Association of mutation in the beta-3 adrenergic receptor gene with obesity and response to diet plus exercise intervention in Korean middle-aged women

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Introduction

Recently, β3-adrenergic receptor gene has potential role in the development of obesity, and the mutation in β3-adrenergic receptor gene is known to negative affect the response of weight loss intervention in obese (Xinli et al., 2001). But several previous studies did not support the view that the mutation in β3-adrenergic receptor gene is determinant for the expectation of weight loss and body fat distribution after obesity control program. The aim of this study was to determine whether there is a difference of response to diet plus exercise intervention according to β3-adrenergic receptor gene polymorphism in Korean middle-aged adult women.

Methods

Subjects were divided to Trp64Arg heterozygote group (n=14) and normal homozygote group (n=45). Trp64Arg mutation of the β3-adrenergic receptor gene was detected by polymerase chain reaction-restriction fragment length polymorphism (PCR-RFLP) method. 12 weeks Intervention program was consisted of diet control with exercise program (resistance training and 30 mins jogging). For the comparison of responses to diet plus exercise intervention according to gene mutation, skinfold thickness and body circumferences were measured at baseline and after intervention. The concentration of blood lipid profiles were analyzed as cholesterol, triglyceride, HDL-C, LDL-C, and FFA, and the measurement of physical fitness items were performed as sit-up, sit & reach, and Harvard step test (Physical efficiency index). Data are presented as mean±SD, and were compared using 2-way repeated ANOVA with group and time. Significance for all statistical analyses was set at P<0.05.

Results

Body weight, %fat, and BMI in Trp64Arg heterozygote group showed a significant (P<.05) higher values than homozygote group, and skinfold thickness and circumferences of triceps and thigh in Trp64Arg heterozygote group showed a significant (P<.05) higher values than homozygote group. But physical fitness and blood lipid levels showed no significant difference between two groups. Body weight and %fat showed no significant difference between before and after intervention, but BMI significantly (P<.05) decreased after intervention as compared to baseline in both groups. Skinfold thickness except of thigh significantly (P<.05) decreased after intervention as compared to baseline in both groups. Skinfold thickness of thigh significantly (P<.05) decreased after intervention (30.41±6.74 mm) as compared to baseline (33.81±8.25 mm) in Trp64Arg heterozygote group, but homozygote group showed no significant difference. WHR and body circumferences showed no significant differences after intervention as compared to baseline in both groups. But thigh circumference significantly (P<.05) decreased after intervention as compared to baseline in both groups. Blood levels of lipid profiles showed no significant differences after intervention as compared to baseline in both groups.

Discussion/Conclusion

Trp64Arg polymorphism for β3-adrenergic receptor gene appeared to be a genetic risk factor for obesity, but Trp64Arg mutation no contributed to response to diet plus exercise intervention on the focus of body composition and body fat distribution in Korean middle-aged women.

References