Consumo de bebidas con cafeína y sus efectos en estudiantes de Medicina de la Universidad Autónoma de Baja California, Tijuana

Consumption of Beverages with Caffeine and its Effects in Medical Students of the Autonomous University of Baja California, Tijuana

Consumo de bebidas com cafeína e seus efeitos em estudantes de medicina da Universidade Autônoma da Baja California, Tijuana

Martha Rosales-Aguilar
Universidad Autónoma de Baja California, Facultad de Medicina y Psicología, México
martha_rosales@uabc.edu.mx
https://orcid.org/0000-0002-3528-2277

Eduardo Castillo Ortiz
Universidad Autónoma de Baja California, Facultad de Medicina y Psicología, México
Ecolobo94@hotmail.com
https://orcid.org/0000-0001 9058-908X

Cesar G. Díaz Trujillo
Universidad Autónoma De Baja Califorínía, Facultad de Química e Ingenieria,México
Diazg@uabc.edu.mx
https://orcid.org/0000-0001- 7402-1435

María de los Remedios Sánchez-Díaz
Universidad Autónoma de Baja California, CISALUD Valle de las Palmas, México
maria.sanchez@uabc.edu.mx
https://orcid.org/0000-0002- 7901-3802

Resumen

Dentro de las bebidas populares, no necesariamente nutricionales, están las bebidas con cafeína. En México, después del agua y la leche, el café y las bebidas gaseosas son los productos de mayor ingesta por toda la población. Los adultos jóvenes presentan un importante consumo en estas bebidas. Los estudiantes refieren consumirlas por diferentes motivos: para mejorar el promedio académico, realizar mayor actividad durante el día, hacer ejercicio y socializar. El propósito del estudio fue conocer el consumo de bebidas con cafeína entre los estudiantes de medicina, la razón de este consumo y los efectos que perciben tras haberlas ingerido. **Material y Método:** estudio descriptivo de corte transversal en el que participaron estudiantes activos de todos los semestres de manera voluntaria a través de una encuesta. **Resultados:** participaron 235 estudiantes que consumen bebidas como café, té, gaseosas de cola y energizantes en diferentes cantidades. Los estudiantes argumentaron las razones por las cuales las consumen: socializar, estudiar, mantenerse en vigilia, etc. Se encontró que los efectos que causaron estas bebidas son variados (agradables, desagradables y ambos), además de que detonaron sensibilidad al no consumo de estas bebidas, manifestando efectos que pudieran ser considerados de abstinencia. **Discusión y conclusión**: se encontró que el café fue la bebida de mayor consumo estudiantil en 77.44%, y su razón de consumo fue la realización de sus actividades diarias y académicas. Los efectos que produce la cafeína pueden ser dependientes de la cantidad de tazas consumidas y el tipo de bebida (café, té, bebidas gaseosas de cola y bebidas energizantes). Los efectos pueden ser placenteros (tranquilidad, energía, relajación) o desagradables (taquicardia, insomnio, diuresis); ambos, refirieron síntomas relacionados a la abstinencia (cefalea, somnolencia e irritabilidad) cuando no se consumen dichas bebidas, y muestran conocimientos de que pueden causar patologías.

Palabras clave: abstinencia, bebidas energizantes, cafeína, efectos colaterales síntomas benéficos.

Abstract

Among the popular beverages, caffeinated beverages are not necessarily nutritional. In Mexico, after water and milk, coffee and soft drinks are the products with the highest intake throughout the population. Adult young people presents an important consumption of these drinks. Students report consuming them for different reasons: to improve the academic average, perform more activities during the day, exercise and socialize. The purpose of this study is to know the consumption of caffeinated beverages among medical students, the reason for this consumption and the effects they perceive after having ingested them. **Material and Method:** a descriptive cross-sectional study in which active students of all semesters participated voluntarily through a survey. **Results:** 235 students who consumed beverages such as coffee, tea, soft drinks and energizers in different quantities participated. The students argued why they consume them: socialize, study, stay awake. It was found that the effects caused by these drinks are varied (pleasant, unpleasant and both). They also showed sensitivity to the non-consumption of these drinks, manifesting effects that could be considered as abstinence. **Discussion and conclusion:** it was found that coffee is the beverage with the highest student consumption at 77.44%. Its consumption ratio was due to the realization of the daily and academic activities of the students. The effects produced by caffeine can be dependent on the amount of cups consumed and the type of beverage; coffee, tea, cola soft drinks and energy drinks. The effects can be pleasant such as tranquility, energy, relaxation, unpleasant tachycardia, insomnia, diuresis both, refer symptoms related to withdrawal, headache, drowsiness and irritability, when not consumed and show knowledge that caffeinated beverages can cause pathologies.

Keywords: abstinence, energizing drinks, caffeine, side effects, beneficial symptoms.

Resumo

Entre as bebidas populares, não necessariamente nutricionais, são bebidas com cafeína. No México, após a água e o leite, o café e os refrigerantes são os produtos com maior consumo para toda a população. Os jovens adultos apresentam um consumo importante nessas bebidas. Os alunos relatam consumi-los por diferentes motivos: melhorar a média acadêmica, realizar mais atividades durante o dia, exercitar e socializar. O objetivo do estudo foi conhecer o consumo de bebidas com cafeína entre os estudantes de medicina, o motivo desse consumo e os efeitos que eles percebem após terem ingerido. Material e Método: estudo descritivo transversal em que os alunos ativos de todos os semestres participaram voluntariamente através de uma pesquisa. Resultados: 235 alunos participaram, consumindo bebidas como café, chá, colas e energizantes em diferentes quantidades. Os alunos discutiram os motivos pelos quais eles os consumiam: socializar, estudar, manter a vigília, etc. Verificou-se que os efeitos causados por essas bebidas são variados (agradáveis, desagradáveis e ambos), bem como a sensibilidade detonante ao não consumo dessas bebidas, manifestando efeitos que podem ser considerados abstinência. Discussão e conclusão: descobriu-se que o café era a bebida com o maior consumo de estudantes em 77,44%, e seu índice de consumo era a realização de suas atividades diárias e acadêmicas. Os efeitos que a cafeína produz podem depender da quantidade de copos consumidos e do tipo de bebida (café, chá, refrigerantes e bebidas energéticas). Os efeitos podem ser agradáveis (tranquilidade, energia, relaxamento) ou desagradáveis (taquicardia, insônia, diurese); ambos relataram sintomas relacionados à abstinência (dor de cabeça, sonolência e irritabilidade) quando essas bebidas não são consumidas e mostram conhecimento de que elas podem causar patologias.

Palavras-chave: abstinência, bebidas energéticas, cafeína, efeitos colaterais, sintomas benéficos.

Introduction

Coffee is one of the most consumed beverages. Statistics show that around 2500 million cups of coffee a day are served in the world (Pardo, Álvarez, Barral and Farro, 2007). Mexicans consume approximately 800 g to 1400 g per year of coffee, that is, 2.6 cups a day of this infusion (Barreda-Abascal, Molina, Haro, Alford and Verster 2012). After water and milk, coffee and tea are the most consumed beverages in Mexico. (Rivera et al., 2008). Coffee is a non-caloric, non-nutritive and bitter-tasting beverage, and its role in health has been widely discussed (Aguilera et al., 2009). Coffee contains an amount of caffeine that can vary between 0.8 and 1.8% per grain; in 150 ml of coffee there is an approximate 30 mg to 175 mg of caffeine, and in decaffeinated between 2 mg and 8 mg (Pardo et al., 2007). Currently, there is a wide variety of beverages with different caffeine content, such as soft drinks with cola (BGC) and energy drinks (BE), which are consumed due to their stimulating action and to feel better (Ramírez, 2010). Energy drinks have different caffeine content, ranging from 29 mg to 114 mg depending on the presentation and volume ranging from 250 ml to 473 ml. BGC and BE are classified according to Official Mexican Standard-218-SSAI-2011 (2012) within non-alcoholic flavored drinks, added, which also contain other substances with stimulating action such as taurine, with GABA type neurotransmitter function in the thalamus of the brain according to Fan Jia et al (2008). Caffeine is an alkaloid, derived from purines that is formed by condensations of a pyrimidine and an imidazole, known as methylxanthines. The best known are caffeine, theophylline and theobromine, with formula 1,3, 7-trimethylxanthine-1,3-dimetixanthin and 3,7-dimetixanthin (Valenzuela, 2011).

It has been described that caffeine can cause physical and psychological dependence in daily consumption of amounts greater than 500 mg per day, and the effects referred to by abstinence include irritability, fatigue, drowsiness and headache, occurring between 12 noon and 24 noon. consumption (Gantiva, Amateus and Perilla, 2008). In Argentina, the abuse and dependence of products with caffeine was measured; It was found that students can generate a certain degree of dependence when consuming caffeinated beverages, as well as withdrawal symptoms (Horvat, Grela, Delgado and Morales, 2005). After the approximate consumption of more than 200 mg of caffeine, the mood improves and the fatigue decreases. It is estimated

that coffee starts with the consumption of 600 mg to 750 mg per day; a consumption greater than 1000 mg per day is considered a toxic range and could cause nervousness, insomnia, in addition to inducing anxiety, gastric acidity, confusion, tachycardia and cardiac arrhythmia (Horvat et al., 2005). Apparently, the preparation of coffee can modify the metabolism: boiled coffee contains substances such as cafestol, kahwol and soluble diterpenes and consuming it in this way can be a risk factor for the elevation of total cholesterol and LDL cholesterol (Ramírez, 2010). Valenzuela (2011) points out that the consumption of more than 300 mg of caffeine per day is not a cause of hypertension, nor constitutes a risk of myocardial infarction or modification of plasma levels indicating cardiovascular risk, such as C-reactive protein and homocysteine.

The absorption of caffeine in the body is almost complete in the stomach and is supplemented in the small intestine, increasing its concentration in the blood plasma at a maximum level of 30 min to 45 min. Caffeine reaches all tissues, including the brain, managing to cross the blood-brain barrier; in the liver it is metabolized by the cytochrome P-450 isoenzyme (CYP), subfamily1A, gen2 (CYP1A2) that demethy caffeine by 95%, transforming it into paraxanthine (85%), theobromine (10%) and theophylline (5%) , only 1% is excreted as unchanged caffeine in the urine. These compounds are transformed into uric acid derivatives (Barreda-Abascal et al., 2012).

The mechanism of action of methylxanthines, as structural analogs of adenosine, binds to cellular receptors without activating them. This produces an inhibition of the enzyme phosphodiesterase that leads to an increase in the concentrations of cAMP and cGMP, activating the calcium channels. It is considered that caffeine is a competitive antagonist of adenosine receptors in the membranes of the central and peripheral nervous system, increasing the release of glutamate. When adenosine exerts its receptor function, it activates different cellular functions such as dilating the blood and coronary vessels, regulating in turn the distribution of oxygen. In the brain, adenosine receptors inhibit the release of noradrenaline, dopamine, adrenaline and serotonin, which is associated with feeling better mood and well-being (Cote-Menéndez, Rangel, Sánchez and Medina, 2011).

Górnicka, Pierzynowska, Kaniewska, Kossakowska and Wozniak, (2014), in the study with young students in Poland, analyzed which caffeinated beverages they consumed, finding that

97% drink coffee, BGC 47%, and BE 53%; These, in particular, are consumed by the male gender and taken for exercise. In Lima, Peru, another study was conducted on the consumption of caffeinated beverages in students, recording that 96.31% of the students took the drinks especially for the taste. In this way, the BGC were the preferred ones, followed by chocolate, coffee, tea and BE. A relationship was sought between the consumption of caffeinated beverages and the symptomatology of depression and anxiety: the result was that no association of the variables was found (Osada, Rojas, Rosales y Vega, 2008).

Ríos *et al.* (2013) They surveyed college students in Puerto Rico, regarding beverages with caffeine, stress and academic activity. Eighty-eight percent agreed to consume this type of beverage and determined that BGC, coffee, hot chocolate (CHC) and tea, in this order, are preferred; 29% argued to consume BE to stay awake, because they perceive the heavy academic load. With respect to caffeine consumption in beverages and stress, no association was found in this study.

In Holland, Mackus, Van de Loo, Benson, Scholey and Verster (2016) surveyed university students and their knowledge about caffeine and its content in beverages. They found little knowledge about the caffeine content and the perception that they minimized the amounts of caffeine they ingested and overestimated the caffeine content of other beverages such as BE and BGC. The young people expressed that, by custom, 51% consume more coffee; 35%, tea; 9.2%, BE and 4.7%, BGC.

In Delhi, India, Gera, Kalra, and Gupta (2016) found that Indian students in the urban area consumed caffeine from drinking coffee, tea, BGC, CHC and BE; the coffee was consumed two to three times a day. In Pakistan, Aslam et al., (2013) conducted a survey among the students and their awareness of the BE. It was reported that his favorite beverage was tea, coffee and BE, explaining that its consumption was due to the fact that it provides them with physical resistance and concentration, as well as help in memory, decision making and academic performance.

On the other hand, in Saudi Arabia, Alsaggaf, Wali, Merdad and Merdad (2016) measured the quality of sleep in relation to caffeine consumption in students, reporting that 65% consumed beverages with maximum caffeine twice a day, and only 13% more than three times. The authors noted that insomnia and not sleeping properly are related to stress,

academic load, habits and hours of study, rather than the consumption of beverages of this type.

Champlin, Pash and Perry (2016) studied the consumption of BE and the relationship with the academic average of the students. They observed the consumption of BE in a period of two months and the students presented a decrease in the academic average. They concluded that the students consumed BEs with the wrong result and did not notice. Pettit and De Barr (2011) argue that the consumption of BE in conjunction with stress also has a negative effect on the academic average and that men are more regular with their consumption. Lieberman et al. (2015) explored, in five universities in the United States, students who consume products with caffeine; 92% consumed coffee for its flavor. They also found that the older they are, the greater their consumption. The investigation revealed that if they consumed coffee, they were more awake, with improved mood and with relief from stress. On the other hand, Gabrish (2017) found results that show that men consume energy drinks, while women prefer only coffee. Their finding was that caffeine users sleep on average fewer hours than non-consumers. Ogeil and Phillips (2015) point out that caffeine consumption is associated with decreased sleep quality, and in women it can cause psychological distress due to the stimulation of caffeine.

The objective of this study was to know if students consume caffeinated beverages, the reasons why they consume them, if they perceive a symptomatology when doing it or when to stop doing it and their knowledge and repercussion of the unmoderated consumption, considering that there is a controversy between the benefits or damage caused by the consumption of caffeine, a molecule that has been studied for various reasons in health matters and, although, benefits and harms have been described, its role has not been demonstrated, so it is intended to find a physiological and more specific psychology in young people, who are the most numerous population worldwide.

Materials and method

It was a cross-sectional descriptive study, which included the voluntary participation of students from the first to the tenth semester with active enrollment, men and women, of the Faculty of Medicine and Psychology of the Autonomous University of Baja California (UABC); the total number of students enrolled was 842. It was conducted from June to December 2016, based on a simple random sampling, with the total participation of 235 students ranging from 18 to 28 years. The exclusion criteria consisted in not having completed the survey. An electronic survey was applied with informed consent to facilitate participation. The statistical analysis was performed using the SPSS V20 software.

Results

The total number of participants was 235 (28%) of the total enrollment; 43% were men 43% and 57% women between 18 and 28 years old. No data exclusion was made because the students answered complete the survey. The general consumption of beverages was: coffee (77.44%), tea (13.19%), BGC (7.23%) and BE (2.12%). The daily consumption of coffee was 47.48%; of tea, 80.64%; of BGC, 70.58% and BE, 40%, for one cup per day (Table 1).

Tabla 1. Tipos de bebidas con cafeína de consumo entre estudiantes de Medicina

Variable		CAFÉ	TE	BGC	BE
¿Tipo de bebidas?		77.44[a]	13.19	7.23	2.12
Consumo por día	1 taza	47.48	80.64	70.58	40
	2 tazas	34.06	16.22	17.64	60
	3tazas	13.73	3.22	5.88	-
	4 tazas	4.39	-	5.88	-
Equivalente consumo de cafeína*	1taza	158mg/250mL	34mg/250mL	25mg/250mL	115mg/250mL

Nota* valores tomados de Osada2008, a: resultados de este estudio y representan porcentajes (%)

Regarding the symptoms they experience, 30% said they did not detect any symptoms, while others manifested to the consumption of a cup of coffee, tachycardia, obtaining energy, wakefulness, pleasure, relaxation, anxiety, acidity or peristalsis. For two cups (approximately 300 mg / ml of caffeine), symptoms such as alertness, insomnia, pleasure, energy, wakefulness, and tranquility were noted. For three cups, the effect of: wakefulness, pleasure, relaxation, concentration was maintained, while others manifested insomnia.

The consumers of tea manifested with a dream cup (2.5%), to feel alert, with energy, pleasure and relaxed; others felt tremors, dizziness and heartburn (1.2%). Tachycardia and nausea were present with the consumption of two cups (12.5%). On the other hand, 6.25% reported insomnia, dizziness, tremor and anxiety. Regarding the BGC, 2.8% felt tachycardia and 1.1% tremors and wakefulness. For BE, the effect of the highest percentage was that they produced stomach acid, anxiety and energy in 2.9%. Among the effects classified as pathophysiological, tachycardia is the symptom with the greatest presence and the most significant effects occur in the consumption of two cups of coffee and tea, according to the percentages shown in (Table 2).

Tabla 2. Síntomas percibidos por consumo de bebidas con cafeína

¿Qué efectos experimenta al momento de tomar estas bebidas?	CAFÉ (tazas)				TÉ (tazas)			BGC			BE	
	1	2	3	4	1	2	3	1	2	3	1	2
Nada	31	32.3	50	-	15	12.5	3.1	14.2	-	-	-	1.6
Fisiopatológicos												
Taquicardia	11.4	5.8	7.1	28.5	-	12.5	-	-	2.8	-	-	1.6
Diuresis	2.2	2.9	-	-	-	-	-	-	-	-	-	-
Acidez	3.4	5.8	-	-	1.2	-	-	-	-	-	2.9	-
Peristalsis	3.4	-	-	-	-	-	-	-	-	-	-	-
Evacuación Fecal	2.2	-	-	-	-	-	-	-	-	-	-	-
Nauseas	-	5.8	7.1	-	-	12.5	-	-	-	-	-	-
Dolor de Cabeza	-	5.8	-	-	-	-	-	-	-	-	-	-
Sed	-	2.9	-	-	-	-	-	-	-	-	-	-
Hambre	-	5.8	-	-	-	-	-	-	-	-	-	-
Mareos	-	-	-	-	1.2	6.5	-	-	-	-	-	-
Psicológicos agradables												
Energía	9.1	17.6	7.1	-	1.2	6.25	-	1.4	-	-	2.9	3.3
Vigilia	9	14.7	57	-	-	-	-	-	1.1	1	-	1.6
Placer	5.7	20.5	21.4	-	1.2	-	-	-	-	-	-	-
Relajación	4.5	14.7	14.1	-	1.2	6.25	-	-	-	-	-	-
Concentración	4	8.8	14.1	-	-	-	-	-	-	-	-	1.6
Humor Mejora	2.2	-	-	-	-	-	-	-	-	-	-	-
Calor	1.1	2.8	-	-	-	-	-	-	-	-	-	-
Hiperactividad	1.1	5.8	7.1	-	-	-	-	-	-	-	-	-
Tranquilidad	1.1	11.7	7.1	-	-	-	-	-	-	-	-	-
Saciedad	1.1	2.9	-	-	-	-	-	-	-	-	-	-
Psicológicos desagradables												
Ansiedad	4.5	5.8	7.1	-	-	6.25	-	-	-	-	2.9	-
Irritabilidad	3.4	26.4	7.1	-	1.2	-	-	1.4	-	-	-	-
Temblor	1.1	5.8	7.1	-	1.2	6.25	-	-	1.1	-	-	-
Sueño	1.1	8.8	-	-	2.5	-	-	-	-	-	-	-
Insomnio	-	14.7	14.1	-	-	6.25	-	-	-	-	-	-
Excitación	-	2.9	-	-	-	-	-	-	-	-	-	1.6
Nerviosismo	-	-	7.1	-	-	-	-	-	-	-	-	-
Euforia	-	-	7.1	-	-	-	-	-	-	-	-	-

Nota: resultados de este estudios expresados en %

According to the effects manifested by the consumption of caffeine, a classification of physiopathological effects was made, pleasant and unpleasant psychological effects. The results showed that students can feel a combination of primary and secondary symptoms, which can be feelings of discomfort and, at the same time, of pleasant emotions, such as tachycardia-elimination of sleep, energy-headache, alertness-happiness, wakefulness - concentration or tranquility-abdominal pain (Table 3).

They also manifested the presence of totally pleasant symptoms, such as relaxation-energy-mental fluency, tranquility-satiety-relaxation, no sleep-concentration, active energy, and, similarly, reported the opposite of feeling uneasy sensations such as tachycardia-anxiety .

Regarding the abstention of these beverages, 25.8% of coffee consumers reported no symptoms, as well as 48.3% of those who consumed tea, 60.5% of BGC and 33.3% of BE; the rest of the participants declared symptoms such as tiredness, drowsiness, headaches, irritability and depression.

In the daily routine, they stated that the consumption of coffee was for studying (25.8%), accompanying breakfast (20.8%) and waking up (21.9%). In the case of tea, 20% consumed it for studying, 43% for social living 43% and 20% for dinner. In the case of the BGC, 33.3% ingested them to study and dinner and 16.6% to wake up. The consumption of the BE was especially for exercise and social coexistence (33.3%) or study and awakening (16.6%).

The young people showed knowledge that if people consume these products, they could suffer signs of hypertension and affection of the digestive system (heartburn), cardiovascular, nervous or renal system. The risk of association between drinking caffeinated beverages and presenting manifestations with significant results was estimated with chi-square test. Pearson 9.463a Gl 2 p = 0.005 for one cup consumption and presence of symptoms.

Tabla 3. Clasificación de síntomas primarios y secundarios según consumo de cafeína

1 taza	2 tazas	3tazas
Taquicaridia		
Acidez	Sed-Insomnio	Eliminación Del Sueño
Diuresis	Nausea	
No Sueño	Ansiedad	
Energía	Energía	
Peristalsis	Alerta	
Saciedad	Dolor Epigastrio	
Energía		
Placer	Dolor De Cabeza	Activo
Humor	Nauseas	
Calor	Taquicardia	
Acidez	Calor	
Vigilia		
Enfocado	Relajación	Concentración
Concentración		
Relajación		
	Placer	Tranquilidad
	Concentración	Fluidez Mental
Alerta		
Felicidad	Atención	Felicidad
Concentración	Energía	Concentración
Humor	Placer	
Placer	Bienestar	
Tranquilidad		
	Saciedad	Relajación
	Alerta	Claridad
	Dolor Abdominal	Concentración

Nota: valores cualitativos del estudio

Discussion and conclusion

Coffee turned out to be the preferred caffeinated drink. In order of consumption, it was similar to that of the Indian students: coffee, tea, BGC and BE. Regarding the taste of coffee and the consumption of two to three cups, it was similar to the study in the Netherlands. In the case of the BGC, their consumption was low and they did not turn out to be the preferred ones, as shown by the works of Ríos et al. and Osada et al. In general, students do not consume BE frequently, unlike Lieberman, who reports that the consumption of BE and coffee by college students is to feel better, exercise and study.

It is important to note that the effect of caffeine content in any beverage can cause unwanted symptoms such as unpleasant physiopathological and psychological effects that the students manifested, or trigger other secondary symptoms because of it. In relation to the symptoms presented, these may be related to the concentrations of caffeine consumed and, consequently, one or more symptoms would manifest, with feelings of discomfort (such as heartburn), pleasure (energy) or both (tachycardia and energy).). The relevance of the study is that consumers expressed awareness of the presence of these pleasant or unpleasant symptoms, and that they were able to provide psychological and physiological sensations that trigger risk factors for other diseases in the future. For those who already had a feeling of discomfort, it was found that the symptoms did not manifest in the same way in individuals, however, the consumption of any of these drinks was with the intention of feeling better.

In this work it was clear that a variety of physiological and psychological symptoms or both, due to the consumption of caffeine, and that the intensity of them was related to the concentrations (number of cups), so the drinks were beneficial or not, depending on the individual and, above all, their habits for the consumption of these drinks. It is notorious that, being young, they manifested withdrawal symptoms such as irritability, tiredness, drowsiness and headaches, as Gantiva points out in their study.

The habit of drinking caffeinated beverages in medical students was associated with their academic activities and daily routine, at the time of preparation for

study, be active and concentrate with energy; consumption for pleasure, in different situations, such as socializing and exercising.

In their health knowledge, they showed that caffeinated beverages can be addictive and harmful, in the long term, for health, and that they can cause damage to the digestive system and cardiovascular system.

In this work, it was concluded that the young students of Medicine of the Faculty of Medicine and Psychology, usually consume caffeinated beverages to study, concentrate and stay awake. Due to the amounts consumed and the concentration of caffeine, they present pleasant and unpleasant physiopathological and psychological symptoms, which, for the moment, do not represent a disease, recognizing that they can present a long-term pathology.

References

Aguilera V., López-Espinoza A., Martínez A. G., Díaz F., Valdez E., Galindo A. y De la Torre-Ibarra C. (2009) Efectos del consumo de café sobre la conducta alimentaria en ratas. *Diversitas: Perspectivas en Psicologia, 5*(1), 177-185.

Alsaggaf, A.M, Wali, S.O, Merdad, R.A, y Merdad, L.A. (2016) Sleep quality, quantity and insomnia symptoms of medical students during clinical year. *Saudi Medical Journal, 37*(2), 173-182.

Aslam, M. H., Mughal, A., Edhi, M. M., Saleem, S., Rao, M. H., Aftab, A., Hanif, M., Ahmed, A. y Hammad Khan, A. M. (2013). Assessment of pattern for consumption and awareness regarding energy drinks among medical students. *Archives of Public Health*, *71*(1), 31:1-11.

Barreda-Abascal, R., Molina L., Haro-Valencia, R., Alford, C., y Verster, J. C. (2012). Actualización sobre los efectos de la cafeína y su perfil de seguridad en alimentos y bebidas. *Revista Médica del Hospital General de México*, *75*(1), 60-67.

Cote-Menéndez, M., Rangel-Garzón, C.X., Sánchez-Torres, M. y Medina-Lemus, A. (2011). Bebidas Energizantes: ¿Hidratantes O Estimulantes? *Revista de la Facultad de Medicina*, *59*(3), 255-265.

Champlin, S. E., Pasch, K.E. y Perry, C.L. (2016).Is the Consumption of Energy Drinks Associated With Academic Achievement Among College Students? J. Primary Prevention, 37(4), 345-359.doi10.1007/s10935-016-0437-4

De productos y servicios. Bebidas saborizadas no alcohólicas, sus congelados, productos concentrados para prepararlas y bebidas adicionadas con cafeína. Especificaciones y disposiciones sanitarias. Norma Oficial Mexicana NOM-218-SSAI-2011. Publicada en el Diario Oficial de la Federación, 10 de febrero de 2012. Recuperado de http://dof.gob.mx/nota_detalle.php?codigo=5233379&fecha=10/02/2012

Fan Jia, Yue M., Chandra, D., Keramidas, A, and Goldstein, P.A, Homanics, G. E. and Neil L. Harrison. (2008). Taurine is Potent Activator of Extrasynaptic *GABA_A* Receptors in

the Thalamus. *Journal of Neuroscience*, *28*(1), 106-115. doi.org/10.1523/JNEUROSCI.3996-07.2008

Gabrish, D. (2017). Caffeine Use, Hours of Sleep, and Academic *Performance of Undergraduate College Students*. (Electronic Thesis or Dissertation). Recuperate de: https://etd.ohiolink.edu/etdc/view? acc_num=kent1492104014680732

Gantiva, D. C., Mateus, R.J., y Perilla, S.C. (2008) Efectos del consumo de bebidas energetizantes en el aprendizaje encadenado en ratas. Psychology: Avances de la disciplina, Vol2 (2):93-109

Gera, M., Kalra, S. and Gupta, P. (2016).Caffeine intake among adolescents in Delhi. Indian J Community Med., 41(2), 151-153.

Górnicka, M., Pierzynowska, J., Kaniewska, E., Kossakowska, K. y Woźniak, A. (2014).School pupils and university students surveyed for drinking beverages containing caffeine. *Rocz Panstw Zakl Hig*, *65*(2), 113-117.

Horvat, E. A., Grela, C.A., Delgado, L. K. y Morales, D. Y. (2005). Influencia de la ingesta de cafeína en estudiantes de 6° año de la facultad de medicina de la universidad nacional del nordeste. *Revista de Posgrado de la VI a Cátedra de Medicina*, (145), 4-6.

Lieberman, H., Marriott, B., Judelson, D., Glickman, E., Geiselman, P., Giles, G. y Mahoney C.(2015). Intake of Caffeine from All Sources Including Energy Drinks and Reasons for Use in US College Students**.** *FASEB J.*, *29*(1), 392.

Mackus, M., Van de Loo, A.J., Benson, S., Scholey, A., y Verster, J.C.(2016). Consumption of caffeinated beverages and the awareness of their caffeine content among Dutch students. *Appetite*, (103), 353-357.

Ogeil, R. P. y Phillips, J. G. (2015). commonly used stimulants: Sleep problems, dependence and psychological distress. *Drug Alcohol Depend*, (153), 145-151.

Osada, L. J. E., Rojas, V. M. O., Rosales, V. C. E. y Vega, D. J. (2008). Consumo de cafeína en estudiantes de medicina y su coexistencia con sintomatología ansiosa y depresiva. *Rev Medica Herediana*, *19*(3), 102-107.

Pardo Lozano, R., Álvarez García, Y., Barral Tafalla, D. y Farro Albaladejo, M. (2007). Cafeína: un nutriente, un fármaco, o una droga de abuso. *Adicciones*, *19*(3), 225-238.

Pettit, M. L. y De Barr, K. A. (2011). Perceived stress, energy drink consumption, and academic performance among college students. *J American College Health*, *59*(5), 335-341.

Ramírez, P. D. M. (2010). Café, cafeína *VS* Revisión del efecto del café en la salud. *Revista Universidad y Salud*, *1*(12) ,156-167.

Ríos, J. L., Betancourt, J., Pagan, I., Fabián, C., Cruz, S. Y., González, A. M., González, M. J., Rivera-Soto, W. T. y Palacios C. (2013). Caffeinated-beverage consumption and its association with socio-demographic characteristics and self-perceived academic stress in first and second year students at the University of Puerto Rico Medical Sciences Campus (UPR-MSC). *Puerto Rico Health Sci J.*, *32*(2), 95-100.

Rivera, J. A., Muñoz-Hernández, O., Rosas-Peralta, M., Aguilar-Salinas, C. A., Popkin, B. M. y Willett, C. (2008). Consumo de bebidas para una vida saludable: recomendaciones para la población mexicana. *Salud Pública de México*, *50*(2), 173-195.

Valenzuela, B. A. (2010). El Café y sus efectos en la salud cardiovascular y en la salud materna. *Revé Chil Nutr*, *37*(4), 514-523.

Rol de Contribución	Autor (es)
Conceptualización	Martha Rosales y Eduardo Castillo
Metodología	Martha Rosales y Eduardo Castillo
Software	Eduardo Castillo, Martha Rosales
Validación	Martha Rosales
Análisis Formal	Eduardo castillo y Cesar Gerardo Díaz Trujillo
Investigación	Martha Rosales, Eduardo castillo y Cesar Gerardo Díaz Trujillo
Recursos	Martha Rosales, Eduardo castillo
Curación de datos	Martha Rosales
Escritura - Preparación del borrador original	Martha Rosales, Eduardo Castillo y María de los Remedios Sánchez
Escritura - Revisión y edición	Martha Rosales y María de los Remedios Sánchez
Visualización	Martha Rosales , María de los Remedios Sánchez, Eduardo Castillo y Cesar Gerardo Díaz Trujillo
Supervisión	Martha Rosales y María de los Remedios Sánchez
Administración de Proyectos	Martha Rosales
Adquisición de fondos	Apoyo PRODEP Martha rosales y Cesar Gerardo Díaz