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EFFECT OF CHANGES OF MUSCLE TENSION AND BRAIN α WAVE ACTIVITY INDUCED BY FUNCTIONAL BEVERAGE ON GOLF PERFORMANCE

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BACKGROUND

Brain waves are classified into four kinds, named α, β, δ and θ waves, according to frequency.

α-brain waves is considered as a bio-marker of the relaxed state in human. L-theanine in green tea has been reported to increase α-brain waves and cause a feeling of relaxation without drowsiness in human. This study was conducted to see the effects of the changes of muscle tension, α-brain waves and some physical fitness induced by L-theanine containing functional beverage on golf performance.

METHODS

Healthy Bogey players were recruited through internet and written advertisement and submitted informed consent to participate in the study. Two studies, study1 for physical fitness, EMG and EEG and study 2 for putting and simulated drive shot, were performed before and after administration of test (300 mg Suntheanine, 20 mg L- carnitine, 100 mg Dongchunghacho) or placebo solution in a double blind randomized cross-over design. Each study has two study days, separated by at least 3 days. Subjects were asked to refrain from use of caffeine containing food or beverage, alcohol for at least 3days before either study day. Physical fitness test consisted of forward bending for flexibility, one leg standing for balance and vertical jump for agility and surface EMG (WEMG-4) test was measured on both sides of proximal 1/3 of forearm and mid portion of trapezoid muscle during full swing motion with shortened iron golf club, commercially made for practice. EEG (WEEG-4) test was measured on frontal and occipital regions for one hour after administration in supine position with eye opened. Putting test for % success of hole in one and distance between the putted ball and hole cup was performed before and at 50 min after administration at 3 meter distance. Following putting test, the accuracy and total distance of drive shot was assessed by side angles from midline and total carry predicted by Swing & Impact Analyzer System, respectively. 10 times trials for putting and 5

times trials for drive shot was given to all subjects before and after administration. Repeated measure ANOVA and paired t-test were used for statistical analysis.

RESULTS

Twenty three bogey players (handy score: Male; 18 – 30, Female; 28 – 40) out of twenty nine volunteers were selected according to inclusion and exclusion criteria. Three subjects among them completed only study 2. Nine subjects were excluded for the final analysis of study 1 because of protocol violations and also two outliers showing data more than 3 SD values were excluded for the final analysis of study 2. The test solution showed no troubles as a beverage in subjects. L-theanine containing beverage showed significant increase of α-brain activity in frontal region (ANOVA: $P<0.05$) and also increasing tendency of α-brain activity in occipital region (ANOVA: $P>0.05$) compared to placebo. α-brain activity started to increase in 30 min ($P>0.05$ vs placebo) and kept increasing at time 40 min, 50 min, and 60 min ($P<0.05$ vs placebo) after administration. There were significant increases of putting success rate and predicted drive shot accuracy compared to placebo ($P<0.05$).

CONCLUSIONS

These results suggest that relaxation effects induced by L-theanine containing beverage may be helpful to improve golf performance. Larger field trial may be required to confirm these effects.