Review Article

Update on Management of Polycystic Ovarian Syndrome for Dermatologists

Abstract

Polycystic ovarian syndrome (PCOS) is the commonest endocrine disorder in women having wide range of clinical manifestation. These women may present with reproductive, dermatological, metabolic, psychological, or neoplastic implications from adolescence to menopause. The common dermatological manifestations include hirsutism, acne, alopecia, or acanthosis nigricans. Women presenting with these dermatological manifestations must be evaluated for PCOS. A multidisciplinary team approach involving a reproductive endocrinologist, dermatologist, psychologist/psychiatrist, dietician, and sometimes a bariatric surgeon should be undertaken for long-term management of these patients. Unless metabolic and underlying endocrinal disturbances arecorrected and simultaneous life-style modification is adopted, cosmetic treatment would give only temporary relief.

Keywords: *Acne, alopecia, antiandrogen drugs, hirsutism, Polycystic ovarian syndrome*

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Introduction

Polycystic ovarian syndrome (PCOS) is the commonest endocrinological disorder leading to reproductive as well as metabolic dysfunction in women. PCOS jeopardizes feminine identity of a woman due to alteration in her aesthetic standards in the form of hirsutism, acne, alopecia, obesity, menstrual irregularities, and infertility.

The aim of this review is to highlight the dermatological implications of PCOS, and appropriate therapeutic approaches that are needed to manage the morbidity of this syndrome as most of these women require long-term treatment and follow-up.

Diagnostic criteria for PCOS

PCOD (polycystic ovarian disease) is a known identity since 1935 when Stein and Leventhal first described a case series of seven women who presented with oligo/amenorrhea, obesity, hirsutism, and bilateral polycystic ovaries. Due to complexity of this disorder and various controversies, three sets of diagnostic criterion have been proposed to diagnose PCOS in last three decades [Table 1].

The National Institutes of Health (NIH) in 1990 proposed hyperandrogenemia (HA) and oligo-anovulation as the two criteria and two out of two are needed to diagnose PCOS after excluding other related disorders.[1]

Rotterdam ESHRE/ASRM-sponsored PCOS Consensus Workshop Group in 2003 proposed to add polycystic ovarian morphology (PCOM) (ultrasound finding of polycystic ovaries) to NIH criteria; out of these three criteria (HA, ovulation dysfunction, and PCOM), two are required to diagnose PCOS.[2] The proportion of diagnosed PCOS women was increased significantly with Rotterdam's diagnostic criteria.

In 2006, Androgen Excess and PCOS Society (AE-PCOS) concluded that PCOS should be based only on two criteria, that is, HA, clinical or biochemical, and ovarian dysfunction (OD). According to this criteria, women with chronic anovulation with PCOM but without HA were excluded from PCOS.[3,4]

Due to controversies among diagnostic criteria, in 2012, NIH Consensus (NIH and ESHRE/ASRM) recommended broader Rotterdam/ESHRE/ASRM 2003 criteria with detailed PCOS phenotype of all PCOS.[5,6] According to which, two out of three criteria (hyperandrogenism, ovulatory dysfunction, and PCOM) are needed to diagnose. And, each case has

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Table 1: Diagnostic criteria for PCOS (summary)

Year	Diagnostic criteria proposed by	Criteria	Number of criteria required for diagnosis	Phenotype
1990	National Institutes of Health[1]	1.Hyperandrogenism 2.Oligo-anovulation	Two out of two	
2003	Rotterdam's criteria[2,3]	1.Hyperandrogenism 2.Ovulatory dysfunction 3.Polycystic ovarian morphology (12 follicles 2-9 mm in each ovary with volume of 10 ml)	Two out of three	
2006	AE-PCOS[4,5]	1.Hyperandrogenism 2.Ovulatory dysfunction	Two of two	
2012	NIH 2012 extension ofESHRE/ASRM 2003[6]	1.HA 2.OD 3. PCOM	1. Two of three 2. Identification of specific phenotype	A.HA + OD + PCOM B. HA + OD C.HA + PCOM D.OD + PCOM

HA = Hyperandrogenism; OD = Ovulatory dysfunction; PCOM = Polycystic ovarian morphology

to classify into a specific phenotype as Phenotype A: hyperandrogenism + ovulatory dysfunction + PCOM; Phenotype B: hyperandrogenism + ovulatory dysfunction; Phenotype C: hyperandrogenism + PCOM; and Phenotype D: ovulatory dysfunction + PCOM [Table 1].

Diagnostic criteria for PCOS in adolescents

Diagnosis of PCOS is crucial at adolescence because hormonal and reproductive transition of normal puberty may mimic features ofthe syndrome. Different diagnostic criteria have been proposed in this respect[6] [Table 2].

Table 2: Criteria to diagnose PCOS in adolescents

Diagnostic criteria proposed by	Criterias	Number of criteria needed to diagnose
ESHRE/ASRM 2012[7]	1.Hyperandrogenism (clinical or biochemical) 2. Oligo-/anovulation 3. Polycystic ovarianmorphology	Three out of three required

Etiopathogenesis

Although the etiopathogenesis of PCOS is not clearly understood, it is known to be a multifactorial disorder with genetic, endocrinological as well as environmental factors having a role to play [Figure 1].[7] According to Franks *et al*., PCOS is a genetically determined ovarian pathology characterized by androgen overproduction and manifest heterogeneously depending on interaction of genetic predisposition with other environmental factors.[8] PCOS may be due to epigenetic reprograming of fetal reproductive tissue following in utero exposure to androgens which may trigger hypothalamic–pituitary–ovarian axis of fetus leading to altered folliculogenesis.[8,9] It has been found that there is 20–60% of familial occurrence of PCOS in first-degree relatives.[10] According to most of the studies, PCOS has polygenic transmission, but few have postulated autosomal transmission with single gene defect.

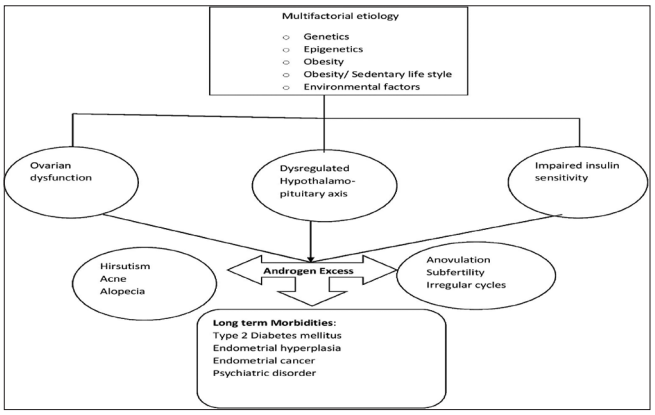

Figure 1: Etiopathogensis of PCOD

PCOS is an OD secondary to dysregulated hypothalamo-pituitary axis and impaired insulin sensitivity. Elevated luteinizing hormone (LH) levels are the hallmark of PCOS and the LH: FSH ratio may be greater than 2. In response to high LH, there is increased production of androgens (in theca cells of the ovary). There is decreased sensitivity to insulin leading to hyperinsulinemia with resultant hyperglycemia, high androgens production, and decrease in sex-hormone-binding globulin (SHBG). Increased insulin binds to insulin-like growth factor – I (IGF-1) receptor on the ovary stimulating androgen production directly. Both IGF-I and IGF-II increase and IGF-I-stimulated 5-alpha reductase activity lead to intensified hirsute response, alopecia, and acne. IGF-II enhances LH-stimulated androgen production by theca cells.

PCOS women have genetic predisposition of diabetes. Other associated abnormalities seen are obesity, hypertension, dyslipidemia, fatty liver, sleep apnea, endometrial carcinoma, cardiovascular diseases, and depression. Upto 47% women with PCOS have metabolic syndrome categorized by adult treatment panel III and include ≥3 of the following: waist circumference >88 cm, triglyceride level ≥150 mg/dl, high-density lipoprotein −<50 mg/dl, blood pressure ≥130/80 mmHg, and fasting blood glucose level ≥100 mg/dl.[11]

Prevalence of cutaneous manifestations in PCOS

The prevalence of PCOS varies with different diagnostic criteria as well as different geographic regions. Worldwide, it ranges from 4% to 21%.[12,13] In adolescents, the prevalence is 9.13–36% as per different studies.[14-17] The cutaneous manifestations include hirsutism, acne, alopecia, and acanthosis nigricans. In a study by Azziz *et al*., 78.4% of hirsute women were diagnosed suffering from PCOS according to NIH 1990 criteria.[18] In another study by Souter *et al.*, approximately 50% of women, who complained of unwanted excess facial hairs, demonstrated PCOS on further evaluation.[19] The prevalence of acne alone is less as compared to other cutaneous manifestations and ranges between 20% and 40% in different studies.[20-22] The exact prevalence of alopecia alone or alopecia with hirsutism is unclear. In a study by Vexiau *et al.*, among 100 women with alopecia with no hirsutism, PCOS was present only in 10%.[23]

Cutaneous manifestation

Hirsutism

It is the most distressing and dermatology consultation seeking implication of PCOS. It is defined as the excessive growth of terminal hairs at androgen-dependent areas in females similar to male distribution.

It is the most commonly used clinical criteria of androgen excess and seen in 50–80% of all women with HA.[2,24] The prevalence of hirsutism in PCOS ranges from 50% to 89% in different studies.[25-27] The modified Ferriman Gallwey (FG) score is commonly used to evaluate and quantify hair growth in nine androgen-dependent areas of the body (upper lip, chin, chest, upper back, lower back, upper abdomen, lower abdomen, arm, and thigh). The score ranges from zero (no terminal hair growth visible) to four (extensive hair growth), and a score of ≥8 indicates hirsutism.[28,29] It is examiner dependent and has no correlation between circulating androgen levels and FG score. Although hirsutism is diagnosed if FG score is more than 8, women who have unwanted excess hair growth over face or body with score less than 5 were also found to have PCOS in around 50% in a study by Souter *et al.*[19]

The hair follicle formation as well as concentration occurs during fetal development and varies with ethnicity. There is difference in hair growth of all individuals due to difference in 5-alpha reductase enzyme activity which converts testosterone to dihydrotestosterone (DHT). There are two isotypes of the enzyme; type 1found in sebaceous glands and skin of pubic region, whereas type 2 is in hair follicles, scalp, and genital area. In PCOS, there is increasing activity of 5-alpha reductase in hair follicles which is also stimulated by hyperandrogenism, insulin-like growth factors, and insulin.[30] Testosterone and DHT also alter the hair cycle resulting in the transformation of vellus hair into terminal hairs which are thicker and darker, especially in face, neck, chest, and pubic region which areandrogen-sensitive sites.[24,31] There is alteration of anagen phase of the hair cycle. In some regions, this phase gets prolonged, while in the scalp anagen, phase shortening is seen.[24]

Acne

Acne is one of the cutaneous manifestations of PCOS, but it is important to differentiate it from acne vulgaris which affects almost 80% of adolescents and majority of them remit before third decade of life.[32] PCOS should be considered for women with associated signs of hyperandrogenism, failure to respond to conventional therapy, menstrual irregularities, and insulin resistant. Most women with PCOS exhibit facial acne lesions and up to 50% women have involvement of the neck, chest, and upper back as well. As compared to hirsutism, the prevalence of acne alone (excluding hirsutism) is very less. Around 20–40% of PCOS women are reported to have acne and highest incidence has been reported in Indonesian women.[22] The role of androgens in pathogenesis of acne is debatable because the androgen levels are found to be normal in acne vulgaris. However, it has been seen that there is increased receptor sensitivity to circulating androgen in women with acne as compared to normal counterparts.[33] Androgens increases the sebum production, causing abnormal desquamation of follicular epithelial cells resulting in comedones formation. Further colonization of the follicles by *Propionibacterium acnes* results in inflammation and further formation of papules, pustules, nodules, cysts, and scarring. In literature, many studies have documented correlation of acne with high levels of dehydroepiandrosterone sulfate (DHEA-S), DHT, androstenedione, testosterone, and IGF while few studies have not established any corelation.[34,35]

Acanthosis nigricans

Acanthosis nigricans is associated with obesity, insulin resistance, PCOS, diabetes, drug reaction, malignancies, and in some genetic diseases. It is characterized by brown velvety moist, verrucous hyperpigmentation of skin, usually seen on the back of the neck and intertriginous areas like armpits and groins, underneath breast, inside thighs. In PCOS, it has been reported in only 5% of women.[36] It is due to excessive binding of serum insulin to IGF-1 receptors which results in proliferation of keratinocytes and fibroblasts. Histological features include

papillomatosis, hyperkeratosis, and acanthosis with or without hyperpigmentation of the basal layer.

Alopecia

Alopecia is characterized by progressive hair loss or thinning. In PCOS, usually there is thinning at vertex with maintenance of frontal hairline, but in a few, it is similar to androgenic alopecia in which there is loss of hairs in the central region of scalp. Hyperandrogenism causes increased levels of 5-alpha reductase along with increased androgen receptors and decreased levels of cytochrome p 450 enzyme resulting in short anagen phase and miniaturization of terminal hairs with eventual transformation to vellus hairs.[37]

Seborrhea

The presence of oily and shiny skin in the nasolabial folds, forehead, or behind the ear is defined as seborrhea. Seborrhea is found in women who have HA and hyperinsulinemia.

Evaluation of Cutaneous Manifestations

Aim of the management should be centered at confirmation of diagnosis of PCOS and early intervention to prevent long-term sequelae. Detailed clinical history is required due to wide variations in clinical presentation. History should include duration of cutaneous manifestation, menstrual history, history of infertility, diet history, and family history.

Clinical examination should include grading of hirsutism with FG scale, site of acne and type of lesions, seborrhea, and presence of alopecia. Examination of genital region to look for the signs of virilization such as clitoromegaly should be done.[38] BMI (body mass index), waist circumference, and blood pressure should also be measured.

Laboratory Evaluation

As such, there is no single test to clinch the diagnosis of PCOS. Final diagnosis is based on clinical features, physical findings, and few laboratory investigations. HA is the most important feature and to confirm biochemical hyperandrogeniemia, commonandrogens to be measured are testosterone (total or free), androstenedione, DHEA, and DHEA-metabolite DHEAS.

In approximately 70% of PCOS, women who were diagnosed by NIH 1990 criteria were found to have elevated free testosterone. It is recommended to measure free testosterone rather than total one because SHBG is reduced in hyperandrogenism which is the main determinant of bioavailable testosterone.[39] Ideally, test should be performedearly in the morning and preferable between day 4th and day 10th of menstrual cycle. Elevated level of testosterone is not the sole criterion to diagnose hyperandrogenism because in 20–40% of women with PCOS, androgen levels are in normal range and total testosterone levels are variable.[40]

The role of androstenedione is not clearly known and it may increase the numbers of hyperandrogenemic by around 10%. Even DHEA has limited diagnostic value, but DHEAS can be measured to exclude adrenal cause. Other biochemical tests are Thyroid stimulating hormone TSH, prolactin, 17 hydroxy progesterone, dexamethasone suppression test, and 24 h urinary cortisol which areto be done to exclude other causes which also mimic PCOS.

The gonadotropin abnormalities seen in PCOS are increased secretion of LH, increased GnRH/LH pulsatility, and normal FSH. The raised LH/FSH ratio in follicular phase has been considered as a marker of PCOS but not used as diagnostic criteria because the values are affected by the assays which used to measure them as well the obesity.[41]

The prevalence of insulin resistance and hyperinsulinismin PCOS is between 50% and 70%. There is always controversy regarding the best method to assess the insulin resistance, but standard 2 h oral glucose tolerance test (OGTT) is considered to be the best way to assess both insulin and glucose yield.[40] OGTT should be done only when fasting blood glucose level is <110 mg/dl (normal) or impaired (110–125 mg/dl). Fasting value above 126 mg/dl is considered suggestive of type 2 diabetes. In 2 h OGTT, blood glucose level of less than 140 mg/dl is normal, 140–199 mg/dl impaired, and more than 200 mg/dl is frank diabetes.[42]

Evaluation DHEAS level may be useful where there is rapid virilization, but in assessing hirsutism, its role is questionable.

Management

As per Green-top Guidelines 2014, all women, who have been diagnosed as PCOS, should have accurate diagnosis based on Rotterdam criteria OGTT is must in PCOS women with BMI >25, lean PCOS with advanced age, personal history of gestational diabetes, and family history of type II diabetes.[43] All of them have to be assessed for obesity (BMI and waist circumference) and blood pressure at every visit. Along with life-style modification, the psychosocial issues are to be discussed with every women[43] [Table 3].

Life-style modification

It is the first step of management which includes dietary restriction, exercise, and weight loss. It has been seen that just 5% loss of total body weight reduces the insulin resistance and testosterone levels with marked improvement in body composition and cardiovascular risk markers.

Medical therapy

The therapeutic goal is to achieve inhibition of ovarian androgen production and decrease their bioavailable forms by increasing SHBG levels.

Table 3: Management options for PCOS

Life-style modification	Medical therapy			Cosmetic/Local therapy	Psychosocial support
Diet restriction	Hormonal pills	Antiandrogens	Insulin sensitizer	Medical	
Exercise	Estrogens + progestins	Spironolactone	Metformin	Eflornithine Hydrochloride	
Weight reduction	Progestins with low androgenic activity	CPA		Fluridil	
	Norethindrone, desogestrel	Flutamide		Waxing	
	Norgestimate	Finasteride		Bleaching	
	Antiandrogenic progestins			Threading	
	Cyproterone acetate			Laser	
	Drosperinone				

Oral contraceptive pills

Combined oral contraceptive pills (COCPs) are commonly prescribed for adults and adolescents with PCOS to ameliorate the clinical symptoms. Different combinations of COCPs are available with heterogeneous estrogen and progestin preparations with varying pharmacological and clinical properties. Thus, the efficacy and consequences of COCPs in PCOS may vary. Oral contraceptive pills (OCPs) contain estrogen which suppresses the LH, increases SHBG, and decreases ovarian androgen production. These actions reduce the free testosterone which limits the cutaneous manifestations (acne and hirsutism) of PCOS. The progestins used in OCP are considered as per degree of androgenic properties as they are testosterone derivatives.[44] Newer progestins like norethindrone, desogestrel, and norgestimate have some androgenic action whereas CPA (cyproterone acetate) and drosperinone are androgenic receptor antagonist. CPA is more potent as it also inhibits 5-alpha reductase.[45] Drosperinone is an aldosterone antagonist with antimineralocorticoid action and some antiandrogenicproperty which counteract the action of estrogen on rennin–angiotensin–aldosterone system.

COCPs should be prescribed by balancing efficacy, metabolic risk profile, side effects, cost, and availability as various preparations available with lowest effective estrogen doses (20–30 micrograms of ethinyloestrdiol or equivalent) and have similar efficacy in treating hirsutism.[46] OCPs should be continued for atleast 6–9 months before any improvement in hirsutism is noted.[44] OCPs significantly improve the cutaneous manifestations and protect the endometrium from unopposed estrogen action; however, worsening of insulin resistance and dysplipidemias have also been reported. Other concerns include hypercoagulability and vascular reactivity in women with history of vascular diseases like migraine.

As per latest international evidence-based guideline for the assessment and management of polycystic ovary syndrome (2018), COCPs alone are recommended in adult women and adolescents with PCOS for management of hyperandrogenism and/or irregular menstrual cycles and can be considered in adolescents who are at risk but not yet diagnosed with PCOS.[46] Due to risk of adverse effects like venous thromboembolism, the 35-µm ethinyloestradiol plus CPA preparations (EE+CPA) should not be considered first line in PCOS.[46]

Antiandrogens

Antiandrogens mainly act either by competitive inhibition of androgen-binding receptors or inhibit 5-alpha reductase enzyme which decreases androgen production.[47] OCPs should be added with all antiandrogens in sexually active women as there is risk of feminization of male fetus if pregnancy occurs.

Spironolactone

It is the most effective antiandrogen which has shown demonstrable effect on hirsutism even over and above OCPs.[48,49] It has been found to be effective for acne and alopecia. Spironolactone is an aldosterone antagonist havingaction on androgen receptor and 5-alpha reductase inhibitor activity. The dose is 25–100 mg/day, which is generally well tolerated, but symptoms offatigue, postural hypotension, and dizziness may be experienced by some women. So, start with a low dose (25 mg) and progressively increase over a week. There is a dose-related menstrual irregularity; therefore, it is given in combination with OCP.

Cyproterone acetate

It is a progestational antiandrogen which inhibits binding of testosterone and 5-alpha DHT to androgen receptor. It can be used alone in dose of 50–100 mg daily or with combination with ethinyl estradiol in reverse sequential regimen. It has been found to be more effective than finasteride.[48] It is well tolerated; however, patients may complaint of headache, weight gain, breast tenderness, and depression. Hepatotoxicity is a rare side effect. Although it is usually recommended for hirsutism only, it also found to be effective for alopecia as well.

Flutamide

Flutamide is a nonsteroidal anti androgen which blocks androgens by competitive inhibition of receptors, reducing

androgen synthesis and increasing its inactivation. The dose is usually 250–750 mg/day, but the main concern is hepatotoxicity.[50] Ibanez *et al.* have found flutamide with metformin more effective than OCP alone in improving PCOS symptoms.[51] It is effective hirsutism, acne, andalopecia.

Finasteride

Finasterideis apotent competitive inhibitor of the type 2 isoenzyme of 5-alpha reductase and blocks the conversion of testosterone to the moreactive metabolite DHT. It has no effect on DHT receptors or any known effect on steroid biosynthesis. It isusedincombination with OCPS and has found to have better results in patients who take OCPs alone.[52] It is found to be equally effective when directly compared to OCP containing CPA.[53] These anti androgens are the drug of choice for hirsutism in cases where estrogens are contraindicated. In such cases, combination offinasteride with spironolactone has also been tried and found effective.[54]

Insulin sensitizers

Weight reduction drugs may be helpful in reducing hyperandrogenaemia, but there is no direct evidence of benefit of met for min on hirsutism or acne. In a study by Yilmaz *et al.*, rosiglitazone was found to have some effect onhirsutism.[55] Metformin would benefit women having insulin resistance or deranged blood glucose levels.

Cosmetic/Local therapy

Options available are medical therapy or physical method of removing hairs by threading, waxing, plucking, bleaching, or shaving. The permanent hair-reduction techniques, such aselectrolysis and photoepilation, are also therein which destruction of hair follicle is done with energy source.

Medical therapy

Eflornithine hydrochloride (13.9%)

Eflornithine also known as difluoromethylornithine is an approved drug by the Food and Drug Administration for the treatment of unwanted facial hair growth. It is an irreversible inhibitor of l-ornithine decarboxylase, an enzyme that control shair growth and proliferation. It helps in slowing and miniaturizing the hair follicle rendering them less coarse.[56,57] Continuous use can cause reversible reduction in upto 70% of hair growth. The drug takes 8 weeks to show clinical improvement; however, the benefit reverses after withdrawal in 8 weeks' time. Monotherapy is not considered to be effective and it can be used along with medical treatment in mild cases. Scottish Medicines Consortium guidelines 2007 recommended its use only after trying all available options, but in 2016, they stopped supporting it for routine use as well. It has been shown to be superior than placebo. No comparative studies demonstrating the effectiveness of eflornithine versus hormonal treatment are available.[57]

Fluridil

A new topical gel fluridil 2% has been developed for hyperandrogenic skin syndrome.[58] It has shown to have a good safety profile, but larger clinical trials are not available to support its use.

Permanent method of hair removal

Techniques for accomplishing permanent destruction of hair follicles are electroepilation and laser photothermolysis. In electrolysis, there is risk of post-inflammatory pigmentation and scarring, whereas laser is expensive but less painful and faster. Laser therapy selectively damages the hair follicle without destroying adjacent tissues by its photothermaland photochemical effect. Along with destruction of hair follicle, it also induces the miniaturization of terminal course hairs into vellus hairs. According to light source, laser may be grouped into three categories:

1. Red light systems (694nm ruby),
2. infrared light systems (1064nm neodymium: yttrium–aluminum–garnet), and
3. intense pulsed light sources (590–1200 nm).

Other lasers used in photoepilation are long-pulse alexandrite laser − 755 nm andpulsed diode laser –800 and 810 nm. Laser therapy requires multiple sittings at regular intervals and it has been observed that 65–75% hair reduction is possible at 3 months after one to two sittings whereas >75% hair reduction in 91% of cases at 8 months after four sittings with diode laser in women with hirsutism.[59] The laser hair removal is more effective for women of fairskin with dark hairs.[60] Various other studies have also demonstrated 70% reduction in hair growth in PCOS women following laser therapy.[61]

Combined medical and local therapy

Combined approach is advocated in all women of PCOD with dermatological manifestation because systemic therapy would correct the metabolic and endocrinal abnormality and decreases the circulating androgen levels responsible, whereas the local therapy will give the symptomatic relief to the patient.

Hirsutism

Cosmetic therapy along with OCPs is recommended in cases of women with hirsutism, but the response to treatment is usually expected after 6–9 months of therapy due to long hair growth cycle of 6 months.[31] If needed, antiandrogen to be added after 6 months of OCPs only.

Acne

OCPs have been found effective for acne in PCOD as well and especially in cases of deep-seated nodules and relapsing acne on isotretinoin. Huber *et al.* have found 30–60% reduction in inflammatory acne count within 3–6 months of OCP treatment and improvement in 50–90% of women.[62]

Alopecia

OCPs and anitiandrogens are usually recommended for alopecia, but there are very limited data available to know the exact efficacy of all these drugs.[63] Topical minoxidil is considered as first-line treatment.

Menstrual abnormality

Women with PCOS usually have anovulatory cycle which predisposes to endometrial hyperplasia and later carcinoma. So, women with irregular cycles should be advised to take OCPs or progesterone withdrawal atleast every 3–4 months interval.[43] In women with abnormal uterine bleeding or thickened endometrium, endometrial biopsy should be considered to rule out hyperplasia or malignancy.[43]

Women with infertility should be referred to reproductive endocrinologist and have the option of ovulation induction agents like clomiphene citrate and aromataseinhibitor (anastrazole and letrozole). In cases of clomophene citrate resistant, ovarian drilling and gonadotropins can be offered.

Obesity

Most women with PCOS are either obese or overweight (70%) and have centripetal fat distribution. Statins can be considered in obese women; however, long-term benefit in preventing cardiovascular disease in young women is not established. Bariatric surgery can be considered in morbidly obese women where life-style management fails to achieve weight loss.

Psychological support

PCOS women have increased risk of developing psychological and behavioral changes due to chronic nature of the disorder. Appropriate counseling along with adequate intervention should be offered to every PCOS patient.[64-66] Most women are depressed due to the affliction of androgenic effects which threatens their feminine identity, obesity, and associated poor reproductive performance. They are more prone to substance abuse and smoking.

Conclusion

There is no effective treatment of PCOS and it is directed only to treat the symptoms of individual patient. There is a genuine need to understand and diagnose this syndrome early so that holistic treatment of this syndrome can be initiated at the earliest, there by preventing the long-term morbidity. Addressing the endocrine and metabolic deviations, inculcating life-style modifications and involving the use of lasers for hirsutism, forms the mainstay of the management.

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Conflicts of interest

There are no conflicts of interest.

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