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Pathophysiological Detection of Alpha-Fetoprotein in Iraqi Women with Polycystic Ovarian Syndrome

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ABSTRACT

Polycystic ovary syndrome (PCOS), is one of the most common endocrinpathies in premenopausal women, which has been reclassified as a reproductive and metabolism disorder after the recognition of the important role of insulin resistance in the pathophysiology of the syndrome. Current surveillance strategy for patients with polycystic ovary syndrome at risk of nonalcoholic fatty liver disease development is unsatisfactory. We aimed to investigate the diagnostic accuracy of alpha-fetoprotein (AFP). Moreover, existing data support that androgen excess, which existing data support that androgen excess, which is the main feature of PCOS and is interrelated to insulin resistance, may be an additional contributing factor to the development of non-alcoholic fatty liver disease (NAFLD). The biomarker (AFP) was investigated in group of PCOS women (75) and group control (50). AFP showed higher in patients with PCOS (80 ± 0.22) compared to control group (0.67 ± 0.19) at p. value < 0.05. The results also showed a significant increase of AFP in PCOS women than control in all BMI categories with except normal weight was not scored significant difference at p. value < 0.05.

The serum AFP levels estimated relationship between fatty liver disease and PCOS can effectively improve the diagnostic performance of PCOS, providing a new indicator that is simple, economical and pervasive for clinic.

Keywords: *Alpha-Fetoprotein, Polycystic Ovary Syndrome, Diagnostic, Iraqi women*

INTRODUCTION

Displays the characteristic clinical signs of hyperandrogenism, such as male pattern baldness hirsutism, and acne, as well as reproductive problems (including oliamenorrhoea and associated sub-fertility) (Barber et al., 2013). Additionally, PCOS raises the risk of dyslipidemia and non-alcoholic fatty liver disease (NAFLD) (Ramezani et al., 2014). Prenatal levels begin to increase in the developing human embryo after the first trimester and begin to diminish after 32 weeks of pregnancy. Maternal serum AFP is one of the three or four screening tests for prenatal abnormalities (Sharony et al., 2016). The actual role of AFP remained unclear (Gabant et al., 2002). Study also revealed that alph-fetoprotein and the BMI are the best predictors of diagnosting gestational diabetes and type 2 diabetes (Alselawi et at., 2022). Under conditions of normal physiology, the level of AFP in adult serum decreases to normal and remains there (Zheng et al., 2020).

Alpha- fetoprotein is primarily used as a serum marker for primary hepatocellular carcinoma in clinical diagnosis, prognosis, and transplant selection. It is intimately associated with the occurrence and development of hepatocellular carcinoma (Trevisani et al., 2019). Elevated blood levels of AFP have also been inflammatory bowel disease, acute hepatitis and chronic liver conditions (Wong et al., 2015). Although AFP is the most often used biomarker, certain people with benign liver disorders usually have increased serum AFP levels (Wang et al., 2017). It was shown that AFP levels increased when abnormal levels of fibrosis and inflammation rose (Kim et al., 2017). It was Observed that individuals with fatty liver had noticeably higher blood AFP levels, and that the degree of hepatic steatosis was strongly correlated with these levels (Kara et al., 2013).

The incidence of NAFLD within the PCOS population is now estimated to be anywhere between 15% and 55%, depending on the diagnostic index used for both NAFLD and PCOS (Cerda et al., 2007). The metabolic disorder and obesity are both strongly correlated with non-alcoholic fatty liver disease (NAFLD), which is also known as metabolic fatty liver disease (Chalasani et al., 2012).

In the present study, we aimed to evaluate and determine the potential association between PCOS patients and biomarker of AFP in a cohort in Iraqi-The-Qar patients.

MATERIALS AND METHODS

Study population

In this case- study, 75 women between the ages of 16 and 43 who had been diagnosed with PCOS and were referred from an outpatient gynecology clinic in Th-Qar between last December 2021 to 30 June 2022 participated. In addition, 50 healthy volunteer women between the ages of 16 and 43 were enlisted as healthy controls. The exclusion criteria included a history of autoimmune diseases, such as diabetes, hyperprolactinemia, and known hyperandrogenic disorders, as well as any medications that might impair the normal operation of the PCOS, such as anti-androgen and anti-lipid therapies, anti-diabetic agents, and any hormones. Menopausal, pregnant, and hyperandrogenemia women, as well as those with irregular menstruation, were also disqualified.

The following two groups were investigated

Diagnostic Criteria

Based on ESHRE/ASRM criteria, the diagnostic standards for PCOS-"History of discovery of polycystic ovary syndrome," (2017).

Amenorrhea and Oligomenorrhea

Clinical or biochemical hyperandrogenemia is one example.

The ultrasonographic definition of polycystic ovary morphology is 12 or more (2-9 mm) follicles or more per ovary.

Patients who, after excluding those with congenital adrenal hyperplasia, diabetes, prolactinaemia, autoimmune diseases, androgen-secreting tumor, etc., meet at least two of the previous diagnostic criteria.

Statistical analysis

The current data were analyzed by using statistical software program SPSS (Statistical Package for Social Science), based in using the following statistical laws. Independent sample t test, One way ANOVA and Least Significant Difference (LSD) at p. value < 0.05 and < 0.01.

RESULT

Estimation Result Concentration of Involved AFP in PCOS women and Control Group

The α-fetoprotein increased significantly in PCOS women. At p. value < 0.05 as in table (3-1).

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TABLE 3-1: Concentration of involved α-fetoprotein in PCOS women and control group.

Parameter	Mean ± SD		T test P. Value
	PCOS No. 75	Control No. 50	
AFP	0.80 ± 0.22	0.67 ± 0.19	0.001

Estimation of α-fetoprotein Concentration in PCOS women and Control Group According to Age Groups

The current results showeda non-significant difference in concentration of α-fetoprotein in both PCOS women and control group according to age groups. The results also showed a significant increase in PCOS women than control in second and third age groups at p. value < 0.05 as in table 4-8.

α-fetoprotein	Cases No.	PCOS Mean ± SD	Cases No.	Control Mean ± SD	t. test p. value
16-25	27	0.79 ± 0.16	15	0.71 ± 0.21	0.195
26-35	30	0.82 ± 0.27	23	0.66 ± 0.22	0.024
Above 35	18	0.80 ± 0.21	12	0.65 ± 0.09	0.021
p. value	75	0.878	50	0.672	
LSD	Non-Sig		Non-Sig		

Estimation of α-fetoprotein Concentration in PCOS women and control group according to BMI

The current results showed a non-significant difference in concentration of α-fetoprotein in PCOS women and control group according to BMI. The results also showed a significant increase in PCOS women than control in all BMI categories with except normal weight which was not scored significant difference at P. value < 0.05 as in table (3-2).

TABLE 3-3: α-fetoprotein concentration in PCOS women and control group according to BMI.

α-fetoprotein BMI Kg/M2	Cases No.	PCOS Mean ± SD	Cases No.	Control Mean ± SD	t. test P. Value
Normal weight	15	0.81 ± 0.09	16	0.74 ± 0.28	0.385
Over weight	34	0.75 ± 0.20	21	0.64 ± 0.15	0.043
Obesity	14	0.86 ± 0.29	8	0.64 ± 0.08	0.013
Obesity 1	12	0.88 ± 0.28	5	0.64 ± 0.07	0.016
P. Value	75	0.234	50	0.414	
LSD		Non- Sig		Non- Sig	

DISCUSSION

Alpha-Fetoprotein is a embryonic yolk sac and fetal liver produces plasma protein. Screening tests for chromosomal abnormalities are performed by using the concentration of AFP in the human serum, urine and fetal membranes (Sharony et al., 2016). The current results, which recorded a significant increase in the concentration of Alpha-Fetoprotein (AFP) in PCOS women than control group. Values of (AFP) was significantly increased in PCOS patients when compared with control group (0.80 ± 0.22 versus 0.67 ± 0.19mIU/ ml) at p. value P < 0.05. Recent study has looked at the potential association between AFP and fatty liver disease. Our result indirectly suggested a potential positive link between serum ALP and PCOS.

This study agrees with study of Barry et al., (2014) who their study recorded a relation between PCOS and ovarian cancer, and with nonalcoholic fatty liver (NAFLD) refers to a broad range of liver disorders, from simple

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steatosis to nonalcoholic steatohepatitis (NASH), which can progress to cirrhosis (Chalasani et al., 2012). Also, the study of Babalı et al., (2009) showed that blood concentration of AFP were markedly elevated in individuals with fatty liver, and that these concentrations were directly linked with the severity of hepatic steatosis. Nonalcoholic fatty liver disease (NAFLD) is most in women with PCOS. According to a recent meta-analysis, the women with PCOS have a four-fold greater risk of NAFLD (Ramezani-Binabaj et al., 2014). NAFLD is a hepatic symptom of metabolic syndrome (Farrell et al., 2013). In PCOS, the obesity, persistent low-grade inflammation, insulin resistance (IR), hyperandrogenemia (HA) and hereditary factors are the key risk factors for Nonalcoholic fatty liver disease (Sarkar et al., 2020). Is a reliable indicator of NAFLD in women with PCOS and women with both PCOS and Hyperandrogenemia having more significant steatosis than PCOS patients without hyperandrogenemia (Jones et al., 2012).

ALFA fetoprotein concentration, androgen levels or body mass index (BMI) may have an influence on the development of NAFLD in PCOS-affected patients.

In present study as shown table (3-2), according to BMI, the concentration of Alpha -fetoprotein in PCOS women and the control group did not differ significantly. The findings also revealed that PCOS women had a substantial rise compared to controls in all BMI categories, with the exception of normal weight, which did not demonstrate a significant difference. Hence, this result is similar to study Teede et al., (2013) who reported, that metabolic disorder polycystic ovarian syndrome is a prime example of one that is connected to insulin resistance, shows up as cardio metabolic risk, and has implications that are considerably increased by obesity. By study of Ollila et at., (2016) a significant is correlation between body mass index (BMI) and features of PCOS at all ages. May be polycystic ovary syndrome (PCOS) has emerged as a significant risk factor for the development of NAFLD in women. Which is common in obese patients with PCOS, contributes towards the metabolic dysfunction associated with PCOS (Macut et al., 2018).

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