Research Article

Knowledge of Polycystic Ovarian Syndrome Among Undergraduate Nursing and Midwifery Students in Princess Nourah Bint Abdulrahman University

Abeer Eswi[1*], Nora Omar Baqatada[2], Norah Falah Alsubaie[3], Omamah Ayman Alabduljabbar[4], Omniyyah Mohammed Alamoudi[5], Randa Abdullah Almutawa[6], Reem Abdulazeez Almousa[7], Sadeem Mohammed Alabbas[8], Sara Ahmad Alsheddi[9]

[1*]*Professor of Maternity Nursing , King Saud Bin Abdulaziz University of Health Sciences, College of Nursing, Saudi Arabia, Jeddah, Faculty of Nursing, Cairo University , Egypt .*

[2,3,4,5,6,7,8,9 9]*College of Nursing, Princes Nourah Bint Abdulrhman University, Saudi Arabi, Riyadh*

Abstract

Background: Polycystic ovarian syndrome is a metabolic, reproductive, and endocrine disorder, in which the ovaries contain a large number of harmless follicles. Aim of the study was to assess knowledge of nursing and midwifery students in Princes Nourah Bint Abdelrhman University regarding PCOS.

Methodology: The research design was a descriptive cross-sectional design. A convenience sample of 268 undergraduate nursing students in PNU was obtained from each level in both program, nursing and midwifery, also the internship students were included. Data was collected through a self-administrated questionnaire that was uploaded through Google form to the students.

Result: of the study indicated that 75% nursing and 25% midwifery students their age ranged from 18 and 20 years. Knowledge regarding polycystic ovarian syndrome (PCOS): The overall mean score of knowledge was 12.324.45/Moderate, Clinical evaluation for PCOS was diagnosed in 14.18%, with 28.76% having Prolonged periods, 58.44% having acne, 57.52% having family history of diabetes, 54.55% having hair growth, 52.6% having very heavy periods, 51.32% having hair loss, 43.79% having partial absence of periods, 41.83% having discoloration, and 9.21% having diabetes.4. The sources of the information were as follow; 34.72% got the information of PSOC from the internet, followed by healthcare providers (24.53%), then family/friends and academic learning for around 18% each, then newspapers, brochure/written material, and workshop/seminars for less than 2% each. **Conclusion:** Most of the students from the nursing and midwifery program had awareness of PCOS and risk factors, however, there is a lack of information about the signs and symptoms of PCOS, and the main sources of information were from health care providers.

Recommendation:1. Conducting educational programs to raise awareness among university students about PCOS.

Keywords: Polycystic Ovarian Syndrome, Nursing and Midwifery students, Undergraduate, Knowledge.

Introduction

Polycystic ovarian syndrome is a metabolic disorder that is related to lifestyle. It is also a reproductive disorder, and an endocrine disorder, in which the ovaries contain a large number of harmless follicles. The follicles are underdeveloped in PCOS these sacs are unable to release an egg which means ovulation does not take place. With symptoms that included irregular menstruation, chronic anovulation, acne hirsutism,

and disturbance in metabolism (Alruwaili et al., 2020) [1] It affects 4%–20% of women of reproductive age worldwide. And the exact cause of the polycystic ovarian syndrome is unknown yet, women with PCOS are pre-disposed to long-term health diseases, such as type 2 diabetes, central obesity, infertility, hyperinsulinemia, cardiovascular disease, anovulation, and liver disease (Thabet et al., 2021) [2]

Lack of knowledge among women about PCOS may lead to a delay in the diagnosis and treatment. The level of PCOS knowledge was found to vary greatly. In Saudi Arabia, for example, the vast majority of women (>60%) were unaware of PCOS symptoms and complications (Alshinan & Shaman, 2017) [3]

According to a research conducted in India among 200 female medical students from various institutions, 28% of the medical students were not aware of PCOS. Even though PCOS is a widespread disorder, only 10.7% of the student nurses had excellent understanding of the condition, compared to 76% who had mediocre knowledge (Sunanda & Nayak, 2016) [4]

The level of knowledge and attitude toward PCOS might also be influenced by sociocultural influences. For instance, in Egypt, the majority of women had poor or insufficient understanding about PCOS, with 52.4% of them not even knowing the term's description, 45.4% unaware of its symptoms, and 69.6% unaware of its implications (Ali & Mahmoud, 2019) [5] 10% of people in Pakistan have heard about PCOS (Gul , Zahid & Ansari, 2014) [6] In addition, women and primary care doctors agreed that irregular menstrual periods were a crucial clinical aspect of PCOS (Teede , Gibson, Norman & Boyle, 2014) [7] . At 2016 a survey was conducted in Quetta's universities to determine the percentage of girls who were aware of PCOS, it was found that 72.5% of respondents were unaware of the condition (Nasim et al., 2017) [8] Another study conducted in central India found that roughly one-third of the participants reported not knowing anything about PCOS (Patel & Rai, 2018) [9]

Purpose:
This study aims to assess the knowledge of PCOS among undergraduate nursing and midwifery students in Princess Nourah bint Abdulrahman University.

Statement of the Problem:
Most of the women worldwide are affected by PCOS, which has obvious symptoms but may be misdiagnosed by a girl as symptoms of a regular menstrual cycle.

In Saudi Arabia, for example, the vast majority of women (>60%) were unaware of PCOS symptoms and complications (Alshinan & Shaman, 2017).[3]

As a result, the girl may ignore the symptoms and getting checked, which can result in serious complications that can occur such as endometrial cancer, infertility, abortion, and some mental illnesses like depression and anxiety (Thabet et al., 2021) [2]

There are studies similar to this study in different regions that showed negative results in terms of students' knowledge of PCOS. This proves the importance of this topic to be conducted. Therefore, the current study aims to assess the

knowledge of undergraduate nursing and midwifery students at Princess Nourah bint Abdulrahman University about PCOS.

Significance of the study:
Nursing Education: This study will help to raise awareness about PCOS and its impact on the health of teenage females and women as well.

Nursing practice: The study will contribute to better quality care provided to teenage females and women who complain of PCOS and progressively will help to improve changes to increase the chance to be a mother.

Nursing Profession: This study will add to the body of knowledge in nursing research related to PCOS

Research Questions:
1- What is the level of knowledge about PCOS among undergraduate nursing and midwifery students in Princess Nourah bint Abdulrahman University?
2- Is there any difference in the level of knowledge between undergraduate nursing and midwifery students?

Review of Literature
literature review is organized according to research themes which are the level of knowledge about PCOS among nursing and midwifery students. Studies have been taken from Google Scholar used to search for relevant research about PCOS. A review of related literature included eight journal articles (used different designs as cross-sectional study and descriptive survey approach and a mixed methodology approach and quantitative study). A considerable amount of literature has been published in Saudi Arabia, India, and Iraq. This review will focus on two major themes which emerge repeatedly throughout the literature reviewed. These themes are level knowledge of PCOS and level of knowledge about symptoms of PCOS. These studies include nursing students, university students, nursing & midwifery staff, and a sample random of the community.

The level of knowledge of PCOS
Polycystic Ovarian Syndrome (PCOS) is one of the disorders of the endocrine system, faced by women usually after puberty of all races and ethnicity (Alruwaili et al., 2020) [1] Knowledge Was assessed in two studies in the Kingdom of Saudi Arabia, one of them was conducted on the level of nursing students at far as a university, and the other study was on students at qassim university, both of them used quantitative research, and the two studies showed that there is a lack of awareness about the syndrome in Saudi Arabia, as research carried out at Jazan University, which was to enhance the abilities of awareness of PCOS among nursing students through advanced computational analysis, This experiment involves 200 students between the ages of 18 and 25. The results revealed that 111 out of the 200 respondents, or about 55%, were aware of PCOS and about 44.5% had poor knowledge of PCOS (Dharmarajlu, 2021) [10] Review of related literature found that (Alshinan & Shaman, 2017) [3] in

their study that assessed the information of Saudi women with PCOS regarding the physiology of female reproductive systems, In which 350 volunteer students from Qassim University were selected using a random sample according to the comprehensive criteria (their ages ranged between 18-25 years). Regarding the results, more than 60% (n=210) of the enthusiastic sample were lacking even a basic understanding of PCOS symptoms, and 40% (n=140) had good knowledge of the symptoms. A Study to Measure the Health Awareness of PCOS in Saudi Arabia. Also, conducted studies in India about the level of knowledge and awareness of PCOS among nursing students, the aim of these studies to assess the knowledge and awareness of PCOS among student nurses. The first study included about 88 students. Nearly all students (89.8%) stated that PCOS is a majority of prevalent endocrinological condition. 83 pupils knew that obesity was a risk factor. Regarding knowledge 62 participants (70.4%) were aware of the metabolic syndrome when it came to long-term complications, 51 participants (57.95%) were aware of hypertension, fifty individuals (56.81%) were aware that they were at risk for developing diabetes mellitus, and aware that they were at risk for developing diabetes mellitus, and 60 participants (68.18%) were aware that endometrial cancer was a possibility (Sasikala , Shanmugham , Varghese & Saravanan , 2021) [11] For the other study data from the nursing students was gathered using a structured questionnaire (Sunanda & Nayak, 2016).[4] In studying knowledge of PCOS among 150 nursing students in Nitte Usha Institute of Nursing Sciences. Data were examined using both descriptive and inferential statistics utilizing a descriptive survey research approach. There were three categories for knowledge level: bad (13.3%), average (76%), and good (10.7%). The study's findings indicate that the majority of students (114) had average knowledge. And previous studies showed that women in Saudi Arabia had little knowledge about PCOS, other research about nursing students in Saudi Arabia had moderate knowledge of PCOS and its symptoms because the level of knowledge about PCOS in Saudi Arabia is lower than outside Saudi Arabia, because there's no awareness between people and some of them didn't think about how much this condition is serious, and nursing students in India had an average knowledge of 71% of PCOS and were familiar with some of the PCOS and risk factors.

The level of knowledge about symptoms of **PCOS**

Most studies examined nursing students' awareness of PCOS by examining the students' awareness of symptoms defined as characterized by excessive ovarian and/or adrenal androgen secretion. Ovarian factors include altered steroidogenesis as well as other factors such as hyperinsulinemia which contribute to excessive ovarian androgen production. Importantly, amenorrhea increases the chance of having PCOS to 90%. Other associated symptoms of PCOS include hirsutism, acne, central obesity, and sub-fertility (Alfanob et al. 2022) [12]

One of the studies conducted in the Kingdom of Saudi Arabia stated that. This study has a type of quantitative research (QR) approach that was obtained using a Descriptive Survey Design. Previous studies have reported that the sample is nursing students from level 4 to 8, age group between 18 to 25 years,

and the total sample size was (n=200). The purpose of the study was to assess and indicate the degree of understanding PCOS among nursing students at the University College of Farasan in Saudi Arabia. The results of the study were the level of awareness of PCOS among students at Farasan College was recorded for various symptoms that include irregular menstrual, facial acne, hirsutism, reduction in fertility rate, abnormal weight gain, frontal hair loss, frequent pelvic pain, hypertension, and psychological disturbance. From the collected datasets which have been analyzed about all awareness factors, it has been observed that an average of 45.12% of students are aware of the syndrome, where's an average of 54.88% of nursing students are unaware or were not previously aware of PCOS.

A similar study with a descriptive quantitative approach was also carried out in Saudi Arabia. A total of (n=158) convenience samples out of 408 were collected from female nursing students at KAU. To assess the level of awareness of nursing students regarding PCOS at King Abdulaziz University. The outcomes are in Resentful of their knowledge of the clinical evaluation of PCOS, (31.6%) of the participants were answering responses had very heavy menstruation, while 15.8% answered prolonged menstruation, more than 7 days, and 13.3% of them answer complete cessation of the menstrual cycle. (27.8%) were answered with a partial cessation of the menstrual cycle. The correct answer of the participants about acne problems during the menstrual cycle, an unusual amount of hair loss from the scalp, uncommon hair growth in different parts of your body, discoloration or dark color patches on the skin, continuous abnormal weight gain and diagnosis with diabetes (55.1%, 27.8%, 22.2%, 25.3%, 19%, 4.4%). Respectively among the 95 participants, 88 students completed the online survey. The study group's average age was 21.4 years, and they ranged in age from 18 to 22 (Thabet et al., 2021) [2] This study was conducted to evaluate the knowledge and awareness of PCOS among nursing students. The results came in two ways in this study knowledge about the risk factors for PCOS is illustrated. Regarding the knowledge about the risk factors, 83 students were aware of obesity as the risk factor, and 73 participants knew that a sedentary lifestyle and lack of physical exercise can increase the risk for PCOS. 70% of the students accepted that junk food intake is associated with PCOS. Only half of the participants knew the familial inheritance of PCOS. Depicts the knowledge about the clinical presentation of PCOS. On analyzing the awareness about the clinical presentation, 85% responded as menstrual irregularities, and half of them knew hirsutism (abnormal male type of hair distribution) and acanthosis nigricans (velvety patches over the nape of the neck) (Sasikala et al., 2021) [11]

There was no clear difference in the results of awareness in Saudi Arabia from India, all students had limited awareness of the symptoms. The reason may be that the curriculum method in Saudi Arabia and India is simple and does not deal with such common topics as PCOS extensively. The study about awareness began to expand. A study in Iraq conducted on nurses and midwives about their awareness of symptoms. The descriptive study was conducted in the State of Iraq. Include a sample (systematic random) of (100) nurses and midwives who work in obstetric and gynecological

departments from three hospitals in Baghdad City to assess nurses' knowledge about PCOS. in this study, the participants showed a high knowledge of the symptoms of PCOS. Regarding the absence of a menstrual cycle or irregular menstrual cycle (100%), hair growth in unusual amounts in facial or body hair (hirsutism) (93%), acne problem (severe) or oily skin (47%), the minority choose the answer yes to hair loss from head more than normal (19%), increased level of testosterone (70%) (Salman, 2020) [13] The widest reading in studies about awareness, we found studies that measure the awareness of the society of women in KSA and abroad about the symptoms of PCOS. There was a study in Saudi Arabia cross-sectional study. Includes 413 adult female participants were randomly enrolled. The goal of the research is to assess the significance of differences in participants' levels of awareness and sociodemographic data. The results are about awareness of symptoms awareness of PCOS symptoms was assessed and most of the women participating (73.8%) were aware of the associated symptoms (Alruwaili et al., 2020) [1] These findings were similar to those of a descriptive cross-sectional study conducted in Saudi Arabia. A total of 100 people took part, with an average age of 29 to 31 years. The purpose of this study is to determine the knowledge, attitude, and weight-loss practices of women of reproductive age who have PCOS. The study participants' understanding of PCOS symptoms. The study participants' awareness of PCOS symptoms reveals information about the study participants' awareness of PCOS symptoms. The most commonly reported symptoms were irregular menstrual cycles (52%), facial acne (32%), hirsutism (37%), psychological disturbance (37%), fertility reduction (39%),Obesity (37%), pelvic pain (35%), frontal hair loss (23%), abortion (24%), high sugar blood (15%), and early puberty (Albezrah & Arein, 2019) [14]

Materials and Methods

Design: The study was conducted using a descriptive cross-sectional quantitative design. The cross-sectional design is a type of research in which data collected from many different individuals at a single point in time (Thomas, 2022) [15] this design was chosen because it fits the nature of the study. The current study was conducted at PNU's College of Nursing.The sample included undergraduate nursing and midwifery students studying at Princess Nourah bint Abdulrahman University.

Sampling technique: It was a non-probability convenience sample of 268 of the nursing students in PNU was obtained from each level in both program, nursing science and midwifery program, also the internship students was included.

Sample size calculation: The margin of error is 5%, The confidence level is 95%, The response distribution was 50%, The sample size is 268. Data was collected with the use of adopted questionnaire of Nasim et al., (2017) [8] in the title (Prevalence and Knowledge of Polycystic Ovarian Syndrome (PCOS) among female science students at different public universities (QUETTA)) it was a self-administered questionnaire through that was filled through google form. The questionnaire consists of 36 questions classified into 3 categories: social features, knowledge of PCOS, clinical

evaluation knowledge, it was sent to the student through the university email. The first six questions asked regarding social traits like age, education, and marital status. The participants were then questioned regarding their knowledge of PCOS. Questions about general knowledge regarding the clinical evaluation of PCOS were found in the third paragraph. The questionnaire was ordinal scale with closed and open-ended questions, had 3 answers (Yes, no, I do not know). Nursing students further classified their knowledge scores as follows: bad if the overall score was lower than 50%, moderate if it was between 50% and 70%, and good if it was above 70. The tool was viewed as dependable (Cronbach's alpha = 0.799).

Data gathering procedure:
IRB approval from PNU and administrative clearance from the Dean on 2/5/2023, students\saffairs, data was collected from March to April 2023. The questionnaire of the study posted on Google Forms and sent to the students at nursing colleges via email. The participants completed the questionnaire within 5 minutes.

Statistical analysis
Data was analysed using SPSS version 25.0. The frequencies, percentage, mean and standard deviation were conducted to describe the distribution of the Knowledge regarding polycystic ovarian syndrome (PCOS). The Mann Whitney and Kruskal Wallis were used to assess the difference in mean rank score of knowledge in term of Socio-demographic factors. A p value less than 0.05 was considered statistically significant.

Ethical Consideration
IRB Approval was obtained from Princess Nourah bint Abdulrahman University. Data confidentiality and privacy was sustained and guaranteed. The participants' written agreement to take part in the research beforehand collection of data was safeguarded**.**

Data Analysis
Data was analysed using SPSS version 25.0. The frequencies, percentage, mean and standard deviation were conducted to describe the distribution of the Knowledge regarding polycystic ovarian syndrome (PCOS). The Mann Whitney and Kruskal Wallis were used to assess the difference in mean rank score of knowledge in term of Socio-demographic factors. A p value less than 0.05 was considered statistically significant.

The normality test:
One-Sample Kolmogorov-Smirnov test was conducted to test the normality of the data distribution; the variable was not normally distributed ($p<0.05$); thus, the non-parametric tests (Mann Whitney and Kruskal Wallis) were applied.

Socio-demographic information:
As shown in Table (1) 268 medical students participated in the study including 75% nursing students and 25% midwife students, 57.46% aged between 18 and 20 years, followed by 21-23 years old (36.94%), while only 5.65 older than 23 years old. There were 26.12% from the first year, followed by the second year (23.13%), then the third year (22.76%), then the

fourth year (17.16%), and finally the internal (10.82%). It was reported that 51.49% had normal weight, followed by overweight (20.9%), then underweight (16.42%), and finally the obese students (11.19%). 97.39% were single, while only 2.61% were married. 50.75% of the students' mother had university Educational, followed by high school (29.10%), the rest level had less than 10% each. 22.76% of the students had a family history of polycystic ovarian syndrome (PCOS).

Knowledge regarding polycystic ovarian syndrome (PCOS):

As shown in Table (2) The knowledge of PCOS was measured by 20 items/statements, which were dichotomised/classified into "Correct" and "incorrect" answers, so the possible score ranged between zero (the less relevant to knowledge) and 20 (the most relevant to knowledge). The overall mean score was (12.32±4.45/Moderate). In details, 3 statements had less than 50% of the awareness, which ranged between 41.04% and 23.13%, while 17 statements had more than 50% of the awareness, which ranged between 92.91% and 55.97%. In term of the student's program, midwife students had mean score (13.67±3.98/High). In details, 4 statements had less than 50% of the awareness, which ranged between 44.78% and 14.93%, while 16 statements had more than 50% of the awareness, which ranged between 95.25% and 52.24%.

Nursing students had mean score (11.87±4.52/Moderate). In details, 5 statements had less than 50% of the awareness, which ranged between 25.27% and 16.92%, while 15 statements had more than 50% of the awareness, which ranged between 91.54% and 53.23%.

Clinical evaluation for PCOS:

As shown in Table (3) The Clinical evaluation for PCOS of was evaluated by 13 items/statements, which were listed in the table descended, only 14.18% were diagnosed with PCOS, , 28.76% had Prolonged periods (more than 7 days), , ,58.44% faced acne problem during menstrual cycle,57.52% had Family history of diabetes, 54.55% had Unusual amount of hair growth at different parts of your body , 52.6% reported that had very heavy periods (more than 2 pads per day), 51.32% had Unusual amount of hair loss from scalp,43.79% had partial absence of periods (not after 28 days), , 41.83% had discoloration or dark color patches on skin, 40.91% had Continuous abnormal weight gain, 28.76% had prolonged periods (more than 7 days 27.27% reported a complete Absence of periods (not at all) ,only 9.21% had diabetes. , As shown in Figure (1) 24.645 had a history of PCOS
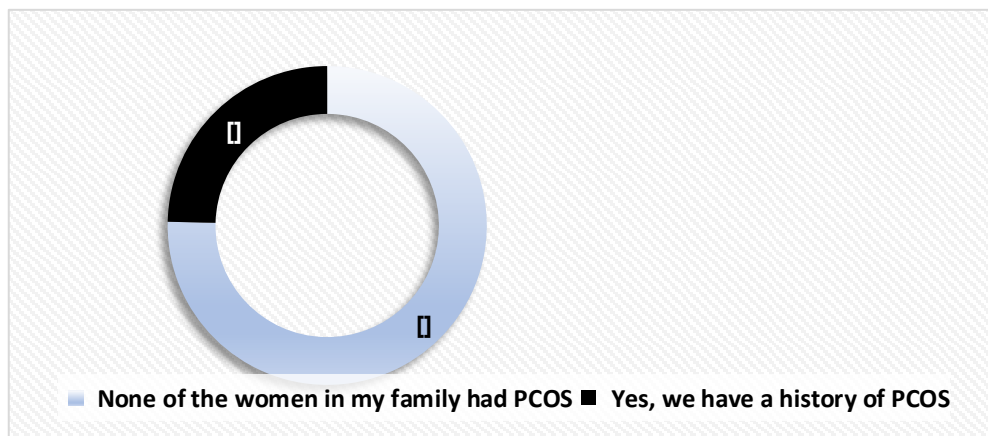

Figure 1 The medical history of PCOS in mother or sister

As shown in Figure (2) 34.72% got the information of PCOS from the internet, followed by healthcare providers (24.53%), then family/friends and academic learning for around 18% each, then newspapers, brochure/written material and workshop/seminars for less than 2% each.
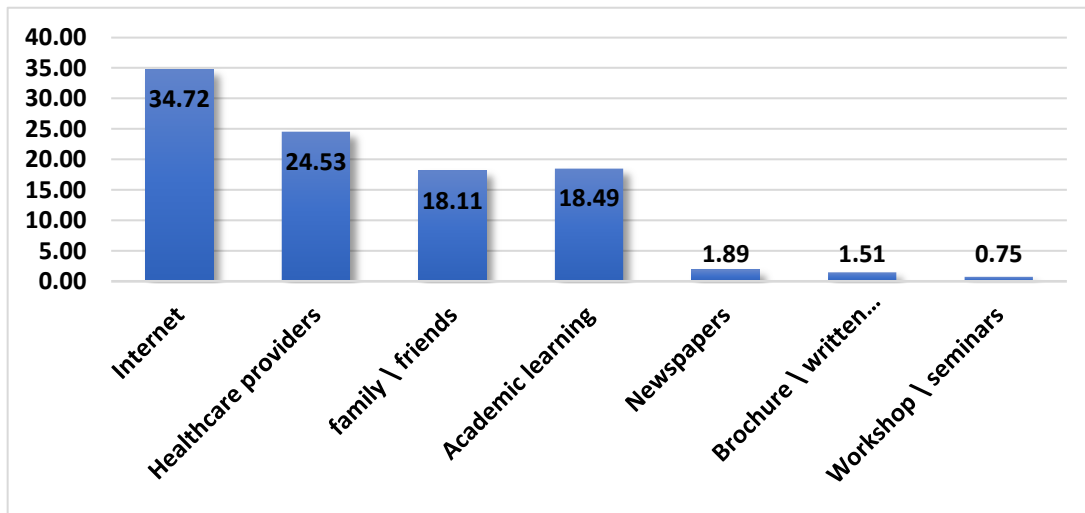
Figure 2 The sources of the information

As shown in figure (3) The Mann Whitney and Kruskal Wallis were used to assess the difference in mean rank score of PCOS knowledge in term of Socio-demographic factors.

It was found that midwife students (mean rank =158.93) are more aware than nursing students (mean rank =126.36) (U=5097, p<0.01=0.003 see figure (3)
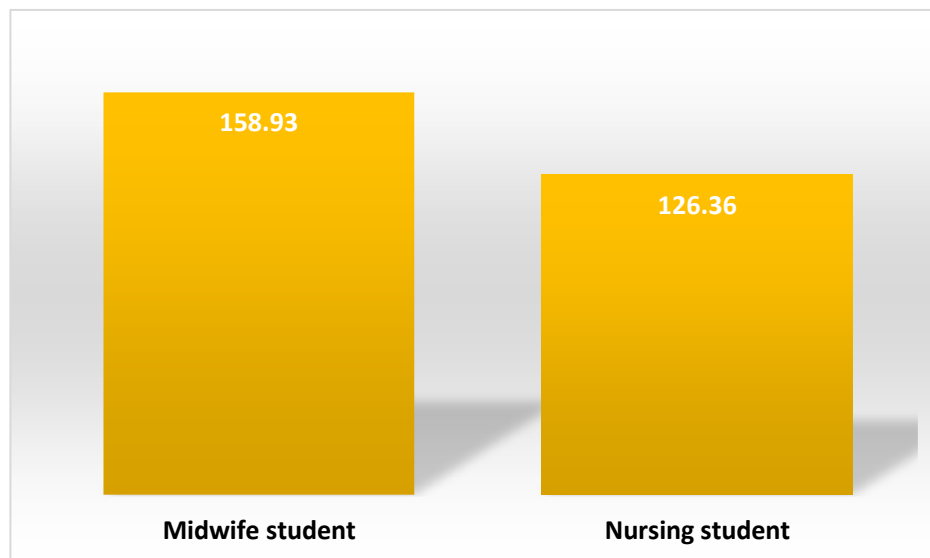
Figure 3 Student's knowledge about PCOS

It was found that Intern students (mean rank =163.60) are more aware about PCOS than other study years (X^2= 15.901, p<0.01=0.003) , Figure (4).
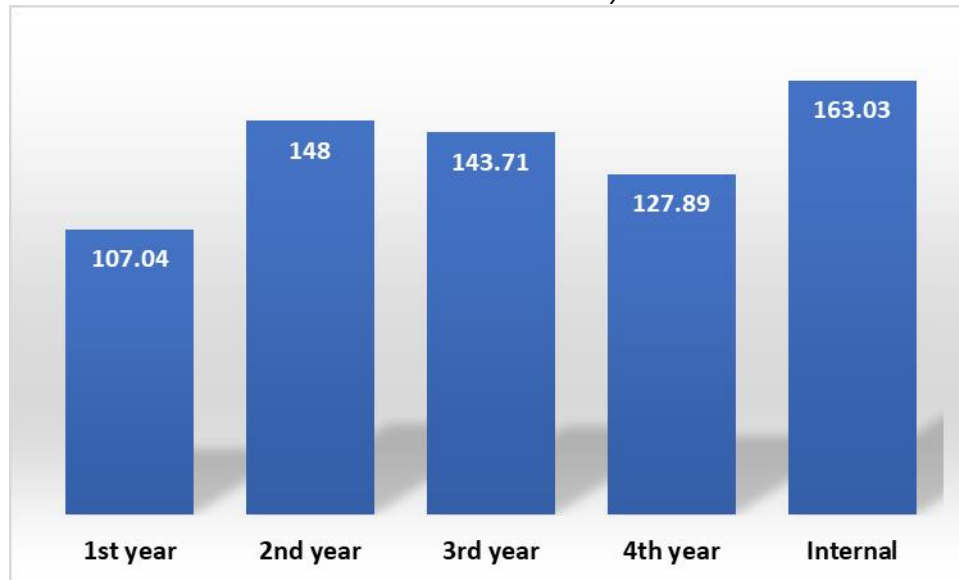
Figure 4 PCOS knowledge of the students in different Academic levels

It was found that Overweight students (mean rank =158.60) are more aware about PCOS than other students with various BMI level (X^2= 8.052, p<0.05=0.045), see Figure (5)

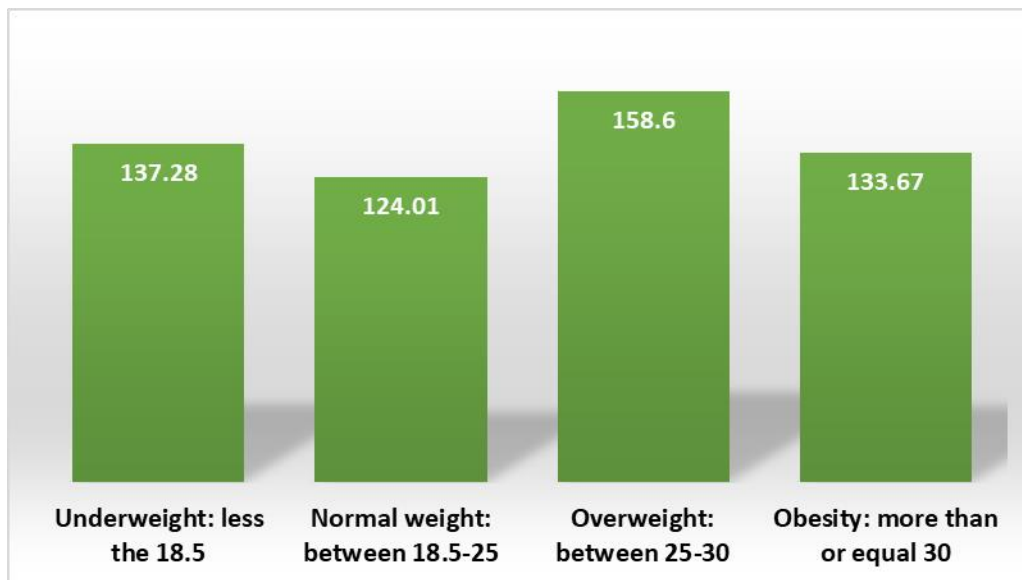
Figure 5 Student's Knowledge about BMI and PCOS

It was found that students who had family history of PCOS syndrome (mean rank =159.56) are more aware than those who did not have (X^2= 8.472, p<0.05=0.014), see Figure (6).

Figure 6 PCOS knowledge of Students have family history with PCOS

Discussion

The aim of the current study was to assess the knowledge of polycystic ovarian syndrome (PCOS) among undergraduate nursing and midwifery students at University of Princess Nourah Bint Abdulrahman.

Results of the current study were formulated according to the following items: a) knowledge of PCOS among nursing and midwifery students; b) the knowledge sources of PCOS; c) and lastly, the association between personal knowledge of PCOS and the socio-demographic data of the participants.

Regarding the knowledge of PCOS among the participants and its risk factors, the current study result revealed that most of participants were aware of PCOS and its risk factors; however, less than half of them were aware of specific blood tests used to diagnose PCOS, with an overall score 12.32/moderate. In a study done by Al Bassam, Ali & Rahman, 2018) [17] on 350 students from Qassim University via an online questionnaire, they found that about 71% (n=248) students are aware of PCOS and its risk factors. Another study done by Sasikala et al., (2020) [11] who recruited 88 students to participate, most of the included students (89.8%) were aware of PCOS as the most common endocrinological disease. Also, Sunanda and his colleges collected data from 150 participants at Nitte Usha Institute of Nursing Sciences and found that 76% of the participants were with average knowledge of PCOS and its risk factors (Sunanda, Nayak & Sabitha, 2016) [17]

Interestingly, Deviet al., (2017) [18] assessed the knowledge of PCOS among students at Sikkim Manipal College of Nursing, reported that all students were aware of PCOS with different degrees of its risk factors with an overall score of 14.97; which were in alignment with our findings.

In align to the current study results, a study done by (Dharmarajlu, 2021) [10] on 200 nursing students at University College of Farasan in Saudi Arabia, found that slightly more than half of the participants (55.5%) were aware of PCOS and its risk factors. On contrary to the current study findings, a study done by Nasim et al., (2017) [8] on 451 females science students at Different Public Universities of Quetta, Pakistan,

found that most of the participants (72.5%) were not aware of PCOS and its risk factors; however, post educational intervention about PCOS revealed that the majority of the participants had adequate knowledge about PCOS.

On the other hand, Jahangir and his colleges conducted a survey on non-medical undergraduate students in Bangladesh and found that only 6% of the participants had good knowledge about PCOS and about 56% of the total participants had very less knowledge about PCOS (Jahangir 2013) [19] Another similar finding was reported by (Sunanda & Nayak , 2016) [4] on nursing students in India, found that only 10.7% of the total 150 participants had good knowledge about PCOS. Also, similar findings were reported by(Gul , Zahid & Ansari , 2014) [6]which were conducted in Pakistan reported that the percentages of women's awareness of PCOS and its risk factors were 10%.

As regards to clinical evaluation of PCOS, current study findings revealed that only 14.18% of total participants were diagnosed with PCOS with acne during menstrual cycle, unusual amount of hair growth at different parts of the body and family history of diabetes are the most common problems associated with the participants. In alignment with current study findings, of (Al Bassam Ali & Rahman , 2018) [17] reported that about 12% of their participants suffered from PCOS, and the most common symptoms associated with their participants was Irregular menstrual cycle. Another study done by Dharmarajlu (2021) [10] found that about 11.9% of the participants diagnosed with PCOS and reported that irregular menstrual cycle and facial acne were the most common symptoms associated with the participants.

Moreover, a study on Sudanese women done by Alfanob et al., (2022) [12] found that 32.5% were diagnosed with PCOS; and many of them were complaining from symptoms in which the most experiences symptoms were menstrual cycle irregularities (85.9%), acne (79.5%), weight gain (78.2%), and hirsutism (70.5%). Compared to a study in India done by (Upadhye & Shembeker, 2017) [20] they found that the symptoms associated with PCOS were 33.5% of females had acne, 16%

had cycle irregularity, and 5% had hirsutism while 2% had infertility.

Concerning the sources of PCOS knowledge, results revealed that the most common source of PCOS information and knowledge was the internet (34.72%), followed by healthcare providers (24.53%), while the least common source, was information from written materials (1.51%), followed by workshops or seminars (0.75%). Current study results were in accordance to what was mentioned in the study done by Dharmarajlu (2021), [10] who found that the most common source mentioned from their respondents was the social medial (67.5%), while the least common sources were reading books or magazines (1.5%), or asking patients with PCOS (2.5%). On the other hand, a study by (Devi et al, 2017) [18]found that the most common source of knowledge of PCOS was health care providers in 23% in participants with above median level of knowledge, and 40% in participants with below median level of knowledge, while the least common sources were family members or friends.

Alfanob and his colleges mentioned that the main common source of PCOS knowledge was medical professionals as gynecologists (Alfanob et al., 2022 [12] and their results were in align with other findings reported by Alshinan & Shaman (2017) [3] in Saudi Arabia where the most common source of information women did get from guidance of medical doctors. Again, these results were in contrary to our results.

Regarding the association between personal knowledge of PCOS and the socio-demographic data, results revealed that midwife students, participants whose BMI between 25-30, and whose family had a history of PCOS; experienced more knowledge of PCOS compared to others. However, there was no association between level of PCOS knowledge and age of participants, marital status, or education level of the mothers.

These findings are in accordance to a study done by Dharmarajlu et al., (2021) [10] who observed that 63.84% of their participants mothers or grandmothers had experienced PCOS symptoms in which they were examined and diagnosed; those participants were more aware of PCOS compared to others.

Similar to our findings of (Devi et al., 2017) [18] who reported that there was no significant relation between participants age, or their education with the level of PCOS knowledge. However, they found that the family history of PCOS was not associated with higher levels of PCOS knowledge, which was contraindicated with our findings. Also, (Kalpana, 2013) [21] reported that no relation between knowledge of PCOS and age of students, or family history of PCOS. Small sample size was the main contributor to their results regarding the association of PCOS knowledge and other variables among their students.

Another study by Nasim et al., (2017) [8] reported no association between level of knowledge and demographic variables as age of student, year of study, marital status or locality; however, their study was conducted only on one city of Pakistan and only on educated females whom the majority were not aware of PCOS and further PCOS diagnosis was based on signs and symptoms only due to the lack of facilities, so their results might be biased.

In contrast to the current study findings, Alruwaili et al., (2020) [1] reported that the level of PCOS awareness was significantly related to the education level in which it increased with higher levels of education. Also, they found no association between the age of participants and level of awareness of PCOS. However, they found a significant association between marital status and level of knowledge, and married participants had the highest levels of awareness; these findings were contraindicated to our findings.

Also, another study by (Alessa et al., 2017) [22] reported that education level was correlated positively with the level of PCOS knowledge, and also stated that level of PCOS awareness had not correlated with marital status.

Another study done by Alfanob et al., (2022) [12] is in contrary to the current study results, they found that knowledge about PCOS was significantly associated with age of participants, educational level, and being a health professional; and their results were validated with another study done by (Alshinan & Shaman, 2017) [3] conducted in Saudi Arabia in which the knowledge level of PCOS was significantly related to higher educational levels and health qualifications. Their results might be explained by the fact that women with higher educational levels are more aware of the information of the disease, as well as good medical care.

Interpretation of contradicting findings
From the researcher's point of view the differences and contradictions of results with other research may be due to cultural differences, age differences as well as sample size.

Conclusion
The current study concluded that most of the students in nursing and midwifery programs were aware of PCOS and its risk factors; however, there is a lack of information regarding signs and symptoms of PCOS. The main source of information was the internet, within a minority the source of knowledge was from the healthcare providers, which raise the necessity of an effective educational interventions especially for first year's nurses to raise their knowledge regarding PCOS.

Recommendations:
Based on the study findings the following are recommended:
1. Development of educational programs to raise the awareness of the university students toward PCOS.
2. Poly cystic ovarian syndrome (PCOS) should be included in all nursing curricula, not only midwifery programs.

References:
Alruwaili, G., Mohammad, S., Almoaibed, F., Badawi, F., Alruwaili, R., Alkholaifi, M., Alharthi, K., Alhassoun, A., & AlNissayan, S. (2020). General public awareness toward polycystic ovarian syndrome among females in Saudi Arabia. *International Journal of Medicine in Developing Countries*, 1847–1853. https://doi.org/10.24911/ijmdc.51-1601060234

Thabet, H., Alsharif, F., Garoot, L., Yousef, M., Almutairi, L., & Kutbi, R. (2021, September 1). The level of awareness of nursing students regarding polycystic ovarian syndrome in King Abdulaziz University. *Assiut Scientific Nursing Journal*.Retrieved February 1, 2023, from https://asnj.journals.ekb.eg/article_214686.html

Alshinan, A., & Shaman, A. A. (2017). A Study to Measure the Health Awareness of Polycystic Ovarian Syndrome in Saudi Arabia. *Global Journal of Health Science*, 9(8), 130. https://doi.org/10.5539/gjhs.v9n8p130

Sunanda, B., & Nayak, S. (2016). A Study to Assess the Knowledge Regarding PCOS (polycystic ovarian syndrome) among Nursing Students at NUINS. *Journal of Health and Allied Sciences NU*, 6(03), 24-26.

Ali, M. R. and Mahmoud, O. M. (2019). Polycystic ovarian syndrome knowledge and awareness of non-medical undergraduate students. *International Journal of Novel Research in Healthcare and Nursing*, 6(3), 1249–1258

Gul, S., Zahid, S. N., & Ansari, A. (2014). Original Article PCOS: Symptoms and Awareness in Urban Pakistani Women. *International Journal of Pharma Research and Health Sciences*, 2 (5), 356–360.

Teede, H., Gibson-Helm, M., Norman, R. J., & Boyle, J. (2014). Polycystic Ovary Syndrome: Perceptions and Attitudes of Women and Primary Health Care Physicians on Features of PCOS and Renaming the Syndrome. *The Journal of Clinical Endocrinology &Amp; Metabolism*, 99(1), E107–E111. https://doi.org/10.1210/jc.2013-2978

Nasim, A Haq, N., Khan, Z., Riaz, S.,., Shahwani, R., & Tahir, M. (2017). Prevalence and Knowledge of Polycystic Ovary Syndrome (PCOS) Among Female Science Students of Different Public Universities of Quetta, Pakistan. *Imperial Journal of Interdisciplinary Research*, 3(6).

Patel, J., & Rai, S. (2018). Polycystic ovarian syndrome (PCOS) awareness among young women of central India. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology*, 7(10), 3960-3965.

Dharmarajlu, S. M. & John ,R., (2021). Enhancing the Polycystic Ovary Syndrome Awareness Capabilities among Nursing Students through Advanced Computational Analysis. *CERN European Organization for Nuclear Research - Zenodo. https://doi.org/10.5281/zenodo.5790199*

11.Sasikala, R., Shanmugham, D., Varghese, J., & Saravanan, D. K. (2021). A study of knowledge and awareness on polycystic ovarian syndrome among nursing students in a tertiary centre in South India. *The New Indian Journal of OBGYN*, 8(1), 121–125. https://doi.org/10.21276/obgyn.2021.8.1.23

Alfanob, Z. O., Ahmed, M. H., Ahmed, M., Badi, S., & Elkheir, H. K. (2022). Knowledge, Prevalence and Practice of Polycystic Ovary Syndrome among Sudanese women in Khartoum State, Sudan: The need for health education. *Sudan Journal of Medical Sciences*, 17(2), 204-217.

Salman, A. D. (2020). Nurses – Midwifes Knowledge Concerning Polycystic Ovary Syndrome in Baghdad Hospitals. *Indian Journal of Forensic Medicine &Amp; Toxicology*. https://doi.org/10.37506/ijfmt.v14i4.12337

Albezrah, N. A., & Arein, F. (2019). Knowledge, attitude, and practice toward weight reduction among polycystic ovary syndrome women at Taif city. *Saudi Journal for Health Sciences*, 8(2), 112. https://doi.org/10.4103/sjhs.sjhs_16_19

Thomas, L. (2022, July 21). Cross-Sectional Study | Definition, Uses & Examples. *Scribbr*. https://www.scribbr.com/methodology/cross-sectional-study/

Naeem, S , Aslam, M., Batool, M., Tahir, M., Asmat, A.,., Tul Wusqa, U., Haneef, Y., & Sabir, U. (2022). AN EXPLORATORY RESEARCH TO UNDERMINE THE KNOWLEDGE RELATED ATTRIBUTES OF POLYCYSTIC OVARY SYNDROME AMONG ADULT FEMALES. Pakista BioMedical Journal, 5(1). https://doi.org/10.54393/pbmj.v5i1.179

Al Bassam, N. M. A., Ali, S., & Rahman, S. R. (2018). POLYCYSTIC OVARIAN SYNDROME(PCOS), awareness among female students, qassim university, qassim region, saudi arabia. *International journalofresearch-granthaalayah*,6(9),395–406. Https://doi.org/10.29121/granthaalayah.v6.i9.2018.1252

Devi, B., Doma , K., l, Sahuutia , D., Oinam, D., & Dey, S., . Published online 30th November, 2017. Knowledge regarding polycystic ovarian syndrome among students of selected nursing institute of Gangtok, East Sikkim.*International Journal of Current Research*. https://tinyurl.com/2p943s2y

Jahangir S. A study on knowledge & awareness of polycystic ovarian syndrome among female non-medical undergraduate students. [Dhaka, Bangladesh]: Department of Pharmacy East West University; 2013.

Upadhye JJ, Shembekar CA. Awareness of PCOS (polycystic ovarian syndrome) in adolescent and young girls. *International Journal of Reproduction Contraception*, Obstetrics and Gynecology. 2017; 6(6): 2297–2301.

Kalpana SP. A study to evaluate the effectiveness of structured teaching program (STP) regarding knowledge on polycystic ovaries among the students of selected preuniversity college in Bangalore. Unpublished Master thesis in Master of Science in nursing in community health nursing. 2014.

Alessa A, Aleid D, Almutairi S, Alghamdi R, Huaidi N, Almansour E, et al. Awareness of polycystic ovarian syndrome among Saudi females. *International Journal of Medical Science and Public Health*. 2017; 6 (6): 1013 – 20.https://doi.org/10.5455/ijmsph.2017.0202507022017.

Tables

Table 1 Socio-démographique data of the Students (N=268)

Factor		N	%
Age	18-20	154	57.46
	21-23	99	36.94
	>23	15	5.60
Student program	Nursing student	201	75.00
	Midwife student	67	25.00
Academic year	1st year	70	26.12
	2nd year	62	23.13
	3rd year	61	22.76
	4th year	46	17.16
	Internal	29	10.82
Body Mass Index	Underweight: less the 18.5	44	16.42
	Normal weight: between 18.5-25	138	51.49
	Overweight: between 25-30	56	20.90
	Obesity: more than or equal 30	30	11.19
Marital status	Single	261	97.39
	Married	7	2.61
Educational Level of the mother	Not able to read and write	9	3.36
	Primary school	21	7.84
	Middle school	19	7.09
	High school	78	29.10
	University	136	50.75
	Postgraduate	5	1.87
Does anyone in your family have polycystic ovarian syndrome?	Yes	61	22.76
	No	158	58.96
	IDK	49	18.28

Table 2 Knowledge regarding polycystic ovarian syndrome (PCOS) in general and across the study Student Program

Statement	All				Nursing student				Midwife student			
	Correct		Incorrect		Correct		Incorrect		Correct		Incorrect	
	N	%	N	%	N	%	N	%	N	%	N	%
1. Have you heard about the term called "polycystic ovary syndrome" (PCOS)?	249	92.91	19	7.09	184	91.54	17	8.46	65	97.01	2	2.99
2. Have you heard about androgen (male) hormone (eg testosterone and androstenedione)	228	85.07	40	14.92	166	82.59	35	17.41	62	92.54	5	7.46
3. In PCOS there is increased level of androgen hormone	150	55.97	118	44.03	100	49.75	101	50.25	50	74.63	17	25.37
4. Female suffering	205	76.49	63	23.51	146	72.64	55	27.36	59	88.06	8	11.94

Statement	All				Nursing student				Midwife student			
	Correct		Incorrect		Correct		Incorrect		Correct		Incorrect	
	N	%	N	%	N	%	N	%	N	%	N	%
from PCOS have small multiple cysts in their ovaries												
5. Obesity may cause PCOS	195	72.76	73	27.24	144	71.64	57	28.36	51	76.12	16	23.88
6. Prediabetes condition (due to decrease insulin action in body) may cause PCOS	126	47.01	142	52.98	91	45.27	110	54.73	35	52.24	32	47.76
7. Irregular or abuse once of menstrual (period) cycle is a symptom of PCOS	239	89.18	29	10.82	175	87.06	26	12.94	64	95.52	3	4.48
8. Unusual amount of hair growth on different body parts (upper lip, chin, abdomen, breast, thighs etc) is a symptom of PCOS	196	73.13	72	26.86	140	69.65	61	30.35	56	83.58	11	16.42
9. Severe acne problem during menstrual (periods) cycle is a symptom of PCOS	156	58.21	112	41.79	112	55.72	89	44.28	44	65.67	23	34.33
10. Hair loss from scalp more than normal is a symptom of PCOS	152	56.72	116	43.28	107	53.23	94	46.77	45	67.16	22	32.84
11. PCOS diagnosis can be confirmed by vaginal ultrasound	166	61.94	102	38.06	123	61.19	78	38.81	43	64.18	24	35.82
12. Specific blood test can be used for diagnosis of PCOS	143	53.36	125	46.64	34	16.92	167	83.08	10	14.93	57	45.07
13. PCOS may leads to diabetes (sugar)	84	31.34	184	68.65	60	29.85	141	70.15	24	35.82	43	64.18

Statement	All				Nursing student				Midwife student			
	Correct		Incorrect		Correct		Incorrect		Correct		Incorrect	
	N	%	N	%	N	%	N	%	N	%	N	%
14. PCOS may leads to heart diseases	62	23.13	206	76.87	43	21.39	158	78.61	19	28.36	48	71.64
15. PCOS may leads to infertility (inability to have children)	191	71.27	77	28.73	141	70.15	60	29.85	50	74.63	17	25.37
16. PCOS may leads to anxiety and depression	216	80.60	52	19.4	158	78.61	43	21.39	58	86.57	9	13.43
17. Hormonal therapy may be used to treat PCOS	178	66.42	90	33.58	128	63.68	73	36.32	50	74.63	17	25.37
18. Anti-diabetic medications (metformin) may be used to treat diabetes	110	41.04	158	58.95	80	39.80	121	60.20	30	44.78	37	55.22
19. Symptomatic treatment may be given to relief the symptoms of PCOS	187	69.78	81	30.23	136	67.66	65	32.34	51	76.12	16	23.88
20. Surgery may be use to remove the ovarian cysts	168	62.69	100	37.31	118	58.71	83	41.29	50	74.63	17	25.37
Mean±SD/Level	**12.32±4.45/Moderate**				**11.87±4.52/Moderate**				**13.67±3.98/High**			

Keys:0-6.66=Low,6.67-13.33=Moderate,13.34-20=High

Table 3 Clinical evaluation for PCOS

Statement	Yes		No		IDK	
	N	%	N	%	N	%
Are you diagnosed with PCOS?"	38	14.18	230	85.82	na	na
Acne problem during menstrual cycle	90	58.44	56	36.36	8	5.19
Family history of diabetes	88	57.52	51	33.33	14	9.15
Unusual amount of hair growth at different parts of your body (upper lip, chin, abdomen, breast, thighs etc.)	84	54.55	60	38.96	10	6.49
Very heavy periods (more than 2 pads per day)	81	52.6	58	37.66	15	9.74
Unusual amount of hair loss from scalp	78	51.32	61	40.13	13	8.55
Partial absence of periods (not after 28 days)	67	43.79	75	49.02	11	7.19
Discoloration or dark color patches on skin	64	41.83	73	47.71	16	10.46
Continuous abnormal weight gain	63	40.91	83	53.9	8	5.19
Prolonged periods (more than 7 days)	44	28.76	98	64.05	11	7.19
Complete Absence of periods (not at all)	42	27.27	99	64.29	13	8.44
Diabetes	14	9.21	128	84.21	10	6.58
na= not available						

Table 4 The distribution of PCOS knowledge in term of Socio-demographic information

Factor		Mean rank	Statistic	P value
Age	18-20	129.59	X^2= 1.462	0.481
	21-23	140.99		
	>23	142.00		
Student program	Nursing student	126.36	**U=5097****	**0.003**
	Midwife student	**158.93**		
Academic year	1st year	107.04	**X^2= 15.901****	**0.003**
	2nd year	148.00		
	3rd year	143.71		
	4th year	127.89		
	Internal	**163.03**		
Body Mass Index	Underweight: less the 18.5	137.28	**X^2= 8.052**	**0.045***
	Normal weight: between 18.5-25	124.01		
	Overweight: between 25-30	**158.60**		
	Obesity: more than or equal 30	133.67		
Marital status	Single	135.25	U=717	0.330
	Married	106.43		
Educational Level of the mother	Not able to read and write	110.72	X^2= 2.936	0.710
	Primary school	132.36		
	Middle school	133.37		
	High school	132.31		
	University	136.04		
	Postgraduate	182.70		
Does anyone in your family have polycystic ovarian syndrome?	**Yes**	**159.56**	**X^2= 8.472***	**0.014**
	No	128.32		
	IDK	123.22		
*≤0.05; **≤0.01; *** ≤0.001				
X^2= Kruskal Wallis test score.				
U= Mann Whitney score.				