

## Abstract

**Background:** Polycystic ovary syndrome (PCOS) is one of the most common endocrine disorders in women of childbearing age. The pathogenesis of PCOS is complex and still unclear. Insulin resistance, which is a factor associated with metabolic syndrome, is more common in patients with PCOS than in the general population. Most recent studies have shown that PCOS is not just an endocrine and reproductive disorder, but a metabolic disorder associated with many cardiovascular risk factors such as insulin resistance, diabetes, lipid profile disorder, and hypertension. This syndrome is associated with different clinical outcomes including reproductive, metabolic, psychological, and some cancers. Paraoxonase 1 (PON1) is an antioxidant enzyme that has been shown to reduce serum PON1 activity, which may help increase the susceptibility to insulin resistance and atherosclerotic heart disease (AHD) in women with PCOS. Butyrylcholinesterase (BuChE) and paraoxonase 1 (PON1) enzymes are bio-cleansing enzymes in serum and exhibit anti-inflammatory and antioxidant activities. PON1 is associated with diseases caused by high oxidative stress, and BuChE is involved in the pathophysiology of metabolic syndrome and related disorders.

**Objective:** The aim of this study was to answer the question whether the activity of PON1 enzyme in women with PCOS is higher than the control group or not and whether there is a significant relationship between the activity of BuChE and PON1 enzymes in PCOS and whether the relationship between these two enzymes can be considered dependent on insulin resistance.

**Methods:** In this case-control study, 56 women diagnosed with PCOS according to the Rotterdam 2003 criteria were selected as the case group and 62 healthy individuals as the control group. Parameters such as menstrual status, fasting plasma glucose (FPG), fasting serum insulin (Fins), body mass index (BMI), insulin resistance homeostasis evaluation model (HOMA-IR) and evaluation of PON1 enzyme activity by Beltowski method were evaluated and measured.

**Results:** The results of data analysis showed that the parameters of menstrual irregularity ( $P = 0.001$ ), fasting insulin concentration ( $P = 0.008$ ), insulin resistance ( $P = 0.014$ ) were significantly higher in the case group but PON1 enzyme activity ( $P = 0.006$ ) were less in the case group than the control group. In women with insulin resistance, there was no significant difference between case and control groups in terms of PON1 enzyme activity ( $P = 0.056$ ). Also, no significant relationship was found between the activity of BuChE and PON1 enzymes in the case group ( $P = 0.07$ ).

**Conclusion:** The results show that decreased PON1 enzyme activity is involved in the pathogenesis of PCOS and PON1 enzyme can be associated with insulin resistance independent of PCOS. Insulin resistance is likely to lead to abnormal gonadotropin levels, ovarian dysfunction, and menstrual irregularities, affecting PON1 activity. However, determining the association between BuChE and PON1 enzymes in PCOS requires further research.

**Keywords:** Polycystic Ovary Syndrome, Paraoxonase 1, Serum Cholinesterase, Insulin Resistance