Coffea plant (Caffeine): Examining its Impact on Physical and Mental Health

Obaidullah Alimyar
Department of Biology, Faculty of Education, Parwan University, Parwan, Afghanistan

Aimal Nahiz
Department of Horticulture, Faculty of Agriculture, Helmand University, Helmand, Afghanistan

Abdul Wahid Monib
Department of Biology, Faculty of Education, Kandahar University, Kandahar, Afghanistan

Abdul Qadeer Baseer
Department of Biology, Faculty of Education, Kandahar University, Kandahar, Afghanistan

Mohammad Hassan Hassand
Department of Biology, Faculty of Education, Kandahar University, Kandahar, Afghanistan

Uzair Mohammad Kakar
Department of Chemistry, Faculty of Education, Logar University, Logar, Afghanistan

Sayedwali Sediqi
Department of Biology, Faculty of Education, Urozgan Higher Institute, Urozgan, Afghanistan

Atiqullah Sarwari
Department of Biology, Faculty of Education, Helmand University, Helmand, Afghanistan

Abdul Bari Hejran
Department of Biology, Faculty of Education, Helmand University, Helmand, Afghanistan

Mustafa Rahimi
Department of Physic, Faculty of Education, Ghazni University, Ghazni, Afghanistan

Mohammad Shafi Akhundzada
Department of Horticulture, Faculty of Agriculture, Helmand University, Helmand, Afghanistan

Parwiz Niazi
Department of Biology, Faculty of Education, Kandahar University, Kandahar, Afghanistan

Abstract
This research delves into the extensive use of caffeine across various consumables like foods, drinks, medications, and supplements. Caffeine's influence on the central nervous system renders it a popular substance globally. The study aims to elucidate how caffeine impacts health and overall well-being. It examines both the physical and mental repercussions of caffeine consumption, highlighting its advantages, risks, and individual differences in sensitivity. Moreover, the research investigates how caffeine...
Introduction

The coffee plant, belonging to the *Rubiaceae* family and *Coffea* genus, typically grows as a woody perennial tree in higher altitude regions. There are around 70 species of *Coffea*, with the most important ones being *Coffea Arabica* L. (arabica coffee) and, *Coffea canephora* (robusta coffee). *Arabica* and *Robusta* coffee differ in taste, appearance, and caffeine content. *Arabica* is preferred by consumers and accounts for 75–80% of global production, while *Robusta* captures the remaining 20% market share. *Robusta* coffee produces a less desirable taste with higher caffeine content compared to *Arabica* [1].

Caffeine is a widely consumed substance found naturally in plants like the Coffea plant, tea leaves, cacao beans, and certain nuts [2]. Coffee beans, in particular, are famous for their high caffeine content and are used to make the popular beverage enjoyed globally [3]. Besides natural sources, caffeine is also synthesized and added to various drinks, foods, and medicines. It's present in a wide range of products, from energy drinks to chocolate bars, providing consumers with easy access. Despite its different origins, caffeine's effects on the body and mind remain consistent, making it a subject of interest in fields like medicine, nutrition, and psychology [4].

The top ten countries with the highest coffee production are Brazil, Vietnam, Colombia, Indonesia, Ethiopia, Honduras, Peru, India, Uganda, and Guatemala. Leading the pack is Brazil, producing a whopping 3.0 million tons of coffee each year (Chart 1). Vietnam takes the second place with 1.7 million tons of annual coffee production [5]. Colombia is at third place with 885.1 thousand tons annually, followed by Indonesia, which produces 761.0 thousand tons per annum. Ethiopia is the fifth-largest coffee-producing country producing 482.6 thousand tons followed closely by Honduras at 476.3 thousand tons. Peru and India also demonstrate significant coffee production output with 363.3 thousand tons and 319.5 thousand tons annually, respectively. Rounding off the top ten are Uganda and Guatemala, contributing 254.1 thousand tons and 225.0 thousand tons to global coffee production each year, respectively [6].

Coffee is a popular drink made from roasted coffee beans. It contains caffeine, which adds to its appeal. Coffee has many different chemicals, and studies on its health effects mostly look at observations. In the past, worries about health risks from coffee were influenced by habits like smoking and inactivity. But now, some studies suggest coffee might lower the risk of certain diseases. Still, conflicting research makes it hard for experts and the public to understand its health effects clearly [7].

Caffeine can cause anxiety, insomnia, nervousness, and hypertension. Caffeine is a diuretic, and increases urination. Caffeine can help to relieve headaches, so a number of over-the-counter, and prescription pain relievers include it as an ingredient, usually with aspirin or another analgesic [8]. These days Energy drinks are a growing problem: significance of caffeine and mental performance, coronary heart disease, cardiovascular effects of antidepressants in children and adolescents, and bone gain in children and adolescents [9]. Thus, the World Health Organization, and some health care professionals recognize caffeine dependence as a clinical disorder.

We'll also discuss how caffeine links to common health issues like heart problems, weak bones, and mental disorders. Alongside highlighting risks, we'll provide practical tips for safe caffeine use, stressing moderation and knowing your limits. By doing so, we hope to empower everyone - from consumers to healthcare providers and policymakers - with the knowledge they need to make informed choices about caffeine, promoting better overall well-being (Table 1 in Appendix).

Materials and Methods

Articles published between January 2000 and March 2024 were selected after crossing *Coffee* or *Caffeine* with a list of keywords representative of the most relevant health areas potentially affected by Coffee or Caffeine intake.
Caffeine and Coffee

Caffeine is a natural stimulant found in various plants, including coffee beans, tea leaves, cacao beans (used to make chocolate), and kola nuts. It belongs to a class of compounds called methylxanthines and acts as a central nervous system stimulant, temporarily warding off drowsiness and restoring alertness [10]. Caffeine affects the body by blocking certain receptors, leading to stimulating effects. It increases alertness, raises blood pressure temporarily, speeds up metabolism, and promotes urine production. After consumption, caffeine is quickly absorbed in the stomach and distributed throughout the body, including the brain. The liver primarily breaks down caffeine, with a specific enzyme accounting for most of this process. The breakdown products include paraxanthine, which can undergo further transformations in the body[11].

Coffee can be prepared in various ways, including drip brewing, espresso brewing, French press, and cold brew methods. The taste, strength, and aroma of coffee can vary depending on factors such as the type of coffee beans, the roast level, and the brewing technique used [12].

Caffeine is well known as an ingredient in coffee, there is much confusion, even in research literature, between the effects of caffeine and those of coffee [13]. Coffee contains many other constituents that may also carry health benefits too. Most of the pharmacologic effects of adenosine in the brain can be suppressed by relatively low concentrations of circulating caffeine (the equivalent of 1-3 cups of coffee) [14]. Adenosine decreases the neuronal firing rate and inhibits both synaptic transmission and the release of most neurotransmitters [15]. Caffeine increases the turnover of many neurotransmitters, including monoamines and acetylcholine. Caffeine wakes people up but also disrupts the quality of sleep, consuming caffeine in the evening the equivalent of a double espresso delays the human endogenous circadian clock by antagonizing receptors for the endogenous sleep factor adenosine in the brain. Mistimed caffeine consumption may contribute to the growing incidence of sleep problems in society [16]. Coffee contains several micronutrients like magnesium, potassium, niacin, and vitamin E, which may play a role in the health benefits associated with drinking coffee [17,18].

Physiological Effects of Caffeine

Both caffeine and coffee have significant effects on the body. Caffeine, a stimulant found in coffee, blocks a neurotransmitter called adenosine in the brain, leading to increased alertness and improved focus. It also boosts the release of neurotransmitters like dopamine and norepinephrine, enhancing mood and cognitive function. Caffeine can temporarily raise heart rate and blood pressure. Moderate caffeine intake can help with alertness and performance. Coffee, being a major source of caffeine, also contains other compounds like chlorogenic acids and antioxidants that may have health benefits [19].

Caffeine is a pharmacologically active substance and, depending on the amount consumed, can be a mild stimulant to the central nervous system [20]. Caffeine is not alone in this respect, it is one of several ingredients in foods capable of exerting pharmacological, and physiological effects. For example, capsaicin in hot peppers causes the familiar burning sensation that often evokes sweating, when caffeine is consumed orally, it is rapidly absorbed into body fluids, and distributed throughout the body in its “water phase” (i.e. blood, urine etc.). However, excessive caffeine or coffee consumption can cause jitteriness, anxiety, digestive issues, and sleep problems. Therefore, it's important to consume caffeine and coffee in moderation to reap their benefits without adverse effects [21].

Clinical Studies of Central Nervous System Arousal

Caffeine has appeared to be associated with a higher overall arousal level, better processing of attended, and unattended information, and more rapid motor processes [21]. Clinical studies show that caffeine boosts alertness and reduces drowsiness by stimulating the central nervous system, it does this by blocking adenosine, a chemical that makes us feel sleepy. Caffeine can increase the release of dopamine and norepinephrine, further enhancing alertness and cognitive function [22]. These findings have important implications for productivity, cognitive abilities, and managing sleep-related issues, these studies confirm that caffeine is a popular and effective way to stay awake and alert, there is a growing body of evidence that caffeine has a significant effect on the sleep wake cycle and on circadian rhythm.

Cardiovascular and Respiratory Effects

Studies on the effects of coffee and caffeine on the heart and lungs have been conducted. Moderate coffee consumption, containing caffeine, might have heart benefits like better blood vessel function and lower heart disease risk, but too much caffeine, especially from energy drinks or supplements, can increase heart rate, blood pressure, and risk of irregular heartbeats. Caffeine can also briefly narrow blood vessels, affecting blood flow to the heart. For the lungs, caffeine acts as a bronchodilator, helping with asthma symptoms and improving breathing. But excessive caffeine intake can worsen breathing problems, especially for those with existing conditions, while some coffee and caffeine may be good for the heart and lungs in moderation, it’s important not to overdo it to avoid possible problems [24].

Caffeine induces various Cardiovascular, and respiratory effects. Arterial stiffness, and endothelium dependent vasodilatation also result, leading to
increases in systolic and diastolic blood pressure. An increase in the respiration rate is the prime effect dependent on the plasma caffeine value [25]. High doses of caffeine could potentially exacerbate cardiac conditions for which stimulants are contraindicated, including ion channelopathies and hypertrophic cardiomyopathy in children, and young adults, due to the risk of hypertension, syncope, arrhythmias, and sudden death [26].

Cancer
Research on coffee's effects on cancer is mixed. Some studies suggest that moderate coffee drinking might lower the risk of certain cancers like liver and colorectal cancer, possibly due to antioxidants in coffee, high coffee intake could potentially raise the risk of some cancers, such as bladder cancer [27]. Many epidemiological studies have explored the link between coffee or caffeine intake and cancer risk, there's scant evidence to suggest that drinking coffee increases cancer risk, particularly when accounting for smoking habits [28]. While early studies hinted at connections between caffeine intake and cancers like pancreatic, bladder, and ovarian, newer and more robust research hasn't backed up these claims, drinking a hot coffee might increase the risk of esophageal cancer, while moderate coffee drinking may have some benefits for certain cancers, more research is needed, and other factors like genetics and lifestyle also play a role, it's important to maintain a balanced diet and lifestyle to lower overall cancer risk [29].

Most of the research on possible links between cancer and caffeine has been conducted on coffee, and tea. Consequently, research on caffeine and its effects on cancer, if any, is sparse [30]. There are however, references in coffee, and tea research relating to caffeine that are generally positive. Caffeine has not been shown in animal or human studies to be carcinogenic [31]. WHO IARC concluded in his review of the research that caffeine is unlikely to be a human carcinogen at levels below cups of coffee per day, or less than 500 mg caffeine per day, the evidence indicates that caffeine, as present in coffee does not cause breast or bowel cancer, although early case control studies appeared to link caffeine intake to pancreatic, bladder, and ovarian cancers, more recent, better designed studies have not supported these conclusions, a number of case control studies have demonstrated reduced risk of colorectal cancer with coffee consumption.

Studies have shown mixed results regarding the relationship between coffee consumption and the risk of colon cancer [32]. Case-control studies suggest a lower risk of colon cancer with higher coffee intake, while prospective cohort studies don't show the same association, this could be due to biases in case-control studies regarding recalling coffee consumption and selecting control groups [33]. Recent reviews found similar patterns, with case-control studies suggesting a link between coffee and lower colon cancer risk, but prospective cohort studies not showing the same association. Interestingly, large cohort studies found a lower risk of rectal cancer among those who drank decaffeinated coffee regularly, but no association was found with caffeinated coffee, tea, or caffeine intake [29], coffee consumption didn't show a consistent association with the risk of colorectal adenoma or recurrent adenomas over time in case-control studies [34].

Effects of Caffeine on Reproductive System
Research on caffeine and coffee's impact on the reproductive system has varied results. Moderate caffeine intake, like that from coffee, may not harm fertility or reproductive health in most individuals [35]. However, excessive caffeine especially in women could increase the risk of miscarriage and affect fertility, some studies indicate high caffeine intake might lower sperm quality and male fertility, caffeine could influence hormone levels, which might affect reproductive health [36]. While moderate caffeine and coffee consumption may not greatly affect most people's reproductive function, it's crucial to watch intake, especially for those trying to conceive or with fertility concerns [37].

Conducted a very systematic review on the relationship between caffeine consumption by both pregnant women, and women of child-bearing age, and the occurrence of congenital malformations, fetal growth retardation, small- for-date babies, miscarriages, behavioral effects, maternal infertility and genetic effects [38]. The only statistically significant results were teratogenic (birth defect) effects in rats administered extremely high levels of caffeine intravenously, which do not necessarily translate to humans, and also could never be attained merely by drinking beverages containing caffeine [36]. Consulting a healthcare provider for personalized advice is recommended.

Effects of Caffeine on Gastrointestinal and Urinary
Coffee and caffeine affect the stomach and bladder. Coffee, containing caffeine, can increase stomach acid, causing heartburn in some people. It can also make some people need to use the bathroom more often due to increased bowel movements [39]. However, drinking coffee has been linked to a lower risk of certain stomach and liver issues, caffeine's diuretic effect can lead to more frequent urination, but regular coffee drinkers often become tolerant to this, while coffee and caffeine can have both good and bad effects on the stomach and bladder, it's important to use them in moderation to avoid problems [40]. Caffeine excites the small intestine, causing secretion of water, and sodium. Caffeine has been seen to promote apoptosis in, and
even serves as a psychoactive drug in the treatment of Parkinson’s disease, with its potential utilization in medicine, the safety, and effects of caffeine are important issues (Mohamed, A. R. 2024).

**Psychological Effects of Caffeine**
The psychological effects of caffeine encompass a range of influences on mood, cognition, and behavior [41], caffeine as a central nervous system stimulant, can enhance alertness, concentration, and cognitive function, making individuals feel more awake and focused. Many people rely on caffeine to combat feelings of fatigue and improve productivity, caffeine consumption has been associated with mood enhancement, leading to feelings of well-being and reduced perception of effort [42]. However, excessive caffeine intake can also induce feelings of jitteriness, anxiety, and restlessness, particularly in sensitive individuals, caffeine can disrupt sleep patterns, leading to difficulties in falling asleep or staying asleep, which can further impact mood and cognitive function, while moderate caffeine consumption can have positive psychological effects, it’s important to be mindful of individual tolerance levels and potential negative outcomes associated with excessive intake [43].

**Individual Differences in Caffeine Sensitivity**
Individual differences in caffeine sensitivity refer to variations in how people respond to caffeine based on factors such as genetics, age, weight, metabolism, and overall health [44]. Some individuals may be more sensitive to caffeine and experience stronger effects even with small amounts, while others may require higher doses to feel its effects. Some are more sensitive and feel its effects strongly, while others need more to feel anything. Pregnant women, people with health issues, and those on medications need to be extra careful with caffeine. It’s essential to know your limits and how caffeine affects you personally to stay safe and get the benefits without the drawbacks. Genetic factors play a significant role in determining caffeine sensitivity, with certain genetic variations influencing how caffeine is metabolized in the body [45]. Age can also affect caffeine sensitivity, with younger individuals typically being more sensitive than older adults due to differences in metabolism and liver function [46]. Body weight and metabolism can also influence caffeine sensitivity, as caffeine is distributed differently in the body based on these factors, overall health and medical conditions can impact caffeine sensitivity, with certain conditions such as anxiety disorders or gastroesophageal reflux disease (GERD) making individuals more susceptible to the negative effects of caffeine [47], caffeine metabolism is slower among infants, pregnant women, and individuals with liver disease [48]. Understanding individual differences in caffeine sensitivity is important for optimizing caffeine consumption and minimizing potential adverse effects.

**Effects of Caffeine on Sleep**
The effects of caffeine on sleep can be significant [46]. As a stimulant, caffeine can interfere with the body’s natural sleep-wake cycle [49]. Consuming caffeine especially in large amounts or later in the day can make it difficult to fall asleep and may reduce sleep quality [50]. Caffeine blocks the action of adenosine [51], a neurotransmitter that promotes sleepiness, leading to increased alertness and wakefulness [15], caffeine can delay the onset of sleep and reduce total sleep time, leading to feelings of restlessness and sleep fragmentation [26]. Even moderate caffeine intake particularly within several hours of bedtime can disrupt sleep patterns and contribute to insomnia [52]. Individuals vary in their sensitivity to caffeine’s sleep-disrupting effects with some people being more affected than others [53], it’s advisable to limit caffeine consumption especially in the afternoon and evening to promote better sleep quality and overall well-being.

**Influence of Caffeine on Physical Performance**
The influence of caffeine on physical performance is well-documented with numerous studies showing its potential benefits for athletes and active individuals [54]. Caffeine acts as a stimulant affecting both the central nervous system and the muscular system [55]. By blocking adenosine receptors in the brain, caffeine can reduce perceived effort and fatigue allowing individuals to exercise for longer periods with increased intensity. Caffeine has been shown to enhance muscle contraction and strength leading to improved performance in activities such as weightlifting and sprinting [56]. Caffeine can increase the mobilization and utilization of fat stores, thereby sparing glycogen and delaying the onset of fatigue during endurance exercise [57]. The ergogenic effects of caffeine are dose-dependent, with optimal doses typically ranging from 3 to 6 milligrams per kilogram of body weight[39]. However, individual responses to caffeine can vary, and some individuals may experience side effects such as jitteriness, increased heart rate, or gastrointestinal discomfort, caffeine is widely recognized as a safe and effective ergogenic aid for improving physical performance in a variety of athletic endeavors [58].

**Energy Drink Use Among Adolescents and Children**
The effects of energy drink use among adolescents and children have raised concerns in recent years [59], these beverages typically contain high levels of caffeine, along with other stimulants and sugar. Excessive consumption of energy drinks by adolescents and children has been linked to various adverse effects; including increased heart rate and blood pressure, disrupted sleep patterns, anxiety, and dehydration, the high caffeine content in these drinks can negatively...
impact developing brains and bodies, leading to impaired cognitive function and behavior problems, the combination of caffeine and other ingredients in energy drinks may pose risks for cardiovascular health, particularly in individuals with underlying heart conditions [60-63]. Furthermore, frequent consumption of energy drinks has been associated with a higher likelihood of engaging in risky behaviors such as alcohol and substance abuse, the potential risks, it’s important for parents, caregivers, and healthcare professionals to educate adolescents and children about the potential dangers of energy drink consumption and to encourage healthier beverage choices.

Children and adolescents with eating disorders especially anorexia nervosa may regularly consume high amounts of caffeine to counter caloric-restriction-associated fatigue, suppress appetite, and produce looser stools and some di-uresis.97–100 given that children and adolescents with eating disorders have a propensity for cardiac morbidity/mortality and electrolyte disorders consumption of high-caffeine energy drinks may put them at further risk for cardiac dysrhythmias, and intracardiac conduction abnormalities.97–99 [64].

Benefits of Caffeine to Human Body
Caffeine and coffee provide numerous potential benefits to the human body [65]. Caffeine’s stimulating effect on the central nervous system increases alertness and improves cognitive function, enhancing concentration and mental clarity [66], caffeine can boost physical performance by increasing adrenaline levels, making it a popular choice for athletes and those engaging in strenuous activities [67]. Coffee rich in antioxidants, offers protection against oxidative stress, reducing the risk of chronic diseases such as heart disease and certain cancers [68]. Furthermore regular coffee consumption has been associated with a lower risk of neurodegenerative diseases like Parkinson’s and Alzheimer’s [69]. Caffeine’s ability to boost metabolism and increase fat burning makes it a potential aid in weight loss efforts [70]. Moderate coffee intake has also been linked to improved liver health and mood enhancement, while some research suggests it may reduce the risk of stroke [71,72].

Besides the mental and physical performance benefits of caffeine several areas are emerging in which consumption of caffeine could be beneficial to health, some studies investigate pure caffeine, while the others not pointing out the other components in coffee and their potential confounding effects [26]. Caffeine levels observed to have beneficial effects for some conditions could have adverse effects for other health conditions, and individuals should consult a physician about safe caffeine intake levels when faced with multiple health concerns, despite these limitations, extensive explorations of caffeine have been carried out, and have provided a great deal of information regarding the effects of caffeine [9]. Caffeine consumption has also been associated with positive effects on the brain. Last three years a study from the Harvard School of Public Health suggested that drinking between two, and four cups of coffee a day may reduce suicide risk in adults, while more recent research found that ingesting 200 mg of caffeine each day may boost long term memory [73].

Disadvantages of Caffeine to the Human Body
Coffee and caffeine can have downsides too despite their benefits. Having too much caffeine whether from coffee or other sources can cause problems like feeling jittery, anxious, getting headaches, or having trouble sleeping [74], It can also make heart issues worse, raise blood pressure, and cause irregular heartbeats especially in people with heart conditions. Pregnant women should be careful too, as too much caffeine can raise the risk of miscarriage and affect the baby's development [75]. Drinking lots of caffeine regularly can make your body used to it needing more for the same effects, and you might feel tired and irritable if you suddenly cut back [76]. Some people like those with anxiety, trouble sleeping, or stomach issues, might be more sensitive to caffeine’s negative effects. Caffeine could have detrimental effects on a hypertensive that is stressed, and consumes caffeine as ultimately caffeine is a stimulant, and as with as all stimulants and substance’s abuse or overuse has negative effects [77], heavy daily caffeine use more than 500 to 600 mg a day may cause side effects such as; insomnia, nervousness, restlessness, irritability, stomach upset, fast heartbeat, muscle tremors [78]. Adverse health effects of caffeine intake in specific population group’s relevant population groups are: breast-fed infants consuming caffeine via mother’s milk, children possibly divided by age group, pregnant women, Lactating women, adults, and adolescents, adults, and adolescents performing endurance exercise [79], while moderate coffee and caffeine intake can be healthy for most people, it’s crucial to watch how much you have and be aware of potential problems [80].

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Discussion

It’s advisable to limit caffeine consumption to moderate levels, typically around 200-400 milligrams per day for most adults, this equates to roughly 2-4 cups of brewed coffee. Be mindful of the timing of caffeine consumption, particularly in the afternoon and evening, as it can interfere with sleep quality and disrupt sleep patterns, avoid consuming caffeine several hours before bedtime to promote better sleep. Pay attention to how your body responds to caffeine and adjust your intake accordingly, some individuals are more sensitive to caffeine’s effects than others, so it’s essential to know your limits. Individuals with certain health conditions, such as anxiety disorders, heart conditions, insomnia, or gastroesophageal reflux disease (GERD), may need to limit caffeine intake or avoid it altogether, consult with a healthcare professional if you have concerns about caffeine consumption and its impact on your health. Balance caffeine intake with adequate hydration by drinking plenty of water throughout the day, caffeine can have a diuretic effect, so it’s important to replenish fluids to prevent dehydration. Be cautious of consuming caffeinated beverages with added sugars, artificial sweeteners, or high-calorie additives, as these can contribute to excess calorie intake and may negate the potential health benefits of caffeine. Opt for healthier sources of caffeine, such as coffee or tea, over sugary energy drinks or caffeine supplements, which may contain excessive amounts of caffeine and other potentially harmful ingredients. By following these recommendations, individuals can enjoy the potential benefits of caffeine and coffee while minimizing the risk of adverse effects and promoting overall health and well-being. Coffee production and consumption can also affect the poverty, we will provide a few examples:

1. Economic Impact: Coffee is a significant agricultural commodity in many developing countries, providing employment and income for millions of people, in regions where coffee is grown, it can be a crucial source of revenue for smallholder farmers and their communities. However, fluctuations in coffee prices on the global market can affect the livelihoods of coffee farmers, potentially contributing to poverty when prices are low.

2. Income Inequality: The distribution of profits along the coffee supply chain can exacerbate income inequality. While coffee consumption is often concentrated in wealthier countries, the majority of coffee producers are in developing nations. This can result in disparities in wealth distribution, with farmers often receiving a small fraction of the retail price of coffee.

3. Sustainable Development: Sustainable coffee production practices, such as Fair Trade and Direct Trade initiatives, aim to address poverty by ensuring that farmers receive fair prices for their coffee and promoting environmentally friendly farming methods. By empowering farmers and investing in their communities, these initiatives can contribute to poverty alleviation.

4. Social Impact: Coffee production can also have social impacts on communities, including access to education, healthcare, and infrastructure. In regions heavily reliant on coffee farming, fluctuations in coffee prices can affect access to essential services and exacerbate poverty.

5. Environmental Sustainability: Environmental degradation caused by unsustainable coffee farming practices, such as deforestation and chemical use, can further impact vulnerable communities and contribute to poverty. Implementing sustainable farming methods.
can help mitigate these effects and promote long-term economic resilience. While coffee production and consumption can provide economic opportunities for some communities, they can also contribute to poverty and inequality in others, sustainable and ethical practices throughout the coffee supply chain are essential for addressing poverty and promoting the well-being of coffee-producing communities.

Conclusion
Caffeine from the Coffea plant has significant effects on both the body and mind. It boosts alertness and cognitive function by affecting the central nervous and cardiovascular systems, it can influence mood positively and may even help with mild depression when consumed moderately. However, managing caffeine intake is crucial due to its complex relationship with sleep; high doses can disrupt sleep patterns. Understanding individual tolerance levels and optimal dosage is essential for maximizing its positive impacts on overall well-being, caffeine consumption at varying levels may help reduce the risk of several chronic diseases, most prospective cohort studies have found that caffeine consumption does not significantly increase the risk of coronary heart disease (CHD), stroke, cancer or many women's health issues. On the basis of this review, we conclude that energy drinks have only a few therapeutic benefit, and both the known, and unknown pharmacology of various ingredients, combined with reports of toxicity, suggest that these drinks may put some children at risk for serious adverse health effects; typically, energy drinks contain high levels of caffeine, taurine, which have stimulant properties, and cardiac activity, but manufacturers claim that energy drinks are nutritional supplements. We've looked at its physical, mental, and performance-related impacts, finding that moderate intake can improve alertness, cognition, and physical abilities, too much caffeine can lead to problems like anxiety, sleep issues, and heart concerns. It's crucial to use caffeine in moderation and be aware of individual differences in tolerance. Our recommendations aim to help people make informed choices about caffeine intake, empowering consumers, healthcare providers, and policymakers, understanding caffeine's effects is key to promoting overall well-being while avoiding potential health risks, also further research is needed to fully comprehend caffeine's diverse effects and its potential in promoting physical and mental health.

Funding
This research received no external funding.

Conflict of Interests
Authors declare no conflict of interest.

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## Table 1: Different types of coffee species, their origins, potential side effects, as well as advantages and disadvantages

<table>
<thead>
<tr>
<th>Coffee</th>
<th>Origin</th>
<th>Common Varieties</th>
<th>Main Characteristics</th>
<th>Disadvantages</th>
<th>Advantages</th>
<th>Recommended Daily Intake</th>
<th>Side Effects</th>
<th>General Risks and Side Effects of Caffeine Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arabica</td>
<td>Ethiopia</td>
<td>Typica, Bourbon, Caturra, etc.</td>
<td>Smooth, mild flavor; lower caffeine content; higher acidity</td>
<td>May cause acidity and stomach discomfort in some people</td>
<td>Rich flavor profile; lower caffeine content</td>
<td>1-3 cups (150-300 mg caffeine)</td>
<td>Insomnia, jitteriness, increased heart rate</td>
<td>Increased heart rate and palpitations, Anxiety and nervousness, Insomnia and disrupted sleep patterns, Gastrointestinal issues, Headaches, Dependency and withdrawal symptoms, Increased blood pressure, Interference with medication, Pregnancy complications and, Impact on bone health</td>
</tr>
<tr>
<td>Robusta</td>
<td>Central and West Africa</td>
<td>Robusta</td>
<td>Strong, bold flavor; higher caffeine content; less acidity</td>
<td>Harsher taste compared to Arabica; bitter aftertaste</td>
<td>Higher caffeine content; cheaper production</td>
<td>1-2 cups (200-400 mg caffeine)</td>
<td>Increased blood pressure, digestive issues</td>
<td></td>
</tr>
<tr>
<td>Liberica</td>
<td>West Africa</td>
<td>Liberica</td>
<td>Unique fruity and floral notes; large beans</td>
<td>Limited availability; less widespread cultivation</td>
<td>Distinctive flavor profile; large bean size</td>
<td>1-2 cups (150-300 mg caffeine)</td>
<td>Gastrointestinal discomfort, allergic reactions</td>
<td></td>
</tr>
<tr>
<td>Excelsa</td>
<td>West Africa, Southeast Asia</td>
<td>Excelsa</td>
<td>Distinctive fruity and tart flavor; large beans</td>
<td>Less common than Arabica and Robusta</td>
<td>Unique taste profile; large bean size</td>
<td>1-3 cups (150-300 mg caffeine)</td>
<td>Heartburn, acid reflux, sleep disturbances</td>
<td></td>
</tr>
</tbody>
</table>

Source: [84-90]