An Appraisal on the Knowledge Status of PCOS - Clinical Pharmacist Approach: A Multicentric Kap Study

Prakruti Parmar[1], Prachi Prajapati[2], Hitaxi Jesadiya[3], Pooja Prajapati[4], Dr. Steffi John[5], Dr. Swati Agrawal[6]

[5]Guide, Assistant Professor, Department of Pharmacy Practice, SDPC, KIM

[6]Consultant- Obstetrician & Gynaecologist at Kiranmulti Super Speciality Hospital, Surat

Abstract: *Polycystic ovarian syndrome (PCOS) is a widespread reproductive disorder that encompasses many associated health conditions and has an impact on various metabolic processes. PCOS is depicted by hyperandrogenism, polycystic ovaries, and an ovulation. It increases the risk of insulin resistance (IR), type 2 diabetes, obesity, and cardiovascular disease [1]. The etiology of the disease remains unclear, and the subjective phenotype makes a united diagnosis difficult among physicians. It seems to be a familial genetic syndrome caused by a combination of environmental and genetic factors. It can be linked with metabolic disorders in first-degree family members. PCOS is the cause of up to 30% of infertility in couples seeking treatment. Currently, there is no cure for PCOS. Despite the growing incidence of this syndrome, limited research has been done that encompasses the entirety of PCOS spectrum. In this review, the current status and possible future perspective will be discussed. Polycystic ovarian syndrome (PCOS) is a common metabolic disorder that typically affects women of childbearing age. Several factors are involved in the genesis of this disease but a common agreement on its etiology is still far to be reached. According to Rotterdam criteria, PCOS is characterized by oligo and/ or an ovulation, biochemical hyperandrogenism and polycystic ovaries on ultrasound; following main clinical features and symptoms, women with PCOS are distinguished in four different phenotypes [2, 3]. The combination of different medical and, in specific cases, surgical treatments is necessary to properly reduce symptoms and restore fertility. Paucity of knowledge, practice and negative lifestyle attitude towards polycystic ovarian syndrome can affect compliance to treatment modality. The present study was undertaken to explore knowledge, attitude and practice (KAP) in patients with PCOS [3].*

Abbreviations
PCOS: Polycystic Ovarian Syndrome.
ASRM: American Society for Reproductive Medicine
ESHRE: European Society of Human Reproduction and Embryology
KAP: Knowledge, Attitude and Practice
AGEs: Advanced Glycation End products
IR: Insulin Resistance
SES: Socio-Economic Status
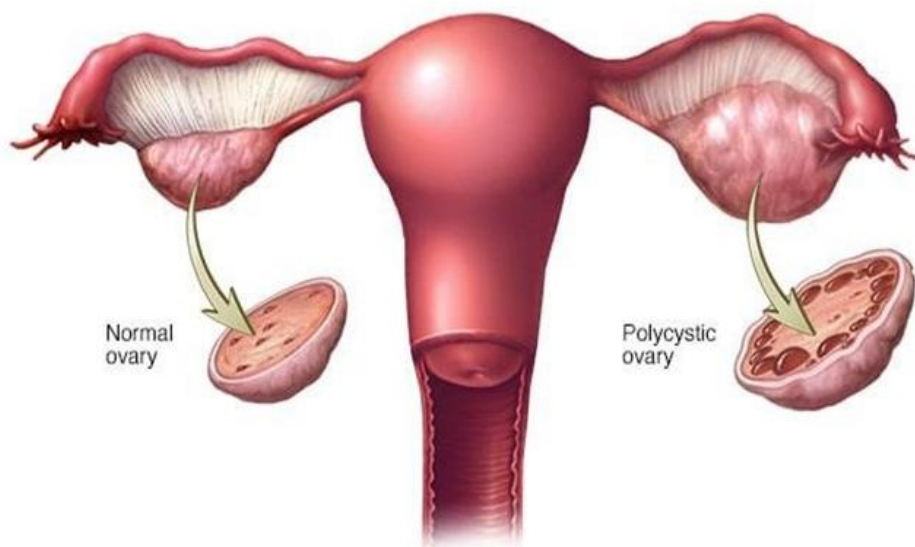GDM: Gestational Diabetes Mellitus

1. Introduction

Figure 1: Polycystic ovarian syndrome.

PCOS is a **"syndrome,"** or group of symptoms that affects the ovaries and ovulation. The word **"polycystic"** means **"many cysts"** [3].

The term polycystic ovarian disease is a misnomer. Polycystic ovary syndrome (PCOS) affects 5±10% of women in the developed world, making it the most common endocrine disorder among women of reproductive age [4].

To better understand what PCOS is, it is important to know how PCOS is defined and categorized. Although it is called polycystic ovary/ ovarian syndrome, PCOS is not primarily defined by ovarian cysts. Rather, PCOS is defined by the presence of at least two of three diagnostic criteria [4].

These diagnostic criteria have been defined three separate times—by the National Institutes of Health (NIH) in 1990, by the European Society of Human Reproduction and Embryology (ESHRE) and the American Society for Reproductive Medicine (ASRM) in 2003 (also known as the Rotterdam criteria), and by the Androgen Excess and PCOS Society (AE-PCOS) in 2006.In 2012, NIH endorsed the 2003 Rotterdam criteria for PCOS [4] [5].

Its three main features are:
- Cysts in the ovaries
- High levels of male hormones (Testosterone)
- Irregular or skipped periods

In PCOS, many small, fluid-filled sacs grow inside the ovaries. These sacs are actually follicles, each one containing an immature egg. The eggs never mature enough to trigger ovulation. [5]

The lack of ovulation alters levels of estrogen, progesterone, FSH, and LH. Progesterone levels are lower than usual, while androgen levels are higher than usual. Extra male hormones disrupt the menstrual cycle, so women with PCOS get fewer periods than usual.

The main difference between PCOD and PCOS is that PCOD can be reversed and in that condition less number of cysts seen on ovaries compare to PCOS. While in PCOS more than 10cysts seen on ovaries, it cannot be reversed and can lead to infertility.[6]

According to **Rotterdam criteria,** a clinical diagnosis of PCOS requires that a patient must be present with two of the following symptoms:
1) Oligo or anovulation
2) Clinical and/or bio chemical signs of hyperandrogenism
3) Polycystic ovaries

It is typically defined as the association of hyperandrogenism with chronic an ovulation in women without specific underlying disease of the adrenal or pituitary glands. PCOS is diagnosed on the clinical picture, supported in some women by biochemical abnormalities and/or polycystic ovaries on ultrasonography [2] [9]
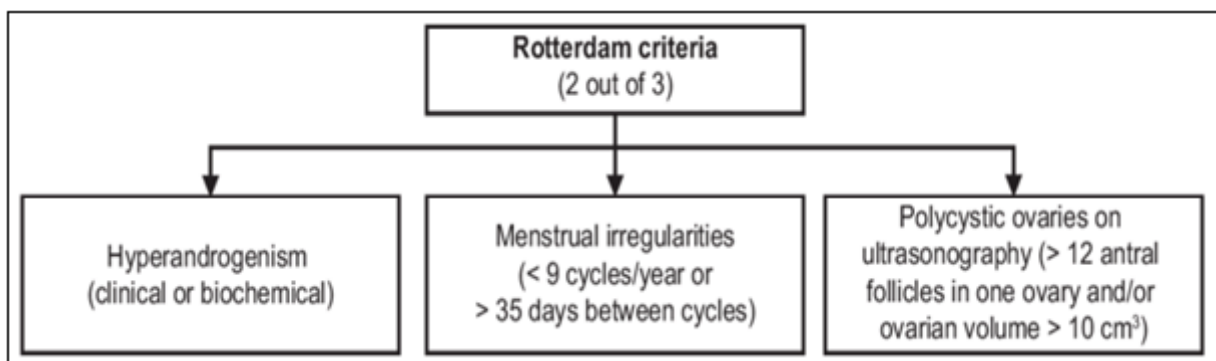
Figure 2: Rotterdam criteria for Polycystic ovarian syndrome

Types of PCOS
1) Insulin resistance PCOS
2) Pill induced PCOS
3) Inflammatory PCOS
4) Hidden PCOS

2. Causes

1) Genes
2) Insulin resistance and
3) Inflammations have all been linked to excess and rogen production.[10]

Figure 3: Causes of PCOS

3. Literature Review

1) A cross-sectional study of polycystic ovarian syndrome among adolescent and young girls in Mumbai, India Beena Joshi, Srabani Mukherjee, and Rama Vaidya Result: The prevalence of PCOS among them was 22.5% by Rotterdam and 10.7% by Androgen Excess Society criteria. Non obese comprised 71.8% of PCOS diagnosed by Rotterdam criteria. Mild PCOS (oligomenorrhea and polycystic ovaries on USG) was the most common phenotype (52.6%).History of oligomenorrhea had a positive predictive value of 93.3% and negative predictive value of 86.7% to detect a possible case of PCOS. Hyperinsulinemia (serum insulin15μlU/mL) was present among 19.2% of diagnosed PCOS cases. Obese girls with PCOS were more hirsute, hypertensive, and had significantly higher mean insulin and 2 h post 75 g glucose levels compared with non obese PCOS.

2) The prevalence of polycystic ovary syndrome in a community sample of Iranian population: Iranian PCOS prevalence study, Fahimeh Ramezani Tehrani, Masoumeh Simbar, […], and Fereidoun Azizi Result: The mean+/-SD of age of study population was 34.4+/-7.6 years. Estimated prevalence of idiopathic hirsutism was 10.9% (95% CI: 8.9-12.9%); 8.3% of women had only oligo/ an ovulation and 8.0% had only poly cystic ovaries. The prevalence of PCOS was 7.1% (95% CI: 5.4-8.8%) using the NIH definition, 11.7% (95% CI:9.5-13.7%) by AES criteria and 14.6% (95%CI:12.3-16.9%) using the Rott definition.

3) Knowledge, attitude and practice towards exercise in young females diagnosed with polycystic ovary syndrome, Preet V Davda, Razia M Nagarwala*, Ashok K Shyam, Parag K Sancheti Result: 93% of the respondents are aware of PCOS being one of the most common lifestyle disorders. 22.5% were aware of obesity being a complication of PCOS and only 23.1% were aware of weight reduction as a benefit of exercise. 5.4% consulted a Physiotherapist to treat the condition. 70% reported that health care professionals were their main source of information about PCOS. 74% strongly agreed to the importance of treating PCOS to prevent its future complications and 66% agreed to take some time out of their daily schedule to indulge in an exercise program. 84% were aware that exercise is a treatment option in the management of PCOS but only 67% practiced exercise regularly. 34.8% of the population chose a lack of time as the main reason for not exercising regularly.

4) Awareness of PCOS (polycystic ovarian syndrome) in adolescent and young girls, Jayshree J. Upadhye, Chaitanya A. Shembekar Result: present study, 51% girls had normal BMI, 19.5% were overweight, 16.5% were obese while 13% were underweight. 33.5% females had acne, 16% had irregularity of menses, 5% had hirsutism while 2% had infertility. In present study, 33% adolescent and young girls had information about PCOS from teacher,19% got information from friend, 11.5% got information from a doctor, 3.5% got information from newspaper while 5% got information from internet. 28% adolescent and young girls were unaware of PCOS.

5) Polycystic Ovarian Syndrome: Perception of Women with PCOS and Impact of Pharmacist's Intervention, Ravi R, Krishna Murthy M, JoseSa Result: The mean age of participants was 25.54±5.18 years of which a majority belonged to 21- 30 age group (76%).The pre test mean scores for KAP was 7.31±3.04, 6.26±2.19 and 6.45±2.74 (p & lt; 0.001) while post test mean scores were 9.15±2.5, 7.42±2.33 and 7.93±2.60 (p & lt; 0.001) respectively. Statistically significant difference was found between pre and post test (p & lt; 0.001) regarding KAP scores of PCOS. The study revealed that there were improvements in KAP after the educational interventional program.

6) A Study to Assess the Knowledge Regarding PCOS (Polycystic Ovarian Syndrome) among Nursing Students at NUINS, B., Sunanda; Nayak, Sabitha Result: data collected from 150 samples in Nitte Usha Institute of Nursing Sciences. Descriptive survey research approach was adopted and data was analyzed by using descriptive and inferential statistics. Distribution of the samples on demographic characteristics revealed that 85% of the samples were in the age group of 21-25years, 75% of the samples were Christians, 82% of the samples were consuming mixed diet, and 92% samples had regular menstrual cycle. 76% of the samples werewith average knowledge and 10.7% with good knowledge regarding polycystic ovarian syndrome. Hence the study

concluded that Source of information, consumption of junk food, dietary patterns of the students were associated with their level of knowledge on PCOS at 5% level of significance.

7) Self-Administered Questionnaire to Screen for Polycystic Ovarian Syndrome, Bronwyn S.Bedrick, Ashley M. Eskew, Jorge E. Chavarro, and Emily S. Jungheim Result: Fifty-one women with PCOS and 50 women without PCOS participated in this study. Many study participants were current users of hormonal contraceptives making it difficult to discern menstrual cycle characteristics. Hirsutism, defined by a modification of the FG score of ≥3 from the upper lip and abdomen based on self-assessments, provided a sensitivity of 76% and specificity of 70%, whereas report of any depilatory practices provided a sensitivity of 71% and specificity of 74%. The combined sensitivity of these measures was 93% with a specificity of 52%. In multivariate logistic regression, women who used depilatory techniques had an adjusted odds ratio (aOR) of PCOS of 6.6 (95% confidence interval [CI]2.5–17.3, p = 0.0002). Those with obesity had similar aOR of PCOS (aOR 6.7, 95% CI 2.5–17.9, p = 0.0001). Addition of other variables did not improve model fit and the net sensitivity and specificity of these two variables did not improve those of depilatory practices and hirsutism.

8) Urban rural comparisons of polycystic ovary syndrome burden among adolescent girls in a hospital setting in India, Swetha Balaji et al. Biomed Res Int. Result: Eighteen percent of the participants were confirmed of having PCOS by recent guidelines of Rotterdam Consensus for adolescent diagnosis of PCOS (presence of all three elements). Majority of the individuals with PCOS had an average age of 16 (SD = 2) (P = .02) years with an average age of menarche 12years (SD=1).

9) Nutrition Education Intervention for the Management of Polycystic Ovary Syndrome (PCOS), Anjana Simha1, Shubhi Agarwal2 Result: 521 respondents were screened and 40 respondents were selected for this study based on the inclusion criteria and were divided into experimental and control group. Majority of the subjects were college students with 19.5years being the average age of the selected subjects. Various questionnaires were used to elicit the general information, nutritional knowledge, attitudes and practices, information on PCOS, physical activity level and quality of life of subjects. Nutrition education sessions were conducted using various education materials for a period of 2 months with a minimum of 3 sessions per subject through one to one sessions or video conferencing. The statistical analysis of Pre and Post intervention study revealed a significant improvement in the mean scores of Knowledge (81.75 to 97.10) and Attitude (46.60 to 52.95), post intervention. The study helped the subjects in improving their knowledge about the importance of nutrition in PCOS and instilled a positive attitude which was reflected in the scores of various quality of life dimensions and intensity of physical activity.

10) Updated adolescent diagnostic criteria for polycystic ovary syndrome: impact on prevalence and longitudinal body mass index trajectories from birth to adulthood, Chau ThienTay, Roger J. Hart, Anju E. Joham Result:

Overall, 227 post menarchal adolescent females from the prospective cohort Raine Study undertook comprehensive PCOS assessment at age14–16 years. PCOS was diagnosed in 66 (29.1%) participants using original criteria versus 37(16.3%) participants using updated Rotterdam criteria. Using updated criteria, participants with PCOS had higher BMI than participants without PCOS from prepubertal. Only the phenotype meeting the updated criteria was significantly associated with higher long-term BMI gain whereas other PCOS pheno types had similar BMI trajectories to participants without PCOS (p < 0.001).

11) Prevalence of polycystic ovary syndrome in young women from North India: A Community- based study, Harmandeep Gill, Pallavi Tiwari, and Preeti Dabadghao Result: Of the 1520 girls, 200 (13.1%) were labeled as probable cases; 175 (87.5%) had MI and 25(12.5%) had both MI and H. Of the 200 cases, 75 (37.5%) had hormonal evaluation while 11 agreed for ultrasonography. 27 girls had confirmed PCOS. Therefore, if all the 200 girls would have had hormonal evaluation, 56 girls were likely to be confirmed as PCOS, giving a calculated prevalence of 3.7% (95% CI, 2.6–4.4) in this population. The mean age of these PCOS cases was 18.96 ± 1.73 yrs, body mass index was 21.72 ± 5.48 Kg/m2, and waist hip ratio was 0.81 ± 0.08. Only 12% girls had a body mass index ≥ 27.5 Kg/m2, but 44% had waist hip ratio & gt; 0.81, again highlighting that despite low BMI, Indians have more abdominal obesity.

12) Pregnancy outcome in women with PCOS and in controls matched by age and weight, L.Haakova, D. Cibula, K. Rezabek, M. Hill, M. Fanta, J. Zivny Result: we did not find any significant differences in the prevalence of pregnancy complications such as gestational diabetes mellitus, pregnancy-induced hypertension (PIH) and premature deliveries between the group of PCOS patients and the controls.

4. Materials and Methods

The study was conducted according to the ROTTERDAM CRITERIA and National Institutes of Health (NIH) guideline. This method includes ICF which was given to the subjects for their voluntarily participation.

An observational KAP study was conducted using random sampling among the age group between 18 -40 years. A total of 120 subjects were screened with the help of a standardized verified questionnaire. The presence of PCOS was confirmed using the Rotterdam criteria (2003). A KAP tool validated by an expert panel was given to the subjects who have confirmed their participation in the study of assessing knowledge, attitude and practice status of PCOS.

This study is based on the KAP status and conducted at Kiran Multi super speciality hospital and SDA Diamond hospital, Surat.

This hospital based observational study was carried out for a period of 6 months. A total of 120 subjects of reproductive age group diagnosed with PCOS were recruited from the out-patient department of gynaecology. KAP of the subjects was

assessed using a self-structured & verified questionnaire. The importance of lifestyle management and treatment was provided by direct conversation and through distribution of patient information leaflets (PILs). Data collected were analyzed using descriptive statistics.

Statistics and Result
Majority of the study participants were graduate, women reside in the urban areas were 97.5% and in the rural were 2.5% and around 63.3% were married while 36.7% were unmarried. Importantly, the most reported presenting complaint among women with PCOS was menstrual problem. 9.2% patients had heard about the ovarian cyst before and 90.8% were not heard. The most reported symptoms were irregular menstrual cycle (91.1%), facial acne (42%), hirsutism (51.8%), psychological disturbance (59.3%), reduction infertility (36.7%), weight gain (11.6%), pelvic pain (39.5%), frontal hair loss (20.5%), diabetes (10.2%), early puberty (2.5%), and hypertension (4.2%).
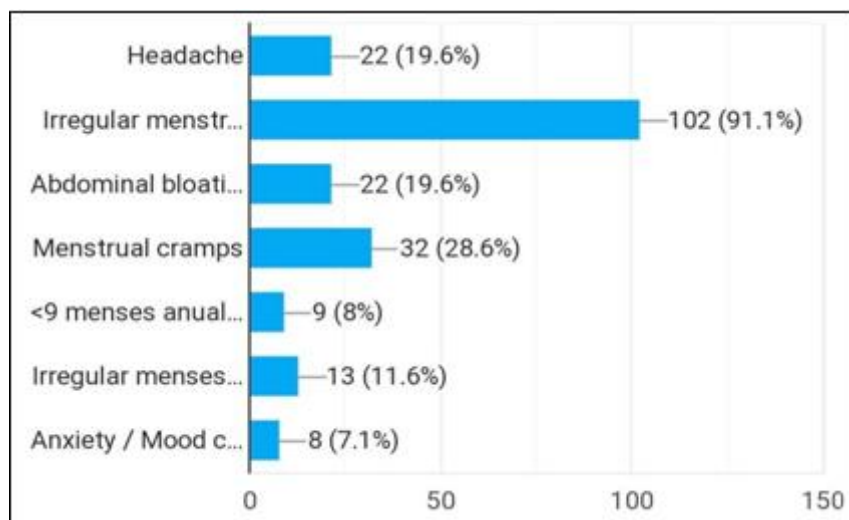
Section A –Demographic data and lifestyle

S. No	Complications of PCOS	Percentage of population
1	Overweight	11.1%
2	Obesity	33.3%
3	Infertility	36.7%
4	Type2diabetes	10.2%
5	Cardiovascular disease	25.5%
6	Irregular menstrual period	91.1%
7	Anemia	45.8%
8	Anxiety or stress disorder	7.1%
9	Hirsutism	51.8%
10	Early puberty	2.5%

Figure 4: Percentage of the population having of the complications of PCOS

1) On studying the BMI of the participants, 61.7% of them were normal, 33.3 were overweight and 5% came under the obese class.
2) On studying the consumption of junk food, 3% of the population consumed more than twice a week, 23% twice a week, 41% once a week and 1% once/ twice in a month.

Figure 5: % of women having menstrual problems

Section B–Knowledge about PCOS
1) Only9.2% of the population was aware that PCOS is one of the most common lifestyle disorders in the adolescent population. And 90.8% population was unaware about it.
2) Looking at the awareness regarding treatment options of PCOS, 93.3% chose medication, 10.8% physical exercise, 5% healthy low-calorie diet.

Section C–Attitude towards PCOS
1) Regarding the importance of treating PCOS to prevent its future complications, 74% strongly agreed, 24% agreed and 2% did not know.
2) 95% of the population agreed to make changes in their diet by including healthy fresh food.

Section D–Practice of exercise
1) Only 10.8% of the population exercised every day regularly.

5. Discussion

The present study was conducted to assess the current level of knowledge, attitude, and practices among women with PCOS of reproductive age group following their diagnosis. The conducted study showed that PCOS has a great association with menstrual irregularity and infertility. [15]

The present study highlighted that health education after friends was the most frequent source of information received by PCOS women. Moreover, the results also highlighted that delay in pregnancy and menstrual problems were conceived as problems and long-term outcomes of PCOS. As it has been reported by a study conducted by Panidis D that infertility rates among women with PCOS are very high and these women are much concerned about increasing their chances to get pregnant. Moreover, about four-fifth of the study participants were aware about the problems of the disease with 89% having heard of ovarian cyst prior. [16] [17] It has been repeatedly reported in the literature reviewed by koh - Banerjee , Sifakis S , Fan J, Wang Y that obesity is

a risk factor for PCOS, as obesity induces mild chronic inflammation in adipose tissues, thereby increasing insulin resistance leading to increased risk of diabetes, dyslipidemia, and cardiovascular disorder. The narrative review conducted has clearly reported that PCOS is clearly associated with the poor pregnancy outcome and emphasized a healthy lifestyle for women with PCOS. Another study conducted by Bahri Khomami M ,Boyle JA they recruited the study participants with the age group of 18–30 years has reported that the sign and symptoms among PCOS women were infertility, irregular ovulation or menstrual period, and enlarged ovaries, with prolonged symptoms leading to diabetes, heart disease, and endometrial cancer. Moreover, a study conducted by Priyanka Shenoy B, Brundha MP in India that recruited the study participants with the age group of 30–50 years reported the signs and symptoms as irregular menstruation, obesity, excessive hair growth, etc., with prolonged disease leads to diabetes, heart disease, and endometrial cancer.[19]

Another study by Lin AW, Dollahite JS, Sobal J, highlighted that women with PCOS demonstrated worsened quality of life, increased anxiety, depression, risk of obesity, infertility, perceived greater importance in reducing future risk of prediabetes, gestational diabetes, type 2 diabetes, heart disease, obesity, and infertility than women without PCOS. Moreover, women with PCOS were more likely to have fears about future health related to weight gain, loss of femininity, loss of sexuality, and infertility as compared to women without PCOS related to BMI status stated by Moran L, Gibson-Helm M, Teede H, Deeks A. [20]

In one of the study conducted by Van Hooff, M. H., Voorhorst, F. J., Kaptein, M. B., Hirasing, R.A., Koppenaal, C., & Schoemaker, J. (2000). It was observed that the prevalence of Polycystic Ovaries increased significantly with their regularity of the menstrual cycle pattern. Similar findings were reported where it was observed that the excess amount of androgens production in PCOS women prevents ovulation, may cause infertility, acne and abnormal hair growth, such as excess facial hair or male pattern baldness.[21]

In another study conducted in New Delhi by Majumdar, A., & Singh, T. A. (2009) to study the clinical manifestations in PCOS women it was found that the prevalence of menstrual irregularities, clinical hyperandrogenism, endometrial hyperplasia (EH), and type 2 diabetes mellitus was significantly higher in the PCOS women. There is an escalation in the prevalence of PCOS due to the nutritional transitions of developing countries towards obesogenic lifestyle. The rising incidence coupled with the etiological complexity of PCOS calls for the effective management of this condition to improve the quality of life. [22]

The present study conducted had certain limitations. First, the study was conducted at only study site, Gynecology Department of kiran hospital and SDA diamond hospital with limited participants enrolled. This had reduced the generalizability and external validity of the study findings. Second, in the current study on account of the nature of the questionnaire, the participants might have over reported or under reported their knowledge, attitude, and practices, thus influencing the findings of the study due to self-reporting

bias. Therefore, in future, a study should be conducted at multiple sites with more number of participants being recruited randomly, with a validated tool inquiring more robustly about the knowledge, attitude, and practices among women with PCOS.[23][24]

The Developed KAP Questionnaire helped in acquiring the information regarding Knowledge, Attitude and Practices of the selected subjects pertaining to Nutrition and PCOS. It was clearly evident that the subjects had low attitude and their practices were not commensurate with the knowledge they had about PCOS and Nutrition. Contrasting results were observed in one of the study conducted by Patel et al, 2018 in young central Indian Population, where among 400 participants, only 41% of the women were aware of the term PCOS and very few young women understood the earliest symptoms that should alarm them to consult a physician. [25]

Another study conducted by Mohamed, H. A.A.(2016) observed that most of the subjects in the study had poor knowledge regarding polycystic ovarian syndrome. After the educational sessions there was enhancement of knowledge score on polycystic ovarian syndrome. Similar findings were obtained in one more study conducted by Ray, S., Udumyan, R., Rajput-Ray, M., Thompson, B., Lodge, K. M., Douglas, P& Gillam, S. (2012). Where nutrition education improved KAP scores significantly and Ninety-seven per cent of the participants rated the overall intervention and its delivery as 'very good to excellent', reporting that they would recommend this educational intervention to colleagues.[26]

6. Conclusion

PCOS is becoming a more prevalent disorder among women of reproductive age with lifelong complications. One of the most challenging aspects of this syndrome is its ambiguous diagnostic criteria and vast complexity of characteristics. In the future, more research in the genetics and pathophysiology of PCOS is needed to determine preventative risk factors as well as successful treatment modalities for this syndrome.

Promotion of healthy lifestyles, the need for regular exercise and increased awareness programs on PCOS is the need of the hour to enable a holistic solution to this problem. The present study shows that clinical pharmacist plays a significant role in patient education and in improving patient care of such lifestyle diseases

7. Limitations

Subjects beyond the required age groups.
Individuals with congenital adrenal hyperplasia, androgen secreting tumors, cushing syndrome, thyroid dysfunction and hyperprolactinemia as mentioned in the Rotterdam criteria of diagnosis of PCOS

8. Future Direction

- To assess the quality of life.
- Create awareness among girls and women about the

disease.
- Minimize the risks that can cause the disease.
- Provide knowledge about disease, its consequences.
- Educate them about the adherence to the treatment and exercise help to restore the fertility.
- Advice a diet plan to maintain the body weight.

References

[1] Norman RJ, Dewailly D, Legro RS, Hickey TE. Polycystic ovary syndrome. Lancet. 2007; 370:685–697.

[2] Rotterdam ESHRE/ASRM-Sponsored PCOS Consensus Workshop Revised 2003 consensus on diagnostic criteria and long-term health risks related to polycystic ovary syndrome (PCOS). Hum Reprod. 2004; 19:41–47.

[3] Carmina E, OberfieldSE, LoboRA. The diagnosis of polycystic ovary syndrome in adolescents. AmJ Obstet Gynecol. 2010; 203:201. e1–201.e5.

[4] Diamanti-Kandarakis E, Kouli C, Tsianateli T, Bergiele A. Therapeutic effects ofmetformin on insulin resistance and hyperandrogenism in polycystic ovary syndrome. Eur JEndocrinol.1998;138:269–274.

[5] AdamsJ, PolsonDW, FranksS. Prevalence of polycystic ovaries in women with an ovulation and idiopathic hirsituism. BrMedJ (ClinResEd)1986; 293:355–359.

[6] Franks S, Gharani M, Waterworth D, Batty S, White D, Williamson R, McCarthyM. The genetic basis of polycystic ovary syndrome. HumReprod.1997;12:2641–2648.

[7] Franks S, Mc Carthy M. Genetics of ovarian disorders: polycystic ovary syndrome. RevEndocrMetab Disord.2004;5:69–76.

[8] Vink JM, Sadrzadeh S, Lambalk CB, Boomsma DI. Heritability of polycystic ovary syndromeina Dutch twin-family study. JClin Endocrinol Metab.2006;91:2100–2104.

[9] Broekmans F, Knauff E, Valkenburg O, Laven J, Eijkemans M, Fauser B. PCOS according to the Rotterdam consensus criteria: change in prevalence among WHO-II an ovulation and association with metabolic factors. BJOG. 2006; 113: 1210– 1217.

[10] Dunaif A, Finegood DT. Beta-cell dysfunction independent of obesity and glucose intolerance in the polycystic ovary syndrome. J Clin Endocrinol Metab.1996; 81: 942–947.

[11] Corbould A, Kim YB, Youngren JF, Pender C, Kahn BB, Lee A, Dunaif A. Insulin resistance in the skeletal muscle of women with PCOS involves intrinsic and acquired defects in insulin signaling. AmJ Physiol Endocrinol Metab.2005; 288: E1047– E1054.

[12] Svendsen PF, Nilas L, Nørgaard K, Jensen JE, Madsbad S. Obesity, body composition and metabolic disturbances in polycystic ovary syndrome. HumReprod. 2008; 23: 2113–2121.

[13] Graham H, Der G. Influences on women's smoking status: The contribution of socioeconomic status in adolescence and adulthood. Eur J Pub Health. 1999;9:137–141.

[14] Barkley GS. Factors influencing health behaviors in the National Health and Nutritional Examination Survey, III (NHANESIII). Soc Work Health Care. 2008;46:57–79.

[15] Thurston RC, Kubzansky LD, Kawachi I, Berkman LF. Is the association between socioeconomic position and coronary heart disease stronger in women than in men? Am JEpidemiol.2005;162:57–65.

[16] Balen AH. Polycystic ovary syndrome (PCOS). The Obstetrician & Gynaecologist. 2017;19(2):119–29.

[17] Escobar-Morreale HF. Polycystic ovary syndrome: definition, aetiology, diagnosis and treatment. Nature Reviews Endocrinology.2018;14(5):270.pmid:29569621

[18] Centers for disease control and prevention, 2019. Accessed on 06/11/2019.

[19] Cooney LG, Dokras A. Beyond fertility: polycystic ovary syndrome and long-term health. Fertility and sterility. 2018;110(5):794–809.pmid:30316414

[20] Kalra P, Bansal B, Nag P, Singh JK, Gupta RK, Kumar S, et al. Abdominal fat distribution and insulin resistance in Indian women with polycystic ovarian syndrome. Fertility and sterility. 2009; 91(4):1437–40.pmid:18722605

[21] Khomami MB, Tehrani FR, Hashemi S, Farahmand M, Azizi F. Of PCOS symptoms, hirsutism has the most significant impact on the quality of life of Iranian women. PLoSOne.2015;10(4):e0123608.pmid:25874409

[22] March WA, Moore VM, Willson KJ, Phillips DI, Norman RJ, Davies MJ, et al. Theprevalence of polycystic ovary syndrome in a community sample assessed under contrasting diagnostic criteria. HumReprod.

[23] Lauritsen MP, Bentzen JG, Pinborg A, Loft A, Forman JL, Thuesen LL, et al. Theprevalence of polycystic ovary syndrome in a normal population according to the Rotterdam criteria versus revised criteria including anti-mullerian hormone. HumReprod.

[24] Mykhalchenko K, Lizneva D, Trofimova T, Walker W, Suturina L, Diamond MP, et al. Genetics of polycystic ovary syndrome. Expert RevMolDiagn.

[25] LiL, Baek KH. Molecular genetics of polycystic ovary syndrome: An update. Current Molecular Med.

[26] Amsterdam ESHRE/ASRM-Sponsored 3rd PCOS Consensus Workshop Group. Consensus on women's health aspects of polycystic ovary syndrome (PCOS).Hum Reprod.

Author Profile

Prakruti Parmar, Doctor of Pharmacy, Shree Dhanvantary Pharmacy College, Kudsad Road, Olpad, Kim'394111.Email-Id: prakrutiparmar754@gmail.com CONTACT NO: 7226095550

Prachi Prajapati, Doctor of Pharmacy, Shree Dhanvantary Pharmacy College, Kudsad Road, Olpad, Kim '394111
Email- Id : prachiprajapati201098@gmail.com

Hitaxi Jesadiya, Doctor of Pharmacy, Department of Pharmacy [PHARM D]), Shree Dhanvantary Pharmacy College, Kudsad Road, OLPAD, KIM '394111. EMAILhitaxijesadiya82@gmail.com

Pooja Prajapati, Doctor of Pharmacy, Shree Dhanvantary Pharmacy College, Kudsad Road, Olpad, Kim '394111
EMAIL-ID :prajapatipooja3800@gmail.com