Evaluation of Reproductive Hormones Levels and Metabolic Risk Factors among Women with Polycystic Ovary Syndrome inSana'a YEMEN

Abstract

Background and Objectives: Polycystic ovary (PCOs) syndrome is most complex endocrine disorders in female reproductive system with metabolic and psychological manifestation; which affect 5% -10% of reproductive-aged women. PCOs.There are no study has been conducted or published on this aspects. The present investigation was aimed to evaluate the hormones &metabolic syndromes (MS) risk factors and smoking and chewing khatimpacts on the syndrome among PCOs women in Sana'a.

Materials and Methods:forty-five Yemeni women age variety (18–45 years) with PCOS were separated into two groups concerning age: group one (18– 29 years), group two (30–45) years and been subjected to clinical assessment (waist, BMI and sex hormones, blood pressure, glucose, lipids, insulin), transvaginal ultrasound. **Results**: The prevalence of MS among PCOs patients was 35% and the most prevalent MS risk factors among PCOs patients were waist circumference (WC) 64.4%, and HDL-C 64.4% respectively, while prevalence of triglycerides (TG), hypertension and fasting blood sugar (FBS) were 28.9%, 20% and 13.3%, respectively. PCOspatients had significant increase in serum levels of luteinizing hormone (LH) ($p < 0.001$), Insulin ($p < 0.001$), HOMA-IR ($p < 0.001$), T testosterone (TT) ($p < 0.001$), DHEA-S ($p < 0.001$)and FBS ($p < 0.016$). Lean PCOspatients had a significant increase in TT than overweight/obese PCOs($p < 0.045$) dehydroepiandrosterone sulfate (DHEA-S) was found significantly higher in PCOswomen with MS ($p < 0.011$). Insulin resistance was significantly higher in PCOswomen with hypertension as compared to PCOs women without hypertension ($p < 0.023$).

Conclusion:PCOssyndrome was a result of reproductive hormone disturbance. The patients had a significant increase in serum levels of LH, LH/ Follicle Stimulating Hormone (FSH) ratio, insulin, TT and DHEA-S. Infertility, hirsutism, menstrual irregularity and polycystic ovary on ultrasound were the most significant symptoms among PCOspatients. MS was found in 35 % of patients and was presented by a significant increase in Insulin resistance and HOMA-IR, WC and reduced HDL-C. A significant association was found between the patients and family history of PCOs.

Keywords; Polycystic Ovary Syndrome; Hormones; Metabolic Risk Factors; Insulin

Introduction

Polycystic ovary syndrome (PCOs) begins during adolescence and gradually transitions to adulthood and its effects persist even post-menopause. Clinical features of PCOs can be categorized in three different groups– such as reproductive, metabolic, and psychological; which the most common multifaceted and heterogeneous endocrinopathy disorder among adult women [1].It estimated to affect 6% -8% of females in reproductive age[2].Chronic anovulation, infertility, clinical evidence of Hyperendrogenism (hirsutism, balding of the male pattern and, acne) and

enlarged polycystic ovaries have been characterized by PCOs.[3]. PCOsalso related to resistance to the action of insulinleading to biochemical disturbance to the metabolism of carbohydrates,sex steroids and lipids[4], in addition to an increase in inflammation markers.In 2003, Rotterdam consensus has been reached on the diagnosis of PCOsin women with at least two of the following characteristics: clinical or biochemical hyperandrogenemia, amenorrhea or oligomenorrhea and ultrasound involvement of ovarian cyst. Even increased cardiovascular disease (CVD) risk factors are identified for women with PCOs [5], besides increased MS prevalence. PCOspatients are advised to be tested for MSand CVD risk factors[6].More precisely, PCOs women may have altered tolerance to glucose and dyslipidemia[7]. Moreover, thyroid disorders are now recognized to be more prevalent in patients with PCOs than in a regular population[8].However, accurate data on the prevalence and incidence is limited and variable, mainly due to the different sets of the diagnostic criteria used to define the disorderas well as the exact number of women affected is unknown[9]. PCOS is also often undiagnosed[10].Not surprisingly, the prevalence of PCOS appear to be higher form 35%-90% in women with menstrual abnormalities also is increased in the presence certain diseases. The prevalence of PCOS in women with epilepsy, for example, exceeds that in women without epilepsy[11].This research aimed to determine the independent correlation of metabolic and clinical outcomes in a well-characterized population of patients with and without PCOS. We have provided data on 45 women with PCOs and 45 women without PCOS, hormonal and metabolic findings were compared in patients divided into two classes' case and control. In Yemen, there are no published data regarding the prevalence or incidence of PCOs among women. There is also a great need for research into several issues regarding the complexity of PCOs among Sana'a Yemeni women and the late negative impact on their health. The current study aimed to determine the independent correlation of metabolic and clinical outcomes in a well-characterized population of patients with and without PCOs.

Materials and Methods

Specimen Collection and Processing

 A total of 45diagnosedPCOswomens between 18- 43 years age groups were selected from the department of obstetrics and gynaecology at AL-Kuwait University Hospital, Al-Sabeen Hospital, central health lab and modern international lab in Sana'a. 45women without PCOs were selected as control. The PCOssubject was selected if they had 2 out of 3 criteria met (oligoovulation and anovulation)excess androgen activity, polycystic ovaries by gynecologic ultrasound, with excluding other endocrine disorders; that may cause similar symptoms likehyperprolactinemia, hypothyroidism, cushing syndrome and congenital adrenal hyperplasia.

Assay

 5ml of Venous blood sample was collected after 12 h overnight fasting assayed at 8:00-10:00 AM, during the 3rd-5thday of the menstrual cycle (the only early follicular phase). Nine hormones α-OH progesterone, Dehydroepiandrosterone included sulfate(DHEA-S), thyroid-stimulating hormone, prolactin (PRL), follicle stimulating hormone(FSH), luteinize hormone(LH), insulin andtotal testosterone(TT)were measured by ELISAtechniqueusing commercial kits (Human Germany, DRG International USA, Roche, Germany, Abbott USAs). Glucose, Cholesterol,

Triglycerides, HDL-cholesterol (HDL-C) andLDL-cholesterol (LDL-C) were measure by enzymatic colorimetric reactionusing commercial kits (Human Germany).

Data collection

The primary data collection technique i.e. questionnaire (self-administrated) was used to collection of data. The which consisted of three parts; i) Participants demographic characteristics; ii) Participants epidemiologic characteristics and; iii) Participants medical characteristics

The demographic section includes marital status and age of participants, while the epidemiologic includes obesity, smoking, chewing khat and family history of diabetes, obesity, hirsutism and PCO, and medical characteristics includes menarche, regularity of menses fertility, primary and secondary infertility, thyroid disorder, hirsutism, acne, PCO, diabetes, galactorrhea and medication.

Data Analysis

Data analysis was performed using the SPSS software (16.0,SPSS Inc, Chicago, IL), and the significant difference was indicated if (P-value <0.05).Continuous variables were checked for normality using the one-sample Kolmogorov-Smirnoff test; they are expressed as mean ± standard deviation (SD). The categorical variables are expressed as percentages. Distributions between groups are compared using the T-test with Bonferroni correction for pairwise comparison. Insulin sensitivity, expressed as the IS, was calculated using mathematical modeling(MIN MOD version 3.0) HOMA-IR and HOMA-%β were calculated using the 1996 HOMA2 computer model.

Results

The sample size of this study was 90 women belongs to 18-43 years of age group. 45 of them were healthy controls women and 45 PCOs patients; who have been diagnosed based on the 2003 Rotterdam criteria. Hirsutism was found in 43(95.6%), 41(91%), had menstrual irregularity. Percentage of oligomenorrhea, amenorrhea and normal menstrual was 25(55.5%), 16(35.5%) and4(9%) respectively, Among the 17 infertile patients; 11(24.4%) had primary infertility and 6(13.3%) had secondary infertility. PCO on ultrasound was recorded 42(93.3%) and3(6.7%); had no PCO.18 (40%) had acne while 3(6.7%) had alopecia.18(40%) of PCOs patients hadacne, while 3(6.7%) had alopecia (Table 1).

Table: 1-Description of the most important clinical finding of PCOs patients

Clinical finding (Variable)	PCOs	
	Yes	No
	N (%)	N (%)
Hirsutism	43(95.6%)	2(4.4%)
Acne	18(40%)	27(60%)
Alopecia	3(6.7%)	42(93.3%)
Infertility	17(37.7%)	-

	Primary	11(24.4%)	-
	Secondary	6(13.3%)	-
Menstrual irregularity	41(91%)		4(9%)
	Regular	4(9%)	-
	Oligomenorrhea	25(55.5%)	-
	Amenorrhea	16(35.5%)	-
PCO	42(93.3%)		3(6.7%)

Mean±SD, n=45, N: number; SD: standard deviation; *P-value < 0.05considered significant;**P-value <0.001 considered highly significant

Menses frequency was significantly higher among PCOs Patients than that of healthy controls women (P< 0.001). Systolic and diastolic blood pressure was also significantly higher among PCOswomen as compared to the healthy control group (p< 0.008 and p<0.047) respectively. There were nosignificant differences in menarche, height, weight, BMI and WHR between PCOspatients and healthy controls(Table.2).

Table:2-Demographic characteristics of both healthy control and polycystic ovary syndrome patients.

Variables	Non-PCOs	PCOs	P-value
Menarche(years)	12.49±2.67	12.73±1.59	0.83
Married	20(44.4%)	17(37.7%)	0.280
Single	25(55.65)	28(62.2%)	
BMI (Kg\m²)	25.37 ± 4.57	26.85 ± 7.81	0.26
WHR(cm)	0.81 ± .08	0.82 ± .09	0.27
WC(cm)	79.93±11.68	84. ±17.83	0.204
Days between menstrual cycle(day)	25.18±3.05	86.24±56.59	<0.001**
Systolic blood pressure(mmHg)	114.89±13.71	124.3±18.69	0.008**
Diastolic blood pressure (mmHg)	79.56±9.58	83.78±9.89	0.043*

Mean±SD, n=45, N: number; SD: standardstander deviation; *P-value < 0.05 considered significant;**P-value <0.001 considered highly significant

The family history of PCOswas significantly increased among PCOspatients compared to that of healthy controls (p < 0.001, p<0.004) respectively. However, smoking was more common among

healthy controls than patients (P< 0.002). Table 3 depicted the family history of PCOs; were significantly increased among PCOspatients compared to that of healthy controls (p < 0.001, p<0.004), respectively. However, smoking was more common among healthy controls than patients (P< 0.002). Also, Khatchewing,obesity, family history of obesity and diabetes between two controls and PCOspatients were not significantly different

Table:3- Distribution of risk factors for PCOs in both healthy controls and polycystic ovary syndrome patients

Risk factors	Non-PCOs	PCOs	Odd ratio (95%CL)	P-value
Smoking	16 (35.6%)	4 (8.9%)	0.177(0.054-0.0584)	0.002**
Chewing Khat	17(37.8%)	10 (22.2%)	0.471(0.186-1.188)	0.107
Obesity	27 (60%)	29 (64.4%)	1.325(0.566-3.099)	0.517
Family history of DM	30 (66.7%)	24 (53.3%)	0.571(0.244-1.341)	0.197
Family history of obesity	32(71.1%)	31 (68.9%)	0.900 (0.365-2.271)	0.818
Family history of PCOs	0 (0%)	9 (20.0%)	0.444(0.345-0.567)	0.004**

Mean±SD, n=45, N: number; SD: standardstander deviation; *P-value < 0.05 considered significant;**P-value <0.001 considered highly significant

.Table4 shows the differences between biochemical markers between PCOspatients and healthy control women. The hormonal disturbance of LH, LH/FSH ratio, T. Testosterone and DEHA-Swerestatically significant to PCOspatients compared to healthy controls (P<0.001, p <0.001, p <0.001, p<0.001) respectively. Moreover, FBS, Insulin and HOMA-IR were moderate significant to PCOs patients (P <0.020, p <0.001, p<0.001) respectively whereas, there were nosignificant increase was foundin lipid profile among PCOs patients as compared to healthy controls. In the other hand, the difference in FSH level was observed between PCOspatientsand controls.

Table: 4-Description and P-value of the biochemical parameters for both healthy controls and polycystic ovary syndrome patients

Parameters	Normal Range	Non-PCOs	PCOs	P-Value
LH (mlu\L)	(1-18)	4.10 ±1.41	12.4 ±6.32	<0.001**
FSH(mlu\L)	(3.0- 7.9)	6.18 ±1.30	6.00 ±2.25	0.658
LH\FSH ratio	(1:1)	0.669 ±0.18	2.23 ±1.16	<0.001**
T.T (ng/ml)	(0.06-0.82)	0.212 ±0.107	0.657 ±0.614	<0.001**
DHEA-S (ng/ml)	(0.06-0.82)	1.61 ±0.99	3.28 ±2.36	<0.001**
Insulin (u/ml)	(3-17)	7.98 ±3.41	13.24 ±9.46	<0.001**
F.B.S (mg/dl)	(70-115)	80.78 ±8.95	89.89 ±23.23	0.02*
HOMA-IR	-	1.61±0.76	3.13±2. 86	0.001**
HOMA-%β	-	139.95±53.02	146±13	0.590

HOMA-S	-	95.99±50.40	71.75±48.05	0.022
Cholesterol (mg/dl)	< 200	190.67 ±36.94	204.98 ±36.04	0.06
Triglyceride(mg/dl)	< 150	114.73 ±47.82	130.78 ±57.75	0.155
HDL-C(mg/dl)	>40	44.91 ±9.15	46.33 ±14.71	0.583
LDL-C(mg/dl)	<130	122.84 ±30.40	131.53 ±36.69	0.225

Mean±SD, n=45, N: number; SD: standard deviation; *P-value < 0.05considered significant;**P-value <0.001 considered highly significant.

Comparison side, at the Prevalence of different characteristics of metabolic syndrome between PCOs patients and healthy control women, was 16(35.6% vs.0 (0%). The rate of WC indicated the rate of central obesity was 29(64.4% vs. 24(53.3%)), FBS ≥100mg/dl was [6(13.3% vs. 2(4.4%)], Triglycerides ≥150 mg/d (13(28.9% vs. 7(15.6%), HDL-C < 50 mg/dl was 29.9(64.4% vs. 14(31.1%)) and blood pressure ≥130/85 mmHg in PCOs women was(9(20%) vs. 1(2.2%) respectively. The risk of metabolic syndrome was higher significant among PCOspatients than controls (f < 0.002) and no significant differences in the characteristics of metabolic syndrome except blood pressure (p< 0.284, p< 0.138, p< 0.655, vs p<0.007).

Comparison of the prevalence of different characteristics of metabolic syndrome between PCOs patients and healthy control women was 16(35.6% vs.0 (0%). The rate of WC indicated the rate of central obesity was 29(64.4% vs. 24(53.3%)), FBS ≥100mg/dl was(6(13.3% vs. 2(4.4%)), Triglycerides ≥150 mg/d 13(28.9% vs. 7(15.6%), HDL-C < 50 mg/dl was 29.9(64.4% vs. 14(31.1%)) and blood pressure ≥130/85 mmHg in PCOswomen was 9(20%) vs. 1(2.2%) respectively. The risk of metabolic syndrome was higher significant among PCOs patients than controls (f < 0.002) and no significant differences was found in the characteristics of metabolic syndrome except blood pressure (p< 0.284, p< 0.138, p< 0.655, vsp<0.007)(Table 5). Figure 1**also** showed the comparison prevalence characteristics of metabolic syndrome between PCOs patients and control (healthy)women's.

Table: 5-comparison the prevalence of different characteristics of metabolic syndrome between PCOSs patients and healthy control women

Variables	Non-PCOs	PCOs	P .Value
WC ≥ 80(cm)	24(53.3%)	29(64.4%)	0.284
FBS ≥100(mg/dl)	2(4.4%)	6(13.3%)	0.138
Hypertension: SBP/DBP ≥130/85(mmHg)	1(2.2%)	9(20%)	0.007*
Dyslipidemia Triglycerides≥150(mg/dl) HDL<50(mg/dl)	6(13.3%) 7(15.6%) 14(31.1%)	12(26.7%) 13(28.9%) 30(64.4%)	0.114 0.128 0.655
Metabolic syndrome	0(0%)	16(35.6%)	0.002°

Mean±SD, n=45, N: number; SD: standard deviation; *P-value < 0.05considered significant;**P-value <0.001 considered highly significant.
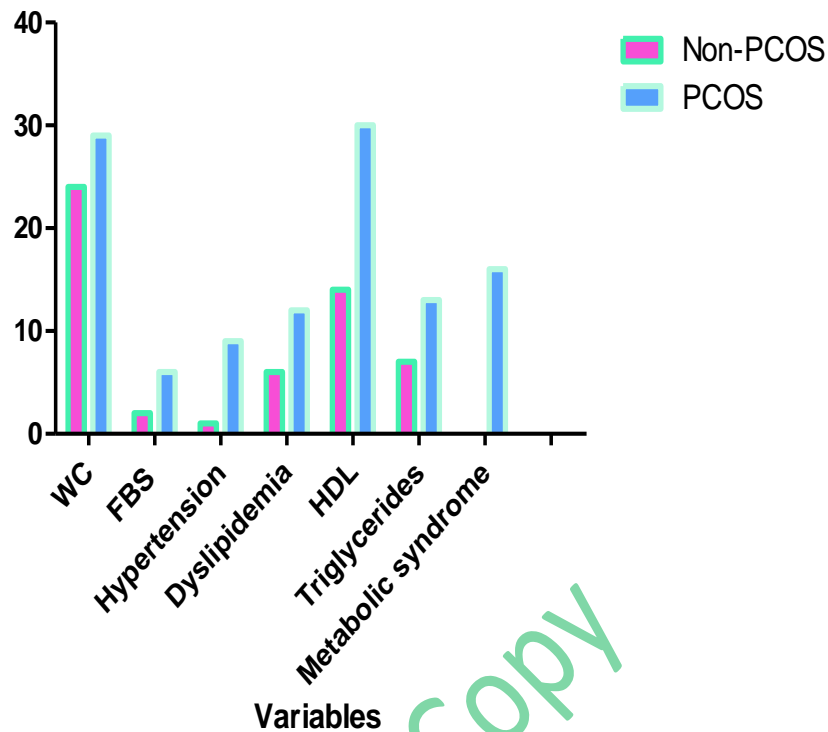
Figure: 1. Comparison prevalence characteristics of metabolic syndrome between PCOs patients and control (healthy) women's.

Clinical, metabolic characteristics and hormones

The clinical and biochemical characteristics of the 45 patients divided according to age. The obesity markers (BMI, WC) associated more with age ($p < 0.008$, $p<0.039$) also diastolic blood pressure and HOMA-IR ($p <0.037$, $p<0.004$). At the same time, hormonal disturbance of LH, LH\FSH ratio, T. Testosterone were lower significant with age ($p< 0.048$, $p<0.007$, $p< 0.004$) respectively. Also, no significant difference in systolic blood pressure, FSH, DHEA-S, Insulin, F.B.S, HOMA%β cell, HOMA-S, Cholesterol, Triglyceride, HDL.C, LDL.C with ageing among PCOs patient (Table 6).

Table:6-The association between ages, the clinical and biochemical variables in PCOs patients

Variables	18-29 year (N=35)	30-43 year (N=10)	P-Value
BMI(Kg\m²)	25.24±6.56	32.46±9.52	0.008**
Waist(cm)	81.09±17.03	94.20±17.20	0.039*
Systolic blood pressure(mmHg)	122.29±19.60	131.50±13.55	0.172
Diastolic blood pressure (mmHg)	82.14±10.24	89.50±5.99	0.037*
LH (mlu\L)	13.37±6.46	8.91±4.56	0.048*
FSH(mlu\L)	5.85±2.45	6.53±1.32	0.407
LH\FSH ratio	2.47±1.17	1.37±0.64	0.007**
T.T (ng/ml)	0.73±0.67	0.41±0.22	0.004**
DHEA-S (ng/ml)	3.33±2.55	3.08±1.57	0.124

Insulin (u/ml)	11.14±5.15	20.59±16.11	0.160
F.B.S (mg/dl)	87.03±17.44	99.90±36.69	0.768
HOMA- %β	142.083±62.82	181.29 ±76.76	0.105
HOMA-S	77.74±51.48	50.79±25.34	0.119
HOMA-IR	2.48±1.70	5.38±4.67	0.004**
Cholesterol (mg/dl)	201.09±38.37	206.10±27.65	0.704
Triglyceride(mg/dl)	123.91±58.08	132.30±58.98	0.648
HDL.C (mg/dl)	42.34±13.91	47.80±17.57	0.395
LDL.C(mg/dl)	133.66±38.45	130.50±30.80	0.831

Mean ± SD, N: number; SD: standard deviation; *P-value < 0.05considered significant;**P-value <0.001 considered highly significantTable7indicatesno significance difference in anthropometrics, hormonal profiles and metabolic parameters in two ages groups except insulin and HOMA-IR were more significant in 30-43 year group than smaller groups(18-29 year) (p< 0.027, p<0.01) indicated that insulin and HOMA-IR were worse with age.

Table: 7- The association between age, clinical and biochemical variables in the healthy controls group

Variables	18-29 year (N=19)	30-43 year (N=26)	P-Value
BMI(Kg\m²)	24.50±5.16	26.46±4.08	0.278
Waist(cm)	77.26±12.82	81.88±10.59	0. 193
WHR	0.807±0.87	81.88±10.59	0.747
Systolic blood pressure(mmHg)	113±10.28	115±15.88	0.545
Diastolic blood pressure (mmHg)	79.21±8.38	79.81±10.53	0.893
LH (mlu\L) (1-18)mlu\L	3. 70±1.53	4. 40±1.28	0.101
FSH(mlu\L) (3.0- 7.9) mlu\L	5.85±2.45	6.53±1.32	0.341
LH\FSH ratio(1:1)	5.96±1.55	6.33±1.08	0.247
T.Testosterone (ng/ml) (0.06-0.82)ng/ml	0.73±0.67	0.41±0.22	0.094
DHEA-S (ng/ml) (0.06-0.82)ng/ml	3.33±2.55	3.08±1.57	0.829
Insulin (u/ml) (3-17)u/ml	6.67±3.46	8. 93±3.10	0.027*
F.B.S (mg/dl) (70-115)mg/dl	78.01±8.57	82.81±8.83	0.075
HOMA-%β cell(%)	138.80±63.60	140.17±54.89	0.915
HOMA-S	96.71±52.97	98.71±64.51	0.912
HOMA-IR	1.27±0.63	1. 86±0.77	0.01*
Cholesterol (mg/dl) Up to 200mg/dl	186.32±34.8	193.85±38.78	0.506
Triglyceride(mg/dl) Up to 200mg/dl	104.21± 36.20	122.42±54.17	0.211
HDL.C (mg/dl) (40-60) mg/dl	44.21±8.95	45.42±9.43	0.666
LDL.C(mg/dl) (100-160)mg/dl	121.47±28.16	123.85±32.45	0.799

Mean ± SD, N: number; SD: standard deviation; *P-value < 0.05considered significant;**P-value <0.001 considered highly significant

Rotterdam criteria and the metabolic syndrome criteria

Figure 2 indicates the frequency of the Rotterdam criterion in the two groups of patients, separated by age. The incidence of the individual criteria of the metabolic syndrome show older age group was associated with increased frequency of high waist circumference, increased TG levels and high blood pressure.
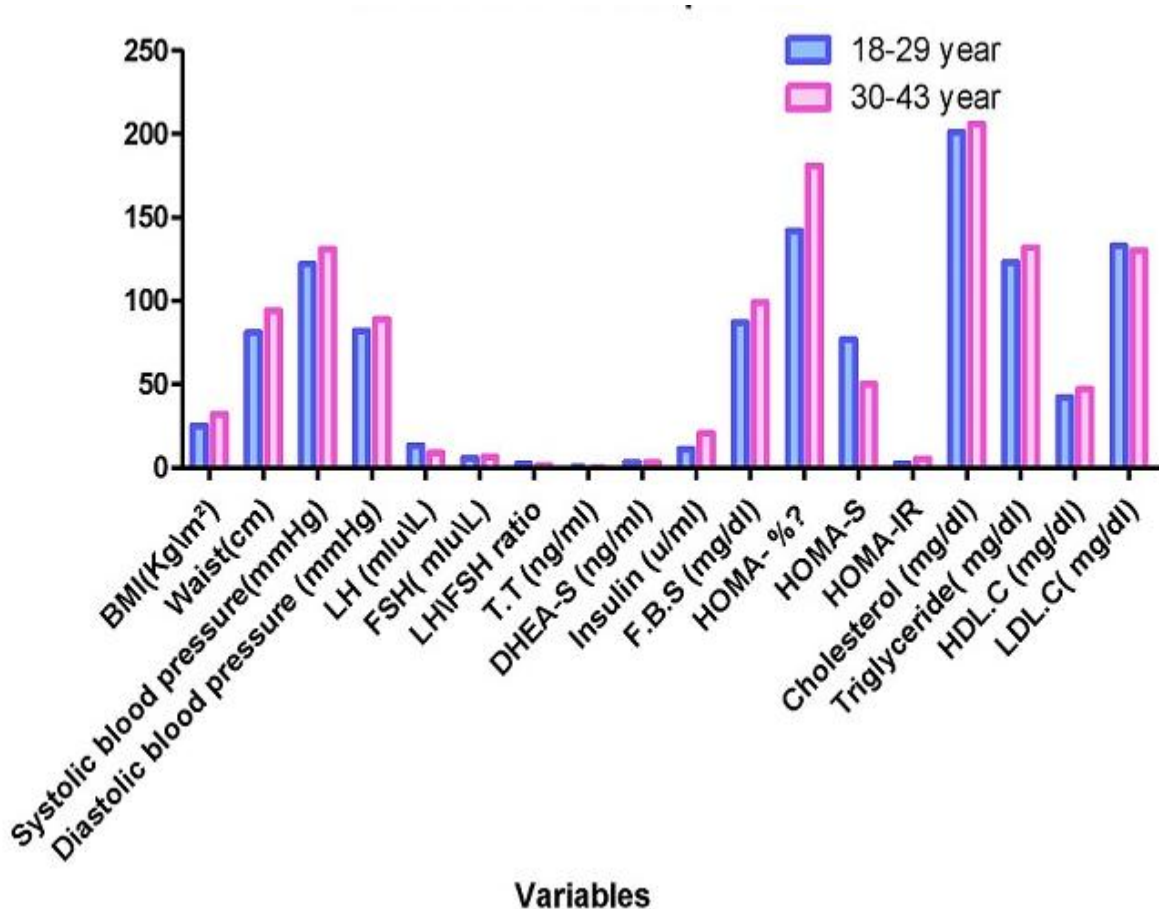
Figure 2: Association between age and variables (clinical and biochemical) in PCOs patients

Discussions

This study aims to investigate the percentage of infertility among PCOs women in Sana'a Yemen. Study association of PCOs with reproductive hormones and metabolic factors and investigate theassociationof investigated parameters with smoking and khat chewing. The case study included 45 PCOs women, among which only 17(33.3%) were marriedand 45 healthy control women, among which 20(44.4%) were married. The case and control groups were similar in their demographic profile, and age ranged 18 - 43 years. Mean age of menarche was not different between case and control in (12.73±1.59, 12.73±2.67) respectively. The mean age of menarche is typically between 12 and 13 years.The reported mean age of menarche was similar to previous studies[12,13]. Among the 45 PCOs patients, only 17(37.8%) weremarried. All of the married PCOs women were infertilewith primary infertility (the individual who have never established a pregnancy)representing 11(24.4%), andsecondary infertility(the individual who has conceived previously (including miscarriages) but is currently unable to establish a subsequent pregnancy established a pregnancy)(10) representing 6 (13.3%).In one of the largest published series of 1,871 women with PCOs. Whereas 14% were

presented with secondary infertility[14].This finding was different from a Greek study presenting primary and secondary infertility by 49%, and 26% respectively[15].Therefore,primary infertility is more common among PCOspatients. Irregular menseswas found in 41(91.1%) of the total women included in this study, among which 25 (55.6%) had either oligomenorrhea or 16 (35.6%) amenorrhea, while 4 (8.9%) of them still had regular menses.Hirsutism, in general, was the second most common complaint after infertility that the attendants claimed to suffer. Our study found hirsutism in 95.6 % of the studied PCOs women in Sana'a. Prevalence of hirsutism in PCOs generally ranges from 40% to 90% among European and American women. It is common in darker skin types, and rare in Japanese and Asian females[16].Another explanation for this discrepancy is the genetically determined differences in skin 5α-reductase activator maybe because of diet and environment[17].Therefore, acne is common in PCOs; in our study, 40% from the PCOs patients had acne. Also, Alopecia prevalence in our studywas 6.7% which is rare manifestation amongPCOs patients. Our results were compatible with previous reports which found the prevalence of alopecia to be 6% -10%[18]. PCOs and non-PCOs at ultrasound scan was (93.3% and 6.7%) respectively, which meets the Rotterdam criteria of PCOs cases 93%[19]. Family history of PCOs among mothers of patients was markedly significant as compared to controls (P <0.0001). The results of present study is in line with previous investigation reported by Mukherjee et al., [20]. On the other hand, there was no significance in a family history of DM and obesity, which were different from studies established in Greeks, United Arab Emirates, and Libya (71%, 75.5%,82%) respectively[21,22]. Furthermore, in our study, smoking did not affect androgens (TT and DHEA-S) (P< 0.45, P < 0.72) among PCOs women. This may be due to recall bias, small sample size, or because women in Sana'a are usually not chronic smokers. Triglyceride, LDL-C was significantly higher while HDL-C was significantly lower among smoker patients as compared to non-smokers. Moreover, there was no association between chewing khat and different hormonal and metabolic parameters measured in the PCOs group. No previous researches were established to estimate the effect of khat on PCOs. Therefore, furtherstudies are needed to confirm or exclude our findings. In general, smoking and khat have not changed in the reproductive hormones and metabolic parameters[23].In this study, the presence of PCOs was not associated with any differences in FSH level. is an association with LH levels and LH/FSH ratios were remarkably higher among the PCOspatients as compared to the healthy controls(P <0.001,<0.001). The similar results were reported by previous findings in Makah, Jeddah, Iraq, Thai and Libya[24,25]. Total testosterone levels were significantly higher in our PCOs patients (P<0.001), also DHEA-S levelsincreased significantly among PCOs women (P<0.001). In recent study revealed an increase in all MS risk factors as compared to control among which insulin resistance and hypertension were statistically significant.As per NHLBI/AHA criteria, the MScharacteristics such as WC 29.9(64.4%), HDL-C 29.9(64.4%), HTN 9 (20%),TG13 (28.9%), FBS 6(13.3%)respectively were recorded in PCOs patients. of . In our study, the patient phenotype differed greatly from one another age groups. Age was positively associated with obesity markers (BMI and waist circumference) in women with PCOs. The investigating of PCOs in women of different ages is important because it is now understood the increase metabolic and cardiovascular risk and undoubtedly depend on age[26]. As a result, these age-related changes may affect the observed incidence of PCOs. This study found that Women aged 30-43 years possessed higher BMI and waist than younger women (aged 18-29 years). This study was in agreement with Gu¨lekli's suggestion that PCOs women are susceptible to gain weight as they get older[27].PCOs is careful to be a polygenic trait, and clinical features of this disorder may change with age, beginning in adolescence until menopause[28]. During the transvaginal US PCOs

is a standard variant, and the incidence of PCOs in young, healthy women younger than 21 years was as high as 80% in a Danish study[29]. Duijkers found that the prevalence of PCOs was 84 % in young women aged 18–22 years compared to 33 % in the age group of 33–37 years suggesting that the prevalence of PCOs is lower in older women[30]. Our evidence supports the need to adapt the PCOs criterion in the Rotterdam definition of PCOs to patients' age, as indicated by Duijkers and Kristensensen. Our study included only patients with Rotterdam PCOs parameters, and the latest guideline indicates that before PCOS can be diagnosed, all 3 Rotterdam parameters must be present in adolescents. Older patients may be more commonly diagnosed with idiopathic hirsutism diseases due to enhanced ovulation rate[31].

Conclusion

The PCOs is hormonal disturbance disease, and there is a strongly associated between PCOs and each of these hormones: T.T, DHEA-S, LH, LH/FSH ratio, insulin and HOMA-IR.The hormonal disturbance was clinically presented among PCOs patients in Sana'a as follows: Hirsutism was the most common symptom, and alopecia was the least common, high parentage of PCOs patients suffer from the irregular menstrual period, all married PCOs women were infertile, high prevalence of polycystic ovary (pearl necklace appearance with many cysts up on ultrasound examination) among PCOs patients, The most significant predictor of metabolic syndrome in PCOs patients was increased waist circumference and reduced HDL-C, Insulin resistance (HOMA-IR) was a strong association with PCOs; Obesity was not a risk factor for PCOs.Contrary to previous studies, there was a strong association between the family history of PCOs and presentation of thePCO Syndrome among patients.Chewingkhat insignificantly reducedtestosterone, DHEA-S, insulin, HOMA-IR, HOMA-β, LH, while increases FSH. No significant association was found between PCOsneither with smoking nor with khat chewing. Therefore, further study should be needed in future to evaluate the effects of smoking and khat on PCOSNo previous researches were established to estimate the effect of khat on PCOs.

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