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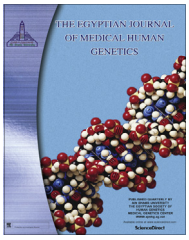

ORIGINAL ARTICLE

Metabolic abnormalities in young Egyptian women with polycystic ovary syndrome and their relation to *ADIPOQ* gene variants and body fat phenotype

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KEYWORDS

ADIPOQ variants;
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Central obesity;
Young women

Abstract *Background:* Polycystic ovary syndrome (PCOS) is the most common endocrine disorder. It is associated with high prevalence of metabolic risk factors, but little is known about the prevalence of metabolic syndrome (MS) and its components among Egyptian PCOS women. The objective of the study was to determine the metabolic abnormalities among young Egyptian women with PCOS and evaluate their relation with *adiponectin* gene (*ADIPOQ*) variants and body fat adiposity pattern.

Materials and methods: The present study included 80 PCOS women and 80 healthy women with similar age and body mass index. All participants underwent clinical, anthropometric, biochemical, ultrasonographic and adiponectin (*ADIPOQ*) gene 11391G > A (rs17300539) examinations.

Insulin resistance was assessed by the Homeostatic model assessment for insulin resistance (HOMA-IR).

Results: MS was identified in 22.5% of PCOS women. The most prevalent MS components in PCOS women were central obesity, decreased high-density lipoprotein cholesterol (HDL-C), and

Abbreviations: PCOS, Polycystic Ovarian Syndrome; BMI, Body Mass Index; BP, Blood Pressure; MUAC, Mid Upper Arm Circumference; WC, Waist Circumference; HC, Hip Circumference; WHR, Waist to Hip Ratio; SF, Skin Fold; HOMA-IR, Homeostatic Model Assessment for Insulin Resistance; HDL-C, High Density Lipoprotein Cholesterol; LDL-C, Low Density Lipoprotein Cholesterol; TG, Triglycerides

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increased triglycerides (TG), blood pressure (BP) and fasting glucose levels. The study found association between *ADIPOQ* promoter variants −11391G > A and MS in PCOS women. Moreover, multivariate logistic regression analysis showed association between abdominal fat accumulation and IR in PCOS.

Conclusion: The prevalence of MS was significantly higher in PCOS women than controls, and central obesity and hypertension are risk factors for insulin resistance. Moreover, obesity plays a key role in the development of PCOS and *ADIPOQ* −11391G > A gene variants showed association with MS.

1. Introduction

Polycystic ovary syndrome (PCOS) as the most common endocrinopathy among reproductive aged women is a major health and economic burden. Depending on the criteria used for its definition, the method used to define each criterion and the study population, the prevalence of PCOS ranges between 2.2% and 26% in various countries [1]. The ovarian dysfunction syndrome encompasses a broad spectrum of clinical signs and symptoms. Clinical manifestations include menstrual irregularities, hyperandrogenism and infertility [2]. According to previous reports, insulin resistance, obesity and dyslipidemia have commonly been described as associated with PCOS [3]. These disorders are also the features of the so-called metabolic syndrome (MS) or syndrome X, another cluster of endocrine disturbances defined by the World Health Organization, the National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP III) and the International Diabetes Federation (IDF) guidelines [4].

Metabolic syndrome (MS) which is a common disorder related to visceral obesity and insulin resistance (IR) is associated with atherosclerosis and cardiovascular (CV) disease [5,6]. The prevalence of MS is high, occurring in 23.7% of the USA population over 20 years [7]. The prevalence also increases with age, from 6.7% in the third decade to 43.5% in the 7th decade [8,9]. The overall prevalence of MBS appears to be similar between the USA and European countries with reported rates of 23.5% in Spain and 23.9% in Portugal [10].

In Egypt, a cross-sectional observational study was conducted on 1450 women visiting the outpatient clinic of Minia University Maternity Hospital [11], included 620 middle-aged fertile women with an intrauterine contraceptive device and gave birth more than 2 years previously and 830 with primary or secondary infertility reported that the prevalence of PCOS in the fertile women was 14% (87/620) and 37.5% (311/830) in the secondary infertile women.

MS is a combination of cardiovascular risk factors, including dyslipidemia, impaired fasting glucose levels, abdominal obesity and high blood pressure. Insulin resistance, as a major defect in MS, appears to be a common linkage between these coexisting abnormalities [12]. Since the anthropometric and metabolic abnormalities found in PCOS overlap with the components of MS [13,14], the issue regarding MS in women with PCOS has generated tremendous interest. Diagnosis of MS requires clinical and laboratory information that is grouped into criteria. However, each institute defines the cut-off for each criterion differently. Such difference would affect the prevalence of MS, even within the same population [15]. Recent studies have found a much higher prevalence of MS in women with PCOS than in those without PCOS [13,16,17]. According to estimates based on the US population, the prevalence of MS in women with PCOS is approximately 43–46% [18,19].

The aim of the present study was to assess the metabolic abnormalities among young Egyptian women with PCOS and evaluate the influence of body fat adiposity pattern and *ADIPOQ* gene variants and metabolic abnormalities.

2. Subjects and methods

All the procedures used in this study were in accordance with the guidelines of the Helsinki Declaration on Human Experimentations. The study was approved by local ethics committee of the National Research Centre (No: 13176); the purpose of the protocol was explained to both the patients and control women, and written informed consent was obtained from them before beginning the study.

This prospective case-control study included eighty Egyptian women with PCOS between ages 20 and 35 years. They were referred from different Obstetrics and Gynecology centers to the National Research Centre Clinics between 2013 and 2014. All participated in the project entitled "Body adiposity phenotypes, dietary intake, adiponectin gene variants, metabolic markers and their significance in obesity-related diseases."

Eighty women controls of similar age and BMI of patients were selected. All subjects were sedentary and were not participating in any specific diet plan. The mean age of attaining menarche in PCOS patients was 12.83 ± 1.11 years, and for controls was 12.73 ± 1.35 years.

The diagnosis of PCOS was based on Rotterdam-PCOS criteria [20].

According to these criteria, PCOS were diagnosed if at least two of the following criteria were present: oligoamenorrhoea, clinical or biochemical hyperandrogenism and PCO on ultrasonography. Exclusion criteria: women with congenital adrenal hyperplasia, androgen-secreting neoplasms, androgenic/anabolic drug use or abuse, Cushing's syndrome, syndromes of severe insulin resistance, thyroid dysfunction, and hyperprolactinemia.

All control subjects underwent an ultrasonographic examination by a gynecologist, and women who had any pathologic findings or polycystic ovaries were excluded from the study. HOMA-IR cut-off was = 3.46 as insulin resistant [21].

MS was defined using the definition of the 2001 National Cholesterol Education Program Adult Treatment Panel III