wjpmr, 2018,4(8), 226-235

SJIF Impact Factor: 4.639

WORLD JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.wjpmr.com

Research Article

ISSN 2455-3301

WJPMR

AN ANALYSIS OF HYPERANDROGENIC FEATURES AND OTHER CLINICAL CHARECTERISTICS IN NON OBESE PCOS-THE PHENOTYPIC DIAGNOSTIC CRITERIA

Malathi Balamurugan*

India.

Corresponding Author: Malathi Balamurugan

India.

Article Received on 20/06/2018 **Article Revised on 10/07/2018** **Article Accepted on 01/08/2018**

INTRODUCTION

Polycystic ovary syndrome (PCOS) most common endocrinopathy of premenopausal women, with a prevalence estimated at approximately 25%,[1] of the Indian population. PCOS was initially recognized as a clinical combination of anovulation and hyperandrogenism; now it appears to be a new face of metabolic syndrome.[2] Stein Aand Levebnthal were the first to describe in 1935, the correlation that existed between polycystic ovaries, and signs of hirsutism and amenorrhea.[3] Also biochemical, clinical and endocrinologic studies revealed an array of underlying abnormalities. The basic etiopathogenesis reveal alteration in hypothalamo pituitary ovarian axis, causing increased level of androgens secreted in the blood.[4] Therefore hyperandrogenism is a cause of lot of clinical features in these patients, which became one the important clinical parameter to diagnose PCOS.

According to Rotterdam 2003 Diagnostic criteria, Diagnosis of PCOS should be made with physical findings of hyperandrogenism, oligo/ anovluation and ultrasonography, after exclusion of specific ovarian, adrenal and pituitary disorders. Also Androgen Excess Society (AES),[5] National Institute of Health (NIH) criteria (NIH), European Society for Human Reproduction and Embryology/ American Society for Reproductive Medicine (ESHRE/ASRM) diagnostic criteria ESHRE ASRM,[5,6] SOGC,[7] released new guidelines in diagnosing PCOS stating clinical signs of hyperandrogenism as an important parameter. Therefore signs of hyperandrogenism becomes a sensitive index in diagnosing PCOS.

PCOS is also associated with insulin resistance and hyperinsulisam and obesity amplifies the degree of these abnormalities.[4] Whether the obesity is a cause of PCOS or obesity is a result of PCOS is unclear, but it seems that the latter is more likely.[8] 50% of PCOS are non-obese.[9] The significance of these hyperandrogenic features in lean and ideal weight PCOS as a dignostic criteria is a untouched field.

We hypothesised whether there is a negative correlation to the sensitivity of signs of hyperandrogenism in PCOS without obesity. Therefore we destined to estimate the prevalence of these features in PCOS compared to the controls and to find out the sensitivity of these parameters in non-obese young PCOS. We also looked into the correlation of these parameters with respect to waist circumference (WC) and waist – hip ratio (WHR).

MATERIAL AND METHODS

This case control study was conducted in the Department of Physiology, PSG IMS&R. Both study and control groups gave written informed consent. Also clearance from the Institute's Human Ethics Committee was obtained. The patient study group included women who presented to the infertility clinics, gynaecologists, and family physicians with complaints of dysfunctional uterine bleeding, or infertility and diagnosed to have PCOS by the experts.

Sample size calculation: According to the disease prevalence in India the sample size was calculated.[10]

The required sample size calculated was 18.PCOS was diagnosed with physical findings of hyperandrogenism, oligo/anovulation and ultrasonography, after exclusion of specific ovarian, adrenal and pituitary disorders, according to Rotterdam 2003 diagnostic criteria.[10] Study group included 24 non-pregnant ideal and lean weight (measured by BMI – body mass index) women with PCOS. The patients were grouped as lean and normal as per the WHO criteria. And 30 regularly menstruating (every 27–32 days) women volunteers who were matched for age and BMI were included.

On arrival of the patient the following complete details were obtained from the study group

1. Baseline cardiovascular parameters.
2. Anthropometric measurements.
3. Clinical manifestations of hyperandrogenism.
4. Menstrual history.

5. Life style parameters.

1. Baseline cardiovascular parameters

a. Resting heart rate (RHR): left radial artery at wrist the pulse rate was counted for complete 1min, after 5 min of sitting rest, by palpation

b. Resting blood pressure (RBP): Blood pressure was recorded. Subjects were in supine position, using a manual sphygmomanometer (a Novaphone make), after 20 min of quiet supine rest. Systolic and diastolic blood pressure was measured Recorded from right arm to the nearest 2 mmHg. Blood pressure was defined as the points of the appearance and disappearance of Korotokoff sounds, respectively.

c. Rate-Pressure Product (RPP): a determinant of myocardial oxygen consumption and workload was calculated using the formula. (12) RPP = (BHR×SBP)×10-2

2. Anthropometric measurements

a. Body mass index (BMI): BMI was obtained by dividing weight in kg by square of the height (in meters).first the study group were measured for height and weight (wt). Height was measured in centimeters. Study participants stood in their upright position using the height measuring scale. The weight was measured using electronic weighing machine.s They were selected according to World Health Organization guideline. Obesity is graded as underweight (BMI < 18.5 kg/m^2), normal (18.5–24.9 kg/m^2), pre-obese (25.0–29.9 kg/m^2), and class I obese (30.0–34.9 kg/m^2).[13]

b. Waist circumference: Waist circumference was taken by standard measures.[14] The subject assuming a standing position and then the points were marked on the subjects. Waist circumference was measured half way between the lower border of the ribs and the iliac crest in the horizontal plane. Briefly, 2 measurements to the nearest 0.5 cm were measured. A third measurement was taken if the variation between the measurements were >2 cm. The mean of the 2 closest measurements was calculated. For females waist circumference 80–87.9 cm was graded as overweight and ≥ 102 cm as obese.[14]

c. Waist Hip ratio: For Waist hip ratio (WHR) we also obtained standard cut-off for WHR which denotes risk (> 0.85 in women) and lower cut-offs (0.80 in women).[15]

d. Neck circumference: It was measured vertically against the major axis of the neck at the height just below the Adam's Apple.[16] According to the guidelines provided by National Institute of Tech and Evaluation.It was measured in the midway of the neck, between mid-cervical spine and mid anterior neck, to within 1 mm, using non-stretchable plastic tape with the subjects standing upright.[17] While taking this reading, the subject was asked to look straight ahead, with shoulders down, but not hunched. Care was taken not to involve the shoulder/neck muscles (trapezius) in the measurement.[17] Neck circumference is a good clinical predictor of menstrual irregularity, hirsutism, infertility, insulin resistance and the PCOS. Hence it was included for the study.[16] Neck circumference of less than 39, 39-42, greater than 42 cms reflect a low, intermediate and a high risk of metabolic and PCOS syndrome in obese patients.[18] Also NC >37 cm in men and NC >34 cm in women are probably the best cutoff points to determine subjects with central obesity.[19]

3. Clinical manifestations of hyperandrogenism

a) Hirsutism

Hirsutism is defined as the presence of terminal hairs in a male-like pattern in women.The sideburns of the face and chin areas are frequently involved. Other areas include anterior chest, midline abdominal area, and a triangular male-pattern pubic hair distribution in the lower abdomen. Increased hair growth may also be noted in the presacral and perineal areas and extremities.[20] A modified Ferriman–Gallwey score (mF-G; comprising the nine body areas denoted above) of 8 or more was observed in about 5% of reproductive-aged Caucasian women, who were then defined as being hirsute.[21]

b) Acne and Comedons

Diagnosis is made by the presence of open and closed comedones (blackheads and whiteheads), which are the primary lesions of acne. They present alone or more frequently in combination with pustules and erythematous papules in the face and upper trunk. Progression of acne is associated with lateral extension from localized areas over the lower third of the face with development of large inflammatory lesions typical of cystic acne. The grading of acne is usually based on the number, type, and distribution of acneic comedones.[22]

c) Acanthosis nigricans

PCOS women usually demonstrate acanthosis nigricans, appears as a hyperpigmented, possibly hyperkeratotic area of the skin, occurring most commonly in the crural areas of the skin, such as the axilla, nape of the neck, and other skinfold locations and other intertrigenous zones, as well as exposed areas such as the elbows and knuckles.[23] It may occur in many insulin-resistant states, including obesity and PCOS.[23]

d) Hidradenitis suppurativa

Hidradenitis suppurativa (HS) is a stubborn inflammatory disorder. It is characterized initially by the development of deep tender subcutaneous nodules primarily affecting the apocrine gland bearing areas, including the axillae, perineum, and sub and infra-mammary regions. Over time these nodules may spontaneously rupture forming chronic, relapsing, deep-seated dermal abscesses.[24]

e. Seborrhea (Seborrhoeic dermatitis) a long-term skin disorder,[25] have red, scaly, greasy, itchy, and inflamed skin. Areas of the skin rich in oil -producing are often

affected including the scalp, face, and chest.[25] Seborrhea was found to be related with free testosterone, fasting glucose and insulin.[26]

f. Dandruf

Dandruff is a skin condition that mainly affects the scalp. Symptoms include flaking and sometimes mild itchiness. A more severe form of the condition, which includes inflammation of the skin, is known as seborrheic dermatitis.[25]

g. Androgenic alopecia

Androgen-related alopecia in women with PCOS often tends to be seen in the anterior mid-vertex area, starting as a "triangular" thinning patch with postero-lateral extension to the crown. The anterior hairline generally remains intact in women with PCOS, and significant bitemporal scalp hair loss is unusual.[26]

4 Menstrual history of the PCOS

Relevant menstrual history like Oligomenorrhea, Chronic pelvic pain, Premenstrual tension, History of similar problems in family and Age of menarche were taken.

5. Life style of the PCOS

a. Exercise

1. No general exercise for daily activities
2. Occational (work required exertion /seasonal sporting 2/week)
3. Definite exercise programme (3/week)

b. Regularity of food intake, number intake of beverages like coffee or tea (number /day),

c. Altered sleep d. Stress level

1. Baseline.
2. More than usual but not affecting daily life.
3. Significantly high stress affecting daily life.
4. Worst stress were recorded.

Statistical Analysis

Independent sample't' test was used to compare the measured parameters of patients with PCOS and control group. Chi square test was used for categorical variables. Values were expressed as Mean ± SD. Pearsons Correlation analysis was done to relate relationship with baseline parameters and binary logistic regression analysis was done to find the predictors among the base line parameters, hyperandrogenic features and other significant clinical parameters. Statistical significance was set at $p < 0.05$.

RESULTS

All the study population in our group was young (case 22.96 ± 3.96 vs control 24.20 ± 4.57 p value= 0.298) and was of lean and ideal weight as per BMI(Kg / m2) (case 22.13 ± 2.39 vs control 20.86 ± 2.38; p value=0.054) and waist circumference (60.96 ± 15.97 vs 76.67 ± 8.00, p value= < 0.00). The presence of central obesity (Waist Hip Ratio) was 41.66% (10/24) p value <0.05 with respect to WHR. According to Neck circumference both the group did not have insulin resistence & Central obesity (31.77± 2.73 vs 30.55± 1.94 ; p value 0.061) (Table :1) Resting blood pressure showed there were no hypertensives with SBP (100.51 ± 11.16 vs 106.47 ± 12.77 and DBP (68.25 ± 9.35 vs71.80 ± 9.89) with P value 0.078 and 0.815 respectively was not significant. RPP (89.04 ± 15.48vs 77.37 ± 13.97) and RHR (83.08 ± 12.35 vs 72.83 ± 6.93) was statistically significant with p value <0.01 and <0.01respectively (Refer Table2).

Table 1: Comparison of Anthropometric Measurements of the PCOS and Control Group.

Parameter	PCOS (N=24) N (%)	Control (N=30) N (%)	p value
Age (years)	22.96 ± 3.96	24.20 ± 4.57	0.298 (NS)
BMI(Kg / m2)	22.13 ± 2.39	20.86 ± 2.38	0.054 (NS)
Weight(Kg)	53.60 ± 8.86	49.67 ± 9.42	0.124(NS)
Waist circumference (cms)	96.83 ± 9.45	74.49 ± 8.79	**<0.001*****
W / H ratio	0.84 ± 0.005	0.81 ± 0.004	**<0.05***
Neck circumference(cms)	31.77± 2.73	30.55± 1.94	0.061(NS)

******- Highly Significant. *- Significant***

Table 2: Comparison Of Baseline Cardiovascular Parameters Of The PCOS And Control Group.

Parameter	PCOS (N=24) N (%)	Control (N=30) N (%)	p value
RHR	83.08 ± 12.35	72.83 ± 6.93	**<0.01****
SBP (mm Hg)	100.51 ± 11.16	106.47 ± 12.77	0.078 (NS)
DBP (mm Hg)	68.25 ± 9.35	71.80 ± 9.89	0.815 (NS)
RPP (Rate pressure product)	89.04 ± 15.48	77.37 ± 13.97	**<0.01****

*****- Moderately Significant***

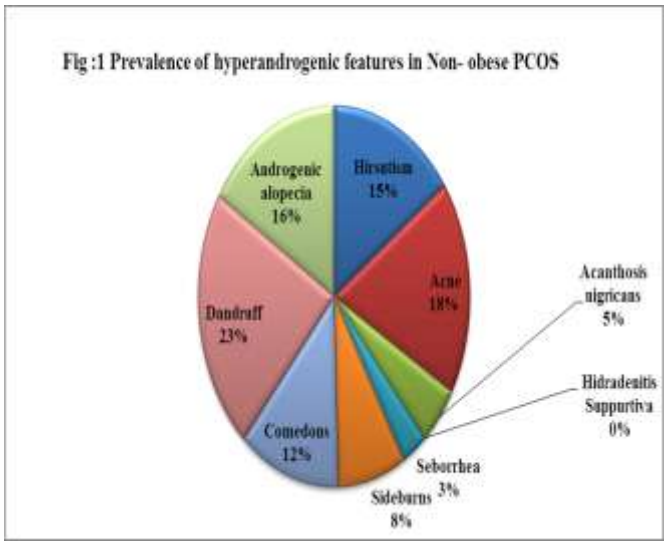
(1) Clinical phenotype: and Among the hyperandrogenic features showed the incidence of Hirsutism was 62.5% (15/24) p value <0.001 (defined as a Ferriman-Gallwey score > or = 6), Acne was 75% (18/24) p value <0.01,

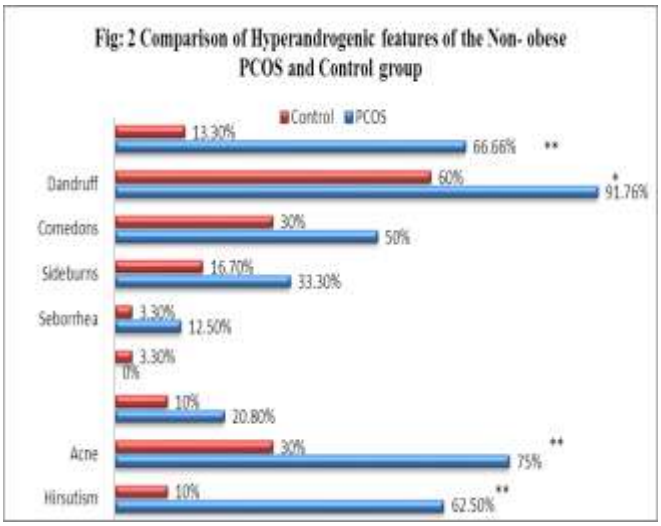
Acanthosis nigricans was 20.8% (5/24) p value 0.124, Hidradenitis suppurativa was 0 % (0/24) p value0.367 Seborrhea was 12.5% (3/24) p value 0.201, Sideburns was 33.3% (8/24) p value 0.155, Comedons was 50% (12/24) p value 0.134, Dandruff was 91.76% (22/24) p value <0.05 and androgenic alopecia was 66.66% (16/24) p value <0.001. (Table: 3 Fig: 1, 2)

Table 3: Comparison Of Hyperandrogenic Features of the PCOS and Control group.

Parameter	PCOS (N=24) N (%)	Control (N=30) N (%)	P value
Hirsutism	62.5% (15/24)	10% (2/30)	**<0.001*** **
Acne	75% (18/24)	30% (9/30)	**<0.01** **
Acanthosis nigricans	20.8% (5/24)	10% (2/30')	0.124
Hidradenitis Suppurtiva	0 % (0/24)	3.3% (1/30)	0.367
Seborrhea	12.5% (3/24)	3.3% (1/30)	0.201
Sideburns	33.3% (8/24)	16.7% (5/30)	0.155
Comedons	50% (12/24)	30% (9/30)	0.134
Dandruff	91.76% (22/24)	60% (18/30)	**<0.05***
Androgenic alopecia	66.66% (16/24)	13.3% (4/30)	**<0.001*** **

******- Highly Significant. **- Moderately Significant. *- Significant***



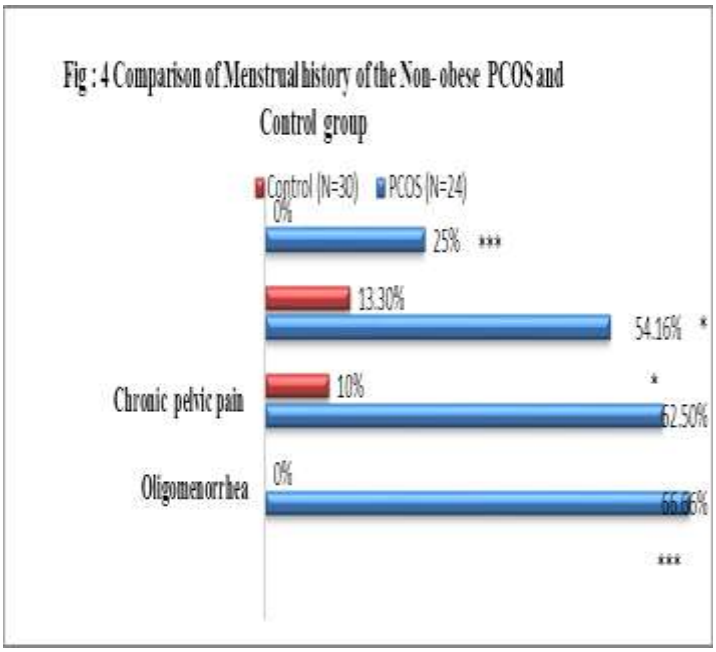


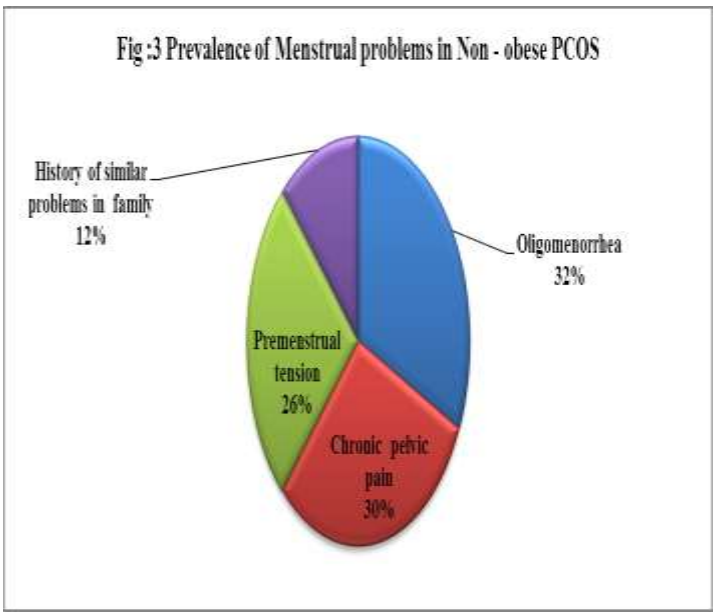
(2) Menstrual history: Oligomenorrhea 66.66% (16/24) p value <0.001, Chronic pelvic pain 62.5% (15/24) p value<0.05, Premenstrual tension (54.16% (13/24) p value <0.005, history of similar problems in family 25% (6/24) p value<0.05, Age ofmenarche was significantly less in PCOS case (13.83 ± 2.23 vs 12.37 ± 1.3 pvalue < 0.05. (Table: 4 Fig.3, 4).

Table 4: Comparison of Menstrual History of the PCOS and Control group.

Parameter	PCOS (N=24) N (%)	Control (N=30) N (%)	p value
Oligomenorrhea	66.66% (16/24)	0%(0/30)	**<0.001*** **
Chronic pelvic pain	62.5% (15/24)	10% (3/30)	**<0.05***
Premenstrual tension	54.16% (13/24)	13.3% (4/30)	**<0.05***
History of similar problems in family	25% (6/24)	0% (0/30)	**<0.01****
Age of menarche	13.83 ± 2.23	12.37 ± 1.3	**<0.05***

******- Highly Significant. **- Moderately Significant. *- Significant.***





(3) Life style: Irregular food intake 20.166 % (7/24) value <0.05, coffee or tea >3 /day 12.5% (3/24) value<0.05, No exercise 83.33% (20/24) value 0.424, Altered sleep 50% (12/24) value <0.01 and Significant stress level grade III 58.33% (14/24) value <0.001 (Table:5)

Correlation between study group and Basic Defining parameters showed Waist circumference,W / H ratio, Age of Menarche (years), Hirsutism score were significantly correlated with p value of <0.001, 0.01,< 0.001, ,< 0.001 respectively. (Table: 6).

Table 5: Comparison of Life style of the PCOS and Control group.

Parameter		PCOS (N=24) % (N)	Control (N=30`) % (N)	P value
Irregular food intake		20.166 % (7/24)	3.3% (1/30)	**<0.05***
Coffee or tea (Number /day)	No	12.5% (3 /24)	20% (6/ 30)	**<0.05***
	1	8.3% (2/24)	40% (12/ 30)	
	2	41.7% (10/24)	20% (6/ 30)	
	3	25% (6/24)	20% (6/ 30)	
	>3	12.5% (3/24)	0% (0/ 30)	
Exercise	No exercise	83.33% (20/24)	80% (24/30)	0.424
	Occasional exercise	0 % (0/24)	6.7% (2/30)	
	Regular exercise	16.7% (4/24)	13.3% (4/30)	
Altered sleep		50%(12/24)	13.3%(4/30)	**<0.01****
Stress level	Baseline	16.7% (4/24)	80% (24/30)	**<0.001*****
	>Usual Grade I	20.8% (5/24)	10% (3/30)	
	Significantly high Grade II	58.3% (14/24)	10% (3/30)	
	Worst Grade III	4.2% (1/24)	0% (0/30)	

***- Highly Significant. **-Moderately Significant. *- Significant*

A binary logistic regression analysis was done to find the effect of Age, BMI, Waist circumference, W / H ratio, Neck circumference, RHR, RSBP, RDBP, Age of Menarche (years), Oligomenorrhea, Chronic pelvic pain, Premenstrual tension, History of similar problems in family, Altered sleep, Stress and effect of not doing Exercise on the likelihood of participants having PCOS.The model explained 100% of Nagelkerke R^2 Of the variance in PCOS and correctly explained 100% of caes. The test was good fit according to Hosmer and Lemeshow test and no parameters showed greater individual prediction significantly. (Table: 6, 7).

Table 6: Correlation and Regression Analysis Between Study Group And Basic Defining Parameters.

Parameters	Correlation analysis		Regression analysis	
	r value	p value	Standardised beta	p value
Age	- 0.144	0.298	0.937	1.000
BMI(Kg / m2)	0.264	.054	-2.516	1.000
Waist circumference	0.719	**<0.001*****	2.228	0.999
W / H ratio	0.379	**<0.01****	161.016	0.999
Neck circumference	0.257	0.061	-6.852	0.999
RHR	0.471	**<0.001*****	0.105	1.000
RSBP(mm Hg)	- 0.242	0.078	-0.333	0.999
RDBP(mm Hg)	- 0. 183	0.185	-0.729	0.999
RPP(mmHg/Min)	0.374	**<0.01****	0.055	0.010
Age of Menarche (years)	- 0.550	**<0.001*****	-0.653	0.999
Hirsutism score	0.686	**<0.001*****	2.729	0.44

***- Highly Significant. **- Moderately Significant.*

Table 7: Regression analysis between the study group and hyperandrogenic parameters and other clinical parameters.

Hyperandrogenic parameters			Other clinical parameters		
Parameters	**r value**	**p value**	**Parameters**	**r value**	**p value**
Hirsutism	-1.029	0.690	**Oligomenorrhea**	-19.136	0.999
Acne	-2.123	0.582	**Chronic pelvic pain**	-8.179	1.000
Acanthosis nigricans	9.158	**<0.05***	**Premenstrual tension**	-12.096	1.000
Hidradenitis Suppurtiva	27.616	**<0.001*****	**History of similar problems in family**	-11.875	1.000
Seborrhea	-18.158	0.066	**Altered sleep**	14.929	0.999
Sideburns	1.494	0.536	**Stress**	4.202	1.000
Comedons	4.673	0.183	**Exercise**	-0.262	0.732
Dandruff	-5.388	0.302			
Androgenic alopecia	-11.090	**<0.05***			

***- Highly Significant *- Significant*

Table 8: Regression Analysis between Significant Hyperandrogenic Parameters With Rate Pressure Product (RPP) And Waist Circumference (WC).

	RPP		WC	
Significant hypenandrogenic features	**Standardised beta**	**p value**	**Standardised beta**	**p value**
Hirsutism	0.021	0.50	0.094	**<0.001*** **
Acne	0.015	0.407	0.053	**<0.05***
Dandruff	-0.003	0.888	0.023	0.311
Androgenic alopecia	0.057	**<0.01****	0.073	**<0.05***

- *Highly Significant* *- *Significant

The test was also carried out to find the association between hyperandrogenic parameters and PCOS with 89% of Nagelkerke R^2 explaining the variance and 88.9% correctly predicted according with Hosmer and Lemeshow test. Of the parameters Acanthosis nigricans, Hidradenitis Suppurtiva and Androgenic alopecia came out as significant individual predictors of a person to have PCOS who is of ideal and lean weight with p value < 0.05, <0.001, <0.05 respectively with Odds ratio more than 1. (Table: 7).

Regression analysis was done to predict the association between RPP, WC to significantly present hyperandrogenic features, i.e., hirsutism, achne, dandruff and androgenic balding and we found that androgenic balding alone was associated with RPP p value < 0.05 but with WC., hirsutism, achne, dandruff and androgenic balding were significant predictors with p value <0.01,<0.05 and < 0.05 respectively. (Table: 8).

DISCUSSION

Polycystic ovary syndrome (PCOS) is a common condition in women of reproductive age with well-established metabolic abnormalities. There are numerous diagnostic criteria generating several reproductive diagnostic phenotypes [National Institute of Health (NIH) hyperandrogenic anovulatory PCOS and non-NIH PCOS including hyperandrogenic ovulatory or non-hyperandrogenic anovulatory. Our study gives a detailed description and prevalence of hyperandrogenic features and other clinical features as diagnostic criteria in lean PCOS. It also brought out important clinical hypaerandrogenic predictors among non- obese PCOS.

Weight gain may be associated with the development of PCOS, also has a role in the development of cutaneous signs of hyperandrogenism. BMI is a predictor of the persistence of oligomenorrhea into adolescence and presumably the development of PCOS.[27] as also the BMI was slightly, but significantly, higher among girls with compared to those without, PCOS.[28] Visceral adiposity is frequently noted, with an increase of the waist-to-hip ratio greater than 88 cm (35in.), and is associated with a number of metabolic aberrations in PCOS, including higher degrees of hyperandrogenemia, insulin resistance, glucose intolerance, and dyslipidemia.[29] Therefore in Our patient population we had lean and normal weight patients according to BMI, and WH Ratio though there was presence of central obesity in patient group with waist circumference. WC and WHR were highly correlated to PCOS. WC was also important predictor of significant hyperandrogenic features like hirsutism, Achne, androgenic balding and Dandruff.

Neck circumference (NC) is a relatively new method of differentiating between normal and abnormal fat distribution. It is a marker of upper body subcutaneous (SC) adipose tissue distribution. Upper body SC fat is related to metabolic disorders like glucose intolerance, diabetes, hypertriglyceridemia, etc.[30] Another study reports that large NC is related to the presence of sleep apnoea, diabetes, and hypertension.[31] Neck circumference is a good clinical predictor of menstrual irregularity, hirsutism, infertility, insulin resistance and the PCOS. Hence it was included for the study. Neck circumference reflects the risk of metabolic and PCOS syndrome in obese patients.[16] Prevalence of increased neck circumference 50% (12/24) was not significant (NS), but there was no significant increase in neck circumference between the groups. They were not insulin resistant and no central obesity was present with respect to NC.

No one had diabetes mellitus and hypertension and Rate pressure product was significant in this study as well as in our previous study turning out be an important parameter determining cardiovascular risk.[32] Here RPP as well as RHR was significantly correlated to PCOS. RPP came out as an important predictor of PCOS as well as it was associated with Androgenic balding. RPP denotes increased oxygen demand and increased myocardial load.[32]

Among the hyperandrogenic features the incidence of Hirsutism was 62.5% Hirsutism represents as a primary clinical indicator of androgen excess.[33] This was the fourth highest prevailing androgenic sign in lean PCOS next only to dandruff (91.76%), Acne (75%) and androgenic alopesia (66.66%). The prevalence of hirsutism in PCOS patients is 40 – 92% in European and American females.[33] Hirsutism is based on a conversion of weak light vellus hair into strong dark terminal hair in androgen-sensitive body areas. Differential diagnosis of androgen-independent hypertrichosis may be crucial.The primary androgen responsible for hair growth is dihydrotestosterone (DHT), which is synthesized from testosterone by the activity of 5α-reductase type 2.

Hirsute females have increased 5α-reductase-activity in hair follicles.[33] Hirsutism appears to be strongly related with hyperandrogenism and metabolic abnormalities in PCOS women,[26] but in our study androgenic alopesia is the greatest individual predictor to have PCOS next only to Acanthosis nigricans and Hidradenitis Suppurtiva with accordance with regression analysis.

One of the important etiologic factors in acne is an increase in sebaceous gland activity, which is androgen dependent. Acne is a common manifestation of hyperandrogenemia, the levels of plasma-free T in PCOS are similar in patients with or without acne.[34] Prevalence was 37.3% among PCOS,[35] here in non-obese PCOS it has a high prevalence of 75%. Acne was not associated with the hormonal, metabolic and anthropometric variables.

Acanthosis nigricans (AN) usually correlates to insulin resistance (IR) or obesity in obese populations. It is more commonly seen as a marker of hyperinsulinemia and the metabolic syndrome.[37] AN appears to be detectable in a large proportion of women with PCOS, although large-scale studies are lacking In patients with normal BMI, 33 (9.7%) women had AN,[38] compared to our patient group who had 20.8% (5/24) who were non obese.

Seborrhea was 12.5% (3/24) compared to the prevalence of seborrhea, 34.8% in one study.[26,25] Dandruff was 91.76% (22/24) and androgenic alopecia was 66.66% (16/24) significantly altered compared to 34.8%,[26] it was associated with altered RPP as well as increased WC. Sideburns was 3.3% (8/24) and Comedons was 50% (12/24) and of no significance.

PCOS accounts for 75% of patients with anovulatory infertility,[39] 30–40% of secondary amenorrhea, and 85–90% of women with oligomenorrhea.[40] Menstrual dysfunction is usually characterized by infrequent or absent menstrual bleeding, usually not preceded by premenstrual symptoms that may include mood changes, bloating, or breast fullness or tenderness, suggesting anovulation.[41] In Our patient population, 66.66% had Oligomenorrhea, 62.5% Chronic pelvic pain, 54.16% Premenstrual tension 25% History of similar problems in family 25%, all with significant difference between the study groups. Age ofmenarche was significantly mores in PCOS and it was positively correlated. None of them came out as individual predictors for a person to have PCOS.

Life style pattern showed Irregular food intake 20.166 % (7/24) coffee or tea >3 /day 12.5% (3/24), No exercise 83.33% (20/24), Altered sleep 50% (12/24) value and Significant stress level increased to grade III 58.33% (14/24).

CONCLUSION

Generally, the findings elicited by the medical history and physical exam provide the strongest suggestion that a patient suffers from PCOS. Clinical assessment of the hyperandrogenic woman requires a comprehensive evaluation of all signs and symptoms. Signs may be subtle but may yield clues as to the clinical presence of the insulin resistance syndrome and the frequent development of type 2 DM and possible cardiovascular disease. The role of the physician is to recognize the various presentations of this syndrome and not only to initiate treatment to minimize the reproductive and cosmetic features of PCOS, but to initiate appropriate treatment to minimize the associated risk factors leading to diabetes and cardiovascular events.

REFERENCES

1. Abdul H Zargar, Vipin K Gupta, Arshad I Wani, Shariq R Masoodi, Mir I Bashir, Bashir A Laway, Mohammed A Ganie and Mohammad Salahuddin. Prevalence of ultrasonagraphy proven polycystic ovaries in North Indian women with type 2 diabetes mellitus. Reproductive Biology and Endocrinology, 2005; 3: 35. doi: 10.1186 / 1477 – 78 27 – 3 – 35.
2. Ovalle F,Ricardo A Insulin resistence, Polycystic ovary syndrome and Type II Diabeyes mellitus. Fertil Steril, 2002; 77: 1095-1105.
3. Stein Leventhal I, Polycystic ovar syndrome richard scott lucidi AmJ Obstet Gynecol, 1935; 29: 181.
4. Barber TM .Expert Review Of Endocrinology And Metabolism, 2010 5(4): 549-61.
5. Lisa Moran, Helena Teede. Metabolic features of the reproductive phenotypes of polycystic ovary syndrome Human Reproduction Update, 2009; 15(4): 477–488.
6. PCOS consensus workshop group. Fertil Steril, 2004; 81(1): 19-25.
7. Vause TD J. Obsteta G Aynaecol Can, 2010; 32(5): 495-502.
8. Malathi Balamurugan, M. Balamurugan, Gomathi Ramanathan. Heart Rate Variability And Lipid Profile In Non-Obese Young Indian Women With Polycystic Ovary Syndrome. Journal of Evolution of Medical and Dental Sciences, 2015; 2(24): 4092-4109.
9. A J Morales, G A Laughlin, T Bützow, H Maheshwari, G Baumann, S S Yen. Insulin, somatotropic, and luteinizing hormone axes in lean and obese women with polycystic ovary syndrome: common and distinct features .The Journal of Clinical Endocrinology & Metabolism, 1996; 81(8): 2854–2864.
10. Abdul H Zargar, Vipin K Gupta, Arshad I Wani, Shariq R Masoodi, Mir I Bashir, Bashir A Laway, Mohammed A Ganie and Mohammad Salahuddin. Prevalence of ultrasonagraphy proven polycystic ovaries in North Indian women with type 2 diabetes mellitus. Reproductive Biology and Endocrinology, 2005; 3: 35.
11. The Rotterdam ESHRE / ASRM – sponsored PCOS consensus workshop group Revised 2003 consensus on diagnostic criteria and long term health risks

related to Polycystic Ovary Syndrome. January; Fertility and sterility, 2004; 81: 19.
12. White WB. Heart rate and the rate-pressure product as determinants of cardiovascular risk in patients with hypertension. Am J Hypertens, 1999; 12(2 Pt 2): 50S-5.
13. Tsuguhito Ota, Toshinari Takamura, Nobuyuki Hirai, Ken-ichi Kobayashi. BMI Classification Physical status: Preobesity in World Health Organization Classification Involves the Metabolic Syndrome in Japanese. Diabetes Care July, 2002; 25(7): 1252-1253.
14. World Health Organization. Obesity – Preventing and Managing the Global Epidemic: Report of a WHO Consultation on Obesity. Geneva: World Health Organization, 1998.
15. Lean MEJ, Han TS, Morrison CE. Waist circumference as a measure for indicating need for weight management. BMJ, 1995; 311: 158–61.
16. Measurement method for body size. Human characteristic Dada bare. National Institute for Technologyand Evaluation.http://www.tech.nite.go.jp/human/eng/contents/cmeasurement/uran/neckuran.html.
17. Jagadamba Aswathappa, Sumit Garg, Karthiyanee Kutty, and Vinutha Shankar. Neck Circumference as an Anthropometric Measure of Obesity in Diabetics. N Am J Med Sci., 2013; 5(1): 28–31.
18. John B. Dixon, Paul E. O' Brien. Neck circumference a good predictor of raised insulin and free androgen index in obese premenopausal women: Changes with weight loss clinical endocrinology, 2002; (57)6: 769 – 778.
19. Yang GR, Yuan SY, Fu HJ, Wan G, Zhu LX, Bu XL. Neck circumference positively related with central obesity, overweight, and metabolic syndrome in chinese subjects with type 2 diabetes: Beijing community diabetes study 4. Diabetes Care, 2010; 33: 2465–7.
20. Ruutiainen K, Erkkola R, Gronroos MA, Irjala K. Influence of body mass index and age on the grade of hair growth in hirsute women of reproductive ages. Fertil Steril, 1998; 50: 260 –265.
21. Hatch R, Rosenfield RL, Kim MH, Tredway D. Hirsutism: implications, etiology and management. Am J Obstet Gynecol,, 1981; 140: 815–830.
22. Pochi PE, Shalita AR, Strauss JS, et al. Report of the Consensus Conference on Acne Classification. Washington, DC, March 24 and 25, 1990. J Am Acad Dermatol, 1991; 24: 495–500.
23. Rogers DL. Acanthosis nigricans. Semin Dermatol, 1991; 10: 160–163.
24. R. Verdolini , A. Smith, N. Alwash, B. Mannello, N. Clayton. Metformin for the treatment of hidradenitis suppurativa: a little help along the way. Journal of European Academy Of Dermatology And Venereology. September, 2013; 27(9): 1101-1108.
25. Borda, Luis "Seborrheic Dermatitis and Dandruff: A Comprehensive Review". Journal of Clinical and Investigative Dermatology, 2015; 3(2).
26. Suna Özdemir, Mustafa Özdemir, Hüseyin Görkemli, Aysel Kiyici, Sait Bodur. Specific dermatologic features of the polycystic ovary syndrome and its association with biochemical markers of the metabolic syndrome and hyperandrogenism. February, 2010; 89(2): 199–204.
27. Van Hooff MH, Voorhorst FJ, Kaptein MB, Hirasing RA, Koppenaal C, Schoemaker J. Predictive value of menstrualcycle pattern, body mass index, hormone levels and polycystic ovaries at age 15 years for oligo-amenorrhoea at age 18 years. Hum Reprod, 2004; 19: 383–392.
28. Michelmore KF, Balen AH, Dunger DB, Vessey MP. Polycystic ovaries and associated clinical and biochemical features in young women. Clin Endocrinol (Oxf), 1999; 51: 779–786.
29. Ehrmann DA. Polycystic ovary syndrome. N Engl J Med, 2005; 352: 1223–1236.
30. Jagadamba Aswathappa, Sumit Garg, Karthiyanee Kutty, and Vinutha Shankar. Neck Circumference as an Anthropometric Measure of Obesity in Diabetics. North American Journal of Medical Sciences, 2013; 5(1): 28.
31. Medeiros CA, Bruin VM, Castro-Silva Cd, Araújo SM, Chaves CM, Junior, Bruin PF. Neck circumference, a bed side clinical feature related to mortality of acute ischemic stroke. Rev Assoc Med Bras, 2011; 57: 559–64.
32. Malathi Balamurugan, M. Balamurugan, Gomathi Ramanathan. Poincare plot of heart rate variability: quantitative analysis of sympathetic nervous activity in non-obese polycystic ovary syndrome patients. J. Evolution Med. Dent. Sci., 2016; 5(47): 3005-3010.
33. Lowenstein EJ Diagnosis and management of the dermatologic manifestations of the polycystic ovary syndrome. Dermatol Ther., 2006; 19: 210–23.
34. Lucky AW, McGuire J. Rosenfield RL, Lucky PA, Rich BH. Plasma androgens in acne vulgaris. J Invest Dermatol, 1983; 81: 70–74.
35. Penwadee Timpatanapong, Aram Rojanasakul. Hormonal Profiles and Prevalence of Polycystic Ovary Syndrome in Women with Acne. The journal of dermatology, 1997; 24(4): 223-229.
36. Borgia F, Cannavo S, Guarneri F, Cannavo SP, Vaccaro M, Guarneri B. Correlation between endocrinological parameters and acne severity in adult women. Acta Derm Venereol, 2004; 84: 201–204.
37. Dunaif A, Green G, Phelps RG, Lebwohl M, Futterweit W, Lewy L. Acanthosis nigricans, insulin action, and hyperandrogenism: clinical, histological, and biochemical findings. J Clin Endocrinol Metab, 1991; 73: 590–595.
38. Zhe Dong, Jia Huang, Lili Huang, Xiaoli Chen, Qianqian Yin, Dongzi Yang. Associations of acanthosis nigricans with metabolic abnormalities in polycystic ovary syndrome women with normal body mass index March, 2013; 40(3): 188-192.

39. Adams J, Polson DW, Franks S. Prevalence of polycystic ovaries in women with anovulation and idiopathic hirsutism. Br Med J, 1986; 293: 355–359.
40. Franks S, White DM. Prevalence of and etiological factors in polycystic ovarian syndrome. Ann NY Acad Sci., 1993; 687: 112–114.
41. Chang RJ, Katz SE. Diagnosis of polycystic ovary syndrome. Endocrinol Metab Clin North Am, 1999; 28: 397–408.