

The Awareness of Jazan Females about the Nutrition Related Effects of Polycystic Ovary Syndrome

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Abstract

Introduction: Polycystic ovary syndrome (PCOS) is one of the most common endocrine and metabolic disorders in premenopausal women affecting 5% - 10% women in reproductive age. Many studies show that good dietary habits and balanced diet in addition to regular exercise can significantly improve the symptoms of the syndrome. The prevalence rate in the Kingdom of Saudi Arabia reached 42.8%. This study aimed to measure the awareness of Jazan females about the nutrition related effects of polycystic ovary syndrome and investigate the association between age and awareness of nutrition related effect on PCOS. **Method:** Cross sectional study was conducted during a period from January 9th to February 5th 2023, by a questionnaire used to measure the awareness of female in Jazan region about the nutrition related effects of polycystic ovary syndrome. Data was collected using Google questionnaire survey and it was randomly distributed to Jazan women from 18 to 50 years old. The questionnaire was about general information about PCOS, nutrition-related effects of PCOS, the effects of eating patterns on PCOS, physical activity, and sleeping. The sample size was 384 women. **Results:** The total response was about 363 women. The results showed that women in the Jazan region did not have sufficient knowledge about PCOS 51.5% and 63.4% had no knowledge about diet recommendations for PCOS. However, there was awareness about healthy eating patterns that reduce the symptoms of PCOS. The level of awareness of PCOS and its association with age among Jazan women was higher in young adult groups (21 to 29 years old). **Conclusion:** Based on the results of this study, the level of knowledge about PCOS among

Jazan women is insufficient. Also, their awareness about diet and lifestyle interventions was low. There is a relationship between age and awareness of the nutrition-related effects of PCOS. Promoting the role of balanced nutrition and nutritional knowledge is an important requirement for all women, especially those with PCOS. The role of health, educational, and governmental institutions is important in spreading the link between nutrition and PCOS.

Keywords

PCOS, Nutrition, Awareness, Diet and Lifestyle

1. Introduction

Polycystic ovary syndrome (PCOS) is one of the most common endocrine and metabolic disorders in premenopausal women. PCOS affects about 5% - 10% of women of reproductive age. The prevalence rate in the Kingdom of Saudi Arabia reached 42.8% [1]. The signs of PCOS are ovulatory dysfunction and androgen excess. The etiology of this syndrome is still largely unknown, but evidence suggests that the causes may be a polygenic disorder with strong environmental and genetic influences, including lifestyle and diet [2]. This syndrome is often associated with insulin resistance, obesity, and metabolic disorders; moreover, in previous studies, women with PCOS have been shown to have different body composition compared to unaffected women, which is a sign of a chronic inflammatory condition [3] [4]. It is also linked to type 2 diabetes, heart disease, dyslipidemia, and endometrial cancer [5]. Women with this syndrome face more vitamin D deficiency than healthy people [6].

According to previous studies, lifestyle intervention may improve the free androgen index (FAI), weight, and BMI in women with PCOS [7]. Sixty percent of women with PCOS are overweight or obese, PCOS management also emphasizes the importance of diet in PCOS and recommends nutritional and exercise interventions as the first line of management in this population, where several strategies have been proposed. Diets for PCOS such as the low glycemic index diet, dietary approaches to stop hypertension diet, the Mediterranean diet, low carbohydrate diet, pulse-based diet, ketogenic diet, low-starch/low-dairy diet, vegetarian diet, and intermittent fasting (IF) [8].

The diet of TRF (Time-restricted feeding) may be beneficial to anovulatory PCOS on weight loss especially reducing body fat, improving menstruation, hyperandrogenemia, insulin resistance, and chronic inflammation [9]. Studies have suggested that the keto diet may be considered a valuable non-pharmacological treatment for PCOS [8] and their evidence was that the use of omega-3 fatty acid may be recommended for the treatment of PCOS with insulin resistance as well as high TC (especially LDL-C) and TG [10].

Also, according to a previous study, the management of PCOS emphasizes the importance of diet and recommends nutritional and exercise interventions.

There were no previous studies measuring people's awareness of PCOS. The purpose of this study is to measure the awareness of Jazan females about the nutrition-related effects of polycystic ovary syndrome and investigate the association between age and awareness of nutrition-related effects on PCOS. Our hypothesis for this study is that awareness of the nutritional-related effects of polycystic ovary syndrome is low in this population and there is an association between the age and the level of awareness of the nutritional-related effects of PCOS [11].

Polycystic ovarian syndrome complications are thought to be caused primarily by a lack of knowledge about the condition and poor lifestyle choices. One of the primary goals of PCOS treatment is to reduce the metabolic consequences of obesity, fatness, insulin resistance, and metabolic syndrome. As a result, it is critical to reduce excess fat mass associated with obesity and insulin resistance in PCOS women. According to the Androgen Excess Society and the European Society of Endocrinology, PCOS therapy should be based on lifestyle changes such as increased physical activity and dietary changes such as intake of SFA and low Glycemic Index (GI) foods, as well as weight loss if necessary [12]. Early intervention and symptom reduction are made possible by being aware of the symptoms and knowing how to change one's lifestyle and eating habits. This improves one's quality of life. It is crucial to evaluate women's PCOS knowledge because there is little information on the nutritional consequences on PCOS.

Some previous studies were showed that there was insufficient knowledge about PCOS and its nutritional complications. The results of some research showed there is insufficient knowledge about polycystic ovary disease and its nutritional complications. A study was conducted in Jordan in 2020, the aim of which was to evaluate the knowledge and perception of women about PCOS in Jordan, its symptoms, diagnosis, and treatment. The participants of this study were female of 18 - 45 years, using a cross-sectional descriptive study conducted through a questionnaire designed and published online using Google Forms. 227 females participated in the study and their results showed that two hundred and twenty-seven females do not have sufficient knowledge of polycystic ovary disease and its complications [7].

Another study conducted in 2021 aimed to estimate knowledge and practice towards weight loss among women with PCOS, in which a descriptive analysis was used and search engines such as Google Scholar and PubMed, it was also found that there is insufficient knowledge about PCOS and its complications [13].

Also, a study was conducted in 2022 in Klang Valley, Malaysia. It was aimed to determine the prevalence, knowledge, and health-related practices of PCOS. A self-questionnaire was used in which Malaysian women from 18 to 45 years of age were included. The number of participants was 410 females. Nearly half of the respondents had poor knowledge and health-related practices towards PCOS [14].

Other study conducted in the same year among the late adolescent girls was aimed to assess the knowledge and attitudes of late adolescent girls regarding polycystic ovary syndrome by using the self-administrated interviewing questionnaire sheet. The results of the study showed that more than half of the late adolescent girls had unsatisfactory knowledge and negative attitude regarding PCOS [15].

Kaundal *et al.*, 2022 conducted a study that aimed to assess knowledge among reproductive women regarding risk factors, symptoms, and complications of PCOS using a descriptive cross-sectional study involving 350 women. It was concluded that (60.5%) had no knowledge about PCOS, while (24.9%) had good knowledge about it [16].

In other study they used a descriptive design to assess nutrition knowledge, diet quality, and the risk of developing an eating disorder among university students with PCOS. Twelve university students with PCOS were admitted to the study after clinical and biochemical analysis. Validated questionnaires (Nutrition Knowledge Questionnaire, Eating Disorder Examination-Questionnaire 6.0 (EDE-Q 6.0), 3-day food records, and body composition testing) were completed by participants. Participants were obese (75%), insulin resistant (58%), and ate an unbalanced diet (41% carbohydrate, 43% fat), according to the findings. Bread and fruit were avoided by 27.3% of people. Nutrition knowledge was low (48% correct) and negatively related to fruit consumption ($p > 0.05$). Almost half (41.6%) were at high risk for eating disorders (EDE-Q \geq score 4). University students with PCOS have poor nutrition knowledge and eat an unbalanced and restricted diet [17].

Other studies sought to examine the dietary habits identified by diet quality scores (DQS) in the context of body fatness (BF) and nutritional knowledge (NK) in women with polycystic ovary syndrome (PCOS) in Poland. Dietary Habits and Nutrition Beliefs Questionnaire were used in a case-control study to access the DQS. 122 PCOS women and 116 age- and socioeconomic status-matched healthy controls (CON) aged 17 - 44 years were included in the study. In this study, pro-healthy DQS and NK of PCOS women were lower than CON [18].

Numerous studies have demonstrated that reducing central fat deposition, circulating insulin and androgen levels, and insulin sensitivity in overweight women with PCOS can help restore ovulation, improve menstrual cycles, and lower cardiovascular disease risk factors. This weight loss can be achieved by losing 5% to 10% of client total body weight. Lifestyle choices, such as the type and amount of food client eat, improve the symptoms of PCOS. There was study shows that there is undeniable proof that exercise lowers CVD risk factors in women with PCOS. Additionally, increased insulin sensitivity and decreased hyperinsulinaemia are associated with exercise's capacity to reduce various CVD risk variables. They said that the PCOS recommendations call for at least 150 minutes of exercise per week [19].

The literature shows that there is a relationship between exercise and polycystic ovarian syndrome, as previous studies have shown that exercise has a role in improving symptoms in affected women. Preet and Razia's study in 2020 aimed to evaluate young girls with PCOS' awareness, attitudes, and practice of exercise as a therapy option. A cross-sectional study with 100 female participants aged 18 to 26 was used. They came to the conclusion that 84% knew that exercise was a therapy option for PCOS [20].

According to Amal and Dala's studies, nutrition and a healthy diet play a role in improving PCOS symptoms. In 2016, a population-based cross-sectional study on PCOS awareness was conducted in Saudi Arabia using a paper and soft copy questionnaire. They came to the conclusion that some women know that eating fruits and vegetables, exercising, and losing weight are all connected with lessening the symptoms of PCOS [1].

Our objectives for this study are to measure the awareness of Jazan females about the nutrition related effects of polycystic ovary syndrome, investigate the association between age and awareness of nutrition effect on PCOS, and measure the level of awareness of Jazan female inhabitant on the effect of the diet and life style interventions.

2. Material and Method

2.1. Study Design

This is a cross-sectional study used an online google survey consisting of six sections.

2.2. Study Area and Time

This study was carried out online among women from Jazan region. The survey was available from January 9 to February 5, 2023.

2.3. Study Subjects

Women in Jazan region of age between 18 and 50 years old were randomly selected as study group. Any women under the age of 18 and over 50 were exempted from the study.

2.4. Data Collection

Data was collected using Google survey. A self-constructed questionnaire was used to assess women's knowledge about diet related PCOS based on data from other questionnaire in similar studies with modification to matching the contextual of this study population. The survey originally written in Arabic so that all participants could understand it, and it consisted of six parts as follow, the first section contains a definition of the type of questionnaire and its purpose; second section demographic information, third section is general information about PCOS; diagnosis of PCOS if present plus other; fourth section effects of PCOS related to nutrition including questions about the symptoms and signs

that indicate the presence of ovarian cysts, and the fifth section assessed the awareness on effect of nutritional pattern on PCOS including questions about the importance of a healthy diet and the dietary recommendations for women with PCOS; the last section about physical activity, which contains (questions about the role of physical activity in alleviating the symptoms of PCOS. The answers ranged from yes, no, I don't know. The two versions (Arabic and English) questionnaires are attached in the **Appendix**.

2.5. Sample Size

The minimum sample size obtained for this study was 384 women in the Jazan region, estimated using Roasoft's online sample size calculator. The statistics provide a confidence level of 95% and a margin of error of 5%. The minimum sample size was selected randomly.

2.6. Data Analysis

SPSS software (IBM SPSS Statistics for Macintosh, Version (20.0.0.0) was used for statistical data analyses and descriptive data presentation. Education level was regrouped due to response of participant. For awareness assessment, a percentage (%) was calculated for each participant based on their choice of answer with scoring higher than 60% being considered to be aware. Chi-square test was done to determine the significance of association between respondents' age and level of their awareness. Incomplete responses were excluded.

3. Results

Three hundred and sixty-three female participants in the study (**Figure 1**) show demographic characteristics, the mean age of participants was 25.8950 and SD was 7.3012. In our study, most of the participants were unmarried ($n = 198$, 54.5%) and the married were ($n = 165$, 45.5%).

This study has shown that the level of education was under graduation, and they are the most aware category ($n = 289.79$, 60%) (**Table 1**).

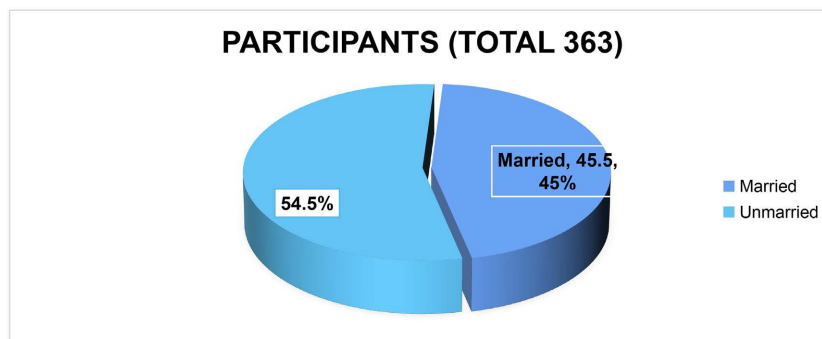
The awareness of female in Jazan region about PCOS was found to be 51.5% of subjects had no knowledge, while 48.5% had knowledge (**Table 2**). The association between Jazan females' knowledge about PCOS and was significant with the age group 21 - 29 years (chi-square 0.15)

Table 1. Education level.

Education level	Percentage (%)
Primary	1.1
Intermediate	2.2
High school	14.0
Under graduate	79.6
Graduate	3.0

Table 2. Knowledge of female about PCOS.

Knowledge about PCOS	Percentage (%)
No	51.5
Yes	48.5

**Figure 1.** Marital status of participants.

15% of women participated in our study were diagnosed with PCOS though 85% were not diagnosed with syndrome (**Figure 2**).

Table 3 revealed that (n = 116, 31.9%) of participants were aware insulin resistance (IR) is a symptom of PCOS while (n = 41, 11.2%) of participant have no idea.

The present study showed that 11.8 % of participant had no knowledge PCOS can lead to diabetes mellitus (DM) and the majority of them were of 21 - 29 years old (**Table 4**).

Figure 3 describes the current knowledge of Jazan females' inhabitants that certain food are suitable for PCOS, 65.8% were know that there food that suitable for PCOS while 29.5% manifested the opposite.

Table 5 indicated that the majority of participant (n = 247, 68%) had a good knowledge about the PCOS has effects on body weight, of whom (n = 170, 68.8%) from the age of 21 - 29.

Regarding healthy living pattern and its effect on PCOS symptoms, an increased number of the respondents 239 (65.8%) have no idea that healthy living pattern affect the symptoms of PCOS in contrast to 29.5% and 4.7% whose believe that healthy living pattern increase or decrease the symptoms of PCOS respectively (**Table 6**).

A majority of 63.4% of females were unfamiliar of existing dietary recommendations for PCOS patients, versus 36.1% said to appreciate the presence of such recommendations (**Table 7**).

Regarding specific dietary recommendations, a majority of respondents were not aware about the benefits of eating meals rich in carbohydrates with a low glycemic index, vegetables, animal protein, vegetables and fruits with a low glycemic index, and fish rich in Omega-3 oily help in reducing the common PCOS symptoms respectively, (63.6%), (60.1%), (60.3%), (50.7%), (50.4%). Interestingly 45.5% of participants were known that that eating of fish rich of omega-3

reduces PCOS symptoms (**Table 8**).

Regarding nutritional education, a majority of respondents (73.3%) have not received any nutritional education regarding PCOS, whereas (26.7%) have received such education, and among them, the primary source of nutritional education was dietitian, doctor, internet, in addition to other sources 25.5%, 19.0%, 52.6%, 2.9 % respectively (**Table 9** and **Table 10**).

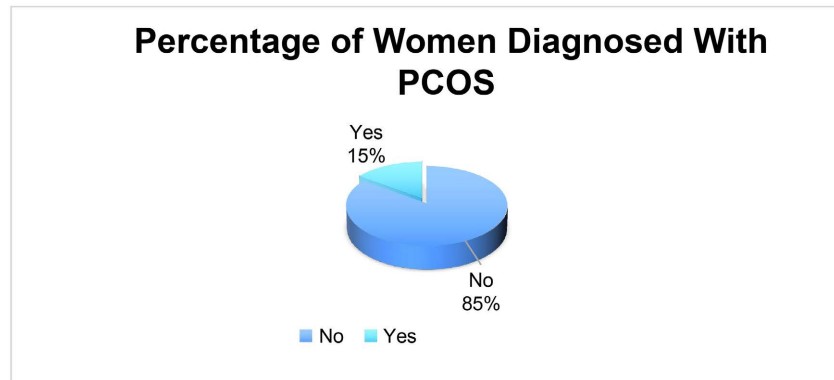


Figure 2. The percentage of women diagnosed With PCOS.

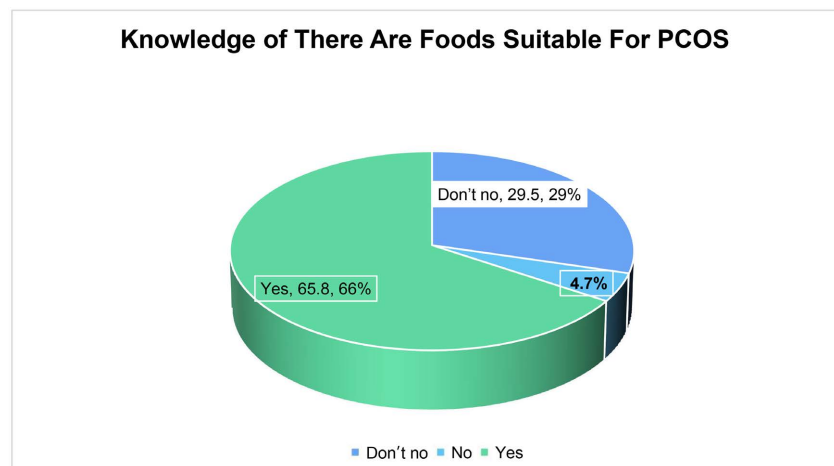


Figure 3. Knowledge of foods that are suitable for PCOS.

Table 3. Awareness of participant about IR and its relation with PCOS.

	participant 18 - 20 year	21 - 29 year	30 - 39 year	40 - 50 year	Total	Percentage
Yes	11	80	21	4	116	31.9%
No	4	23	9	5	41	11.2
Don't know	24	132	26	21	203	55.9

Table 4. Knowledge of PCOS patients about D.M.

	Participant 18 - 20 year	21 - 29 year	30 - 39 year	40 - 50 year	Total	Percentage
Yes	9	59	14	9	91	25.1%
No	4	27	8	4	43	11.8%
Don't know	26	149	34	26	235	64.7

Table 5. Awareness of participant about the effects of PCOS on body weight.

Participant	18 - 20 year	21 - 29 year	30 - 39 year	40 - 50 year	Total	Percentage
Yes	21	170	42	14	247	68%
No	5	18	2	1	36	9.9%
Don't know	13	47	12	15	87	23.9%

Table 6. Effect of healthy living pattern on PCOS symptoms.

Participant	Decrease	Increase	Not change
Healthy living patterns and their effect on PCOS symptoms	N = 17, 4.7%	N = 107, 29.5%	N = 239, 65.8%

Table 7. Knowledge about the dietary recommendations for PCOS patients.

Participant	Don't know	No	Yes
Dietary recommendation	0.6%	63.4%	36.1%

Table 8. Knowledge of participants on the effects of eating patterns on PCOS.

Participant	No	Yes	Don't know
Eating foods rich in carbs (CHO) with low glycemic index	6.9%	29.5%	60.1%
Eating balanced meals rich in vegetables	3.3%	36.6%	60.3%
Eating balanced meals rich in animal protein	5.8%	33.9%	50.7%
Eating vegetables and fruits with a low glycemic index	25%	46.8%	50.4%
Eating fish rich in omega-3	4.1%	45.5%	26.7%

Table 9. Nutritional education about PCOS.

Participant	No	Yes
Received any nutritional education about PCOS	73.3%	26.7%

Table 10. Source of nutritional education regarding PCOS.

Source of education training	Percentage (%)
Dietitian	25.5%
Doctor	19.0%
Internet	52.6%
Other	2.9%

4. Discussion

The purpose of this study was measuring the awareness of Jazan females about the nutrition related effects of polycystic ovary syndrome. According to the results of our study and the previous studies, there is an insufficient knowledge about PCOS. In addition, there was no study that examined awareness of the nutrition related effects of PCOS at Jazan region. Our study also aimed to inves-

tigate the association between level of awareness of the nutrition-related effects of PCOS and age and results showed that there was significant association.

The findings of this study are consistent with previous research that has shown a positive correlation between age and awareness of nutrition-related effects of PCOS. The literature review highlighted those older women with PCOS are more likely to be aware of the importance of nutrition in managing their condition, as they may have had longer exposure to healthcare providers or self-education. But, the finding of this study was the level of awareness of PCOS and its association with age among Jazan women was higher in young adults' groups (21 to 29 years old) and the correct chi-square is (0.015). Based on the chi-square that indicates there is a relationship between age and awareness of nutrition-related effects of PCOS.

The association between the level of awareness of the nutrition-related effects of PCOS and age was found to be significant. There is a correlation between age and awareness about PCOS, and the correct chi-square is (0.015). This suggests that there is a relationship between age and awareness of the nutrition-related effects of PCOS among women with PCOS.

Regarding the chi-square analysis assessing the association between the level of awareness of the nutrition-related effects of PCOS and age, the results showed that the association was significant as it showed in **Table 2**, the three results are PCOS have an effect on weight (0.004), knowledge of how PCOS affect weight (0.037), easy weight acquisition and difficulty in losing is a trait of PCOS (0.009). This suggests that there is a relationship between age and awareness of nutrition-related effects of PCOS. These findings are consistent with previous research that has shown that younger individuals may be more likely to engage in health behaviors and seek out information on health-related topics.

The findings of this study have several implications for healthcare providers it is important for healthcare providers to educate women with PCOS about the importance of nutrition in managing their condition, particularly younger women who may be less aware of the long-term effects of PCOS. Healthcare providers should take this into account when providing education and counseling for women with PCOS, and policymakers should consider the inclusion of nutrition education in PCOS management guidelines to improve awareness and management of PCOS.

5. Conclusion

Based on the results of our study, generally the level of knowledge about PCOS among Jazan women is insufficient (51.5%). And their awareness about the effects of the diet and lifestyle interventions on PCOS was low. The level of awareness of PCOS and its association with age among Jazan women was higher in young adults' group (21 to 29 years old). Based on the chi-square that indicates there is a relationship between age and awareness of nutrition-related effects of PCOS. Unmarried females and young adults showed better knowledge

about PCOS. The majority of respondents (71.1%) believe that healthy eating patterns may reduce the symptoms of PCOS.

6. Limitation

The sampling method was affected by fact that data were collected from female above age of 18 residing in Jazan area, KSA which may affect the generalization of study results.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- [1] Amari, A.S., *et al.* (2017) Role of Polycystic Ovarian Syndrome in Developing Psychological Burden in Saudi Arabian Females: A Case Control Study. *Front Public Health*, **10**, Article ID: 999813.
- [2] Escobar-Morreale, H.F. (2018) Polycystic Ovary Syndrome: Definition, Aetiology, Diagnosis and Treatment. *Nature Reviews Endocrinology*, **14**, 270-284. <https://doi.org/10.1038/nrendo.2018.24>
- [3] González, F. (2012) Inflammation in Polycystic Ovary Syndrome: Underpinning of Insulin Resistance and Ovarian Dysfunction. *Steroids*, **77**, 300-305. <https://doi.org/10.1016/j.steroids.2011.12.003>
- [4] Barrea, L., Arnone, A., Annunziata, G., Muscogiuri, G., Laudisio, D., Salzano, C., Pugliese, G., Colao, A. and Savastano, S. (2019) Adherence to the Mediterranean Diet, Dietary Patterns and Body Composition in Women with Polycystic Ovary Syndrome (PCOS). *Nutrients*, **11**, Article 2278. <https://doi.org/10.3390/nu1102278>
- [5] Hardiman, P., Pillay, O.C. and Atiomo, W. (2003) Polycystic Ovary Syndrome and Endometrial Carcinoma. *Lancet*, **361**, 1810-1812. [https://doi.org/10.1016/S0140-6736\(03\)13409-5](https://doi.org/10.1016/S0140-6736(03)13409-5)
- [6] March, W.A., Moore, V.M., Willson, K.J., Phillips, D.I., Norman, R.J. and Davies, M.J. (2010) The Prevalence of Polycystic Ovary Syndrome in a Community Sample Assessed under Contrasting Diagnostic Criteria. *Human Reproduction*, **25**, 544-551. <https://doi.org/10.1093/humrep/dep399>
- [7] Simon, N.H., Akinola, A. and Samadi, F. (2021) Knowledge and Practice towards Weight Reduction among Women with Polycystic Ovarian Syndrome. *International Journal of Obstetrics, Perinatal and Neonatal Nursing*, **7**, 20-32.
- [8] Paoli, A., *et al.* (2020) Effects of a Ketogenic Diet in Overweight Women with Polycystic Ovary Syndrome. *Journal of Translational Medicine*, **18**, Article No. 104. <https://doi.org/10.1186/s12967-020-02277-0>
- [9] Li, C., Xing, C., Zhang, J., Zhao, H., Shi, W. and He, B. (2021) Eight-Hour Time-Restricted Feeding Improves Endocrine and Metabolic Profiles in Women with Anovulatory Polycystic Ovary Syndrome. *Journal of Translational Medicine*, **19**, Article No. 148. <https://doi.org/10.1186/s12967-021-02817-2>
- [10] Yang, K.L., *et al.* (2018) Effectiveness of Omega-3 Fatty Acid for Polycystic Ovary Syndrome: A Systematic Review and Meta-Analysis. *Reproductive Biology and Endocrinology*, **16**, Article No. 27. <https://doi.org/10.1186/s12958-018-0346-x>

- [11] Conway, G., Dewailly, D., Diamanti-Kandarakis, E., *et al.* (2014) The Polycystic Ovary Syndrome: A Position Statement. *European Journal of Endocrinology*, **171**, 1-29. <https://doi.org/10.1530/EJE-14-0253>
- [12] Abu-Taha, M., Daghash, A., Daghash, R. and Abu Farha, R. (2020) Evaluation of Women Knowledge and Perception about Polycystic Ovary Syndrome and Its Management in Jordan: A Survey-Based Study. *International Journal of Clinical Practice*, **74**, e13552. <https://doi.org/10.1111/ijcp.13552>
- [13] Goh, J.E., Farrukh, M.J., Keshavarzi, F., Yap, C.S., Saleem, Z., Salman, M., *et al.* (2022) Assessment of Prevalence, Knowledge of Polycystic Ovary Syndrome and Health-Related Practices among Women in Klang Valley: A Cross-Sectional Survey. *Frontiers in Endocrinology*, **13**, Article ID: 985588. <https://doi.org/10.3389/fendo.2022.985588>
- [14] Mohamed Reda, A., Ahmed Hassan, A., Abdalla El Sayed, H. and Mohammed Salama, A. (2022) Knowledge and Attitude of Late Adolescent Girls regarding Polycystic Ovarian Syndrome. *Journal of Nursing Science Benha University*, **3**, 889-906. <https://doi.org/10.21608/jnsbu.2022.215660>
- [15] Kaundal, A., Renjhen, P. and Kumari, R. (2022) Awareness of Lifestyle Modifications in the Management of PCOS: A Population-Based Descriptive Cross-Sectional Study. <https://doi.org/10.21203/rs.3.rs-1378647/v1>
- [16] Douglas, C.C., Jones, R., Green, R., Brown, K., Yount, G. and Williams, R. (2021) University Students with PCOS Demonstrate Limited Nutrition Knowledge. *American Journal of Health Education*, **52**, 80-91. <https://doi.org/10.1080/19325037.2021.1877218>
- [17] Bykowska-Derda, A., Czlapka-Matyasik, M., Kaluzna, M., Ruchala, M. and Ziemnicka, K. (2021) Diet Quality Scores in Relation to Fatness and Nutritional Knowledge in Women with Polycystic Ovary Syndrome: Case-Control Study. *Public Health Nutrition*, **24**, 3389-3398. <https://doi.org/10.1017/S1368980020001755>
- [18] Woodward, A., Klonizakis, M. and Broom, D. (2020) Exercise and Polycystic Ovary Syndrome. *Advances in Experimental Medicine and Biology*, **1228**, 123-136. https://doi.org/10.1007/978-981-15-1792-1_8
- [19] Alessa, A., Aleid, D., Almutairi, S., AlGhamdi, R., Huaidi, N., Almansour, E. and Youns, S. (2017) Awareness of Polycystic Ovarian Syndrome among Saudi Females. *International Journal of Medical Science and Public Health*, **6**, 1013-1020. <https://doi.org/10.5455/ijmsph.2017.0202507022017>
- [20] Davda, P.V., Nagarwala, R.M., Shyam, A.K. and Sancheti, P.K. (2020) Knowledge, Attitude and Practice towards Exercise in Young Females Diagnosed with Polycystic Ovary Syndrome. *Indian Journal of Obstetrics and Gynecology Research*, **7**, 369-373.

Appendix. Questionnaire

Polycystic ovarian syndrome is a common hormonal disorder among women and usually begins after puberty. The purpose of this questionnaire is to measure women's awareness of PCOS and its effects on nutrition.

Target group: Jazan women from 18 to 50 years old.

We wish to fill out the following questionnaire about nutrition related effects on PCOS, which includes several axes (demographic information, general information about PCOS, Nutrition-related effects of polycystic ovaries, The effect of eating patterns on polycystic ovaries, Physical activity and effects of sleep)

Confidentiality: This survey does not include your personal information and will not be shared with any other party.

The right to withdraw: If you do not want to complete the survey, you can withdraw at any time.

This survey will not take more than ten minutes of your time.

Consent: Do you agree to participate in this study?

(a) Yes.

(b) No

Demographic information:

1-Age:

18 - 20

21 - 39

30 - 40

40 - 50

2-Education Level:

Primary

Intermediate

Secondary

Bachelors

Illiterate

3-Marital Status:

Married

Unmarried

4-Occupation:

Student

Employee

Entrepreneurial

Housewife

Retired

5-Income Level:

500 - 1000

2000 - 4000

5000 - 7000

8000 - 10,000

More than 10,000

6-Nationality:

Saudi

Non-Saudi

7-Length

8-Weight

General information about polycystic ovaries:

1-Do you have information about PCOS?

Yes

No

2-Have you ever been diagnosed with PCOS?

Yes

No

3-If your answer is yes in which age group, were you diagnosed with PCOS?

18 - 20

21 - 29

30 - 40

40 - 50

4-PCOS is very common chronic condition that affects one in five women of childbearing age.

Yes

No

I don't know

Nutrition-related effects of polycystic ovaries:

1-In your opinion, polycystic ovaries have an effect on weight?

Yes

No

I don't know

2-If yes, how does it affect it?

Increase weight

Loss weight

It doesn't change

I don't know

3-An increase in waist circumference is an indicator of weight gain resulting from polycystic ovaries?

Yes

No

I don't know

4-Easy weight acquisition and difficulty in losing it from polycystic ovary traits

Yes

No

I don't know

5-Do you think that insulin resistance is a symptom of polycystic ovaries?

Yes

No

I don't know

6-Polycystic ovaries may lead to diabetes

Yes

No

I don't know

7-Being eating especially eating high carbohydrates with sugar is a symptom of polycystic ovaries

Yes

No

I don't know

8-Do you think that there are food suitable for polycystic ovaries?

Yes

No

I don't know

The effect of eating patterns on polycystic ovaries:

1-The health system is a system that requires a balanced lifestyle and is not limited to eating specific type of food, but is a healthy lifestyle for life

Yes

No

I don't know

2-Do you have information about dietary recommendations for PCOS patients?

Yes

No

I don't know

3-Healthy eating behaviors reduce the symptoms of polycystic ovaries?

Yes

No

I don't know

4-Eating food rich in carbohydrates with a low glycemic index (do not raise blood sugar quickly) is related to polycystic ovaries

Yes

No

I don't know

5-Eating balanced meals rich in vegetables protein (legumes) is related to reducing ovaries

Yes

No

I don't know

6-Eating balanced meal rich in animal protein (egg, fish, meat) is related to reducing polycystic ovaries

Yes

No

I don't know

7-Eating vegetables and fruits with low glycemic index (do not raise blood sugar quickly) is useful for polycystic ovaries.

Yes

No

I don't know

8-Omega-3 oily fish can help reduce common PCOS inflammation

Yes

No

I don't know

9-Have you received nutritional education regarding polycystic ovaries?

Yes

No

I don't know

10-If the answer to question 9 is yes, what is the source of nutrition education regarding PCOS?

Doctors

Dietitian

Internet

Social media platforms

Physical activity and effects of sleep:

1-Physical activity has a positive effect on women with polycystic ovaries

Yes

No

I don't know

2-Walking is useful for relieving the symptoms of polycystic ovaries

Yes

No

I don't know

3-Resistances exercises such as weight lifting, body weight exercises have an effect on improving insulin response in women with PCOS

Yes

No

I don't know

4-Good sleeping don't affect PCOS

Yes

No

I don't know