World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(RESEARCH ARTICLE)

Check for updates

Caffeinated hot beverage consumption and their caffeine contents and health related problems

Hanan Mohammed Abdella *, Ali Ateia Elmabsout, Malak Yuonis Badi, Hounida Abdalwahed Mustafa and Nuha Fathi Mohammed

Department of Nutrition, Faculty of Public Health, University of Benghazi, Benghazi, Libya.

World Journal of Advanced Research and Reviews, 2023, 18(01), 1139–1155

Publication history: Received on 07 March 2023; revised on 22 April 2023; accepted on 25 April 2023

Article DOI: https://doi.org/10.30574/wjarr.2023.18.1.0684

Abstract

Background: Caffeinated beverages include coffee, tea, hot chocolate, soft drinks, and energy drinks. The main active ingredient in caffeinated beverages is caffeine. Therefore, the aim of the present work was to determine the caffeine contents of the most popular caffeinated hot beverages and their related health problems.

Methods: This cross sectional study accrued out a number of café to collect caffeinated hot beverages for determine their caffeine contents by analytical methods. The next second part of this study was done through predesigned questionnaire to study the most consumed beverages and health problems related hot caffeinated beverages consumption. The data was analysis by Chi-square or T test at $\alpha<0.05$ for statistical differences.

Results: The intake volume of one cup of Espesial hot beverages has mean ± SD 87.6±3.7 ml, Espresso 27±7 ml, green tea 138.33±6 ml, red tea 129.3 ± 14 ml, Nescafe 114.33±17ml and coffee 132±34 ml. Similarly, has been estimated for volume intake of homemade hot beverages and found that mean± SD for coffee, cacao and red tea 58.4±6 ml, 61.7±4 ml, and 57.6±7 ml respectively. Green tea contains an averages caffeine 16.5%, red tea 21.9%, cacao 10.4%, Nescafé 32.2%, Expresso 207.3%, Espesial 50.3%, coffee 132.6% and homemade coffee 102.3%. The total volume intake of caffeine based on the type of cup volume purchased form the café shown that the real intake of caffeine in the beverages were as following 23g/138.33 ml drinkable green tea, 28.5g/129.3 ml drinkable red tea, 6.5g/61.7 ml drinkable cacao, 29g/129.3 ml drinkable Nescafe, 56g/27 ml drinkable Expresso, 44g/87.6 ml drinkable Espesial, 175g/132ml drinkable coffee and 60g/58.4 ml drinkable homemade coffee. This result further shown that, highest caffeine intake was found in Expresso (56g/27 ml), coffee (175g/132ml) and homemade coffee (60g/58.4 ml) while the other hot beverage have least amount of caffeine was that cacao 6.5g/61.7ml, and almost similar amounts of caffeine found in green tea, red tea and Nescafe (about 29g/130 ml for each) and the moderate levels of caffeine found in Expresso, 44g/87.6 ml. The symptoms and complication have been reported by one third of the participants were insomnia, nervousness, headache. The positive effect of caffeine intake reported was improved in mood.

Conclusion: The present study revealed that, some caffeinated hot beverages contain higher amounts of caffeine and the people should be aware for such products to avoid the negative or positive effect of caffeine.

Keywords: Hot drink; Caffeine; Health problems; Mood; Caffeinated products

1. Introduction

Caffeinated beverages include coffee, tea, hot chocolate, soft drinks, and energy drinks (1). The main active ingredient in caffeinated beverages is caffeine (2), one of the most widely consumed pharmacologically active substances in the

* Corresponding author: Hanan Mohammed Abdella

world (3). About 87% of individuals worldwide consume food and/or beverages containing caffeine, with a reported average caffeine consumption of 149.8 mg per day from all caffeine sources, which are primarily coffee (71%), soft drinks (16%), and tea (12%) (4). A recent study conducted at two different medical schools in Puerto Rico found that 56.2% of the sample members consumed caffeine, getting it mainly from coffee (5). There are other components present in some caffeinated beverages, including herbal extracts such as guarana, ginseng, and gingko biloba; B vitamins; amino acids such as taurine; amino acid derivatives such as carnitine; and sugar derivatives including glucuronolactone and ribose (6). The acute and long-term effects resulting from excessive and chronic consumption of these additives alone and/or in combination with caffeine are not known (7). However, excessive caffeine consumption can produce harmful health and nutritional consequences, such as promoting diuresis and natriuresis, a reduction in insulin sensitivity, an increase in blood pressure, chronic daily headaches, and even death (8).

Caffeine also increases alertness, improves memory, and enhances mood and decreases stress symptoms, but only if it is consumed in moderation. Although numerous studies have evaluated the impact of stress in college students, and a recent study evaluated the use of caffeinated beverages by medical students, little is known regarding the association between caffeinated-beverages consumption (as a stress coping strategy), academic load, and stress in college students. In addition, there is concern about the high levels of stress in health professions (9).

A challenge in determining exposure to caffeine is obtaining current and accurate data on the caffeine content of beverages. For commercially available energy drinks, coffees and teas, this is less problematic. Even though the caffeine content of beverages is not required on a label, most companies make these data readily available and the values are fairly consistent across sources (10). A greater challenge is assigning specific values for the caffeine content of coffee and tea. The origin of the crop, processing, and preparation, including the type, temperature, and time for brewing or steeping, all affect the caffeine concentration. Tea consumption has remained relatively stable and contributes a small amount of caffeine to the diets of consumers. For example, in one study, the caffeine content of a specialty coffee from a single location on 6 consecutive days yielded values ranging from 259 to 564 mg per 16 fluid ounces for the same variety and type sampled (11). These data suggest that even with brand-specific caffeine values for coffee, the variability can be quite high. For this reason, most caffeine values for coffee and tea are not brand specific except for commercial varieties (11).

‘Caffeine intake is increased now a day through hot beverages and due to lack of labeling on the products result in hot beverages highly consumption which might has positive of negative impact on the health and the personality. Lack of the hot beverages caffeine contents let us thinking how much we drink caffeine per day, whether our intake under recommended levels or not and also this work will attempt to highlighted the actual amount of caffeine intake per size and volume of the cups in different types of hot drink that distributed through different café. Therefore, the aim of the present work was to determine the caffeine contents of different hot beverages distributed in number of café and also to compare the caffeine intake to recommended levels. Furthermore, to determine most popular hot drink consumed among people and health problems related to caffeine consumption.

2. Material and method

3. Study design and period of study

Cross sectional study was conducted in number of café to collect most popular hot drink from Jan to march 2022.

Experiment procedure

This study consists of two part, part one, was predesign questionnaire to collect information from the caffeinated hot drink consumer for frequencies and most common caffeinated hot beverages intake and their health problems. The second part of the study was the experimental work. A total samples collected were 27. The sample of caffeinated hot beverages were collected in triplicate from café and also homemade caffeinated hot drink include coffee and tea. The procedure was done as the following: 6 different hot drink was collected from café and three homemade drinks.

Before the procedure started the following was done: Weight of pure sample (ml), Weight of empty cup (gm), Weight of sample with cup (gm), Weight of sample without cup (ml)

There were also collected information regarding anthropometric measurements, and biochemical and nutrients related blood disorders as described in (10)

3.1. Experimental work

3.1.1. Chemicals

The chemicals used in this study include hydrochloric acid (HCI), chloroform ($CHC1_3$) obtained from Friend's laboratory chemical, sodium carbonate (Na_2CO_3) obtained from Riedel - de Haen and caffeine obtained from AppliChem.

Different samples were purchased from different markets of Benghazi (Libya) including Coffee, Green tea, Red tea, Cacao, Espresso, Special and homemade include coffee, red and green tea.

3.1.2. Calibration solutions preparation

Caffeine stock solution of 1000 ppm was prepared by dissolving 0.1 g of pure caffeine in 100 mL chloroform. It was analyzed by UV / Vis spectrometry for determining Amax and the resulting spectrum.

Further dilutions were prepared in the range of 1-25 ppm and their absorbance were measured at Amax 274 nm. The resulting values are given were used to draw the calibration line for caffeine analysis. Cuvettes of plastic were not used because chloroform dissolved plastic.

3.1.3. Extraction of caffeine from tea

All glass apparatus was rinsed with chromic acid and distilled water before use. 2 g of dried tea powder was taken in a beaker and 20 mL of distilled water was added to it and boiled. After boiling, 2 g of sodium carbonate was added for precipitating tannins, then filtered. The filtrate was heated and concentrated to 5 mL. Then 5 mL of chloroform was added for extraction of caffeine using a separatory funnel. The extract was analyzed for caffeine contents and the average values are reported and described in (12).

3.1.4. Extraction of caffeine from beverages

A beverage portion was drawn by a 10 mL pipette and poured directly in a separatory funnel, then 1 mL of 20 % (w / v) sodium carbonate solution and 5 mL of chloroform were added and shaken for few minutes. The lower (organic) layer containing caffeine was taken in a sample cell. Preparation of a sample solution of beverages 0.1 mL of the extract of beverages, present in the sample cell, was dissolved in 5 mL of chloroform to form the sample solution. Reading was performed at a wavelength of 274 nm.

3.2. Data analysis

The data were analyzed using GNU PSPP (GNU Project, Boston, MA, USA). Continuous variables are summarized using number (frequency), mean, and standard deviation while categorical variables are summarized using frequency and percentage. Means were compared across groups using t-test, and proportions were compared with Karl Pearson's Chi-square test. Level of significance (α) was set at 0.05.

4. Results

The analytical data from different café shown that, the most common volume of drinkable hot beverages were variables for example the intake volume of Espesial hot beverages has mean ± SD 87.6±3.7 ml, Espresso 27±7 ml, green tea 138.33±6 ml, red tea 129.3 ± 14 ml, Nescafe 114.33±17 ml and coffee 132±34 ml (Table 1). Similarly, has been estimated for volume intake of homemade hot beverages and found that mean± SD for coffee, cacao and red tea 58.4±6 ml, 61.7±4 ml, and 57.6±7 ml respectively (Table 2).

Table 1 Types of caffeinated hot drink and their weighing

Weight of sample from café					**Weight of pure sample (ml)**
Types of caffeinated hot drink	**Number of sample**	**Weight of sample with cup (ml)**	**Weight of sample with cup (gm)**	**Weight of empty cup (gm)**	
Espesial	1	94	94	9	85
Espesial	2	94	90	9	85
Espesial	3	102	102	9	93
Mean ±SD					87.6±3.7 ml
Espresso	1	27	28	4	23
Espresso	2	30	30	4	26
Espresso	3	46	46	4	42
Mean ±SD					27±7 ml
Green tea	1	143	143	13	130
Green tea	2	151	151	7	144
Green tea	3	148	148	7	141
Mean ±SD					138.33±6 ml
Red tea	1	132	132	13	119
Red tea	2	132	132	13	119
Red tea	3	157	157	7	150
Mean± SD					129.3±14.6 ml
Nescafe	1	104	104	13	91
Nescafe	2	146	142	14	132
Nescafe	3	135	135	15	120
Mean ± SD					114.33±17 ml
Coffee	1	76	76	4	72
Coffee	2	166	166	7	159
Coffee	3	172	172	7	165
Mean± SD					132±34 ml

Average caffeine contents shown in table 3, in which this work present the caffeine content to each 100 ml of hot beverages. Green tea contains an averages caffeine 16.5%, red tea 21.9%, cacao 10.4%, Nescafé 32.2%, Expresso 207.3%, Espesial 50.3%, coffee 132.6% and homemade coffee 102.3%. In the next the total volume intake of caffeine based on the type of cup volume buying form the café as described in table 1 shown that the real intake of caffeine was as following 23g/138.33 ml drinkable green tea, 28.5g/129.3 ml drinkable red tea, 6.5g/61.7 ml drinkable cacao, 29g/129.3 ml drinkable Nescafe, 56g/27 ml drinkable Expresso, 44g/87.6 ml drinkable Espesial, 175g/132ml drinkable coffee and 60g/58.4 ml drinkable homemade coffee. This result further shown that, highest caffeine intake was found in Expresso (56g/27 ml), coffee (175g/132ml) and homemade coffee (60g/58.4 ml) while the other hot beverage that have least amount of caffeine was that cacao 6.5g/61.7ml, and almost similar amounts of caffeine found in green tea,

red tea and Nescafe (about 29g/130 ml for each) and the moderate levels of caffeine found in Expresso, 44g/87.6 ml (Table 3).

Table 2 Homemade coffee, cacao and tea

Weight Homemade samples					
Types of hot caffeinated drink	**Number of sample**	**Weight of sample with cup (ml)**	**Weight of sample with cup (gm)**	**Weight of empty cup (gm)**	**Weight of pure sample In (ml)**
coffee	1	140	140	77	63
Coffee	2	158	158	109	49
Coffee	3	140	140	77	63
Mean± SD					58.4±6 ml
Cacao	1	138	138	77	61
cacao	2	164	164	109	55
cacao	3	146	146	77	69
Mean ± SD					61.7±4 ml
Red tea	1	182	182	123	59
Red tea	2	181	181	133	48
Red tea	3	199	199	133	66
Mean± SD					57.6±7 ml

Table 3 Caffeine content of different hot beverages

Types of caffeinated hot beverage	**% of caffeine (g/100 ml)**	**Average caffeine intake in the drinking cup**
Green tea 1	15.21	
Green tea 2	18	
Green tea 3	16.34	
Mean± SD	16.51667±1.5	23g/138.33 ml drinkable solution
Red tea 1	22	
Red tea 2	24	
Red tea 3	19.99	
Mean ± SD	21.99667±2	28.5g/129.3 ml drinkable solution
Cacao 1	9.86	
Cacao 2	10.25	
Cacao 3	11.22	
Mean ± SD	10.44333±0.5	6.5g/61.7±4 ml drinkable solution
Nescaffe 1	33.68	
Nescaffe 2	37	
Nescaffe 3	26	

Mean ±SD	32.22667±4	29g/129.3 ml drinkable solution
Expresso 1	205	
Expresso 2	216	
Expresso 3	201	
Mean ±SD	207.3333±6	56g/27 ml drinkable solution
Espesial 1	54	`
Espesial 2	49	
Espesial 3	48	
Mean± SD	50.33333±1.4	44g/87.6 ml drinkable solution
Coffee Market 1	134	
Coffee Market 2	115	
Coffee Market 3	149	
Mean ±SD	132.6667±16	175g/132ml drinkable solution
Coffee Homemade1	110	
Coffee Homemade 2	90	
Coffee Homemade 3	107	
Mean± SD	102.3333±6	60g/58.4 ml drinkable solution

The section of this study was a survey for hot beverages consumption and shown that, the female participants tow time more than male 66% and 34%. The age of the participants presented by 44.8% for age groups between 18-25 years old and 24% for age groups 26-40 years old and similar percentage has been reported for both age groups less than 18 and above 60 years old (6%). Most of the participants found have high levels of education (university 59.8%). Married and single occupied the large number of sample in this study 41.6%, and 35.6% respectively (Table 4).

Table 4 Socio-demographic data

		N	**N %**
Gender	Male	136	34.0%
	Female	264	66.0%
	Total	400	100.0%
Age (years)	Less than 18	24	6.0%
	18-25	179	44.8%
	26-40	96	24.0%
	41-60	77	19.3%
	Above 60	24	6.0%
	Total	400	100.0%
Educational level	Illiterate	17	4.3%
	Primary	25	6.3%
	Secondary	99	24.8%
	College	239	59.8%
	Master	10	2.5%

	other	10	2.5%
	Total	400	100.0%
Marital status	Single	166	41.6%
	Engaged	61	15.3%
	Married	142	35.6%
	divorced	10	2.5%
	Widow	21	5.0%
	Total	400	100.0%

The anthropometrics data shown that, the average BMI of the participant was an overweight while the rest of anthropometrics were in normal levels (Table 5).

Table 5 Anthropometric data

	Mean± SD
Weight (kg)	68
Height (m^2)	164
BMI	25.1
Waist (cm)	80.8
Hip (cm)	98.5
WHR (cm)	0.820305

The types of hot beverage consumptions have been studies in table 6 A-D, in which coffee most consumption at afternoon (29%), once a day (37.8%), tea was highly consumption in the morning 22%, with once a day 32.3% in the morning. In regard green tea, 28.8% consumed at afternoon, once/day (33.5%), the hot beverage consumed of cacao 12.5% afternoon and once/day (28%). Nescafe consumption was predominantly afternoon (21.3%) once time 32.8%, while Espresso and Especial being the least common consumed in the morning and once/day (5%). Overall hot beverage consumption none were significant consumed.

Table 6 A Types of hot beverage consumption

		N	**N %**
Time of coffee consumption	Morning	48	12.0%
	afternoon	116	29.0%
	Night	14	3.5%
	Morning and afternoon	81	20.3%
	Morning and night	10	2.5%
	Afternoon and night	28	7.0%
	Non	103	25.8%
	Total	400	100.0%
Frequent of coffee consumption	1.0	151	37.8%
	2.0	98	24.5%
	3.0	22	5.5%

	4.0	17	4.3%
	5.0	9	2.5%
	Non	103	25.5%
	Total	400	100.0%
Time of red tea consumption	Morning	88	22.0%
	afternoon	42	10.5%
	Night	14	3.5%
	Morning and afternoon	16	4.0%
	Morning and night	7	1.8%
	Afternoon and night	8	2.0%
	Non	225	56.3%
	Total	400	100.0%
Frequent of Red tea consumption	1.0	130	32.3%
	2.0	24	6.0%
	3.0	13	3.3%
	4.0	5	1.3%
	5.0	3	0.8%
	Non	225	56.5%
	Total	400	100.0%

Table 6 B. Types of hot beverage consumption

		N	**N %**
Time of green tea consumption	Morning	15	3.8%
	afternoon	115	28.8%
	Night	18	4.5%
	Morning and afternoon	5	1.3%
	Morning and night	11	2.8%
	Afternoon and night	6	1.5%
	Non	230	57.5%
	Total	400	100.0%
Frequent of green tea consumption	1.0	134	33.5%
	2.0	25	6.3%
	3.0	6	1.5%
	4.0	6	1.5%
	5.0	2	0.5%
	Non	227	56.8%
	Total	400	100.0%

Time of Cocoa consumption	Morning	44	11.0%
	afternoon	50	12.5%
	Night	22	5.5%
	Morning and afternoon	4	1.0%
	Morning and night	3	0.8%
	Non	277	69.3%
	Total	400	100.0%
Frequent of cocoa consumption	1.0	115	28.0%
	2.0	6	1.5%
	3.0	2	0.5%
	Non	277	70.0%
	Total	400	100.0%

Table 6 C Types of hot beverage consumption

		N	**N %**
Time of Nescafe consumption	Morning	45	11.3%
	afternoon	85	21.3%
	Night	11	2.8%
	Morning and afternoon	18	4.5%
	Morning and night	1	0.3%
	Afternoon and night	5	1.3%
	Non	235	58.8%
	Total	400	100.0%
Frequent of Nescafe consumption	1.0	131	32.8%
	2.0	23	5.8%
	3.0	9	2.3%
	5.0	2	0.3%
	Non	235	59.0%
	Total	400	100.0%
Time of Espresso consumption	Morning	12	3.0%
	afternoon	9	2.3%
	Night	1	0.3%
	Afternoon and night	1	0.3%
	Non	377	94.3%
	Total	400	100.0%
Frequent of Espresso consumption	1.0	21	5.3%
	2.0	1	0.3%

	5.0	1	0.3%
	Non	377	94.3%
	Total	400	100.0%

Table 6 D Types of hot beverage consumption

		N	N %
Time of Especial consumption	Morning	4	1.0%
	Afternoon	10	2.5%
	Night	1	0.3%
	Morning and afternoon	1	0.3%
	Non	384	96.0%
	Total	400	100.0%
Frequent of special consumption	1.0	15	3.8%
	2.0	1	0.3%
	Non	384	96.0%
	Total	400	100.0%

Symptoms and complication reported by one third of the participants were insomnia, nervousness, headache (Table 7 A to C).

Table 7 A Symptoms and complication reported by the participant

		N	N %
Tremor	Yes	69	17.3%
	No	331	82.8%
	Total	400	100.0%
Dryness	Yes	79	19.8%
	No	321	80.3%
	Total	400	100.0%
Insomnia	Yes	153	38.3%
	No	247	61.8%
	Total	400	100.0%
Skin disorder	Yes	33	8.3%
	No	367	91.8%
	Total	400	100.0%
Nervousness	Yes	178	44.5%
	No	222	55.5%
	Total	400	100.0%
GIT disorders	Yes	77	19.3%

	No	323	80.8%
	Total	400	100.0%
constipation	Yes	68	17.0%
	No	332	83.0%
	Total	400	100.0%
diarrhea	Yes	23	5.8%
	No	377	94.3%
	Total	400	100.0%
Dizziness	Yes	83	20.8%
	No	317	79.3%
	Total	400	100.0%
headache	Yes	142	35.5%
	No	258	64.5%
	Total	400	100.0%

Table 7 B Symptoms and complication reported by the participant

		N	**N %**
Bone diseases	Yes	31	7.8%
	No	369	92.3%
	Total	400	100.0%
Asthma	Yes	11	2.8%
	No	389	97.3%
	Total	400	100.0%
Stress	Yes	89	22.3%
	No	311	77.8%
	Total	400	100.0%
Nausea	Yes	29	7.3%
	No	371	92.8%
	Total	400	100.0%
Urination	Yes	43	10.8%
	No	357	89.3%
	Total	400	100.0%
Depression	Yes	52	13.0%
	No	348	87.0%
	Total	400	100.0%
HTN	Yes	29	7.3%
	No	371	92.8%

	Total	400	100.0%
DM	Yes	20	5.0%
	No	380	95.0%
	Total	400	100.0%
Kidney disease	Yes	4	1.0%
	No	396	99.0%
	Total	400	100.0%
Epilepsy	Yes	1	0.3%
	No	399	99.8%
	Total	400	100.0%

Table 7 C Symptoms and complication reported by the participant

		N	**N %**
Eye problems	Yes	37	9.3%
	No	363	90.8%
	Total	400	100.0%
Ulcer	Yes	11	2.8%
	No	389	97.3%
	Total	400	100.0%
Gallstones	Yes	6	1.5%
	No	394	98.5%
	Total	400	100.0%
Respiratory system diseases	Yes	20	5.0%
	No	380	95.0%
	Total	400	100.0%
Urinary Tract disease	Yes	24	6.0%
	No	376	94.0%
	Total	400	100.0%
Tachycardia	Yes	44	11.0%
	No	356	89.0%
	Total	400	100.0%
Cancer	Yes	1	0.3%
	No	399	99.8%
	Total	400	100.0%
Sinusitis	Yes	70	17.5%
	No	330	82.5%
	Total	400	100.0%
Cardiovascular	Yes	20	5.0%

	No	380	95.0%
	Total	400	100.0%
COPD	No	400	100.0%
	Total	400	100.0%
Sterility	Yes	2	0.5%
	No	398	99.5%
	Total	400	100.0%

The reason for caffeinated hot beverages consumption was further investigated and found that significant result in improved in mood (57.5%) P=0.000, while the other non-significant include improve in energy, weight, cognition and physical performance (P> 0.05) (Table 8).

Table 8 Stimulant effect of caffeine

		N	N %	P values
Improvement in energy	Yes	130	32.5%	0.07
	No	270	67.5%	
	Total	400	100.0%	
Improve in mood	Yes	230	57.5%	0.000
	No	170	42.5%	
	Total	400	100.0%	
Improve in weight	Yes	23	5.8%	0.9
	No	377	94.3%	
	Total	400	100.0%	
Improve in cognition	Yes	82	20.5%	0.8
	No	318	79.5%	
	Total	400	100.0%	
Improve physical performance	Yes	48	12.0%	0.9
	No	352	88.0%	
	Total	400	100.0%	

Chi-square test was performed and considered significant at $\alpha < 0.05$.

The most common nutrients deficiency found that, vitamin D deficiency (46%) while the lease common anemia, calcium deficiency and thyroid function test but none of them was significant (Table 9).

Table 9 Nutrients disorders reported by participants

		N	N %
Vitamin D deficiency	Yes	184	46.0%
	No	216	54.0%
	Total	400	100.0%
Anemia	Yes	72	18.0%
	No	328	82.0%

	Total	400	100.0%
Calcium deficiency	Yes	45	11.3%
	No	355	88.8%
	Total	400	100.0%
Hypothyroidism	Yes	3	0.8%
	No	397	99.3%
	Total	400	100.0%
Hyperthyroidism	Yes	9	2.3%
	No	391	97.8%
	Total	400	100.0%

In regarding blood biochemical, the result shown that, elevated levels of FBS, HbA1C while the levels of ferritin and vitamin D lower than normal levels (Table 10).

Table 10 Blood Biochemical lab result

	Mean± SD
FBS	108.91
HbA1C	9.31
LDL	119.2
HDL	49.7
TG	114.6
Cholesterol	163.2
HB	12.1
Ferritin	31.20
VITD	19.07

5. Discussion

Excessive caffeine intakes have been associated with anxiety, headaches, nausea, and restlessness (13). Side effects (i.e., headache, fatigue, drowsiness) may be experienced when caffeine intake is stopped suddenly; however, symptoms are generally mild and temporary (14). Some but not all studies have shown an increased risk of hypertension and cardiovascular disease (13). Moderate caffeine intake (less than 400 mg/day for healthy adults) does not adversely affect cardiovascular health (15). Scientific data do not support adverse effects of moderate caffeine consumption below 300 mg/day on reproductive health or pregnancy outcomes (16).

Regardless of the longstanding consumption of caffeine-containing beverages in the diet, there is a lack of comprehensive and current population-based data on caffeine intakes. Most studies still cite information dating back to the 1980s and 1990s when Barone and Roberts (17) highlighted results from earlier population-based surveys. In 2014 Mitchell et al (11) published data from the Share of Intake Panel (SIP) a syndicated beverage survey conducted by NFO World Group. There has also been an introduction of a greater variety of beverages in the marketplace. The introduction of functional beverages such as hot beverages and coffees, also highlights the importance of characterizing more recent beverage consumption patterns and caffeine intakes that may have evolved over the last decade. The present study aimed to determine the caffeine contents of most popular hot drink and so that, the result was optimistic. The present study revealed that, variation of caffeine in hot drink ranging from, Green tea contain an averages caffeine 16.5%, red tea 21.9%, cacao 10.4%, Nescafé 32.2%, Expresso 207.3%, Espesial 50.3%, coffee 132.6% and homemade coffee

102.3%. Even though the caffeine content of hot beverages is not required on a label, most companies make these data readily available and the values are fairly consistent across sources.

A greater challenge is assigning specific values for the caffeine content of coffee and tea. The origin of the crop, processing, and preparation, including the type, temperature, and time for brewing or steeping, all affect the caffeine concentration. Tea consumption has remained relatively stable and contributes a small amount of caffeine as aforementioned result to the diets of consumers. Coffee poses more of a question, especially with the rising popularity of specialty coffees over the last decade and possibly a low awareness of their caffeine content. For example, in one study, the caffeine content of a specialty coffee from a single location on 6 consecutive days yielded values ranging from 259 to 564 mg per 16 fluid ounces for the same variety and type sampled (18,19). These data suggest that even with brand-specific caffeine values for coffee, the variability can be quite high. This values obtained in the previous study was lower than the present work because in the present work the caffeine content in hot drinks whether marketing or in homemade presented by 132.6% and 102.3% respectively.

In the previous study, of the 42,851 respondents in the survey sample, 37,602 reported consuming at least one caffeinated beverage. Using the survey weights, this represents approximately 85% of the U.S. population (20). Over 98% of all beverage caffeine consumed came from total coffee (all types including specialty drinks and decaffeinated coffee), total tea (black, green, white, and other varieties). This is in agreement with the present data in this study.

Amount of caffeine from food is quite insignificant relative to the total amount of caffeine consumed. In adults, food contributes less than 2% to total (21). Of those who drank caffeinated beverages, more than half reported consuming CSDs (63%), coffee (55%), and tea (53%). In the present work, the consumption of hot drink was less than the previous work.

Based on the survey (22), the mean daily caffeine intake from all consumers of caffeinated beverages in the U.S. was 165 mg/day, or 2.2 mg/kg body weight/day. Caffeine intakes are higher (165 mg/day vs. 120 mg/day). In fact, due to present study collected samples from different types of caffeinated hot beverages so that the mean was less than the study conducted in US (23).

Caffeine intakes from tea remained relatively stable. Over the past decade, there was also a slight increase (from 1.5 to 1.8) in the total number of caffeinated beverage occasions (24). This finding with the present study.

In regarding the positive or negative health effect of caffeinated hot beverages, the current study reported some health problems include one third of the participants were have insomnia, nervousness, headache as negative effect of caffeinated but these result not significant. Similarly, has been found in the previous work (25). The positive effect of caffeinated hot products includes improve in mood and this was found in number of studies (26, 27).

Overall the caffeinated hot drinks have varied amount of caffeine and consumption was lower than the recommended with some symptoms reported but insignificant with except the positive effect improve in mood.

6. Conclusion

To our knowledge, this is the first population-based study to estimate the caffeine intakes from hot beverages in over a decade. The results from this study shown that the intake of caffeine wa varies with highest caffeine intake was found in Expresso (56g/27 ml), coffee (175g/132ml) and homemade coffee (60g/58.4 ml) while the other hot beverage that have least amount of caffeine was that cacao 6.5g/61.7ml, and almost similar amounts of caffeine found in green tea, red tea and Nescafe (about 29g/130 ml for each) and the moderate levels of caffeine found in Expresso, 44g/87.6 ml. The symptoms and complication reported by one third of the participants were insomnia, nervousness, headache. The data of this study suggested that, caffeine should be consumed at recommended levels since some hot drink contain higher levels which could predisposing into positive or negative effect of caffeine intake.

Compliance with ethical standards

Acknowledgments

We are grateful to all subjects who participated in the study.

Disclosure of conflict of interest

There are no conflicts of interest.

Statement of informed consent

The study was approved by the Institutional Ethics Committee of public health faculty. A signed informed consent was obtained from all the participants in the study.

References

[1] Khan N. Caffeinated beverages and energy drink: Pattern, awareness and health side effects among Omani university students. Biomed Res. 2019, 30(1):113-21.

[2] Ríos JL, Betancourt J, Pagán I, Fabián C, Cruz SY, González AM, González MJ, Rivera-Soto WT, Palacios C. Caffeinated-beverage consumption and its association with socio-demographic characteristics and selfperceived academic stress in first and second year students at the University of Puerto Rico Medical Sciences Campus (UPR-MSC). Puerto Rico health sciences journal. 2013 May 29, 32(2).

[3] Acheson KJ, Gremaud G, Meirim I, Montigon F, Krebs Y, Fay LB, et al. Metabolic effects of caffeine in humans: Lipid oxidation or futile cycling? Am J Clin Nutr 2004, 79:40-46.

[4] Reissig CJ, Strain EC, Griffiths RR. Caffeinated energy drinks--A growing problem. Drug Alcohol Depend 2009, 99:1-10.

[5] Food and Drug Administration. Caffeine intake by the US population. 2010. Available at: http://www.fda.gov/downloads/AboutFDA/CentersOffices/Officeof Foods/CFSAN/CFSANFOIAElectronicReadingRoom/UCM333191.pdf. Accessed January 14, 2013.

[6] Arce M, Brunet K, Jimenez A, Mansilla P, Sheplan P, Vanoni A et al. El uso de estimulantes con o sin receta para el aprovechamiento académico entre estudiantes de medicina en Puerto Rico. Rev Puerto Med Salud Pub 2011, 26:24-33.

[7] O'Brien MC, McCoy TP, Rhodes SD, Wagoner A, Wolfson M. Caffeinated cocktails: energy drink consumption, high-risk dinking, and alcohol-related consequences among college students. Acad Emerg Med 2008, 15:453-460.

[8] Malinauskas BM, Aeby VG, Overton RF, Carpenter-Aeby T, BarberHeidal K. A survey of energy drink consumption patterns among college students. Nutr J 2007, 6:1-10

[9] Barraza Macías, A. Un modelo conceptual para el estudio del estrés académico. Rev Electr Psicol Iztacala 2006, 9:110-129.

[10] Almaghrbi A, Altarrani M, Elmighrabi N, Bakoush HM, Elmabsout AA. Effect of Vitamin D Supplementation on Blood Glucose Homeostasis, BMI and Lipid Profile in Diabetic Patients with Vitamin D Deficiency. Asian Journal of Basic Science & Research. 2021 Jul;3(3):25-35.

[11] Mitchell DC, Knight CA, Hockenberry J, Teplansky R, Hartman TJ. Beverage caffeine intakes in the U.S. Food Chem Toxicol 2014, 63: 136-142.

[12] Altiab E, Mohamed M, Mohamed S, Mansour R, Buhagar S, El-Mani S, Bakoush HM, Elmabsout AA. approximate composition analysis and nutritive values of improver and non-improver white bread. IRJMETS 2021.3. 793-803.

[13] Nkondjock A, Ghadirian P, Kotsopoulos J, et al. Coffee consumption and breast cancer risk among BRCA1 and BRCA2 mutation carriers. Int J Cancer 2006, 118:103.

[14] Bøhn SK, Blomhoff R, Paur I. Coffee and cancer risk, epidemiological evidence, and molecular mechanisms. Mol Nutr Food Res 2014, 58:915.

[15] Baker JA, Beehler GP, Sawant AC, et al. Consumption of coffee, but not black tea, is associated with decreased risk of premenopausal breast cancer. J Nutr 2006, 136:166.

[16] Ishitani K, Lin J, Manson JE, et al. Caffeine consumption and the risk of breast cancer in a large prospective cohort of women. Arch Intern Med 2008, 168:2022.

[17] Turati F, Galeone C, La Vecchia C, et al. Coffee and cancers of the upper digestive and respiratory tracts: meta-analyses of observational studies. Ann Oncol 2011, 22:536.

[18] Yang TO, Crowe F, Cairns BJ, et al. Tea and coffee and risk of endometrial cancer: cohort study and meta-analysis. Am J Clin Nutr 2015, 101:570.

[19] Braem MG, Onland-Moret NC, Schouten LJ, et al. Coffee and tea consumption and the risk of ovarian cancer: a prospective cohort study and updated meta-analysis. Am J Clin Nutr 2012, 95:1172.

[20] Wikoff D, Welsh BT, Henderson R, et al. Systematic review of the potential adverse effects of caffeine consumption in healthy adults, pregnant women, adolescents, and children. Food Chem Toxicol 2017, 109: :585–648.

[21] Fulgoni VL, Keast DR, Lieberman HR. Trends in intake and sources of cafeine in the diet of US adults: 2001-2010. Am J Clin Nutr. 2015, 101:1081–7.

[22] Tooze JA, Kipnis V, Buckman DW, Carrolee RJ, Freedman LS, Guenther PM, Krebs-Smith SM, Subar AF, Dodd KW. A mixed-effects model approach for estimating the distribution of usual intake of nutrients: The NCI method. Statistical Methods. 2010;29(27):2857–2868

[23] Cappelletti S, Piacentino D, Fineschi V, Frati P, Cipolloni L, Aromatario M. Cafeine-realated deaths, manner of deaths and categories at risk. Nutrients. 2018, 10:611.

[24] RRv K, Bauer PR, Schuitema I, Sander JW, Visser GH. Cafeineand seizures: a systematic review and quantitative analysis. Epilepsy Behav. 2018, 80:37–47.

[25] Loftfeld E, Freedman ND, Dodd KW, Vogtmann E, Xiao Q, Sinha R, et al. Cofee drinking is widespread in the United States, but usual intake varies by key demographic and lifestyle factors. J Nutr. 2016, 146:1762–8.

[26] Lieberman HR, Agarwal S, Fulgoni VL. Daily pattern of cafeine intake with multiple sociodemographic and lifestyle factors in US adults based on NHANES 2007-2012 surveys. J Acad Nutr Diet. 2019, 119(1):106–14.

[27] Meilad M, Ramadan S , Hassan H, Elmabsout AA. caffeinated products consumption and their health and behavior alerts among medical students at Benghazi university. IJRD. 2012. 6. 159-168.