Does Drinking Red Bull™ Increase Manual Dexterity?

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ABSTRACT

Energy drinks have become popularized and Red Bull™ has been demonstrated to increase endurance. However, as far as we are aware the effects of this energy drink on dexterity have not been evaluated. Therefore, the aim of the present study was to evaluate the effects of drinking one can of Red Bull™ energy drink on manual dexterity using a standardized 9-hole peg test. Eighteen volunteers (adults and children) performed a standardized dexterity test with their left and right hands twice before consuming a 250 ml can of Red Bull™ energy drink, resting for a period of 30 minutes and repeating the standardized dexterity test. Dexterity performance for each hand was compared pre- and post-consumption of the drink. Five volunteers underwent the same testing procedure but drank 250 ml of water rather than Red Bull™ to serve as a control group. The mean times for completion of the dexterity test pre-consumption were 15.92 seconds (SD 1.98) and 16.6 seconds (SD 2.02) for right and left hands, respectively. The mean times for completion of the dexterity test post-consumption were 17.3 seconds (SD 2.1) and 17.8 seconds (SD 2.5) for right and left hands, respectively. In the control group, pre-consumption means for completing the dexterity test with the left and right hands were 16.9 and 18.8 seconds, respectively. There were no statistically significant differences in terms of the hand used to carry out the test or of gender, or between the control group and the study participants. It is concluded that Red Bull™ energy drink has no short-term effects on manual dexterity, although larger cohort studies are required to confirm these preliminary findings.

Key Words: Sports drinks, energy drinks, caffeine

INTRODUCTION

Energy drinks have become very popular recently, particularly among college-aged individuals. However, there are conflicting data concerning the actual benefits of consuming these drinks. One popular brand of energy drink, Red Bull™, is claimed by the manufacturer to increase performance, concentration, reaction speed, vigilance and metabolism and has been the subject of several studies. Caffeine is a major component of Red Bull™, with levels comparable to that found in one cup of coffee, and is purported to be the main active ingredient of this energy drink; other ingredients include taurine, glucuronolactone, B-vitamins and glucose. It has been demonstrated that Red Bull™ improves endurance in a cycling time-trial performance in comparison to a placebo drink. However, a study concerning high-intensity run time-to-exhaustion carried out on young adults aged between 21 and 25 years showed that sugar free Red Bull™ had no effect on endurance. A study investigating the effects of Red Bull™ on cardiovascular and renal function demonstrated that the drink had no effect on overall cardiovascular function, though energy drinks having been linked to significant alterations in the cardiovascular system including increased platelet aggregation and decreased endothelial function in healthy young adults. Furthermore, the study carried out by Ragsdale and colleagues demonstrated that far from being deleterious to young adults, Red Bull™ consumption ameliorated changes in blood pressure during stressful situations and increased pain tolerance.

A non-traditional manual dexterity test has revealed that an energy drink has a positive effect in terms of counteracting fatigue. However, the purpose of the present study was to investigate whether consumption of a 250 ml can of Red Bull™ energy drink affected manual dexterity, and as far as we are aware this is the first study of its type. The working hypothesis was that consuming Red Bull™ would result in increased dexterity.
MATERIALS AND METHODS

Following institutional review board approval, the present study was carried out on 23 volunteers (18 study participants and five control subjects) who had given written informed consent. All volunteers were healthy and no individuals were chronic consumers of caffeine. The age range of the participants was nine to 62 years (mean 24 years), with the experimental group consisting of six males and 12 females. The control group consisted of three females and two males ranging in age between 10 and 69 years (mean 38 years). Each individual performed a standardized 9-hole peg test in duplicate using each hand, beginning with their dominant hand. After performing the peg test, study participants were asked to consume a 250 ml can of Red Bull™ (Austria), or 250 ml water in the case of the control group. The manual dexterity of each participant was evaluated before and after consuming Red Bull™ or water. There was no waiting period between peg hole testing of the same hand, or between tests carried out with left and right hands. Each volunteer waited 30 minutes after consuming Red Bull™ (experimental group) or water (controls) and then repeated the dexterity test twice using each hand. The time taken to complete the test was recorded using a stopwatch. Each volunteer began the peg hole test using their dominant hand and could not place the other hand on the table while carrying out the test; directions for the 9-hole peg test were followed exactly. For example, pegs had to be picked up one at a time and returned to the container one at a time. The stopwatch was started when the first peg was picked up. Statistical analysis using Statistica version 5.0 (Statssoft Inc., Chicago) was used to investigate significant differences in terms of the hand used to perform the test, gender and age between the study group and controls. Tukey’s post hoc tests were used to determine differences between means. Statistical significance was set at p<0.05.

RESULTS

The times taken by individuals to complete the dexterity test with their right or left hands before consumption of Red Bull™ were comparable (Table 1). The times taken by individuals to complete the test with either hand after consumption were also comparable. However, consumption of Red Bull™ resulted in a slight decrease in the time taken to complete the dexterity test for each hand (Table 1), although the results were not significant and the same trends were evident when the control group data were analyzed (Table 1). The maximal times taken by control subjects to complete the test were slightly greater than those of the experimental group but the difference did not reach statistical significance. There were no statistically significant differences ($P > 0.05$) in the time taken to complete the nine-hole peg test in terms of the hand used, gender or age.

DISCUSSION

Sports drinks are widely used to maintain electrolyte levels and hydrate consumers. However, more recently, sports drinks labeled as energy drinks have become very popular and it has been demonstrated that most components of popular energy drinks are present at levels that provide no therapeutic benefits. One major component of Red Bull™, one of the most popular energy drinks, is the stimulant caffeine. Caffeine blocks the release of the neurotransmitter adenosine, which causes an increase in the overall arousal state of the body owing to the release of epinephrine. The data concerning caffeine are conflicting. At least two studies have demonstrated that this stimulant has no effect on coordination$^{10,11}$, but Scott et al. reported that caffeine increased performance of hand-eye coordination.$^{12}$ Furthermore, Liebermann et al. demonstrated that moderate doses of caffeine can improve vigilance and memory.$^{13}$

Red Bull™ energy drink contains glucuronolactone, niacin, pantothenic acid, riboflavin and taurine, a sulfonic amino acid predominantly located in skeletal muscle that has been reported to improve exercise performance in endurance athletes.$^{14}$ In addition to the above components, Red Bull contains glucose and B group vitamins; the glucose is metabolized during exercise and has been shown to promote cognitive performance.$^{15}$ In an animal study, Sun et al. revealed that nutritional supplementation with a combination of mitochondrial nutrients, including vitamin B and taurine enhances exercise performance and improves recovery from fatigue by replenishing antioxidant system and reducing generation of reactive oxygen species.$^{16}$

It has been reported that Red Bull™ has no effect on run time-to-exhaustion following consumption.$^{2}$ In another study, repeated sprint performances were comparable between groups receiving placebo and Red Bull™ containing 1.3 mg/kg of caffeine and 1 g of taurine 1 h pre-exercise.$^{17}$ However, several other studies indicate that this energy drink improves endurance.$^{3,18,19}$ In the current study, drinking 250 ml of Red Bull™ did not significantly decrease the time

| Table 1. Time taken to complete a standardized nine-hole peg test (time in seconds) before and after consumption of Red Bull™ or water. |
|----------------------------------|-----------------|-----------------|
| **Experimental Group**          | **Controls**    |                 |
| Pre-consumption right hands      | 12.63-19.59     | 15.53-19.66     |
| (mean 15.92; SD 1.98)            | (mean 16.9)     |
| Pre-consumption left hands       | 14-20.53        | 13.69-21.68     |
| (mean 16.6; SD 2.02)             | (mean 18.8)     |
| Post-consumption right hands     | 11.84-20.78     | 11.91-19.25     |
| (mean 14.9; SD 2.5)              | (mean 17.8)     |
| Post-consumption left hands      | 12.06-20.56     | 13.16-21.06     |
| (mean 15.83; SD 2.1)             | (mean 17.3)     |

Note that experimental group consumed 250 ml Red Bull™ and controls consumed 250 ml water. Individuals waited 30 minutes after consumption before repeating the dexterity test in duplicate.
taken for an individual to complete a standardized dexterity test, and we tentatively conclude that Red Bull™ does not increase manual dexterity.

CONCLUSIONS

The data presented herein do not support the hypothesis that drinking Red Bull™ increases manual dexterity. There were no statistically significant differences in the time taken to complete a dexterity test between volunteers who consumed Red Bull™ and those who did not. However, in general, control subjects took longer to complete the manual dexterity test than individuals who consumed Red Bull™. The sample size used in the present study was relatively small and further studies incorporating larger samples are required to confirm the tentative conclusion that Red Bull™ does not increase manual dexterity.

REFERENCES