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The Effects of Varying Doses of Caffeine on Sports Skill Related Performance and Reaction Time

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Caffeine is a stimulant agent used frequently by a large population and can be found in a number of beverages ranging from soft drinks to energy drinks. It is not clear what the optimal dosage of caffeine would be to improve cognitive function and skill related exercise performance. **PURPOSE:** To examine the effects that caffeine would produce on strength, sports related performance activities and cognitive function when taking varying doses. **METHODS:** Ten (1 female, 9 male) subjects (Age=20.5 yrs) came in on four separate occasions and consumed varying doses of caffeine (baseline, 200, 300, and 400 mg) in randomized order and performed several sports performance related tests. After consuming assigned dose of caffeine, subjects were instructed to rest for 30 minutes prior to performing the tests. After obtaining blood pressure (BP) and heart rate (HR), each subject was asked to complete an online cognitive reaction time, handgrip strength, vertical jump, broad jump, and shuttle run tests. One-way ANOVA with repeated measure was used to compare differences in reaction time, handgrip strength, vertical jump height, broad jump distance and shuttle run time at varying doses of caffeine. **RESULTS:** A decrease in cognitive reaction time was shown in all three trials (200, 300, 400 mg) when compared to the baseline although the differences were not statistically significant (244.7 ± 19.1 , 242.8 ± 14.1 , and 268.4 ± 50.6 vs. 264 ± 48.6 msec, $p > 0.05$). A significant increase was observed in handgrip strength with 300 mg dose showing the greatest increase from the baseline for both non-dominant (44.9 ± 14.5 vs. 51.9 ± 16.0 kg, $p = 0.03$) and dominant hand (47.9 ± 13.8 vs. 51.0 ± 12.8 kg, $p = 0.03$). Moreover, modest but not significant increases were shown in vertical jump height with 300 mg dose showing the greatest improvement (54.9 ± 7.59 vs. 58.4 ± 7.0 cm, $p = 0.071$). Comparing to the baseline, significant decrease in shuttle run time was observed in all 200, 300, and 400 mg trials (3.7 ± 0.4 vs. 3.4 ± 0.3 , 3.5 ± 0.3 , and 3.4 ± 0.3 sec, $p = 0.02$). No significant caffeine effect was observed for BP or HR. **CONCLUSION:** Based on the results of study, the optimal dosage of caffeine for improvements in performance appear to be in the 200-300 mg range while 400 mg dose seemed to have negative effects.