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Prevalence and Side Effects of Caffeinated Drinks Intake, Sleep Biological Rhythms and Increase BMI among Medical Students

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ABSTRACT

This research investigates prevalence and side effects of caffeinated drinks intake, sleep biological rhythms and increase BMI among medical students in Karachi. The primary objective was to assess the prevalence of caffeinated drinks intake among undergraduate medical students on weekly and daily basis. Secondary objectives were to determine the associated potential side effects, the way excessive consumption influences the sleep patterns and BMI. Thirdly objective were to determine the relationship between demographic variables and caffeinated drink intake, assess mean differences in Sleep schedule and BMI between students' groups and, report the predictors of caffeinated drinks consumption. A cross-sectional study was conducted for 6 months (February – July 2024) among currently enrolled undergraduate medical students studying in medical colleges and universities in Karachi, Pakistan. The study used the self-reported questionnaire that included four sections: Sec (1). Demographic characteristics; Sec (2). Caffeinated drinks consumption; Sec (3). Side effects of caffeinated drink intake; Sec (4). Body Mass Index (BMI) and collected data through Convenient sampling. Data was analyzed through SPSS version 23.0. Pearson Correlation analysis was conducted to reveal the relationship between caffeinated drink consumption, Potential side effects and impact on sleep biological rhythms and altered BMI. This study examines the demographics, consumption patterns, and impacts of caffeinated drink intake among 309 students aged 20-25 from medical and non-medical fields. The sample included 66.9% females and 33.1% males, with 68.5% from medical fields. Regular caffeine consumption was reported by 98% of participants, primarily for taste (24.4%), staying awake (56.2%), and social reasons (33.1%). Common side effects included insomnia (66.9%), nervousness (33.1%), and palpitations (24.4%). Sleep patterns showed 66.9% maintained a regular schedule, but caffeine significantly disrupted sleep. BMI analysis revealed a mean of 22.45 kg/m² (SD=6.07), with significant correlations between caffeine intake and BMI changes (12.3%). Awareness of caffeine's impact on weight was reported by 50.3%, with 16.6% seeking medical advice. Significant associations were found between awareness of side effects and impacts on BMI (p=0.006), medical advice (p=0.004), and sleep (p=0.000). Caffeinated drink consumption is prevalent among medical and non-medical students, primarily driven by academic pressures and social habits. While providing temporary cognitive benefits, it is associated with several side effects, including sleep disturbances and increased BMI. This study underscores the importance of promoting health education and informed consumption practices to safeguard students' health and well-being.

Keywords: *Medical Students; Chronotype; Obesity; Caffeinated Drinks; Adverse Effects (Source: MeSH-NLM)*

INTRODUCTION

In a world where the pulse of productivity never seems to slow, caffeinated beverages stand as the silent guardians of alertness, fueling the endeavors of millions, including the aspiring minds of medical students. Yet, behind the facade of heightened focus lies a complex interplay of habits, biology, and health outcomes that warrant closer examination [1,2]. Caffeine, a widely consumed psychoactive component, is a central nervous system stimulant found in beverages like coffee, tea, energy drinks, and chocolates therefore, termed as Caffeinated drinks which are legal stimulants globally, featuring in most world cultures in various forms [1,2,9]. Caffeinated beverages, such as coffee, tea, energy drinks, and soft drinks, are commonly consumed by individuals seeking to alleviate fatigue, enhance cognitive function, and improve alertness [1,2-6]. Alternatively, Caffeinated drinks intake can cause addiction, causing symptoms like palpitations, tremors, sensory abnormalities, tachypnea, diuresis, gastrointestinal issues, and anxiety or despair [4,7]. Excess sugar is also likely to linked to low level of serotonin and brain function [14]. Caffeine use does appear to have important implications in the medical schooling environment. Its high consumption has been associated with great alteration in BMI [15], falling asleep at campus [16], behavioral problems [17], violence and conduct disorder [18], and low academic achievement [19]. The effects of energy drinks may be best understood in combination with other aspects of diet. With increasing consumption of high-caffeinated energy drinks, an increase in the intake of junk food (processed and snack foods, which are high in fat and/or sugar) is of particular concern Korean medical adolescents. Caffeinated drinks are freely available at cafeterias in universities without proper education and its side effects for the general population [3,4,5]. Caffeinated beverages have become ubiquitous in modern society, with a significant portion of the population, particularly college students. Among college students, medical students represent a demographic that frequently faces high levels of academic demands and stress, making them particularly susceptible to the allure of caffeinated drinks. However, the prevalence of caffeinated drink intake among medical students raises concerns regarding its potential impact on sleep quality, biological rhythms, and body mass index (BMI) [8,9].

The consumption of caffeinated drinks among medical students is often intertwined with their lifestyle choices, including sleep habits and dietary patterns. Research indicates that medical students may resort to caffeinated beverages as a coping mechanism to manage the rigors of their academic workload, leading to habitual consumption and potential dependency on caffeine [6,9,10]. The relationship between caffeinated drink intake and sleep biological rhythms among medical students has garnered attention in the literature. Studies have shown that excessive caffeine consumption, particularly in the evening, can disrupt circadian rhythms, delay sleep onset, and impair sleep quality [9,10]. Furthermore, the prevalence of irregular sleep-wake patterns, such as delayed sleep phase syndrome, among medical students may exacerbate the adverse effects of caffeinated drinks on sleep architecture and duration [4,6,7]. Moreover, emerging evidence suggests a potential link between caffeinated drink intake and alterations in energy metabolism, which may influence BMI among medical students. Chronic sleep deprivation, often associated with irregular sleep schedules and poor sleep hygiene, has been implicated in dysregulated appetite hormones and increased caloric intake [2,5,8-10]. Consequently, the consumption of caffeinated drinks, particularly those high in sugar and calories, may contribute to weight gain and obesity among medical students [9,18].

The multifaceted relationship between caffeinated drink intake, sleep biological rhythms, and increased BMI underscores the need for comprehensive investigations into the prevalence and side effects of caffeinated beverage consumption among medical students [1,2,9]. By elucidating the complex interplay between lifestyle factors and health outcomes, such research endeavors can inform targeted interventions aimed at promoting healthier behaviors and mitigating the adverse effects of caffeinated drink intake among this vulnerable population [5,19].

The consumption of caffeinated beverages among medical students transcends borders, with its prevalence echoing across continents and cultures. Globally, approximately 70% to 80% of medical students across various regions reported daily consumption of caffeinated drinks, such as coffee, tea, and energy drinks [6-10]. In USA, nearly 60% of medical students experienced sleep disturbances attributable to caffeine consumption, highlighting the significant impact of this habit on their sleep quality and overall well-being [7,9]. This high prevalence underscores the widespread reliance on caffeine as a means to enhance alertness and combat fatigue among medical students worldwide [7,9]. Caffeinated drinks have become an integral part of the daily routines of medical students, offering a temporary reprieve from the demands of academia and clinical practice [1,4,15,17]. However, the extent of consumption varies widely across regions, with distinct patterns emerging in different parts of the world. Despite the global trend, regional disparities in caffeinated drink intake among medical students are evident, with factors such as socioeconomic status, urbanization, and cultural norms shaping consumption patterns [9,14-16,20]. While some countries exhibit a culture of moderation and restraint, others embrace caffeinated beverages as essential companions in the pursuit of academic success and professional fulfillment [7,17,19,20].

Against this backdrop of global and regional dynamics, the relationship between caffeinated drink intake, sleep biological rhythms, and body mass index (BMI) among medical students emerges as a critical area of inquiry [1,8]. As medical education evolves in an era of heightened competition and technological advancement, understanding the implications of caffeinated beverage consumption for the health and well-being of future healthcare professionals becomes paramount [17,19,20].

Globally, approximately 80% of the world's population consumes a caffeinated product every day and 90% of adults in North America consume caffeine on a daily basis [9,6]. Today, Nordic countries have the largest intake people in Finland, Norway, Iceland, Denmark, and Sweden consume an average of 12 kg, 9.9 kg, 9.0 kg, 8.7 kg and 8.2 kg of coffee per capita per year, respectively [6,8-10]. In Western Europe, including Spain, the average daily intake of caffeine is as similar to the U.S [7-9]. In the United States, for example, 90% of adults consume caffeine-infused beverages (i.e., coffee, tea, energy, or other drinks) almost daily 2 with consumption averaging 200 mg/day [8]. Spain revealed a prevalence of poor sleep between 38.2% to about 50% [8,9]. Studies conducted in Korea showed poor sleep quality in 38% to 40% of the participants [10]. Ethiopia had a higher overall prevalence of poor sleep quality of 65.5% [11,12]. In Makkah and Riyadh, Saudi Arabia, the prevalence was 38.2% and 68%, respectively [14,20]. In the United States 51% reported at least one energy drink consumed in the preceding month [9]. The Turkey showed 32.6% consumed caffeinated drink at least once [14,20].

In Asia, where the pursuit of academic excellence is deeply ingrained in cultural values, the prevalence of caffeinated drink intake among medical students is particularly pronounced [9,11,14,20]. Countries like China and India have witnessed a surge in the consumption of coffee, tea, and energy drinks among medical students, reflecting the growing influence of globalized lifestyles on dietary habits and wellness practices and other countries like Pakistan, with its burgeoning youth population and rapidly evolving educational landscape, have witnessed a notable increase in the consumption of coffee, tea, and energy drinks among medical students [15,16]. The availability of these beverages in university cafeterias, local eateries, and convenience stores has contributed to their widespread use as aids for study sessions and late-night revisions. In Pakistan reported 52% of medical students consumed caffeine to cope up with academic and athletic stress and workloads [16,15]. Also, the prevalence rate of sleep disorders and metabolic diseases is on the rise, the relationship between caffeinated drink intake, sleep biology, and body mass index (BMI) among medical students assumes heightened significance is 36.9% of men and 38.0% of women were overweight, while 22.0% of men and 24.4% of women were obese [8,16]. Understanding the interplay between these factors is crucial for devising targeted interventions to promote healthier lifestyle choices and mitigate the risk of adverse health outcomes among future healthcare professionals in Pakistan [14-16]. Occupational stressors and the demanding nature of medical training

may exacerbate the reliance on caffeinated beverages as coping mechanisms, further amplifying their impact on sleep quality and metabolic health [4,17,19].

In addition to occupational factors, medical conditions such as sleep disorders, anxiety, and depression may contribute to increased caffeine consumption among medical students. The bidirectional relationship between caffeine intake and mental health outcomes underscores the need for holistic approaches to address the complex interplay between lifestyle factors and psychological well-being [2,17]. Furthermore, individual risk factors such as genetics, dietary habits, and susceptibility to caffeine-related side effects may further modulate the impact of caffeinated drink intake on health outcomes among medical students [5-7,18].

The purpose of this study is to examine the relationship between caffeinated drink intake, sleep rhythms, and BMI among medical students. By investigating global and regional prevalence, occupational stressors, and individual risk factors, the study aims to identify key factors influencing health outcomes in this population. Through rigorous research and targeted interventions, the study seeks to promote healthier lifestyle choices and mitigate the risk of adverse health outcomes among medical students. Ultimately, the study aims to contribute to a culture of health and well-being within medical education institutions, empowering students to thrive both academically and personally. The proposed research will be aim to evaluate the impact of caffeinated drink intake on medical students, sleep pattern and BMI (Body Mass Index) for their health and academic performance.

The Significance of Research

Understanding the impact of caffeinated drink intake on medical students' sleep patterns and BMI was crucial for their health and academic performance. This research addresses a gap in the literature and has broader implications for public health. By identifying the effects of caffeine consumption, interventions can be developed to promote healthier habits among medical students.

Rationale of Research

This study aims to understand the impact of consuming caffeinated drinks on the sleep patterns and weight of medical students. The objective was to determine the prevalence of this habit and its potential adverse effects. Through this research, insights into the influence of caffeine on medical students can be gained, contributing to their overall well-being.

Research Question

What is the prevalence of caffeinated drink intake among medical students, and how does it affect their sleep patterns, biological rhythms, and BMI?

Hypothesis

Medical students who consume caffeinated drinks regularly are more likely to experience disrupted sleep patterns, altered biological rhythms and increased BMI compared to those who do not consume caffeinated drinks, so according to the analysis we reject the null hypothesis.

Operational Definitions

Caffeinated Drink: Drinks containing caffeine, a stimulant of the central nervous system, are classified as caffeinated drinks, which includes various commercially accessible drinks e.g. energy drinks, sodas, coffee, and tea [1].

Biological Rhythm: Biological rhythm is defined as the recurring and predictable natural cycles in physiological processes, such as sleep and wakefulness, that follow a consistent and measurable timeframe [3,4,6].

BMI (Body Mass Index: BMI, or Body Mass Index, is a numerical measure of body weight in relation to height, calculated by dividing weight in kilograms by the square of height in meters [4,7,8].

LITERATURE REVIEW

M.Sami Khan, et al. (2022) from Karachi, Pakistan Conducted a cross-sectional study "Caffeine Consumption and Academic Performance among Medical Students of Dow University of Health Science (DUHS), Karachi, Pakistan to determine the frequency of caffeine consumption and its effect on academic performance among medical students of DUHS with sample size was of 400 medical undergraduate students from first to final year MBBS were included through systematic sampling. Self-administered structured questionnaire was used as an outcome measure to conclude information regarding socio-demographic characteristics, perceptions regarding caffeine consumption on academic performance. The study concluded High proportions of medical students were found to be consuming caffeine due to the misconception that caffeine increases academic performance and also found no significant association with academic performance and caffeine consumption [33].

Md. Ashraful Islam et al. (2020) from Imam Abdulrahman bin Faisal University in Dammam, Saudi Arabia conducted a cross-sectional study among undergraduate students studying in colleges affiliated with Imam Abdulrahman bin Faisal University with sample size was of 507 students. The outcome measure used was the Beverage Frequency Questionnaire (BFQ) to examines weekly frequency and quantity of beverages consumed. The finding of study concluded there was a high consumption of beverages in students that was related to their demographic characteristics. There is a need to create awareness among the students regarding the detrimental effects of chronic consumption of these beverages [7].

Kathleen E. Miller et al. (2018) from University at Buffalo, conducted a Controlled Clinical Trial with sample size was of 602 in Western New York undergraduate medical students. The outcome measure used was a self-reported questionnaire along with multivariate linear and logistic regressions, to assess differences in problem behaviors by frequency of caffeinated drink consumption. The finding revealed frequency of consumption was positively associated with a problem behavior syndrome, Frequent consumption may serve as a useful screening indicator to identify students at risk for substance use and/or other health-compromising behavior [9].

Al Shaibi, et al. (2017) conducted a comprehensive cross-sectional study in Gulf region mainly (UAE), the survey analyzed various studies on the prevalence of caffeinated drink intake among medical students with total sample size was of 175 participants (129 females and 46 males) conveniently selected from different settings at Zayed University. The prevalence estimates caffeinated intake was high among both males and females. The synthesis of existing literature provides a valuable overview, emphasizing the need for tailored interventions to address the challenges posed by this prevalent habit [5].

Mohamud Rahamathulla et al. (2017) from Prince Sattam bin Abdulaziz University, SAU conducted a quantitative research design with sample size was of 358 female students, recruited from Prince Sattam bin Abdulaziz University. The outcome measure used was the self-administered questionnaire estimating the prevalence, side effects and awareness about caffeinated drinks. The finding reported high consumption caffeinated drinks regularly with several adverse effects. The study concluded that the government of Saudi Arabia should take serious initiatives towards organizing effective awareness programs specifically in universities and colleges to control the consumption of caffeinated drinks and educate on the adverse effects (8).

Josué L Ríos et al. (2016) conducted a cross-sectional study to determine the association between caffeinated-beverage consumption, self-perceived academic load, and self-perceived stress levels in first- and second-year students at UPR-MSC with sample size was of 275 students from University of Puerto

Rico. The outcome measure used was a self-administered anonymous questionnaire. The study concluded consuming caffeinated beverages was a popular practice among participants, with soft drinks and coffee being the ones that are the most frequently consumed, no associations were found between the consumption of caffeinated beverages and academic stress or load [34].

Magdalena Górnicka et al. (2016) conducted comparative study to compare the consumption of drinks containing caffeine (coffee, colas and energy drinks), the reasons and circumstances under which they were drunk by middle school (junior high school) pupils and university students. The surveyed subjects were 90 middle school pupils from Warsaw and Kunti together with 100 students attending the Warsaw University of Life Sciences (SGGW). The outcome measure was a questionnaire used to determine the amounts, frequency and the reasons or circumstances in which coffee, colas and energy drinks were consumed. The study resulted that Cola drinks were found to be the most popularly consumed beverages containing caffeine; 97% pupils and 93% students. Coffee was however drunk twice less by pupils compared to students, whilst similar amounts of energy drinks were consumed by both groups, pupils also drank energy drinks due to its taste but students because of improved mental performance and in staying awake. The study concluded drinking caffeine containing drinks by adolescents can be very variable and comes from many different sources. Thus, its intakes may be very high and so require monitoring, particularly for the youngest [22].

Seyhan Hidiroglu et al. (July 2016) from Marmara University, Turkey conducted a descriptive analytical study: A survey of energy-drink consumption among medical students at Marmara University Medical School, to determine the frequency and pattern of energy drink consumption among medical school students, their knowledge of its effects and side effects and to see its relation with alcohol and cigarette usage with the mean age of the 390 students were surveyed. The outcome measures used was a semi-structured questionnaire filled by students who were asked about their socio-demographic status and their energy drink consumption. The study concluded consumption of energy drinks was common among medical students, the knowledge of ingredients and knowledge of health risks of energy drinks among them was unsatisfactory [25].

Ebtihal E Eltyeb, et al. (Aug 2023) from Jazan University, SAU conducted a cross-sectional study "Caffeine Consumption and Its Potential Health Effects on Saudi Adolescents" in Jazan with sample size was of 718 participants age group of 16-18 years were enrolled. The outcome measure used was a self-reported online questionnaire. The finding revealed that the most consumed type of caffeinated beverage was Arabic coffee, followed by tea, soft drinks, and Nescafe also education level and age group showed a significant correlation with consumption patterns. As well, the most common health effects of caffeine consumption were headaches, irregular sleep, and nausea, which were statistically related to age group, gender, and comorbid conditions. The study highlighted that consumption of coffee and caffeinated beverages was relatively high among adolescents [19].

Mubashir Ahmad & Rashk E Hinna, et al. (2023) from CMH Lahore Medical College, CMH Hospital Lahore, Pakistan conducted a cross-sectional study: Knowledge and trends of caffeine consumption among medical and non-medical students of Lahore Pakistan to determine the rate of the caffeine consumption among students and to assess side effects and benefits of the caffeine among medical and non-medical students. The target population for study included were medical and non-medical students of various institutes of Lahore. The outcome measure used was predesigned structured questionnaire. The finding revealed Astonishingly 98.6% (74) of medical and 97.4% (73) of the non-medical students consume caffeine in one form or another, the most popular caffeinated product turned out to be soft drinks (39%/126 responses) followed by Tea (26.5%/86 responses), coffee (20.6%/67responces) and energy drinks (11.2%/36 Responses), other caffeinated tablets and gums etc. The study concluded most students consume more caffeine during exams and other periods of strenuous activities [26].

Nadir M Makki et al. (2023) from Psychiatry, Taibah University, Medina, SAU conducted a cross-sectional study on Taibah University students in Medina from both health-related and non-health-related colleges, with sample size was of 520 students. The outcome measure used was the Depression Anxiety Stress Scale (DASS-21) to examine association between daily caffeinated drink intake and psychological well-being, including depression, anxiety, and stress, in students from both health / non-health-related colleges of Taibah University. The finding revealed a correlation between high caffeinated drink intake and heightened anxiety levels among medical students. Their study concluded the importance of considering not only the physical but also the mental health aspects associated with caffeinated drink intake in this specific population [1].

Zelal Kharaba et al. (March 2019 - May 2022) from Al Ain University, Abu Dhabi, UAE conducted a cross-sectional study "Caffeine Consumption among Various University Students in the UAE, Exploring the Frequencies, Different Sources and Reporting Adverse Effects and Withdrawal Symptoms" with sample size was of 500 university students from different universities in the UAE were approached and asked to complete a self-administered online-based questionnaire. The study concluded that caffeine consumption is highly prevalent among university students in the UAE. Yet, there is insufficiency in the current knowledge of safe caffeine consumption patterns reflecting the importance of health awareness programs and nutritional lectures to decrease the long-term health issues and unintentional overdose of caffeine [20].

K-H Lee et al. (2019) from University of the Free State, South Africa conducted a cross-sectional study: Medical students' use of caffeine for 'academic purposes and their knowledge of its benefits, side-effects and withdrawal symptoms. This study was conducted among first- to third-year medical students and outcome measure used was an anonymous, self-administered questionnaire completed by students during formal class time, arranged in advance with the relevant lecturers, prior to an actual conduct, pilot study was conducted on 20 physiotherapy students. The study finding shows 90.5% (360/389) response rate, 94% of participants used caffeine, with academic purposes (62.6%) among the three most frequent reasons given for its consumption. Also, Other reasons were included as social consumption (70%) and preference for the taste (72.4%). Coffee (88.2%) was the most commonly consumed caffeinated product among these students, followed by energy mixtures and tablets (37.9%), and soft drinks (36%). Third-year students were the heaviest consumers of coffee for academic purposes. The study also concluded the high percentage of caffeine usage and low scores in the caffeine knowledge test indicated that most participants were using caffeine without having sufficient knowledge of its benefits, side-effects and withdrawal symptoms. Therefore, it was recommended that awareness programs on the side-effects and symptoms of caffeine dissemination of information on this extensively consumed substance [28].

D M Warburton et al. (2019) conducted a comparative Study with sample size of 42 participants from Department of Psychology, Earley Gate, UK. The outcome measure used in the study was a rapid visual information test, a verbal reasoning test, a verbal and non-verbal memory test and a set of mood measures. The study findings revealed in both studies, the caffeinated, taurine-containing beverage produced improved attention and verbal reasoning, in comparison with a sugar-free and the sugar-containing drinks. Another important finding was the reduction in the variability of attentional performance between participants. No effects on memory were found (10).

Ali Samaha et al. (Feb 2020) from Lebanese International University, Lebanon conducted a non-experimental cross-sectional correlational study "Data on the relationship between caffeine addiction and stress among Lebanese medical students, The study design was used to asses and quantify the main sources of stress, caffeine consumption, caffeine intake behaviors, and examine the relationship between the stress and caffeine with sample of 800 medical students enrolled in different studying years in different Lebanese universities. The outcome measure used was Well-established psychometric

instruments in primary data collection method, which are the Medical Student Stressor Questionnaire (MSSQ) and the Caffeine Consumption and Dependence Scale [23].

Haitham Jahrami et al. (April 2020) from Arabian Gulf University, Bahrain conducted a cross-sectional study "Intake of Caffeine and its Association with Physical and Mental Health Status among University Students in Bahrain" with a surveyed convenience sample of (n = 727). The research aim was to quantify caffeine intake and how this was related to measures of physical and mental health in a Bahraini population. The outcome measure used was a semi-quantitative food frequency and Hopkins Symptoms Checklist-25. The finding revealed that participants consuming 400 mg/day or more showed a statistically and significantly twice as high risk for five symptoms, these were: headaches, spells of terror or panic, feeling trapped or caught, worrying too much about things, and having feelings of worthlessness. The prevalence of caffeine intake among university students in Bahrain was high and also high caffeine intake was associated with an anxiogenic effect in the surveyed students [21].

P. A. H. M Hameleers et al. (2020) from Maastricht University, The Netherlands conducted an Analytical study: Habitual caffeine consumption and its relation to memory, attention, planning capacity and psychomotor performance across multiple age groups to evaluate the association between habitual caffeine intake via coffee and tea and cognitive performance with sample size was of 1875 healthy adults, stratified for age (range 24 - 81 years), sex, and general ability. The outcome measure used was Stroop Test to check the association between habitual caffeine consumption and short-term memory, information processing, planning, and attention. However, the study finding reported no difference in sensitivity to caffeine intake between different age groups, suggesting that caffeine intake did not counteract age-related cognitive decline [31].

Martin R Yeomans et al. (2017) from University of Sussex, Brighton (UK), conducted a clinical trial, effects of caffeine on performance and mood depend on the level of caffeine abstinence at Experimental Psychology, University of Sussex with sample size of 30 moderate caffeine consumers to assess Performance on a measure of sustained attention and mood before and after each drink. The study finding concluded Caffeine reliably improved performance on a sustained attention task, and increased rated mental alertness, in moderate caffeine consumers who were tested when caffeine-deprived. However, caffeine had no such effects when no longer deprived [11].

Paul Hewlett et al. (2017) conducted a comparative study, effects of repeated doses of caffeine on performance and alertness at Centre for Occupational and Health Psychology, Cardiff University, UK. The study determines whether caffeine withdrawal influenced mood and performance with sample size of 120 medical students, the outcome measure used was self-reported questionnaire. The study result showed no effect of overnight caffeine withdrawal on mood or performance among medical students. In contrast, caffeine challenge improved vigilance performance and prevented decreases in alertness with the size of the effects increasing with caffeine dose [12].

Toqeer Ahmed Iqbal.et al. (2016) from Federal Medical & Dental College, Islamabad conducted a cross-sectional study "Use of Caffeine Intake Among Medical Students During Examinations in A Public Sector Medical College of Pakistan" by sampling target population of 1st – 4th year medical students at the Federal Medical & Dental College, Islamabad to investigate caffeine use during exams by the level of knowledge of its benefits, side effects and withdrawal symptoms. The outcome measure used was standardized questionnaire. The study concluded the high percentage of caffeine usage and low scores in the caffeine knowledge test indicated that most participants were using caffeine without having sufficient knowledge of its benefits, side-effects and withdrawal symptoms increasing the need for implementing the awareness programs by the student health and counseling facilities on campus [32].

Laura M Juliano et al. (2016) from American University, conducted a critical review of caffeine withdrawal: empirical validation of symptoms and signs, incidence, severity, and associated features to

provide a comprehensive review and analysis of the literature regarding human caffeine withdrawal to empirically validate specific symptoms and signs, and to appraise important features of the syndrome. A literature search identified 57 experimental and 9 survey studies on caffeine withdrawal that met inclusion criteria. Of 49 symptom categories identified, the following 10 fulfilled validity criteria: headache, fatigue, decreased energy/activeness, decreased alertness, drowsiness, decreased contentedness, depressed mood, difficulty concentrating, irritability, and foggy/not clearheaded. In addition, flu-like symptoms, nausea/vomiting, and muscle pain/stiffness were judged likely to represent valid symptom categories. The study concluded caffeine-withdrawal syndrome has been well characterized and there is sufficient empirical evidence to warrant inclusion of caffeine withdrawal as a disorder in the DSM and revision of diagnostic criteria in the ICD [27].

Francisco Romo-Nava, et al. (2016) conducted cross sectional study with total sample size of 1068 medical students from a public Medical School in Mexico City, the aimed was to evaluate the association between caffeinate drink intake, stress, chronotype and depression in medical student. The outcome measures used was Patient Health Questionnaire-9 (PHQ-9) to evaluate depressive symptom severity and the presence of a current depressive episode, Morning-Evening Questionnaire (MEQ) to establish chronotype and the Academic Stress Inventory to measure perceived academic stress (PAS). The findings revealed that chronotype and PAS are factors associated with depression in medical students, and when combined promote this association with results might aid in early identification of medical students susceptible to depression [16].

Jack E James et al. (2015) from National University of Ireland conducted Meta-Analysis: effects of caffeine on performance and mood: withdrawal reversal is the most plausible explanation with the aim of clarifying current understanding regarding the effects of caffeine on human performance and mood. The study resulted little evidence of caffeine having beneficial effects on performance or mood under conditions of long-term caffeine use vs abstinence. Although modest acute effects may occur following initial use, tolerance to these effects appears to develop in the context of habitual use of the drug [29].

Alice Rosia, et al. (2022) conducted cross sectional study in the Department of Food, Environmental and Nutritional Sciences (DeFENS), University of Milan, Italy to assess the possible relationship between chronotype, sleeping, and eating patterns with 74 Italian adults (71.6% women) were included as participant. As an outcome measure Morningness-Eveningness Questionnaire (MEQ) score was used in which participants were classified as morning (n ¼ 24), intermediate (n ¼ 25), and evening (n ¼ 25) chronotypes. From analysis, finding revealed no significant differences among chronotypes emerged for sleep habits, also associated evening subjects with a significant delay in waking-up and going to bed. The same delay emerged in meal consumption, leading to negative health implications. The study concluded more knowledge in this area could help develop personalized strategies to reduce the risk of obesity [14].

Juana Inés Gallego-Gómezes al. (JUNE 2021) conducted a cross sectional and observational study in the Department of Nursing, Physiotherapy and Medicine, Faculty of Health Sciences Catholic University of Murcia, Spain. The survey revealed a relationship between sleep habits and academic performance in university nursing students. The outcome measures used were an anonymous and self-administered questionnaire including different scales such as the 'Morningness and Eveningness scale', an author-generated sleep habit questionnaire. The study findings concluded almost 1/3 of the nursing students were identified as having bad sleep habits, and these students were characterized by an evening chronotype and a short sleep pattern [15].

Castelli et al. (2019) conducted a cross-sectional study, biological rhythm and chronotype: new perspectives in health in Iran, the study delved into the impact of caffeinated drinks on sleep patterns among medical students with sample size was of 277. The outcome measure used in the study was Midline Estimating Statistic of Rhythm (MESOR). The study result identified a disruption in the sleep

biological rhythm, with increased instances of delayed sleep onset. This aligns with the growing concern regarding the potential adverse effects on the sleep quality of this demographic [3].

Chenzhao Ding, et al. (March 2018) conducted a cross-sectional study in the Chinese University of Hong Kong, China. The study revealed worldwide trend towards suboptimal sleep duration and poor sleep quality in parallel with this obesity epidemic which was highly plausible that abnormalities in sleep, both quantity and quality, impact negatively on energy metabolism. The finding exposed the relationship between sleep physiology and energy homeostasis, revealing sleep dysregulation perturbs the metabolic milieu via alterations in hormones such as leptin and ghrelin, eating behavior, neuroendocrine and autonomic nervous systems exert a negative influence that triggered circadian misalignment, leading to impaired glucose tolerance and increased fat accumulation [18].

Hiwot Brant, et al. (2017) conducted a cross-sectional study in Ethiopia to determine the prevalence and associated factors of sleep quality among adults with sample size used was of 422. The outcome measure was current community-based (validated PSQI). The findings of the study identified some important factors related to sleep quality; limitations should be noted [6].

Emily J Watson et al. (Aug 2016) from Centre for Sleep Research, University of South Australia conducted a cross-sectional study: caffeine consumption and sleep quality in Australian adults, with sample size was of 80 adults to determine the relationship between caffeine consumption and sleep quality in adults. The outcome measure used was C-FFQ and the Pittsburgh Sleep Quality Index (PSQI). The study finding revealed caffeine consumption remained stable across age groups while the source of caffeine varied also higher total caffeine consumption was associated with decreased time in bed, The data also concluded that shorter sleep is associated with greater caffeine consumption, and that consumption is greater in adults with reduced sleep quality [24].

Maria Carliana Mota, et al. (Apr 2016) conducted a cross-sectional study in the Faculty of Medicine, Federal University of Uberlandia, Minas Gerais, Brazil. The survey revealed a significant relationship between chronotype and caffeinated drink intake, physical sleep and activity among medical staff with sample size was of 72 resident physicians (52 women and 20 men). The outcome measures used in study were Horne and Ostberg Morningness-Eveningness questionnaire (MEQ); caffeine intake pattern through a self-administered food diary that was kept over the course of 3 non-successive days; physical activity level, using the Baecke questionnaire (BQ); sleep quality and quantity using the Pittsburgh Sleep Quality Index (PSQI); and sleepiness, Epworth Sleepiness Scale (ESS).The study concluded that most issues related to nutrition problems and unhealthy lifestyle were associated with scores indicative of eveningness. The findings of study emphasize the importance of assessing an individual's chronotype when examining feeding behavior [13].

Mithawk et al. (2020) conducted cross-sectional study with sample size was of 616 medical students from Chongqing Medical University in Chongqing, China. The outcome measure used was a self-reported questionnaire and mediational models with maximum likelihood estimation to test the impact of late chronotype on increased BMI through caffeinated drinks consumption. The findings revealed high prevalence of caffeinated beverage intake among medical students, emphasizing the need for further investigation into its implications and provide possible new evidence to enrich the effect of the eating behavioral model of BMI to the circadian rhythm's theory [2].

Victoria Garfield, et al. (November 2019) conducted a cross-sectional study, the association between body mass index (BMI) and sleep duration in the institute of cardiovascular science of London. The survey studies largely observe that cross-sectionally a higher BMI was associated with shorter sleep and that in longitudinal studies shorter sleep duration was associated with increases in BMI over time. The evidence appraised clearly revealed there was some modest evidence of a bidirectional relationship between BMI and sleep duration in medical students [17].

Vernarelli, J. A., et al. (2023) conducted a cross-sectional study tea consumption is inversely associated with weight status and other markers for metabolic syndrome to examines the association between tea consumption (evaluating hot and iced tea independently) and markers for metabolic syndrome adults with an enrolled sample was of 6,472, the outcome measure used was food frequency questionnaires and 24-h dietary recalls. The result showed hot tea consumption was inversely associated with obesity, for iced tea consumption, the association was reversed, increased iced tea consumption was associated with higher BMI, greater waist circumference, and greater subcutaneous skinfold thickness [38].

Alawadh, R. A.et al. (2022) conducted cross-sectional study, Arabic Coffee Consumption and Its Correlation to Obesity Among the General Population in the Eastern Province, Kingdom of Saudi Arabia to assess the relationship between Arabic coffee consumption and obesity among the Saudi adult population with sample size was of 389 were targeted from population living in the Eastern Province, Self-administered questionnaire was used as an outcome measure. Inn last, study concluded that excessive consumption of Arabic coffee was predicted to have a direct association with obesity specifically in female and when mixed with additives including milk, cardamom, and other calorie additives. Furthermore, the odds of obesity tend to increase more when eating chocolate and dates along with coffee [37].

Matsuura, H., et al. (2021) conducted cross-sectional study, relationship between coffee consumption and prevalence of metabolic syndrome with sample size was of 3284 employees (2335 men and 948 women) aged 20 to 65 years. The finding showed that among all components of metabolic syndrome, high blood pressure and high triglyceride level were inversely associated with moderate coffee consumption in men, after adjusting for age, body mass index, smoking status, drinking status, and exercise. However, in women, moderate coffee consumption was not significantly associated with the prevalence of metabolic syndrome or its components [36].

Bouchard, D. R, et al. (2020) conducted cross-sectional study coffee, tea and their additives: association with BMI and waist circumference with sample size was of 3,823 participants and an outcome measure used were BMI and waist circumference (WC) to assess obesity and questionnaire to assess coffee and tea consumption and use of additives. The study concluded that Frequency of coffee/tea consumption was not associated with measures of obesity because additive use explained the association between tea consumption and obesity in men perhaps an artificial sweetener use within coffee/tea was associated with higher BMI [40].

Wu, C. H, et al. (2020) conducted cross-sectional comparative study, relationship among habitual tea consumption, percent body fat, and body fat distribution with sample size of 1,210 epidemiologically sampled adults (569 men and 641 women). The outcome measure used were structured questionnaires, bioelectrical impedance analysis for measuring percent body fat (BF%) and also waist-to-hip ratio (WHR) to assess body fat distribution. The finding expels that men, older age, higher BMI, and current smokers were positive factors for BF% and WHR. In contrast, longer duration of habitual tea consumption and higher total physical activity were negative factors for BF% and also longer duration of habitual tea consumption, higher socioeconomic status, and premenopausal status were negative factors for WHR [39].

Garcia P, et al. (November 2018 to March 2019) conducted cross sectional study in the North-West of Ireland, the survey revealed a significant association between frequent consumption of caffeinated drinks and an increased Body Mass Index (BMI) among medical students was observed. As an outcome measure self-reported questions were asked in relation to demographics, body mass index (BMI) and food frequency questionnaire was used to measure dietary quality. The findings underscore the need to explore the dietary and lifestyle factors contributing to this phenomenon [4].

Hsiu Chen Tseng, et al. (2016) conducted cross-sectional study tea drinking habit among university students with sample size was of 5936 in Taiwan to investigate the prevalence of tea drinking and to

explore the correlated factors on tea drinking among young students in the university. The outcome measure used were validated self-reported questionnaire, Pittsburgh Sleep Quality Index (PSQI) and the 12-item Chinese Health Questionnaire (CHQ-12). The finding revealed that the tea-drinking habit was correlated with higher body mass index [41].

Giuseppe Grosso, et al. (2016) conducted cross-sectional study, association of daily coffee and tea consumption and metabolic syndrome in Krakow, Poland with sample size was of 8,821 adults (51.4 % female). The outcome measure used was food frequency questionnaires to evaluate coffee and tea consumption. The study result found that among specific components of MetS, high coffee consumption was negatively associated with waist circumference, hypertension, and triglycerides, whereas tea consumption with central obesity and fasting plasma glucose in women, but not in men [35].

Esther Lopez-Garcia et al. (2016) from Harvard School of Public Health, USA conducted prospective study: changes in caffeine intake and long-term weight change in men and women in order to assess the relation between caffeine intake and 12-y weight change with sample size enrolled was of 18417 men and 39 740 women, with no chronic diseases at baseline. The outcome measure used was self-reported weight to calculate weight change difference. The finding concluded change in caffeine intake varied across quintiles, from decreases of 296 and 342 mg/d to increases of 213 and 143 mg/d in men and women, respectively. Also, age-adjusted models showed a lower mean weight gain with increased caffeine consumption than in those who decreased their consumption. At last, study concluded, increases in caffeine intake may lead to a small reduction in long-term weight gain [30].

METHODOLOGY

An online self-administered questionnaire was used to investigate the prevalence of caffeinated drink intake and its associated side effects among medical students, and informed consent was obtained from participants who met the inclusion criteria.

Inclusion Criteria

1. The inclusion criteria for this study were:
2. Enrolled medical students
3. Participants in various academic years
4. Male and female was included
5. AGE: 20 – 26
6. Regular caffeinated drinks consumers
7. Consent and willingness to participate
8. A healthy individual without known medical conditions affecting sleep or BMI

Exclusion Criteria

1. Exclusion criteria for this study were:
2. Smokers
3. Participants with highly irregular sleep schedules
4. Individuals with a history of bariatric surgery
5. Participants following highly specialized diets or training regimens
6. Individuals using medications known to significantly impact sleep or BMI

Study Design

This study employed a descriptive cross-sectional design which allow for the simultaneous investigation of the variables of interest (Caffeinated drink intake and its effects on sleep rhythm, BMI) in a specific population at a specific point in time. Therefore, “Prevalence and Side Effects of Caffeinated Drinks Intake, Sleep Biological Rhythms and Increase BMI Among Medical Students” used one.

Study Setting

1. Different Medical Colleges/Universities (KARACHI)
2. Physiotherapy and Rehabilitation Departments (KARACHI)
3. Nursing Institutes (KARACHI)

Study Duration

Six months after the synopsis was approved.

Sample Size

For our cross-sectional study, " Prevalence and Side Effects of Caffeinated drinks intake, sleep biological rhythms and increase BMI among medical students," we have 308 participants at 5% margin of error, 80% power of test with 95% confidence of interval in our sample size, which gives us the chance to gather a sizable amount of data from our target population at one time.

Sampling Technique

Non-Probability Convenience Sampling

Sampling Selection

The research used a non-probability convenient sampling method to recruit participants.

Medical students were selected based on their ease of access and availability, facilitating efficient data collection. While this approach allows for quick data gathering, it may limit the defeasibility of the findings to the broader population.

The inclusion criteria include healthy medical students without known medical conditions affecting sleep or BMI of various academic years, age 20 – 26 and a regular caffeinated drink consumer. Participation was voluntary, with consent obtained before administering the questionnaire.

Outcome Measure

The outcome measures were assessed using self-administered questionnaire, the data captured was on caffeinated drink intake, sleep biological rhythm, increased BMI, side effects of caffeinated drink intake. The research analyzes questionnaire responses from participants to gauge the prevalence and association between these variables.

VARIABLES

Dependent Variables

Variables	Type	Measurement	Statistical Test
Sleep Biological Rhythm Alteration	Ordinal/Categorical	Likert scale/Categorical	Chi-Square, ordinal logistic regression
Increased BMI	Continuous	BMI value (kg/m2)	Mean, SD, t-test, ANOVA, regression
Side Effects of Caffeinated Drink Intake	Categorical/Ordinal	Presence/Absence or Severity	Chi-Square, logistic regression

Independent Variables

Variable	Type	Measurement	Statistical Test
Caffeinated Drink Consumption	Continuous/Categorical	Amount/Frequency	Correlation, regression

Data Collection plan

Data collection involved targeting medical students from various universities and colleges in Karachi. Informed consent was obtained from participants prior to data collection. A detailed questionnaire was administered to collect demographic information and data on caffeinated drink intakes, sleep patterns, BMI and side effects. A non-probability convenience sampling method was employed and the sample size was statistically determined. This approach facilitated efficient data collection from the targeted population, enabling the research objectives to be achieved.

Data Analysis Procedure: Data were stored and analyzed using IBM-SPSS version 23.0; count with percentages were given on demographic information, caffeinated drinks consumption, side effects of caffeinated drink intake, sleep patterns and biological rhythms, and impact on body mass index. Means with standard deviation were given on BMI, Height, weight and scores of all studied sections. Independent sample t-test was used to compare these scores between medical and other filed samples, Pearson Correlation analysis was done to study the relationship between BMI, caffeinated drink consumption, side effects and sleep. P-values less than 0.05 were considered statistically significant, pie diagram, bar charts, histogram and scatter plots were also used to give graphical presentation of study findings.

RESULT

Participant Demographics Statistics

The demographic characteristics of the current sample comprising total of 309 Participants from medical and non-medical fields with mean age of group, 20 – 21 years were (39.9%, n=123), 22 – 23 years were (39.6%, n=122) and 24 – 25 years (20.5%, n=63) were included in this survey to answered the questionnaire as shown in (table 1). Regarding the gender of consumers, the baseline characteristics of studied samples, in the present study there were 309 samples with a significantly higher proportion of (66.9%, n=206) female students and (33.1%, n=109) male students respectively. Furthermore, respondents indicated that a total of (24.4%, n=75) of participants were of grade 2nd year (Junior), (19.5%, n=60) were of grade 3rd – 4th year (Inter-medical) and (56.2%, n=173) were of 4th – 5th year (Senior) who showed slight advantage in the sample distribution. In addition, table.1 reported for filed medical (68.5%, n=211) who consumed caffeinated drinks were compared to non-medicals (31.5%, n=96, p=-0.014).

Caffeinated Drinks Consumption

The daily intake and pattern of caffeinated drink of the study participants among medical and non-medical fields were presented in Table 2. The vast majority (approx. 98%) of the participants reported regular daily intake of caffeinated drinks in the clinical / academic years. Among consumers of caffeinated drinks, Table-2 reports the description on caffeinated drinks consumption reporting on, how often do they consume caffeinated drinks with estimating, 2-3 times a week were reported by (39.9%, n=33), Multiple times a day (39.6%, n=93), once a day (20.5%, n=112) and Rarely (66.9%, n=70). The primary reasons for consuming caffeinated drinks (Table 2) were because of enjoyment of taste (24.4%, n=128), to stay awake/alert during studying (56.2%, n=118), as a social beverage (33.1%, n= 30), and other (19.5%). The vast majority of the participants prefer their sources of intake reported for what do they prefer having, mean intake from all sources was higher for females than for males which were estimated as Coffee (Black / White) (68.5%, n=54), Energy drinks (Soda, Soft drinks etc.) as (31.5%, n=66) and Tea (Black / White) reported were (17.3%, n= 188). Furthermore, this study also estimated for how long they have been consuming drinks, which were reported for 10 years or less (56.1%, n=139),5 years or less (61.2%, n=89) and few months back as (32.3%, n=86). In addition to that, the proportion of average cups of caffeinated drink consumption during studying hours were highlighted in order to estimate the consumption rate which were reported 3 or more than 3 cups during 5hrs (21.4%, n=11), A cup every time while studying (37.4%, n= 113), Once or twice during 2hrs (18%, n= 71), and once or twice during 5hrs were reported by (42.9%, n=113).

Potential Side Effects of Caffeinated Drink Intake

The questionnaire showed that consumers of caffeinated drinks manifested some potential side effect after consumption. (Table-3) provides the distribution of the symptoms, reports the description on side effect of caffeinated drink intake regarding the symptoms experienced. Firstly, the rate of awareness was highlighted likely as, do the consumers were aware of any potential side effects associated with consuming caffeinated drinks which were reported by Somehow (39.9%), Yes (39.6%). Secondly, the most prevalent symptoms were highlighted with specific side effects they most commonly experienced after consuming caffeinated

drinks and reported 20.5% of consumers(n=72) experienced hot flushes, 66.9% of consumers(n=99) had insomnia, 33.1% of consumers(n=54) reported having nervousness, 24.4% (n=63) had Palpitation (Increase heart rate), and 19.5% of consumers(n=20) reported Tachypnea (Increase Respiratory rate). Finally, no consumer reported crash episodes as a side effect of caffeinated drink consumption.

Sleep Pattern and Biological Rhythms

The variable of consumption had a non-significant, negative, and weak relationship ($p > 0.5$), as questionnaire also showed that consumers of caffeinated drinks followed mediating effects on sleep pattern. (Table-4) reports the descriptive on sleep pattern and biological rhythms, estimating hours of sleep students typically get per night on weekdays were reported 2 - 4hrs 39.9% by consumers (n=32), 4 - 6hrs 39.6% by (n=123), 6 - 8hrs reported by 20.5% (n=153) , there were 66.9% (n=164) said they have regular sleep schedule, as well the preferred study time for students were investigated showing high percentage for Morning about (19.5% , n=69), afternoon (33.1%, n=23), Evening as (24.4%,n=73), Night was reported by (56.2%, n=143). Furthermore, the hypothetical statement to find that consuming caffeinated drinks closer to bedtime disrupts the ability to fall asleep or stay asleep during exams or clinical night rotations was discussed and finding were revealed as somehow (68.5%, n=73), and yes were reported by (31.5%, n=133).

Impact on Body Mass Index (BMI)

However, accounting for the indirect effects of the proposed variables indicating that caffeinated drinks consumption significantly mediates the effect of BMI, to address this statement (Table-5) reports the descriptive on impact of body mass index by estimating that either the participants believe that consuming caffeinated drinks had impacts their weight or BMI which was reported somehow by (39.9%, n=65), yes reported by (39.6%, n=127). Additionally, highlighting participants suggestion as did they find that consumption of caffeinated drinks was associated with certain eating habits estimation reported as somehow (20.5%) and yes (66.9%) elaborated the revealed finding as positively affirmative. Later on, it was addressed that participants had noticed any changes in weight over the past year revealed finding justified as somehow (33.1%), yes (24.4%) and also speculate how often do participants seek medical advice or assistance regarding their health and well-being which was reported never by (19.5%, n=60), Occasionally (56.2%, n=77), Rarely (68.5%, n= 128), and regularly was reported by (31.5%, n=43).

Standard Deviation for Mean BMI

Regarding the Standard deviation for Mean BMI, Table-6 reports that mean weigh of samples was 58.30 (SD=±13.43), mean height was 1.62 (SD=±0.13) meter and mean BMI was 22.45 (SD=±6.07) kg/m2.

Comparison Of Caffeinated Drinks, Side Effects, Sleep Pattern and Impact of BMI

Table-7 gives the comparison of scores on caffeinated drinks consumption, side effect of caffeinated drink intake, sleep patterns and biological rhythms and impact on BMI between medical and other samples, results showed among medical field samples. Mean Caffeinated drinks consumption score was 17.71 (SD=±2.93) , Mean Side effects of caffeinated drink intake score was 9.46 (SD=±7.27) , Mean Sleep Patterns and Biological Rhythms score was 14.87 (SD=±4.01), Mean Impact on BMI score was 9 (SD=±2.25) , and Mean BMI was 22.24 (SD=±6.34) , whereas among other filed samples mean caffeinated drinks consumption score was 16.84 (SD=±2.73), Mean Side effects of caffeinated drink intake score was 9.18 (SD=±6.79) , Mean Sleep Patterns and Biological Rhythms score was 15.14 (SD=±4.43) , Mean Impact on BMI score was 9.08 (SD=±2.51) ,and Mean BMI was 22.9 (SD=±5.45). Independent sample t-test showed a significant difference for Caffeinated drinks consumption score between medical and other field samples (p=-0.014).

Correlation Analysis Of BMI

Table-8 reports the correlation analysis of studied parameters, results showed BMI gives 12.3% significant positive correlation with impact on BMI scores and there was 11.6% significant negative correlation

between caffeinated drink consumptions and impact on BMI ($p<0.05$). As shown in (Fig.21) scatter plot showing a significant positive correlation between impacts on BMI scores with BMI.

Association of Primary Reason for consuming Caffeinated dirks with Age Group

Table-9 reports the association of primary reason of consuming caffeinated drinks with age group, among aged 22 -23 years old respondents 50% said as a social beverage, and 40.6% said other. Pearson Chi Square test did not give any significant association of age group with primary reason ($p=0.588$)

Association of Primary Reason of Consuming Caffeinated drinks with Sleep Schedule

Table-10 reports the association of primary reason of consuming caffeinated drinks with regular sleep schedule, among samples with no regular schedule of sleep 30% said as a social beverage, and 49.2% said due to enjoyment of taste. Pearson Chi Square test did not give any significant association of regular sleep schedule with primary reason ($p=0.196$)

Association of Awareness of Side Effects with Impact on BMI

Table-11 reports the association of awareness of any potential side effects with impact on weight or BMI, 50.3% samples said they have awareness and believe that consuming caffeinated drinks impact on their weight or BMI. The association was found statistically significant with $p=0.006$ using Pearson Chi Square test.

4.12. Association of Awareness of Side Effects with Medical Advice:

Table-12 reports the association of awareness of any potential side effects with seeking medical advice, only 16.6% samples said they have awareness and they take medical advice regularly. The association was found statistically significant with $p=0.004$ using Pearson Chi Square test.

4.13. Association of Awareness of Side Effects with Sleep:

Table-13 reports the association of awareness of any potential side effects with sleep, there were 49.1% samples said they have awareness and found that consuming caffeinated drinks closer to bedtime disrupts ability to fall asleep or stay asleep during exams or clinical night rotations. The association was found statistically significant with $p=0.000$ using Pearson Chi Square test.

4.14. Association of duration of consuming drinks with Sleep:

Table-14 reports the association of duration of drinks with sleep, there were 45.8% samples reported duration of consuming caffeinated drinks few months ago and they were found that consuming caffeinated drinks closer to bedtime disrupts the ability to fall asleep, however the association was not statistically significant $p=0.504$ using Pearson Chi Square test.

4.15. Association of duration of Consuming Drinks with Impact on BMI:

Table-15 reports the association of awareness of any potential side effects with impact on BMI, there were 41% samples said they started consuming drinks few months age and believe that consuming caffeinated drinks impact on weight or BMI. The association was found statistically insignificant with $p=0.955$ using Pearson Chi Square test.

4.16. Association of impact of caffeinated drink on BMI with Change in Weight:

Table-16 reports the association of impact of caffeinated drink on BMI; there were 73.2% responded said they believed consuming caffeinated drinks impact on weight of BMI and they have noticed changed in weight over the past years. The association was found statistically significant with $p=0.000$ using Pearson Chi Square test.

4. 17. Association of side effect of caffeinated drink with Sleep Schedules:

Table-17 reports the association of side effect of caffeinated drinks with sleep schedule, among samples with non-regular sleep schedule 44.4% reported hot flushes, and 55.6% were reported for Palpitation, the association was not statistically significant, p=0.460 using Pearson Chi Square test.

4.18. Association of side effect of caffeinated drink with Eating Habits:

Table-18 reports the association of side effect of caffeinated drinks with eating habits, among samples with eating habits 50% reported hot flushes, and 44.4% were reported for Palpitation, the association was not statistically significant, p=0.554 using Pearson Chi Square test. Hence,

4.2.1. Table: Descriptive on Demographic information (n=309)

Variables		***n***	***%***
Age Group	20 – 21 years	123	39.9
	22 – 23 years	122	39.6
	24 – 25 years	63	20.5
Gender	Female	206	66.9
	Male	102	33.1
Grades	2nd year (Junior)	75	24.4
	3rd year (Inter-medical)	60	19.5
	4th - 5th year (Senior)	173	56.2
Field	Medical	211	68.5
	Other	97	31.5

4.2.2. Table: Descriptive on Caffeinated Drinks Consumption

Variables		***n***	***%***
How often do you consume caffeinated drinks (e.g., coffee, tea, energy drinks)?	2-3 times a week	33	10.7
	Multiple times a day	93	30.2
	Once a day	112	36.4
	Rarely	70	22.7
What is the primary reason for consuming caffeinated drinks?	As a social beverage	30	9.7
	Enjoyment of taste	128	41.6
	Other	32	10.4

	To stay awake/alert during studying	118	38.3
What do you prefer having?	Coffee (Black / White)	54	17.5
	Energy drinks (Soda, Soft drinks etc.)	66	21.4
	Tea (Black / White)	188	61.0
How long have you been consuming drinks?	10 years or less	139	45.1
	5 years or less	86	27.9
	Few months back	83	26.9
Average cups of caffeinated drink consumption during studying hours?	3 or more than 3 cups during 5hrs	11	3.6
	A cup every time while studying	113	36.7
	Once or twice during 2hrs	71	23.1
	Once or twice during 5hrs	113	36.7

***4.2.3. Table*: Descriptive on Side Effects of Caffeinated Drink Intake**

Variables		***n***	***%***
Are you aware of any potential side effects associated with consuming caffeinated drinks?	No	66	21.4
	Somehow	79	25.6
	Yes	163	52.9
Which specific side effects do you most commonly experience after consuming caffeinated drinks?	Hot flushes	72	23.4
	Insomnia	99	32.1
	Nervousness	54	17.5
	Palpitation (Increase Heart rate)	63	20.5
	Tachypnea (Increase Respiratory rate)	20	6.5

4.2. 4. Table: Descriptive on Sleep Patterns and Biological Rhythms

Variables		***n***	***%***
How many hours of sleep do you	2 - 4hrs	32	10.4

typically get per night on weekdays?	4 - 6hrs	123	39.9
	6 - 8hrs	153	49.7
Do you have a regular sleep schedule (going to bed and waking up at the same time each day)?	No	144	46.8
	Yes	164	53.2
What is your preferred study time?	Afternoon	23	7.5
	Evening	73	23.7
	Morning	69	22.4
	Night	143	46.4
Do you find that consuming caffeinated drinks closer to bedtime disrupts your ability to fall asleep or stay asleep during exams or clinical night rotations?	No	102	33.1
	Somehow	73	23.7
	Yes	133	43.2

4.2.5. Table: Descriptive on Impact of Body Mass Index

Variables		***n***	***%***
Do you believe that consuming caffeinated drinks impacts your weight or BMI?	No	116	37.7
	Somehow	65	21.1
	Yes	127	41.2
Do you find that your consumption of caffeinated drinks is associated with certain eating habits? (Snacking, Behaviors, Meal skipping)	No	112	36.4
	Somehow	46	14.9
	Yes	150	48.7
Have you noticed any changes in your weight over the past year?	No	100	32.5
	Somehow	38	12.3
	Yes	170	55.2
How often do you seek medical advice or assistance regarding your health and well-being?	Never	60	19.5
	Occasionally	77	25.0
	Rarely	128	41.6
	Regularly	43	14.0

4.2.6. Table: Mean and Standard deviation of Weight, Height, and BMI

Parameters	*Mean*	*Standard Deviation*
Weight (KG)	58.30	13.43
Height (m)	1.62	0.13
BMI	22.45	6.07

4.2.7. Table: Comparison of Caffeinated drinks, side effects, sleep pattern and impact of BMI

Variables		*n*	*%*
Do you believe that consuming caffeinated drinks impacts your weight or BMI?	No	116	37.7
	Somehow	65	21.1
	Yes	127	41.2
Do you find that your consumption of caffeinated drinks is associated with certain eating habits? (Snacking, Behaviors, Meal skipping)	No	112	36.4
	Somehow	46	14.9
	Yes	150	48.7
Have you noticed any changes in your weight over the past year?	No	100	32.5
	Somehow	38	12.3
	Yes	170	55.2
How often do you seek medical advice or assistance regarding your health and well-being?	Never	60	19.5
	Occasionally	77	25.0
	Rarely	128	41.6
	Regularly	43	14.0

4.2.8. Table: Association of Studied Parameters using Pearson Correlation

Variables		BMI	Caffeinated drinks consumption	Side effects of caffeinated drink intake	Sleep Patterns and Biological Rhythms
Caffeinated drinks consumption	r-value	-0.099	1		
	p-value	0.084			
Side effects of caffeinated drink intake	r-value	-0.053	0.003	1	
	p-value	0.354	0.952		
Sleep Patterns and Biological Rhythms	r-value	-0.011	0.023	-0.034	1
	p-value	0.846	0.687	0.550	
Impact on BMI	r-value	0.123	-0.116	0.000	0.088
	p-value	0.031*	0.042*	0.994	0.122
***p<0.05 was considered statistically significant**					

4.2.9. Table: Association of Primary Reason for consuming Caffeinated dirks with Age Group

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	4.700[a]	6	.583	.588		
Likelihood Ratio	4.979	6	.546	.559		
Fisher's Exact Test	4.889			.560		
Linear-by-Linear Association	3.084[b]	1	.079	.080	.042	.003
N of Valid Cases	308					

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.14.

b. The standardized statistic is -1.756.

Crosstab

			What is the primary reason for consuming caffeinated drinks?				
			As a social beverage	Enjoyment of taste	Other	To stay awake/alert during studying	Total
Age	20 - 21	Count	7	51	14	51	123
		% within What is the primary reason for consuming caffeinated drinks?	23.3%	39.8%	43.8%	43.2%	39.9%
	22 - 23	Count	15	49	13	45	122
		% within What is the primary reason for consuming caffeinated drinks?	50.0%	38.3%	40.6%	38.1%	39.6%
	24 - 25	Count	8	28	5	22	63
		% within What is the primary reason for consuming caffeinated drinks?	26.7%	21.9%	15.6%	18.6%	20.5%
Total		Count	30	128	32	118	308
		% within What is the primary reason for consuming caffeinated drinks?	100.0%	100.0%	100.0%	100.0%	100.0%

4.2.10. Table: Association of Primary Reason of Consuming Caffeinated drinks with Sleep Schedule

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	4.677[a]	3	.197	.196		
Likelihood Ratio	4.800	3	.187	.189		
Fisher's Exact Test	4.651			.196		
Linear-by-Linear Association	1.849[b]	1	.174	.177	.092	.010
N of Valid Cases	308					

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 14.03.
b. The standardized statistic is -1.360.

Crosstab

			What is the primary reason for consuming caffeinated drinks?				
			As a social beverage	Enjoyment of taste	Other	To stay awake/alert during studying	Total
Do you have a regular sleep schedule (going to bed and waking up at the same time each day)?	No	Count	9	63	13	59	144
		% within What is the primary reason for consuming caffeinated drinks?	30.0%	49.2%	40.6%	50.0%	46.8%
	Yes	Count	21	65	19	59	164
		% within What is the primary reason for consuming caffeinated drinks?	70.0%	50.8%	59.4%	50.0%	53.2%
Total		Count	30	128	32	118	308
		% within What is the primary reason for consuming caffeinated drinks?	100.0%	100.0%	100.0%	100.0%	100.0%

4.2.11 Table: Association of Awareness of Side Effects with Impact on BMI

Crosstab

			Are you aware of any potential side effects associated with consuming caffeinated drinks?			
			No	Somehow	Yes	Total
Do you believe that consuming caffeinated drinks impacts your weight or BMI?	No	Count	33	31	52	116
		% within Are you aware of any potential side effects associated with consuming caffeinated drinks?	50.0%	39.2%	31.9%	37.7%
	Somehow	Count	13	23	29	65
		% within Are you aware of any potential side effects associated with consuming caffeinated drinks?	19.7%	29.1%	17.8%	21.1%
	Yes	Count	20	25	82	127
		% within Are you aware of any potential side effects associated with consuming caffeinated drinks?	30.3%	31.6%	50.3%	41.2%
Total		Count	66	79	163	308
		% within Are you aware of any potential side effects associated with consuming caffeinated drinks?	100.0%	100.0%	100.0%	100.0%

4.2.12 Table: Association of Awareness of Side Effects with Medical Advice

Crosstab

			Are you aware of any potential side effects associated with consuming caffeinated drinks?			
			No	Somehow	Yes	Total
How often do you seek medical advice or assistance regarding your health and well-being?	Never	Count	20	14	26	60
		% within Are you aware of any potential side effects associated with consuming caffeinated drinks?	30.3%	17.7%	16.0%	19.5%
	Occasionally	Count	13	13	51	77
		% within Are you aware of any potential side effects associated with consuming caffeinated drinks?	19.7%	16.5%	31.3%	25.0%
	Rarely	Count	24	45	59	128
		% within Are you aware of any potential side effects associated with consuming caffeinated drinks?	36.4%	57.0%	36.2%	41.6%
	Regularly	Count	9	7	27	43
		% within Are you aware of any potential side effects associated with consuming caffeinated drinks?	13.6%	8.9%	16.6%	14.0%
Total		Count	66	79	163	308
		% within Are you aware of any potential side effects associated with consuming caffeinated drinks?	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	19.099[a]	6	.004	.004		
Likelihood Ratio	18.552	6	.005	.006		
Fisher's Exact Test	18.106			.006		
Linear-by-Linear Association	1.513[b]	1	.219	.229	.115	.011
N of Valid Cases	308					

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 9.21.

b. The standardized statistic is 1.230.

4.2.13 Table: Association of Awareness of Side Effects with Sleep

Crosstab

			Are you aware of any potential side effects associated with consuming caffeinated drinks?			
			No	Somehow	Yes	Total
Do you find that consuming caffeinated drinks closer to bedtime disrupts your ability to fall asleep or stay asleep during exams or clinical night rotations?	No	Count	30	20	52	102
		% within Are you aware of any potential side effects associated with consuming caffeinated drinks?	45.5%	25.3%	31.9%	33.1%
	Somehow	Count	10	32	31	73
		% within Are you aware of any potential side effects associated with consuming caffeinated drinks?	15.2%	40.5%	19.0%	23.7%
	Yes	Count	26	27	80	133
		% within Are you aware of any potential side effects associated with consuming caffeinated drinks?	39.4%	34.2%	49.1%	43.2%
Total		Count	66	79	163	308
		% within Are you aware of any potential side effects associated with consuming caffeinated drinks?	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	20.530[a]	4	.000	.000		
Likelihood Ratio	19.154	4	.001	.001		
Fisher's Exact Test	18.884			.001		
Linear-by-Linear Association	3.299[b]	1	.069	.072	.038	.006
N of Valid Cases	308					

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 15.64.

b. The standardized statistic is 1.816.

4.2.14 Table: Association of duration of consuming drinks with Sleep

Crosstab

			How long have you been consuming drinks?			
			10 years or less	5 years or less	Few months back	Total
Do you find that consuming caffeinated drinks closer to bedtime disrupts your ability to fall asleep or stay asleep during exams or clinical night rotations?	No	Count	46	29	27	102
		% within How long have you been consuming drinks?	33.1%	33.7%	32.5%	33.1%
	Somehow	Count	39	16	18	73
		% within How long have you been consuming drinks?	28.1%	18.6%	21.7%	23.7%
	Yes	Count	54	41	38	133
		% within How long have you been consuming drinks?	38.8%	47.7%	45.8%	43.2%
Total		Count	139	86	83	308
		% within How long have you been consuming drinks?	100.0%	100.0%	100.0%	100.0%

4.2.15 Table: Association of duration of Consuming Drinks with Impact on BMI

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	3.352[a]	4	.501	.504		
Likelihood Ratio	3.375	4	.497	.503		
Fisher's Exact Test	3.305			.511		
Linear-by-Linear Association	.466[b]	1	.495	.502	.260	.025
N of Valid Cases	308					

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 19.67.

b. The standardized statistic is .683.

Crosstab

			How long have you been consuming drinks?			
			10 years or less	5 years or less	Few months back	Total
Do you believe that consuming caffeinated drinks impacts your weight or BMI?	No	Count	50	33	33	116
		% within How long have you been consuming drinks?	36.0%	38.4%	39.8%	37.7%
	Somehow	Count	32	17	16	65
		% within How long have you been consuming drinks?	23.0%	19.8%	19.3%	21.1%
	Yes	Count	57	36	34	127
		% within How long have you been consuming drinks?	41.0%	41.9%	41.0%	41.2%
Total		Count	139	86	83	308
		% within How long have you been consuming drinks?	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	.672[a]	4	.955	.955		
Likelihood Ratio	.670	4	.955	.956		
Fisher's Exact Test	.672			.957		
Linear-by-Linear Association	.096[b]	1	.757	.787	.393	.029
N of Valid Cases	308					

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 17.52.

b. The standardized statistic is -.309.

4.2.16 Table: Association of impact of caffeinated drink on BMI with Change in Weight

Have you noticed any changes in your weight over the past year? * Do you believe that consuming caffeinated drinks impacts your weight or BMI? Crosstabulation

			Do you believe that consuming caffeinated drinks impacts your weight or BMI?			
			No	Somehow	Yes	Total
Have you noticed any changes in your weight over the past year?	No	Count	55	23	22	100
		% within Do you believe that consuming caffeinated drinks impacts your weight or BMI?	47.4%	35.4%	17.3%	32.5%
	Somehow	Count	12	14	12	38
		% within Do you believe that consuming caffeinated drinks impacts your weight or BMI?	10.3%	21.5%	9.4%	12.3%
	Yes	Count	49	28	93	170
		% within Do you believe that consuming caffeinated drinks impacts your weight or BMI?	42.2%	43.1%	73.2%	55.2%
Total		Count	116	65	127	308
		% within Do you believe that consuming caffeinated drinks impacts your weight or BMI?	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	35.554[a]	4	.000	.000		
Likelihood Ratio	35.432	4	.000	.000		
Fisher's Exact Test	35.207			.000		
Linear-by-Linear Association	27.641[b]	1	.000	.000	.000	.000
N of Valid Cases	308					

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.02.

b. The standardized statistic is 5.257.

4.2.17 Table: Association of side effect of caffeinated drink with Sleep Schedules

Crosstab

			Which specific side effects do you most commonly experience after consuming caffeinated drinks?					
			Hot flushes	Insomnia	Nervousness	Palpitation (Increase Heart rate)	Tachypnea (Increase Respiratory rate)	Total
Do you have a regular sleep schedule (going to bed and waking up at the same time each day)?	No	Count	32	47	23	35	7	144
		% within Which specific side effects do you most commonly experience after consuming caffeinated drinks?	44.4%	47.5%	42.6%	55.6%	35.0%	46.8%
	Yes	Count	40	52	31	28	13	164
		% within Which specific side effects do you most commonly experience after consuming caffeinated drinks?	55.6%	52.5%	57.4%	44.4%	65.0%	53.2%
Total		Count	72	99	54	63	20	308
		% within Which specific side effects do you most commonly experience after consuming caffeinated drinks?	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	3.621[a]	4	.460
Likelihood Ratio	3.641	4	.457
Linear-by-Linear Association	.228	1	.633
N of Valid Cases	308		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 9.35.

4.2.18 Table: Association of side effect of caffeinated drink with Eating Habits

Crosstab

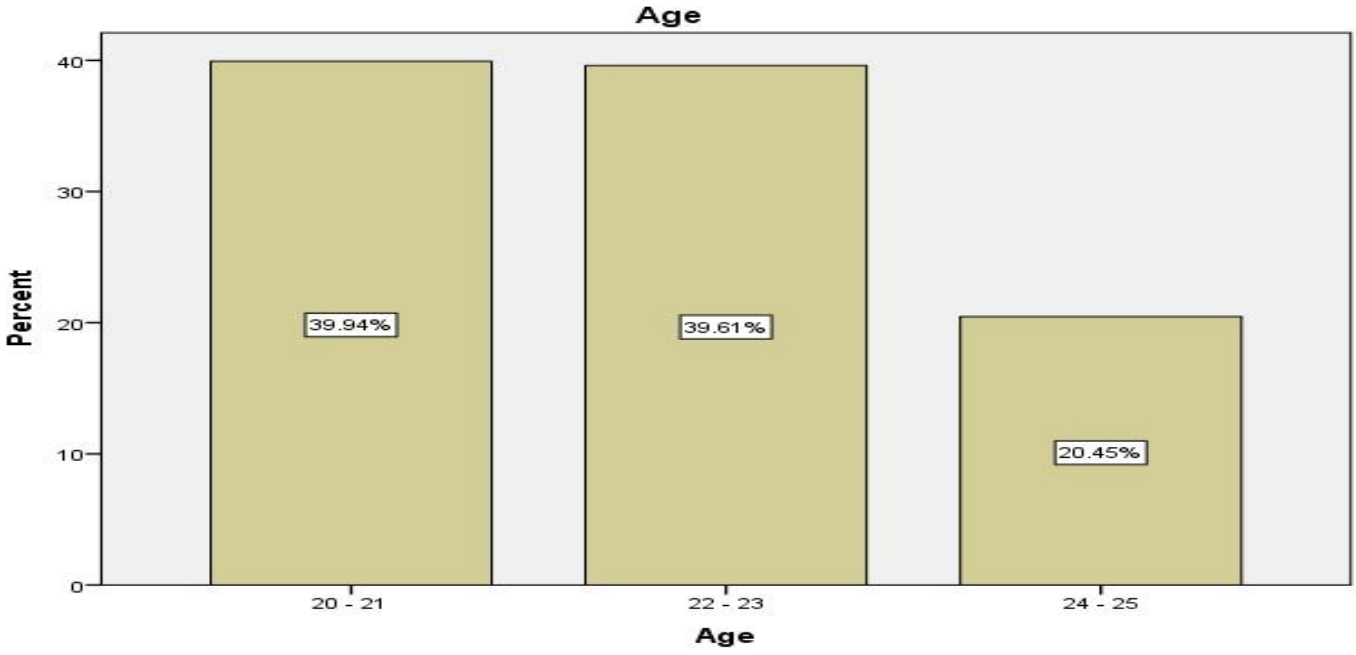
			Which specific side effects do you most commonly experience after consuming caffeinated drinks?					
			Hot flushes	Insomnia	Nervousness	Palpitation (Increase Heart rate)	Tachypnea (Increase Respiratory rate)	Total
Do you find that your consumption of caffeinated drinks is associated with certain eating habits? (Snacking, Behaviors, Meal skipping)	No	Count	21	34	20	28	9	112
		% within Which specific side effects do you most commonly experience after consuming caffeinated drinks?	29.2%	34.3%	37.0%	44.4%	45.0%	36.4%
	Somehow	Count	15	16	7	7	1	46
		% within Which specific side effects do you most commonly experience after consuming caffeinated drinks?	20.8%	16.2%	13.0%	11.1%	5.0%	14.9%
	Yes	Count	36	49	27	28	10	150
		% within Which specific side effects do you most commonly experience after consuming caffeinated drinks?	50.0%	49.5%	50.0%	44.4%	50.0%	48.7%
Total		Count	72	99	54	63	20	308
		% within Which specific side effects do you most commonly experience after consuming caffeinated drinks?	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

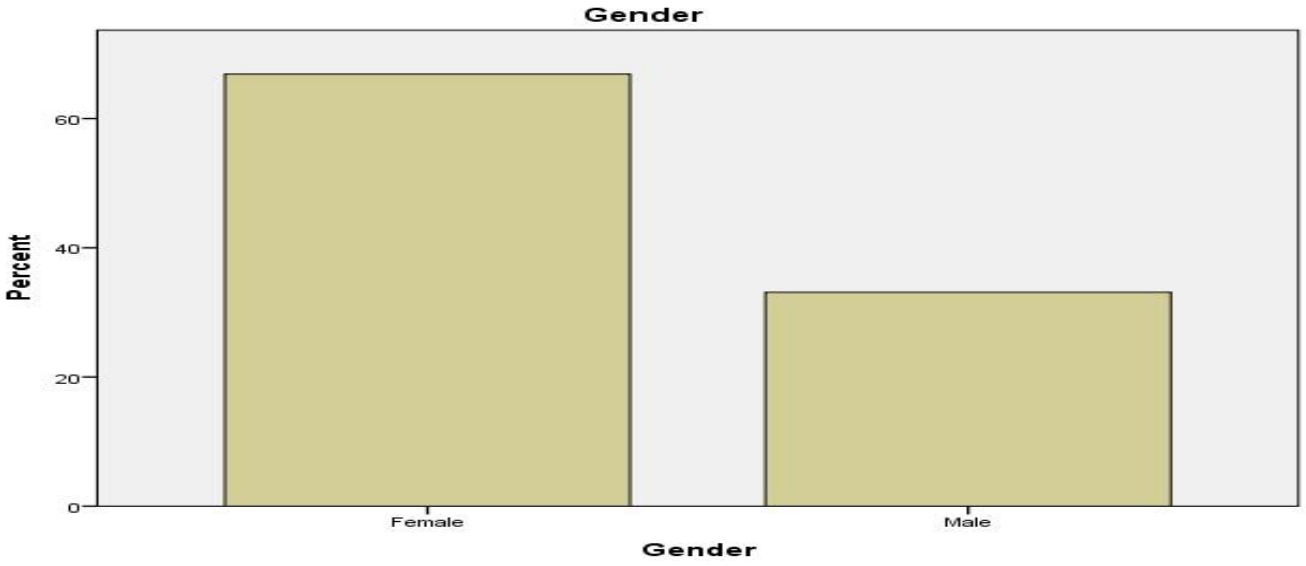
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	6.839[a]	8	.554
Likelihood Ratio	7.161	8	.519
Linear-by-Linear Association	1.744	1	.187
N of Valid Cases	308		

a. 1 cells (6.7%) have expected count less than 5. The minimum expected count is 2.99.

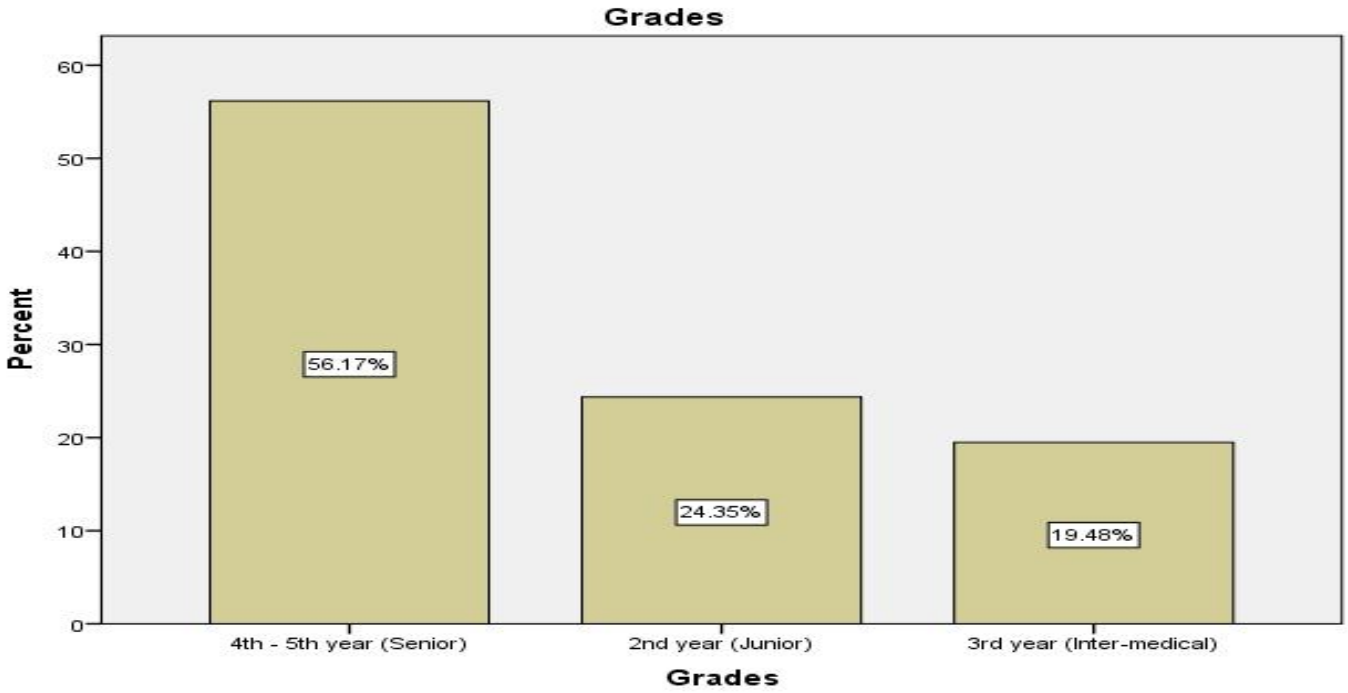
(A) Figure: Age (%)



(B) Figure: Gender (%)



(C) Figure: Grades (%)



(D) Figure: Field (%)

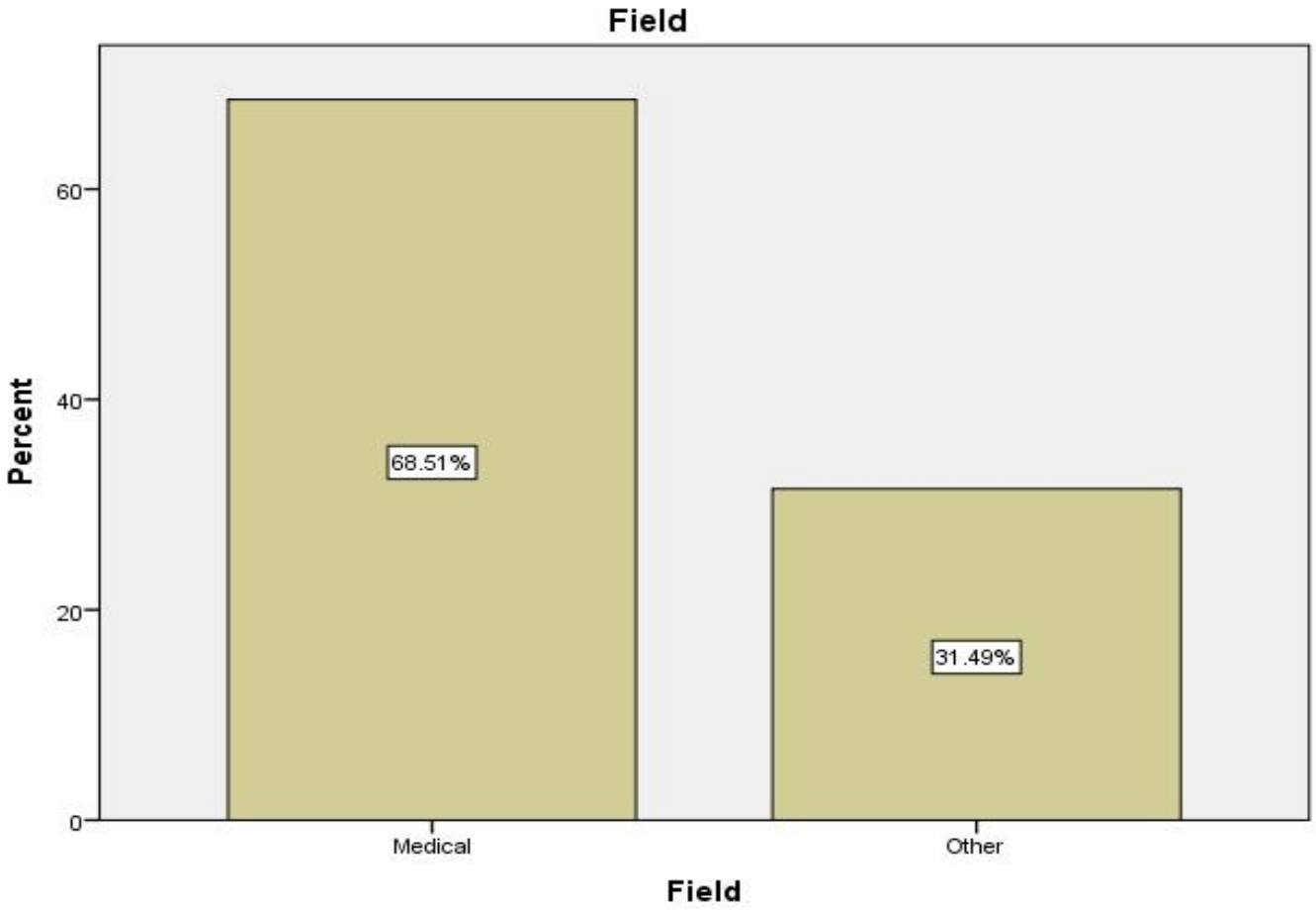


Figure : Consumption of caffienated drinks (Frequency)

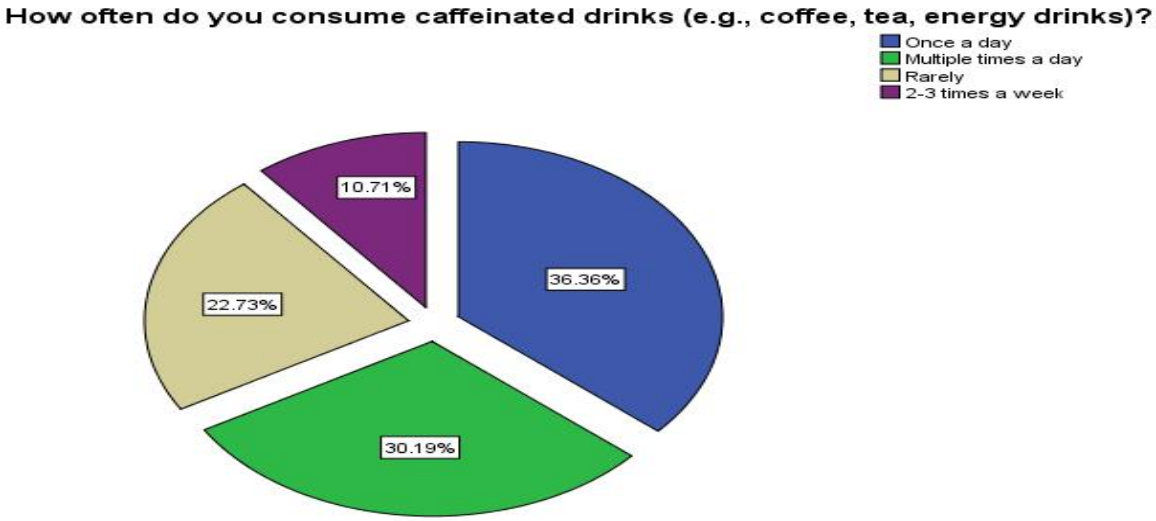


Figure: Primary Reason for Consumption

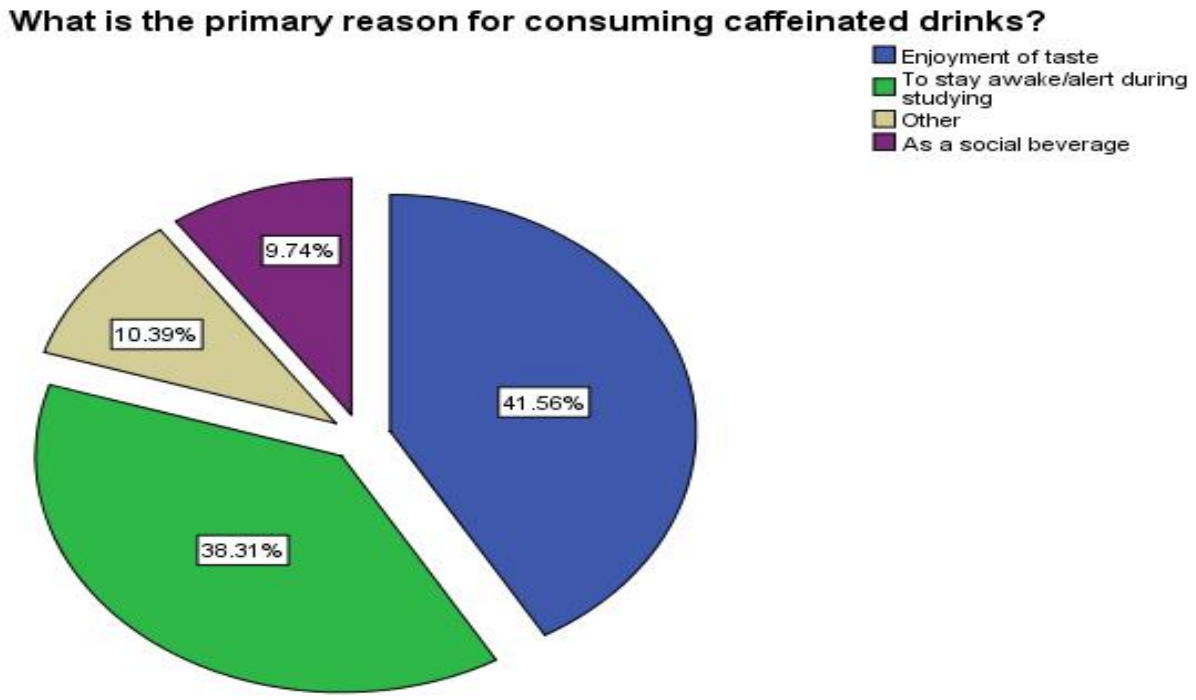


Figure: Pattern of Consumption

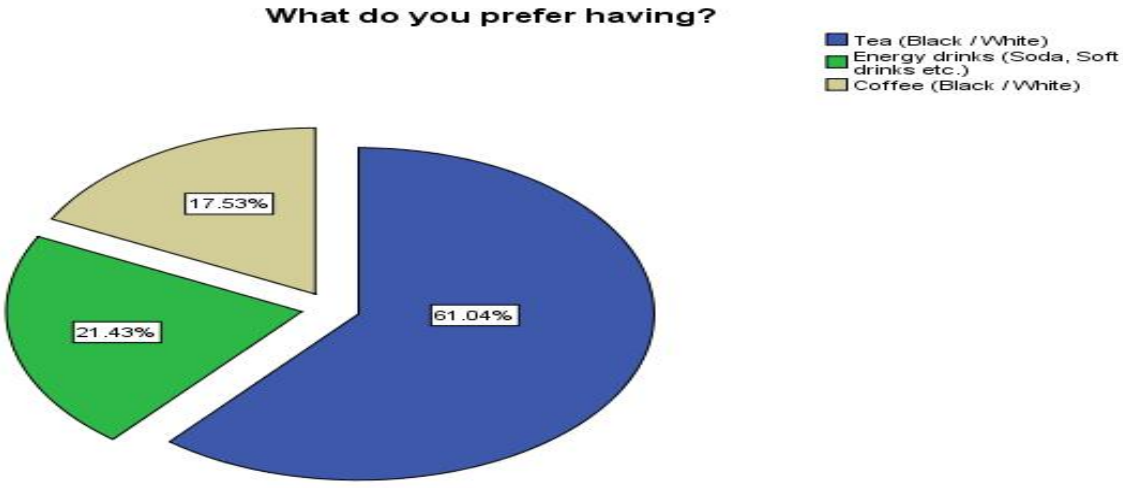


Figure: Duration Of Consumption

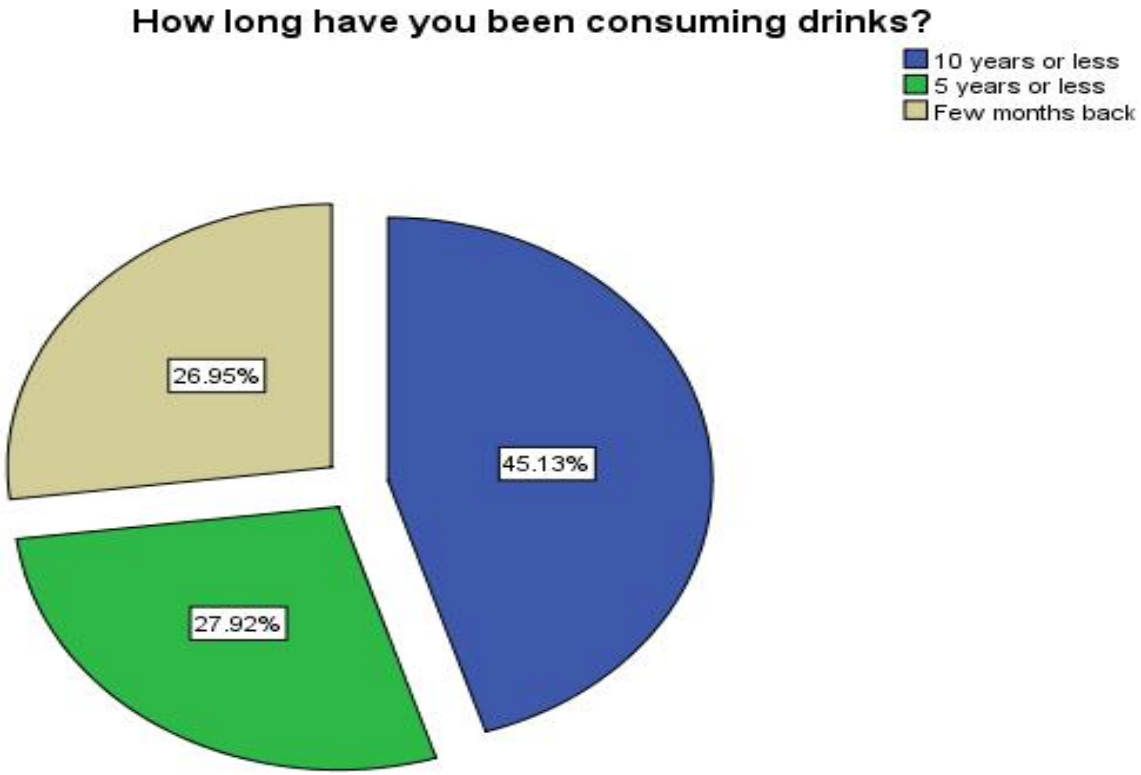


Figure : Average Cups of Intake

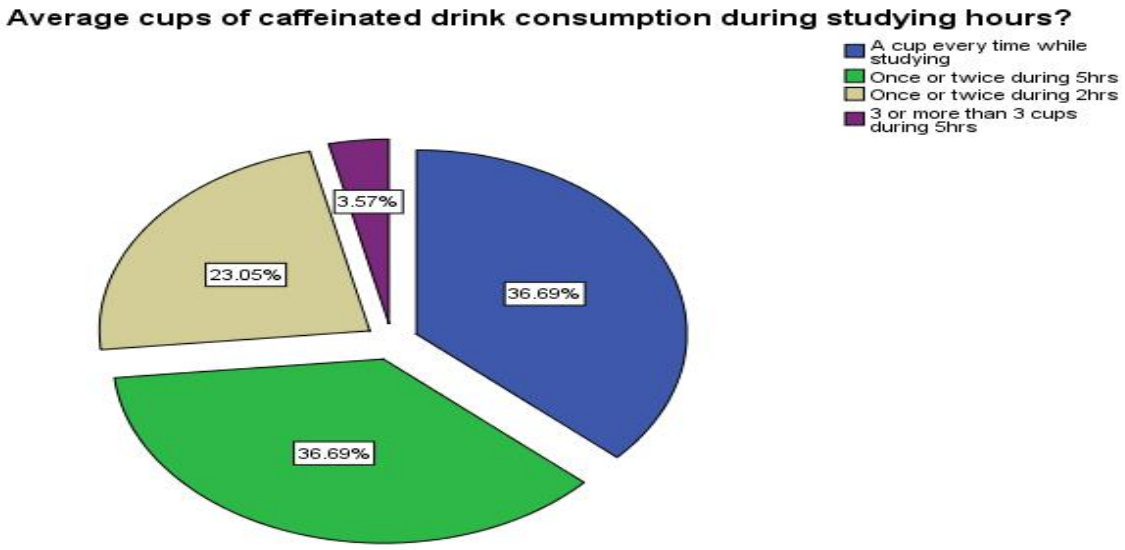


Figure: Commonly Experienced Side Effects

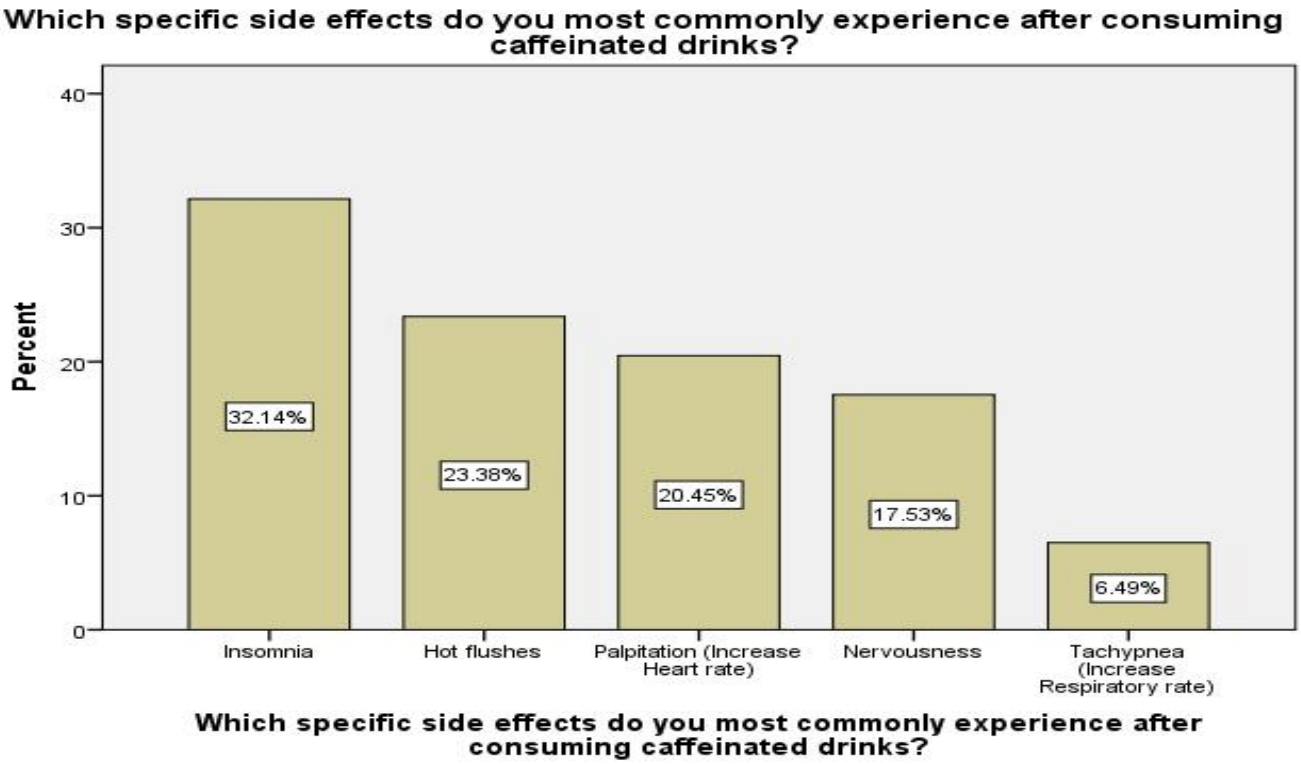


Figure: Duration of Sleep

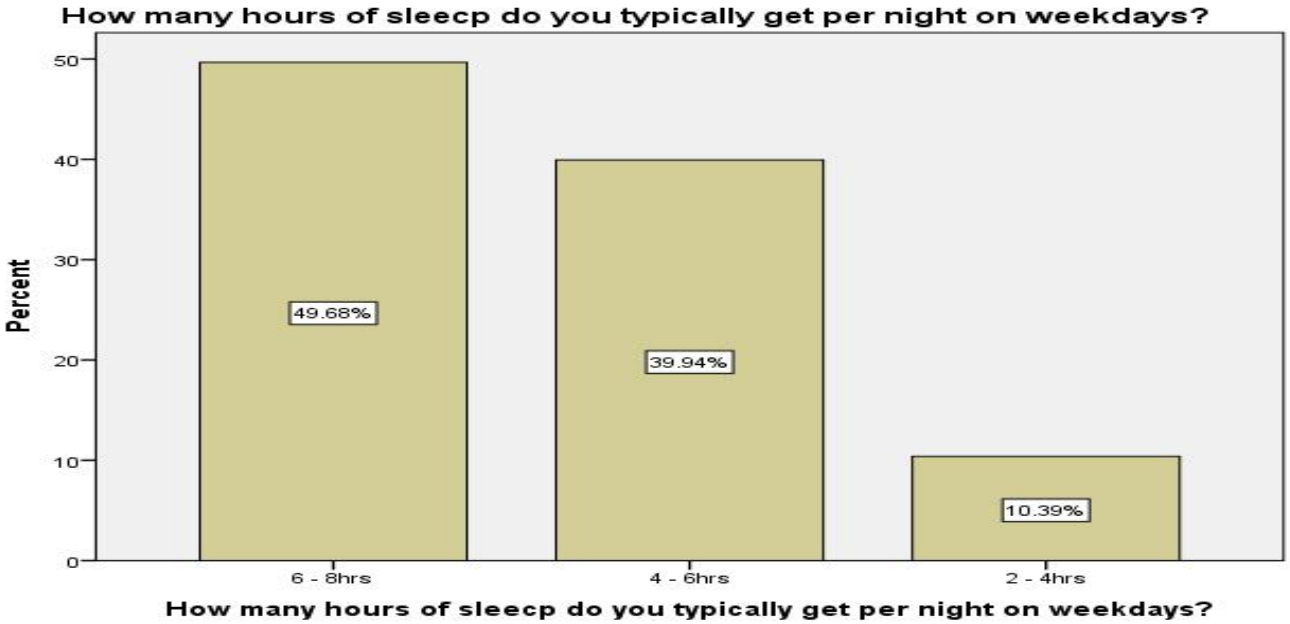


Figure: Preferred Study Time

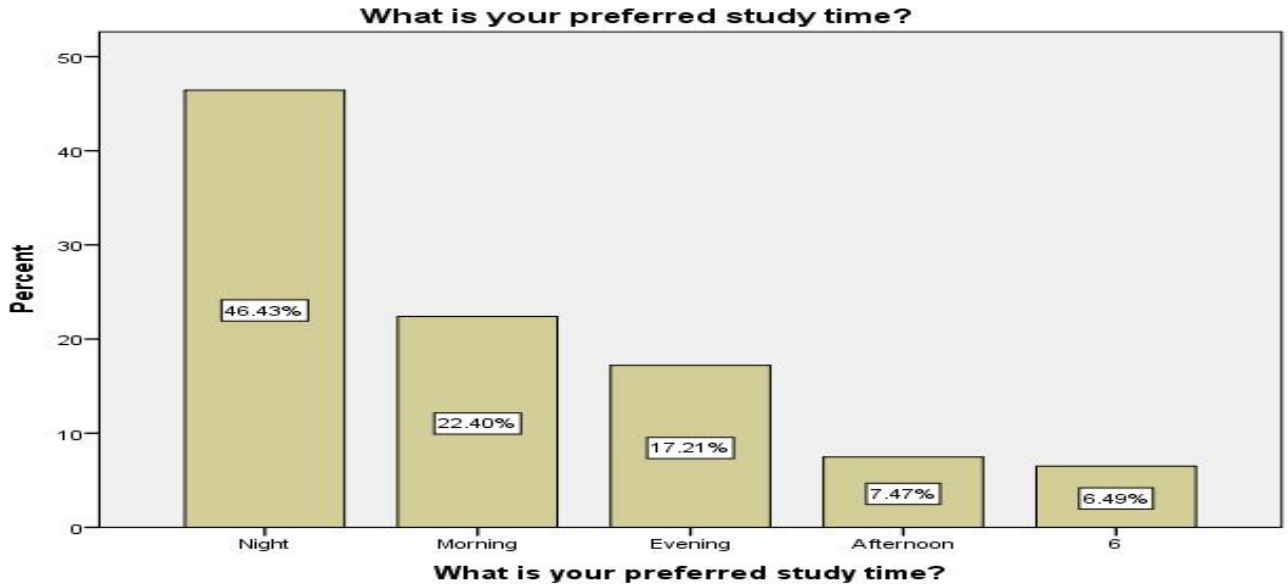


Figure: Consumption Closer to Bedtime

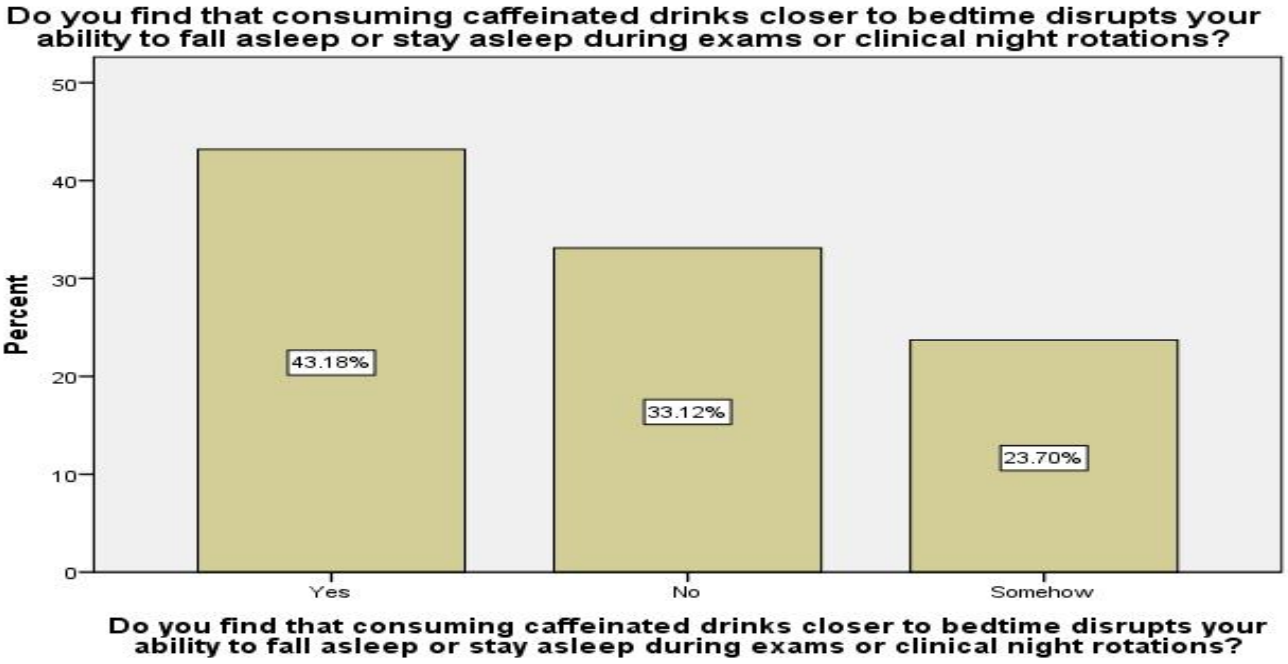


Figure: Caffeinated Consumption Impacting Weight

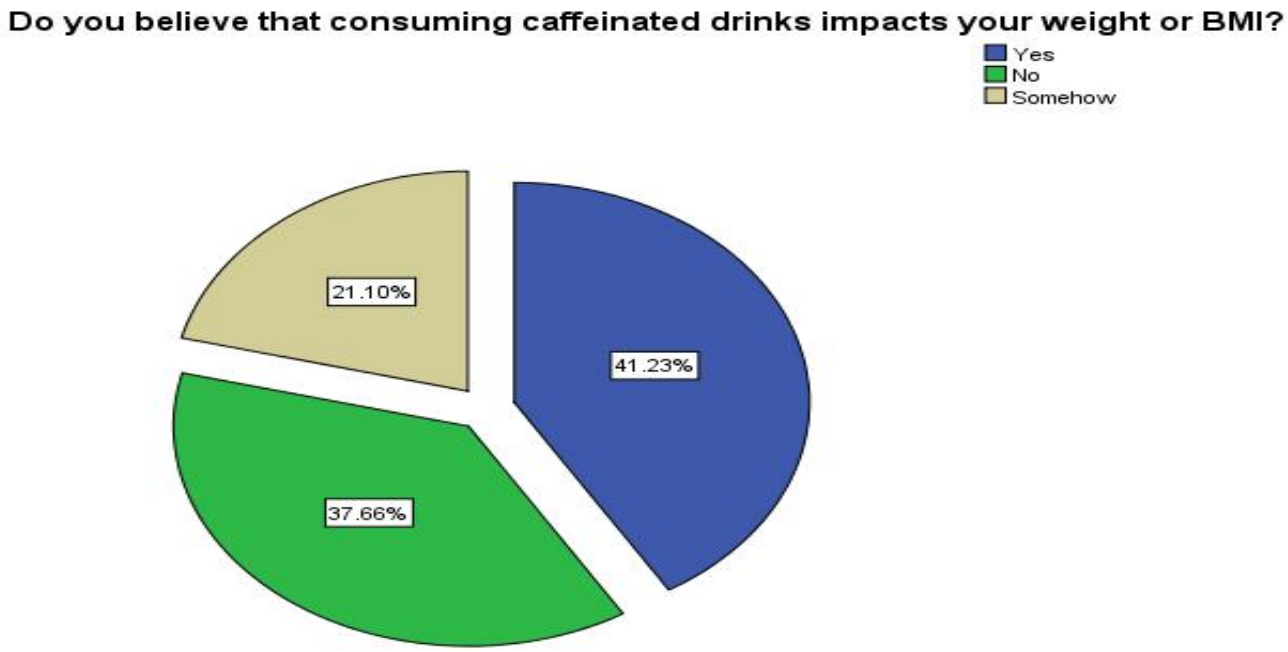


Figure : Caffeinated Consumption Associated with Eating Disorders

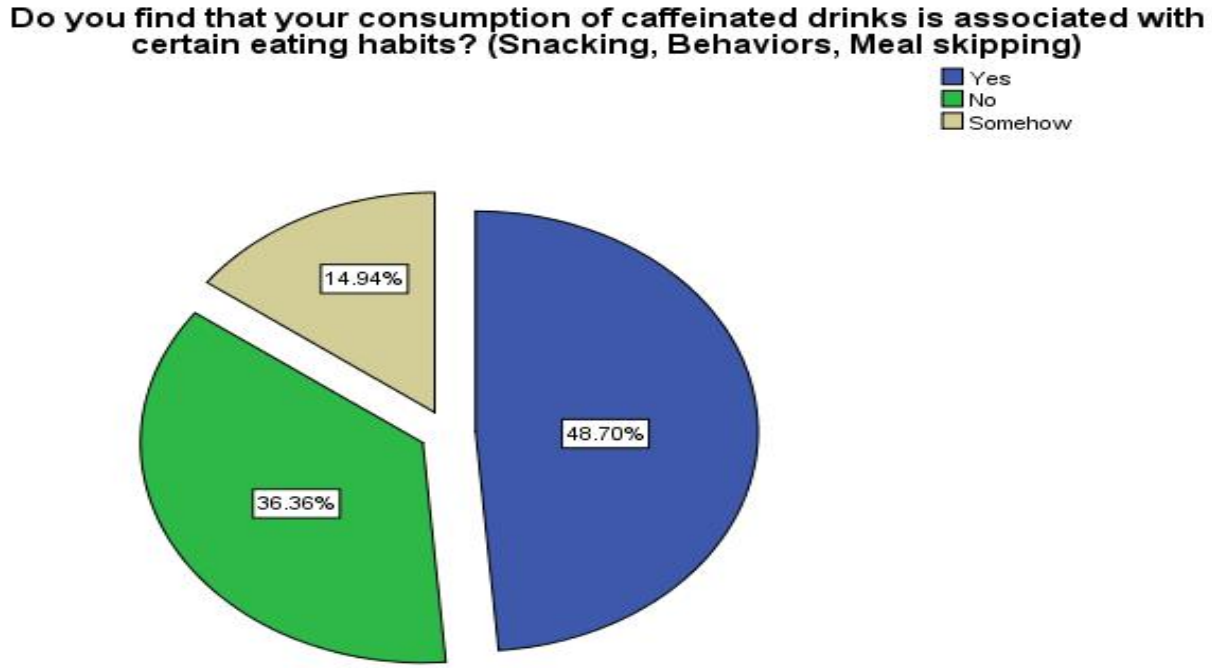


Figure : Changes in Weight Over Past Year

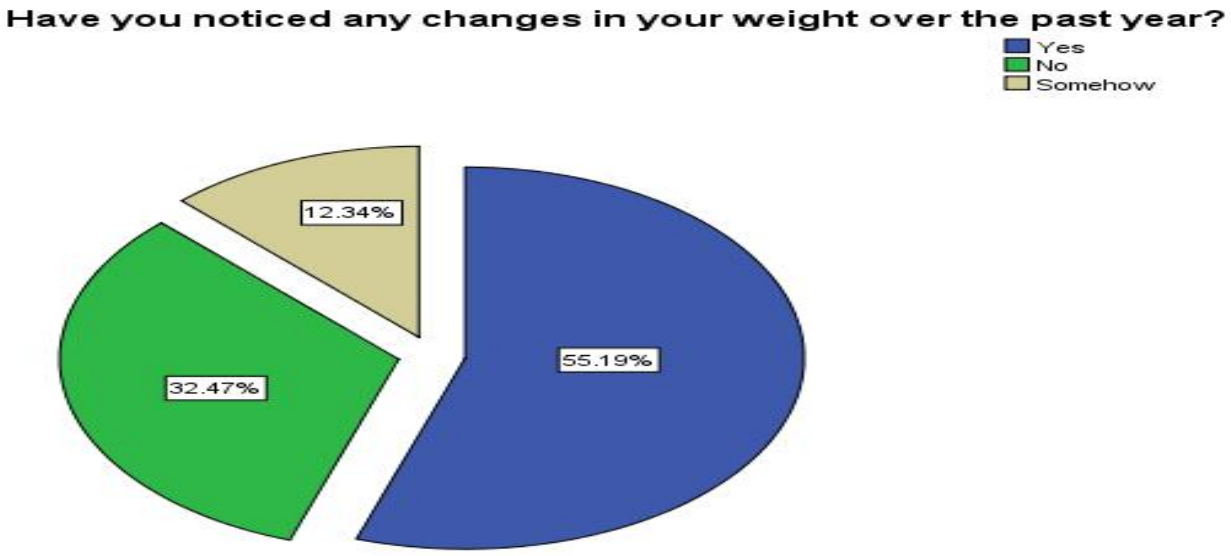


Figure: Seeking Medical Advice

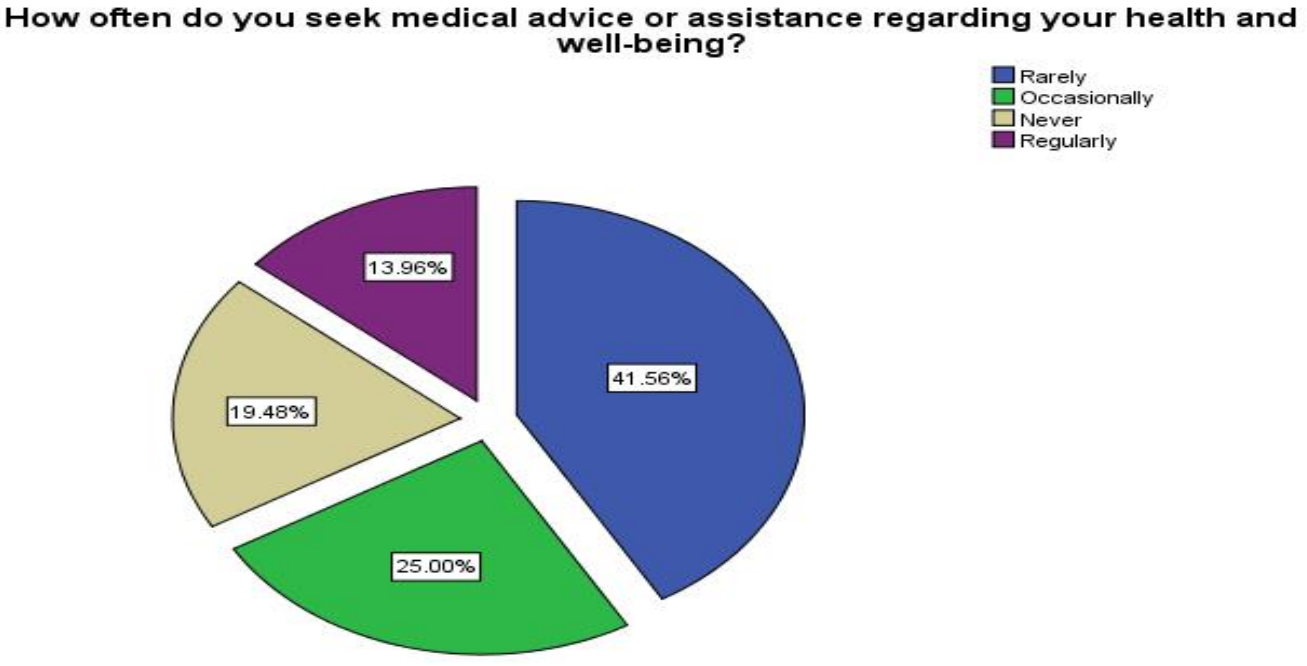


Figure: Impact on BMI (Frequency)

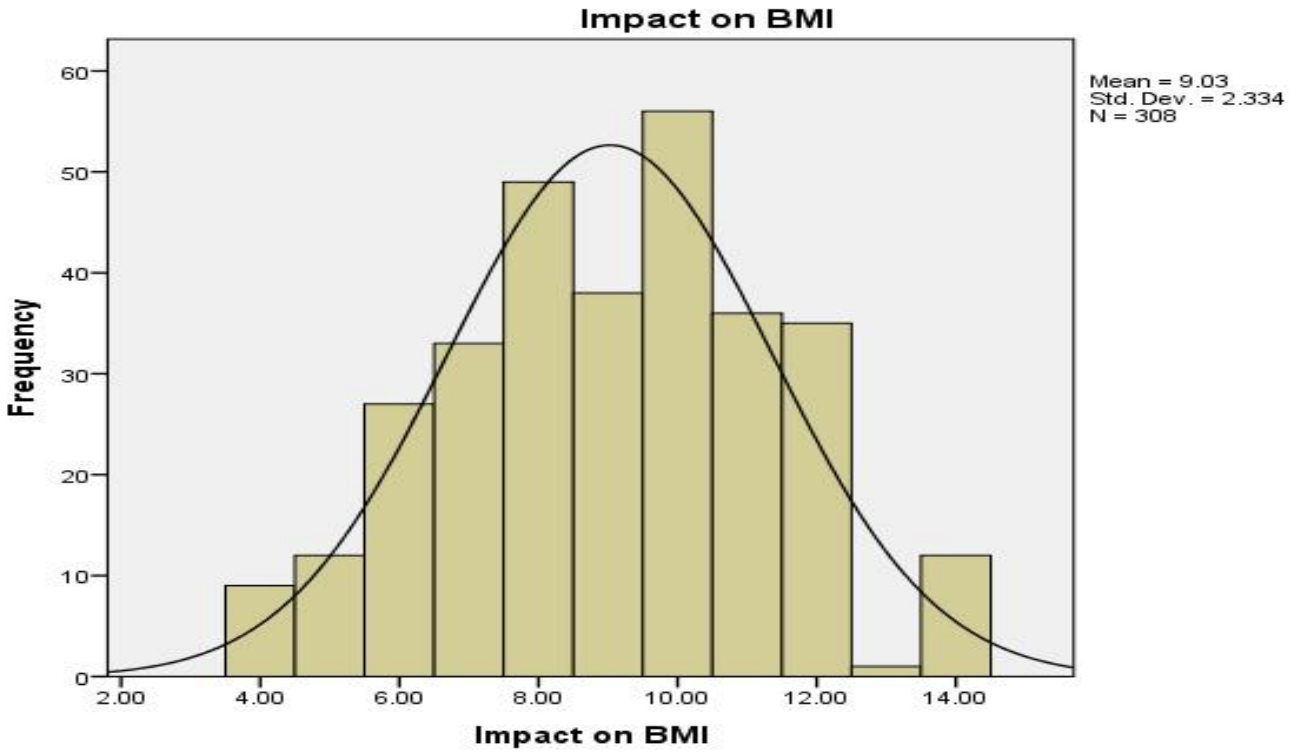


Figure: Impact on BMI (Plotter chart)

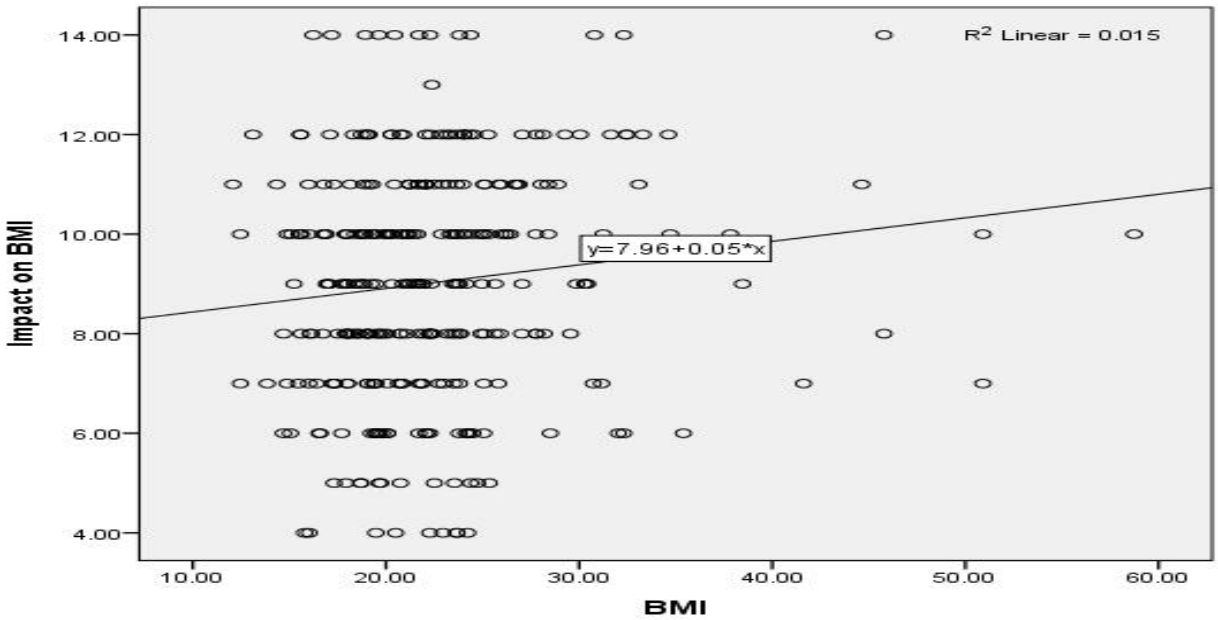


Figure: Primary Reason for Consuming Caffeinated Drinks

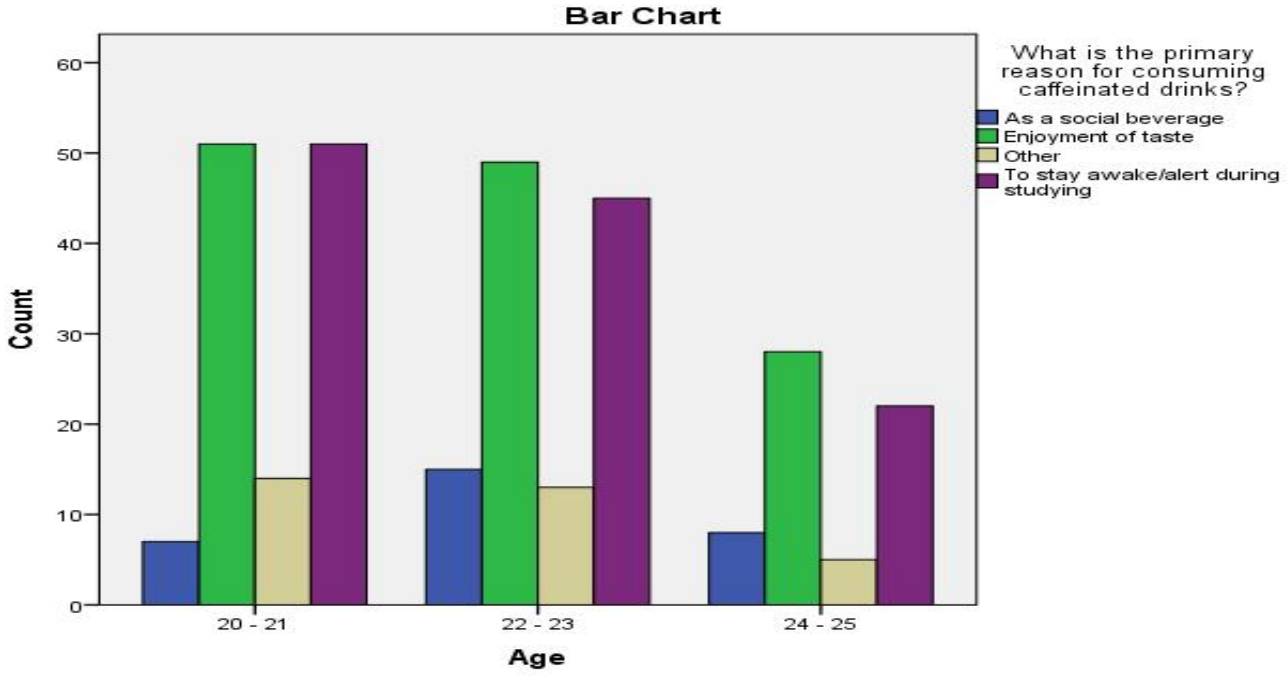


Figure: Regular Sleep Schedule

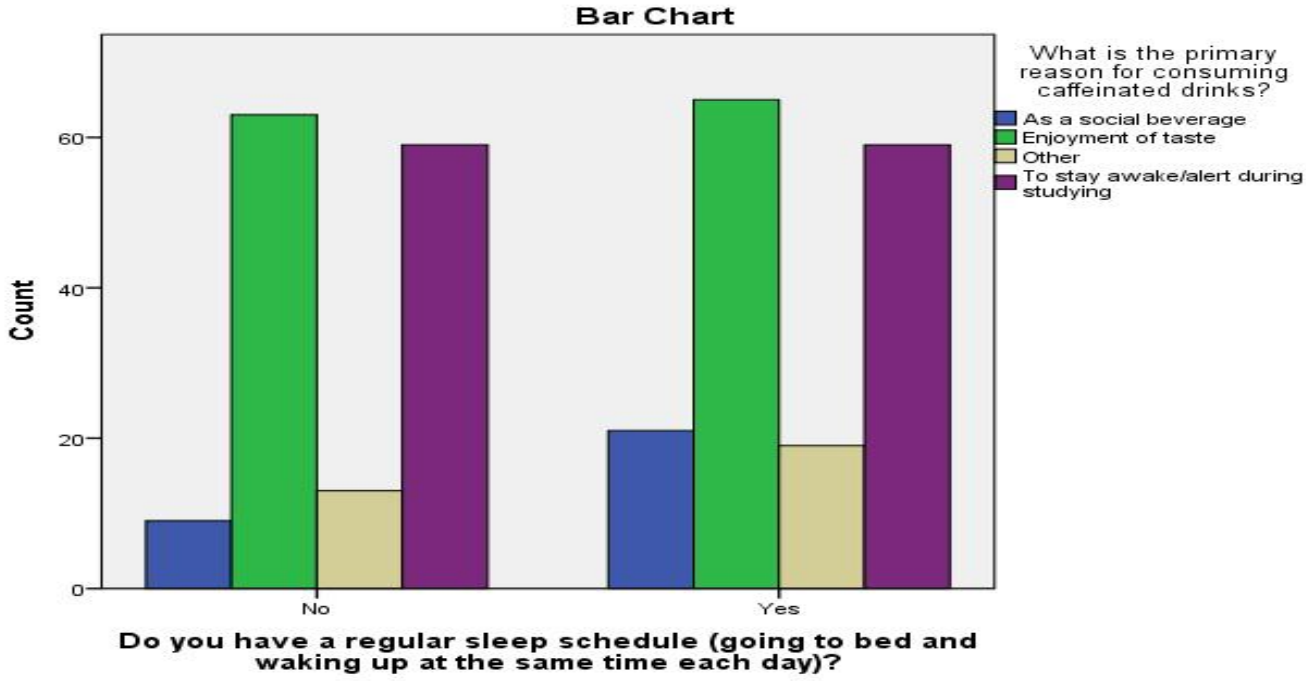


Figure: Consumption Impacting Weight

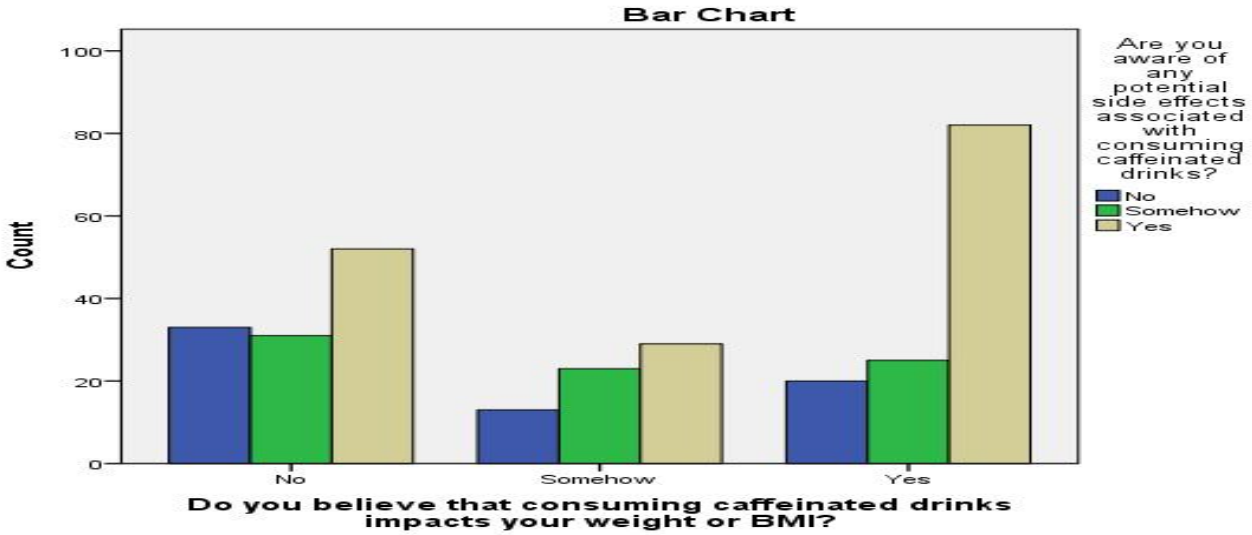


Figure: Seeking Medical Advice

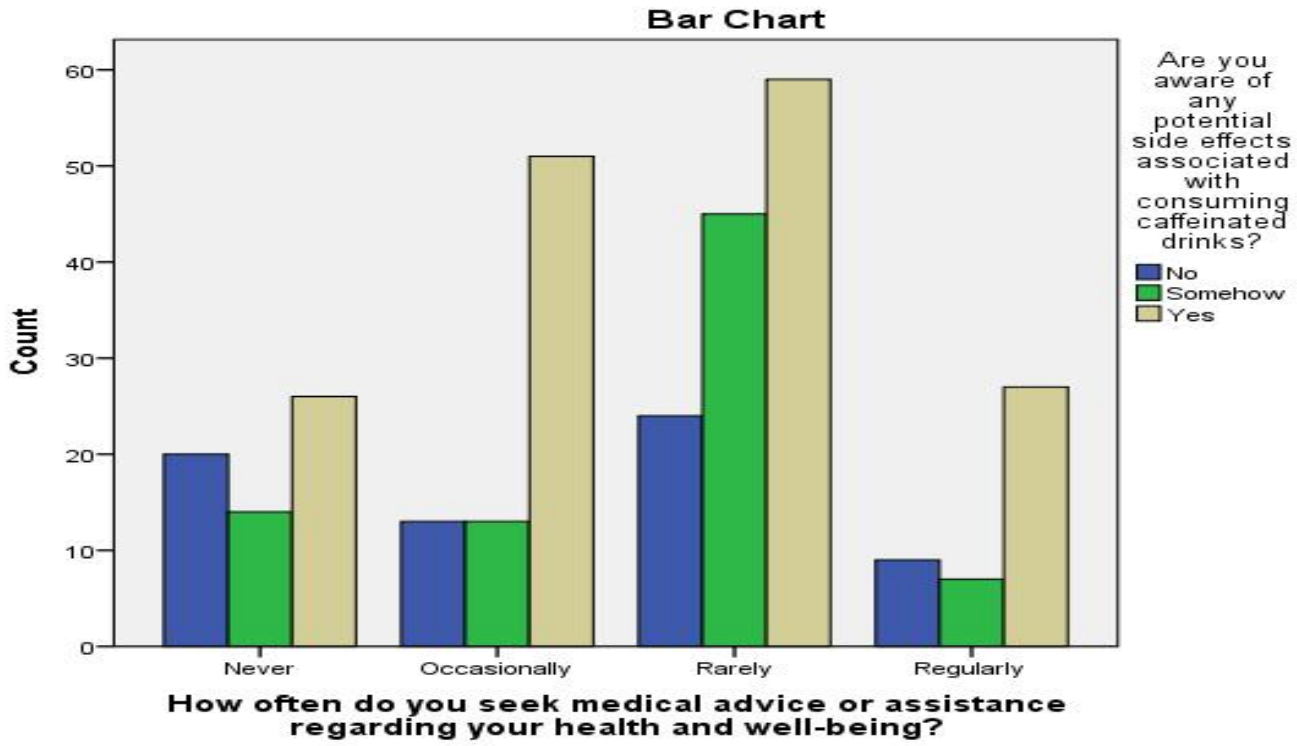


Figure: Consumption Closer to Bedtime

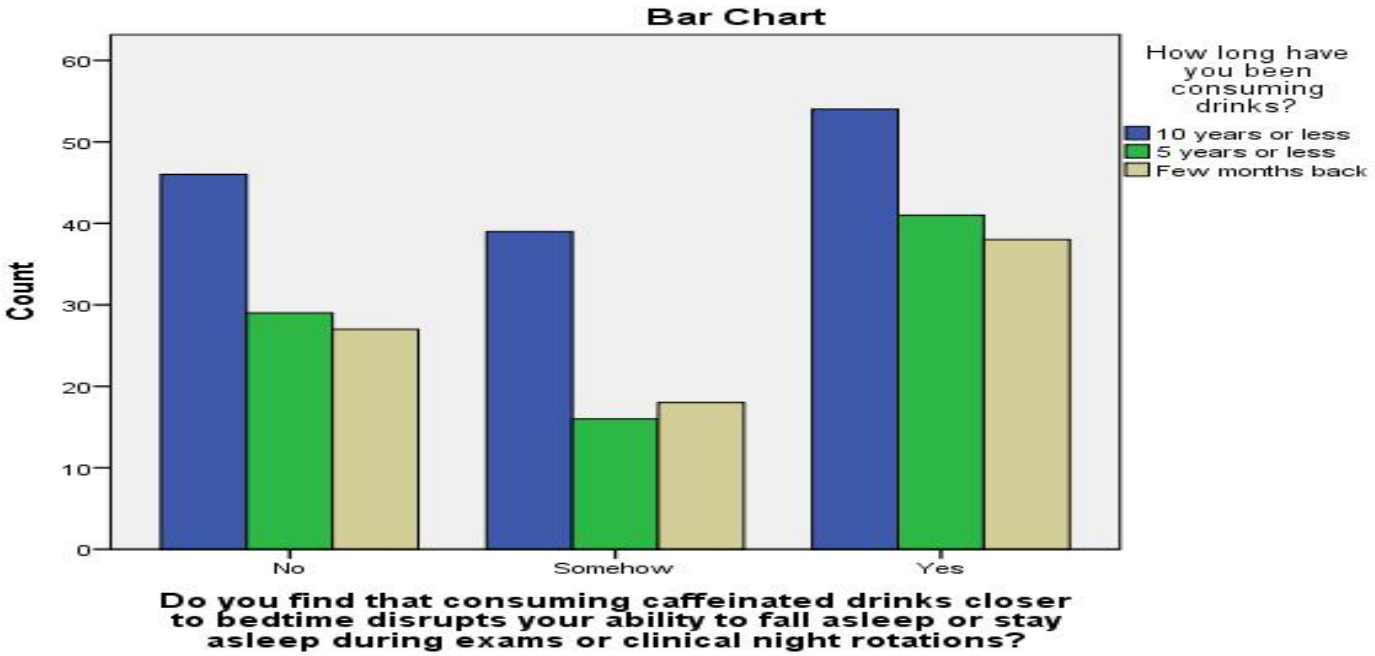


Figure: Consumption Impacting Weight

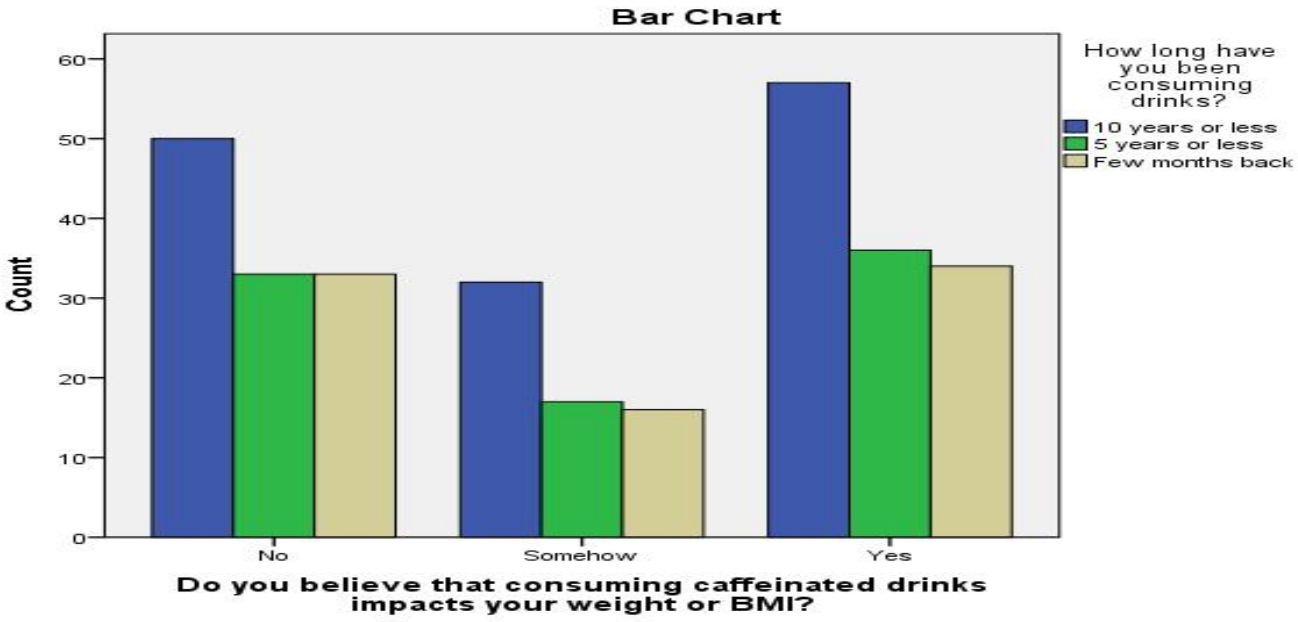


Figure: Changes in Weight over Past time

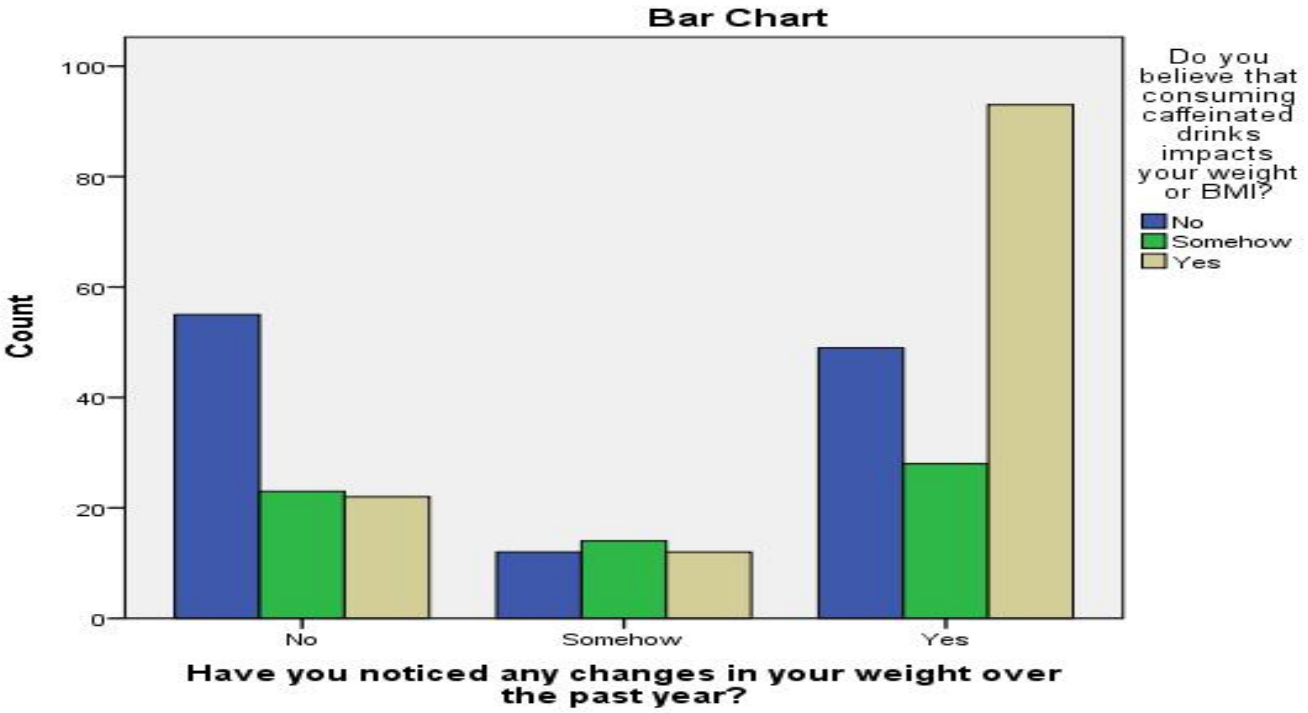


Figure: Regular Sleep Schedule

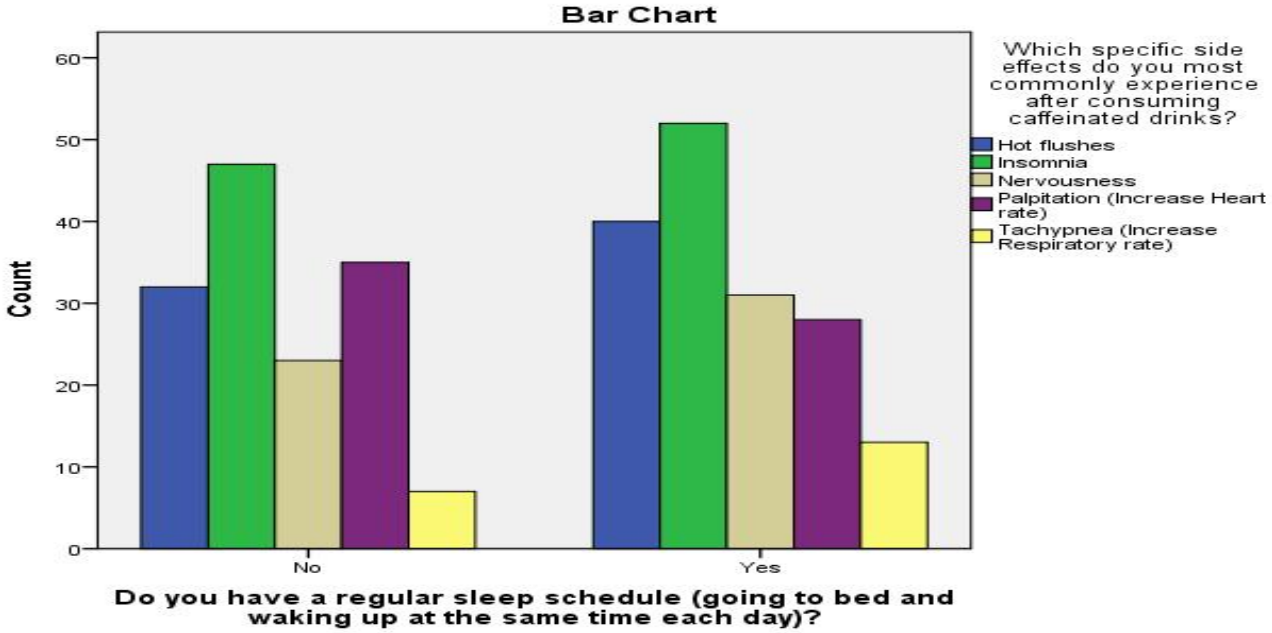
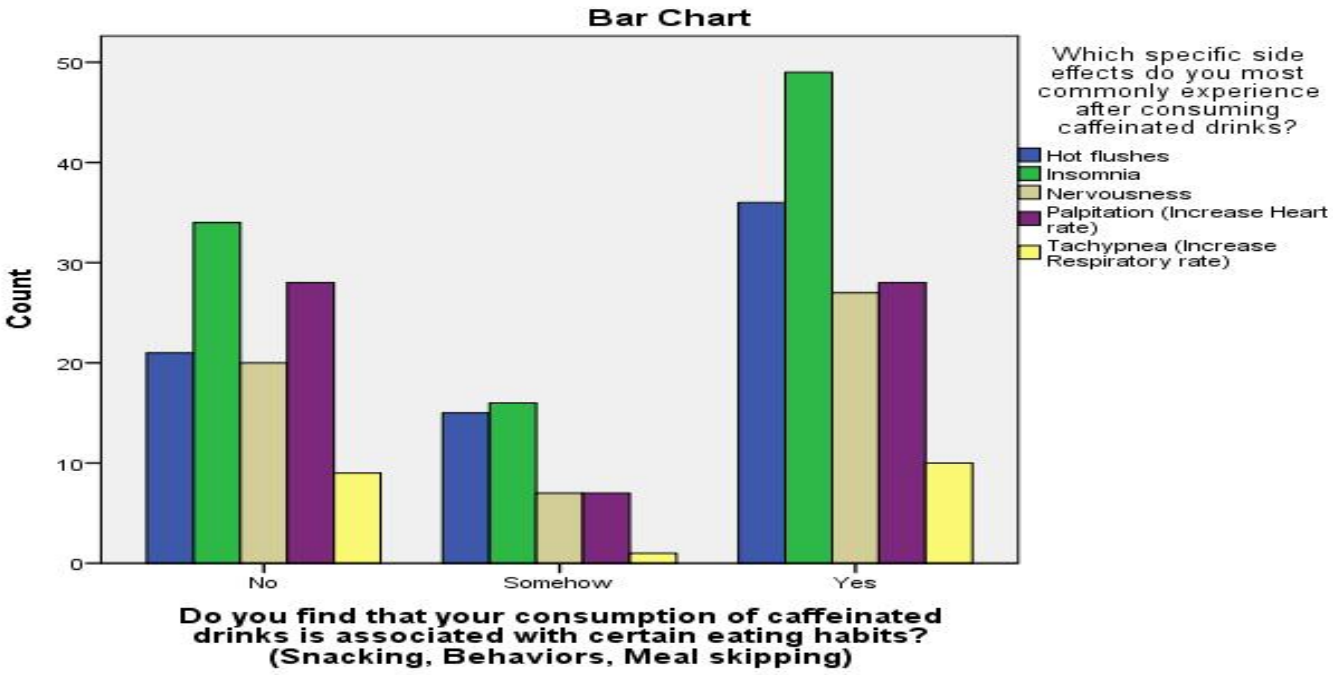


Figure : Consumption Associated With Certain Eating Habits



DISCUSSION

Caffeinated drink intake is the most widely used all over the world among medical students. The aim of current study is to assess the prevalence and side effects associated with caffeinated drinks intake among medical students and others, and their influence on sleep patterns and BMI. The results of current study showed that the proportion of regular daily intake of caffeinated drink is higher in female medical students than males comparative to other students during the clinical / academic years for a reason of enjoyment of taste and to stay awake during studying it shows the insignificant association between regular caffeinated drink intake and primary reason of consumption. While previously the study conducted by Rola M. Al Ghali et al on caffeinated Consumption among Zayed University Students concluded the determined average intake of caffeinated drink intake by university students. Despite the difference between mean caffeinated intake between male and females, yet this did not show any statistical difference. In contrast to this, the gender difference in caffeinated intake, selective and limited studies were found in the literature yet none of them had the same focus as this study. Although there was no statistical difference between males and females in regards to caffeine consumption, yet, in alignment with other studies males tend to have higher caffeine consumption than females. In addition, coffee and energy drink consumption was more prevalent in males. The narrated statement from current study shows controversially statistical insignificant association. Conversely, other previous study conducted by M. Sami Khan et al on-caffeine consumption and academic performance among medical students concluded that majority of the medical students consuming caffeinated beverages were for common reasons of leisure, peer influence and habit however no association was found between caffeine consumption and academic performance. Which is parallel to current study because of the included sample (Medical and Non-medical students), gender of differences (female more than male) and use of different sampling technique. Conversely, research conducted in Saudi Arabia by Rahamathulla M. P. on Prevalence, side effects and awareness about caffeinated drinks among the female university students evaluated that female student indicated better performance in exams more frequently as compared to male students.

Therefore, females preferred regular caffeinated drink intake for performing better in their examinations that was estimated about 41.2% and the least among was for thirst. Similar results were recorded in another study conducted in Pennsylvania, where only 20% from the total population stated the reason for consumption, which was to stay awake for late hours to study better. Both the studies are parallelly owned by current study in terms of favor and found to be statistically significant.

Other studies also found that the association of primary reason of consuming caffeinated drinks with age group, among aged 22 -23 years old respondents 50% said as a social beverage, and 40.6% said other likely to stay awake during studying, association found was statically insignificant. While study conducted by Lee K-H et al concluded that academic purposes were the third most common reason for caffeinated drink intake in the target population (second most common in second-year students and third most common in first, and third-year students) showing the highly significant association with maximum age of 22 – 24 years old under second year students for a purpose of academic purposes , hence the study is showing parallel correlation due sharing the same rationale for caffeinated intakes among adolescents. In contrast, another study concluded by A.I. Toqeer et al on use of caffeinated intake among medical students during examinations in a medical college of Pakistan stated that the Participation was 92.8% % for the entire target population of first- to fourth year medical students. Based on the high response rate from each academic year group, it can be stated that the results obtained in this investigation is representative of the target population. Therefore, the relation between caffeinated consumption among different academic year students and day scholar or boarding students shows insignificancy indicating contrary indications in relate to current study.

Furthermore , the study found that 98% of students reported caffeinated drinks consumption, which was bad sign if medical students were unaware of the potential side effects with impact on weight or BMI therefore, they would unable to counsel young and adolescent individuals in general population about the harmful effects of caffeinated drinks perhaps present study found that 50.3% samples affirmed that they had awareness and believe that consuming caffeinated drinks impact on their weight and the association among awareness of potential side effects and impacting BMI was statistically significant. Current study found that association of awareness of potential side effects with seeking medical advice, only 16.6% samples said they had awareness and take medical advice regularly. The association was also found statistically significant. While study conducted by Md. Ashraful Islam et al on Prevalence, side effects and awareness about caffeinated drinks consumption among the female university students in Saudi Arabia stated that consumption of caffeinated drinks consumption effects the nutrition and health, with a negative effect on the metabolism leading to health concerns that are related to greater risk of obesity, high triglyceride, high density lipoprotein cholesterol, and increasing glucose level impacting the weight and BMI. Therefore, higher consumption was found to be associated with side effects of generating strong traits of impacting weight and BMI. Which is parallel to current study as it showed the level of awareness regarding potential side effects of drinks intake among medical students impacting BMI. Another study by Lee K-H et al on medical students' use of caffeine for 'Academic purposes and their knowledge of its benefits, side-effects and withdrawal symptoms concluded that participants had the most knowledge on the withdrawal symptoms, less knowledge on the side-effects and the least knowledge on its benefits. These findings could be attributed to the fact that side effects and withdrawal symptoms of caffeine are more commonly experienced than its benefits, since many of the benefits are associated with long-term use of caffeine. Which is contrary to current study because of majority participants using caffeinated drinks without sufficient knowledge of its benefits, side-effects and withdrawal symptoms. The association of awareness of any potential side effects with seeking medical advice was found to be statistically significant which is also parallel to current study due to level of knowledge among students regarding side effects and importance to get immediate medical consultation. Yet, there is insufficiency in the current knowledge of safe caffeine consumption patterns reflecting the importance of health

awareness programs and nutritional lectures to decrease the long-term health issues and unintentional overdose of caffeine.

Lastly, Present studies reported that 41% samples said they started consuming drinks few months age and believe that consuming caffeinated drinks impact on weight or BMI. The association was found statistically insignificant. However, according to the previous study conducted by Alawadh, R. A. on coffee consumption and its correlation to obesity reported that daily drinking of Arabic coffee was identified among 53.5% of the population. Of them, 33.7% were obese and 29.8% were overweight and the prevalence of obesity among coffee drinkers was significantly higher. Therefore, the study shows contrary association among different studies regarding drinks intake impact on BMI due general population variability most specifically focused on females. Conversely, current study reported the impact of caffeinated drink on BMI, there were 73.2% responded said they believed consuming caffeinated drinks impact on weight of BMI and they have noticed changed in weight over the past years. The association was found statistically significant. However, Study conducted by Lopez-Garcia, E. et al on changes in caffeine intake and long-term weight change in men and women stated that increase in caffeinated drink intake during 12 y was associated with slightly smaller weight gains in men and women. In addition, an increase in coffee or tea consumption was also associated with a smaller weight gain. Which is contrary to current studies due to age factor, frequency of caffeinated drink intake and gender difference.

LIMITATIONS

- The research has some limitations that need to keep in mind when interpreting the findings.
- The cross-sectional nature of the study limits the ability to draw causal inferences about the relationship between caffeine consumption and its effects on sleep and BMI.
- The reliance on self-reported data may introduce bias, as participants might under-report or over-report their caffeine intake and associated behaviors.
- The use of convenience sampling may affect the representativeness of the sample, potentially limiting the generalizability of the findings to the wider student population.
- The study was conducted in Karachi, Pakistan, which may limit the applicability of the results to other regions with different cultural and dietary habits.
- Lack of Longitudinal Data: The study did not track changes over time, which would be necessary to establish long-term effects of caffeine consumption on sleep patterns and BMI.

STRENGHTS

- The study included a diverse sample of 309 participants, providing a comprehensive overview of caffeinated drink consumption patterns among medical and non-medical students in Karachi.
- By including students from various academic fields and years, the study offers insights into the broader student population, enhancing the generalizability of the findings.
- The study utilized a detailed questionnaire that covered various aspects of caffeine consumption, including frequency, reasons for consumption, awareness of side effects, and its impact on sleep and BMI.

- The use of advanced statistical methods, including independent sample t-tests and Pearson correlation analysis, provided robust and reliable results, ensuring the validity of the findings.

RECOMMENDATIONS

- Implement educational programs to inform students about the side effects of caffeinated drinks and healthier alternatives.
- Encourage regular medical consultations to monitor and manage potential health impacts.
- Conduct longitudinal studies to better understand the long-term effects of caffeinated drink consumption on health and academic performance.

CONCLUSIONS

This study explored the prevalence, side effects, and impacts of caffeinated drink consumption among medical students in Karachi, Pakistan. The research provided significant insights into the patterns of caffeinated drink intake, associated side effects, sleep disturbances, and their subsequent effects on BMI. A high prevalence (98%) of regular caffeinated drink consumption was observed among the participants, with female students showing a higher intake than males. The main reasons for consuming caffeinated drinks were to stay awake during study sessions, enjoyment of taste, and social interactions. Many participants reported experiencing side effects such as insomnia, nervousness, and palpitations. Awareness of these side effects was moderately high, yet only a small fraction regularly sought medical advice. Caffeinated drink consumption was found to have a negative impact on sleep patterns, with many students reporting disrupted sleep schedules, especially during exam periods. There was a significant association between caffeinated drink consumption and BMI. Many participants believed that their intake of caffeinated drinks influenced their weight, with a notable proportion observing changes in their weight over the past year. The study found statistically significant associations between caffeinated drink consumption and BMI, awareness of side effects, and the need for medical consultation. There was no significant association found between the primary reason for consuming caffeinated drinks and age group or sleep schedules. The results align with some previous studies that indicate a high prevalence of caffeinated drink consumption for academic purposes but show differing views on gender differences in consumption patterns. Contrary to some studies, this research found a significant correlation between caffeinated drink intake and BMI, emphasizing the need for awareness regarding potential long-term health effects. The findings highlight the need for increased awareness and education regarding the potential side effects of excessive caffeinated drink consumption. Health awareness programs and nutritional lectures could be beneficial in mitigating the adverse effects and promoting healthier consumption habits among students.

REFERENCES

Ahmad, Mubashir; E Hinna, Rashk; and Tayyab, Ahmad (2017) "Knowledge and trends of caffeine consumption Among medical and non-medical students of Lahore Pakistan," Pakistan Journal of Neurological Sciences (PJNS): Vol. 12: Iss. 2, Article 5.

Al Ghali RM, Al Shaibi H, Al Majed H, Haroun D. Caffeine consumption among Zayed University students in Dubai, United Arab Emirates: A cross-sectional study. Arab J Nutr Exercise. 2016;1(3):131-141.

Al Shaibi H, Al Majed H, Haroun D. Caffeine consumption among Zayed University students in Dubai, United Arab Emirates: A cross-sectional study. Arab J Nutr Exercise. 2017;1(3):131-141.

Alawadh, R. A., Abid, N., Alsaad, A. S., Aljohar, H. I., Alharbi, M. M., & Alhussain, F. K. (2022). Arabic Coffee Consumption and Its Correlation to Obesity Among the General Population in the Eastern Province, Kingdom of Saudi Arabia. Cureus, 14(10), e30848.

Albinsaleh, A. A., Al Wael, W. M., Nouri, M. M., Alfayez, A. M., Alnasser, M. H., & Alramadan, M. J. (2023). Prevalence and Factors Associated with Poor Sleep Quality

Among Visitors of Primary Healthcare Centers in Al-Ahsa, Kingdom of Saudi Arabia: An Analytical Cross-Sectional Study. Cureus, 15(7), e42653.

Berhanu, H., Mossie, A., Tadesse, S., & Geleta, D. (2018). Prevalence and Associated Factors of Sleep Quality among Adults in Jimma Town, Southwest Ethiopia: A Community-Based Cross-Sectional Study. Sleep disorders, 2018, 8342328.

Bouchard, D. R., Ross, R., & Janssen, I. (2010). Coffee, tea and their additives: association with BMI and waist circumference. Obesity facts, 3(6), 345–352.

Brant H, Missie A, Tadesse S, Geleta D. Prevalence and associated characteritics of sleep quality among adults in Jimma Town, Southwest Ethopia: a community-based cross-sectional study. Sleep Discord. 2017; 2018:8342328.

Bryant Ludden, A., & Wolfson, A. R. (2010). Understanding adolescent caffeine use: connecting use patterns with expectancies, reasons, and sleep. Health education & behavior: the official publication of the Society for Public Health Education, 37(3), 330–342.

Caffeine Consumption and Depression, Anxiety, and Stress Levels Among University Students in Medina: A Cross-Sectional Study. Cureus, 15(10), e48018.

Castelli, L., Mulè, A., Scurati, R., Esposito, F., Galasso, L., & Roveda, E. (2019). Biological Rhythm and Chronotype: New Perspectives in Health. Biomolecules, 11(4), 487.

Cheng, A. L., Yang, H., Li, C., Zhao, M., & Xi, B. (2024). Zhonghua yu fang yi xue za zhi [Chinese journal of preventive medicine], 58(5), 622–628.

Doak S, Kearney JM, McCormack JM, Keaver L. (18-19). The relationship between diet and lifestyle behaviours in a sample of higher education students: a cross-sectional study. Clin Nutr ESPEN. 2023; 54:293-299.

Eltyeb, E. E., Al-Makramani, A. A., Mustafa, M. M., Shubayli, S. M., Madkhali, K. A., Zaalah, S. A., Ghalibi, A. T., Ali, S. A., Ibrahim, A. M., & Basheer, R. A. (2023). Caffeine Consumption and Its Potential Health Effects on Saudi Adolescents in Jazan. Cureus, 15(8), e44091.

Gallego-Gómez, J. I., González-Moro, M. T. R., González-Moro, J. M. R., Vera-Catalán, T., Balanza, S., Simonelli-Muñoz, A. J., & Rivera-Caravaca, J. M. (2021). Relationship between sleep habits and academic performance in university Nursing students. BMC nursing, 20(1), 100.

Garcia P, Kerney JM, McCormack JM, Keaver L. (18-19). The relationship between diet and lifestyle behaviours in a sample of higher education students: a cross-sectional study. Clin Nutr ESPEN. 2023; 54:293-299.

Garfield V. (2019). The Association Between Body Mass Index (BMI) and Sleep Duration: Where Are We after nearly Two Decades of Epidemiological Research? International journal of environmental research and public health, 16(22), 4327.

Górnicka, M., Pierzynowska, J., Kaniewska, E., Kossakowska, K., & Woźniak, A. (2014). School pupils and university students surveyed for drinking beverages containing caffeine. Roczniki Panstwowego Zakladu Higieny, 65(2), 113–117.

Grosso, G., Stepaniak, U., Micek, A., Topor-Mądry, R., Pikhart, H., Szafraniec, K., & Pająk, A. (2015). Association of daily coffee and tea consumption and metabolic syndrome: results from the Polish arm of the HAPIEE study. European journal of nutrition, 54(7), 1129–1137.

Hameleers, P. A., Van Boxtel, M. P., Hogervorst, E., Riedel, W. J., Houx, P. J., Buntinx, F., & Jolles, J. (2000). Habitual caffeine consumption and its relation to memory, attention, planning capacity and psychomotor performance across multiple age groups. Human psychopharmacology, 15(8), 573–581.

Heckman M.A., Weil J., de Mejia E.G. Caffeine (1, 3, 7-trimethylxanthine) in foods: A comprehensive review on consumption, functionality, safety, and regulatory matters. J. Food Sci. 2010;75: R77–R87.

Hewlett, P., & Smith, A. (2007). Effects of repeated doses of caffeine on performance and alertness: new data and secondary analyses. Human psychopharmacology, 22(6), 339–350.

Hidiroglu, S., Tanriover, O., Unaldi, S., Sulun, S., & Karavus, M. (2013). A survey of energy-drink consumption among medical students. JPMA. The Journal of the Pakistan Medical Association, 63(7), 842–845.

Hidiroglu, S., Tanriover, O., Unaldi, S., Sulun, S., & Karavus, M. (2013). A survey of energy-drink consumption among medical students. JPMA. The Journal of the Pakistan Medical Association, 63(7), 842–845.

Iqbal TA, Maken ZH. Use of caffeine intake among medical students during examinations in a public sector medical college of Pakistan. Pakistan Journal of Public Health. 2016;6(2): [1-56].

Islam MA, Al-karasneh AF, Hussain AB, Muhanna A. Assessment of beverage consumption by young adults in Saudi Arabia. Saudi Pharm J. 2020; 28:1635-1647.

Jahrami, H., Al-Mutarid, M., Penson, P. E., Al-Islam Faris, M., Saif, Z., & Hammad, L. (2020). Intake of Caffeine and Its Association with Physical and Mental Health Status among University Students in Bahrain. Foods (Basel, Switzerland), 9(4), 473.

James, J. E., & Rogers, P. J. (2005). Effects of caffeine on performance and mood: withdrawal reversal is the most plausible explanation. Psychopharmacology, 182(1), 1–8.

Juliano, L. M., & Griffiths, R. R. (2004). A critical review of caffeine withdrawal: empirical validation of symptoms and signs, incidence, severity, and associated features. Psychopharmacology, 176(1), 1–29.

Kang, J. M., Lee, J. A., Jang, J. W., Kim, Y. S., & Sunwoo, S. (2013). Factors associated with poor sleep quality in primary care. Korean journal of family medicine, 34(2), 107–114.

Khan MS, Nisar N, Naqvi SAA, Nawab F. Caffeine Consumption and Academic Performance among Medical Students of Dow University of Health Sciences (DUHS), Karachi, Pakistan [Online]. Annals ASH KM&DC 2017; 22:81-7.

Kharaba, Z., Sammani, N., Ashour, S., Ghemrawi, R., Al Meslamani, A. Z., Al-Azayzih, A., Buabeid, M. A., & Alfoteih, Y. (2022). Caffeine Consumption among Various University Students in the UAE, Exploring the Frequencies, Different Sources and Reporting Adverse Effects and Withdrawal Symptoms. Journal of nutrition and metabolism, 2022, 5762299.

Lee, K. H., Human, G., Fourie, J., Louw, W., Larson, C., & Joubert, G. (2009). Medical students' use of caffeine for 'academic purposes and their knowledge of its benefits, side-effects and withdrawal symptoms. South African Family Practice, 51(4), 322–327.

Lieberman, H. R., Agarwal, S., & Fulgoni, V. L., 3rd (2019). Daily Patterns of Caffeine Intake and the Association of Intake with Multiple Sociodemographic and Lifestyle Factors in US Adults Based on the NHANES 2007-2012 Surveys. Journal of the Academy of Nutrition and Dietetics, 119(1), 106–114.

Lopez-Garcia, E., van Dam, R. M., Rajpathak, S., Willett, W. C., Manson, J. E., & Hu, F. B. (2006). Changes in caffeine intake and long-term weight change in men and women. The American journal of clinical nutrition, 83(3), 674–680.

Madrid-Valero, J. J., Martínez-Selva, J. M., Ribeiro do Couto, B., Sánchez-Romera, J. F., & Ordoñana, J. R. (2017). Age and gender effects on the prevalence of poor sleep quality in the adult population. Gaceta sanitaria, 31(1), 18–22.

Makki, N. M., Alharbi, S. T., Alharbi, A. M., Alsharif, A. S., & Aljabri, A. M. (2023). Caffeine Consumption and Depression, Anxiety, and Stress Levels Among University Students in Medina: A Cross-Sectional Study. Cureus, 15(10), e48018.

Matsuura, H., Mure, K., Nishio, N., Kitano, N., Nagai, N., & Takeshita, T. (2012). Relationship between coffee consumption and prevalence of metabolic syndrome among Japanese civil servants. Journal of epidemiology, 22(2), 160–166.

Miller K. E. (2008). Energy drinks, race, and problem behaviors among college students. The Journal of adolescent health: official publication of the Society for Adolescent Medicine, 43(5), 490–497.

Mitchell, D.C.; Knight, C.A.; Hockenberry, J.; Teplansky, R.; Hartman, T.J. Beverage caffeine intakes in the U.S. Food Chem. Toxicol.2014, 63, 136–142.

Mithawk, Guo, T., Tang, X., & Zhao, Y. (2020). Caffeinated Drinks Intake, Sleep cycle, and Altered Body Mass Index among Medical Students in Chongqing: A Mediation Model. International journal of environmental research and public health, 15(8), 1721.

Montaruli, A., Castelli, L., Mulè, A., Scurati, R., Esposito, F., Galasso, L., & Roveda, E. (2019). Biological Rhythm and Chronotype: New Perspectives in Health. Biomolecules, 11(4), 487.

Mota, M. C., Waterhouse, J., De-Souza, D. A., Rossato, L. T., Silva, C. M., Araújo, M. B., Tufik, S., de Mello, M. T., & Crispim, C. A. (2016). Association between chronotype, food intake and physical activity in medical residents. Chronobiology international, 33(6), 730–739.

Plumber, N., Majeed, M., Ziff, S., Thomas, S. E., Bolla, S. R., & Gorantla, V. R. (2021). Stimulant Usage by Medical Students for Cognitive Enhancement: A Systematic Review. Cureus, 13(5), e15163.

Rahamathulla MP. Prevalence, side effects and awareness about energy drinks among the female university students in Saudi Arabia. Pak J Med Sci. 2017; 33(2):347-352.

Riera-Sampol A, Rodas L, Martínez S, Moir HJ, Tauler P. Caffeine Intake among Undergraduate Students: Sex Differences, Sources, Motivations, and Associations with Smoking Status and Self-Reported Sleep Quality. Nutrients. 2022 Apr 16;14(8):1661.

Ríos, J. L., Betancourt, J., Pagán, I., Fabián, C., Cruz, S. Y., González, A. M., González, M. J., Rivera-Soto, W. T., & 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 sciences journal, 32(2), 95–100.

Romo-Nava, F., Tafoya, S. A., Gutiérrez-Soriano, J., Osorio, Y., Carriedo, P., Ocampo, B., Bobadilla, R. I., & Heinze, G. (2016). The association between chronotype and perceived academic stress to depression in medical students. Chronobiology international, 33(10), 1359–1368.

Rosi, A., Lotti, S., Vitale, M., Pagliai, G., Madarena, M.P., Bonaccio, M., Esposito, S., Ferraris, C., Guglielmetti, M., Angelino, D., Martini, D., & Dinu, M. (2022). Association between chronotype, sleep pattern, and eating behaviours in a group of Italian adults. International Journal of Food Sciences and Nutrition, 73, 981 - 988.

Samaha, A., Al Tassi, A., Yahfoufi, N., Gebbawi, M., Rached, M., & Fawaz, M. A. (2019). Data on the relationship between caffeine addiction and stress among Lebanese medical students in Lebanon. Data in brief, 28, 104845. https://doi.org/10.1016/j.dib.2019.104845

Smith, L., Hamer, M., & Tudor Edwards, R. (2020). The association between energy drink consumption, sleep, stress, and suicidality in 6,400 teenagers. European Psychiatry, 63(1), e98.

Tseng HC, Wang CJ, Cheng SH, Sun ZJ, Chen PS, Lee CT, Lin SH, Yang YK, Yang YC. Tea-drinking habit among new university students: Associated factors. Medicine (Baltimore). 2013 Sep 14; 92(23): e406.

Usman A, Bhombal TS, Jawaid A, Zaki S. Energy drinks consumption practices among medical students of a private sector university of Karachi, Pakistan. J Pak Med Assoc 2015; 65:105-7.183.

Vernarelli, J. A., & Lambert, J. D. (2013). Tea consumption is inversely associated with weight status and other markers for metabolic syndrome in US adults. European journal of nutrition, 52(3), 1039–1048.

Warburton, D. M., Bersellini, E., & Sweeney, E. (2001). An evaluation of a caffeinated taurine drink on mood, memory and information processing in healthy volunteers without caffeine abstinence. Psychopharmacology, 158(3), 322–328.

Watson, E. J., Coates, A. M., Kohler, M., & Banks, S. (2016). Caffeine Consumption and Sleep Quality in Australian Adults. Nutrients, 8(8), 479.

Wu, C. H., Lu, F. H., Chang, C. S., Chang, T. C., Wang, R. H., & Chang, C. J. (2003). Relationship among habitual tea consumption, percent body fat, and body fat distribution. Obesity research, 11(9), 1088–1095.

Yeomans, M. R., Ripley, T., Davies, L. H., Rusted, J. M., & Rogers, P. J. (2002). Effects of caffeine on performance and mood depend on the level of caffeine abstinence. Psychopharmacology, 164(3), 241–249.

Yi, X., Yin, C., Chang, M., & Xiao, Y. (2012). Prevalence and risk factors of obesity among school-aged children in Xi'an, China. European journal of pediatrics, 171(2), 389–394.

Zhang, Y., Xiong, Y., Dong, J., Guo, T., Tang, X., & Zhao, Y. (2018). Caffeinated Drinks Intake, Late Chronotype, and Increased Body Mass Index among Medical Students in Chongqing, China: A Multiple Mediation Model. International journal of environmental research and public health, 15(8), 1721.