



Available online freely at www.isisn.org

Bioscience Research

Print ISSN: 1811-9506 Online ISSN: 2218-3973

Journal by Innovative Scientific Information & Services Network



RESEARCH ARTICLE

BIOSCIENCE RESEARCH, 2019 16(4): 3500-3507.

OPEN ACCESS

Effect of caffeinated beverages on college students: A cross-sectional study

*Eman F. El Azab^{1,2}, Shereen Ahmed Elwasefy^{3, 1}, Hassnaa Eid Shaban^{4, 1} Fatma A. M. Mohamed^{1, 5}, Saleha Y. M. Alakilli⁶, Azza Ismail Ismail Elsayed^{7,1}

¹College of Applied Medical Sciences, Jouf University, Kingdom of Saudi Arabia

²Faculty of Sciences, Alexandria University, Egypt.

³Faculty of Nursing, Mansoura University, Egypt.

⁴Medical Surgical Nursing Department, Faculty of Nursing, Menoufia University, Egypt.

⁵ Department, of Chemistry, Faculty of Sciences, Alexandria University, Egypt.

⁶College of Applied Medical Sciences, Jouf University, Kingdom of Saudi Arabia

⁷Faculty of Nursing, Suez Canal University. Egypt.

*Correspondence: emanazab81@yahoo.com Received 23-09-2019, Revised: 08-10-2019, Accepted: 23-10-2019 e-Published: 04-11-2019

Caffeine is generally consumed all over the world and legitimately recognized as a psychoactive ingredient in many beverages and considered a drug. The penalty area of this research was to assess how much college students are dependent on caffeine drinks and to identify knowledge and attitude of students toward the effects of caffeinated beverages on their health. Also, our research aimed to measure the effects of caffeinated beverages on some medical parameters before and after 2 hours of drinking. An authorized survey was distributed haphazardly to 221 students aged between 17 and 22 years. The survey was performed using a pre-validated 15 items questionnaire. Some medical parameters as body mass index, glucose level, and blood pressure were measured. Out of 217 students in the study, the majority of them (98.2%) drank caffeinated beverages in the form of coffee drinks with 23.96%, tea drinks by 11.1%, energy drinks (14.7%), carbonated drinks (34.6 %) and 15.7 % of them drinking all caffeinated beverages. Furthermore, 76.0% of them think caffeine addiction is a health issue. Additionally, caffeinated beverages have antagonistic physiological effects on the level of blood glucose and blood pressure after two hours of consumption ($P < 0.001$). Finally, the highest percent of the overweight and obese students were shown in carbonated drinks consumption group then in energy drinks consumption. Consumption of caffeine-containing drinks in higher doses has undesirable effects on health, so self-control and surveillance are necessary for daily intake.

Keywords: Caffeine, Knowledge, Body mass index, Blood glucose level, Blood pressure.

INTRODUCTION

Caffeine is the most extensively used psychoactive ingredient over the world by both kids and adults, which is lawful, plain to obtain and socially acceptable to consume. Extra than 55% of the adult inhabitation drinks coffee or tea (Bhojaraja et al., 2016 and Uddin et al., 2016). Distant from water, tea and coffee have become world's popular beverages in the greatest of the

individual's life as a daily habit. Consuming energy drinks and carbonated drinks have a crowd to be massive exercise worldwide, normally between youthful populations (Guo et al., 2014).

Caffeine is a significant nervous system stimulant of methylxanthene alkaloid class, naturally occurring in tea leaves, coffee beans, yerba-mate leaves, cola nuts, guarana seeds, and cocoa beans. Temperate consumption of caffeine

that is 200 - 300mg per day are profitable to health (Uddin et al., 2016). An unscathed quantity of everyday caffeine intake is considered as one not override 400 mg per day (Bhojaraja et al., 2016). Overstated daily consumption upstairs 400 mg can also lead to agitation, irritability, anxiety, sleep disturbances, and nervousness (Marmorstein, 2016). Frequent long-range and exaggerated consuming may cause addiction and counteractive health influence (Uddin et al., 2016). Many researchers have reported that caffeine has a psychoactive effect and established that caffeine can have both affirmative and adverse effects on health. Moreover, Caffeine like sugar, may excite the dopaminergic system and consequently result in addiction (Abou-Atme et al., 2019). The undesirable influence of caffeine on health are even more substantial in children and teenagers all over the world (Bhojaraja et al., 2016).

Furthermore, various studies have explored the negative influence of caffeine or coffee on cardiac arrhythmia, heart rate, and blood pressure. Also, several epidemiological studies have deeply concentrated on the link between coffee intake and cardiovascular risk factors, inclusive serum cholesterol and blood pressure levels (Nowak et al., 2018).

MATERIALS AND METHODS

Objectives

The goal of the current study was to appreciate how much university students are dependent on caffeinated beverages, causes for intake and to identify knowledge and attitude of them against the special effects of the caffeine-containing drinks on their health. Besides that, the researchers tried to reconnoiter the physiological effects of caffeinated beverages on the blood pressure, blood glucose, and body mass index.

Methods

A cross-sectional descriptive study was utilized including 221 students enrolled in the Faculty of Nursing, Menoufia University, Egypt. A survey was performed using a pre-validated 15 items questionnaire, on students aged between 17 and 22 years. The questionnaire was distributed into 3 parts including general information, practices, knowledge, and attitude of the study groups as a previous study conducted by Bhojaraja et al. (2016). Also, the effects of caffeinated beverages on some medical parameters as blood pressure, blood glucose

level, and body mass index (BMI) were measured before and after 2 hours of drinking.

Inclusion criteria of sampling

1. Students who free from any disease can affect blood pressure.
2. Communicate effectively.
3. Agree to have participated in the study.

Maneuver

- The researchers primarily assess personal data of the studied sample then assess practice, knowledge, and attitude of them related to caffeinated beverages consumption.
- The researchers measure each student height and weight. These values were used to calculate the BMI (kg/m²), then it was classified according to Holley *et al.* (2016).
- The researchers measure each student's blood pressure and blood glucose level before drinking, then after two hours from caffeinated beverages drinking.

Data analysis

Data were collected, coded, and entered to package of Social Sciences (SPSS) version 24. After data analysis by Chi-square test, numerical variables were expressed as mean \pm standard deviation, frequencies, and percentages. P-value <0.001 considered as significant.

Ethics and Human Subjects Issues

Ethical clearance from the Institutional Ethics Committee was obtained and then the questionnaire was given to the students. Also, informed consent was taken from participated students before involving in the study and after the explanation of the aims of the study. Students assured that all data will be highly confidential, anonymity will be also assured through assigning, a code number for each participant instead of names to save their privacy. The researchers confirmed that participation in the current study was entirely voluntary.

RESULTS

Out of 217 students in the study, more than half of students (55.2%) were female and 42.8% were males in which all of the studied students (100%) were aged between 17-22 years. Among these, 98.2% (n=217, p<0.001) of them drink caffeinated beverages in the form of coffee (23.9%), tea (11.0%), energy drinks (14.7%),

carbonated drinks (34.6 %) and all of the above (15.7 %) (Table 1).

Less than twenty percent of students (18.9%) started consuming the caffeinated beverages when they were aged less than 10 years and 55.8% (121) before 15 years of age while the rest of them 25.3% started consuming the caffeinated beverages before 20 years of age.

Approximately more than one-third of the students (38.7%) drink caffeinated beverages 3

times daily and 30.4% of the students drink more than 3 times daily while 23.50% drink 2 times per day. Approximately 7.4% of them consume caffeinated beverages at one time per day.

The main causes of consuming these beverages were to release headache (31.3%), to keep them awake (29.0%), for energy & keeping refreshed (23.0%). Moreover, more than half them (55.3 %) consuming these beverages at night while 44.7% consuming during the day (Table 1).

Table 1; Students' practices regarding the consumption of caffeinated beverages

Students' practices	Male	Female	Total	Percent
Preferred caffeinated beverages				
Coffee	20(9.2%)	32(14.7%)	52	23.9%
Tea	10(4.6%)	14(6.5%)	24	11.0%
Energy drinks	25(11.5%)	7(3.2%)	32	14.7%
Carbonated drinks	25(11.5%)	50(23.0%)	75	34.6%
All of the above	15(6.9%)	19(8.8%)	34	15.7%
Not preferred	0(0.00%)	4(1.8%)	4	1.8%
Age of start consuming caffeinated beverages/ years of age				
Before 10	30(13.8%)	11(5.1%)	41	18.9%
Before 15	43(19.8%)	78(35.9%)	121	55.8%
Before 20	22(10.1%)	33(15.2%)	55	25.3%
Frequency of consuming caffeinated beverages per day				
One time/ day	6(2.8%)	10(4.6%)	16	7.4%
2 times/ day	10(4.6%)	41(18.9%)	51	23.5%
3 times/ day	48(22.1%)	36(16.6%)	84	38.7%
More than 3 times/ day	31(14.3%)	35(16.1%)	66	30.4%
Causes of consuming caffeinated beverages				
Keep them awake	23(10.6%)	40(18.4%)	63	29.0%
For energy & refreshed	25(11.5%)	25(11.5%)	50	23.0%
Release headache	33(15.2%)	35(16.1%)	68	31.3%
All the previous	14(6.5%)	22(10.1%)	36	16.6%
Preferred time for caffeinated beverages				
During the day	38(17.5%)	59(27.2%)	97	44.7%
At night	57(26.3%)	63(29.0%)	120	55.3%
After joining university, Caffeine consumption increasing				
Yes	78(35.9%)	100(46.0%)	178	82.0%
No	17(7.8%)	22(10.1%)	39	18.0%
Stopping caffeine consumption from 48-72 hours				
Yes	10(4.61%)	25(11.52%)	35	16.12%
No	85(39.17%)	97(44.70%)	182	83.87%
Feeling headache and inability to concentrate without drinking caffeinated beverages				
Yes	71(32.7%)	94(43.3%)	165	76.0%
No	24(11.0%)	28(12.9%)	52	24.0%

Table 2; Students' knowledge and attitude regarding the consumption of caffeinated beverages

Students' knowledge and attitude	Male	Female	Total	Percent
Awareness of the ingredients contained in energy and carbonated drinks				
Yes	51(23.5%)	89(41.0%)	140	64.5%
No	44(20.3%)	33(15.2%)	77	35.5%
The 'safest' amount of caffeine consumption per day				
100-200 mg	17(7.8%)	39(18.0%)	56	25.8%
200-400 mg	73(33.6%)	73(33.6%)	146	67.3%
More than 400mg	5(2.3%)	10(4.6%)	15	6.9%
Caffeine consumption has increased over the years				
Yes	81(37.3%)	111(51.1%)	192	88.5%
No	14(6.5%)	11(5.1%)	25	11.5%
Caffeine addiction is a health issue in society today				
Yes	68(31.3%)	97(44.7%)	165	76.0%
No	25(11.5%)	27(12.4%)	52	23.9%

Table 3; Body Mass Index of the studied students according to the type of caffeinated beverages consumption

	Gender	Underweight	Normal weight	Overweight	Obese
Coffee	Male	6(2.8%)	7(3.2%)	4(1.8%)	3(1.4%)
	Female	2(0.9%)	21(9.7%)	5(2.3%)	4(1.8%)
Tea	Male	5(2.3%)	5(2.3%)	0 (0.0%)	0 (0.0%)
	Female	6(2.8%)	4(1.8%)	3(1.4%)	1(0.5%)
energy drinks	Male	0 (0.0%)	4(1.8%)	16(7.4%)	5(2.30%)
	Female	0 (0.0%)	1(0.5%)	6(2.8%)	0 (0.00%)
carbonated drinks	Male	0 (0.0%)	2(0.9%)	13(6.0%)	10(4.6%)
	Female	0 (0.0%)	0 (0.0%)	33(15.2%)	17(7.83%)
Consuming all of the above	Male	0 (0.0%)	0 (0.0%)	12(5.5%)	3(1.4%)
	Female	0 (0.0%)	0 (0.0%)	14(6.5%)	5(2.3%)

Table 4; blood glucose level difference before and after caffeinated beverages consumption among studied students

	Gender	Blood glucose level (mg/ dl)	P-value
Before drinking(fasting)			
Coffee	Male	79.5±9.1	P>0.001
	Female	83.1±7.8	P>0.001
Tea	Male	77.1±6.5	P>0.001
	Female	81.3±5.8	P>0.001
energy drinks	Male	94.5±4.9	P<0.001*
	Female	84.1±8.2	P>0.001
carbonated drinks	Male	97.9±8.1	P<0.001*
	Female	93.1±7.8	P<0.001*
Consuming all of the above	Male	95.1±4.9	P<0.001*
	Female	91.14±6.32	P<0.001*
After 2 hours			
Coffee	Male	99.6±4.3	P<0.001*
	Female	102.3±5.6	P<0.001*
Tea	Male	98.7±3.9	P<0.001*
	Female	105.5±5.6	P<0.001*
energy drinks	Male	128.7±5.8	P<0.001*
	Female	122.6±7.5	P<0.001*
carbonated drinks	Male	118.7±8.5	P<0.001*
	Female	132.6±7.5	P<0.001*
Consuming all of the above	Male	123.2±4.8	P<0.001*
	Female	124.1±4.9	P<0.001*

Values are expressed in mean ± S.D.
P-value <0.001 considered as significant.

Table 5; Blood pressure readings before and after caffeinated beverages consumption among studied students

	Gender	Blood pressure	P-value
<i>Before drinking(fasting)</i>			
Coffee	Male	122.2/83.6± (5.6/4.3)	P>0.001
	Female	110.4/65.9± (5.3/6.1)	P>0.001
Tea	Male	118.3/83.6± (5.6/4.4)	P>0.001
	Female	110.4/70.0± (4.3/5.1)	P>0.001
energy drinks	Male	125.4/78.0± (5.8/5.0)	P>0.001
	Female	110.4/65.7± (5.3/6.1)	P>0.001
carbonated drinks	Male	122.2/83.6± (5.6/4.3)	P>0.001
	Female	110.4/65.1± (5.3/6.0)	P>0.001
Consuming all of the above	Male	127.7/85.5± (5.6/4.3)	P>0.001
	Female	115.4/75.0± (4.3/6.1)	P>0.001
<i>After 2 hours</i>			
Coffee	Male	140.7/90.1± (8.5/5.2)	P<0.001*
	Female	117.2/73.6± (5.3/6.1)	P<0.001*
Tea	Male	130.3/97.0± (7.5/5.2)	P<0.001*
	Female	115.2/70.5± (5.3/6.7)	P>0.001
energy drinks	Male	140.7/90.1± (8.5/5.2)	P<0.001*
	Female	120.5/78.4± (4.9/4.5)	P<0.001*
carbonated drinks	Male	138.57/96.1± (7.5/5.4)	P<0.001*
	Female	117.25/73.6± (6.2/4.1)	P<0.001*
Consuming all of the above	Male	140.52/104.1± (6.0/5.5)	P<0.001*
	Female	124.25/80.6± (6.0/5.0)	P<0.001*

Values are expressed in mean ± S.D.

P-value <0.001 considered as significant.

Majority of students (82.0%) had the opinion that their caffeine consumption has been elevated after joining the university and 83.9% of students cannot go 48 – 72 hours without consuming caffeine-containing beverages. Furthermore, 76.0% of students have headache and inability to concentrate if they don't consume their regular caffeinated beverage (Table 1).

Regarding students' knowledge and attitude towards consumption of caffeinated beverages, nearly two-thirds of them (64.5%) aware of the ingredients contained in energy and carbonated drinks. Also, 67.3% of students were aware of the safest amount of caffeine consumption per day. Moreover, 88.4% of students think that caffeine consumption has increased over the years. Finally, more than three-quarters of them (76.0%) know that caffeine addiction is a health issue in society today (Table 2).

According to table 3, the BMI of students considered as underweight only on students drinks coffee (3.7%) and tea (5.1%). Also, normal weight found in both students consuming coffee (12.9%) and tea (4.2%) but small percent was shown in energy drinks consumption (2.3%) and carbonated drinks consumption group (0.9%). However, the highest percent of the overweight

was shown in carbonated drinks consumption group (21.01%) then in energy drinks consumption (10.1%). Also, (12.4%) of them were obese students found in carbonated drinks consumption.

Table (4) showed that there were statistically significant ($P > 0.001$) between blood glucose level of the studied students and caffeinated beverages drinking before and after 2 hours.

Table (5) illustrated that there were statistically significant ($P < 0.001$) between blood pressure readings of the studied students and caffeinated beverages consumption before drinking and after 2 hours.

DISCUSSION

There is mounting popularity for caffeinated beverages which are consumed at all ages due to their accessibility, popularity and stimulating impact. It is cherished global even through adolescents. Huge jeopardy on health precipitated with the aid of their extra consumption has been set up in many research (Bhojaraja et al., 2016).

The current study reveals, that consumption of caffeinated beverages is a tremendous practice amongst the students, mainly during studies, to release headache, to keep them awake, and also

for energy and refreshed. A similar survey was once carried out in the University of Life sciences, Poland comparing between middle school students and university students. They pronounced that cola drinks were generally consumed by both groups (97% school students and 93% university students) to improve well-being and to enhance intellectual or physical performance (Bhojaraja et al., 2016 and Uddin et al., 2016). On the other hand, a previous study done by Bhojaraja et al. (2016) reported that students consumed more coffee and tea.

Our study established that less than one-third of the students consuming carbonated drinks then coffee. Another research was proceeded by Abdulrahman et al. (2014) associated with the consumption of energy drinks between adolescents. Around half of the adolescents consumed energy drinks once or more each week and believed that these drinks furnish instant energy. Moreover, Abdulrahman et al. (2014) revealed that half of the adolescents had no knowledge of the ingredients in energy drinks, and they also did not know that these drinks contain caffeine.

While our results proved that more than half of the college students had been conscious of the ingredients especially in the energy and carbonated drinks. Also, a previous study conducted by Bhojaraja et al. (2016) notified that the majority of the students had been conscious of the ingredients mainly in the energy and carbonated drinks.

Also, our study showed that the majority of the students suppose that caffeine consumption has accelerated over the years and greater than half of them have the knowledge that caffeine addiction is a health issue in today's society. The results of a previous study carried out by Bhojaraja et al. (2016), established that most of the student confirmed that most of the scholar tested that caffeine addiction is a health issue in today's society.

Within both genders, the frequency of coffee consumption used to be now not affected in BMI. However, the consuming of carbonated and energy drinks were negatively associated with BMI in both male and female. In agreement with our study, Eney et al. (2017) reported that multiplied soda drinking was related to the increase in BMI.

In the present study, we tried to comprehend the changes occurring in blood pressure after the intake of caffeinated beverages. Our results were in the same line with a previous conducted by

Nowak et al. (2018).

Nowak et al. (2018) confirmed that caffeine upsurges systolic blood pressure to 17% and mean arterial blood pressure to 11%. The elevation in systolic blood pressure attributed greater to the accelerated stiffness of the aorta and larger blood vessels a substitute than prolonged stroke volume. The expand of aortic stiffness is authorized to the amplified production of angiotensin II and catecholamines doubtlessly noradrenaline. These variations are attributable to the repression of adenosine A2a receptors activity in the smooth muscles of blood vessels. The concomitant extent in the release of rennin from the kidneys owing to the direct energizing by using caffeine and parallel activity on sympathetic ganglions discharging noradrenaline participate in the increase in vascular smooth muscles activity (Soares et al., 2017).

Also, Vera et al., (2019) informed that the acute intake of coffee and caffeine upsurges blood pressure. Caffeine is the key active ingredients in caffeinated beverages. Furthermore, several epidemiologic reports have proved contradictory findings concerning the link between blood pressure and coffee consumption (De Giuseppe et al., 2019 and Hirakawa, 2019).

Our results have established that the drinking of caffeinated beverages significantly ($p < 0.001$) increased the level of blood glucose, which can have adverse health effects. Our study was in agreement with Nowak et al., (2018) who reported that acute consuming of energy drinks participated in the elevation of blood glucose level. Moreover, energy drink look to provide the consumer with a blood glucose increase that may stimulate an insulin response and enhance the glucose pool in body cells (Ehlers et al., 2019).

The consumption of excessive levels of sugar causes numerous detrimental effects on health, especially prompting insulin resistance, which is strictly associated with the upgrowth of metabolic disorders such as diabetes type 2 or obesity (MacDonald, 2016 and González-Domínguez et al., 2017). Furthermore, some previous studies have evidenced that caffeine may play a remarkable function in the regulation of insulin release and associated metabolic disorders. Also, González-Domínguez et al. (2017) informed that healthy young adults who consumed sugar-sweetened drinks with caffeine had a significant upsurge in blood glucose and insulin levels after 20–30 min. The authors established that antagonistic effects may be the outcome of the synergic effect of caffeine and sugar (Nowak et

al., 2019)

CONCLUSION

College students drink caffeinated beverages variable from different sources. Consumption of caffeine-containing drinks in higher doses has undesirable effects on health. There were statically significant between blood glucose level, blood pressure readings of the studied students and caffeinated beverages consumption before drinking and after 2 hours.

Recommendation

Based on the results of the current study, we recommended the following:

1. Self-control and surveillance are necessary for each day intake. This can be attained via awareness programs associated with the excessive consumption of caffeine on health.
2. Additional studies on a larger population are required to provide adequate data and evidence.

CONFLICT OF INTEREST

The authors declared that present study was performed in absence of any conflict of interest.

ACKNOWLEDGEMENT

The authors would like to thank students enrolled in this study at the Faculty of Nursing, Menoufia University, Egypt for their good response.

AUTHOR CONTRIBUTIONS

All authors have read and agreed to the content and the publication of this paper.

Copyrights: © 2019 @ author (s).

This is an open access article distributed under the terms of the [Creative Commons Attribution License \(CC BY 4.0\)](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author(s) and source are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

REFERENCES

Abdulrahman O, Musaiger, and Zagzoog N, 2014. Knowledge, Attitudes and Practices toward Energy Drinks among Adolescents in Saudi Arabia. *Global Journal of Health Science*.

- 6(2):42-6. <https://doi.org/10.5539/gjhs.v6n2p42>
- Abou-Atme YS, Melis M, and Zawawi KH, 2019. Efficacy and safety of acetaminophen and caffeine for the management of acute dental pain: A systematic review. *The Saudi Dental Journal*. 13 <https://doi.org/10.1016/j.sdentj.2019.04.008>
- Bhojaraja VS, Janardhan H, Hameed NA, Gulsoom FAR, and Ali MZ, 2016. Knowledge, attitude and practices towards consumption of caffeine containing drinks among the student population of Ras al-Khaimah medical and health sciences university, UAE. *Int J Res Med Sci*. 4: 3537-3541. DOI: <http://dx.doi.org/10.18203/2320-6012.ijrms20162326>
- De Giuseppe R, Di Napoli I, Granata F, Mottolese A, and Cena H, 2019. Caffeine and blood pressure: a critical review perspective. *Nutrition Research Reviews*. 1:1-7. <https://doi.org/10.1017/S0954422419000015>
- Ehlers A, Marakis G, Lampen A, and Hirsch-Ernst KI, 2019. Risk assessment of energy drinks with focus on cardiovascular parameters and energy drink consumption in Europe. *Food and Chemical Toxicology*. 18. <https://doi.org/10.1016/j.fct.2019.05.028>
- Eney AE, Tsang S, Delaney JA, Turkheimer E, and Duncan GE, 2017. Cross-sectional association between soda consumption and body mass index in a community-based sample of twins. *Nutrition journal*. 16(1):48. <https://doi.org/10.1186/s12937-017-0269-y>.
- González-Domínguez R, Mateos RM, Lechuga-Sancho AM, González-Cortés JJ, Corrales-Cuevas M, Rojas-Cots JA, Segundo C, and Schwarz M, 2017. Synergic effects of sugar and caffeine on insulin-mediated metabolomic alterations after an acute consumption of soft drinks. *Electrophoresis*. 38(18):2313-22. <https://doi.org/10.1002/elps.201700044>
- Guo X, Park Y, Freedman ND, Sinha R, Hollenbeck AR, Blair A, and Chen H, 2014. Sweetened beverages, coffee, and tea and depression risk among older US adults. *PLoS one*. 17; 9(4):e94715. doi: [10.1371/journal.pone.0094715](https://doi.org/10.1371/journal.pone.0094715). eCollection 2014.
- Hirakawa Y, 2019. Coffee Drinking and Risk of All-Cause Mortality and Cardiovascular Diseases. *Circulation Journal*. 25; 83(4):711-2. <https://doi.org/10.1253/circj.CJ-19-0157>
- Holley TJ, Collins CE, Morgan PJ, Callister R, and Hutchesson MJ, 2016. Weight expectations,

- motivations for weight change and perceived factors influencing weight management in young Australian women: A cross-sectional study. *Public health nutrition*. 19(2):275-86. [https://doi: 10.1017/S1368980015000993](https://doi.org/10.1017/S1368980015000993)
- MacDonald IA, 2016. A review of recent evidence relating to sugars, insulin resistance and diabetes. *European journal of nutrition*. 1; 55(2):17-23. DOI 10.1007/s00394-016-1340-8
- Marmorstein NR, 2016. Energy drink and coffee consumption and psychopathology symptoms among early adolescents: cross-sectional and longitudinal associations. *Journal of caffeine research*. 1; 6(2):64-72. <https://doi.org/10.1089/jcr.2015.0018>
- Nowak D, Gośliński M, and Nowatkowska K, 2018. The effect of acute consumption of energy drinks on blood pressure, heart rate and blood glucose in the group of young adults. *Int J Environ Res Public Health*. 15(3):544. [https://doi: 10.3390/ijerph15030544](https://doi.org/10.3390/ijerph15030544).
- Nowak D, Gośliński M, Wesolowska A, Berenda K, and Popławski C, 2019. Effects of Acute Consumption of Noni and Chokeberry Juices vs. Energy Drinks on Blood Pressure, Heart Rate, and Blood Glucose in Young Adults. *Evidence-Based Complementary and Alternative Medicine*. Article ID 6076751, 9 pages. <https://doi.org/10.1155/2019/6076751>
- Soares RN, Schneider A, Valle SC, and Schenkel PC, 2017. Regular physical activity increases the systolic blood pressure response to acute caffeine ingestion in non-habitual caffeine consumers. *Journal of Caffeine Research*. 1; 7(2):53-8. <https://doi.org/10.1089/jcr.2016.0017>
- Uddin MS, Wali MW, Mamun AA, Asaduzzaman M, Amran MS, and Rashid M, 2016. Assessment of risk involved in the combination medicine of paracetamol and caffeine. *Journal of Advances in Medical and Pharmaceutical Sciences*. 5(3):1-8. [https://doi: 10.9734/JAMPS/2016/22198](https://doi.org/10.9734/JAMPS/2016/22198)
- Vera J, Redondo B, Molina R, Bermúdez J, and Jiménez R, 2019. Effects of caffeine on intraocular pressure are subject to tolerance: a comparative study between low and high caffeine consumers. *Psychopharmacology*. 14; 236(2):811-819. <https://doi.org/10.1007/s00213-018-5114-2>