A STUDY ON KNOWLEDGE & AWARENESS OF POLY CYSTIC OVARIAN SYNDROME AMONG WOMEN AGED 25 TO 45 IN DHAKA

This dissertation is submitted to the Department of Pharmacy, East West University in the partial fulfillment of the requirements for the Degree of Bachelor of Pharmacy.

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Declaration by the Research Candidate

I, **Sharmin Akter Keya**, ID: 2013-1-70-078, hereby declare that the dissertation entitled "KNOWLEDGE & AWARENESS OF POLYSYSTIC OVARIAN SYNDROME AMONG WOMEN AGED 25 TO 45 IN DHAKA'' submitted by me to the Department of Pharmacy, East West University and in the partial fulfillment of the requirement for the award of the degree Bachelor of Pharmacy, under the supervision and guidance of **Dr. Tasnuva Hauque**, Assistant Professor, Department of Pharmacy, East West University, Dhaka, Bangladesh.

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Certificate by the Supervisor

This is to certify that the dissertation entitled "KNOWLEDGE & AWARENESS OF POLYSYSTIC OVARIAN SYNDROME AMONG WOMEN AGED 25 TO 45 IN DHAKA'' submitted to the Department of Pharmacy, East West University for the partial fulfillment of the requirement for the award of the degree Bachelor of Pharmacy is a bonafied record of original and genuine research work carried out, **Sharmin Akter Keya**, ID: 2013-1-70-078, under my supervision and guidance.

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Certificate by the Chairperson

This is to certify that the dissertation entitled **"KNOWLEDGE & AWARENESS OF POLYSYSTIC OVARIAN SYNDROME AMONG WOMEN AGED 25 TO 45 IN DHAKA''** submitted to the Department of Pharmacy, East West University for the partial fulfillment of the requirement for the award of the degree Bachelor of Pharmacy is a bonafied record of original and genuine research work carried out by **Sharmin Akter Keya** ,ID: 2012-3-70-033, under the supervision and guidance of **Dr. Tasnuva Huque,** Assistant Professor, Department of Pharmacy, East West University and no part of this project has been submitted to other degree.

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This Research paper is
Dedicated
To my Beloved Parents

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List of Abbreviations:

PCOS - Polycystic Ovarian Syndrome

CVD- cardiovascular Disease

FSH- Follicular Stimulating Hormone

LH- Luteinizing Hormone

IUGR -Intra-Uterine Growth Restriction

DHEA - Dehydroepiandrosterone

OCP - Oral Contraceptive Pill

MYO - Myo-Inositol

DCI - Di-Chlro-Inositol

TZD -Thiazolidinedione's (TZD)

IE - Enterotomy

T 2 DM – Type 2 Diabetes Mellitus

Abstract

Polycystic ovarian syndrome is a hormonal disorder of woman in their reproductive age. PCOS creates complication like infertility, hirsutism, miscarriage, pelvic pain, irregular periods, acne and weight gain etc. PCOS is increasing among women day by day worldwide. The objective of the study which was conducted among women aged 25 to 45 in Dhaka, Bangladesh was to investigate the knowledge and awareness about PCOS. The survey was done among 400 women from July 20 to October 25, 2017 in Dhaka. The majority percentage of the woman were minimally aware which was 50.75%, and 31% of the population were unaware about PCOS. Moreover, 100% and 54% of the population thought that difficulty in pregnancy and irregular periods respectively are signs and symptoms of PCOS. Infertility was identified as the highest complications and the percentage was 69.75%. However, 20.5% of the population was diagnosed with PCOS and for the majority (65.85%) source of information was doctor and for minority (2.44%), source of information was physiotherapist %. However, 86% and 88.5% of the population mentioned that PCOS can be manageable with healthy diet plan and exercise. In additionally, as the treatment options for PCO, medication was mentioned by majority (73%) and life style medication was identified by 35.75% women. Finally, the study presents that, the general information for PCOS and the awareness among women was insufficient for leading a healthy life and normal life. Thus, it is needed for every woman to know about PCOS and its related problems.

Key words: Polycystic Ovarian Syndrome, Knowledge, Awareness, Complications, Prevention, Treatment.

1.1 Overview:

Polycystic Ovarian Syndrome (PCOS), also referred to as hyper androgenic anovulation (HA), or Stein–Leventhal syndrome (Evans and Riley, 1958), is one of the most common endocrine system disorders that affect women in their reproductive age (Azziz et al., 2004). Described since 1935 by Stein and Leventhal (1935), it represents a condition in which an estimate of 10 small cysts of a diameter ranging between 2 and 9 mm develop on one or both ovaries and/or the ovarian volume in at least one ovary exceeds 10 ml (Balen et al., 2003).

Systematic screening of women according to the National Institutes of Health (NIH) diagnostic criteria estimated that 4–10% of women of reproductive age suffer from PCOS (Azziz et al., 2004). Although it was previously considered as a disorder of adult women, recent evidence suggests that PCOS is a lifelong syndrome, manifesting since prenatal age. In fact, according to the Rotterdam diagnostic criteria, the prevalence of PCOS in adolescents varies between a minimum of 3% (Hashemipour et al., 2004) and a maximum of 26% (Driscoll, 2003). However, the prevalence of the disease in children is still considered unknown (Kamangar et al., 2015).

Most women with PCOS grow many small cysts on their ovaries. That is why it is called polycystic ovary syndrome. The cysts are not harmful but lead to hormone imbalances.Poly Cystic Ovarian Syndrome (PCOS) is one of the most common metabolic and reproductive disorders among women of reproductive age. Women suffering from PCOS present with a constellation of symptoms associated with menstrual dysfunction and androgen excess, which significantly impacts their quality of life. They may be at increased risk of multiple morbidities, including obesity, insulin resistance, type II diabetes mellitus, cardiovascular disease (CVD), infertility, cancer, and psychological disorders. Early diagnosis and treatment can help control the symptoms and prevent long-term problems.

1.2 Normal ovary:

The ovaries are the female pelvic reproductive organs that house the ova and are also responsible for the production of sex hormones. They are paired organs located on either side of the uterus within the broad ligament below the uterine (fallopian) tubes. The ovary is within the ovarian fossa, a space that is bound by the external iliac vessels, obliterated umbilical artery, and the ureter. The ovaries are responsible for housing and releasing ova, or eggs, necessary for reproduction. At

birth, a female has approximately 1-2 million eggs, but only 300 of these eggs will ever become mature and be released for the purpose of fertilization. (Aurora et al.,2013)

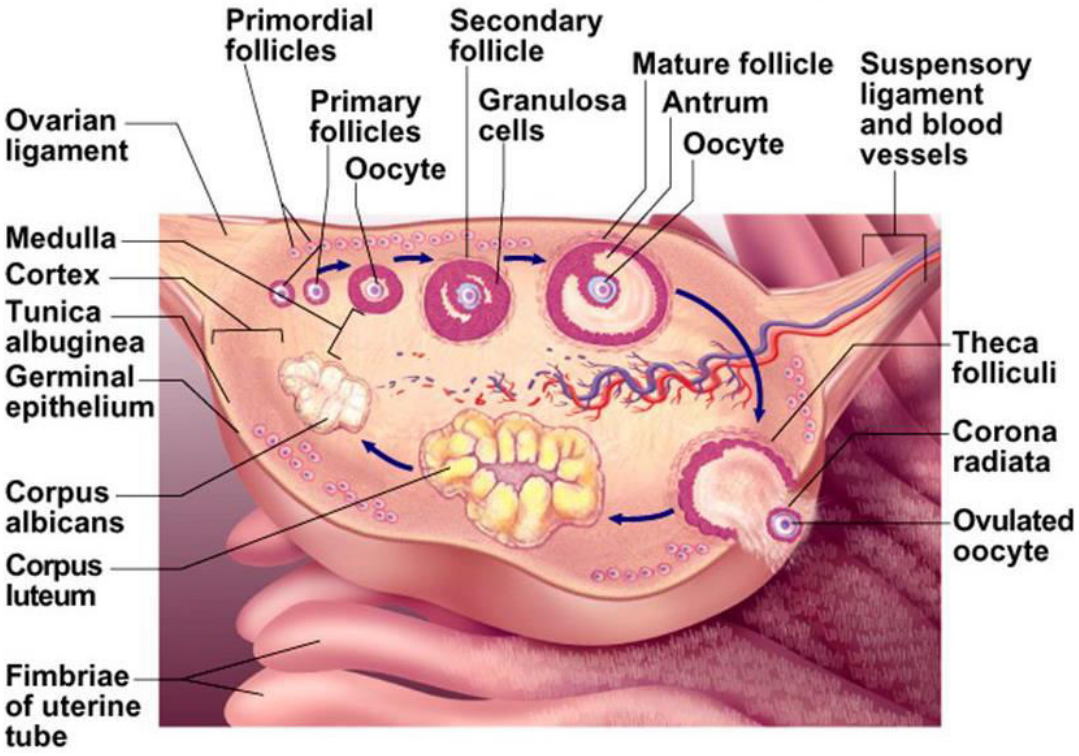

Figure 1.2: Anatomy of human ovary

Adapted from: (Howatt, 2017)

Accessed: 18th October

The ovaries are small, oval-shaped, and grayish in color, with an uneven surface. The actual size of an ovary depends on a woman's age and hormonal status; the ovaries, covered by a modified peritoneum, are approximately 3-5 cm in length during childbearing years and become much smaller and then atrophic once menopause occurs. A cross-section of the ovary reveals many cystic structures that vary in size. These structures represent ovarian follicles at different stages of development and degeneration. (Lippincott W et al.,2006)

1.3 Functions of ovary

1.3.1 Gamete production

The ovaries are the site of production and periodical release of egg cells, the female gametes. In the ovaries, the developing egg cell (or oocyte) grows within the environment provided by follicles. Follicles are composed of different types and number of cells according to the stage of their maturation, and their size is indicative of the stage of oocyte development.

When the oocyte finishes its maturation in the ovary, a surge of luteinizing hormone secreted by the pituitary gland stimulates the release of the oocyte through the rupture of the follicle, a process called ovulation. (Larsen et al., 2011)

The follicle remains functional and reorganizes into a corpus luteum, which secretes progesterone in order to prepare the uterus for an eventual implantation of the embryo. (Pawlina et al., 2011)

1.3.2. Endocrine function

Ovaries secrete estrogen, testosterone and progesterone. In women, fifty percent of testosterone is produced by the ovaries and adrenal glands and released directly into the blood stream. Estrogen is responsible for the appearance of secondary sex characteristics for females at puberty and for the maturation and maintenance of the reproductive organs in their mature functional state. Progesterone prepares the uterus for pregnancy, and the mammary glands for lactation. Progesterone functions with estrogen by promoting menstrual cycle changes in the endometrium. (Elaine et al.,2013)

The ovariesare the primary source of the female hormones. The female hormones are:

- ***Estrogen***: Estrogen is secreted by a number of cells in the follicle. On the way to ovulation, the follicle that has the maturing egg goes through the surface of the ovary. As soon as the matured egg reaches the ovarian surface, ovulation takes place when the follicle and the ovarian surface open letting the egg to drift out of the ovary. The progression of ovulation is commenced and governed by a fall in the hormone estrogen, often 'etradiol' to a low level. If the drop in estrogen levels happens, the hypothalamus, a part of the brain is indicated to boost its secretion of gonadotropin-releasing hormone (GnRH) and as a result

conveying a message to the pituitary gland to augment its secretion of follicle-stimulating hormone (FSH). The increase in FSH causes the growth of ten to 20 of the ovarian follicles.

Progesterone: Progesterone is also generated by the cells in the ovarian follicles soon before the ovulation take place. If pregnancy has not happened after ovulation, the empty follicle known as the corpus luteum, is reabsorbed into the body. If pregnancy has taken place, the corpus luteum generates hormones that aid to maintain the pregnancy.

1.4 Ovulation and the female cycle

Each month, the ovaries go through a series of stages, depending on stimulation by the anterior pituitary hormones the follicle stimulating hormone (FSH) and the luteinizing hormone (LH). A typical female cycle lasts 28 days; however, this can range from 21-35 days.

Ovulation is controlled by a series of hormone chain reactions originating from the brain's hypothalamus. Every month, as part of a woman's menstrual cycle, follicles rupture, releasing an egg from the ovary. A follicle is a small fluid sac that contains the female gametes (eggs) inside the ovary. This process of releasing and egg from the ovary an into the fallopian tube is known as 'ovulation'. (Aurora, 2017)

The ovarian cycle has 2 distinct phases: the follicular phase (days 1-14) and the luteal phase (days 14-28). The follicular phase is characterized by follicle development and growth, the goal being that one follicle matures and releases an egg at the time of ovulation, around day 14 of the female cycle. The remaining immature follicles go through stages of degeneration up until day 28, when the cycle repeats itself. The egg that is released is picked up by the fimbriae of the uterine tube, and the egg is transported toward the uterus. If fertilization does not occur, the egg degenerates, and menstruation occurs. (Garshen et al, 2016)

1.5 Types of ovarian cyst:

1.5.1 Functional Ovarian Cysts:

The most common type of ovarian cyst is called a functional cyst. Functional cysts are usually not dangerous and often do not cause symptoms. If an ovarian cyst is non-functional, it is considered a complex ovarian cyst. 'There are two types of functional ovarian cysts: follicle cysts and corpus luteum cysts. Follicular cysts contain a follicle that has failed to rupture and filled with more fluid

instead. Corpus luteum cysts occur when the follicle ruptures to release the egg, but then seals up and swells with fluid. Corpus luteum cysts can be painful and cause bleeding. When bleeding occurs in a functional cyst, it is known as a hemorrhagic cyst. (Newson L,2015)

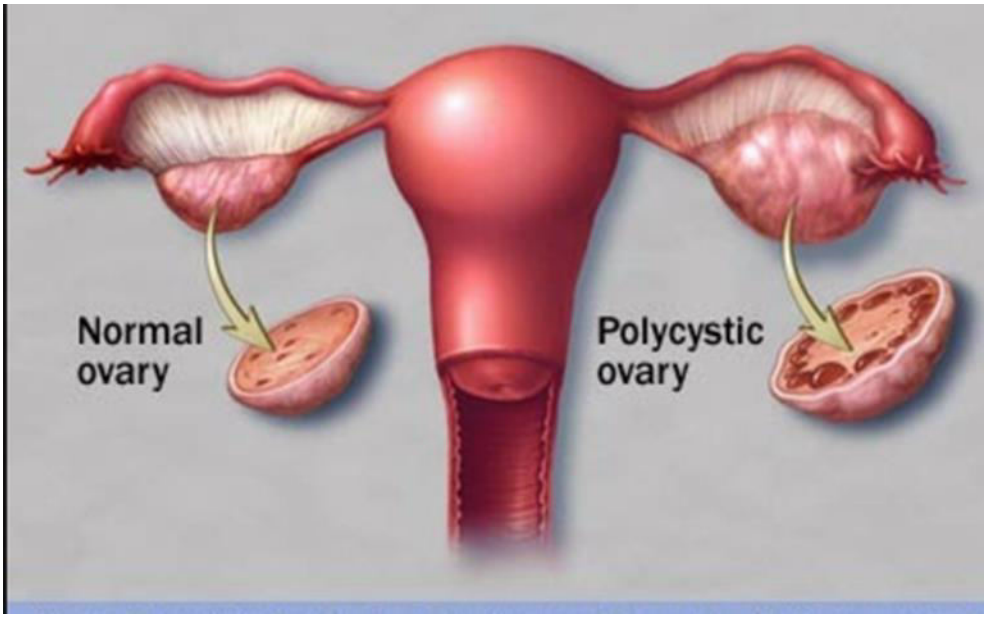

Figure 1.5.1: Polycystic ovary

Adapted from: Mayo Foundation for Medical Education and Research (MFMER),2017. Accessed: 18th October.

1.5.2 Complex Ovarian Cysts:

Other types of ovarian cysts may be associated with endometriosis, polycystic ovarian syndrome (PCOS) and other conditions. Polycystic ovaries occur when the ovaries are abnormally large and contain many small cysts on the outer edges.

Non-cancerous growths that develop from the outer lining tissue of the ovaries are known as cystadenomas. A cyst can also develop when uterine lining tissue grows outside the uterus and attaches to the ovaries; this is known as an endometrium. (Newson L,2015)

1.5.3 Ovarian Cysts During Pregnancy:

Ovarian cysts during pregnancy are usually functional ovarian cysts discovered in the first trimester. Ovarian cysts during pregnancy tend to resolve on their own before childbirth.

1.6 Pathophysiology of PCOS:

1.6.1 Previous Hypotheses:

Many hypotheses emerged trying to explain the pathophysiology of PCOS. Initially, excess intrauterine androgen had been thought to be a main culprit in the development of the disease. Yet recently, human studies showed neither an association between excessive prenatal androgen exposure and the development of PCOS in youth (Hickey et al., 2009) nor an elevation in androgen levels in the cord blood of females born to mothers with PCOS (Anderson et al., 2010). Another hypothesis, the adipose tissue expandability hypothesis, suggested that infants with intra-uterine growth restriction (IUGR) and spontaneous catch-up growth might develop decreased tissue expandability, meaning that they cannot store lipids appropriately in their fat tissues. Consequently, insulin resistance might ensue contributing to PCOS and hyperandrogenemia (Zegher et al., 2009). However, this does not apply for patients with PCOS who did not have IUGR or had it but without spontaneous catch up growth (Ibáñez et al., 2009).

1.6.2 A Multifaceted Disease:

The best understanding of the pathophysiology of PCOS deals with it as a multifaceted disease involving uncontrolled ovarian steroidogenesis, aberrant insulin signaling, excessive oxidative stress, and genetic/environmental factors.

An intrinsic defect in theca cells can partially explain the hyperandrogenemia in patients with PCOS. Indeed, women with PCOS have theca cells that, still secrete high levels of androgens due to an intrinsic activation of steroidogenesis even in the absence of trophic factors (Nelson et al., 1999). This intrinsic dysregulation also affects granulosa cells which produce up to 4 times higher levels of anti-mullerian hormone in women with PCOS in comparison to healthy controls (Pellatt et al., 2007; Azziz et al., 2009; Villarroel et al., 2011). Studies also show an elevated number of follicles, primarily pre-antral and small antral follicles, in females with PCOS (Webber et al., 2003). A defect in apoptotic processes in some maturing follicles further increases their count in PCOS patients (Das et al., 2008).

Alternatively, decreased insulin sensitivity attributable to a postreceptor binding defect in the insulin signaling pathways has been identified as an intrinsic component of PCOS, independent of obesity (Dunaif, 1997). It was also reported an alteration in gene expression of some players in

insulin signaling pathways by microarray gene analysis (Cortón et al., 2008). Moreover, PCOS has been associated with increased glycooxidative stress (González et al., 2006) secondary to mitochondrial dysfunction (Victor et al., 2009). Oxidative stress can itself induce insulin resistance and hyperandrogenism in patients with PCOS (Victor et al., 2009).

Familial aggregation of PCOS (Azziz et al., 2004; Chen et al., 2011) and genomic identification of PCOS-susceptibility loci (Chen et al., 2011) support the role of genetics in the etiology of this disease. Some studies showed an inherited component of androgen excess in patients with PCOS (Legro et al., 1998; Escobar-Morreale et al., 2005; Yildiz et al., 2006). Furthermore, a polymorphic marker in fibrillin 3 gene associated with PCOS, D19S884, has been identified in independent sets of families carrying the disease (Urbanek et al., 2007; Segars and Decherney, 2010).

1.6.3 Evolution:

Recently, multiple studies are suggesting that PCOS might start in utero, mainly in neonates with risk factors implicated in the development of PCOS. This includes low birth weight (Ibáñez et al., 1998; Melo et al., 2010) and high birth weight infants (Cresswell et al., 1997) who later on catch-up on their growth or constantly increase in weight postnatally (Zegher and Ibáñez, 2009). Such risk factors, along with a susceptible genetic component, can lead to signs of premature pubarche, premature adrenarche (elevated DHEAS), and metabolic syndrome (insulin resistance and visceral adiposity) (Verkauskiene et al., 2007; Ibáñez et al., 2009).DHEA (dehydroepiandrosterone) is a hormone produced by your body's adrenal glands. These are glands just above your kidneys. Premature pubarche, or the development of pubic hair before the age of 8 in girls or 9 in boys, is most commonly caused by premature adrenarche. Adrenarche is the maturation of the adrenal zona reticularis in both boys and girls, resulting in the development of pubic hair, axillary hair, and adult apocrine body odor. Although originally thought to be a benign variant of normal development, premature adrenarche has been associated with insulin resistance and the later development of metabolic syndrome and polycystic ovary syndrome. (Gerken et al., 2011). In adolescence, the disease will switch to its more common form with signs and symptoms of hyperandrogenism and anovulation. Later on, throughout adulthood, the picture may evolve to any of the various PCOS phenotypes (Rotterdam, 2004). Long term morbidities, including cardiovascular disease (CVD), tend to be more prevalent in the postmenopausal period (Shaw et al., 2008; Wang et al., 2011).

1.6.4 Hyperandrogenism:

Hyperandrogenism is the most characteristic feature of PCOS, and some argue that it is the defining feature of the disease. Hyperandrogenism is exacerbated by hyperinsulinemia and antral follicle arrest and may itself increase the risk of follicle arrest. Similar ovarian characteristics have been noted in women with other conditions of androgen excess such as congenital adrenal hyperplasia. (Gynaecol et al, 2010). Puberty is characterized by physiological hyperandrogenism (Kahsar-Miller et al., 2001).

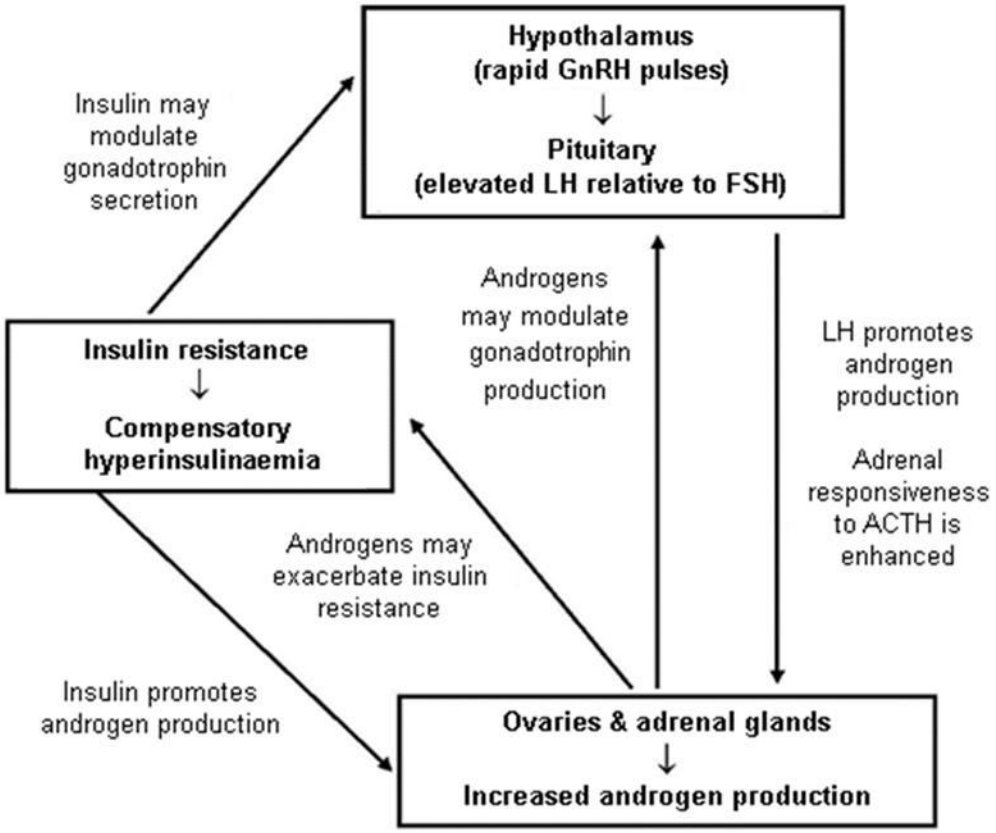

Figure 1.6.4 : Pathophysiology of Hyperandrogenism

Adapted from: (Gynecol et al.,2016). Accessed: 28th August, 2017

Multiple studies showed that testosterone levels rise during puberty and reach a peak adult level within a few years after menarche. This can confound with pathological hyperandrogenism and therefore cloud the picture of PCOS (Moll and Rosenfield, 1983; Van Hooff et al., 2000;

Mortensen et al., 2009; Rosenfield, 2013). Measurement of testosterone levels does not resolve this uncertainty because testosterone concentrations are highly influenced by the stage of puberty and the menstrual cycle along with other factors (Witchel et al., 2015). In addition, no cutoff values or reference ranges for androgen levels are well defined in female adolescents (Legro et al., 2013). Moreover, acne, which is largely seen during puberty, is not correlated with hyperandrogenism (Hickey et al., 2011). Furthermore, diagnosing hirsutism is challenging since the standardized scoring value does not take into consideration ethnic variations (Ferriman et al., 1961).

1.6.5 Neuroendocrine abnormalities:

- Women with PCOS have an increase in the frequency of GnRH pulses; shorter pulses preferentially promote the production of luteinizing hormone (LH) and result in a decrease in the production of follicle stimulating hormone (FSH)
    - Patients with PCOS often exhibit an increase in theLH:FSH *ratio*, which may contribute to the ovarian excess of androgens relative to estrogens
- It is unclear if patients with PCOS have an intrinsically faster GnRH pulsation mechanism which initiates hyperandrogenism in the ovaries, or if oligoanovulation itself promotes more rapid pulsations in GnRH via a reduction in circulating progesterone
    - Normally, progesterone is released from the corpus luteum following ovulation
    - Progesterone acts to slow GnRH pulsation
    - In PCOS, a decrease in ovulatory events may cause a decrease in circulating progesterone
- Exposure to androgens in utero or prepubertally may decrease the inhibitory effects of estrogen and progesterone on the hypothalamus and contribute to increased pulsatility.

1.6.6 Insulin resistance and T2DM (Type 2 diabetes):

A great deal of attention has been given to the metabolic disturbances that accompany PCOS, as well as to the consequences of these disturbances later in life. Today, insulin resistance is considered the main pathogenic factor in the background of increased metabolic disturbances in women with PCOS (Siklar et al., 2015) which can explain hyperandrogenism, menstrual irregularity, and other metabolic manifestations seen in this disease (Baillargeon et al., 2003; Diamanti-Kandarakis and Dunaif, 2012).50-70% of patients with PCOS exhibit metabolic

abnormalities, including poor glucose tolerance and hyperinsulinemia. This is not solely a consequence of increased visceral obesity; rather, obesity and hormonal abnormalities are thought to make additive contributions to insulin resistance: Patients with PCOS exhibit a greater degree of insulin resistance than patients with the same BMI and visceral adiposity who do not have PCOS.

- Functional insulin resistance is considered a consequence of defects in insulin-mediated glucose transport and signaling in adipocytes and myocytes; this may be the result of a dysregulation in adipokine production and signaling from adipose tissues but the mechanism is incompletely understood

The resulting hyperinsulinemia leads to insulin spill over into other tissues, most commonly the skin. Insulin acts via insulin-like growth factor receptors to cause excess keratinocyte growth, producing velvety skin patches known as acanthosis nigricans.

1.7 Factors that causes PCOS or Risk Factors:

1.7.1 Genetics: PCOS is believed to be a complex disorder, with genetic as well as environmental factors contributing to development of the disease. 20-40% of female first-degree relatives of women with PCOS also have the syndrome, suggesting that the disease is partially heritable and clusters in families. Prevalence and severity of presentation vary with ethnicity, with South Asians at a higher risk of disease. Some candidate genes have been identified as contributing to risk of the disease, including 7β-hydroxysteroid-dehydrogenase type 6 (HSD17B6). (Gynaecol,2010)

1.7.2 Environment/lifestyle: Several lifestyle factors and environmental exposures have been associated with a more severe PCOS phenotype. Sedentary lifestyle is associated with increased metabolic dysfunction, and weight gain is associated with oligo anovulation and hyper androgenism. BPA and other environmental androgen-disrupting chemicals may accumulate to a greater extent in individuals with PCOS because of decreased hepatic clearance; these also induce androgen production and insulin resistance. (Endocrinol,2011)

1.7.3 Intrauterine exposures: Exposures to testosterone in utero may predispose to the later development of PCOS. Animal studies have demonstrated that in utero exposure is correlated with

development of a PCOS-like syndrome including hyperinsulinemia, hyperandrogenism, oligoanovulation, and polycystic ovaries. Exposure to androgens may impair estrogen and progesterone inhibition of GnRH, contributing to increased pulse frequency. (Engl, 2005)

1.7.4 Obesity: Although obesity is not believed to cause PCOS, it is known to exacerbate the symptoms of the disease. Obesity is present in 30-75% of women with PCOS. Adipose dysfunction contributes to the development of glucose intolerance and hyperinsulinemia, which in turn can exaggerate the manifestations of hyperandrogenism. Obese women with PCOS are at increased risk of anovulation and consequent subfertility. Childhood obesity is a well-documented risk factor for PCOS. Obese girls are at a higher risk of developing insulin resistance, metabolic syndrome, and PCOS later on in life (Pasquali et al., 2011). On the other hand, women with PCOS are at a higher risk of developing obesity (Randeva et al., 2012). Many studies explain that females with PCOS have increased visceral and subcutaneous body fat distribution due to increased androgen production rates (Kirschner et al., 1990); this central obesity follows a masculinized body fat distribution (Borruel et al., 2013) where the amount of visceral fat correlates with the degree of insulin resistance (Karabulut et al., 2012). Moreover, obesity plays a significant role in expressing the metabolic features of PCOS. Women with PCOS have an atherogenic lipid profile, associated with elevated levels of low-density lipoprotein, triglycerides and cholesterol, along with decreased levels of high-density lipoprotein. They are also at a higher risk of developing atherosclerosis, arterial stiffness, and altered vascular endothelium (Hart and Norman, 2006). In addition, women with PCOS show a worsened cardiovascular profile and associated complications (Randeva et al., 2012). However, obesity by itself is not the main reason behind these features. This is evident in lean women with PCOS who demonstrate the same metabolic features as those who are obese (Balen et al., 1995).Whether obesity leads to PCOS or whether PCOS leads to obesity is still debatable (Kamangar et al., 2015). In animal models of PCOS, administration of testosterone in pregnant rats and monkeys during early conception causes a central abdominal accumulation of fat of the progeny in postpartum life. Hence, prenatal androgen surplus, whether genetic or induced, might be the primordial event in the development of PCOS associated obesity, (Escobar-Morreale et al., 2012) yet does not imply that PCOS will ultimately ensue.

1.8 Diagnosis of PCOS:

There is no test to definitively diagnose PCOS. A physical exam will include checking for signs of excess hair growth, insulin resistance and acne. The doctor might then recommend:

- **A pelvic exam:** The doctor visually and manually inspects reproductive organs for masses, growths or any other abnormalities.
- **Blood tests:** Blood may be analyzed to measure hormone levels. This testing can exclude possible causes of menstrual abnormalities or androgen excess that mimics PCOS.? might have additional blood testing to measure glucose tolerance and fasting cholesterol and triglyceride levels.

  An ultrasound: Normal physiological changes and variations in the volume and size of the ovaries during puberty make ultrasonography findings controversial for the diagnosis of PCOS (Dewailly et al., 2014). Also, performing a transrectal or transvaginal ultrasonography in adolescents may not be always applicable, which may delay diagnosis (Venturoli et al., 1995). For diagnostic purposes, normal ovarian volume in female adolescents is considered equal to or less than 10 ml.(Carmina et al., 2010).

For diagnosing of PCOS, the doctor might recommend additional tests for complications. Those tests can include:

1.9 Signs and Symptoms of PCOS

Many times ovarian cysts do not cause symptoms. When symptoms do occur, they may include the following:

- Pain during intercourse or menstruation
- Abdominal fullness
- Nausea
- Vomiting
- Unusual bleeding

- Weight gain
- Inability to empty the bladder completely
- Breast pain
- Aching in the pelvic region, lower back, or thighs
- Irregular period
- Acne
- Hirsutism
- Hair thinning
- Depression

The following symptoms need immediate medical attention:

- Severe abdominal pain that comes on suddenly (may be aa sign of a ruptured ovarian cyst)
- Fainting
- Weakness
- Dizziness
- Rapid breathing
- Abdominal pain that occurs with vomiting and a fever

1.10. Complications of PCOS

1.10.1 Subfertility:

This is largely a consequence of oligo anovulation, but may also result from abnormalities in oocyte development due to hormonal or other abnormalities. Women with PCOS may have reduced fertility (Hart and Norman, 2006; Hart and Doherty, 2015) due to the associated endocrine and gynecologic abnormalities that impact ovarian quality and function (Hart and Norman, 2006). Accounting for up to 90% of ovulatory disorders (Hull, 1987), PCOS-associated persistent periods of anovulation are positively correlated with infertility (Imani et al., 1998). In 1995, a study

reported up to 50 and 25% of women in a PCOS population suffering from primary and secondary infertility respectively (Balen et al., 1995). More recently in 2015, a study by Hart and Doherty showed that infertility is 10 times more common among women with PCOS in comparison to healthy controls (Hart and Doherty, 2015).

1.10.2 Miscarriage:

There is an increased risk of miscarriage in PCOS patients who do conceive; however, this risk is confounded by the high rate of obesity in this population, which is also a risk factor for miscarriage.On the other hand, some studies suggested that females with PCOS who conceive might suffer from pregnancy-related complications such as gestational diabetes (Bruyneel et al., 2014), pregnancy induced hypertension (Hu et al., 2007; Sir-Petermann et al., 2012; Bruyneel et al., 2014), and preeclampsia (Katulski et al., 2015) to a higher extent in comparison to matched controls. Various research data also suggest an increased risk of miscarriage in women with PCOS (Balen et al., 1993; Homburg et al., 1993; Wang et al., 2001; Winter et al., 2002). The influence of PCOS phenotype, whether classic or non-classic, on female fertility remains poorly comprehended. Data describing the effects of PCOS on pregnancy outcomes are also limited and based on small trials. Thorough studies are needed to assess the degree of infertility in PCOS various phenotypes and to understand the reasons for increased negative pregnancy outcomes in this group of women.

Concerning the effects on the embryo, women with PCOS are 2.5 times at a higher risk of giving birth to small for gestational age children in comparison to healthy females (Katulski et al., 2015) and offspring show an increased morbidity and mortality compared to controls (Fauser et al., 2012).

1.10.3 Cardiovascular disease:

Patients with PCOS often exhibit dyslipidemia, which is likely related both to hyperinsulinemia and hyperandrogenism. In 2010, the Androgen Excess-PCOS society provided a consensus statement about increased risk of CVD in women with PCOS and developed a guideline to prevent such complication (Wild et al., 2010). Yet, despite the increased cardiovascular risk markers and the indubitable presence of CVD risk factors in this population, uncertainty remains regarding the increased cardiovascular morbidity and mortality in patients with PCOS (Legro, 2003; Wild et al.,

2010; Schmidt et al., 2011; Sathyapalan and Atkin, 2012). Discrepancies between studies might be due to the heterogeneous nature of the populations studied. Therefore, supplementary methodologically rigorous trials are needed to determine the absolute risk of CVD in patients with PCOS throughout age ranges.

In 1992, Dahlgren et al. identified a 7 times higher risk of myocardial infarction in patients with PCOS compared to healthy controls (Dahlgren et al., 1992). However, in 1998, an epidemiological study by Pierpointshowed no difference in the risk between the two groups (Pierpoint et al., 1998). More recent data showed that patients with PCOS have significantly elevated levels of circulating biomarkers of CVD, including C-reactive protein (Bahceci et al., 2004; Meyer et al., 2005) and lipoprotein A (Yilmaz et al., 2005; Bahceci et al., 2007; Berneis et al., 2009; Rizzo et al., 2009), in comparison to matched controls. Other studies demonstrated a higher burden of indicators of atherosclerosis with early onset cardiovascular dysfunction, i.e., arterial stiffness, endothelial dysfunction, and coronary artery calcification (Meyer et al., 2005; Moran et al., 2009).

1.10.4 Type 2 Diabetes Mellitus (T2DM):

Patients with PCOS are thought to have an increased risk of developing T2DM above the risk conferred by their level of insulin resistance and as many as 10% may develop T2DM by their fourth decade.

1.10.5 Malignancies:

A combination of hyperinsulinemia, hyperandrogenism, and oligo anovulation increases the risk of endometrial cancer and other endometrial disorders. Females suffering from PCOS present many risk factors associated with the development of endometrial cancer, such as obesity, insulin resistance, type II diabetes mellitus, and anovulation (Legro et al., 2013). Anovulation triggers an unopposed uterine estrogen exposure. This can subsequently trigger the development of endometrial hyperplasia and ultimately endometrial cancer (Hart and Norman, 2006). As a matter of fact, studies show that women with PCOS have a three-fold increased risk of developing endometrial cancer (Chittenden et al., 2009; Fauser et al., 2012; Haoula et al., 2012; Dumesic and Lobo, 2013) which is mostly well differentiated with a good prognosis (Fauser et al., 2012). Regardless, no data supports ultrasound screening for endometrial thickness in women with PCOS, which comes in agreement with the American Cancer Society against screening for endometrial

cancer in patients with average or increased risk. Yet women should be advised to notify their healthcare provider for any spotting or unexpected bleeding (Smith et al., 2001).

On the other hand, there are limited data to support any association between PCOS and breast and ovarian cancer (Chittenden et al., 2009; Fauser et al., 2012).

1.10.6 Psychiatric disorders:

Women with PCOS have an increased risk of anxiety, depression, binge-eating disorder, and bipolar disorder. Psychological stress and PCOS have been shown to be intimately related. A vast number of studies showed that women with PCOS are more prone to suffer from psychological disorders such depression (Veltman-Verhulst et al., 2012), anxiety (Jedel et al., 2010; Veltman-Verhulst et al., 2012), recreational drug-related incidents (Hart and Doherty, 2015), disordered eating, and psychosexual dysfunction (Deeks et al., 2010; Teede et al., 2011) in comparison to healthy female controls. In addition, females with PCOS have a lower self-esteem and body satisfaction (Weiner et al., 2004; Himelein and Thatcher, 2006) and subsequently tend to have more psychiatric hospital admissions than controls (Hart and Doherty, 2015). As a result, they display a low quality of life (Jones et al., 2008; Li et al., 2011; Fauser et al., 2012) and are prone to a high degree of emotional distress (Veltman-Verhulst et al., 2012).It is worth noting that obesity (Elsenbruch et al., 2003; Hahn et al., 2005; Barnard et al., 2007), acne, hirsutism (Weiner et al., 2004; Himelein and Thatcher, 2006) and irregular menstrual cycles (Elsenbruch et al., 2006), all associated with PCOS, are major contributors to the psychological stress that the patients experience due to the challenging of the female identity and her body image (Deeks et al., 2010; Teede et al., 2010, 2011; Dokras et al., 2011; Legro et al., 2013)

1.10.7 Others:

- High Blood Pressure or Hypertension
- High Cholesterol
- High Lipids
- Sleep Apnea
- Higher risk of Gestational diabetes

- Liver disease

1.11 Treatment:

The management of PCOS targets the symptomatology for which patients usually present, anovulation, infertility, hirsutism, or acne being the most common complaints. Treatment usually requires the corroboration of an interdisciplinary team that can include a family practitioner, a gynecologist, and endocrinologist, a dermatologist, a pediatrician, a psychiatrist, and a psychologist.

The treatment section will mainly focus on two major treatment guidelines: The American Task Force (Legro et al., 2013) and the PCOS Australian Alliance Guidelines (Misso et al., 2014).

1.11.1 Medicine and supplement:

If lifestyle changes are not enough to resolve symptomatology, medical treatment is added for better management of the patient's complaints.

a.Oral Contraceptive Pills

OCP are the most commonly used medications for the long-term treatment of women with PCOS and have been recommended by the Task Force and the Endocrine Society (Legro et al., 2013), the Australian Alliance (Misso et al., 2014), and the PCOS Consensus Group (Fauser et al., 2012) as first-line treatment for hyperandrogenism and menstrual cycle irregularities in women with PCOS.

By suppressing the hypothalamus-pituitary-ovarian axis, OCP decrease LH secretions, increase sex hormone binding globulins, and decrease free testosterone levels (Costello et al., 2007). This addresses hyperandrogenism-mediated symptoms improving acne and hirsutism (Costello et al., 2007), corrects menstrual cycle abnormalities, and provides a mean for effective contraception (Yildiz, 2015). A minimum of 6 months of OCP regimen is usually required to obtain satisfactory results against acne and hirsutism (Yildiz, 2008a). Even though guidelines do not specify the use of one OCP over another (Fauser et al., 2012; Legro et al., 2013), the best choice for symptomatic treatment is considered to be low-dose oral contraceptives that contain anti-androgenic or neutral progestin (Yildiz, 2008).

A number of clinical trials associated the use of OCP in patients with PCOS with increased risk of insulin resistance (Baillargeon et al., 2003; Legro et al., 2013). Concerns have been also raised about the negative effects of OCP on the cardiovascular profile of females with PCOS (Baillargeon et al., 2005; Lidegaard et al., 2012). Nevertheless, data from randomized control trials and observational studies demonstrated that OCP are indeed effective and safe for the treatment of patients with PCOS (Mendoza et al., 2014) with their benefits outweighing their risks (Yildiz, 2008).

Both guidelines recommend clomiphene citrate as first line treatment of an ovulatory infertility (Legro et al., 2013; Misso et al., 2014). Exogenous gonadotropins, in vitro fertilization, and laparoscopic ovarian drilling are considered as second line of management (Spritzer et al., 2015) when clomiphene citrate with or without metformin fail to achieve fertility.

b. Inositol

Recently, new drugs are being marketed as a novel treatment of PCOS and are gaining more recognition due to their lack of side effects. These are myo-inositol (MYO) and D-chiro-inositol (DCI), 2 stereoisomers of inositol, an insulin-sensitizing molecule.

Growing evidence suggests that insulin resistance might be induced by an alteration of the metabolism of inositol phosphoglycans (IPG) second messengers and mediators or by a defect in their tissue availability (Baillargeon et al., 2008). Many trials demonstrated that MYO administration improves insulin resistance in PCOS patients (Galazis et al., 2011; Morgante et al., 2011). One study reported that the decline in insulin resistance is positively correlated with increasing fasting insulin plasma levels, which supports the role of inositol as a modulator of insulin-mediated metabolic pathway (Genazzani et al., 2012).

More recent studies assessed the effect of MYO in combination with other new drugs. For instance, when combined with monacolin K (natural statin) and lipoic acid, inositol showed a dose-dependent improvement in dyslipidemia and hyperandrogenism-associated symptoms (Morgante et al., 2015). When combined with folic acid, MYO decreased hyper stimulation syndrome to a higher extent than folic acid alone in PCOS females undergoing oocyte retrieval (Papaleo et al., 2009). MYO also improved reproductive outcomes in those undergoing IVF when it was combined with α-lipoid acid (Rago et al., 2015). More importantly, the combination of MYO with DCI in a

physiological plasma ratio of 40–1 led to a decrease in the risk of developing metabolic syndrome in obese women with PCOS (Nordio and Proietti, 2012). This has been further reinforced by another study that showed significant improvement in PCOS symptoms, in terms of more menstrual cycle regularity, decreased insulin resistance, better lipid profile, and less acne, upon the use of a MYO-DCI combination (Formuso et al., 2015).

Therefore, a combination of MYO and DCI can be a prospective therapeutic approach for the treatment of women with PCOS. New large trials are needed to assess and compare the effect of MYO and its various combinations to the classic PCOS medications and to check for any undetected long-term side effects.

c. Spironolactone

One study showed that spironolactone, a steroid chemically related to the mineralocorticoid aldosterone, was able to improve insulin sensitivity; it also suggested its use for hyperandrogenism-associated symptoms such as acne and hirsutism (Ganie et al., 2004). However, other studies failed to replicate these results (Dunaif et al., 1990; Ganie et al., 2013). Accordingly, guidelines do not provide any specific recommendations for the use of spironolactone in the management of PCOS; further methodological studies are required to assess any benefit, if existent, for spironolactone in the treatment of this disease.by mouth(oral). Combination hormone pills may improve acne that is related to high androgen levels.

d. Metformin

Metformin is the most common diabetes drug that has been useful to reduce insulin resistance in women with PCOS. For many women with PCOS, metformin can also improve menstrual regularity. There are studies that show that metformin may also reduce the risk of miscarriage and gestational diabetes. In contrast, one study performed by Tang et al. showed no significant change in insulin sensitivity in PCOS patients receiving metformin. This could be explained by the high level of obesity (BMI>30 Kg/m2) and the limited weight loss the patients in the study could attain (Tang et al., 2006). Similarly, Ehrmann et al. showed that metformin did not improve insulin resistance in PCOS women (Ehrmann et al., 1997). Acbay et al. stated that metformin has no tangible effect on insulin resistance in PCOS patients (Açbay and Gündoğdu, 1996). Even though studies show contradictory results regarding metformin effect, it is suggested as first-line treatment

for cutaneous manifestations and pregnancy complications in women with PCOS. It is also used as a combination with clomiphene citrate to improve fertility outcomes in clomiphene citrate resistant patients (Legro et al., 2013; Misso et al., 2014).

e. Thiazolidinedione's

Thiazolidinedione's (TZD) represent a class of insulin sensitizer drugs used in the treatment of Type II diabetes mellitus. They activate the gamma isoform of the peroxisome proliferator-activated receptor, which is an adipocyte transcription factor (Majuri et al., 2007). The use of pioglitazone (Actos®), one member of this class, was studied in patients with PCOS and data showed that its administration results in a decline in fasting serum insulin levels and insulin resistance (Brettenthaler et al., 2004; Stabile et al., 2014). However, following the association of pioglitazone with increased risk of bladder cancer (Lee and Marcy, 2014; Levin et al., 2015), it has been recommended against its use or the use of other TZDs (specifically troglitazone and rosiglitazone) in the treatment of PCOS due to major safety concerns (Legro et al., 2013).

f. Clomiphene and Letrozole

Sometimes women with PCOS still need help improving their ovulation despite diet and lifestyle changes. Clomid has traditionally been given to women to improve ovulation. Newer research shows that letrozole may work better than clomid for women with PCOS. Letrozole does not raise estrogen like clomid. (Legro et al., 2013).

g. Gonadotropins for PCOS

The use of gonadotropins can also help women with PCOS conceive. Gonadotropins are made of the sex-hormones FSH, LH, or a combination of the two. Doctor may suggest combining these hormones with fertility drugs or using them on their own. For example, letrozole with a "trigger" shot of LH mid-cycle. Another option doctor may recommend is using gonadotropins with an IUI (intrauterine insemination) procedure. IUI involves placing specially washed semen directly into the uterus via a catheter. The semen may be from a sperm donor or your partner. A major risk of gonadotropins is ovarian hyper stimulation syndrome (OHSS). This is when the ovaries overreact to the fertility medication. If untreated or severe, it can be dangerous. (Ehrmann et al., 1997).

New research is now showing the benefits of certain supplements for improving ovulation, egg quality, and restoring hormone balance in PCOS. Medicines to treat reproductive or metabolic problems include the following drugs:

h. N-Acetyl cysteine

N-Acetyl cysteine (NAC) is a powerful antioxidant that fights oxidative stress and has been shown to improve pregnancy and ovulation rate in women with PCOS when compared to a placebo.

I. Vitamin D

Vitamin D is not only a vitamin but a hormone as well. Vitamin D receptors have been found on a women's eggs. Supplementing with vitamin D has been shown to improve egg quality and ovulation in women with PCOS on its own or while undergoing assisted reproductive therapy.

1.11.2Acupuncture:

Acupuncture helps in conceiving This alternative treatment has been shown to improve hormone balance, BMI, and endometrial thickness in women with PCOS. Acupuncture can be done alone or in conjunction with assisted fertility treatments.

1.11.3Surgery:

1.11.3.1 Laparoscopy

Ovarian wedge resection is the surgical removal of part of an ovary. This is done to help regulate menstrual cycles and start normal ovulation. It is rarely used now because of the possibility of damaging the ovary and creating scar tissue laparoscopic ovarian drilling is a surgical treatment that can trigger ovulation in women who have PCOS and who have not responded to weight loss and fertility medicine. Electrocautery or a laser is used to destroy portions of the ovaries. Surgery for PCOS may be recommended only one who has not responded to any other treatment for PCOS. Each. Surgery is less likely to lead to multiple pregnancies than taking fertility medicines. It is not known how long the benefits from surgery will last. There is some concern that ovarian surgery can cause scar tissue, which can lead to pain or more fertility problems. (Bennett, R. M. 1989)

1.11.3.2 Description of the procedures:

As noted above, the intent of PCOS surgery is to create an opening in the covering of the ovary, allowing mature egg follicles to escape. This mechanical disruption also appears to help normalize hormonal function. Whether the surgeon performs ovarian wedging or drilling, the surgery is generally done laparoscopically.In a laparoscopy, the physician puts the patient under general anesthesia, then cuts several holes (ports) in the body. One port is used to fill the abdominopelvic cavity with a gas to help separate the organs so the surgeon can visualize the ovaries. Using the other ports, the doctor will insert a light, generally a camera, and the surgical instrument(s) with which they can perform the surgery. (Cuccia, A.M,2010)

1.11.3.3 Advantages of Surgery

- ***Direct visualization*:**
  The surgeon can directly see the structures on which s/he is operating.
- ***Observe nearby areas***:
  In addition to treating the ovaries, the physician can visualize nearby structures and assess their health and condition, noting any other areas that may be of concern.

1.11.3.4 Disadvantages: Surgical Risks and Challenges

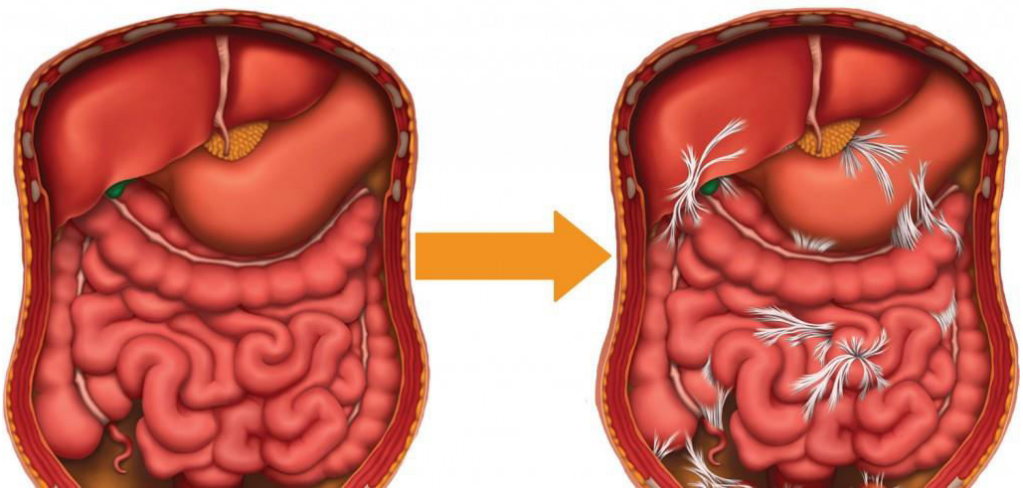

Figure 1.11.3: Adhesions from surgery

Adapted from: Web med. Accessed: 27th August, 2017.

- ***Operative report*:**

  The doctor will dictate a report describing about the observation and the procedures about the surgery.

- ***Anesthesia complications*:**

  Recent studies note concerns about neurotoxic effects on the brain and/or other areas of the body for patients who undergo one or more sessions of general anesthesia.

- ***Inadvertent enterotom*y :**

  When a patient has significant adhesions, it can be difficult for the doctor to see the structures beneath them. Thus, a surgeon can unintentionally cut into a nearby healthy organ or other structure – called an inadvertent enterotomy (IE). An IE can cause serious problems or death.

- ***Hospitalization during recovery**:*

  Most patients must undergo a hospital stay after an invasive surgery to the abdomen or pelvis. Patients are monitored to ensure their recovery and that there are no immediate post-surgical complications or infections.

- ***New adhesions generally form after surgery***:

  A mammoth study of 50+ years of abdominopelvic surgeries shows that adhesions form in 55% to 100% of all such surgeries. Thus, adhesions can recur – sometimes worse than before the surgery to remove them.

1.11.3.5 Advantages of Therapy

- ***No hospitalization:***

  Therapy is performed in a private treatment room, one-on-one with a therapist certified in the work. Patients are invited to bring a partner or family member along for company, if they like.

- ***No anesthesia*:**

  The patient is awake and communicative during the procedure. Patient involvement is encouraged, with the patient invited to give feedback throughout the course of therapy. There is no concern of neurotoxic damage to tissues of the body or the brain from general anesthesia.

- ***Decreased risk:***

  Risk is minimal. There is no cutting or burning, no risk from anesthesia, and no risk of inadvertently cutting through a nearby organ or other structure.

- ***No foreign bodies are introduced*:**

  No staples, stitches, films or meshes inserted into the body. No cameras, gas, lights or surgical instruments enter the body.

- ***Side effects are mild and transient*:**

  The most common side effects reported with therapy are temporary tenderness, aching, fatigue and hip or back pain. When they occur, these symptoms pass within a few days.

- ***Improvements in other areas of the body*:**

  Because therapy focuses on detaching adhesions throughout the body, patients regularly report significant increases in flexibility and range of motion after therapy. Many reported decreased pain and/or increased function in areas near the site where they are being treated. Some report this in areas they had forgotten or had not realized they were having a problem, until therapy relieved the pain or tightness. (Ellis H, et al., 1999)

1.11.3.6 Disadvantages: Risks and Challenges of Therapy

- ***Therapists cannot visualize the adhesions*:**

  Initially, doctors deduce the likelihood of adhesions by conducting a thorough a review of history and symptoms of patient. To gain further insights, doctors may require diagnostic tests or documentation from physician.

- ***Costs of therapy:***

  The total costs of the therapy can be very high for a patient.

- ***Travel and time are a consideration:***

  Therapy generally takes five days; it is only provided by trained, certified therapists in several cities in the U.S. and U.K. The 5-day program is designed for out-of-town and out-of-country patients.

1.12 Natural method treatment:

Here are some natural methods to help manage PCOS symptoms:

Before trying any treatment option, it is important to discuss diagnosis with health care provider and collaborate on a plan that works.

1.12.1 Calorie Intake Strategisation

One study indicates that caloric intake timing can have a big impact on glucose, insulin and testosterone levels. Lowering insulin could potentially help with infertility issues. Women with PCOS who ate the majority of their daily calories at breakfast for 12 weeks significantly improved their insulin and glucose levels as well as decreased their testosterone levels by 50 percent, compared to women who consumed their largest meals at dinnertime. The effective diet consisted of a 980-calorie breakfast, a 640-calorie lunch, and a 190-calorie dinner. Guidelines recommend exercise therapy and calorie-restricted diet as a crucial part of the management of obesity in women with PCOS. In fact, lifestyle modifications are considered as a cost-effective first line treatment and as a necessary adjunct to medication (Legro et al., 2013; Misso et al., 2014).

1.12.2 Decreasing advanced glycation end products

Women with PCOS have been shown to have higher levels of advanced glycation end products (AGEs) in their blood. AGEs are compounds formed when glucose binds with proteins, and are believed to contribute to certain degenerative diseases and aging. One small study found that cutting down on dietary AGEs significantly reduced insulin levels in women with PCOS. Foods high in AGEs include animal-derived foods and processed foods. Applying high heat (grilling, searing, roasting) increases levels.

1.12.3Taking vitamin D and Calcium

A case control study examining 100 infertile women with PCOS found that those who supplemented a daily 1500 mg dose of metformin, a medication commonly used to treat PCOS symptoms, with calcium and vitamin D saw improvements in BMI, menstrual abnormalities, and other symptoms. The women in the study added 1,000 mg of calcium a day and 100,000 IU of vitamin D a month to their daily metformin dose for six months. (Asemi Z, et al.,2014, Moran LJ, et al., 2014)

1.12.4 Getting enough magnesium.

Many women with PCOS exhibit symptoms of insulin resistance and metabolic syndrome, risk factors that raise the risk for heart disease and other problems like diabetes and stroke. Low

magnesium levels are often associated with diabetes, and some research indicates that a dietary supplement of the mineral may improve insulin sensitivity, a factor in the development of type 2 diabetes and PCOS. One study found that overweight, insulin-resistant subjects who received 300 mg of magnesium at bedtime showed a significant improvement in fasting blood glucose and insulin levels, compared to subjects who received a placebo. (Berry A, et al.,2012)

1.12.5 Increasing chromium.

Chromium is an essential mineral that helps the body regulate insulin and blood sugar levels. Some research suggests that chromium supplements can help people with diabetes lower their blood glucose levels. One study examined the role of the mineral in women with PCOS. The results indicated that 200 mcg daily of chromium picolinate significantly reduced fasting blood sugar and insulin levels in subjects — enough that the effects were comparable to the pharmaceutical, metformin. While metformin was also associated with lower levels of testosterone, taking a daily dose of 200 mcg of chromium picolinate could help regulate blood sugar levels.

1.12.6 Loading up on omega-3s.

Fish oil has been associated with a long list of health benefits, and some research indicates that omega-3 supplements can decrease androgen levels in women with PCOS. One study found that women with PCOS who were given three grams of omega-3s a day for eight weeks had lower testosterone concentrations and were more likely to resume regular menses than subjects who received a placebo.

Polycystic Ovarian Syndrome (PCOS) is both a hormonal and mechanical condition. Like physicians, we find that by addressing the mechanical aspects of a woman's reproductive organs, PCOS symptoms can decrease and natural fertility improves. However, our approaches to treating the mechanical aspects are far different from each other.

- Periodic checks of blood pressure, glucose tolerance, and cholesterol and triglyceride levels
- Screening for obstructive sleep apneaScreening for Type II DM:Women with PCOS should be routinely screened for type II DM. Studies have shown that measurement of fasting blood glucose levels alone under-diagnoses type II DM in patients with PCOS, missing up to 80% of pre-diabetic and 50% of diabetic cases (Salley et al., 2007). As such, guidelines currently recommend screening women with PCOS using an oral glucose tolerance test

(Azziz et al., 2006). The screening could be done every 3–5 years (Legro et al., 2013), or every second year in patients with no risk factors for type II DM and annually in patients with risk factors (Misso et al., 2014). Examples of relevant risk factors include age, gender, ethnicity, parental history of diabetes, history of high blood glucose levels, use of antihypertensive medications, smoking, physical inactivity, and waist circumference (Moran et al., 2010).

- Screening for CVD: Women with PCOS should be routinely screened for CVD risk factors. Guidelines recommend cigarette smoking assessment, body weight and BMI measurements to check for obesity, blood pressure monitoring to evaluate for hypertension, and a complete lipid profile panel (total cholesterol, low density lipoprotein cholesterol LDL-C, high density lipoprotein cholesterol HDL-C, and triglycerides levels) to screen for dyslipidemia (Legro et al., 2013; Misso et al., 2014). It is important to note that the Australian guideline dwells in depth in its CVD screening recommendations indorsing blood pressure measurement annually if BMI ≤ 25 kg/m2 or at each visit if BMI ≥ 25 kg/m2 and lipid profile assessment every 2 years if initially normal or every year if initially abnormal (Misso et al., 2014).
- Screening for Psychological Wellbeing: Guidelines recommend screening women with PCOS should be screened for not only depression and anxiety (Legro et al., 2013; Misso et al., 2014) but also for negative body image, eating disorders, and psychosexual dysfunction (Misso et al., 2014). If screening is positive, the health physician should further assess the problem and refer the patient to a specialist if needed.

1.14 Prevention of PCOS

The primary treatment approach for women with PCOS is with lifestyle changes involving eating, physical activity, sleep, and the ability to better manage stress. Polycystic ovary syndrome (PCOS) cannot be prevented. But early diagnosis and treatment helps prevent long-term complications, such as infertility, metabolic syndrome, obesity, diabetes, and heart disease.

1.14.1 Healthy Eating

- A healthy diet is key to managing PCOS. Foods that contribute to raising insulin levels should be cut out from the diet chart. These foods also include sugary beverages, processed foods like crackers, chips, and bread. A balanced diet is needed for a healthy person. A diet that includes lots of fruits, vegetables, whole grains, and low-fat dairy foods, as well as baked goods and desserts can fulfill body's nutritional needs, satisfies hunger, and decreases cravings. Furthermore, a healthy diet makes feel better and give more energy. . (*Sørensen et al.. 2012).*

Women should focus on foods that have been eaten to reduce insulin and inflammation. These foods include fruits, vegetables, nuts, and legumes. Spreading carbohydrate foods evenly throughout the day with moderate amounts at meals and snacks can also help keep insulin down.

1.14.2 Physical Activity

Regular physical activity is an effective way to bring down insulin levels and help with weight management. It is recommended that Americans engage in at least 60 minutes of physical activity daily with at least two days of strength training. Strength or resistance training can help build muscle, which can burn more calories. Physical activity a regular and essential part of life. Fitness activities that are right to help boost motivation that should be done. Walking is one of the best activities. (*Moran et al., 2013)*

1.14.3 Sleep

There is strong research showing that lack of sleep contributes to insulin resistance and weight gain. Most women need around eight hours of sleep each night. Sleep should be made a priority by going to bed at an earlier time. Tips for a better night's sleep include keeping the room cool and dark and having a comfortable pillow and mattress. Avoiding screens (TVs, phones, tablets) at least 30 minutes before bed can also improve the chances of a better night's rest. Many women with PCOS suffer from obstructive sleep apnea, resulting in less oxygen and reduced quality sleep. There is a link between sleep apnea and insulin resistance. Treatment of obstructive sleep apnea can bring down insulin levels. (Asemi,2014)

1.14.4 Leading a stress free life

Consistent high levels of stress can have a big impact on insulin and weight gain. Stress can increase the hormone cortisol, which directly increases insulin. One way to manage stress is with exercises like yoga. Some find floating, meditation, and mindfulness practices beneficial. If you are having trouble managing your stress levels, consider talking with a licensed psychologist.

1.14.5 Weight control and weight loss

Excessive weight, as previously mentioned, is associated with adverse metabolic and reproductive health outcomes in women with PCOS. For instance, female fertility significantly decreases with a BMI >30–32 kg/m2 (Teede et al., 2011). Multiple small uncontrolled trials have shown that a body weight decrease of as little as 5% regulates the menstrual cycle, improves fertility, reduces insulin and testosterone levels, decreases the degree of acne and hirsutism, and benefits psychological wellbeing (Clark et al., 1998; Knowler et al., 2002; Pasquali et al., 2006; Norman et al., 2007). Losing weight can low risks for diabetes, high blood pressure (hypertension), and high cholesterol. Like weight loss in general, weight loss or bariatric surgeries have been found to be effective at improving fertility and metabolic complications. A study in Obesity Surgery showed that weight loss surgeries can improve many symptoms of PCOS, including hirsutism and menstrual irregularity in severely obese women. Weight loss surgeries should only be considered as a last resort, after women with PCOS have gotten help in making lifestyle changes and trying different medications or supplements. A modest weight loss can improve high androgen and high insulin levels and infertility. Weight loss of as little as 5% to 7% over 6 months can reduce androgen levels enough to restore ovulation and fertility in more than 75% of women who have PCOS.

1.14.6 Cessation of smoking

Smoking should avoid and passive smoking is also harmful. Women who smoke have higher levels of androgens than women who do not smoke. Smoking also increases the risk for heart disease.

1.14.7 Regular checkups

Regular checkups are important for catching any PCOS complications, such as high blood pressure, high cholesterol, uterine cancer, heart disease, and diabetes. As part of polycystic ovary syndrome (PCOS) treatment, medicines can be used to help control reproductive hormone levels.

1.15. Prevalence:

Estimates suggest that polycystic ovary syndrome (PCOS) affects between 8% and 20% of reproductive-age women worldwide. Because there is no universal definition of PCOS, the exact number of women in the United States with PCOS is unknown, but is thought to beapproximately 5 million. Most women are diagnosed during their twenties or thirties, but PCOS may affect girls as young as 11 who haven't even had their first period. (Sirmans et al.,2014)

South Asian PCOS women have more severe reproductive and metabolic symptoms than other ethnic groups. South Asians with PCOS seek medical care at an earlier age for reproductive abnormalities; have a higher degree of hirsutism, infertility, and acne; and experience lower live birth rates following in vitro fertilization than do whites with PCOS. Similarly, South Asians with PCOS have a higher prevalence of insulin resistance and metabolic syndrome than do other PCOS-related ethnic groups of a similar body mass index. Inheritance of PCOS appears to have a complex genetic basis, including genetic differences based on ethnicity, which interact with lifestyle and other environmental factors to affect PCOS phenotypic expression. [Gynecol,2013 May]

These statistics are calculated extrapolations of various prevalence or incidence rates against the populations of a particular country or region. The statistics used for prevalence/incidence of Polycystic ovary syndrome are typically based on US, UK, Canadian or Australian prevalence or incidence statistics, which are then extrapolated using only the population of the other country.

Table 1: Statistics of country for polycystic ovarian syndrome.

Country/Region	Extrapolated Prevalence	Population Estimated Used
USA	7,341,385	293,655,405
Canada	812,696	32,507,874

Mexico	2,623,989	104,959,594
Brazil	4,602,527	184,101,109
Paraguay	154,784	6,191,368
Country/Region	**Extrapolated Prevalence**	**Population Estimated Used**
Venezuela	625,434	25,017,387
Sweden	224,660	8,986,400
Britain	1,506,767	60,270,708
Belgium	258,706	10,348,276
France	1,510,605	60,424,213
United Kingdom	1,506,767	60,270,708
Germany	2,060,615	82,424,600
Switzerland	186,271	7,450,867
Russia	3,599,351	143,974,059
Portugal	263,103	10,524,145
Spain	1,007,019	40,280,780
Greece	266,188	10,647,529
Italy	1,451,436	58,057,477
Albania	88,620	3,544,808
China	32,471,190	1,298,847,624

Hong Kong	171,378	6,855,125
Japan	3,183,325	127,333,002
Afghanistan	712,841	28,513,677
Country/Region	**Extrapolated Prevalence**	**Population Estimated Used**
Bangladesh	3,533,511	141,340,476
Bhutan	54,639	2,185,569
India	26,626,765	1,065,070,607
Pakistan	3,979,908	159,196,336
Sri Lanka	497,629	19,905,165
Indonesia	5,961,323	238,452,952
Malaysia	588,062	23,522,482
Philippines	2,156,042	86,241,697
Singapore	108,847	4,353,893
Thailand	1,621,638	64,865,523
Iran	1,687,580	67,503,205
Iraq	634,367	25,374,691
Kuwait	56,438	2,257,549
Saudi Arabia	644,898	25,795,938
United Arab Emirates	63,097	2,523,915

South Africa	1,111,211	44,448,470
Australia	497,828	19,913,144
New Zealand	99,845	3,993,817

Adapted from:2014 Health Grades Inc. Accessed: 18th October.

The word 'prevalence' of Polycystic ovary syndrome usually means the estimated population of people who are managing Polycystic ovary syndrome at any given time (i.e. people with Polycystic ovary syndrome). The term 'incidence' of Polycystic ovary syndrome means the annual diagnosis rate, or the number of new cases of Polycystic ovary syndrome diagnosed each year (i.e. getting Polycystic ovary syndrome). Hence, these two statistics types can differ: a short disease like flu can have high annual incidence but low prevalence, but a life-long disease like diabetes has a low annual incidence but high prevalence. (Health grades,2014)

2.1 Awareness of lifestyle modification in females diagnosed with polycystic ovarian syndrome in India.

A study was conducted in Mumbai and Navi Mumbai, India. Self-made validated questionnaire was administered. Descriptive analysis was done. Perception on PCOS, lifestyle modification, emotional attribution and biggest concern were calculated as absolute frequencies and were reported as overall percentages. 21% of the respondents were very well aware about PCOS. 51% reported as doctor was their main source of information about PCOS. 81% expressed that PCOS was manageable one. Moreover,62% saidthat exercise helps in the management of PCOS. Out of this, and 39% were doing exercise on a regular basis. 32% attributed to anxiety after the diagnosis of PCOS. 64% of the respondents said that changing in diet or eating habits can influence in PCOS. However, 95% of the subjects concurred to follow life style modification. Efforts need to intensify in creating awareness in the general public about PCOS. Absolute majority of the study participant unconcerned to follow lifestyle modification however emphasis needs to address on multidisciplinary approach in managing PCOS. (Pitchai et al,.2016)

2.2 PCOS: Symptoms and Awareness in Urban Pakistani Women

The objective of the study was to collect data on how many women had symptoms of this syndrome including hirsutism, amenorrhoea, dysmenorrhoea and oligomenorrhoea. Furthermore, the ratio of women who were aware of this disorder was evaluated. The survey was done one hundred and seventy-seven women who were either seeking or imparting education in a university. A small portion of the subjects were educated house wives. Subjects were inquired through survey forms of above mentioned symptoms. The collected data was then interpreted to find the prevalence of above mentioned symptoms and awareness about PCOS. 36.7%out of 177 subjects had hirsutism. However,19.5%of population had facial hair,6.5% had breast hair and other forms of hirsutism were 6.5%. Moreover,14% had some sort of irregularity in menstruation. 9% women had oligomenorrhoea, 3% women had amenorrhea. On the whole 10% were familiar with PCOS. Conclusion of this study does not have sufficient evidence to establish the prevalence of PCOs through ultrasonography; thus only prevalence of amenorrhoea, oligomenorrhoea and hirsutism were stated which can serve as a guideline towards finding the true 5% prevalence PCOS in the study.(Gul et al.,2014)

2.3 A Study to Assess the Knowledge Regarding PCOS (Polycystic Ovarian Syndrome) among Nursing Students at NUINS (NitteUsha Institute of Nursing Sciences).

The study was conducted to assess the knowledge of the polycystic ovarian syndrome among the nurse students. However, among 150 students the descriptive survey research approach was adopted and it was analyzed by using descriptive and inferential statistics. Moreover, distribution of the samples on demographic characteristics revealed that 85% of the samples were in the age group of 21-25 years, 75% of then samples wereChristians,82% of the samples were consuming mixed diet, and 92% samples had regular menstrual cycle. 76% of the samples were with average knowledge and 10.7% with good knowledge regarding polycystic ovarian syndrome. Hence, the result of the study was that source of information, consumption of junk food, dietary patterns of the students were associated with their level of knowledge of PCOS at 5% level of significance. (Sunanda et al., 2016)

2.4 Survey of Poly Cystic Ovarian Disease (PCOD) Among The Girl Students of Bishop Heber College, Trichirapalli, Tamil Nadu, India.

The study was attempted to assess prevalence of PCOS among the girl students of a college. The survey was conducted by the female students and the age group was between 18-31yrs. However, PCOS was diagnosed by using a questionnaire with Rotterdam's criteria and the prevalence was found to be 7.14%. This study definitely created awareness among the adolescent college girls about PCOS. The study was done to help them to modify their life style and to have better reproductive life later. During this study it was identified the adolescents with risk for developing PCOS, proper diagnosis and treatment with consultation of a gynecologist was suggested by the survey. Through the study especially in the presence of other risk factors for infertility in married girls, early conception was advised and to find the effectiveness of awareness programme. (Nivetha et al., 2016)

2.5 Awareness of polycystic ovarian syndrome among Saudi females

The study was conducted to assess the level of knowledge of PCOS, clinical presentation, risk factors and complications among Saudi female's population, to identify factors that influenced the awareness, and to improve health care and lower the treatment cost. A population-based cross-

sectional study was conducted in Saudi Arabia, in 2016, about PCOS awareness, using paper and soft copy questionnaire. The participants age group was 18-40. The questionnaire included personal data, awareness and method of knowledge of PCOS, clinical presentation, risks, and complications. Data were analyzed statistically using SPSS software. Total number of participants was 2000. Majority of the studied population 96.4% were from urban back ground. 41% and 49.6% were single and married. The level of awareness of PCOS in this study was 56.7%. Among them 15.3% were PCOS patient, 21.3% have known about PCOS via internet, then patient, doctors, and books, respectively. Among aware females, the majority were aware of symptoms pertaining to endocrine disorders, contraception intake, and a healthy diet. In contrast, most of them were unaware of the relationship between it and occurrence of chronic diseases, early puberty, heart diseases, and inheritance. The level of awareness of PCOS was significantly related to higher educational levels (P = 0.000), and women with health college qualifications (P = 0.000). Area of residence, marital status, and diabetes mellitus had no major impact. Thus, from the study it can be said that, there is a high level of awareness of PCOS among Saudi women. (Aleid et al.,2017)

2.6. The frequency of polycystic ovary syndrome in young reproductive females in Qatar

This was a prospective cross-sectional study, which was conducted among 126 female students between the ages of 18 and 30 years were surveyed for the frequency of polycystic ovary syndrome (PCOS) through clinical interview, questionnaire, and anthropometric measurements. Of all the students, 37 (30.8%) had MI, 38 (31.7%) had clinical hirsutism, 37 (30.8%) had acne, and 76 (63.3%) had a family history of type 2 diabetes. The estimated frequency of PCOS was 18.33% according to the US National Institutes of Health definition. However, hormonal analysis demonstrated a significant increase in androgens (total testosterone, dehydroepiandrosterone sulfate, and free testosterone), and a significant decrease in sex hormone-binding globulin in our PCOS group. This study showed a higher level of the androgen hormones among PCOS subjects with a frequency of PCOS (18.33%), which is similar to the global estimates of 10%–20%. (Sharif et al., 2017)

2.7 Physical activity in women with polycystic ovary syndrome: prevalence, predictors, and positive health associations

The study described the prevalence and predictors of physical activity in women with polycystic ovary syndrome and to explore potential health benefits that are associated with physical activity. In this study, active women were compared with inactive regards to demographic and psychological variables and health characteristics. The study showed that, women with PCOS who met the DHHS (Department of Health and Human Service) guideline for physical activity were more likely enjoy a variety of health benefits. (Lamb et al., 2011)

2.8 Awareness about PCOS and the Likelihood of Its Symptoms in Adolescent Girls in a Semi-Urban Set-Up: A Cross Sectional Study

The main objective of this study was to identify, the prevalence and enhance the awareness of PCOS among the school going girls. However, this study was conducted in a government school in Sambalpur, Odisha state, India. In additionally, the data was taken from 100 school going girls who were 14-17 years old. 12% of the subject were found to have hirsutism, 20% had extreme acne, and 36% had menstrual irregularity. 78% of the student never heard of PCOS before. (Hansa et al. 2016)

2.9 Perception and Attitude of Patients regarding Polycystic Ovarian Syndrome (PCOS) in Tertiary Care Hospitals of Pakistan - A Survey Based Study

The study was performed in Pakistan to determine the perception of patients on polycystic ovarian syndrome (PCOS). This survey was conducted over a period of 8 months among 270 patients. The data was analyzed by SPSS (Software Predicted Statistics) and employed descriptive statistics. The survey showed that,37% were in adult age group and 25.9% were also seen in middle age groups and 22.2% teenage groups whereas geriatrics were observed to be the least in number (14.8%). In terms of BMI (Body Mass Index), 51.8% patients were observed to be obese and 22.2% were extremely obese 55.6% of the patients did not know enough about the disease. The patients of polycystic ovarian syndrome are mostly young and the comprehension and awareness regarding the disease among the patients is generally found to be deficient. (Abbas et al., 2014)

2.10 A life course perspective on polycystic ovary syndrome

This study showed a life course perspective for understanding the psychosocial experiences of women with PCOS and their psychological conditions. The first stage when PCOS can be diagnosed is in adolescent period. With other complications of puberty, PCOS creates a frustrating condition for the adolescent girls with the symptoms of hirsutism that lowers their self-confidence. However, women with PCOS are more likely to suffer from depression than women without PCOS. In fact, they have higher levels of anxiety as well as higher rate of symptoms such as poor sleep, worry about unimportant matters, phobias. PCOS diagnosed patient, express frustration about their lack of knowledge to prevent their symptoms from worsening. Moreover, The adolescents with PCOS express concerns about their future health. As they go through a change in their social life along with their physiological change. Thus, the events in their life change from childhood to adulthood and their roles change from conjugal life to parenthood. The study described that, PCOS deviates the normal scenario in these social changes. (Sanchez, 2014)

2.11 Women's perceptions of polycystic ovary syndrome following participation in a clinical research study: implications for knowledge, feelings, and daily health practices.

The study discussed about the changes in knowledge, feelings, and daily health practices related to PCOS in clinical research study participants among 68 women, who had received counselling and education about PCOS while participating in a clinical research study. They were invited to complete an online based survey that assessed levels of concern, knowledge, healthy dieting, active living, and health care satisfaction before and after the study. From the total participants, 43 women completed the survey. However, after taking part in a clinical research study, participants believed they had increased knowledge and concern about the etiology and health consequences of PCOS, better lifestyle practices and improved health care satisfaction. Finally, after the study, women felt encouraged to participate in the management of their condition and communicate with their primary care providers. (Chizen, 2010)

2.12 Women's experiences of polycystic ovary syndrome diagnosis

The main objective of the study, was to identify the perceived experience of PCOS diagnosis, following by the development of a guideline for PCOS assessment and management. It was

performed in Australia among 210 women having PCOS, aged 18–45 years. 24% of women, PCOS diagnosis took more than 2 years and 39% saw three or more health professionals before diagnosis was made. 60% of the sample reported they were not given to information sources at time of diagnosis and 20% reported receiving information. However, of those who reported provision of information at diagnosis, 62% felt dissatisfied with information provided about PCOS. 79% reported being provided with information about lifestyle management, 89% reported being provided with information about medical therapy, 83% about long-term complications and 95% about potential infertility. (Boyle et al., 2014)

2.13. Awareness of PCOS (polycystic ovarian syndrome) in adolescent and young girls

This study was conducted, to assess the knowledge on PCOS among 200 medical students of different colleges studying in 1st, 2nd, and 3rd year. However, the data was collected from the students by using structured questionnaire. The study showed that, 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. Moreover, the study also present that, 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. Thorough knowledge of the disorder and counseling for adolescents should be included in the curriculum which will provide awareness towards the disorder and lifestyle modification. (Jayshree et al., 2017)

2.14. Aims and Objectives of the study:

The main aims and objective of this study:

- To create awareness about polycystic ovarian syndrome
- To help people recognize the early science and symptoms of polycystic ovarian syndrome, thus enabling them to seek treatment at an early stage
- To encourage the participants to seek prompt medical attention for symptoms which may include infertility, hirsutism pelvic pain menstrual irregularity hormonal imbalance etc.
- To educate people about the key risk factors of polycystic ovarian syndrome which could be prevented by modifying lifestyle or avoiding the key risk factors.
- To inform people about the importance of PCOS check-ups at an early stage
- To determine factors that could influence a respondent's choice of answers (i.e. demographic characteristics such as age, education, profession, occupation, income level, and marital status, etc.). This would help us to study association of knowledge and awareness with the different variables.

2.15. Significance:

Polycystic ovary syndrome (PCOS) is a major public health problem referred to as one of the most common endocrine disorders in women of reproductive age, yet is a condition the public is largely unaware of and that health care providers do not seem to fully understand.

PCOS is characterized by a spectrum of symptoms, including irregular or no menstrual periods, excess hair growth on the face and body (hirsutism), weight gain, acne, ovarian cysts, and thinning of the hair on the scalp. The short- and long-term health problems associated with PCOS are significant, and include obesity, type 2 diabetes, cardiovascular disease, obstructive sleep apnea, complications during pregnancy, impaired fertility, and increased risk of endometrial cancer.

PCOS awareness is an important first step. There's no single test to definitively diagnose PCOS. For this reason, it is important to have a thorough evaluation to help rule out other conditions such as adrenal or thyroid disease, and to accurately confirm the diagnosis of PCOS.

September is PCOS Awareness Month, and women everywhere are speaking out and sharing their experience with PCOS on social media like Facebook, Instagram, and in support groups. Spreading awareness is important because PCOS is something that is relatively misunderstood in the medical field. From what causes it, to why some women have symptoms that others don't. It's a disease that strikes 1 in 10 women, even more the rate is higher in developing countries like Bangladesh. sometimes they have no genetic tie to happen it, while many women have. However, there is one important thing that common do not know and it's very important for doctors to understand: PCOS does not look the same for everyone.

Most of the time, PCOS symptoms can be managed by healthy diet and exercise, along with the right vitamins and supplements, and regular communication with a healthcare professional as symptoms change. While PCOS does not have a cure or a one-size-fits-all, sometimes we can manage our symptoms with lifestyle changes, and as a result experience a more abundant life.

A significant portion of low to higher educated people have poor knowledge about PCOS. On the other hand, there are little number of surveys on level and awareness of PCOS. Awareness for

PCOS can lead to reduction in infertility, diabetes, obesity, myocardial infraction and others major complications.

Just as concerning is the fact that PCOS can be a stigmatizing condition that affects a woman's identity, mental health, and health-related quality of life; all these aspects associated with PCOS have received less attention than the biomedical aspects of the condition.

Thus I have conducted a survey on knowledge and awareness of polycystic ovary syndrome among the women aged between 25-45 in Dhaka.

3.1. Type of study:

The study was a survey based study.

3.2. Study Area:

The study was conducted in Dhaka, Bangladesh.

3.3. Study Population:

The study was performed on 400 women among aged 25 to 45, from July, 2017 to December 2017.

3.4. Inclusion Criteria:

In this survey only women of age 25 to 45 were included.

3.5. Exclusion Criteria:

In this survey:

- Males were excluded,
- Women aged below 25 and above 45 were excluded,
- Anyone unwilling to participate or unable to company with protocol requirements were excluded.

3.6. Study Tool:

To facilitate the study of knowledge and attitude of Polycystic Syndrome among women in Dhaka, Bangladesh, a questionnaire was established in February 2017. Through this questionnaire, demographic information was collected along with some factors that contribute to the knowledge and awareness of polycystic syndrome among women aged 25 to 45

3.7. Questionnaire Development:

The questionnaire was development based on some common criteria that influence knowledge and awareness of Polycystic Syndrome among women in Dhaka, Bangladesh. The questionnaire was developed on the perspective of Bangladesh so that maximum accurate statistical data can be collected from the survey.

3.8. Data Analysis:

After data collection, these data were set on the Microsoft Office Excel and filtered according to the age range, site of living area, educational qualification, about Polycystic Syndrome, marital status, family history, risk factor, etc. So some graphic representations were found that was visually representative of the targeted subject.

3.9. Ethics:

This study was done without conflicting the ethical issues. Ethical consideration was checked the research supervisor with the research policy of the East West University. Oral consent was taken prior to study from the participants

4.1. Distribution of Age in Study population.

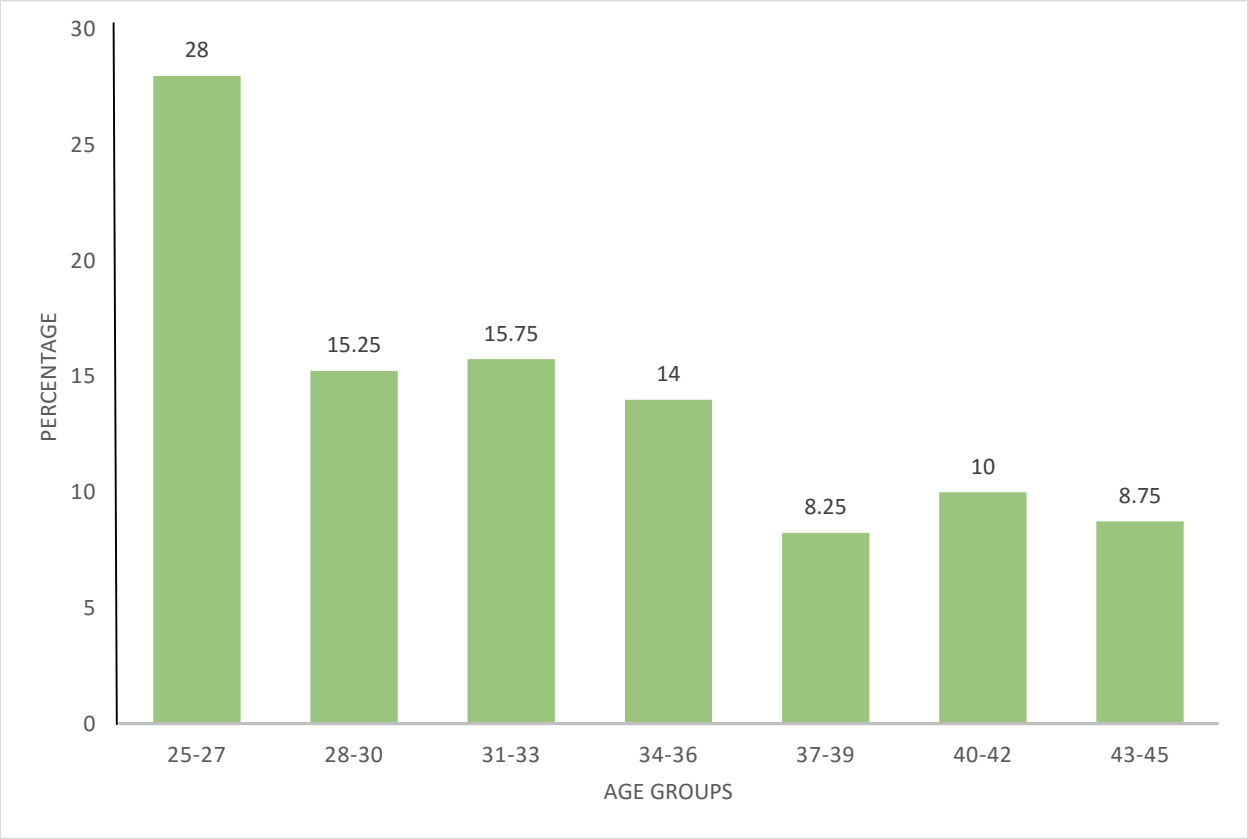

Figure 4.1: Distribution of Age in Study population

The study showed that among 400 women,28 % of the population belonged to the age group 25-27,15.25% of the population belonged to the age group 28-30,15.75% of the population belonged 31-33, 15.75% of the population belonged 31-33, 14% of the population belonged to 34-36, 8.25% of the population belonged to 37-39, 10% of the population belong to 40-42 and 8.75% of the population belonged to age group 43-45.

4.2. Distribution of different religion in the study population:

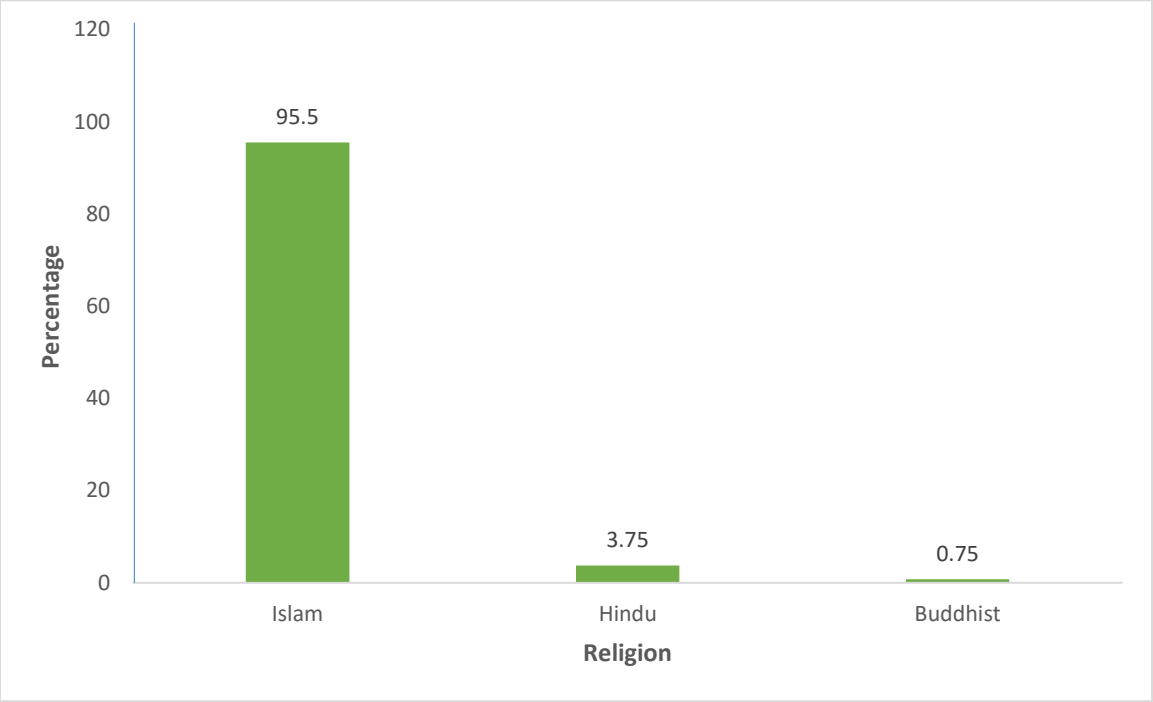

Figure 4.2: Distribution of different religion in the study population

The study showed that among 400 women, the maximum percentage of women were from Islam (95.5%), and (3.75%) were Hindu. However, the lowest percentage was Buddhist which was 0.75%.

4.3. Prevalence of Different Education Level:

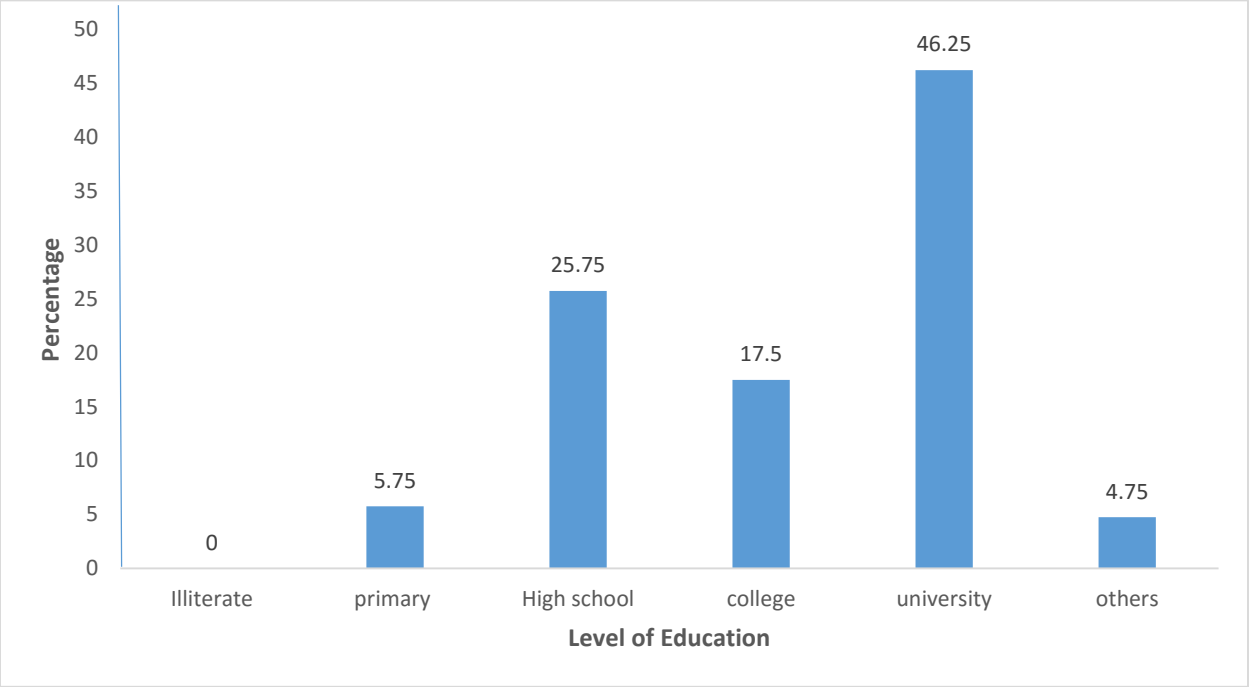

Figure 4.3: Prevalence of Different Education Level

From the 400 study population, 46.25% of women completed university,and 0% were illiterate 25.75% of population went to high school, 5.75% went to primary school and 4.75% attained other degrees.

4.4. Knowledge about awareness level about PCOS among women:

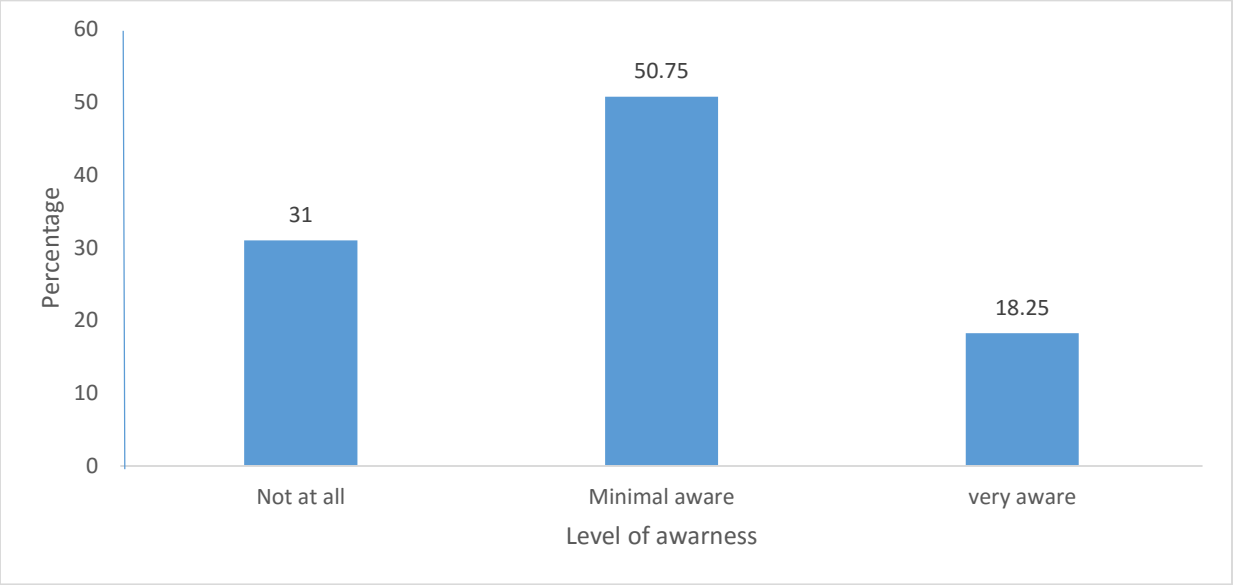

Figure 4.4: Knowledge about awareness level about PCOS among women

The study showed that, the majority of the people were minimal aware and the percentage was 50.75%, and the minority of the people were very aware. Moreover, 31% of the women among 400 were not at all aware about PCOS.

4.5. Perception about PCOS in the study population:

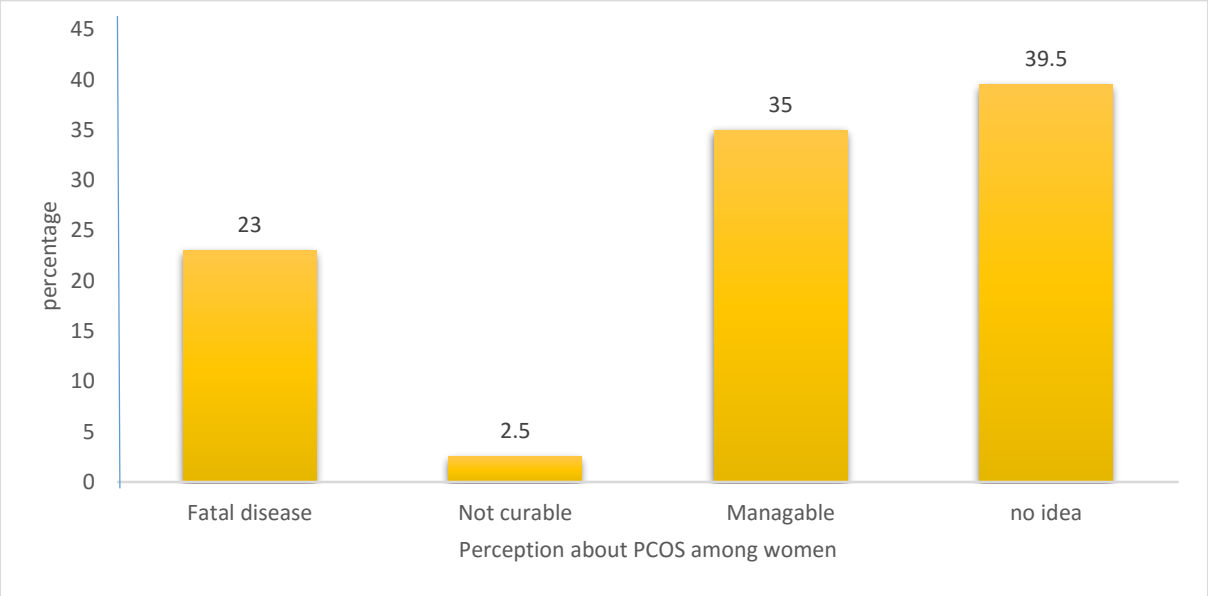

Figure 4.5: Perception about PCOS in the study population

Among 400 women, 35% perceived PCOS as manageable followed by 23% was thought that PCOS is a fatal disease. 2.5% thought that PCOS is not curable and 39.5% of population had no idea about PCOS.

4.6. Knowledge about the signs and symptoms:

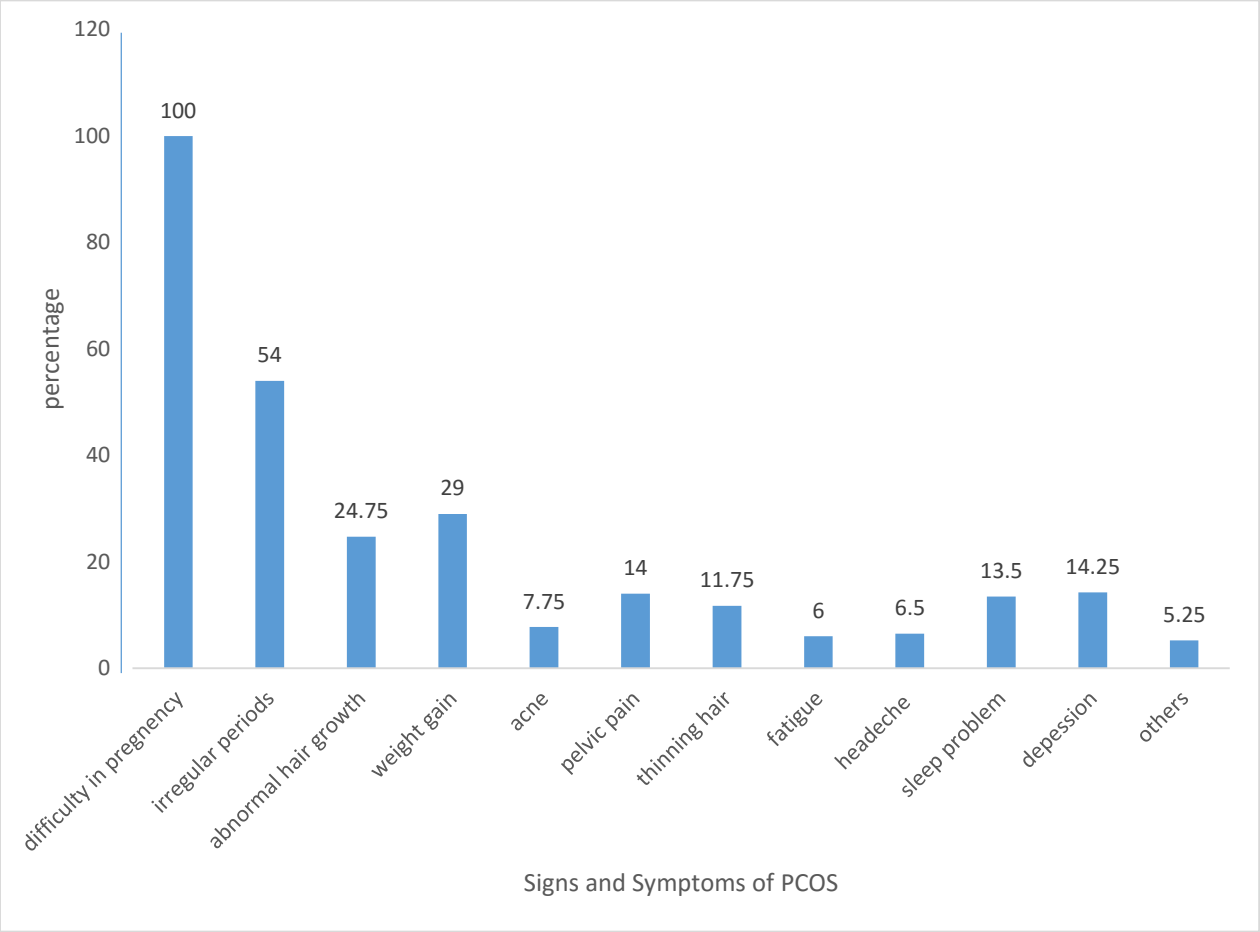

Figure 4.6: Knowledge about the signs and symptoms

From the study, 100% of the population identified difficulty in pregnancy, 54% identified irregular periods, 29% identified weight gain, 14.25% identified depression as a symptom, 14% population identified pelvic pain, 13.5% identified sleep Problem, 11.75% identified thinning of hair, 7.75% identified acne problem, 6.65% identified headache, 6% identified fatigue and 5.25% identified others problem as signs and symptoms of PCOS.

4.7. Complications of PCOS:

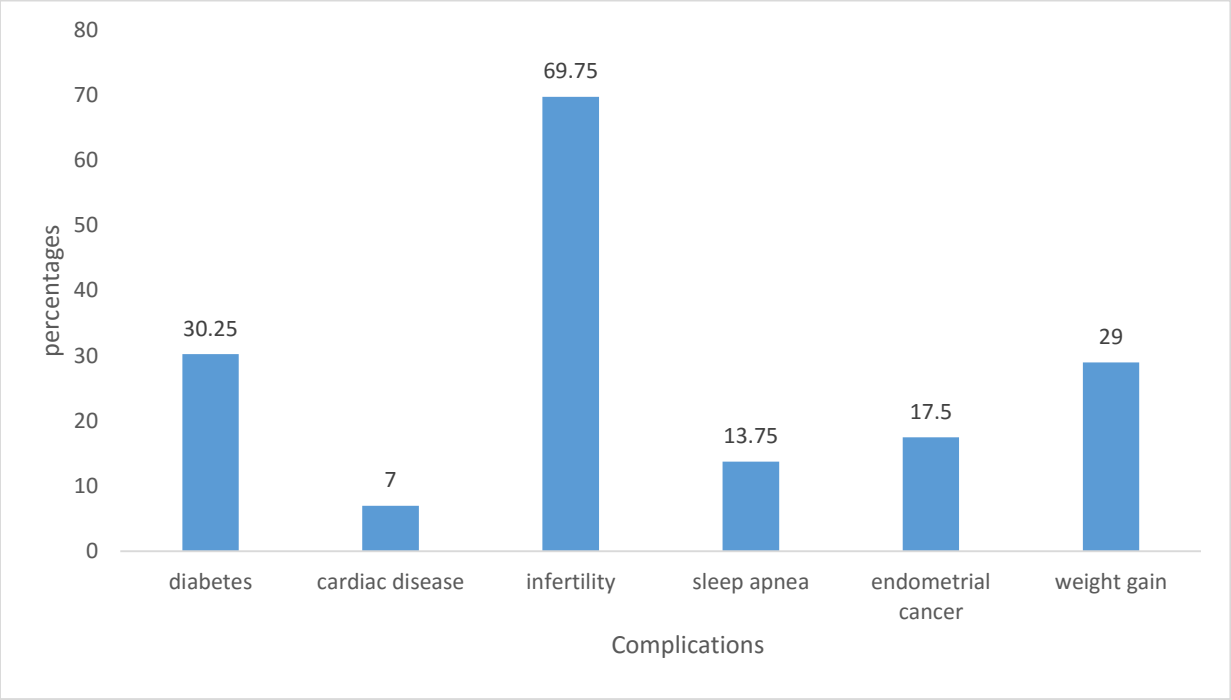

Figure 4.7: Complications of PCOS

The study reported that 69.75% among the women acclaimed infertility, 30.25% acclaimed diabetes, 29% of the population acclaimed weight gain, 17.5% acclaimed endometrial cancer, 13.75% of the population acclaimed sleep apnea and7% of the population acclaimed cardiac disease as the complications of PCOS

4.8. Prevalence of PCOS diagnosis:

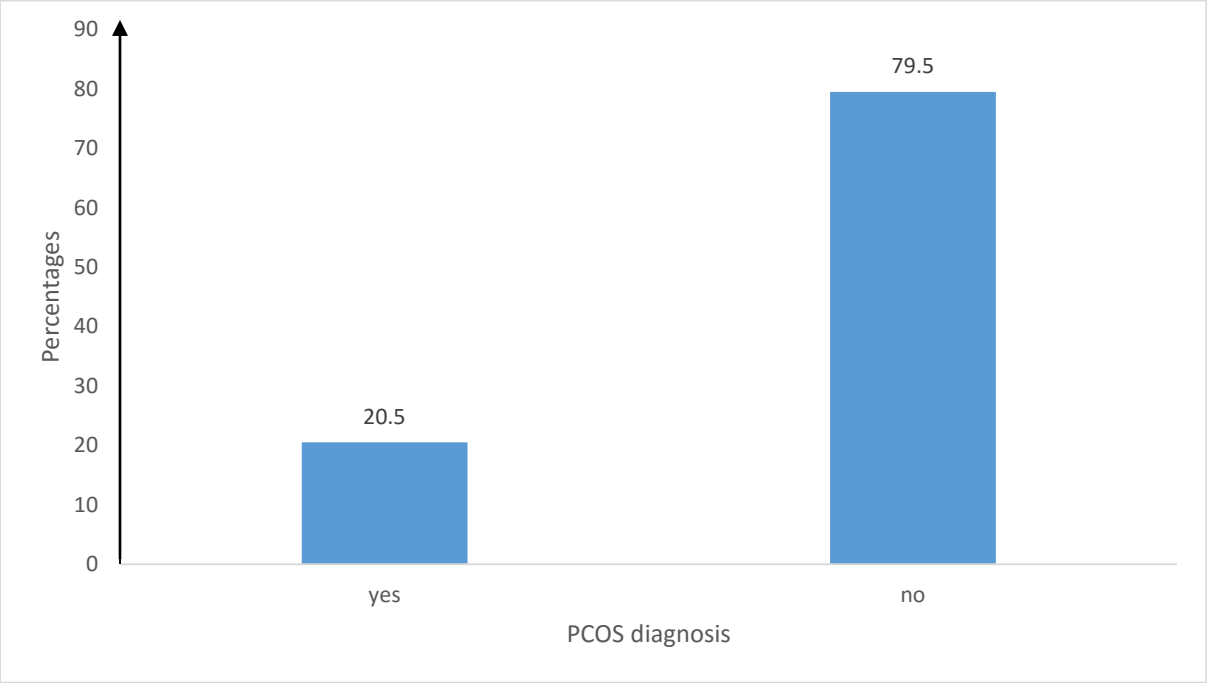

Figure 4.8: Prevalence of PCOS diagnosis

The research presented that 20.5% of the population were diagnosed with PCOS whereas 79.5% of the population among 400 women were not diagnosed by PCOS.

4.9. Family history among PCOS diagnosed patient:

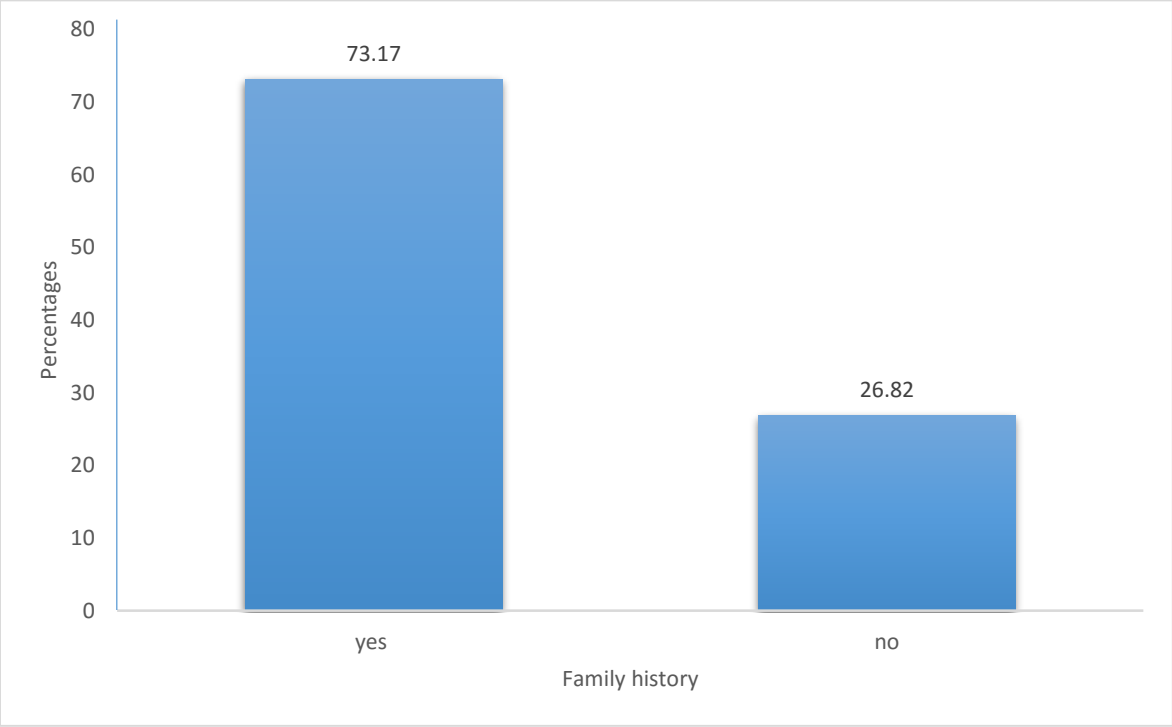

Figure 4.9: Family history among PCOS diagnosed patient

The survey among 82 women showed that 73.17% of the population had family history of PCOS and 26.82% did not have family history of PCOS.

4.10. Method of Diagnosis among PCOS patients:

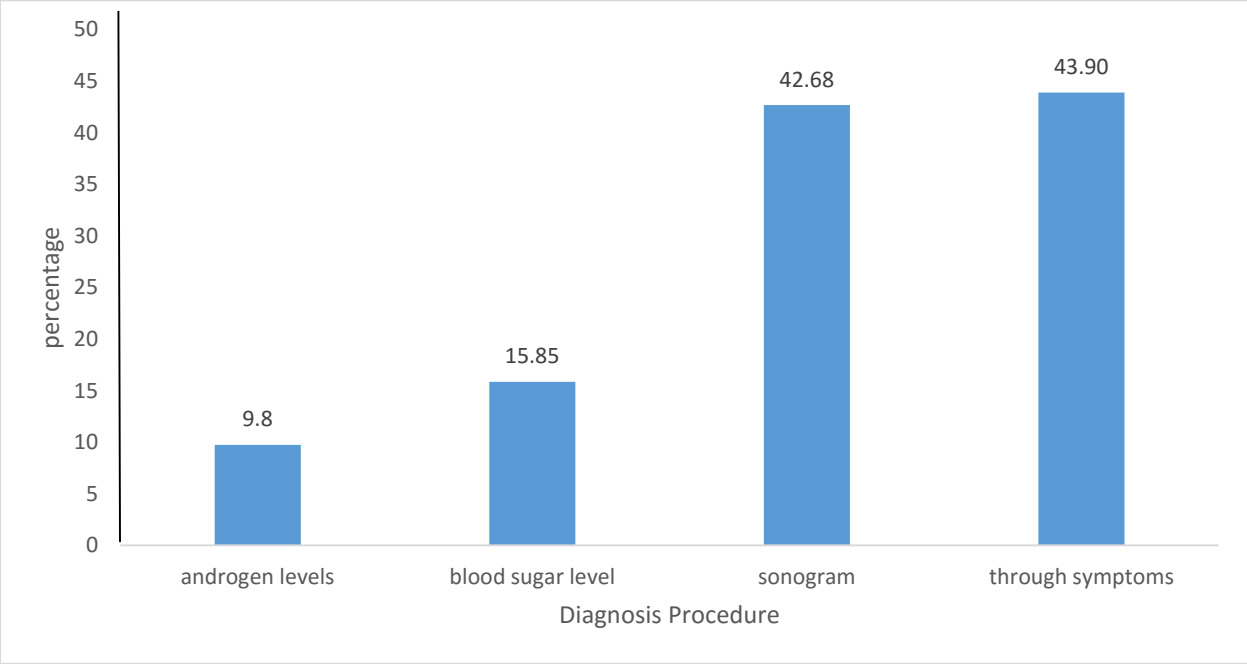

Figure 4.10: Method of Diagnosis among PCOS patients

The study among 82 women showed that 43.90% were identified through symptoms, 42.68% were identified PCOS through sonogram, 15.85% were through blood sugar level and 9.8% of the population were identified through androgen levels.

4.11. Feeling about PCOS among patients

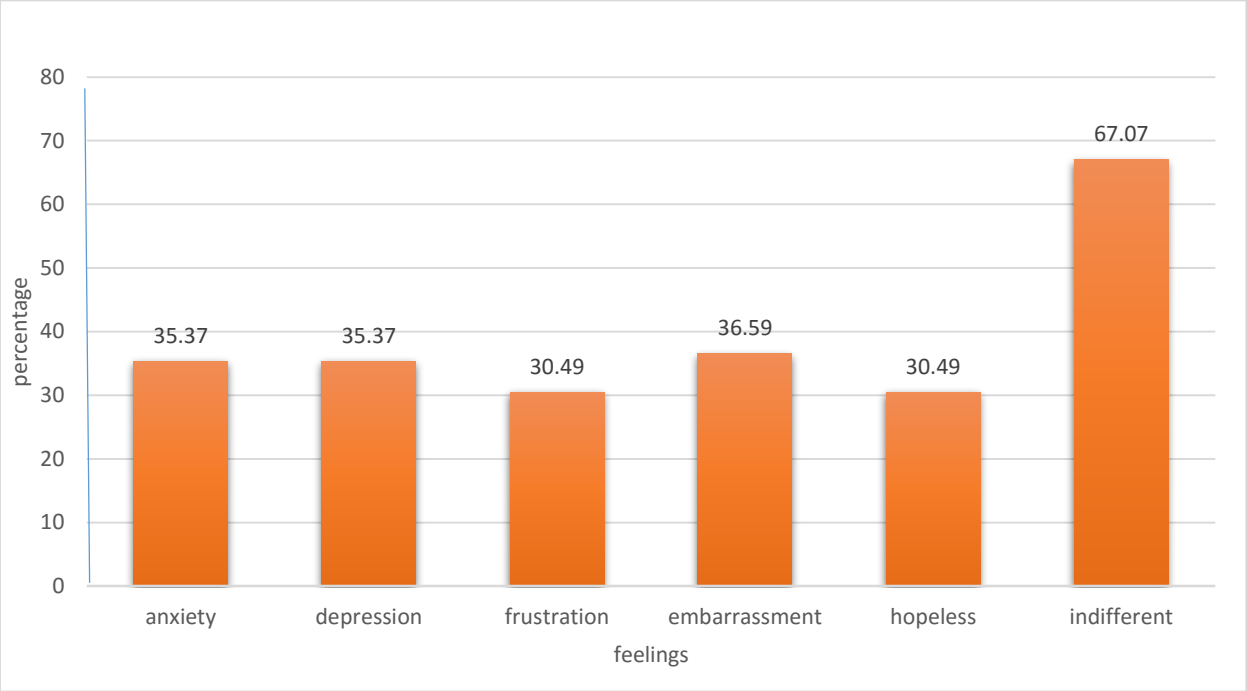

Figure 4.11: Feeling about PCOS among patients

The study showed that among 82 women,67.07% Feelings indifferent, 36.58% felt embarrassment, 30.37% women felt anxiety and depression, and 30.49% also felt frustration and hopeless.

4.12. Treatment options undergone by PCOS patient:

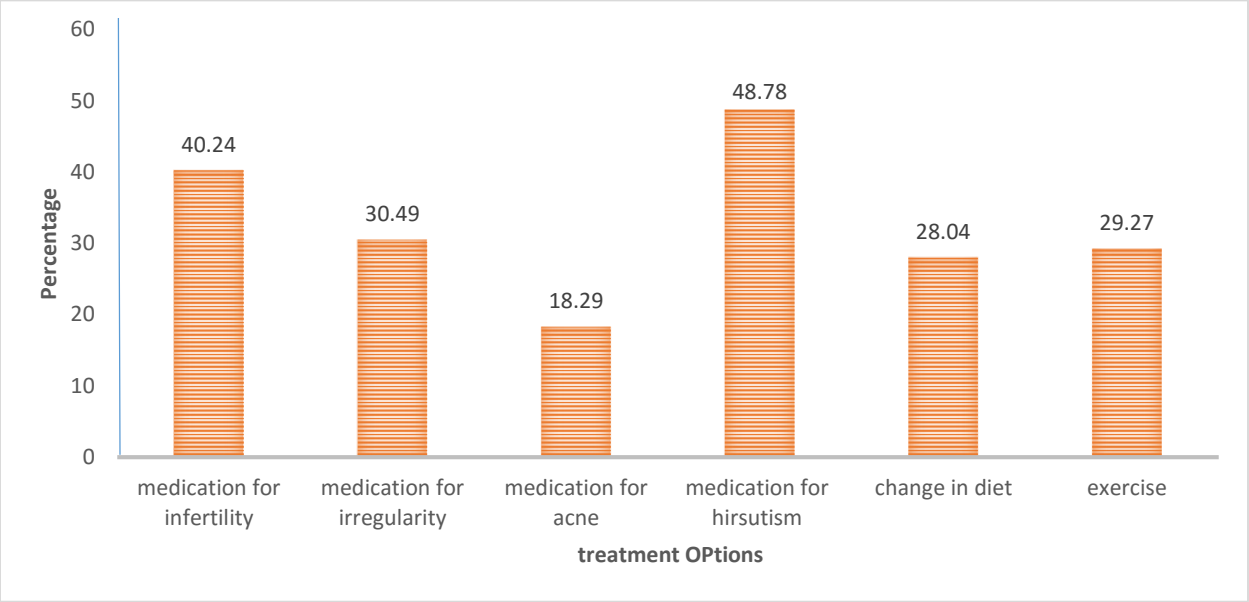

Figure 4.12: Treatment options undergone by PCOS patient

The research showed among 82 women that, 48.79% of the population mentioned medication for hirsutism, 40.24% took medication for infertility, 30.49% took medication for irregularity, 29.27% took exercise, 28.04% mentioned change in diet and 18.29% mentioned medication for acne as the undergoing treatment of them.

4.13. Knowledge about sources of information about PCOS among Patient:

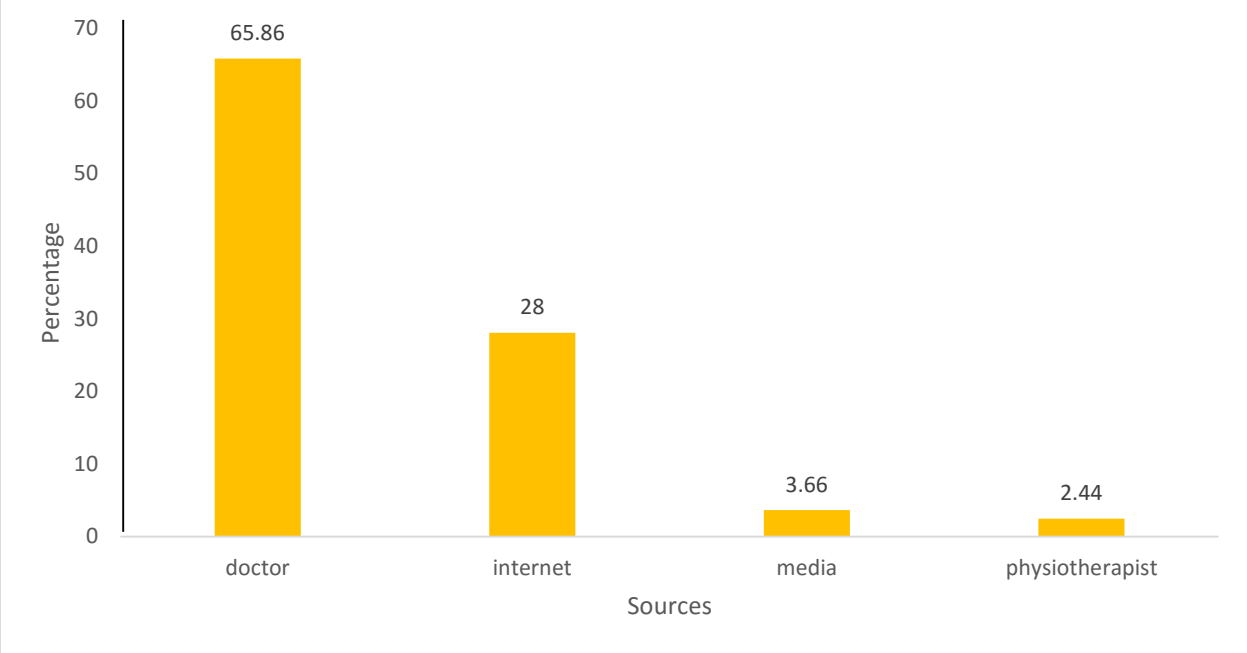

Figure 4.13: Knowledge about sources of information about PCOS among

Patient:

The study revealed that among 82 women, 65.85% mentioned doctor, 28.04% mentioned internet, 3.65% mentioned media, 2.44% mentioned physiotherapist as the sources of information about PCOS.

4.14. Checkup of Health Complications:

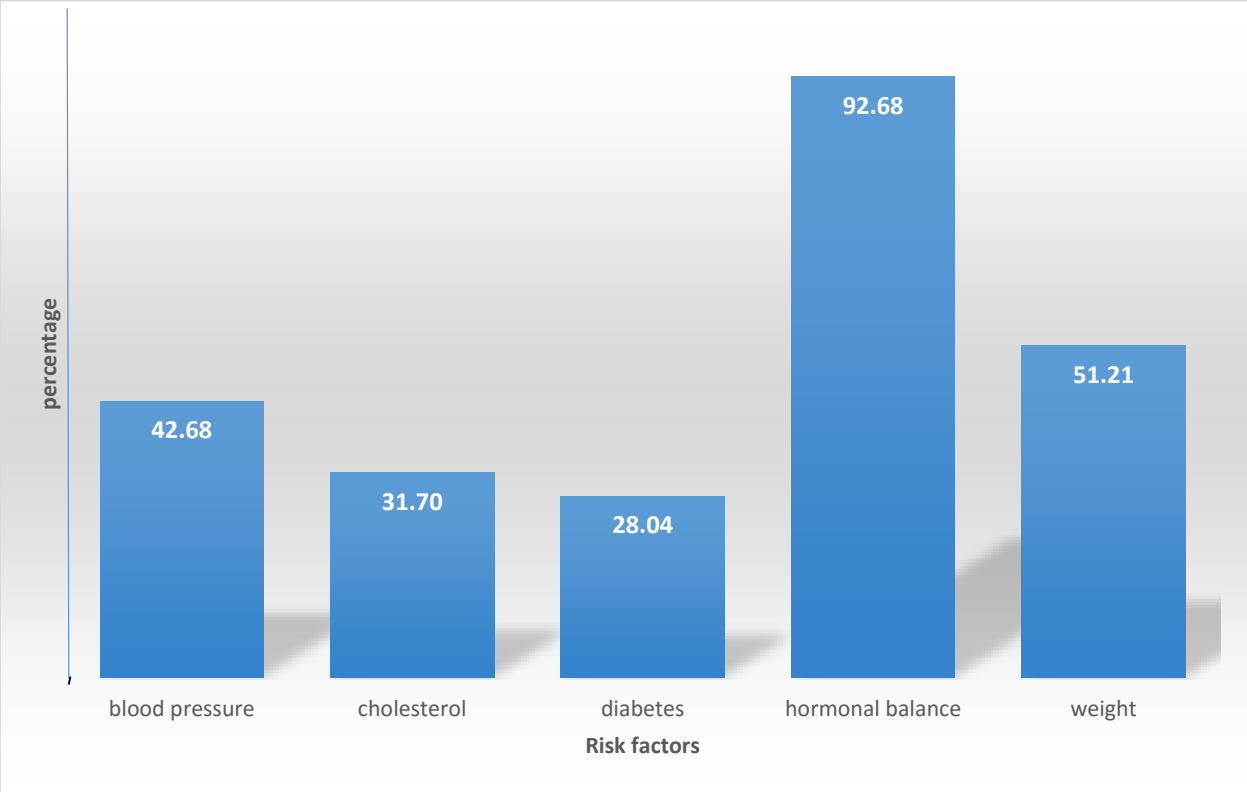

Figure 4.14: Checkup of Health Complications

The study showed among 82 women, 92.68% of the women was on regular checkup of hormonal balance and minimum 51.22% accepted weight, 42.68% accepted blood pressure, 31.70% accepted cholesterol, 28.05% accepted diabetes as they check regularly for controlling PCOS.

4.15. Knowledge about the diet pattern among PCOS patient:

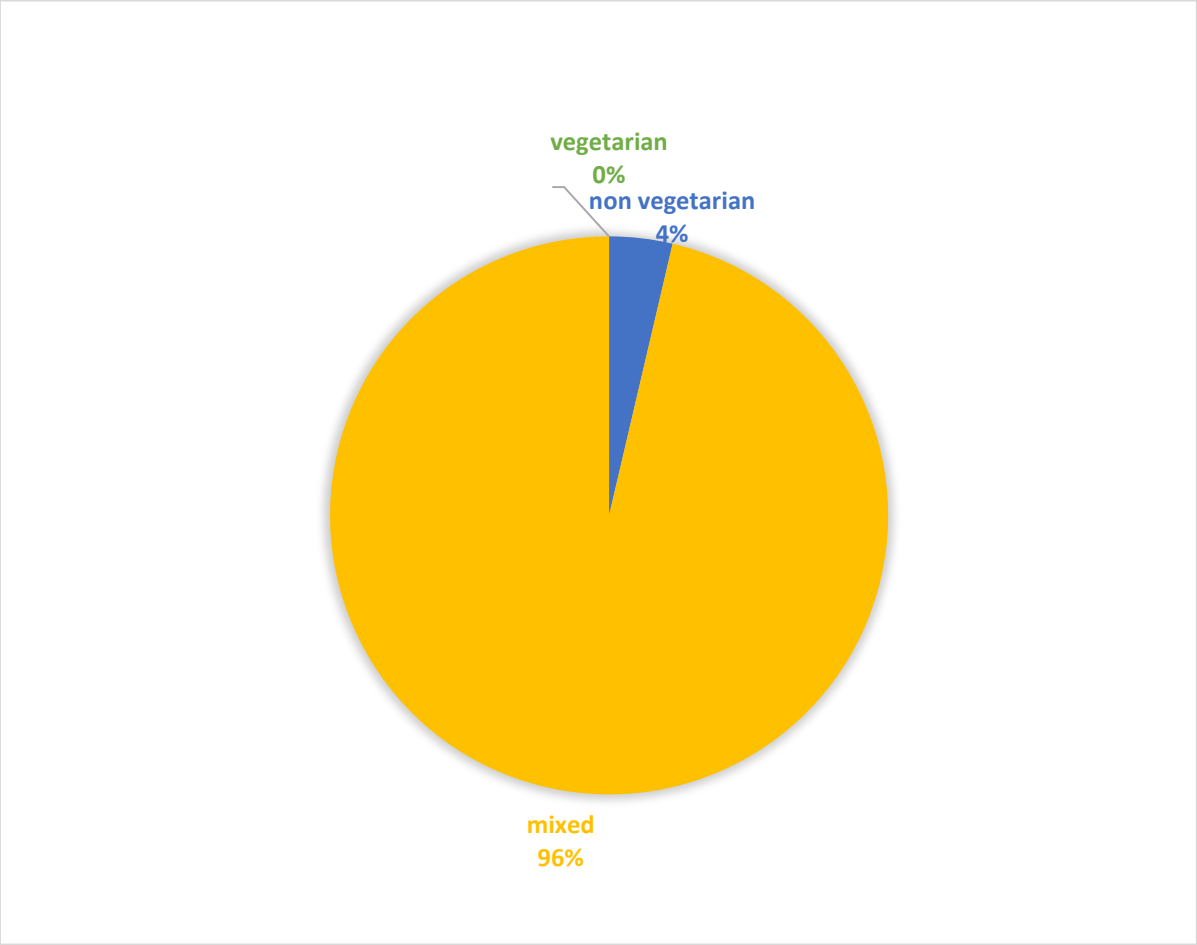

Figure 4.15: Knowledge about the diet pattern among PCOS patient

The study showed among 82 women,96% mentioned mixed, 4% non-vegetarian and 0% of the population mentioned as their diet pattern.

4.16. Consumption of junk food among PCOS patients:

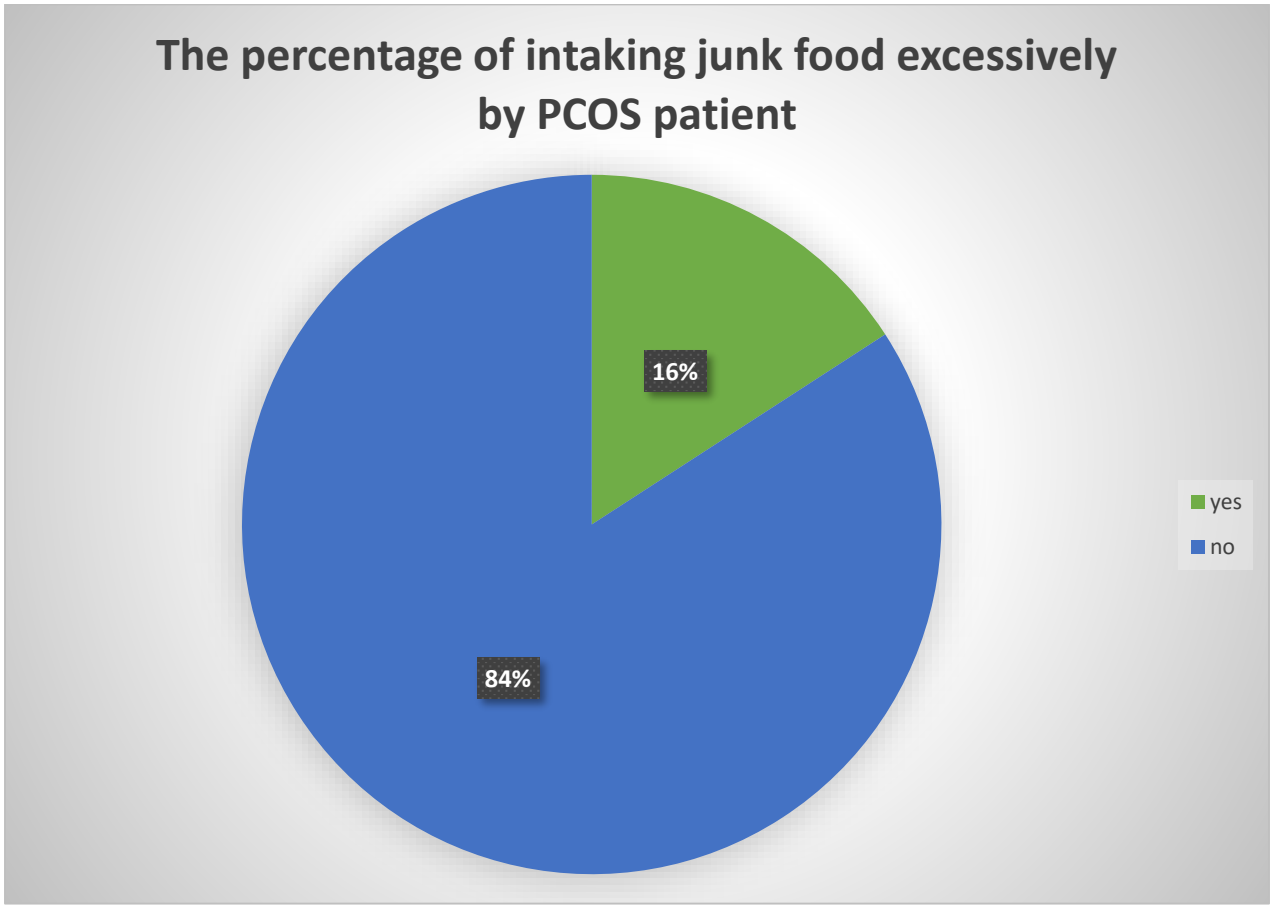

Figure 4.16: Consumption of junk food among PCOS patients

The study among 82 PCOS patient showed that, 16% consumed fast food excessively whereas 84% did not

4.17. Consumption of water among PCOS patients:

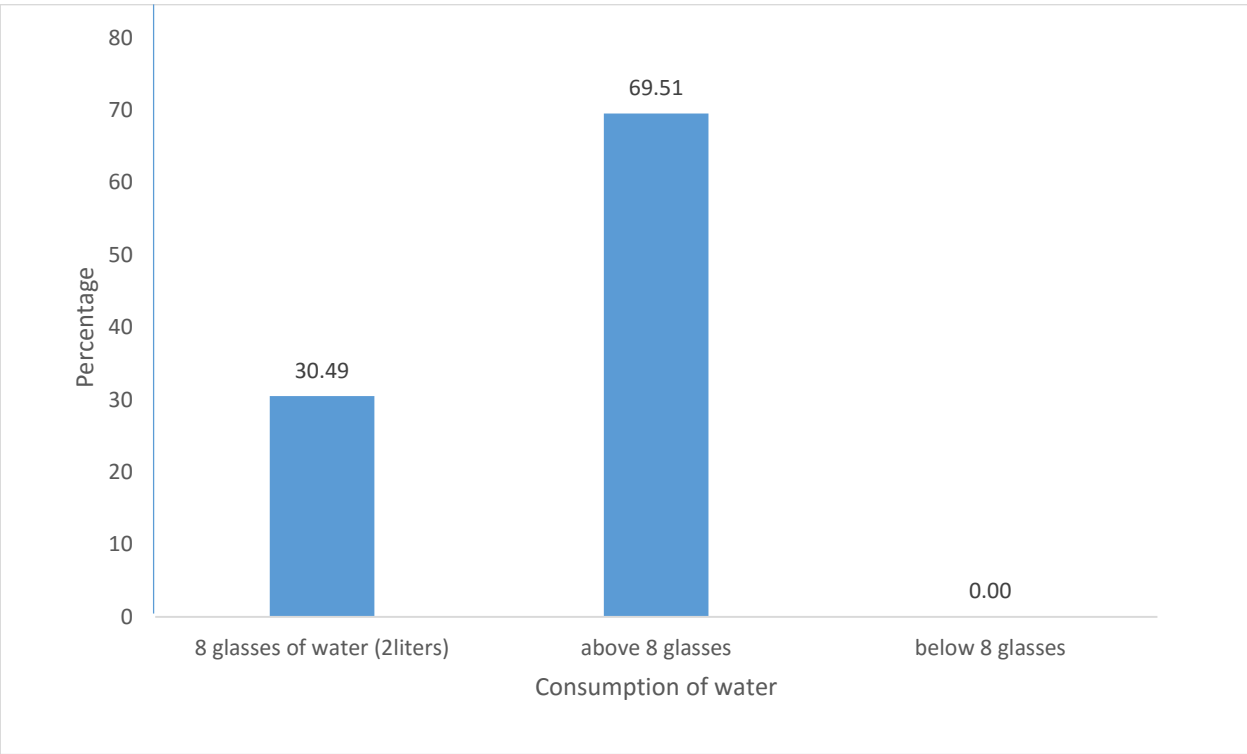

Figure 4.17: Consumption of water among PCOS patients

The study showed among 82 women that, 30.49% of the population consumed 8 glasses of water, and 69.51% population consumed above 8 glasses of water

4.18. Knowledge about healthy diet playing a role in PCOS prevention:

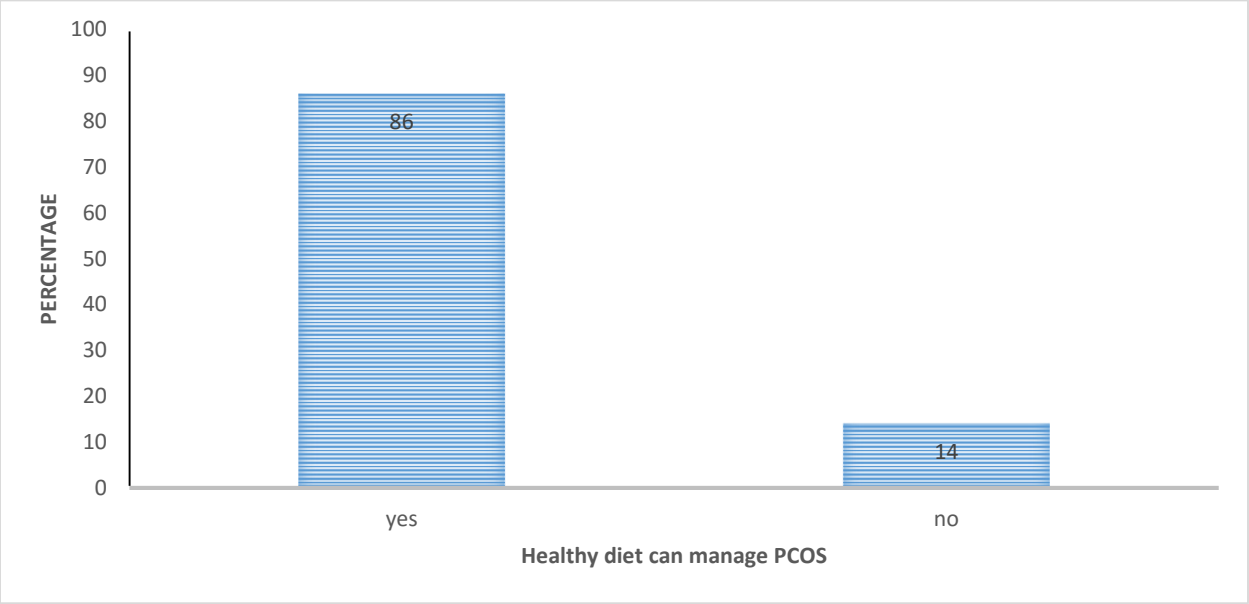

Figure 4.18: Knowledge about healthy diet playing a role in PCOS prevention

The study showed that among 400 women, 86% mentioned yes and 14% mentioned no as healthy diet playing a role in managing PCOS.

4.19. Knowledge of foods to avoid among PCOS patients:

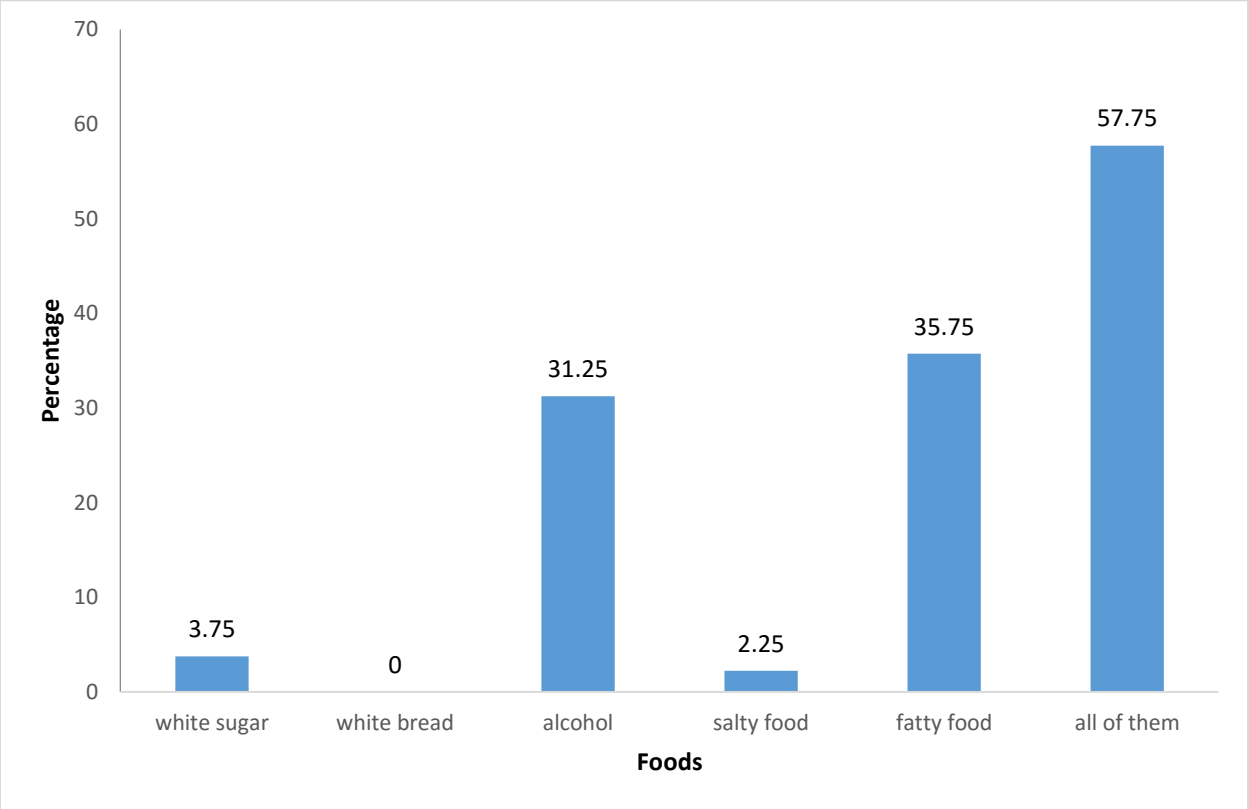

Figure 4.19: Knowledge of foods to avoid among PCOS patients

The survey among 400 women showed that, 57.75% mentioned all of the foods, 35.75% mentioned fatty food, 31.25% mentioned alcohol, 3.75% mentioned white sugar and 2.25% mentioned salty foods to avoid as PCOS patient.

4.20. Knowledge of preventing of PCOS by exercise:

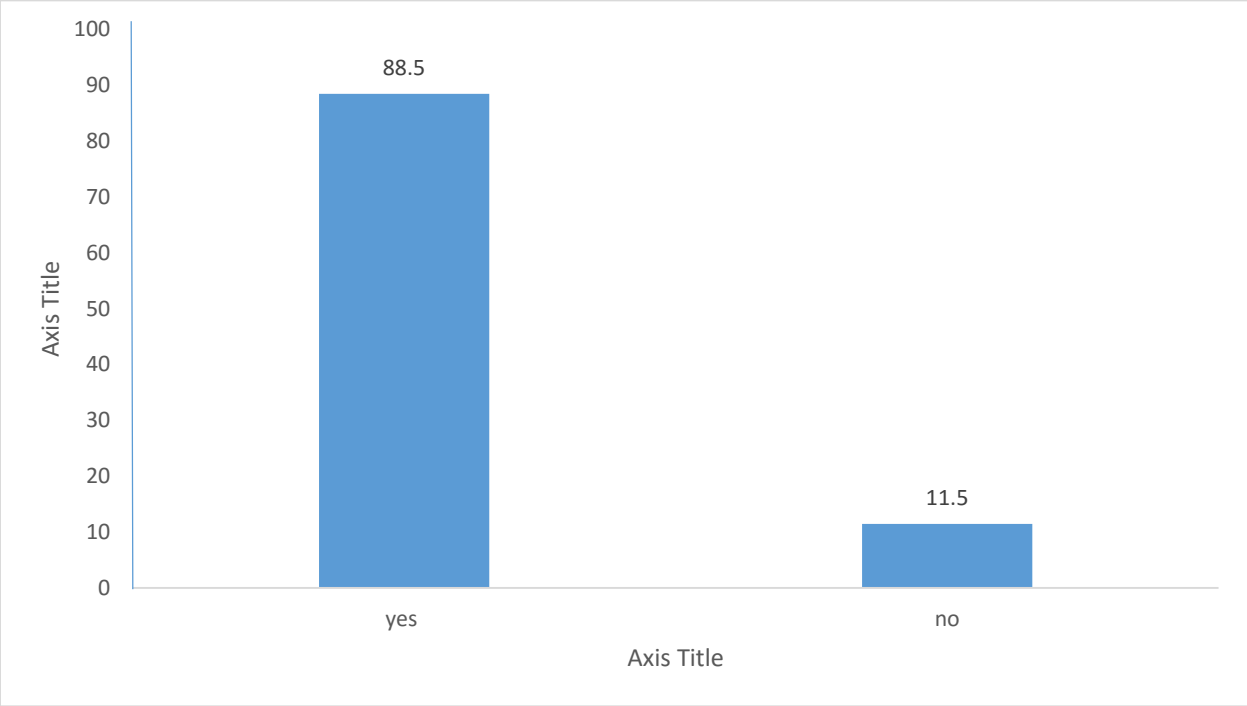

Figure 4.20: Knowledge of preventing of PCOS by exercise

The survey among 400 women showed that,88.75% mentioned yes and 11.5% mentioned no when asked whetherexercise helps in prevention of PCOS.

4.21. Knowledge about the benefits of exercise:

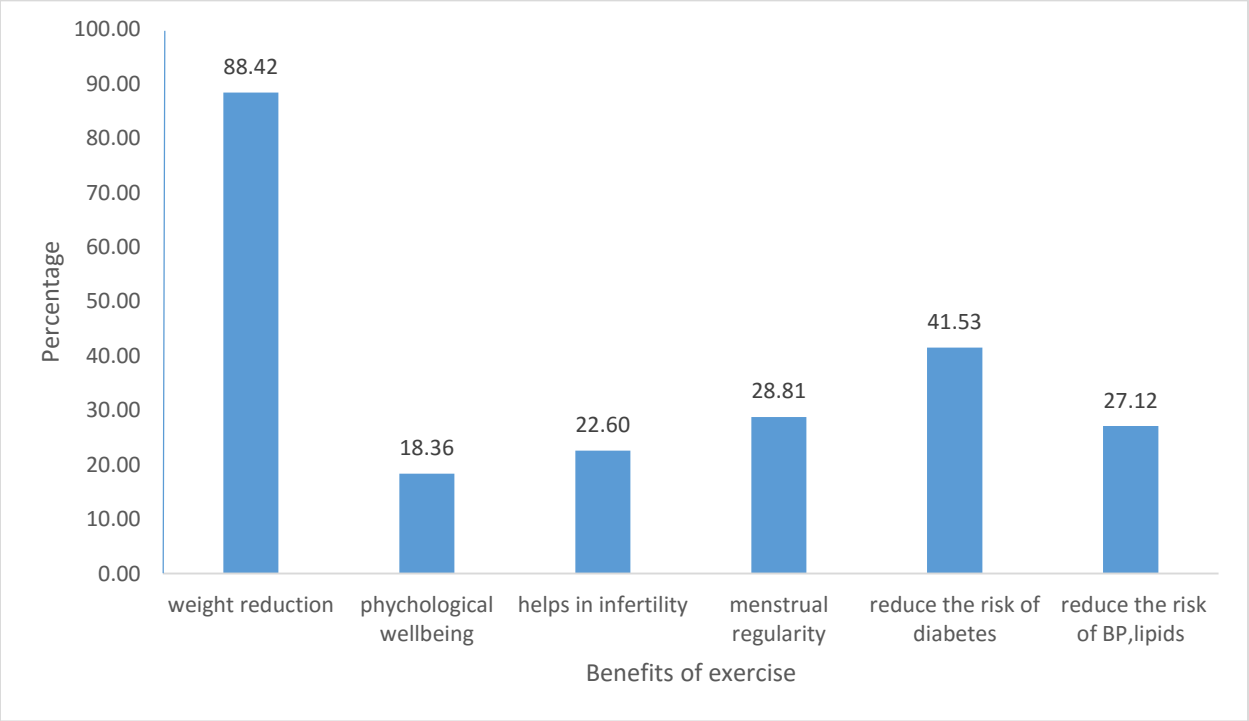

Figure 4.21: Knowledge about the benefits of exercise

The survey among 354 women showed that, 88.42% mentioned weight reduction, 41.53% mentioned reduce the risk of diabetes, 28.81% showed that menstrual regularity, 27.12% mentioned reduce the risk of BP, lipids, 22.60% mentioned helps in fertility and 18.36% mentioned psychological wellbeing as the benefits of exercise for preventing PCOS.

4.22. Prevalence of refraining factors from doing exercise:

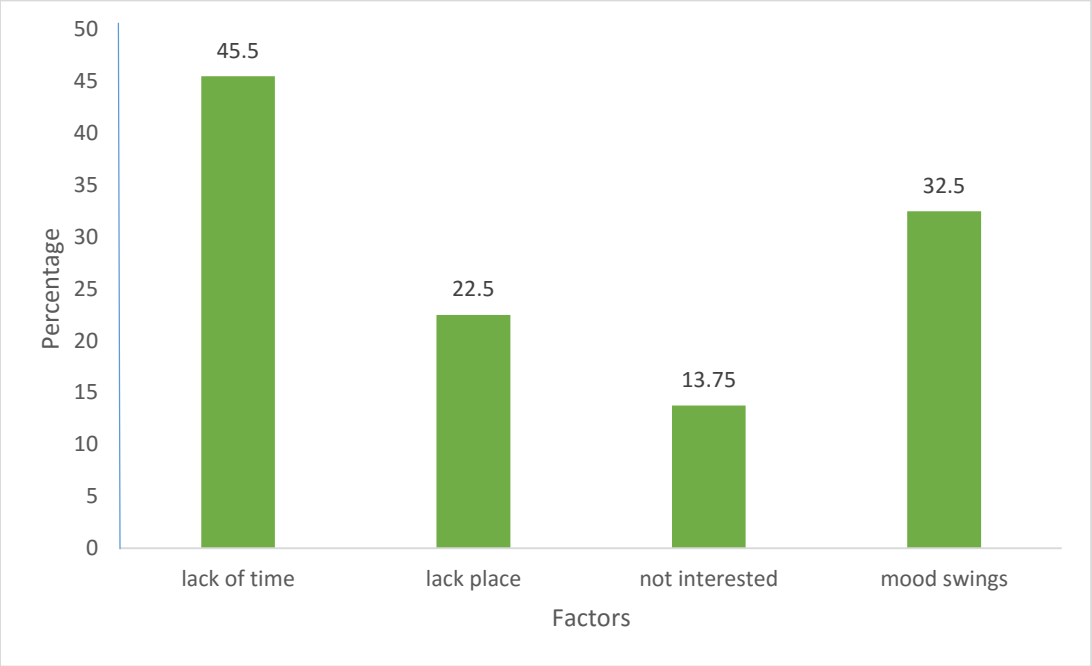

Figure 4.22: Prevalence of refraining factors from doing exercise

The study among 400 women showed that, 45.5% mentioned lack of time, 22.5% mentioned lack of place, 13.75% mentioned disinterest and 32.5% mentioned mood swings as the refraining factors from doing exercise.

4.23. Knowledge about the treatment options among study populations:

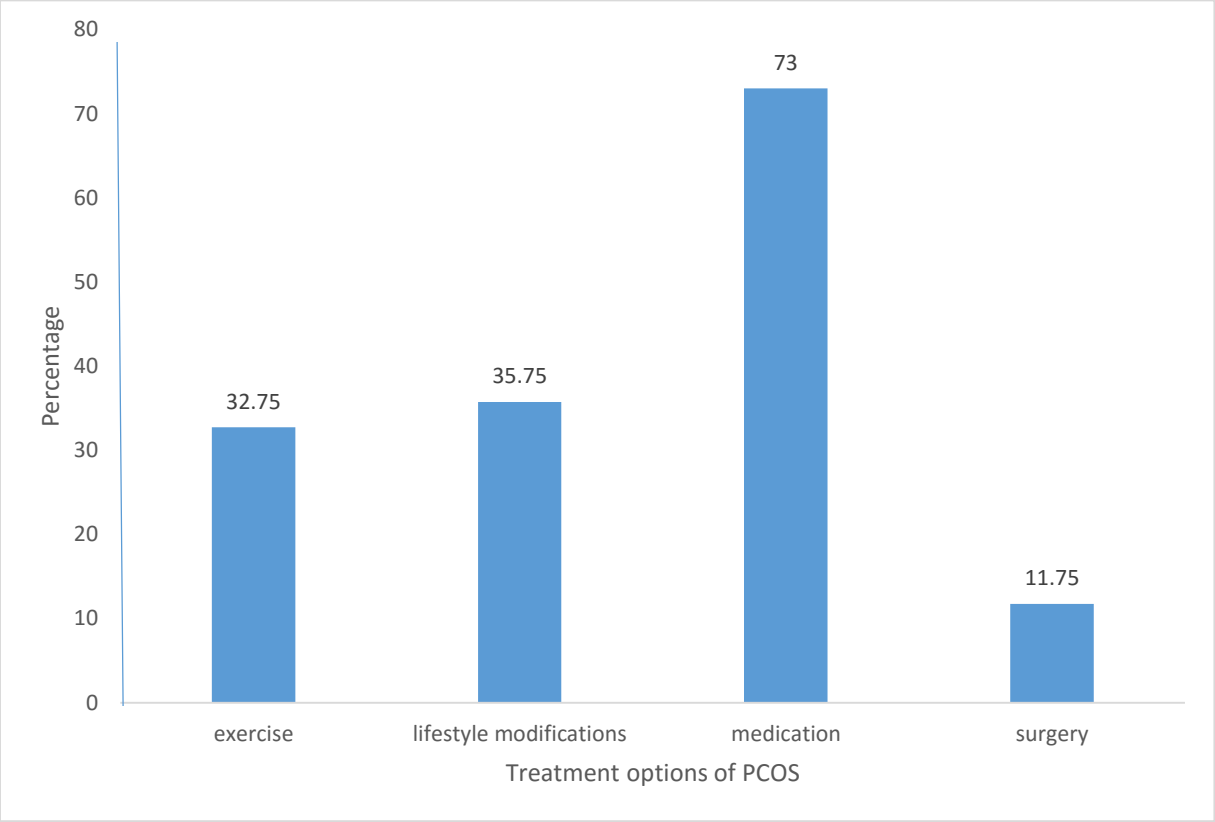

Figure 4.23: Knowledge about the treatment options among study populations

The study showed that, 73% of the population mentioned medication, 35.75% mentioned lifestyle modification, 32.75% mentioned exercise and 11.75% mentioned surgery as the treatment options for PCOS.

Discussion:

Polycystic ovary syndrome (PCOS) is a major public health problem referred to as one of the most common endocrine disorders in women of reproductive age, yet is a condition the women is largely unaware about it and its related problems.

The study showed that among 400 women,28 % of the population belonged to the age group 25-27,15.25% of the population belonged to the age group 28-30,15.75% of the population belonged to 31-33, 15.75% of the population belonged to 31-33, 14% of the population belonged to 34-36, 8.25% of the population belonged to 37-39, 10% of the population belong to 40-42 and 8.75% of the population belong to 43-45. The study showed that among 400 women, the maximum percentage of women were from Islam (95.5%), and (3.75%) were Hindu. However, the lowest percentage was Buddhist which was 0.75%.

The study showed that, the majority of the women were minimally aware and the percentage was 50.75%, and the minority of the women were very aware. Moreover, 31% of the women among 400 were not at all aware about PCOS. On the other hand, a survey was done in Mumbai, India about awareness of lifestyle modifications in females diagnosed with Polycystic Ovarian Syndrome and it showed that 21% of the respondents were very aware of PCOS, 46% reported as somewhat aware, while 27% were minimally aware. 6% of them considered themselves as not at all aware. However, these results are inconsistent with our study and we also have to bear in mind that awareness level in our population was not precise as the answers were objective and the population was given a small briefing if they were not aware at all. (Pitchai et al.,2016)

In our study, majority,100% of the population identified difficulty in pregnancy, 54% identified irregular periods and 29% identified weight gain, as the signs and symptoms of PCOS. Whereas, minority, 6% identified fatigue and 5.25% identified others problem as signs and symptoms of PCOS. However, the above Indian study showed that, 20% acclaimed difficulty in pregnancy,30% acclaimed irregularity in periods,8% acclaimed abnormal hair growth,28% acclaimed weight gain,13% acclaimed acne and 1% acclaimed others as signs and symptoms of PCOS. Between the two studies, the common highest symptoms were irregular periods. (Pitchai et al.,2016)

The study reported that, 20.5% of the population were diagnosed with PCOS whereas 79.5% of the population among 400 women were not diagnosed by PCOS and the number was 82. In another

relevant survey of poly cystic ovarian disease (PCOD) among 252 girl students of Bishop Heber College, Trichirapalli, Tamil Nadu, among17-31 aged women, 15.06% women had PCOS. (Nivetha et al., 2016).

From 82 women it was found that, the highest, 48.79% of the population took medication for hirsutism, 40.24% took medication for infertility whereas 28.04% changed diet and 18.29% of population took medication for acne as the undergoing treatment. In Pakistan, Karachi a survey was done on symptoms and awareness in urban Pakistani women, among 177 participants,37% of the population took medication for hirsutism whereas, from this study it was lesser then our study. (Gul et al.,2014). In additionally, the survey in showed that, 18.25%,17% and 11.11% women took medicine for acne problem, irregularity in period and hirsutism respectively. (Nivetha et al., 2016).

Our study revealed that among 82 women, 65.85% mentioned doctor, 28.04% mentioned internet, 3.65% mentioned media, 2.44% mentioned physiotherapist as the sources of information about PCOS. In the survey done on Mumbai in India among women the main source of information about PCOS was Doctor, Internet and Media which accounts for 51%, 22%, 14% respectively. The information showed doctors and internet seem to have played a significant role as sources of information in both India and Bangladesh as per the two studies. (Pitchai et al.,2016)

Moreover, 67.07% felt indifferent, 36.58% felt embarrassment, 30.37% women felt anxiety and depression, and 30.49% also felt frustration and hopeless. In which above study among 177 women, in distribution of emotional feelings towards PCOS, anxiety was placed on top followed by depression which secured 32% and 19% respectively. In contrast, this study shows the majority person felt indifferent about PCOS. (Pitchai et al.,2016)

Among the 400 women, the study showed that,88.75% mentioned yes as they think PCOS can be manageable by exercise.

The survey among 354 women who thought that exercise prevents PCOS showed that, 88.42% mentioned weight reduction, 41.53% mentioned reduction of the risk of diabetes, and 28.81% mentioned regularity of menstruation as benefits of exercise. However, 22.60% and 18.36% thought that with exercise, fertility problems and psychological wellbeing can be addressed respectively. In India the survey showed, maximum 42% believed that exercise helps in weight reduction which was lower than our study. 26% thought exercise helps in menstrual irregularity

and 14% thought that exercise helps in psychological wellbeing. The minimum 5% believed that helps infertility which was also low. (Pitchai et al.,2016)

The study among 400 women showed that, 45.5% mentioned lack of time and 32.5% mentioned mood swings as the refraining factors from doing exercise. In contrast 33% of the population mentioned lack of time,17% mentioned mood swings as the refraining factors in the survey of Mumbai, India. (Pitchai et al.,2016)

The study showed that,73% of the population mentioned medication, 35.75% mentioned lifestyle modification, 32.75% mentioned exercise and 11.75% mentioned surgery as the treatment options. However, in the above Indian survey, majority 45% mentioned medicine, 24% mentioned life style modification, 20% mentioned exercise and minority 11% mentioned surgery as the treatment option. (Pitchai et al.,2016)

Finally, it can say that from our study, the study population of us fell indifferent like other women, because majority of the people believe it can control by regular exercise and life style modification rather than medicine. Furthermore, this study also explored identifying barriers in lifestyle modification also the effects of lifestyle modification in PCOS.

Conclusions:

In conclusion, PCOS is a common endocrine disorder of with exact etiology unknown but pathophysiology rooted in insulin resistance, hyperandrogenism, and chronic an ovulation. A multitude of clinical factors can present including hirsutism, menstrual irregularities, pelvic pain, acne, infertility and weight gain. No single test can identify polycystic ovary syndrome (PCOS). However, PCOS can diagnosed with medical history, physical exam, and some lab tests. Treatment options include healthy dietary habits and regular exercise accompanied by additional medications to treat presenting symptoms. condition. More efforts need to be given to create awareness in the general public about PCOS since more than 50% of the participants reported as minimally aware and were 31% not at all aware. People should be aware about treatment or lifestyle modification for preventing PCOS, because it is raising alarmingly among women in our society. So the State of education is an important issue which leads to more PCOS patients. Thus, more educational programs conference, doctors camping should be designed to provide comprehensive information and awareness on PCOS. In order to thoroughly understand these aspects of PCOS, the causes, symptoms, and treatments were explored in this study. The research on all of these aspects of PCOS will inform the public about how PCOS can affect them and their loved ones. From this newly gathered knowledge, individuals may be able to protect themselves from some of the negative consequences associated with PCOS. In additionally, if it is possible to create awareness about PCOS among women aged 25-45 will help them to manage PCOS and also will prevent our further generation.

Sample of Questionnaire

KNOWLEDGE AND AWARENESS OF POLY CYSTIC OVARIAN SYNDROME AMONG WOMEN AGED 25 TO 45 IN DHAKA

(Department of Pharmacy, East West University)

(All the questions asked are used for research purpose only and all the information is kept confidential) **Place a tick (√) on your choice of answer**

DEMOGRAPHIC INFORMATION

1. Name ***(if interested)***: _____

2. Age: _____

3. Religion: ☐ Islam ☐ Hindu ☐ Buddhist ☐ Christian ☐ Others: _____

4. Education: ☐ Illiterate ☐ Primary school (Class 1 to 5) ☐ High school (Class 6 to 10)

☐ College ☐ University ☐ Others: _____

5. Occupation: ☐ Student ☐ Teacher ☐Business ☐Administration ☐IT ☐ Retired ☐ Housewife

If you are a student, answer question 6-7

6. What department do you study in?

☐ Medical ☐Business Administration ☐CSE ☐EEE ☐English ☐Law ☐Others: _____

7. What kind of institution do you study in? ☐Public ☐Private ☐Mixed

8. Marital status: ☐ Single ☐ Married ☐ Divorced ☐ Widowed

9. Net household income (BDT) : ☐ No income ☐ < Tk 5000 ☐ Tk 5000-10,000 ☐ Tk 10,000-50,000 ☐ >Tk 50,000

Poly Cystic Ovarian Syndrome (PCOS) RELATED INFORMATION

10. have you ever heard PCOS about? ☐Yes ☐No

11. What is your level of awareness? ☐Not at all ☐ Minimally aware ☐ Very aware

12. What is your perception about PCOS? ☐ It is a fatal disease ☐ It is not curable

☐ It's manageable ☐ No idea

13. what are the risk factors of PCOS?

☐High cholesterol, ☐Obesity, ☐Type 2 diabetes, ☐Family history, ☐Cardiovascular disease, ☐High blood pressure

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