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The effects of Metformin on insulin resistance and cardiometabolic features in Malay women with PCOS

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Abstract

Objective: To compare the effects of metformin and lifestyle management to lifestyle management alone on the markers of insulin resistance, anthropometric, reproductive and metabolic parameters. Design: Cross-sectional clinic based study of Malay women with PCOS and metabolic syndrome for 6 months

Subjects: 43 Malay women with PCOS and metabolic syndrome were randomised into Metformin and Control Groups. PCOS was based on the Rotterdam criteria and the metabolic syndrome was diagnosed based on the Joint Interim Statement of the International Diabetes Federation criteria. Measurements: Anthropometric, biochemical and endocrinological parameters were compared between the two groups of Malay PCOS women.

Results: Overall, both groups of women had very similar age and metabolic and endocrine characteristics. The metformin group became less insulin resistant (HOMA-IR, p = .016) with lower serum insulin (p = .021). Fasting plasma glucose had significantly risen among the control women, but only marginally (p = .042). The differences in serum SHBG, FAI and free testosterone between the groups were not significant, as were the other metabolic measures.

Conclusions: The addition of metformin to lifestyle modification over a period of 6 months reduced insulin resistance in Malay women with PCOS and metabolic syndrome. Metformin treatment may provide an effective early management of metabolic syndrome and related disorders.

Introduction

Polycystic ovary syndrome (PCOS) is a common heterogenous disorder which may affect up to 15% of reproductive age women depending on the population (Bozdag G 2016). It was initially thought of as a reproductive disorder but is now considered a metabolic condition associated with long term health risks.

It is remarkable that PCOS is associated with many of the commonly seen medical conditions. PCOS women may have many conditions similarly seen in the metabolic syndrome such as diabetes mellitus, hypertension, obesity and endothelial dysfunction (Grundy SM *et al* 2007 Moran LJ *et al* 2009). Elevated plasma levels of cholesterol, triglycyerides and low density lipoprotein cholesterol (LDL-C) together with lowered high density lipoprotein cholesterol (HDL-C) are the atherogenic lipid abnormalities are also prevalent (Wild RA *et al* 1985). More recently, a large retrospective study comparing PCOS women with age matched controls has shown that PCOS women had increased risks of obesity, diabetes mellitus, hypertension, ischaemic heart disease and others (Hart *et al* 2015).

The metabolic syndrome is a collection of risk factors linked to the development of atherosclerotic cardiovascular diseases and type 2 diabetes mellitus (Moeller DE *et al* 2005). A recent subgroup metaanalysis among different-aged PCOS women showed that adult PCOS women had 2.6 fold odds of having metabolic syndrome compared to healthy controls (Behboudi-Gandevani S *et al* 2018).

Although the exact etiology of PCOS is still not known, it is established that hyperinsulinism and hyperandrogenism have a key role in its pathophysiology (Stepto NK *et al* 2013). Hyperinsulinemia is accepted as an early stage in the development of DM and the cardiovascular aspect of metabolic syndrome, independent of obesity. Insulin resistance is also associated with increased levels of LDL-C (Dejager S 2001). Furthermore, the increased insulin levels affect the ovary, liver and other organs to increase serum androgen levels (Teede *et al* 2007).

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