



Mini Review

Volume 4 Issue 2 - February 2018
DOI: 10.19080/APBJ.2018.04.555634

Anatomy Physiol Biochem Int J

Copyright © All rights are reserved by Domingos-Souza Gean

The Negative Physiological Effects Associated with the Combination with Alcohol and Energy Drinks



Jessica Adrielle Teixeira Santos¹ and Domingos-Souza Gean^{2*}

¹Department of Psychiatric Nursing and Human Sciences, University of São Paulo, Brazil

²Department of Biomedical Sciences, University of Missouri, USA

Submission: February 08, 2018; **Published:** February 16, 2018

***Corresponding author:** Domingos-Souza Gean, Department of Biomedical Sciences, Department of Medical Pharmacology and Physiology, Dalton Cardiovascular Research Center, University of Missouri, USA, 134 Research Park Drive, Columbia, MO, 65211, USA, Tel: +1 352 815 6797; Email: geandomingosusp@gmail.com

Abstract

A brief review of the effects of caffeine and energy drinks in combination with alcohol is provided in order to establish a landscape of the theme. Several studies have identified a range of negative physiological effects associated with this combination, including elevated blood pressure, decreased cerebral blood flow velocity, insomnia, nervousness, headache, tachycardia, gastrointestinal disorders, tremor, psychomotor agitation, and psycho physiological alteration of decision-making and impulsivity. However, more studies are needed to better understand the complexity of the damages resulting from this interaction, mainly experimental studies.

Keywords: Physiological effects; Alcohol; Energy drinks

Introduction

Due to the popularity of energy drinks in the 1980s there was a growing consumption among young people [1,2] who started to use these substances for a variety of reasons, including to improve physical performance, memory, concentration or to alleviate drowsiness [3,4]. However, recent studies raise questions about their interaction with alcohol and their ability to mask the subjective effects of alcoholic beverages, leading young people to overestimate their level of commitment, drink more and favor engagement in risk behaviors [5-8]. In 2006, the global annual consumption of energy drinks increased by 17% over the previous year to 906 million gallons, although Thailand leads the ranking with the highest per capita consumption in the world, and the US leads the highest total sales volume [9], the consumption of this substance in Brazil has become a notorious public health problem. In the country, it was verified that the university students are quite exposed to this type of consumption. According to the "I National Survey on the Use of Alcohol, Tobacco and Other Drugs among University Students of the 27 Brazilian Capitals," the energy drink is the substance most frequently associated with alcohol, 74.3% reported use of this mixture in life, 53 % use in the last 12 months and 36% use in the last 30 days [10].

Negative Physiological Effects Associated with the Use of Energy Drinks

Evidence alerts the negative physiological effects associated with energy drink, including elevated blood pressure, decreased cerebral blood flow velocity [11], insomnia, nervousness, headache, tachycardia, gastrointestinal disorders, tremor, psychomotor agitation [1], and psychophysiological alteration of decision-making and impulsivity [12-14]. Adds to the risks at the individual level, the negative consequences for public health and communities, for example, exposing the population to impaired motor vehicle direction [15,16] or acts aggressive or delinquent. The main components of energy drinks are caffeine, taurine and carbohydrates in the form of sugars, with caffeine being the most abundant ingredient (levels ranging from a minimum of 50 mg to 505 mg per can or bottle.) Caffeine produces psychostimulant effects, acting positively on mood and specifically on psychomotor performance. Caffeine produces psychostimulant effects, acting positively on mood and specifically on psychomotor performance [1]. A study that evaluated the Time of Reaction (TR) - time that a person takes to initiate any movement - discovered greater agility in consumers of high doses of caffeine (>200mg/ day) [17].

Some of the concerns surrounding this component lie in the absence of monitoring the marketing of beverages containing this substance for children and adolescents, even after recognition of their psychopathological properties recently included in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders – V. A study investigating the use of caffeine among adolescents found a robust association of violent behaviors and conduct disorder among those with higher caffeine consumption, being significantly stronger for girls than boys, both for violent behaviors and behavior. Another study identified that university students are the ones who consume energy drinks the most, and therefore, they present an associated consumption of tobacco, poor breakfast when they wake up and spend more hours using the internet [2].

Combined Use of Energy Drink and Alcohol

In contrast to energy drinks, alcohol impairs a wide range of psychomotor and cognitive tasks, slowing reaction times to some stimulus, impairing memory formation and increasing the incidence of errors in routine tasks [18]. Study identified impairments in the processing of information and tasks of divided attention, of fundamental importance for everyday life, especially among adolescents. In the specific case of consumption associated with energy, a study found that the main reason for its combined use is the pursuit of pleasure and personal satisfaction (hedonistic motives), surpassing the social motives and increasing energy / resistance [19] which raises concerns about its potential in developing physiological dependencies.

Alcohol and caffeine are often consumed together because of the common belief that they have antagonistic effects and that caffeine has an attenuating effect on alcohol intoxication. Although this is a reasonably consistent conclusion regarding the cognitive effects of drugs taken in isolation, there is disagreement as to the interactions between alcohol and energy drinks. Recent evidence points to the potential dangers of the interaction of these substances, such as risk of alcohol dependence, injury episodes and aggressive experience [19].

Study compared the effects of two doses of alcohol, one in combination with energy drink and the other only with alcohol, found that the energetic beverage reduced the perception of alcohol damages among its users, although the psychomotor functions remain unchanged [6]. Another study identified the use of alcohol and energy drink as a consistent predictor for frequent use and serious alcohol problems (≥ 16 in AUDIT), as well as an increased risk of involvement in motor vehicle accidents [8]. Considering the long-term effects of this combination, a study identifies through animal models that repeated exposure to alcohol mixed with caffeine in young mice causes unique behavioral and neurochemical effects similar to those caused by use of cocaine, potentially contributing to a risk of future abuse as a way to compensate for these behavioral and neurochemical changes [20]. However, alcohol and energy co-ingestion may

result in a pattern of behavior characterized by lack of action planning, which implies that there is no chance of consciously considering the consequences of the act [12-14]. This impulsive behavior can be defined as a propensity for rapid and unplanned reactions from external or internal stimuli, without taking into account the negative consequences that can result from actions for the person or others [21].

The use of alcohol combined with energy drinks was associated with several impulsive manifestations among adolescents. Recent studies have shown that those who used the mixture were more likely to engage in delinquent behavior, received poor ratings, consume drugs, engage in risky sexual activity, be physically injured, frequently use alcohol, risk of alcohol dependence, and had a history of dangerous driving of motor vehicle [13,14,19]. Another study with students found that those who had consumed this combination had a significantly higher prevalence of alcohol-related consequences, including: being sexually abused or sexually abusing another student, being injured or injuring someone [4].

Conclusion and Perspectives

Despite the intense concern of the scientific community regarding the simultaneous use of these compounds, further studies are needed to confirm and better understand the complexity of the damages resulting from this interaction, mainly experimental studies.

References

1. Hoffman, Jay R (2010) Caffeine and energy drinks. *Strength Cond J* 32(1): 15-20.
2. Uzundumlu AS, Sezgin A, Sari MM (2016) Analysis of Factors Affecting the Status of Energy Drink Usage Status by University Students. *Ethno Med* 10(3): 307-313.
3. Malinauskas BM, Aeby VG, Overton RF, Carpenter-Aeby T, Barber HK (2007) A survey of energy drink consumption patterns among college students. *Nutr J* 6: 35.
4. O'Brien MC, McCoy TP, Rhodes SD, Wagoner A, Wolfson M (2008) Caffeinated cocktails: energy drink consumption, high-risk drinking, and alcohol-related consequences among college students. *Acad Emerg Med* 15: 453-460.
5. Riesselmann B, Rosenbaum F, Schneider V (1996) [Alcohol and energy drink-can combined consumption of both beverages modify automobile driving fitness?]. *Blutalkohol* 33(4): 201-208.
6. Ferreira SE, De mello MT, Pompeia S, De Souza-Formigoni ML (2006) Effects of energy drink ingestion on alcohol intoxication. *Alcohol Clin Exp Res* 30(4): 598-605.
7. Arria AM, O'brien MC (2011) The "high" risk of energy drinks. *JAMA* 305(6): 600-601.
8. Patrick ME, Evans-Polce RJ, Maggs JL (2014) Use of Alcohol Mixed with Energy Drinks as a Predictor of Alcohol-Related Consequences Two Years Later. *J Stud Alcohol Drugs* 75(5): 753-757.
9. (2007) US overtakes Thailand as world leader in energy drinks. *Zenith International* pp. 100.
10. Andrade AG, Duarte PCAV, Oliveira LG (2010) I Levantamento Nacional sobre o Uso de Álcool, Tabaco e Outras Drogas entre Universitários

- das 27 Capitais Brasileiras. Secretaria Nacional de Políticas sobre Drogas (SENAD); Grupo Interdisciplinar de Estudos de Álcool e Drogas (GREA/IPQ-HCFMUSP) Brasília: SENAD pp. 282.
11. Grasser EK, Yepuri G, Dulloo AG, Montani JP (2014) Cardio- and cerebrovascular responses to the energy drink Red Bull in young adults: a randomized cross-over study. *Eur J Nutr* 3(7): 1561-1571.
 12. Peacock A, Bruno R (2015) Young adults who mix alcohol with energy drinks: typology of risk-taking behaviour. *Addict Behav* 45: 252-258.
 13. Peacock A, Pennay N, Droste R, Bruno D (2013) 'High' risk? A systematic review of the acute outcomes of mixing alcohol with energy drinks. *Addiction* 109(10): 1612-1633.
 14. Tucker JS, Troxel WM, Ewing BA, D'amico EJ (2016) Alcohol mixed with energy drinks: Associations with risky drinking and functioning in high school. *Drug and Alcohol Dependence* 167: 36-41.
 15. Eckschmidt F, Andrade AG, Santos B, Oliveira LG (2013) The effects of alcohol mixed with energy drinks (AmED) on traffic behaviors among Brazilian college students: a national survey. *Traffic Inj Prev* 4(7): 671-679.
 16. Woolsey CL, Jacobson BH, Williams RD, Barry AE, Davidson RT, et al. (2015) Comparison of the combined-use of alcohol & energy drinks to alcohol-only on high risk driving. *Substance use and Misuse* 50(1): 1-7.
 17. Aguiar, Tiago Turnes, Thiago Elpídio Cardoso, Cunha Vasconcellos, Fabrizio Caputo (2012) Efeito da ingestão de cafeína em diferentes tarefas de tempo de reação. *Rev. Bras. Ciênc. Esporte* 34(2): 465-476.
 18. Worldwide Brewing Alliance (2008) Drinking and Driving Report, (8th edn).
 19. Droste N, Tonner L, Zinkiewicz L, Pennay A, Lubman DI (2014) Combined Alcohol and Energy Drink Use: Motivations as Predictors of Consumption Patterns, Risk of Alcohol Dependence, and Experience of Injury and Aggression. *Alcohol Clin Exp Res* 38(7): 2087-2095.
 20. Robins MT, LU J, Van Rijn RM (2016) Unique Behavioral and Neurochemical Effects Induced by Repeated Adolescent Consumption of Caffeine-Mixed Alcohol in C57BL/6 Mice. *PLoS ONE* 11(7).
 21. Moeller FG, Barratt ES, Dougherty DM, Schmitz JM, Swann AC (2001) Psychiatric aspects of impulsivity. *Am J Psychiatry* 158(11): 1783-1793.



This work is licensed under Creative Commons Attribution 4.0 License
DOI: [10.19080/APBIJ.2018.04.555634](https://doi.org/10.19080/APBIJ.2018.04.555634)

Your next submission with Juniper Publishers will reach you the below assets

- Quality Editorial service
- Swift Peer Review
- Reprints availability
- E-prints Service
- Manuscript Podcast for convenient understanding
- Global attainment for your research
- Manuscript accessibility in different formats (Pdf, E-pub, Full Text, Audio)
- Unceasing customer service

Track the below URL for one-step submission
<https://juniperpublishers.com/online-submission.php>