

Antimüllerian hormone level in polycystic ovary syndrome and its association with body mass index

By

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Abstract:

Introduction : Polycystic ovary syndrome is the major endocrinopathy among reproductive-aged women. The anti-müllerian hormone is a member of the transforming growth factor beta family, it is best known as a serum marker for ovarian function and ovarian reserve and polycystic ovarian syndrome.

The current study aimed to evaluate the potential association of anti-müllerian hormone with obesity in women with polycystic ovarian syndrome and explore the effects of obesity on hormonal changes. **Material and methods:** A cross-sectional study was conducted in the Gynecology and Obstetrics Department at Salahadeen General Hospital during the period from the 1st of December 2022 to the 30th of June 2023. A convenient sample of 100 women ages 15-45 years who presented with polycystic ovarian syndrome was enrolled in the current study. **Results :** According to the results of the current study, the levels of the anti-müllerian hormone and inhibin B significantly decreased in obese patients compared to those with overweight and normal weight (P-values were 0.001 for both), while the testosterone level significantly increased in obese patients compared to those with overweight and normal weight (P-value was 0.001). A significant negative correlation was obtained between the anti-müllerian hormone and body mass index. In conclusion, Most patients had higher levels of luteinizing hormone, follicular stimulating hormone, anti-müllerian hormone and testosterone than normal ranges. There were significant associations between the body mass index and the levels of the anti-müllerian hormone, testosterone, and inhibin B. While no significant association was obtained between the patients with obesity, overweight, and normal weight regarding the level of luteinizing hormone and follicular stimulating hormone. There was a significant negative correlation between the body mass index and the anti-müllerian hormone level.

Keyword : polycystic ovary ' antimulerien hormone ' obese patient

Quick Points:

- 1- A significant negative correlation was obtained between the anti-müllerian hormone and body mass index.
- 2- Most patients had higher levels of luteinizing hormone, follicular stimulating hormone, anti-müllerian hormone and testosterone than normal ranges.
- 3- There were significant associations between the body mass index and the levels of the anti-müllerian hormone, testosterone, and inhibin B.

Introduction :

Despite its prevalence, the diagnosis and management of polycystic ovarian syndrome (PCOS) can be difficult since the condition's primary symptoms can shift with a woman's age and medication can be adjusted to meet her unique health concerns(1).

The illness is complicated, and a wide variety of etiological variables have been shown to play a role in both its onset and its progression (2). 1.55 million women throughout the world who are of reproductive age are affected by polycystic ovary syndrome (PCOS), which results in 0.43 million women having disability-adjusted life years. The age-standardized incidence rate of polycystic ovary syndrome (PCOS) was 82.44 per 100,000 people in 2017, which was 1.45 percent higher than in 2007's rate of 78.32 per 100,000 population (3). PCOS is the most common reason for a woman to experience anovulatory infertility(2), In women who have polycystic ovary syndrome (PCOS), the risk of infertility is from 70 to 80 percent (4).

In addition to being the cause of infertility, polycystic ovarian syndrome (PCOS) has been found to be a major concern for the health of women and may put them at risk for serious illnesses that can jeopardize their lives (5)

This study aimed to evaluate the potential association of AMH with obesity in women with PCOS and explore the most impacting factors that could affect this association.

Subject and method: A cross-sectional study will be conducted in Salahadeen General Hospital /Gynecology and Obstetrics department during the period from the 1st of January to the 30th of June 2023.

The number of international review board approval (IRB approval) was 5C / 842 In 13/ 10/ 2022(see in appendix-1).

A convenient sample of 100 women with PCOS will be enrolled in the current study. Diagnosis of PCOS was based on Rotterdam criteria with two of the following: (i) oligo- and/or anovulation, (ii) clinical and/or biochemical signs of hyperandrogenism, and (iii) polycystic ovarian morphology, defined as the presence of ≥ 12 follicles of 2–9 mm and/or ovarian volume of ≥ 10 mL in at least one ovary on transvaginal or abdominal ultrasound(7).

Result:

The study revealed a noteworthy finding regarding the association between AMH (Anti-Müllerian Hormone) levels and BMI (Body Mass Index) among women with PCOS. A substantial negative correlation was observed, indicating that as BMI increased, the levels of AMH decreased.

Sociodemographic characteristics of the patients

In the current study, there were a total of 100 women. Their average age was 26.52 \pm 5.1 years, and their ages ranged from 15 to 38. Most of the people who took part (76%) lived in cities, 43% of them were working, and 92% of them were married. . As shown in Table-1.

Obstetrical history of the patients

Table-2 provides valuable insights into the obstetrical history of the patients included in the study, comprising a total of 92 participants. It offers a comprehensive overview of their gravidity, parity, abortion history, contraception use, and infertility status. The data shows that a significant proportion of the patients had a gravidity of 4-6 (63.0%) and a para of 1-3 (56.5%). Additionally, the majority of the participants had not experienced any abortions (89.1%) and did not

use contraception (89.1%). Notably, a considerable percentage of the patients reported experiencing infertility (81.5%).

Incidence of abnormal investigations among PCOS women

The abnormal results of LH, FSH, AMH, and testosterone were presented in 45%, 20%, 83%, and 61%, respectively

Means of LH, FSH, AMH, Testosterone, and Inhibin B in regards to obesity of PCOS women Table-4 shows mean values and standard deviations for hormones like LH, FSH, AMH, Testosterone, and Inhibin B for each BMI group. No significant difference was found in LH levels among the three groups, suggesting that BMI may not significantly influence LH levels. FSH levels showed no significant difference among the three groups, suggesting that BMI may not significantly impact FSH levels. When comparing the mean levels between the groups, it is evident that the Normal weight group consistently has the highest mean values for AMH (10.1 ± 2.4), Testosterone (0.85 ± 0.2), and Inhibin B (85.83 ± 8.3). On the other hand, the Obese group has the lowest mean values for AMH (8.03 ± 2.2), Testosterone (1.29 ± 0.3), and Inhibin B (71.65 ± 4.9). The Overweight group lies in-between these two groups for all three investigations. The observed significant differences in AMH, Testosterone, and Inhibin B levels among the different BMI groups underscore the potential influence of obesity on hormonal imbalances in PCOS.

Correlation between the Anti-Müllerian hormone and body mass index The study revealed a noteworthy finding regarding the association between AMH (Anti-Müllerian Hormone) levels and BMI (Body Mass Index) among women with PCOS. A substantial negative correlation was observed, indicating that as BMI increased, the levels of AMH decreased. ($r: -0.58$ and $P\text{-value}: 0.001$).

Discussion

The most important thing that this study showed was that most of the patients were either overweight or obese. In another study, done by Abdul Hussein in Iraq in 2014, the same results were found. It showed that the BMI was much higher in women with PCOS than in healthy women (10). In 2022, another study was done in Iraq. It found that 40% of people with PCOS were overweight and 37% of them were obese (11). In contrast, between 38% and 88% of women with PCOS are

obese or overweight, according to a meta-analysis done by T M Barber (12). In agreement, a 2013 study by Uche et al. in the United States found that the BMI of people with PCOS was much higher than that of people in the general population (13). Sachdeva et al. (India, 2019) found that 75.61 percent of people with PCOS were overweight or obese (14).

Less than half of the people in this study had abnormal levels of LH, and one-fifth of them had abnormal levels of FSH. Also, there was no big difference between the levels of LH and FSH in normal-weight, overweight, and obese participants. This was in line with the results of another study (11) which found that the level of FSH in obese and non-obese women with PCOS was not significantly different. The same results were found in another study by Aylin et al. in Turkey (2019), which showed that there was no difference in the levels of LH and FSH between PCOS patients with obesity and PCOS patients with normal weight (15).

Conclusions

- 1) Most patients had higher levels of LH, FSH, AMH and testosterone than normal ranges.
- 2) There were significant associations between the BMI and the levels of AMH, testosterone, and inhibin B. While no significant association was obtained between the patients with obesity, overweight, and normal weight regarding the level of LH and FSH.
- 3) There was a significant positive correlation between the BMI and the AMH level

CONFLICT OF INTEREST: The authors have no conflicts of interest to disclose.

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Table (1):Sociodemographic characteristics of the patients
Sociodemographic characteristics

Sociodemographic characteristics		N%
Age(years)	<21	12(12.0)
	20-30	61(61.0)
	>30	27(27.0)
Residency	Urban	76(76.0)
	Rural	24(24.0)
Employment	Employed	43(43.0)
	Unemployed	47(47.0)
Marital state	Married	92(92.0)
	Unmarried	8(8.0)
Smoking	Yes	5(5.0)
	No	95(95.0)

Table (2):Obstetrical history of the patients

Obstetrical history		N(%)
Gravid	1-3	18(19.6)
	4-6	58(63.0)
	>6	16(17.4)
Para	1-3	52(56.5)
	4-6	37(40.2)
	>6	3(3.3)
Abortion	0	82(89.1)
	1	6(6.5)
	2	3(3.3)
	3	1(1.1)
Contraception	Not used	82(89.1)
	OCCP	8(8.7)
	IUCD	2(2.2)
infertility	Yes	75(81.5)*

	No	17(18.5)
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*Mean (\pm SD) of infertility time=2.7 (\pm 1.05) years

Table (3):Incidence of abnormal investigations among PCOS women Investigations

Investigation	Normal Results N(%)	Abnormal Results N(%)	Mean+,-SD
LH	55(55.0)	45(45.0)*	10.20+,- 2.6
FSH	80(80.0)	20(20.0)**	7.59+,- 1.5
AMH	17(17.0)	83(83.0)*	8.03+,- 2.2
Testosterone	39(39.0)	61(61.0)*	0.61+,- 4.9
Inhibin B (pg/ml)			80.48 +,- 8.39

*Elevated, **Decreased

Table (5):Means of LH, FSH, AMH, Testosterone, and Inhibin B in regards to obesity of PCOS women Investigation

Investigation	Normal weight Mean -,+SD	Overweight Mean (-,+SD)	Obese Mean-,+ SD	P-value
LH	10.06- ,+22.1	10.13 -,+2.6	10.41-,+2.8	0.162
FSH	8.05-,+1.7	7.58 -,+1.5	7.32 -,+1.4	0.200
AMH	10.1 -,+2.4	8.26 -,+1.2	8.03 -,+2.2	0.001
Testosterone	0.85 -,+0.2	0.96 -,+0.2	1.29 -,+0.3	0.001
inhibin	85.83-,+8.3	80.59 -,+7.3	71.65 -,+ 4.9	0.001

Appendix-1 : international review board approval

Republic Of Iraq
Ministry of Higher Education and
Scientific Research
Tikrit University
College of Medicine
Graduate Studies Division



جمهورية العراق
وزارة التعليم العالي والبحث العلمي
جامعة تكريت
كلية الطب
شعبة الدراسات العليا

التاريخ: ٢٠٢٢/١١/٢٢

العدد: ٢٢٣ / ٢٩٦

أمر إداري

- إشارة إلى محضر الجلسة الثانية لمجلس الكلية للعام الدراسي ٢٠٢٢ - ٢٠٢٣ والمتعددة بتاريخ ٢٠٢٢/١٠/١٠ ومصادقة أمانة مجلس الجامعة بكتابهم المرقم ٨٤٢ س/ن في ٢٠٢٢/١٠/١٣ واستناداً إلى الصلاحيات المخولة لنا نقرر:-
- إقرار بحث طلبية الدكتور / فرع النسائية والتوليد

اسم الباحث	المهارة	الإختصاص	عنوان البحث	المشرف
مهملون احمد مختار	الدبلوم العالي	النسائية والتوليد	التشميس بالموجات فوق الصوتية لتكثيف اعضاء الحوض في مستشفى صلاح الدين العام	د.د. اسراء هاشم عبدالكريم
فرح صبحي خليل	الدبلوم العالي	النسائية والتوليد	التهبة الجرثومية حديثة الاعراض والمطرح التوليدية بعد العلاج في بداية الحمل مقفل اوغزة	ا.م.د.مصرية رشاد حسين
حنين عبدالعزیز	الدبلوم العالي	النسائية والتوليد	تأثير الحارة لتدمية تحت المشيمة على سير الحمل عند النساء المسافات بالأجواس المتكثرة	ا.م.د.مصرية رشاد حسين
المبار حسن صبري	الدبلوم العالي	النسائية والتوليد	استوى الهرمون المحفز للموت (المحليل مخزون المبيض) في متلازمة المبيض متعدد الكيسات وارتباطه بنسبة كتلة الجسم	ا.م.د.عرب صالح جاسم
رواء خالد خلف	الدبلوم العالي	النسائية والتوليد	مزايا الشفاء من الكريه بعد سايكوسكروزل بالمقارنة مع زيت الكافور الأساسي في جرح بعض الفرج	د.د.احمد حاتم يوسف
رشاد مزاحم شحاتة	الدبلوم العالي	النسائية والتوليد	المظاهر السريرية لعلم الأمراض العيوب الانفية خلال الحمل	ا.م.د.شاهد ابراهيم محمود
نور فخرت غازي	الدبلوم العالي	النسائية والتوليد	تأثير البروجسترون أثناء فترة الحمل في الوقاية والحماية من الولادة المتكررة	ا.م.د.عبد الوهاب حسني
جانان كريم عواد	الدبلوم العالي	النسائية والتوليد	قيمة الصفائح الدموية ومؤشرات الصفائح الدموية في الثلث الثاني والثالث من الحمل عند النساء الحوامل المصابات بمرض الصل	ا.م.د.عرب صالح جاسم
مان عبدالجبار سلمان	الدبلوم العالي	النسائية والتوليد	تأثير البلازما الغنية بالصفائح الدموية PRP في شفاء جرح عذلية الولادة القيصرية في مستشفى صلاح الدين العام	د.د.اسراء هاشم عبدالكريم
سعاد خلف جلاب	الدبلوم العالي	النسائية والتوليد	تقييم مزلسم التبييدات للتكثيف بطبقات الارتجاع عند النساء الحوامل في مستشفى تكريت العام	د.د.نبيلة كامل يعقوب
ذكري ياسين حميد	الدبلوم العالي	النسائية والتوليد	العلاقة بين الماع الهرموني وجهاز منع الحمل مع العقم الثانوي في مستشفى صلاح الدين العام	د.د.نبيلة كامل يعقوب ا.م.د.محمد غالب زكري

أ. د. وسام سهيل نجم
العميد وكالة
٢٠٢٢/١١/٢٢

جامعة تكريت
كلية الطب
شعبة الدراسات العليا