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Chapter

Prevalence, Symptomatology and Herbal Management of Polycystic Ovarian Syndrome

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Abstract

Polycystic Ovarian Syndrome (PCOS) is multi-organ syndrome that affects 6–25% of females during reproductive age. It disrupts normal hormone levels of females and affects adrenal hormone and sex hormones along with pituitary hormones including adrenocorticotropic, growth hormone and gonadotropins hormones. It results in several secondary characteristics in females such as infertility, hormonal imbalance, oligomenorrhea, amenorrhea, obesity and hirsutism. Polycystic ovarian syndrome is associated with mental and reproductive disorder and almost 4–18% mature female students are affected by polycystic ovarian syndrome. Female affected by polycystic ovarian syndrome have increased risk of infertility, ovarian cancer, skin problems and psychological problems such as anxiety, depression and changes in sleep along with mood swings. This chapter discusses the Prevalence, Symptomatology and Management of Polycystic Ovarian Syndrome. For the management of PCOS, the role of some medicinal plants including *Asparagus racemosus*, *Tinospora cordifolia, Foeniculum vulgare, Ocimum tenuiflorum, Actaea racemosa*, and *Lepidium meyenii* have also been discussed in addition to other treatment modalities. The literature data was searched out and compiled using relevant original research articles and reviews published and indexed in Google Scholar, Scientific Information Database, Elsevier, PubMed and Science Direct.

Keywords: polycystic ovarian syndrome, prevalence, management, medicinal plants

1. Introduction

Polycystic Ovarian Syndrome (PCOS) is a multi-organ syndrome that disturbs the normal hormone levels of females and affects the sex and adrenal hormones as well as pituitary hormones including growth hormone, adrenocorticotropic hormone and gonadotropins [1]. Female illness PCOS commonly results in hormonal imbalance, infertility, amenorrhea, oligomenorrhea, hirsutism and obesity. This study will contribute to the knowledge of prevalence, awareness, practices and attitudes of female university students towards polycystic ovarian syndrome and will enables us to understand the new approaches to control this issue for further strengthening as well as precautions and better treatment methods.

The most common female syndrome is known as PCOS. PCOS is a state of illness that mostly disturbs the hormonal levels in women [1]. Polycystic ovarian syndrome can affect the pituitary hormones including growth hormone, gonadotropin hormone, adrenocorticotropic hormone (ACTH) and can also affect the adrenal and sex hormones, that's why this syndrome can be called as multi organ syndrome [2].

The female reproductive organs consist of gonads known as the ovaries. The function of ovaries is to release mature and properly developed ovum and increase the secretion of steroid hormones. Pituitary gland secretes hormones LH and FSH which are controlling the functions of ovaries [3].

To diagnose PCOS, recently introduced criteria called Rotterdam Criteria is being practiced. According to this criterion, the diagnosis of PCOS depends upon the presence of hyperandrogenemia, oligo-ovulation and presence of inflamed ovaries on ultrasonography. Polycystic ovarian syndrome is classified as a set II ovulation sickness according to World Health Organization (WHO). About 4 to 18 percent women of child bearing age are suffering from polycystic ovarian syndrome. It is associated with metabolic, psychological and reproductive dysfunctions [4]. Those women that are suffering from polycystic ovarian syndrome are at risk of endometrial hyperplasia or cancer, infertility, obstructive sleep apnoea or inability to sleep, abnormal glucose metabolism, anxiety and depression [5].

The exact cause of polycystic ovarian syndrome is not known. Different studies demonstrate that there are some inborn abnormalities like follicular development and ovarian steroidogenesis which are important in the inflamed ovaries disorder. This syndrome is also associated with an excess of luteinizing hormone (LH), decreased secretion of follicle stimulating hormone (FSH) and continuous increase in gonadotropin-releasing hormone (GnRH) which contribute to ovulatory dysfunction and overproduction of androgen hormones [5].

A transmutation in polycystic ovarian syndrome proteins also correlates with multiple environmental factors and inherited factors. There are multiple genes which are responsible for the incidence of polycystic ovaries disorder [6]. Most common endocrine complaint in female is PCOS. PCO has highly variable incidence such as 2.2 to 26% [7, 8]. The indications of polycystic ovarian syndrome may occur in adolescence. But it mostly diagnosed in adulthood. It is thought that different life style and genetic factors take part in the occurrence of PCOS. It has been hypothesized that the earlier predisposing gestational factors of polycystic ovarian syndrome constitute the disturbed foetal programming in the uterus and birth weight [9].

Premature adrenarche has 15 to 20% risk of developing polycystic ovarian syndrome [10]. There was genetic predisposition in a female to developing polycystic ovarian syndrome [11, 12]. Alteration in the life style including high caloric diet and reduced exercise ultimately leads toward insulin resistance and obesity which has been considered as aggravating factors for polycystic ovarian syndrome [13].

It has been found that there is an association between polycystic ovarian syndromes and stress. But in other studies, stress is not considered as a causative factor of polycystic ovarian syndrome. The rate of incidence of polycystic ovarian syndrome depends upon the criteria used to define this disorder. In 1980s the ultrasound imaging showed that inflamed ovaries were mostly associated with hyperandrogenemia and hirsutism in the females with continuous ovulatory cycle [14, 15]. It was also revealed in different studies, that there are some similar share of biochemical features in female with PCOS and regular rotations [16].

The incidence of premenstrual syndrome appears to vary in different countries. In the U.S., according to NIH criteria two studies have showed 4% prevalence rate in a 400 population [17]. About 6.6% prevalence rate have been documented in

females of south-eastern university [18]. From other races the incidence among females seems to be similar. The similar incidence rates of 6.5% also found in a study on 154 Caucasian females in Madrid, Spain [19].

Thus, the incidence of clinically evident PCOS in childbearing female in America and Europe ranges from 6.5 to 8.0% if the 1990 NIH criteria are applied. The incidence raises about two to three folds if the Rotterdam criteria are applied. The prevalence of polycystic ovarian syndrome seems to be lower in Asian countries with a reported incidence rate of 2.4% in China [20]. The prevalence rate reported in Sri Lanka is 6.3% according to Rotterdam criteria [21].

Common endocrine system sickness that affects women of childbearing age is known as PCOS And can also be mentioned as Stein-Leventhal syndrome or hyper androgenic involution (HA). In 1935 Stein and Leventhal described that polycystic ovarian syndrome represents a state in which approximately 10 cysts are made on ovaries and have diameter 2 to 9 mm. The ovarian volume exceeds about 10 ml in at least one ovary [22].

Almost, 7 million females in U.S. have been affected with polycystic ovarian syndrome from which more than half females are aware about polycystic ovarian syndrome and remaining are unaware about PCOS. Polycystic ovarian syndrome awareness not only concern to treat a disease in spite of it, PCOS concern is to improve the female health and make easier their living style [23].

Polycystic ovarian syndrome is associated with mental and reproductive disorder and almost 4–18% mature female students are affected by polycystic ovarian syndrome [24]. Females effected by polycystic ovarian syndrome have increased risk of infertility, ovarian cancer, skin problems and psychological problems such as anxiety, depression and changes in sleep along with mood swings. Polycystic ovarian syndrome is still unknown aetiology but in several studies it is assumed that polycystic ovarian syndrome is inherited and also associated with follicle stimulating hormone (FSH) and luteinizing hormone (LH). Excessive secretion of LH and decreased formation of FSH lead to excessive release of gonadotropin hormone, which causes ovulatory disturbance [25].

Polycystic ovarian syndrome has various symptoms such as weight gain, acne, excessive hair growth on unwanted body parts, irregular menses, and psychological problems like anxiety, depression, sleep & voice changes, and also include dysmenorrhea. Hirsutism is defined as excessive hair growth on unwanted parts of the body in 10% of females caused by excessive production of male hormone androgen which is significantly associated with polycystic ovarian syndrome. Amenorrhea is defined as the lack of menstrual cycle in female of reproductive age, it can be primary (due to hormonal imbalance) and secondary (absence of menstrual cycle for more than 6 month) [26].

Major complications of polycystic ovarian syndrome are hypertension, diabetes mellitus, obesity, cardiovascular disorder, ovarian cancer, skin problems, liver diseases and psychological disorders [27]. The combination of hirsutism, infertility, oligomenorrhea and two sided enlargement of polycystic ovaries was recognized as reported in an article by Stein and Leventhal in 1935 [28]. Syndrome for some time period was known by their name. The term PCOS seem to be looked in 1960s and progressively substituted by the name of Stein-Leventhal syndrome. A major histopathological study conducted in 1982 [29] revealed a comprehensive detail about ovaries, which are inflamed and contain large number of small fluid filled cysts of 10 mm diameter.

The sac of the ovary may be similar with a bulge, so the presence of cystic imaging in the ovary must be deliberated as a normal event. It is only the excessive number of ovarian follicle that necessarily be considered as a disease condition associated by means of polycystic ovarian syndrome. Consequently it is correct

and precise to state ovaries containing large number of follicle instead of polycysts. After Initiation of ultrasound, the follicular surplus became the main feature in the morphology of polycystic ovaries.

An increase in ovarian area (OA) and ovarian volume (OV) are being considered as the exact and accurate markers of polycystic ovarian morphology (PCOM). These two markers provided the dimensions that are voted for the middle segment of the berries. It is confirmed from histopathological studies that both ovarian area (OA) and ovarian volume (OV) are infect good indications of follicular excess and stromal hypertrophy which are the structural or anatomical symbols of the polycystic ovarian morphology (PCOM) [30].

The most common cause of menstrual disruption such as anovulation, infertility, oligo menorrhea and menorrhagia, is the polycystic ovarian syndrome [31]. In the USA, Spain and Greece, the incidence of polycystic ovarian syndrome was assessed to be 4 to 8%. The prevalence of polycystic ovarian syndrome is increasing all over the world and is presenting great increase in parallel with type 2 diabetes mellitus (T2DM) [32].

There were about 116 million females affected by polycystic ovarian syndrome in all over the world. In 2009, about 5 to 10% women were affected by polycystic ovarian syndrome in Pakistan [33]. Polycystic ovarian syndrome is heterogeneous disorder that is associated with polycystic ovarian morphology, hyperandrogenism and ovulatory dysfunction regarding to the pathophysiology. It's distinctive neuroendocrine feature include increased ratio of luteinizing hormone and follicular stimulating hormone (LH/FSH), increased serum level of luteinizing hormone (LH) and increased frequency and rate of LH secretion [34].

Gonadotropin releasing hormone (GnRH) secreted from hypothalamus binds to its receptors that are present on secretory cells of adenohypophysis. Gonadotrophs create LH and FSH in reply to GnRH, and these two hormones (LH, FSH) regulate reproductive processes in the body and regulate the pubertal growth, maturation and development [35]. Follicular stimulating hormone and luteinizing hormone stimulate the ovaries to produce oestrogen hormone in females and inhibit to regulate the menstrual cycle. By inhibiting the production of gonadotropin releasing hormone (GnRH), oestrogen forms a loop of negative feedback mechanism [36].

In polycystic ovarian syndrome, the level of progesterone hormone is decreased which cannot reduce the frequency of GnRH/LH pulse. Hence, the increased secretion of oestrogen hormone may lead towards the formation of autoantibodies in the body. Recently, there are two commonly recognised investigative criteria of polycystic ovarian syndrome and both suggest the presence of two out of three signs to be characterized as polycystic ovarian syndrome (PCOS) [37].

Obesity aggravates different types of comorbidities of polycystic ovarian syndrome for example diabetes, heart disease, hypertension (HYN) and hypercholesterolemia. An ovulation in polycystic ovarian syndrome leads towards unrestricted oestrogen secretion which is a risk factor for carcinoma and endometrial hyperplasia. Quality of life reduces by depression, obesity, hirsutism and infertility caused by polycystic ovarian syndrome (PCOS). Kerchner *et al*. identified the depression in 40% of females of polycystic ovarian syndrome (PCOS). The incidence rate of suicide is increased by seven folds in polycystic ovarian syndrome [38].

In polycystic ovarian syndrome, there is an excessive production of oestrogen hormone which has been related to different types of autoimmune diseases. Oestrogen hormone increases the production of different interleukins like IL-1, IL-6, IL-4 and interferon-*y*. In polycystic ovarian syndrome, the level of progesterone hormone is decreased and it triggers the immune system that ultimately leads towards the production of autoantibodies. Therefore, polycystic ovarian syndrome can be characterized as an autoimmune disorder [39].

Females with PCOS had high risk to develop endometrial cancer while their risks of developing ovarian and breast cancer are same to those of females in overall common population. There are some health significances of polycystic ovarian syndrome including overweight, null parity and continued unrestrained increase of oestrogen that are highly liked with cancer. A study conducted by Barry found an important increase of about three folds for endometrial cancer among females having polycystic ovarian syndrome. But there is no prominent increase in risk factor of ovarian or breast cancer [40].

Women of polycystic ovarian syndrome (PCOS) have a common feature of infertility. In general, infertility is considered as an ovulatory complaint. These types of patients are mostly treated with conservative therapies such as ovulation-induction medications. These medications include clomiphene citrate (CC) or gonadotropins, and considered as first line treatment. These medications increase the incidence of multiple pregnancies. Due to the use of gonadotropins there is an excessive risk of ovarian hyper stimulation syndrome. These types of drug modalities increase the risk of formation of different types of ovarian cysts, pain in ovaries and torsion of ovaries. For pregnancy and infertility problems, most commonly used drug is known as metformin [41].

A heterogeneous condition which has different phenotypic expression is known as polycystic ovarian syndrome (PCOS). Due to its phenotypic forms it becomes a controversial issue which is based upon the diagnostic criteria. The incidence of polycystic ovarian syndrome is about 6 to 15% and it depends upon the use of diagnostic criteria. Every patient experience the severity of the components of polycystic ovarian syndrome and its management is based upon the preferences of the patient. The most prominent endocrinopathy in females is known as polycystic ovarian syndrome (PCOS) with the incidence rate of 6.5 to 6.7% among those women who are in menopausal stage [42].

In 1990, this disorder was well known as the combination of biological and clinical increase in androgen hormones, chronic anovulation and oligomenorrhoea as presented in the NIH conference. The investigative criteria revised in 2003 by Rotterdam consensus [43], with the presence of either two or three following preconditions including clinical chronic anovulation or oligomenorrhoea. Various possible pathophysiological consequences of polycystic ovarian morphology (PCOS), detected in 75% of females of polycystic ovarian syndrome (PCOS), has been comprehensively discussed. Further, it has been discussed that there is no association between the metabolic irregularities of the typical polycystic ovarian syndrome phenotypes and the phenotype of anovulation combined with the morphology of polycystic ovaries [44].

2. Prevalence

Due to increase in endometrial and follicular activity level almost 100% polycystic ovarian syndrome patient suffered from amenorrhea, anovulation and infertility, its occurrence is also due to irregularity in their cyclic menstrual cycle. Almost 60% women's had menstrual problems (amenorrhea, anovulation, infrequent bleeding) in a study conducted on 400 women of general population [45].

Sanchez *et al.* assessed the frequency of this syndrome in females in US (age 18–45 years) is almost 6.6%. According to present study on polycystic ovarian syndrome, occurrence of PCOS is 6% because 6% were diagnosed as having PCOS while 16% girls were refer to doctor and 9% girls did ultrasonography and blood reports [46].

Joshi *et al.* reported that the prevalence of PCOS was extremely inconstant worldwide; fluctuating from 2.2–26%. They found 22.5% prevalence of PCOS by Rotterdam and 10.7% according to Androgen Excess Society criteria [47].

Joshi B and her group evaluated that PCOS is an evolving illness during puberty and screening to avoid illnesses and psychological problems [48]. Shetty D assess that around 10% Indian women was having PCOS symptoms like excessive hair growth in unwanted parts of the body, obesity and acne [49]. Choudhary et al. assessed 9.13% occurrence of PCOS in Indian youths [50]. Vaidya R considered that according to WHO, there was 116 million women throughout world were affected with PCOS in 2012 [51]. Lakshmi KS reported 32% occurrence of PCOS at a tertiary care hospital [52].

Radha P assessed that Indian woman had high risk of PCOS compared to their others counterparts, with an expected incidence of 9.13% in Indian youths [53]. Radha P assessed that 20% of contributors were diagnosed with PCOS. The percentage of PCOS was found increased in city area as compared to rural areas, due to their unhealthy life style [54]. Almost 9.5% girls consulted dermatologist for excessive hair growth on abnormal body parts or acne (major sign of PCOS), 4.5% female referred to gynaecologist for abnormality of periods, and 1% girls used herbal treatment while 1% used homeopathy.

Sills ES assessed that regardless of age, physicians are the most common provider of PCOS information for all (rather than other sources like paper, family and books) [55].

A research about the occurrence of PCOS was conducted at Taibah University Al Madinah Al Munawara on adult unmarried female students, aged 18–28 years. From 201 contributors, 108 (53.7%) were diagnosed to have disorder with a mean age of 21.3 ± 2.1 years, the demographic facts, menstrual irregularities and acne seen in 108 students [56].

Polycystic ovarian syndrome is disturbing 5–10% population because it can cause infertility and endocrine diseases in women's of child bearing age. Symptoms of polycystic ovarian syndrome usually arise during adolescence at the start of menstruation and disturbed the females health and mental state, symptoms can be mild or severe. PCOS is a common endocrinology sickness in young females. Occurrence of PCOS in child bearing age women is 7 to 10% [57]. Study on the prevalence of polycystic ovarian syndrome was conducted in Karachi, Pakistan, to assess the ratio of affected females in Pakistan especially in Karachi [58].

In 2011 a study conducted in Rawalpindi to assess the prevalence of PCOS [43]. In India studies related to occurrence of PCOS was conducted at Thandalam, all these studies indicated that prevalence of polycystic ovarian syndrome is increasing with time and most of our females are affected by PCOS [59]. A study was conducted in Karachi to evaluate the information and awareness of PCOS in urban Pakistani women at 2014 [60].

In present studies maximum adolescent and young girls (almost 33%) got knowledge about polycystic ovarian syndrome from teachers, 19% girls got knowledge from friends, 11.5% females are diagnosed and informed by doctor, 3.5% female got knowledge by reading newspaper and 5% got knowledge from internet resources. Almost 28% young and adolescent girls are unaware about polycystic ovarian syndrome and 72% females have knowledge about polycystic ovarian syndrome symptoms, prevalence and severity.

According to Sunanda B *et al.* 76% females had average knowledge about polycystic ovarian syndrome and 10.7% females had good information related to PCOS [61]. Sills ES assessed more than 97% females were aware with PCOS, while 1.9% had not been aware about PCOS, and < 1% females were unclear [62].

3. Pathophysiology and aetiology of PCOS

The exact cause of polycystic ovarian syndrome is still unknown. PCOS is possibly a mixture of factors such as inheritances, ecological factors as well as fetal contact to high androgen in uterus. The polycystic ovarian syndrome has been noted a familial disorder which runs in families. Those who have PCOS positive family history in mothers or sisters have greater chances to develop the syndrome [63].

The current studies showed that polycystic ovarian syndrome run in families but it is not sex chromosomes disorder, it is of autosomal dominant pattern. A number of factors of polycystic ovarian syndrome have been known, that are associated with PCOS. Maternal causes include low or high birth weight in girls borne from obese females [64].

There are various risk factors like acanthus's Nigerians (skin disorder), metabolic, precocious puberty (puberty in the age of 7 to 9 years) and pubarche [65]. Weight gain sometimes leads toward the development of syndrome. PCOS is diagnosed in adolescent due to their irregular menstrual cycles. Maximum researchers evaluated those natural defects in steroid formation in ovaries and development of follicle play an important role in the etiology of PCOS. The syndrome is also related with insistently quick pulses of GnRH, an excessive production of LH, and inadequate production of FSH, which plays role in extreme ovarian androgen formation and loss of ovulatory function [66].

There are multiple familial genes which are responsible for the development of polycystic ovarian syndrome, many environmental as well as inherited factors which are the main cause in the mutation of polycystic ovarian syndrome protein. The result of transformation and scientific ascertainment reveals in everyday life and it completely altered our lifestyle. Consumption of diet is concentrated increasingly on sugar, fast food, and soft juices and decrease from fresh vegetables and balanced diet. This unhealthy eating behaviors and lack of workout leads toward polycystic ovarian syndrome (PCOS) as well [67].

Causes of many symptoms are treated or become less dangerous because hormonal level become normal due to weight loss. Weight gain can be treated through exercise and balanced food.in last few years 30% Polycystic Ovaries Syndrome cases rise in India. This may occur due to unhealthy life style and lack of information about PCOS [68].

3.1 Pathophysiology

In the women of polycystic ovarian syndrome the gonadotropin releasing hormone (GnRH) level is increases or decreases in frequency with time. Due to decreased gonadotropin releasing hormone level, production of LH is increased resulting in decreased formation of FSH.

Increased level of luteinizing hormone stimulates the theca cells of ovaries to release androgenic hormone and may also disturb the menstruation. Moreover, this low level of follicle stimulating hormone cannot stimulate the granulosa cells of ovaries to convert androgen to estrogen, and ovulation cannot occur in the absence of estrogen.

Normally after ovulation, corpus lutein releases the progesterone hormone. Due to increase in progesterone level, the gonadotropin hormone level is decreased through feedback mechanism. Some readings have explored the role of the controlling genes of cytochrome P450 (CYP) 11A, FST, IVSR, 3-HSDL and CYP 17 enzyme in connection with PCOS.

In the ovaries of PCOS theca cells changed whose cytochrome P450 (CYP) 11A, 3- HSDL and CYP 17 gene display raised intensities. And there is practical anomaly of the 17 -hydroxylase which control androgen biosynthesis. Hereditary studies revealed a link among PCOS and hyper-insulinaemia. Insulin resistance at the margin and to irregular pancreatic [2] cell function is secondary to hyper-insu-linaemia. 50–70% of females effected with PCOS due to insulin conflict. Increased insulin levels may affects the gonadotropin which acts on ovarian function. Ovarian function can be regulated with insulin, and excessive insulin stimulates the ovaries to produce gonadotropin. Increased insulin also subdue generation of sex hormone binding globulin (a carrier protein) which as a result increases androgenicity [69].

A scientific hallmark of PCOS is hyperandogenism, causing reserve development of sac, micro cyst materialization in ovaries and anovulation [70]. Increase level of androgen and insulin affect menstruation and prevent ovulation.

3.2 Mechanisms of anovulation

There is prominent difference between follicle development as well as steroid genesis. One thinkable justification for this puzzle may be a marvel that is assumed to happen usually at the onset of the mid cycle of luteinizing hormone release. This syndrome is considered through excessive secretion of LH and insulin. Many patients have normal blood concentrations of LH has raised serum insulin level [71].

Insulin cooperates with LH in increasing steroidogenesis by granulosa cells of ovaries. Elevated stimulant intensities of LH and its augmentation of action on fol-licle by hyperinsulinemia had explanation of detention of follicle development and improvement of estradiol release [72].

The "control" granulosa cells were differentiated and follicle is released which is then activated at the onset of mid cycle of LH release by intracellular cAMP. Production of cAMP was affected by insulin; it assumed that insulin increases the LH production due to which LH receptors are increased on growing granulosa cells. Excessive secretion of androgens from ovaries can affect follicle growth. Within granulosa cells, androgens enlarge gonadotropin-induced cAMP release [73].

4. Clinical features

Polycystic ovarian syndromes has various symptoms such as weight gain, acne, excessive hair development on unwanted body parts, irregular menses, and psy-chological problems like anxiety, depression and sleep and voice changes and also include dysmenorrhea.

Hirsutism is defined as excessive hair growth on unwanted parts of the body in 10% of females caused by excessive production of male hormone androgen which is significantly associated with polycystic ovarian syndrome. Amenorrhea is defined as menstrual cycle is absent in female of reproductive age, it can be primary (due to hormonal imbalance) and secondary (absence of menstrual cycle for more than 6 months). Major complications of polycystic ovarian syndrome are hypertension, diabetes mellitus, obesity, cardiovascular disorder, ovarian cancer, skin problems, liver diseases and psychological disorders [74].

The combination of hirsutism, infertility, oligo menorrhea and two sided enlargement of polycystic ovaries was recognized by Stein and Leventhal. For some time period, syndrome use their name. The word polycystic ovarian syndrome (PCOS) seems to be looked in the 1960s and progressively changed by label of

Stein-Leventhal syndrome. Last main histopathological study was conducted in 1982 [75].

And it delivers a comprehensive explanation of the polycystic form of the ovaries and the number of follicles that are 10 mm in diameter. Cyst may resemble with ovarian follicle, so the existence of cyst within ovary must be deliberated as a usual experience. Extreme number of ovarian follicle that considered as disease ailment is associated by polycystic ovarian syndrome. Therefore it is correct and precise to express as ovaries containing large number of follicle instead of polycyss. A rise in ovarian area and increased volume was considered the exact and accurate markers of polycystic ovarian morphology (PCOM). These two markersprovided the dimension that was passed out on the middle segment of the ovaries.

It is confirmed from histopathological studies that both ovarian area (OA) and ovarian volume (OV) are infect good indications of follicular excess and stromal hypertrophy which are the structural or anatomical symbols of the polycystic ovarian morphology (PCOM). Hyperandrogenism (Acne, hirsutism, alopecia); 60% PCOS females are suffered with hirsutisim on chin, face upper lips, buttocks [76].

Irregular menstrual cycle means cycle repeat much time within month or may absent for several months. Almost 85% - 90% of women of oligomenarrhoea have PCOS worldwide, while 30–40% of amenorrhea women also affected with this syndrome. Heavy or flimsy menstrual flow indicates polymenorrhea and oligo menorrhea. Lack of ovulation may lead toward infertility and subfertility/70% of pregnancy problem due to anovulation are connected to inflamed ovaries [77]. Fatness with BMI > 35 kg/m^2.

Some other features are:

- Weakening and falling of hair.

- Membranes label below the armpits, neck and below knees.

- Temper complaints such as hirsuitism are common in teenage. Most of females often feel unsatisfied and depressed if they expected difficulty to loose weight, cure acne, abnormal body hair and menstrual problems.

- Cardiac abnormalities.

- Pre diabetes and diabetes

- High total cholesterol and low good cholesterol and high LDL

- Almost 25% females with PCOS had elevated prolactin levels [78].

5. Diagnostic criteria of PCOS

European Society for Human Reproduction and Embryology/American Society for reproductive medicine – funded PCOS workshops in 2004. definition of this syndrome must include two out of the subsequent three conditions:

1. Absence of menstrual cycle for 6 months.

2. Medical or organic symbols of increase androgen product.

3. Inflamed ovaries on ultrasound.

Polycystic ovary was redefined, ovary with more than 12 follicles of size 2–9 mm in diameter.

These standards are not proper for all females, because some PCOS girls had no cyst and experience regular periods.

- Insulin resistance is most common in all PCOS females. 70–95% obese and 30–75% lean PCOS females are affected. This can lead to diabetes and cardiovascular disease in PCOS females.

- It also responsible to raised plasminogen activator inhibitor –1 (PAI-1) in patients with PCOS. Elevated PAI-1 can cause intravascular thrombosis.

- Endometrial hyperplasia and endometrial cancer are thinkable, due to over gathering of uterine lining, due to deficiency of progesterone hormone causing stimulation of uterine cells by oestrogen hormone.

- Breast cancer, obesity and infertility are common in PCOS patients [79].

PCOS mostly affect the obese female's then lean built. Moreover pregnant women suffered with PCOS should be informed about miscarriage, gestational diabetes, pre-eclampsia, eclampsia and premature delivery. Barry found significant rise of three folds for endometrial cancer among females suffered with polycystic ovarian syndrome. But there is no prominent increase in it [80].

6. Investigations

To eradicate all other illnesses that may cause menstrual problems, breast cancer and infertility, the most common diagnostic tests include ultrasound, FNAC and reproductive hormones like estrogen and progesterone.

7. Management

The vital treatment option for polycystic ovarian syndrome is the lifestyle modifications in those cases in which different risk factors are correlated to stimulate the presentations of polycystic ovarian syndrome (PCOS). Treatment modalities are included in other types of intermediations. The main objective of these types of modifications is to decrease the weight and maintain reduced body weight for longer time. Improvement of insulin resistance through weight loss with the help of exercise and diet seems to contribute to the development of metabolic, clinical, and hormonal factors of polycystic ovarian syndrome (PCOS). Though even the uncertain weight loss has been revealed to increase the incidence of ovulation, improvement of hormonal factors and decrease metabolic defects in the females affected with polycystic ovarian syndrome.

Life style modification is very essential in overweight patients. Every female with polycystic ovaries disease can take advantage from a proper balanced diet and consistent exercise. In most of programmes of dietary involvement, the energy restriction has been forefront while excellence of diet may also play a major role in polycystic ovarian syndrome.

To accomplish long term reduction in weight is the major difficulty in polycystic ovarian syndrome. Additional medical therapies are also necessary. In the

management of PCOS, there was a stimulating pathophysiological background to sustain the therapeutic benefits of insulin sensitizers including hyperandrogen-aemia, metabolic characteristics and ovulatory functions. Accessible literature delivers acceptance to this whole concept and inspires the addition of insulin sensitizers in the therapeutic management of polycystic ovarian syndrome. There are two main and most beneficial insulin sensitizers including metformin and thiazolineodiones.

Moreover, different traditional drugs such as clomiphene, oral contraceptives, and antiandrogens drugs are used in the management of polycystic ovarian syndrome. These medications have been considered as supplementation by original pharmacological modalities including insulin sensitizers. Lifestyle modification is still considered beneficial therapeutics. The most commonly studied insulin sensitizer is known as metformin due to its comforting safety profile.

Metformin aids to reduce visceral adiposity, weight loss and decrease insulin resistance commonly at the muscle and hepatic tissue level and it contribute to a more approving hormonal as well as metabolic profile. The metabolic actions of metformin are well recognised in other patients like obese and slim women presenting with PCOS. In a meta-analysis of different people, such as 13 controlled studies of females with polycystic ovarian syndrome it established that metformin has essential role to decrease fasting insulin levels [81].

PCOS is still unknown disorder and has no specific treatment. But it can be treated and managed in several ways. Regularity of menstrual cycle, improve skin disorders and reduce insulin and androgen level are the aims of management for young women. Initial treatment for women with PCOS is life style modification like:

1. Take protein, keep low carbohydrate.

2. Workout.

3. Loss weight.

4. Pharmacological treatments are used.

    i. Overweight:

BMI > 30 kg/m^2 considered as overweight and should be encouraged to loose weight.

    ii. Menstrual abnormality:

Use low dose combined oral contraceptive to manage menstrual cycle.

    iii. Metformin become common medicine selected for this population.

Spironolactone or Flutamide are androgen lowering medication, but shows their effect slowly. Metformin is an anti-diabetic drug that can be used to recover fertility, decline insulin conflict, regulate menses, and recover cardiovascular health in teenagers with PCOS. Aromatase inhibitors are suitable for females of clomiphene resistance. Some girls with PCOS develop depression, therefor they need mental health professional [82]. Cancerous cysts are removed surgically. Ovarian drilling is the best surgery to cure infertility. It is necessary for PCOS girls to consult their doctor often and use proper medication and precaution to regulate periods and decrease the chances to develop diabetes, CVS and skin issues.

8. Medicinal plants

8.1 *Asparagus racemosus* (Shatavari)

In traditional ayruvedic medicine *Asparagus racemosus* (Asparagaceae) is used which aids in regulation of menstrual cycle, stimulating the normal growth of ovarian follicles and strengthening the female reproductive system mostly due to phytoestrogen (known as natural plant consisted of estrogen). It also helps in resisting the hyperinsulinemia [83].

A. racemosus has many other pharmacological effects in addition to above, like tumors, inflammation, neuropathy, nervous disorders, dyspepsia, neuropathy, and hepatopathy. It also acts as antiulcer, antioxidant and anti-diarrheal. *A. racemosus* also helps in preventing aging, increase the endurance of life as well as improves mental function and immune modulatory activities [84].

8.2. *Tinospora cordifolia* (Guduchi)

Tinospora cordifolia, (Menispermaceae) is a well-recognized medicinal plant which has hypoglycemic effect [82]. It is a powerful and effective inflammatory herb. The basic cause of insulin imbalance and ovarian cysts is the chronic inflammation in tissues. *Tinospora Cordifolia* aids in strengthening all the body tissues, increasing metabolism and lowing the insulin resistance [85].

8.3. *Foeniculum vulgare* (Shatapushpa)

The seeds of *Foeniculum vulgare, (Apiaceae)* are used as an excellent supplement for managing the polycystic ovarian syndrome (PCOS). Seeds are the richest source of phytoestrogsns. In fennel, these phytoestrogens helps in decreasing insulin resistance and in lowering the inflammation in PCOS. It is also thought that it helps in lowering the cellular imbalance which ultimately leads towards the metabolic disturbances in PCOS [86].

Currently, various parts of this medicinal plant are used in the management and treatment of many disorders, specifically digestive system disorders. Moreover, it is highly useful in the treatment of inflammation of bronchioles, chronic cough, diabetes mellitus, kidney stones as well as in nausea and vomiting [87].

8.4. *Ocimum tenuiflorum* (Holy Basil)

A traditional herbal medicine *Ocimum tenuiflorum L. (*Lamiaceae) generally known as Tulsi. *Ocimum tenuiflorum* is very effective for polycystic ovarian syndrome. It lowers the production of androgen because it has tremendous anti-androgenic properties [88].

8.5. *Actaea racemosa* (Black Cohosh)

In many disorders of female reproductive system like anvolution, hormonal imbalance, infertility, the *Actaea racemosa* (Ranunculanae) is used because these are important issues in PCOS. Black Cohosh has the capability to stimulate the ovulation in females with PCOS [89].

8.6. *Lepidium meyenii* (Maca)

A traditional herbal medicine *Lepidium meyenii* from Brassicaceae family is used in treating the menopausal symptoms, stimulates the endocrine system. It acts as

natural hormonal balancer without any adverse effects. Progesterone and estrogen hormones help in encouraging the healthy menstrual cycle in the body. It is an implausible fertility super food as well as an adaptogen. Maca also restores the level of testosterone in males [90].

9. Conclusion

The incidence of polycystic ovarian syndrome is rising day by day but students were not aware and conscious of polycystic ovarian syndrome (PCOS) even though the different features regarding to this syndrome were present in many students. Therefore, few teaching projects or schemes have to be prepared to make available information related to these types of disorders in women. Moreover, survey shows many women do not discuss with gynaecologist until there is rigorous or difficult situation occurred. Consequently, women must have to talk to any gynaecologist or doctor for health and fitness. The last prominent matter was about the contemplation of the society about polycystic ovarian syndrome. The most common answer suggested that the people needed awareness concerning the polycystic ovarian syndrome and also most people said that it is significant issue to be discussed because there were misconceptions about polycystic ovarian syndrome.

Conflict of interest

We declare no conflict of interest.

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