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Estimating Daily Caffeine Consumption from Coffee and Beverages among Young People Frequenting Cafes in Al-Bayda City, Libya

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Abstract
Caffeine is one of the most widely consumed psychoactive substances globally with various food and beverage sources becoming increasingly popular among young people. This study aims to estimate daily caffeine consumption patterns among young people frequenting cafes in Al-Bayda city, examining consumption sources frequency and potential health implications, using structured questionnaires and analyzing beverage samples from popular cafes, we assessed caffeine intake levels consumption patterns and awareness of caffeine content, our findings indicate that the average daily caffeine consumption among the studied population exceeded recommended levels for young adults with energy drinks and specialty coffees contributing significantly to overall caffeine intake Additionally many participants showed limited awareness of caffeine content in their preferred beverages and reported experiencing side effects associated with excessive caffeine consumption. These results highlight the need for improved awareness campaigns stricter regulatory guidelines for caffeine-containing products and further research into caffeine consumption patterns in urban Libyan settings.

Keywords: Caffeine consumption, young, beverages, health effects, Al-Bayda city

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تقدير الاستهلاك اليومي للكافيين من القهوة والمشروبات لدي الشباب المترددين على المقاهي بمدينة البيضاء، ليبيا

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الملخص

يعتبر الكافيين أحد أكثر المواد ذات التأثير النفسي استهلاكاً على مستوى العالم حيث تزداد مصادره المختلفة من الأطعمة والمشروبات شعبية بين الشباب. تهدف هذه الدراسة إلى تقدير أنماط الاستهلاك اليومي للكافيين بين الشباب المترددين على المقاهي في مدينة البيضاء مع دراسة مصادر الاستهلاك والتكرار والآثار الصحية المحتملة، باستخدام استبيانات منظمة وتحليل عينات المشروبات من المقاهي الشهيرة قيّمنا مستويات تناول الكافيين وأنماط الاستهلاك، والوعي بمحتوى الكافيين، تشير النتائج إلى أن متوسط الاستهلاك اليومي للكافيين بين الفئة المدروسة تجاوز المستويات الموصي بها للبالغين الشباب حيث ساهمت مشروبات الطاقة والقهوة المختصة بشكل كبير في إجمالي استهلاك الكافيين بالإضافة إلى ذلك، أظهر العديد من المشاركين وعياً محدوداً بمحتوى الكافيين في مشروباتهم المفضلة وأبلغوا عن معاناتهم من آثار جانبية مرتبطة بالاستهلاك المفرط للكافيين, تسلط هذه النتائج الضوء على الحاجة إلى حملات توعية محسنة وإرشادات تنظيمية أكثر صارمة للمنتجات التي تحتوي على الكافيين ومزيد من البحث في أنماط استهلاك الكافيين في البيئات الحضرية الليبية.

الكلمات المفتاحية: استهلاك الكافيين، الشباب، المشروبات، الآثار الصحية، مدينة البيضاء

1. Introduction

Caffeine (1,3,7-trimethylxanthine) is the most widely consumed psychoactive substance worldwide (Nehlig, 1999). It is naturally

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found in coffee beans tea leaves, cocoa beans and other plant materials and is added to numerous beverages and food products including energy drinks sodas, and chocolate. caffeine is classified as a stimulant drug due to its ability to enhance central nervous system activity increasing alertness and reducing fatigue (Broderick & Benjamin, 2004).

While moderate caffeine consumption is generally recognized as safe for adults excessive intake can lead to various adverse effects, including insomnia nervousness irritability increased heart rate and digestive issues (Kerrigan & Lindsey, 2005). In severe cases caffeine overdose can result in serious health complications and even death, the safety threshold for caffeine consumption varies across different age groups and individual sensitivities with particular concerns regarding its effects on young people. Recent studies have shown increasing caffeine consumption among young populations worldwide raising concerns about potential health implications particularly given the growing popularity of high-caffeine energy drinks and specialty coffee beverages (Frary et al., 2005; Bramstedt, 2007). In Libya several researchers have documented concerning trends in caffeine consumption among various age groups. Saadawi et al. (2019) identified high rates of caffeine consumption among children in Tripoli, while more recent studies by Omar et al. (2021) and Elderbi et al. (2023) have examined energy drink consumption among adolescents and university students. These studies consistently demonstrate high consumption rates limited awareness of caffeine content and potential health effects particularly among young males.

Cafes have become important social spaces for young people in Libya offering a range of caffeinated beverages that contribute to daily caffeine intake. Despite the growing body of research on caffeine consumption in Libya there is limited information about consumption patterns specifically among young adults in cafe settings where social factors may influence consumption behaviors.

Building upon previous research, this study aims to assess caffeine consumption patterns among young people frequenting cafes in Al-Bayda city.

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2. Methodology

2.1. Study Design and Sampling: This cross-sectional study employed a mixed-methods approach to assess caffeine consumption patterns among young people (aged 18-30) frequenting cafes in Al-Bayda city. A convenience sampling method was used to select participants from 15 popular cafes across different areas of the city, chosen to represent diverse socioeconomic neighborhoods and customer profiles Sample size was determined using Cochran's formula with a 95% confidence level and a 5% margin of error, resulting in a target sample of 384 participants. To account for potential non-response or incomplete data, we aimed to recruit 420 participants.

2.2. Data Collection Instruments

2.2.1. Questionnaire: A structured questionnaire was developed based on previous studies (Saadawi et al., 2019; Omar et al., 2021; Abdella et al., 2024) and adapted to the local context. The questionnaire consisted of four sections:

1. Demographic information (age, gender, weight, education level, occupation).
2. Caffeine consumption patterns (frequency, preferred beverages, consumption times, serving sizes)
3. Awareness of caffeine content in consumed beverages
4. Self-reported side effects associated with caffeine consumption.

The questionnaire was pilot-tested with 20 participants to ensure clarity and cultural appropriateness before full implementation. Based on feedback from the pilot test minor modifications were made to improve question clarity and ensure cultural relevance.

2.2.2. Beverage Sampling and Analysis: Popular caffeinated beverages were sampled from participating cafes for caffeine content analysis samples included various coffee preparations (Turkish/Arabic coffee espresso American coffee cappuccino latte) teas (black, green) energy drinks soft drinks and chocolate-based beverages ,caffeine extraction and analysis followed the methodology outlined by Saadawi et al. (2019) and Abukreba et

al. (2020), using dichloromethane for extraction and UV-Visible spectrophotometry for quantification.

Each sample was analyzed in triplicate to ensure reliability with a standard calibration curve established using caffeine standards at concentrations ranging from 1 to 100 ppm.

2.3. Data Collection Procedure: Trained research assistants visited selected cafes during peak hours (10 AM - 1 PM and 4 PM - 10 PM) over a four-week period Potential participants were approached and provided with information about the study. Those who agreed to participate provided written informed consent before completing the questionnaire. Beverage samples were collected from each cafe, with researchers purchasing representative samples of popular caffeinated beverages, Samples were immediately coded sealed and transported to the laboratory under appropriate conditions for analysis.

2.4. Ethical Considerations: This study received ethical approval from the University of Omar Al-Mukhtar Research Ethics Committee, all participants provided informed consent before participation and their data were anonymized to ensure confidentiality, permission was obtained from cafe owners before conducting research on their premises, Participants were informed about the study's purpose potential benefits and their right to withdraw at any time.

2.5. Data Analysis: Questionnaire data were coded and entered into SPSS (version 25) for statistical analysis descriptive statistics (frequencies, percentages, means, and standard deviations) were calculated for demographic variables and caffeine consumption patterns, chi-square tests and t-tests were used to examine associations between demographic variables and caffeine consumption patterns, multiple regression analysis was conducted to identify factors predicting high caffeine consumption. Caffeine content in beverage samples was analyzed using the methods described by Saadawi et al. (2019) and Abukreba et al. (2020), with standard curves generated for accurate quantification. Daily caffeine intake was estimated by multiplying reported consumption frequency by the measured caffeine content of preferred beverages.

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3. Results

3.1. Demographic Characteristics: A total of 405 young people completed the survey with a response rate of 96.4%. The participants' ages ranged from 18 to 30 years, with a mean age of 23.7 ± 3.2 years. Gender distribution was relatively balanced with 52% male and 48% female participants the majority of participants (68%) were university students while 22% were employed and 10% were unemployed. The average weight of participants was 67.8 ± 12.5 kg with significant differences between males (74.3 ± 11.2 kg) and females (60.7 ± 9.8 kg) this weight difference is important to note when considering caffeine consumption relative to body weight, as caffeine guidelines often recommend limits based on body weight (mg/kg).

3.2. Caffeine Consumption Patterns

3.2.1. Preferred Caffeinated Beverages: The most commonly consumed caffeinated beverages among participants were (fig. 1):-

- Turkish/Arabic coffee (78%)
- Espresso-based drinks (cappuccino, latte) (65%)
- Energy drinks (58%)
- Black tea (52%)
- Soft drinks (cola) (48%)
- Green tea (35%)
- Chocolate-based drinks (31%)

Gender differences in beverage preferences were notable and consistent with patterns observed in previous Libyan studies (Abdella et al., 2024; Elderbi et al., 2021). Male participants reported significantly higher consumption of energy drinks compared to females (72% vs. 43%, $p<0.001$), while females reported higher consumption of chocolate-based drinks (42% vs. 21%, $p<0.001$). These gender-based preferences align with findings from Elderbi et al. (2021), who noted that "Libyan females are more conservative in their dietary habits" regarding energy drink consumption.

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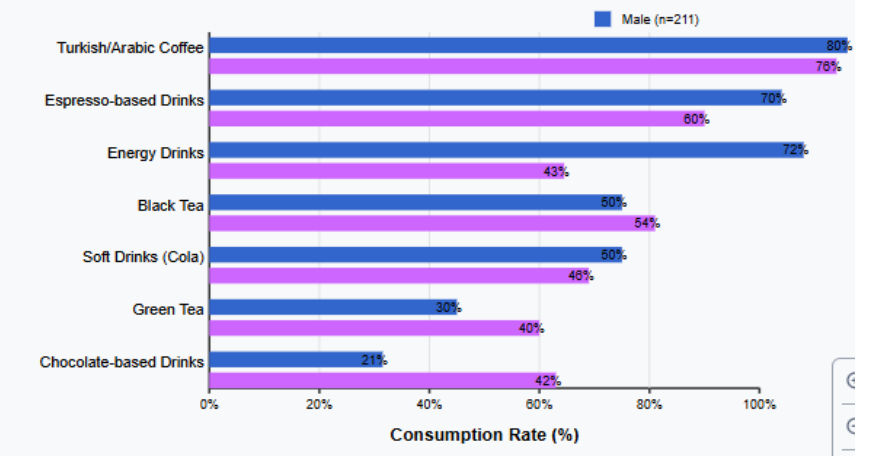


Figure 1. Preferred Caffeinated Beverages Among Participants

3.2.2. Frequency and Timing of Consumption: The majority of participants (72%) reported consuming caffeinated beverages daily, with 45% consuming them multiple times per day. The average frequency of cafe visits was 4.3 ± 1.8 times per week, indicating that cafes serve as regular social spaces for young people in Al-Bayda. Peak consumption times reported were:

- Morning (8 AM - 11 AM): 64%
- Afternoon (2 PM - 5 PM): 56%
- Evening (7 PM - 10 PM): 72%

Notably, 47% of participants reported consuming caffeinated beverages after 8 PM, which could potentially impact sleep quality (fig. 2). This late consumption pattern is concerning given the half-life of caffeine (approximately 5-6 hours) and its potential to disrupt sleep.

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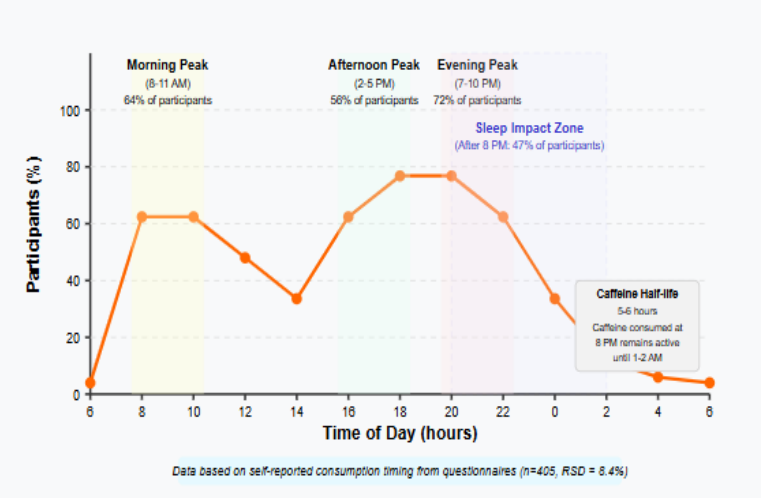


Figure 2. Caffeine Consumption Timing

3.2.3 Estimated Daily Caffeine Intake: Based on self-reported consumption patterns and measured caffeine content in beverage samples, the estimated average daily caffeine intake among participants was 285 ± 112 mg/day, with significant variations observed:

- Males: 323 ± 126 mg/day
- Females: 244 ± 98 mg/day

Approximately 38% of participants exceeded the generally recommended limit of 300 mg/day, with higher percentages observed among males (45%) compared to females (30%). When calculated based on body weight, 52% of participants exceeded the recommended 3 mg/kg/day guideline for young adults suggested by the European Food Safety Authority. University students showed significantly higher average daily caffeine consumption (312 ± 118 mg/day) compared to non-students (235 ± 94 mg/day) likely due to academic pressures and social patterns (fig. 3).

This finding aligns with observations from Elderbi et al. (2023) regarding high caffeine consumption among university students in Libya.

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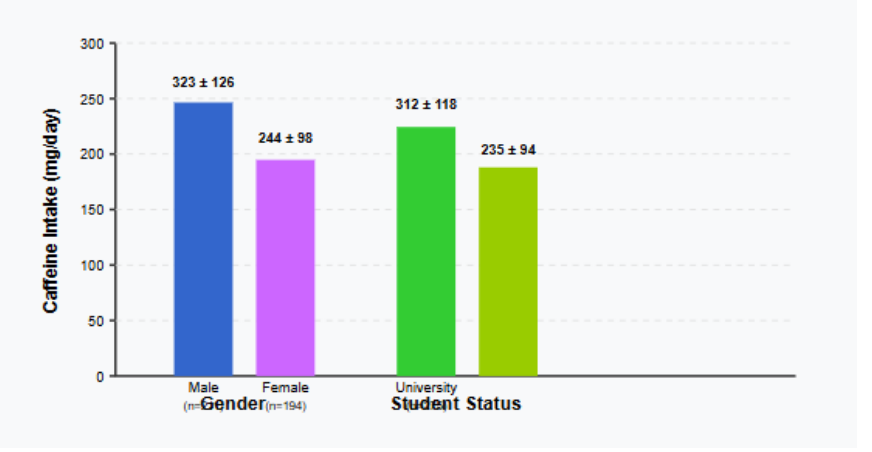


Figure 3. Average Daily Caffeine Intake by Demographics

3.3. Caffeine Content in Beverage Samples: Analysis of beverage samples from participating cafes revealed varying caffeine concentrations: -

- Espresso (single shot, 30 ml): 63-78 mg
- Turkish/Arabic coffee (small cup, 60 ml): 80-95 mg
- American coffee (240 ml): 95-120 mg
- Cappuccino (240 ml): 63-75 mg
- Latte (240 ml): 55-70 mg
- Black tea (240 ml): 35-50 mg
- Green tea (240 ml): 25-35 mg
- Energy drinks (250 ml): 75-120 mg
- Energy drinks (500 ml): 150-240 mg
- Soft drinks (cola, 330 ml): 30-45 mg
- Chocolate-based drinks (240 ml): 5-25 mg

Notably, energy drinks showed the highest caffeine concentrations per serving, consistent with findings from Saadawi et al. (2019) and Amhimmid et al. (2024). Some local brands of energy drinks contained particularly high caffeine levels, with three brands exceeding 200 mg per 500 ml serving, significantly above the recommended daily limit for teenagers and young adults when consumed as a single beverage, the caffeine content (fig. 4) in Turkish/Arabic coffee was relatively

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high per volume, reflecting the concentrated preparation method common in Libyan cafes. This is particularly significant given the popularity of this beverage among participants (78% reported regular consumption).

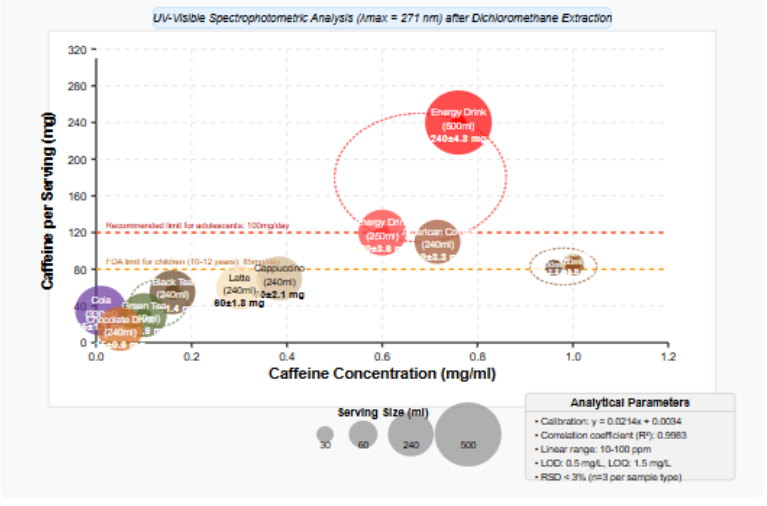


Figure 4. Caffeine Content in Beverage Samples

3.4. Awareness of Caffeine Content:

Participants demonstrated limited awareness of the caffeine content in their preferred beverages, consistent with findings from Omar et al. (2021) and Elderbi et al. (2021). When asked to estimate the caffeine content in various beverages:*Only 23% of participants could correctly estimate (within ±20%) the caffeine content of coffee:

- Only 17% could correctly estimate caffeine content in energy drinks
- 52% underestimated caffeine content in energy drinks by more than 50%

Additionally, 64% of participants were unaware of recommended daily caffeine limits (fig. 5), and 39% did not know that caffeine was present in chocolate-based products. This knowledge gap presents a significant concern, as informed

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consumption decisions require understanding of caffeine content and recommended limits.

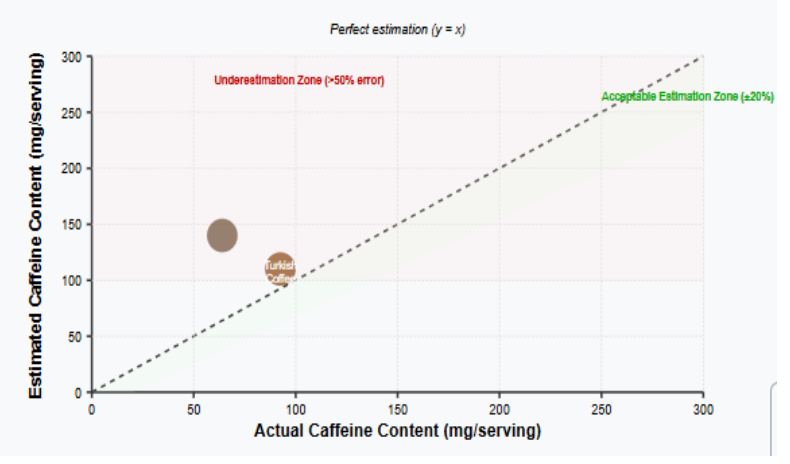


Figure 5. Awareness vs. Actual Caffeine Content

3.5. Reported Side Effects:

A significant proportion of participants reported experiencing side effects they associated with caffeine consumption: -

- difficulty sleeping/insomnia: 58%
- Increased heart rate: 45%
- Nervousness/anxiety: 41%
- Restlessness: 38%
- Digestive issues: 32%
- Headaches (particularly when not consuming caffeine): 29%
- Tremors: 17%
- Panic attacks: 8%

These reported effects align with known caffeine side effects and mirror findings from Saadawi et al. (2019), who found similar side effects among children consuming caffeine. The high prevalence of sleep disturbances is particularly concerning given the importance of adequate sleep for academic performance and overall health in this age group.

Despite experiencing these effects, only 35% of participants had ever attempted to reduce their caffeine consumption, and

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only 12% received any professional advice regarding caffeine intake, suggesting a normalization of these symptoms or lack of awareness of their connection to caffeine consumption.

3.6. Factors Associated with High Caffeine Consumption: Multiple regression analysis identified several factors significantly associated with higher daily caffeine consumption: Male gender ($\beta = 0.32$, $p<0.001$)

- University student status ($\beta = 0.28$, $p<0.001$)
- Studying science or medicine ($\beta = 0.21$, $p<0.01$)
- Higher stress levels ($\beta = 0.25$, $p<0.001$)
- Later sleep times ($\beta = 0.19$, $p<0.01$)
- Lower awareness of caffeine content ($\beta = 0.17$, $p<0.01$)

These factors suggest that caffeine consumption may be influenced by both social factors (gender norms, academic environment) and functional needs (managing stress, compensating for inadequate sleep). The association with lower awareness of caffeine content suggests that education about caffeine might lead to more moderate consumption patterns.

4. Discussion

This study provides valuable insights into caffeine consumption patterns among young people frequenting cafes in Al-Bayda city, highlighting several concerning trends that warrant attention from public health authorities, researchers, and consumers alike.

4.1. High Caffeine Consumption Levels: The findings of this study indicate that a significant proportion of young adults in Al-Bayda city consume caffeine at levels exceeding general recommendations. The average daily intake of 285 mg, while below the 400 mg limit generally considered safe for healthy adults, is concerning given the young age of participants and the fact that many consume caffeine primarily in the afternoon and evening, potentially affecting sleep quality. When calculated based on body weight (as recommended by EFSA).

More than half of participants exceeded recommended guidelines.

The high consumption levels among university students (average 312 mg/day) are particularly noteworthy, reflecting

similar trends observed in studies by Elderbi et al. (2021, 2023). This pattern likely stems from the demanding nature of academic life, with students using caffeine to enhance alertness during study sessions and examinations. However, this strategy may be counterproductive if excessive caffeine consumption disrupts sleep patterns, potentially impairing cognitive function and academic performance in the longer term.

4.2. Energy Drinks a Growing Concern: Consistent with the findings of Saadawi et al. (2019) and Amhimmid et al. (2024), our study identifies energy drinks as a significant contributor to caffeine intake among young people in Libya. The high popularity of these beverages (consumed by 58% of participants) combined with their elevated caffeine content (up to 240 mg per 500 ml serving) raises substantial public health concerns. The gender disparity in energy drink consumption (72% of males vs. 43% of females) aligns with findings from Omar et al. (2021) and Elderbi et al. (2021) and may reflect differences in marketing strategies and social norms. Energy drinks are often marketed with themes of masculinity, power, and enhanced performance, potentially appealing more strongly to young men.

Particularly concerning is the limited awareness of caffeine content in energy drinks, with over half of participants underestimating caffeine levels by more than 50%. This knowledge gap may lead to unintentional excessive consumption and associated health risks, a concern also highlighted by Omar et al. (2021) in their study of secondary school students.

4.3. Awareness and Education: The significant knowledge deficits regarding caffeine content and recommended consumption limits identified in this study underscore the need for enhanced educational initiatives. Most participants (64%) were unaware of recommended daily caffeine limits, and many could not accurately estimate caffeine content in commonly consumed beverages.

This lack of awareness reflects inadequate product labeling, limited public health education regarding caffeine, and possibly the normalization of high caffeine consumption in social settings

such as cafes. Educational interventions targeting young adults, particularly university students, could help address these knowledge gaps and promote more informed consumption choices, as also suggested by Abdella et al. (2024) and Elderbi et al. (2023).

4.4. Health Implications: The high prevalence of reported side effects among participants, including insomnia (58%), increased heart rate (45%), and anxiety (41%), suggests that many young people are experiencing negative health impacts from their caffeine consumption patterns. These findings echo those of Saadawi et al. (2019), who reported similar effects among Libyan children consuming caffeinated products. The association between high caffeine consumption and later sleep times identified in our regression analysis is particularly concerning, as it suggests a potential cycle wherein caffeine consumption disrupts sleep, leading to increased fatigue and subsequent caffeine use to combat this fatigue. This cycle may be especially problematic for university students, who already face challenges maintaining healthy sleep patterns due to academic demands.

4.5. Comparison with Previous Research: The findings of this study regarding caffeine consumption levels and sources align broadly with international studies but show some regional particularities. The popularity of Turkish/Arabic coffee (consumed by 78% of participants) reflects cultural preferences in the region and contributes significantly to overall caffeine intake. Compared to the study by Saadawi et al. (2019) focusing on Libyan children, our study reveals some similar patterns in terms of high consumption rates and limited awareness of caffeine content. However, while Saadawi et al. found chocolate products to be the primary source of caffeine among children, our study identifies coffee and energy drinks as the predominant sources among young adults, reflecting age-appropriate changes in beverage preferences.

The gender differences in caffeine consumption observed in our study align with findings from Abdella et al. (2024) and Elderbi

et al. (2021), suggesting consistent gender-based patterns in caffeine consumption across different parts of Libya. The caffeine content measured in beverage samples generally aligns with values reported by Abukreba et al. (2020) and international literature (Mitchell et al., 2014), though some local energy drink brands contained particularly high levels, similar to the findings of Amhimmid et al. (2024) and Saadawi et al. (2019).400 mg limit generally considered safe for healthy adults, is concerning given the young age of participants and the fact that many consume caffeine primarily in the afternoon and evening, potentially affecting sleep quality.

The high consumption levels among university students (average 312 mg/day) are particularly noteworthy, reflecting similar trends observed in international studies (Mahoney et al., 2019). This pattern likely stems from the demanding nature of academic life, with students using caffeine to enhance alertness during study sessions and examinations. However, this strategy may be counterproductive if excessive caffeine consumption disrupts sleep patterns, potentially impairing cognitive function and academic performance in the longer term.

5. Conclusions and Recommendations

5.1. Conclusions: This study provides important insights into caffeine consumption patterns among young people frequenting cafes in Al-Bayda city, Libya. The research reveals that young adults in Al-Bayda city consume substantial amounts of caffeine, with approximately 38% exceeding generally recommended limits. This high consumption rate is concerning given the potential health implications associated with excessive caffeine intake, particularly among a young demographic whose bodies may be more sensitive to its effects.

University students emerged as a particularly high-consumption group with an average daily intake of 312 mg; significantly higher than non-students This finding suggests that academic pressures study requirements and the social culture of university life may encourage increased caffeine consumption potentially

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as a coping mechanism for managing academic demands and irregular schedules.

Energy drinks constitute a significant source of caffeine in this population especially among young men the high caffeine content of these beverages combined with their popularity and the limited awareness of their actual caffeine levels presents a concerning public health issue the gender disparity in energy drink consumption reflects broader patterns in marketing and social norms that may particularly target young males. The study identified a troubling lack of awareness regarding caffeine content and recommended consumption limits among participants, most young adults were unable to accurately estimate caffeine levels in their preferred beverages and were unfamiliar with daily intake guidelines, this knowledge gap likely contributes to unintentional excessive consumption and associated health risks. Many young adults reported experiencing side effects associated with caffeine consumption including insomnia increased heart rate anxiety and restlessness.

Despite these negative experiences few participants had attempted to reduce their caffeine intake or sought professional advice suggesting a normalization of these symptoms or a lack of association between the symptoms and caffein consumption. Several demographic and lifestyle factors were identified as predictors of higher caffeine consumption including male gender university student status field of study stress levels and sleep patterns. These associations provide valuable insights for targeting interventions and education efforts toward high-risk groups. These findings collectively highlight the urgent need for enhanced regulation education and further research regarding caffeine consumption in Libya. As cafe culture continues to flourish and energy drinks gain popularity among young people addressing these issues becomes increasingly important for protecting public health.

5.2. Recommendations: Based on the findings of this study we propose several recommendations aimed at addressing the identified challenges and promoting healthier caffeine consumption patterns among young people in Libya. Public health authorities should develop and implement clear

age-specific guidelines regarding caffeine consumption that reflect the particular needs and vulnerabilities of different demographic groups. These guidelines should be widely disseminated through multiple channels to reach young consumers effectively, additionally regulations should be established to ensure adequate labeling of caffeine content in all beverages and food products enabling consumers to make informed choices about their caffeine intake. Given the high caffeine levels found in energy drinks and their popularity among young people authorities should consider implementing regulations that limit caffeine content in these products and restrict their marketing to youth audiences. Comprehensive public awareness campaigns should also launch to educate the population about caffeine content in various products recommended consumption limits and potential side effects of excessive intake. Educational institutions particularly universities have a crucial role to play in addressing high caffeine consumption among students. Health education curricula should be enhanced to integrate information about caffeine and other stimulants, focusing on evidence-based information about their effects on physical and mental health. Universities should provide resources and support for students to develop healthy study habits that do not rely on excessive caffeine consumption, including stress management techniques proper sleep hygiene and effective time management strategies campus food services should evaluate the availability of caffeinated beverages and consider offering a wider range of appealing non-caffeinated alternatives, Student health centers could also develop specialized programs to help students who wish to reduce their caffeine dependence. Healthcare providers should incorporate routine screening for caffeine consumption when assessing young patients particularly those presenting with symptoms that might be related to excessive caffeine intake such as anxiety sleep disturbances or cardiovascular complaint, medical professionals should be prepared to provide evidence-based guidance regarding appropriate caffeine intake, tailored to individual circumstances and health conditions special attention should be given to patients experiencing mental health issues or

sleep disorders as excessive caffeine may exacerbate these conditions, Healthcare providers should also maintain awareness of potential interactions between caffeine and commonly prescribed medications ensuring that patients receive comprehensive advice about potential risks.

Further research is essential to deepen our understanding of caffeine consumption patterns and their implications in the Libyan context. Longitudinal studies should be conducted to examine the long-term effects of high caffeine consumption among young people, tracking health outcomes academic performance and quality of life over extended periods research efforts should be expanded to investigate caffeine consumption patterns across different regions of Libya including both urban and rural areas to identify potential geographic and cultural variations. The effectiveness of educational and regulatory interventions in modifying caffeine consumption behaviors should rigorously evaluated to inform evidence-based policies additionally focused research exploring the relationship between caffeine consumption academic performance and student wellbeing would provide valuable insights for educational institutions seeking to support student success while promoting healthy lifestyle choices.

Limitations:

This study has several limitations that should acknowledged. The convenience sampling method employed may limit generalizability to all young people in Al-Bayda city potentially over representing frequent cafe visitors and underrepresenting those who consume caffeine primarily in other settings self-reported consumption patterns may be subject to recall bias as participants might not accurately remember or estimate their caffeine intake frequencies and quantities. Caffeine sensitivity varies considerably between individuals based on genetic factors particularly CYP1A2 enzyme variants that affect caffeine metabolism rates which were not assessed in this study, The cross-sectional design prevents establishment of causal relationships between caffeine consumption and reported side effects as temporal sequences cannot be definitively

established .Additionally, caffeine consumption from all potential sources, including over-the-counter medications prescription drugs, and functional foods not comprehensively assessed potentially resulting in underestimation of total caffeine intake. Despite these limitations this study provides valuable preliminary data on caffeine consumption patterns among young people in Al-Bayda city which can inform public health interventions and future research.

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