OBSERVATIONS

# Association Between Fasting Blood Glucose and Carotid Intima-Media Thickness of Polycystic Ovary Syndrome Patients With Normal Glucose Tolerance

Because cardiovascular disease (CVD) can be prevented by changing the lifestyles, early selection of high-risk patients is essential. Though the relationship between polycystic ovary syndrome (PCOS) and CVD has been well known, it has not been established yet which test should be performed for early prediction of CVD in PCOS (1).

Glycemic parameters, such as elevated fasting glucose (FG) or 2-h post-challenge glucose (PCG), are risk factors to predict future CVD (2). A recent study showed that glycemic parameters are related to increased carotid intima-media thickness (IMT), even in individuals with normal glucose tolerance (NGT) (3).

We evaluated the association between glycemic parameters and IMT, as a CVD surrogate marker, in young Korean PCOS patients with NGT. From July 2010 to May 2011, 341 PCOS patients (24–35 years old) diagnosed according to the 2003 Rotterdam criteria (4) were recruited from nine university hospitals after getting approval from the institutional review board of each hospital. Among 258 PCOS patients with NGT, we analyzed the data from 82 patients for which the results of IMT and glycemic parameters were available. The demographic characteristics such as age, BMI, androgen level, glycemic parameters, and lipid profile of the 82 patients were not significantly different from the 176 patients who did not perform IMT measurement.

The mean IMT was 0.42 ± 0.06 mm (range 0.30–0.56 mm). The association between IMT and glycemic parameters was tested by stratifying patients into quartiles (Q1–Q4) of IMT values. FG for patients in Q4 (thickest IMT, 0.456–0.56 mm) was significantly higher than that from patients in Q1 (thinnest IMT, 0.30–0.37 mm; $P = 0.044$), though 2-h PCG, fasting insulin, 2-h insulin, glycated hemoglobin ($HbA_{1c}$), and homeostasis model assessment of insulin resistance (HOMA-IR) were not significantly different among the quartiles of IMT.

In the simple correlation analysis, sex hormone–binding globulin (SHBG), FG, fasting insulin, HOMA-IR, the ratio of low- to high-density lipoprotein cholesterol (LDL-C/HDL-C ratio), and LDL-C were significantly correlated with IMT—though age, BMI, free testosterone, 2-h PCG, 2-h insulin, $HbA_{1c}$, total cholesterol, triglyceride, and HDL-C were not. The risk factors, which were related to IMT in a simple correlation analysis and well-known risk factors of increased IMT such as age, BMI, and smoking (5), were included in two multivariate linear regression models as independent variables. In the multivariate linear regression, an increase in FG ($P = 0.006$) and LDL-C/HDL-C ratio ($P = 0.016$) were predictors of increased IMT after adjusting for age, current smoking status, BMI, SHBG, and fasting insulin. Because of multicolinearity, we made another model, which substituted HOMA-IR in place of FG and fasting insulin. Thus, age, current smoking status, BMI, SHBG, LDL-C/HDL-C ratio, and HOMA-IR were included as covariates. In this model, only LDL-C/HDL-C ratio ($P = 0.049$) was a predictive variable for IMT. The LDL-C/HDL-C ratio is known as an accurate predictor of CVD risk and is a more reliable marker than LDL-C or HDL-C measurements alone (6). Our study also showed that the LDL-C/HDL-C ratio was a predictive factor of IMT in PCOS. Among glycemic parameters, FG was a best predictor of IMT. Although further studies are needed to evaluate whether FG is a predictive factor for CVD, we suggest that PCOS patients undergo serial follow-up tests to monitor their FG for early detection of CVD risk, even in NGT.

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