

Effects of a Caffeinated Taurine Drink on Mental Performance and Mood in a Fatigue Inducing Paradigm

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INTRODUCTION

Caffeine, taurine, glucuronolactone, sugar and vitamins are the basic ingredients of some of the leading energy drinks. Clear cut performance enhancement in fatigue inducing conditions have repeatedly been reported [1,2,3,4]. The relative contribution to performance enhancement of each of the substances is still in the dark. Caffeine increases alertness and reduces fatigue. It improves performance on vigilance tasks and simple tasks that require sustained response [1,3,5]. Taurine has a variety of modulatory effects on the central nervous system [6,7]. It was also proved that there was a positive effect of glucose on complex performance tasks [8]. Sugar might play a functional role for the effects of energy drinks in fatigue inducing experimental settings [9,10]. The aim of the present study was to show that 250 ml of a caffeinated taurine drink (verum drink containing 80 mg caffeine, 1000 mg taurine, 600 mg glucuronolactone, 0 g sucrose and 0 g glucose) have a performance enhancing effect and positive effects on mood of professional pilots in a 6 hour fatigue inducing paradigm, in comparison to a placebo (verum-drink without caffeine, taurine and glucuronolactone). The paradigm (Graz fatigue paradigm) has already been used to demonstrate performance enhancing effects of caffeinated drinks in breaks [10].

METHOD

23 male, non-smoking pilots (with valid flight licence) with moderate coffee consumption (1-3 cups per day) participated in a randomized placebo-controlled, double blind crossover study on the effect of 250 ml of a commercial caffeinated taurine drink on performance and mood state. Subjects received a standard meal at the beginning of the experiment to prevent hypoglycemic states.

Crossover design

Day A: Verum Drink	Day A: Placebo	total of participants
Day B: Placebo	Day B: Verum Drink	
n=12	n=11	n=23

Testing procedure

DAY A		DAY B	
baseline ae	17.00	baseline be	
application	19.40	application	
Test phase a1		Test phase b1	
Test phase a2	21.30	Test phase b2	
	23.00		

Test substances

250 ml of a commercial caffeinated taurine drink	250 ml placebo
80 mg caffeine	without
1000 mg taurine	caffeine
600 mg glucuronolactone	taurine
0 g sucrose	glucuronolactone
0 g glucose	

Dependent variables

In sum three performance measures were selected for hypothesis testing.

- d2 Letter Cancellation Test (Total Errors T-E)
- sustained match to sample test Cognitron (mean reaction time of correct responses)
- Continuous Performance Task (Total Errors T-E)

A set of supplementary performance tests was used to simulate tiring and monotonous working conditions.

RESULTS

Analysis of Variance

Variable	p-value	adjusted
CPT	.002	.0167 s.

s. significant

As demonstrated in Figure 1 subjects performed significantly better on the Continuous Performance Task in the verum condition compared to the placebo condition.

The other performance measures support the result in a less pronounced way.

The positive performance effect of the verum was well reflected in the subjective state of the subjects (figure 2).

CONCLUSIONS

A sugar free caffeinated taurine drink has a significant effect towards an increase of performance in a fatigue inducing paradigm.

This effect comes along with improved awakens and mood.

Important practical applications of the results are evident as we could show a positive effect in a fatigue inducing evening shift in the laboratory for pilots after a regular day shift work.

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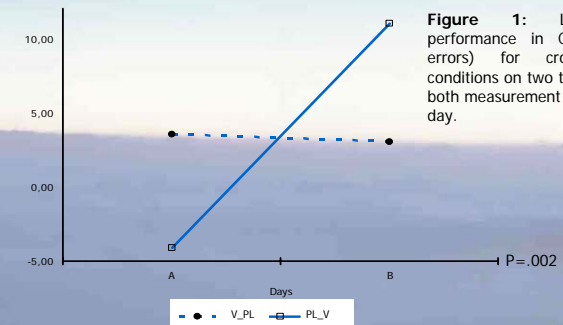


Figure 1: Level corrected performance in CPT (total minus errors) for crossed treatment conditions on two test days (A, B) for both measurement occasions on each day.

V_PL ... first day verum, second day placebo
PL_V ... first day placebo, second day verum

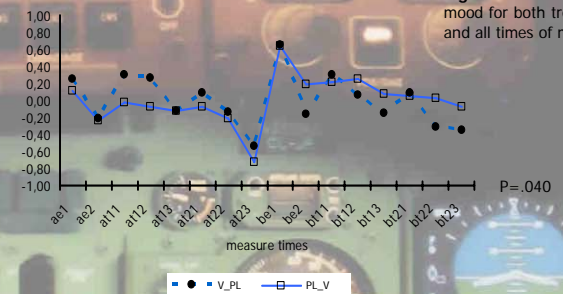


Figure 2: Means of positive mood for both treatment groups and all times of measure.

V_PL ... first day verum, second day placebo
PL_V ... first day placebo, second day verum