THE EFFECT OF EXERCISE TRAINING ON GRAY MATTER STRUCTURE OF ADULT HUMAN BRAIN.

Sensui Hiroomi¹, Gondo Yuichi², Nagamatsu Toshiya¹, Takekura Hiroaki², Fujimoto Toshihiko³
(Meiji Yasuda Life Foundation of Health and Welfare¹, National Institute of Fitness and Sports², Tohoku University³, Japan)

INTRODUCTION: The anatomical structure of the adult human brain was thought not to alter, except for changes in morphology caused by ageing or pathological condition. However, recent studies reported structural plasticity of the brain to environmental demands such as juggling training. In this study, we investigated whether aerobic exercise training would change gray matter structure in adults human. METHODS: 30 right-handed healthy university students who had not habitually exercised were divided into training group (10 males and 5 females) and control group (9 males and 6 females). Training group participated in aerobic dance class 3 times per week for 3 months. Control group have stayed not doing exercise. To evaluate the influence of exercise training on gray matter structure, T1-weighted MR images were acquired before and after training period and voxel-based morphometry (VBM) analysis were performed. VBM is a sophisticated objective whole-brain technique to investigate subtle, region-specific changes in gray matter. Repeated two-way ANOVA was used to test for any regions showing a group x time interaction and paired t-test was used to test for any regions showing a change in gray matter. RESULTS: Group x time interactions (p<0.05, FDR) were found in right middle temporal gyrus, left insula and right orbital gyrus. There is no significant change in training group, however, control group showed significant decreases (p<0.05, FDR) in these regions. CONCLUSION: Aerobic exercise training may influence the structural brain changes in young adults. It is speculated that exercise training attenuates the decreases of gray matter in some brain regions.

Keywords: Exercise Training, Neurophysiology