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RELATIONSHIP BETWEEN PSYCHOSOCIAL FACTORS AND BMI WITH PCOS IN ADOLESCENT GIRLS (CASE-CONTROL STUDY)

Shamam Ali Salih[1], Professor Dr. Shukriya Shadhan Al-ogaili[1]
[1,2]Community Health, College of Health and Medical Techniques, Al-Furat Al-Awsat technical University, Kufa

Abstract
Background: Polycystic ovary syndrome (PCOS) is one of the most common endocrine empathies in adult women, with characteristic features of anovulation, clinical and biochemical hyperandrogenism. The aim of the this study was to identify the relationship between psychosocial factors and BMI with PCOS in adolescent girls at Maternity Teaching Hospitals in Hilla City, Iraq (case-control study) during the period of 10th of Nov. 2023 to 15th of Feb 2024.
Methodology: A nonprobability a purposive sample of (100) adolescent girls a case group, who return to hospital suffering from polycystic ovary syndrome. This is the study group were chosen from Maternal Consultant unite depending on the diagnosis of managing doctor. In addition (100) healthy adolescent girls (free from disease) as control group; those who visit the hospital without a history of polycystic ovary syndrome. The questionnaire form used it composed of (4) part it include demographic variables, BMI, reproductive variables, and psychosocial part it include (daily stress and anxiety)).
Results: The results with regard to BMI shows that there were statistical differences between the case group and the control group, where a high percentage of cases were overweight, in contrast to the control group ($P < 0.05$).
Also shows the comparison between family matters between groups, where there were slight differences that were not statistically significant for paragraphs No. (Family members exposure to serious illness, heavy duties at home, interfere of one of their family members on personal matter), relative to the value of P-value ($p > 0.05$). On the other hand, highly statistically significant differences were found between the two groups in paragraphs (Sudden death of close relative, found argument in family) ($p < 0.05$). In addition, a highly statistically significant differences in all items regarding to physical appearance, dealing with other, and anxiety scale ($P<0.05$).
Conclusion: BMI has effect on the development of PCOS. Women with higher BMI are at an increased risk of developing PCOS and experiencing more severe symptoms.
Psychosocial factors have an impact on the incidence of polycystic ovary syndrome. A multifaceted issue requires the attention of health care providers and researchers.
Recommendations:
1- Encourage regular physical activity: Promote regular exercise and physical activity among adolescents to help manage weight and reduce the risk of developing polycystic ovarian syndrome (PCOS).
2- Provide psychological support: Offer psychological support and counseling for adolescents with PCOS, as the condition can have a significant impact on mental health and self-esteem.

Keywords: PCOS, psychosocial factors, anxiety, BMI

Introduction

One of the most prevalent endocrine empathies in adult women is polycystic ovarian syndrome (PCOS), which is characterized by anovulation and clinical and biochemical hyperandrogenism. This chronic illness gives rise to several pertinent worries, including worry of not becoming pregnant, obesity and its metabolic consequences, and an unfeminine, ugly look caused by

hirsutism, acne, or alopecia. However, identical PCOS signs and symptoms to those seen in adult women—excessive weight, clinical hyperandrogenism, irregular menstruation, and infertility—appears to have an impact on adolescent quality of life (**Kaczmarek et al., 2016**).

According to reports, 30–75% of PCOS women are obese **(Sachdeva et al., 2019)**. About 80% of people with PCOS have BMIs that are high or above normal and exhibit, common symptoms include insulin resistance, polycystic ovaries, and hyperandrogenism. Although it is a lesser but noticeable percentage, women with PCOS may or may not experience symptoms like irregular menstrual periods and acne and have a normal or low BMI **(Toosy et al., 2018)**.

In addition, women who have PCOS are more likely to experience anxiety, eating disorders, bipolar illness, and depression. The adjusted OR for total depressive disorders in women with PCOS was 4.23 after adjusting for BMI, family history of depression, and history of infertility **(Sirmans & Pate, 2013)**.

It has been demonstrated that the most prevalent mental patterns among PCOS patients are chronic worry and depression. Compared to the controls, the patients had less education and were more likely to be jobless **(Sayyah-Melli et al., 2015)**.

Improving maternal health is one of the eight millennium developing goals, this can be done by various activity like providing quality care to girl's pre pregnancy and increasing awareness regarding care during these period.

The researcher chose this problem because a great danger on adolescence in future lead to prevent pregnancy and some disorder on menstrual cycle and felt the need to identify the risk factors to improve knowledge about this syndrome.

Methodology

Study Design

A descriptive case control study is conducted in order to find out the relationship between psychosocial variables, BMI with PCOS during the period from 10th of Nov. 2023 until 15 of Feb. 2024.

Administrative Arrangement & Ethical consideration

1. After obtaining permission to perform the research from the council of the College Of Health And Medical Techniques\Al-Furat Al-Awsat Technical University
2. Agreement from Babil Health directorate for obtaining official permission, perform the study in Hospitals mention above for Ethical consideration
3. The researcher obtains agreement from each one of girls

Study Setting

The study is conducted in (Babil Teaching Hospital for maternity and Children, Imam Sadiq Teaching Hospital, Merjan Teaching Hospital)

Study Samples

A nonprobability a purposive sample of (100) adolescent girls, who return to Hospital suffering from polycystic ovary syndrome. This is the study group was chosen from Maternal Consultant depending on the diagnosis of managing doctor. In addition (100) healthy adolescent girls (free from disease) as control group; those who visit the Hospital without a history of polycystic ovary syndrome.

Inclusion Criteria

The samples are selected according to the following criteria:

1. All participants in adolescent age.
2. All participants' Unmarried girls.
3. In the case group, adolescent girls who are diagnosed with Polycystic Ovary syndrome.
4. In control groups adolescent girls without past history of Polycystic ovary syndrome.
5. Those who are voluntary participated.

Exclusion Criteria

- ✓ Married Girls

Tools and methods of data collections

The tools was generated and constructed by researcher after reviewing literature and past researches. Data gathering was done by applied the created instrument items with aid of planned interview techniques with the items as they were personality interviewed, the investigator used Arabic version of the instrument. The study subject were questioned in a Likert scale. Date gathering procedure began from **10th of Nov. 2023 to 15th of Feb. 2024**. The interview method spent about (15- 30) minutes for each girls. The questionnaire form is composed of (3) parts.

Part one: demographic variables such as age, level of education, residency, smoking, family income.

Part two: BMI

Part three: reproductive characteristics such as age of menarche, menstrual cycle, dysmenorrhea, age of diagnosis of PCOS

Part four: psychosocial stats: such as daily stress and anxiety.

Statistical Analysis

Data of studied sample were prepared, organized grouped, 9 encoded entered and analyzed using the (SPSS) version 25 was used for date analysis, and analysis included the two types of statistics:

1. Descriptive statistics: presented as mean, frequency and percentages = freq./ sample size x 100.
2. Inferential Statistics: Statistical exams were applied according to the distribution and types of variables. Chi-square test was used to compare frequency. Bivariate Pearson's correlation test was used for assessing the correlations.

Results

Table 1: Statistical distribution and difference in demographic data between study and control groups.

Items	Sub-groups	study group Total= 100		Control group Total= 100		P-Value
		Freq.	%	Freq.	%	
Age/Years	15	1	1.0	1	1.0	0.873
	16	2	2.0	2	2.0	
	17	16	16.0	15	15.0	
	18	25	25.0	25	25.0	
	19	56	56.0	57	57.0	
Level Of Educational	Illiterate	2	2.0	3	3.0	0.425
	Reads and write	4	4.0	3	3.0	
	Primary	9	9.0	9	9.0	
	Secondary	47	47.0	56	56.0	
	Institute & above	38	38.0	29	29.0	
Residency	Urban	62	62.0	72	72.0	0.134
	Rural	38	38.0	28	28.0	
Smoking	Active	2	2.0	0	0.0	0.157
	passive	98	98.0	100	100.0	
Family Income	Sufficient	56	56.0	60	60.0	0.699
	Barely sufficient	12	12.0	9	9.0	
	insufficient	32	32.0	31	31.0	

Table 1 shows that the more than half percentage for both groups at age 19 year, (56%) in study group and (57%) in control group. The Sam table shows that educational level for both group, the highest percentage (47%) of girls is in the secondary school level, and (56%) for the control group in the same educational level. For residency, the high percentage (62%) of the case group in the urban residence category, this is matched by (72%) of the control group who reside in urban areas as well. For smoking, the same table shows the majority (98%) of cases are passive smokers, compared to a full percentage (100%) of the control group of passive smokers. For family Income more than half of the case group and (60%) for control group are with sufficient income.

Table 2: Statistical distribution and difference in BMI between study and control groups.

Body Mass Index	Normal weight	14	14.0	86	86.0	0.000
	Overweight	64	64.0	9	9.0	
	Obese	22	22.0	5	5.0	

Table 2 shows the Body Mass Index between the two groups the high percentage (64%) of the case group are overweight girls, while the highest percentage (86%) of the control group are normal weight girls.

Table 3: Statistical distribution and difference according to reproductive characteristics between study and control groups.

Items	**Sub-groups**	**study group Total= 100**		**Control group Total= 100**		**P-Value**
		Freq.	**%**	**Freq.**	**%**	
Age Of Menarche	11	21	21.0	25	25.0	0.236
	12	30	30.0	39	39.0	
	13	43	43.0	28	28.0	
	14	6	6	8	8.0	
Menstrual Cycle	regular	19	19.0	93	93.0	0.000
	irregular	81	81.0	7	7.0	
Dysmenorrhea	Yes	73	73.0	5	5.0	0.000
	No	27	27.0	95	95.0	
Age of diagnosis of PCOS	15	1	1.0	NIL	0.0	0.000
	16	3	3.0			
	17	25	25.0			
	18	28	28.0			
	19	43	43.0			

Table two shows that age of menarche shows that the high percentage (43%) of the case group was 13 years old at menstruation, while the high percentage (39%) of the control group was 12 years old at menstruation. In addition, the menstrual cycle indicate that the majority (81%) of the case group are irregular menstrual Cycle girls, while the majority (93%) of the control group are regular menstrual cycle girls. For dysmenorrhea, the majority of sample (73%) of the case group had dysmenorrhea, for control group (95%) are non-dysmenorrhea. In addition, for age of diagnosis of it shows that the high percentage (43%) of the case group was diagnosed at the age of 19 years, for control group it is free from PCOS

Table 4: Statistical distribution and difference for psychosocial status include A-daily stress of the life event between study and control groups.

Items	Sub-groups	study group Total= 100		Control group Total= 100		P-Value
I-Family matter		**Freq.**	**%**	**Freq.**	**%**	
1-Family Members Exposure To Serious Illness	Non	33	39.0	42	38.0	0.201
	Sometimes	53	47.0	47	51.0	
	Always	14	14.0	11	11.0	
2-Sudden Death Of Close Relative	Non	67	67.0	80	80.0	0.048
	Sometimes	26	26.0	16	16.0	
	Always	7	7.0	4	4.0	
3-Found Argument In Family	Non	36	36.0	50	50.0	0.037
	Sometimes	55	55.0	45	45.0	
	Always	9	9.0	5	5.0	
4-Heavy Duties At Home	Non	62	56.0	47	51.0	0.211
	Sometimes	26	32.0	44	40.0	
	Always	12	12.0	9	9.0	
5-Interfere Of One Of Their Family Members On Personal Matter	Non	39	29.0	35	35.0	0.130
	Sometimes	46	51.0	38	40.0	
	Always	15	20.0	27	25.0	
II-Physical appearance		**Freq.**	**%**	**Freq.**	**%**	
1-Feeling Don't Accept My Appearance	Non	20	20.0	81	81.0	0.000
	Sometimes	46	46.0	13	13.0	
	Always	34	34.0	6	6.0	

2-Feeling Embarrassed Because Of The Excess Facial Hair	Non	23	23.0	93	93.0	0.000
	Sometimes	45	45.0	5	5.0	
	Always	32	32.0	2	2.0	
3-Feeling willingness To Reduce Weight To Be More Attractive	Non	21	21.0	78	78.0	0.000
	Sometimes	33	33.0	10	10.0	
	Always	46	46.0	12	12.0	
4-Feeling Different From Normal Women	Non	73	73.0	95	95.0	0.000
	Sometimes	20	20.0	4	4.0	
	Always	7	7.0	1	1.0	
III-Dealing with other		**Freq.**	**%**	**Freq.**	**%**	
1-No Feeling Easy Communication With Others About PCOS Such as doctors, medical staff,…	Non	34	34.0	100	100.0	0.000
	Sometimes	60	60.0	0	0.0	
	Always	6	6.0	0	0.0	
2-No Feeling Comfortable Talking With Others About PCOS such as my family, friends, relatives,...	Non	9	9.0	100	100.0	0.000
	Sometimes	55	55.0	0	0.0	
	Always	36	36.0	0	0.0	
3-do you get the kind of support from others that you need?	Non	14	14.0	100	100.0	0.000
	Sometimes	49	49.0	0	0.0	
	Always	37	37.0	0	0.0	
4-I Dislike To Sociability	Non	27	27.0	65	65.0	0.000
	Sometimes	49	49.0	20	20.0	
	Always	24	24.0	15	15.0	

Table 5: B-anxiety.

Items	**Sub-groups**	**study group Total= 100**		**Control group Total= 100**		**P-Value**
		Freq.	**%**	**Freq.**	**%**	
1-I Suffered From Depression Due To Pcos?	Non	3	3.0	100	100.0	0.000
	Sometimes	44	44.0	0	0.0	
	Always	53	53.0	0	0.0	
2-Experienced Impatience Due To PCOS?	Non	10	10.0	100	100.0	0.000
	Sometimes	59	59.0	0	0.0	
	Always	31	31.0	0	0.0	

3- Feeling Concerned About Being Overweight ?	Non	9	9.0	35	35.0	0.000
	Sometimes	41	41.0	37	37.0	
	Always	50	50.0	28	28.0	
4-Difficult In Sleeping?	Non	23	23.0	80	80.0	0.000
	Sometimes	59	59.0	17	17.0	
	Always	18	18.0	3	3.0	
5-Feeling Concerned About stopping menstruation	Non	26	26.0	96	96.0	0.000
	Sometimes	51	51.0	3	3.0	
	Always	23	23.0	1	1.0	
6-feeling concerned About Infertility in the future	Non	5	5.0	96	96.0	0.000
	Sometimes	37	37.0	3	3.0	
	Always	58	58.0	1	1.0	
7-Fear From Financial burden?	Non	17	17.0	100	100.0	0.000
	Sometimes	65	65.0	0	0.0	
	Always	18	18.0	0	0.0	

Psychosocial status: it includes two sections:

Section one: Daily stressor of life events, which include three domains.

i. **Family matters:** Table 4 shows the comparison between family matters between the study group and the control group, where there were slight differences that were not statistically significant for paragraphs No. (1, 4, 5) (Family member's exposure to serious illness, heavy duties at home, Interfere of one of their family members on personal matter) relative to the value of P-value ($p > 0.05$). On the other hand, highly statistically significant differences were found between the two groups in paragraphs (2, 3) (sudden death of close relative, found argument in family), where the p value was ($p < 0.05$)

ii. Physical appearance: In terms of physical appearance, the table shows us highly statistically significant differences in all items after comparing the study group and the control group, where the p-value was for all cases ($p < 0.05$).

iii. Dealing with other: the same table shows us highly statistically significant differences in all Items after comparing the study group and the control group, where the p-value was for all cases ($p < 0.05$).

Section Two: Anxiety scale

Table 5 shows us highly statistically significant differences in all Items after comparing the case group and the control group, where the p-value was for all cases ($p < 0.05$).

Table 6: comparisons between study and controls groups regarding PCOS risk factor in relationship between BMI, psychosocial variables with PCOS

Items	Beta	T	Sig.		
			Chi- square	P-Value	
Psychosocial status I-Daily stress of the life event	-0.208	-6.245	71.376	0.005	H.S

Psychosocial status II-Anxiety	-0.217	-5.96	121.437	0.008	H.S
BMI	-0.628	-11.361	103.982	0.000	H.S

Table 6 shows that there is relationship between BMI and psychosocial variables with PCOS and these variables come in order of importance as fallow: body mass index, daily stress of the life event, anxiety.

Discussion

Part I: Discussion of demographic characteristic

In the present study, our research was found that the highest percentage of diagnoses is at the **age of 19 age years** (56%). This result disagree with the results of (**Pourhoseini et al., 2022)** shows that the mean age of adolescent girls was 16.73±3.4 years with median of 17 years. There was study on polycystic ovaries in adolescent girls. This definition includes females between the ages of 10 and 19. Along with the use of pelvic ultrasonography in the diagnosis of PCOS, it also discusses recommendations regarding gynecological age, specifically 8 years post menarche, and the reevaluation of girls who do not meet the diagnostic criteria in adolescence but are thought to be "at increased risk" of PCOS **(Peña et al., 2020**).

From educational levels, our study showed that less than half of the total percentage of girls diagnosed are in the secondary stage, and this is the highest percentage compared to the group of cases. More than half of the total percentage are in the same educational category. Besides, as suggested by the data, knowledge of PCOS was significantly influenced by educational level. This finding indicated that the higher the educational level of Malaysian women, the higher their knowledge of PCOS **(Abu-Taha et al., 2020; Alruwaili et al., 2020).**

Regarding the **residential area**, the results of our study show that the largest percentage of people live in an urban residential area. Our results were agree to other studies such as: **(Priyanka et al., 2018**).

Because of the nature of the social and religious system in Iraq and because of tribal customs, our study produced almost complete relative results that the girls diagnosed were in the category of passive smoking. Disagree to what was reported in one study **(Tao et al., 2021).**

Our study presented the financial situation, such as the monthly family income. We found that more than half of the cases had sufficient monthly income, and there are no significant differences from the control group. While other studies have shown that low socioeconomic status (SES) may be associated with an increased risk of developing polycystic ovary syndrome (PCOS) and vice versa so our study disagree with it **(Rubin et al., 2019).**

Part II: Discussion of Body mass index

One of the expected causes of contracting the disease is with regard to body mass index, as we concluded that the highest percentage of the study group were overweight compared to the control group, which had the highest percentage of normal weight. Our results were agree with the results of previous studies **(Pourhoseini et al., 2022)**.

Part III: Discussion of reproductive characteristics

According to the reproductive characteristics, the statistical distribution in our study of the age of menstruation was that we found that less than half of the percentage, which is the highest percentage, for those diagnosed with PCOS is at the age of 13. While the highest percentage for the control group is at the age of 12, and there were no statistically significant differences between the two groups. While high statistical differences were found with regard to the menstrual cycle, as the majority of the affected group had an irregular cycle compared to the vast majority of the control group, which was regular. Our results agree the findings of some studies, **(Desai et al., 2018; Pourhoseini et al., 2022).**

For dysmenorrhea, the highest percentage of those diagnosed with the disease are have this sign, compared to the control group who have almost completely normal menstruation. Our study is agree with other studies **(Martin et al., 2017)** qualitative interview studies have identified pain in various forms as being part of the patient experience with PCOS, including bodily, abdominal, pelvic or belly pain, sexual pain and headaches.

Regarding the **age of diagnosis** of polycystic ovary syndrome, our results showed that less than half, which is the highest of the total percentage, were diagnosed at the age of 19. The reason for this delay in

diagnosing the late age of adolescent girls may be as a result of the three sets of criteria have been developed for the diagnosis of PCOS: The National Institutes of Health criteria (1992), Rotterdam criteria (2003), and Androgen excess society criteria (2006). All three categories include polycystic ovarian morphology on trans vaginal ultrasound (Pelvic ultrasound not recommended for diagnosis of PCOS within 8 years post menarche) **(Peña et al., 2020)**, clinical and/or biochemical hyperandrogenism, and chronic oligo/anovulation, or different combinations of these disorder **(Varanasi et al., 2018)**.

Part IV: dissections of Psychosocial stats include daily stress and anxiety

PCOS may be significantly impacted by psychosocial variables. The medical community is aware of the connection between PCOS and psychological issues. Numerous studies have connected particular characteristics of PCOS, such acne, hirsutism, and infertility, to a decline in mental health. The findings indicated that the most prevalent psychological patterns in PCOS patients were persistent anxiety and despair **(Sayyah-Melli et al., 2015)**. Our results were not inconsistent with what these studies reported, as we found that psychosocial status is closely related to polycystic ovary syndrome. With the exception of three items of **daily stress of the life event** (family members exposure to serious illness, heavy duties at home, interfere of one of their family members on personal matter), all items had high statistical differences between the groups.

The same applies to **anxiety**. All items showed significant differences between the groups. Anxiety and depression are three times as common in PCOS patients as in non-PCOS people. Anxiety and depression symptoms are also more common and more intense in those with PCOS and was agree with our study results **(Zehravi et al., 2021).**

The main **risk factors** for PCOS were evaluated using **stepwise regressions** in the table 6. The table shows that three variables included (BMI, daily stress of the life event, and anxiety, were found to be highly significant predict of PCOS which came in order of importance.

The first order of importance of variables of PCOS was BMI. **(Pourhoseini et al., 2022),** reported that PCOS increased with increasing BMI and agree with our results. The second order of importance of variable of PCOS was daily stress of the life event**. (Damone et al., 2019)** agree with our results by investigate the role of stress in contributing to and mediating the relationship between PCOS, depression and anxiety.

The third order of importance of variables of PCOS was anxiety. This results was agreed with what had been reported by **(Sayyah-Melli et al., 2015),** who showed that chronic anxiety and depression were the most psychological pattern in PCO patients.

Conclusion

1- BMI has effect on the development and severity of PCOS. Women with higher BMIs are at an increased risk of developing PCOS and experiencing more severe symptoms.
2- Psychosocial factors have an impact on the incidence of polycystic ovary syndrome.

Recommendations:

1. Encourage regular physical activity: Promote regular exercise and physical activity among adolescents to help manage weight and reduce the risk of developing polycystic ovarian syndrome (PCOS).
2. Provide psychological support: Offer psychological support and counseling for adolescents with PCOS, as the condition can have a significant impact on mental health and self-esteem.

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