EMG ANALYSIS OF QUADRICEPS MUSCLE DURING THREE DIFFERENT MANNER OF SQUAT EXERCISE
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Introduction
Recent years, the relationship between the manner of sports activity or exercise and the chronic overuse syndrome is pointed out. Although squat exercise is known as popular training and rehabilitation program, the relationship between the form of squat exercise and muscle activity has not known well. It was therefore the purpose of this study to evaluate the levels of electrical activity of the quadriceps muscle during the three different manner of squat exercise.

Methods
11 healthy volunteers performed squat exercise with unloaded and added resistance equal to 50% of their body weight under three different manner of lower extremity position: knee straight forward to toe, no rotation of the tibia (neutral squat); lateral rotation of the tibia (knee-in toe out); and knee bend forward over toe, no rotation of the tibia (lower leg bent). Bipolar surface electrodes placed on the bellies of the vastus medialis, vastus lateralis and rectus femoris. Integrated EMG (iEMG) of squat was divided by iEMG of maximum voluntary contraction of the quadriceps muscle to %iEMG. The %iEMG was compared among three manner of squat. Repeated measures ANOVA and contrast were used for statistic analysis (p< 0.05).

Results
On the vastus medialis and lateralis, there were no significant differences in electrical activity (%iEMG) among three manner of squat with and without resistance. However the %iEMG of the rectus femoris on the unloaded lower leg bent showed a significantly greater than neutral squat. Two manner of squat such as the knee-in toe-out and the lower leg bent which added 50% of body weight load produced a significantly greater %iEMG than the neutral squat during both ascent and descent phase.

Discussion/Conclusion
We investigated the effect electrical activity of quadriceps muscle to evaluate the influence of manner during squat exercise. The electrical activity of the rectus b femoris on the knee-in toe-out and the lower leg bent showed greater than neutral squat. This higher %iEMG value of the rectus femoris resulted from deep flexion range of the knee and light flexion range of the hip. And these results expressed a characteristic of the rectus femoris as a diarticular muscle well. High activity of the rectus femoris in lower leg bent may lead to a chronic disorder of lower extremity by repeating it.

Keywords: Electromyography, Exercise