affected by obesity although the degree of obesity of PCOS patients

increased, and that data collected from general population indicates that PCOS is reflected by environmental factors of greater extent.

Family history is one of the major factors affecting the prevalence of PCOS. In our study 12.8% of the students had positive family history that associated significantly with occurrence of PCO (p value of 0.001). A study goes along with our study was done by (R Azziz, 2000) [27] noticed that 35% of mothers and 40% of sisters will be affected by PCOS themselves. And like study done by (Vishnubhotla DS, 2022), PCOS was significantly (p=0.001) higher proportion of females had a positive family history [28].

Signs and Symptoms

Although some adolescents will exhibit distinctly adult PCOS symptoms, others will merely exhibit milder, less obvious symptoms that are suggestive of the condition. However, the majority of females with PCOS will have definitely formed the phenotypic by the time they are 18 years old [29]. The current study reported that highly statistical association between the students' age and getting PCO, the older student had more the disease.

In this study, 15.3% had hirsutism, slight similar to the study by (Chatterjee, 2020) 18.5% [12] and study (Vishnubhotla DS, 2022) 18.01%, [28] (Dina H Abd Elmonem, 2022) 18% [16]. And less than study by (Maryam Asgharnia, 2011) 24% [14]. Whereas much lower in study (Dilek, O, 2022) only 3.7% they had hirsutism [20]. And acne was found in 53.3% which more than (Chatterjee, 2020) 40.7% [12] (Dilek, O, 2022) 44.1% [19]. Whereas much more than study by (Vishnubhotla DS, 2022) 27.88% [28]. ((Maryam Asgharnia, 2011) 26.7% [14], (Dina H Abd Elmonem, 2022) 17% [16]. The findings reported that 47.8% of students were complaint from hair loss, that in similar study by (Vishnubhotla DS, 2022) 40.2% [28]. Our study findings revealed that about 27.9% of student's excessive body weight were noted little more than study (Vishnubhotla DS, 2022) 22.5% [28], (Dilek, O, 2022) 10.5%. [19] While 21.6% with oligo menorrhea, similar to study (Maryam Asgharnia, 2011) 20.4% [14].

Conclusion

The prevalence of PCOS was found to be similar to the previous global studies. Many different factors that encountered this study that were put into relation with polycystic ovarian syndrome such as family history of polycystic, ovarian disease, fatty diet, physical activity, and the study shows that there is a statistically significant relation between the risk factors mentioned previously and the occurrence of polycystic ovarian syndrome. One of the most prevalent endocrinological issues nowadays is PCOS. Therefore, to avoid lifetime consequences, early screening, lifestyle modification, and intervention are required.

Research on the prevalence of PCOS in our country was few and lacks reliable data. According to a different study, a larger-scale investigation of PCOS might be beneficial in order to present a more realistic picture of the condition.

Disclaimer

The article has not been previously presented or published, and is not part of a thesis project.

Conflict of Interest

There are no financial, personal, or professional conflicts of interest to declare.

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