Medicinal & Aromatic Plants
ISSN: 2167-0412

Wachamo, Med Aromat Plants 2017, 6:4
DOI: 10.4172/2167-0412.1000301

Review Article Open Access

Review on Health Benefit and Risk of Coffee Consumption

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Received date: July 17, 2017; **Accepted date:** August 01, 2017; **Published date:** August 06, 2017

Abstract

Coffee is the world's beloved drink that is the most regularly consumed caffeine-containing beverage next to water and tea. It contains a multipart combination of chemicals constituents, which associated with health benefits, most consumers, begin their day with a minimum a cup of coffee after eating food, and end their workday with coffee. It is considered as a significant part of modern daily life because it has an alerting outcome on the human brain. Opposing this, various groups report experiencing uneven health risks thus hesitant to drink coffee, this suggests individual disparity to coffee intolerance. The aim of this review was to in brief summarize health benefits and risks coffee consumption. Most of the informative reports suggested that long-term consumption of coffee and decaffeinated coffee can reduce the risk of many diseases. Among these it is used to boosts our physical performance, burn fat, reduces risk of stroke, liver, prostate and colorectal cancer by 20%, risk of Parkinson's disease by 25%, lower risk of Type II diabetes, reduces risk of dementia and protects our mind, brightens our mood, helps us to fight depression and minimize risk of suicide by 50%. In addition, coffee consumers have less risk of heart disease, with strongly integrated DNA. Also reports that coffee drinking has also naturally extended sleep latency, minimizes total sleep time and its effectiveness, and worsened supposed sleep feature.

However, from positive health prospect of coffee consumption, a recent study finds coffee consumption does not always provide protective benefits because overdrinking is associated with negative impact or risk on our health. Some negative impact of coffee consumption on our health; it reduces appetite levels for food, impact on pregnant women, on people with cholesterol, cause insomnia and restlessness, breast tissue cysts in women, incontinence digestive disorders, and risk of headaches. In addition, decrease fertility probability in female and male, cause allergies and miscarriage, forceful heart contractions, anxiety, depression and the need for anxiety medication, inhibits collagen production in the skin of human being, less hearing loss improvement, does not help with extended sleep deprivation interferes with ossification and could also lead to greater risk of bone fracture. Finally, the most recent studies reported that coffee consumption is beneficial for our health when it is optimum range approximately four cups on average. The supplementary research will be crucial to make clear that both the health benefits and risk of coffee consumption.

Keywords: Coffee consumption; Chemical constituents; Health benefits; Health risks

Introduction

Coffee (*Coffea L.*) is the world's beloved drink that is the most regularly consumed caffeine-containing beverage and the second most traded commodity next to edible oil. It contains a complex mixture of chemicals that provide important amounts of chlorogenic acid and caffeine [1]. It is the most important agricultural commodity in international trade and Arabica coffee (*Coffea L.*) and Robusta coffee (*C. canephora* Pierre ex *A. Froehner*) is the two major species used in the coffee production. Although Arabica coffee is Ethiopian origin which is the most significant in the world coffee market and providing approximately about 66-70% of commercial production [2]. In fact, Coffee offers few nutrients, but it contains more than thousands of chemicals which occur naturally such as carbohydrates, lipids, nitrogenous compounds, vitamins, minerals, alkaloids and phenolic compounds, a number of which are potentially healthful (and others potentially harmful) which is well unwritten [3].

Next, to water and tea, it is the world's most popular beverage used in everything from high blood pressure and high cholesterol (and thus heart disease) to pancreatic cancer, fibrocystic breasts, and bone loss. However, recent studies relating coffee/caffeine consumption to health problems. However, in up to date years, most research has suggested that coffee actually has health benefits [4-6]. The caffeine in coffee is a bioactive compound with stimulatory property on the central nervous system and a positive outcome on long-term memory. Although coffee consumption has been historically connected to unfavorable health effects, new research indicates that coffee consumption may be beneficial [5]. Moreover, Coffee consumed by millions of people every day and various scientific studies have been conducted to check the relationship between coffee consumption and a wide range of chronic diseases and health risk, in addition to total death, lots of cancers, cardiometabolic risk, liver disorders, and neurological situation. These properties have been certified due to many different bioactive constituents of coffee, as well as caffeine (methylxanthine), chlorogenic acids (polyphenol), diterpenes, and other phenolics, among these, may also potentially have additive or synergistic effects [6].

In Ethiopia, coffee consumed in a detailed formal procedure that takes place in almost all households in a daily basis and on average

Ethiopians drinks 4 cups per days and they get a cup of coffee at the shop, on the road, hotels, and restaurants, everywhere [7]. Although coffee is enjoyed worldwide, the coffee ceremony is totally an Ethiopian custom/tradition, and while it has long been accepted all over the country [8]. Coffee consumption is a reflection to have both beneficial and negative effects on health like cardiovascular risk, may be due to the presence of the different biologically active substances which taken during coffee intake [9]. Many studies concluded that coffee consumption has health benefits like it can reduce risk of stroke in woman [10], 26% lower probability of developing colorectal cancer [11], reduce the risk of type 2 diabetes mellitus and hypertension, cardiovascular risk such as obesity and depression [12]. It also reported as an energizer, comfort food, addiction, flavoring, and confection [13], positive effect on psychoactive responses (alertness, mood change), neurological (infant hyperactivity, Alzheimer's and Parkinson's diseases) and metabolic disorders (diabetes, gallstones, liver cirrhosis), and gonad and liver function [14].

In addition, Consumption of 3-4 cups coffee/day lower mortality risk in men [15] and inhibit inflammation and thereby reduce the risk of cardiovascular and other inflammatory diseases in postmenopausal women [16]. However, coffee consumption has a detrimental effect on health such Caffeine had a negative impact on the appetite levels [17], adversely affect lipid profiles depending on how the beverage is prepared [12]. Therefore, drinking of coffee is important stimulating beverage drink used worldwide; it includes a wide array of components that can have probable implication on health. However, recent scientific studies show coffee consumption its associated health benefits and negative impact on the health of human being which needs scientific evidence in an advance and through intensive research. With these in mind, the main aim of this review was to reports works done a wide-ranging overview of the health benefits and risks of coffee consumption.

Review of Literature

Major chemical compounds of coffee

Coffee contains diverse compounds that are reported in recent times, which are associated with beneficial health effects [18,19]. It is a complex mixture of chemicals provides significant amounts of chlorogenic acid and caffeine. Unfiltered coffee is a significant source of cafestol and kahweol, which are diterpenes that have been implicated in the cholesterol-raising effects of coffee [1]. It is the main source of caffeine in many populations. Moreover, it also contains thousands of different chemicals like carbohydrates, lipids, nitrogenous compounds, vitamins, minerals, alkaloids, and phenol compounds [5,20]. Chlorogenic acid (the most prominent), caffeic acid, melanoidin are all antioxidants found in coffee. N-methyl pyridinium, one of identified as an anti-oxidant that found in coffee [18,21,22]. Major important chemical constituents in coffee are caffeine, chlorogenic acid, cafestol, kahweol and other micronutrients. Coffee is a composite combination of a thousand chemicals containing possible bioactive molecules such as chlorogenic acid, caffeine, and two diterpenes including cafestol and kahweol [23]. Some of the constituents reviewed as below.

Caffeine (Methylxanthine)

Caffeine (1,3,7-trimethylxanthine) is a nonselective antagonist adenosine receptor in several physiological systems and it is an alkaloid compound which naturally occurring compound of coffee in coffee beans and other sixty plants such as tea leaves, cocoa beans, cola nuts [19,24]. Caffeine is the most commonly consumed psychoactive stimulant in the globe and appears to exert most of its biological property through the antagonism of the adenosine receptor especially A1 and A2A. Its content is highly unstable ranging between 30 mg and 350 mg per cup of coffee or 150 milliliters of home-prepared coffee [1,24]. Adenosine is an endogenous neuromodulator with the regularly inhibitory property, and adenosine antagonism by caffeine results in effects that are normally stimulatory. Some other physiological effects that governed with caffeine include central nervous system stimulation, acute elevation of blood pressure, increased metabolic rate, and dieresis [25]. Caffeine is body weight regulator by controlling the balance of energy through rising energy expenditure and decreasing energy intake. It also improves weight maintenance through thermogenesis, fat oxidation, and energy intake [26].

Caffeine is rapidly absorbed through the gastrointestinal (GI) tract and moves through cellular membranes with the same efficiency as when it is absorbed and circulated to tissue. Caffeine is metabolized by the liver and results in metabolites like paraxanthine (1,7-dimethyl-xanthine), theophylline (1,3-dimethyl-xanthine), and theobromine (3,7-dimethyl-xanthine) by the action of an enzyme [27,28]. Paraxanthine is the known metabolite it accounts for about 84% of the well-known products [28]. The high amount of caffeine occurs in the blood flow within 15-45 min of consumption, peaking approximately 60 minutes post-consumption. It freely crosses the blood-brain barrier like lipid soluble compound, and it has influence in our neural function attributed to energy balance [27]. Cup of coffee gives an energizing jolt because it naturally contains caffeine. The Linus Pauling caffeine Institute notes that caffeine is quickly absorbed by all our body's tissues, including the brain, and stimulates the nervous system (Figure 1). The amount of caffeine depends on the type of coffee and method of preparations. A standard cup of brewed coffee gives us 100 milligrams of caffeine [29,30].

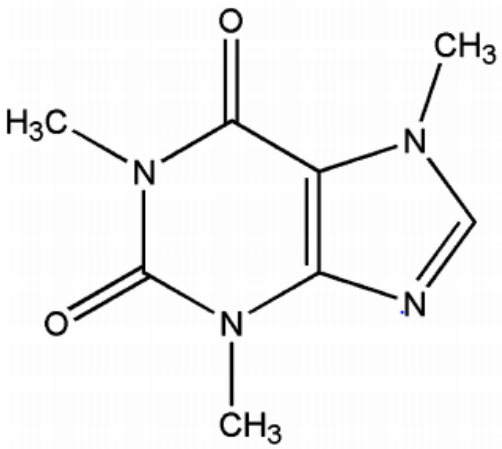

Figure 1: Chemical structure of caffeine.

Chlorogenic acids (Polyphenol)

Chlorogenic acid is one of the biologically active compounds that found in coffee, slow absorption of carbohydrates [31]. It is one chemical compound in coffee which found in Easter family and formed in between trans-cinnamic and quinic acid which are useful nutritional phenols [1,32]. It also is known as 5-O-caffeoylquinic acid which ranges in between 70-350 mg in a 200 ml (7-oz) cup of coffee in which it contains about 35-175 Mg of caffeic acid [17]. Chlorogenic acid can able to exert important roles in glucose and lipid metabolism regulation and on the other related disorders, e.g., diabetes, cardiovascular disease (CVD), obesity, cancer, and hepatic steatosis. Moreover, it has many potential health benefits of such as anti-diabetic, anti-carcinogenic, anti-inflammatory and anti-obesity impacts, may also provide a non-pharmacological and non-invasive advance for some chronic diseases treatment and/or prevention [33] (Figure 2).

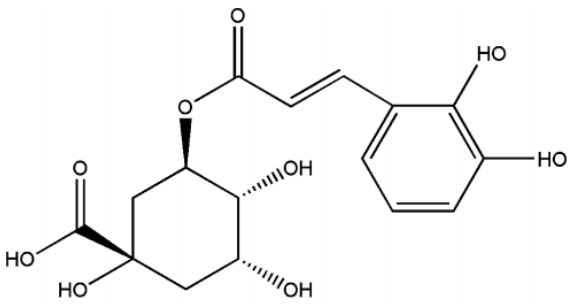

Figure 2: Chemical structure of chlorogenic acids.

Coffee lipids (Cafestol and kahweol)

The typical bean of Coffea arabica contains cafestol and kahweol, a structural analog of cafestol, with individual concentrations ranging from 0.1-7 mg/ml in coffee [34,35]. It is the two-coffee specific diterpenes with anticarcinogenic as well as against aflatoxin B1 (AFB1) activity in human cells and it increases serum cholesterol levels in humans when we drink boiled coffee [36,37]. Diterpenes cafestol and kahweol (C+K) in coffee have able to produce a broad range of biochemical effects resulting in a reduction of the genotoxicity of several carcinogens including 7,12-dimethylbenz[a]anthracene (DMBA), aflatoxin B1 (AFB1), benzo[a]pyrene (B[a]P) and 2-amino-1-methyl-6-phenylimidazo[4,5-b]pyridine [36]. Coffee consumption is the major source of human exposure to C+K. It has health significance in humans consuming moderate amounts of coffee (up to 5 cups a day). Moreover, it occurs in liver, kidney, lung and intestinal tissues [38]. Generally, Natural diterpenes from coffee, cafestol, and kahweol induce apoptosis through regulation of specificity protein expression in human malignant pleural mesothelioma and they found in boiled coffee and promote a rise in plasma cholesterol concentration in humans [39] (Figure 3).

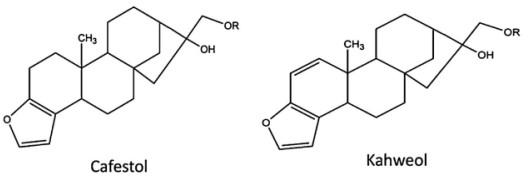

Figure 3: Chemical structure of Cafestol and Kahweol.

Other micronutrients/Compounds

Coffee also contains many micronutrients such as magnesium, potassium, niacin, and vitamin E. and other important minor compounds (Table 1 and 2). A cup of black coffee (1.25 dl) contains practically no fat, carbohydrates or protein, so its energy content is only 1-2 kcal. Coffee contains many minerals and vitamins, particularly potassium, magnesium and nicotinic acid. It's the composition of these depends on such factors as the quantity of ground coffee, the brewing method, the quality of the water used, and the other ingredients used in the coffee [40-42]. Generally, the concentration of twenty-seven elements (Li, Be, B, Mg, Al, P, K, Ca, Cr, Mn, Co, Ni, Cu, Zn, As, Se, Sr, Mo, Cd, Sn, Sb, Ba, Hg, Pb, Bi, Th, and U) in green coffee [41].

Health benefit and risk of coffee consumption

Health benefits of coffee consumption: Coffee is in fact very healthy stimulant commodity that taken daily at least 3-4 cup per day. It contains antioxidants and beneficial nutrients, which can able to improve our health condition. As much scholarly reviewed reports show that coffee drinkers have a much lower risk of several serious diseases. Its major action is to stimulate the central nervous systems, cardiovascular muscle, respiratory system, diuretic, and delays fatigue [19,26,43,44]. Habitual coffee drinking has been associated with a reduced risk of mortality and chronic diseases, including cancer [34,45]. The favorable influence of coffee is supported by several plausible mechanisms due to the presence of a variety of biological compounds such as caffeine, diterpenes, caffeic acid, polyphenols as well as volatile aroma and heterocyclic substances. Recent evidence suggests that coffee consumption is associated with a reduced risk of liver, kidney, and to a lesser extent, premenopausal breast and colorectal cancers, while it is unrelated to prostate, pancreas and ovary cancers. Coffee drinking may still help reduce death due to liver cancer [46,47].

Coffee consumption is significantly associated with a decreased risk of colorectal cancer at less than 5 cups per day of coffee consumption [43]. Caffeine is valuable to mitigate sleepiness, enhance performance, and treat apnea in premature infants. It typically prolonged sleep latency, reduced total sleep time and sleeps efficiency, and worsened perceived sleep quality [48]. Its consumption was also reported that it associated with decreased risk of mortality. It able to show the defending effect stronger smoker status and alcohol drinker [15]. Moreover, coffee consumption has also many health benefits that have been already agreed through real observation in a human being. Some of these are coffee consumption improve energy levels, improve various aspects of brain function such as memory, mood, vigilance, energy levels, reaction times and general cognitive function [49-51]. It

also Coffee consumption burns fat and boosts metabolic rate about in the range of 3-11%. The caffeine can drastically improve physical performance; it stimulates the nervous system, causing it to send signals to the fat cells to break down body fat. A single cup of coffee contains: - Riboflavin (Vitamin B2) which is 11% of the RDA, Pantothenic Acid (Vitamin B5), accounts 6% of the RDA, Manganese and Potassium, 3% of the RDA, Magnesium and Niacin (B3): 2% of the RDA, although most people are drinking more than one cup per day. If it consumed 3-4 cup/day then these amounts quickly increased [52]. Moderate consumption of both caffeinated and decaffeinated coffee may lower risk of type 2 diabetes in younger and middle-aged women. Coffee constituents other than caffeine may affect the development of type 2 diabetes [53].

The caffeine in coffee is a bioactive compound with stimulatory effects on the central nervous system and a positive effect on long-term memory. Although coffee consumption has been historically linked to adverse health effects, new research indicates that coffee consumption may be beneficial [5]. The consumption of coffee has been associated with a number of health benefits, including a reduced risk of cardiovascular disease. Hypertension is an important risk factor for adverse cardiovascular events. Coffee drinking help to reduce blood pressure (BP) in humans, which might be attributable to its polyphenolic compound, chlorogenic acid [54]. On the other hand, by-products of coffee fruit and bean processing can also be considered as potential functional ingredients for the food industry. The coffee husks, peel, and pulp, which comprises nearly 45% of the cherry, are one of the main by-products of coffee agro-industry and might be a valuable material for several purposes, including extraction of caffeine and polyphenols. Other by-products of coffee processing such as the mucilage and the parchment also identified. Additionally, the use of the roasted coffee silver skin as a nutritional fiber-rich ingredient and associated with antioxidative properties [55]. A waste material that is widely available in the world, as a source of natural phenolic antioxidants. Coffee consumption also reported being inversely associated with risk of type 2 diabetes mellitus. Similar associations reported for decaffeinated coffee [56].

According to Sugiyama et al. that association between coffee consumption and the risk of bladder cancer [57]. Regular and decaffeinated coffee consumption decreased plasma free fatty acid levels, increased hepatic adenosine triphosphate content, and decreased total mammalian target of rapamycin (mTOR) and phosphorylated mTOR (p-mTOR) protein content in the liver. Moreover, coffee consumption by the aged population had a positive effect on behavioral energy and lipid metabolism [58]. Caffeine in coffee drink influence the energy balance by increasing energy expenditure and decreasing energy intake, therefore, it can potentially be used as a body weight regulator. It also improves weight maintenance through thermogenesis, fat oxidation, and energy intake. The sympathetic nervous system is involved in the regulation of energy balance and lipolysis (breakdown of lipids to glycerol and free fatty acids) and the sympathetic innervation of white adipose tissue may play an important role in the regulation of total body fat [26]. Increased coffee drink reduces death, decreases progression of the nonalcoholic fatty liver disease and decreases the rate of scarring in the liver and progression to cirrhosis, decreases the rate of liver cancer development, and increases treatment response to hepatitis C antiviral interferon-based therapy [59]. Many reports show beneficial association coffee drinking with human health. For instance it prevent symptomatic gallstone disease in women [60], lower 23-50% risk of type II Diabetes, which is a various health disturbance, recently affiliate about approximately 300 million people in the globe [32,61], 20% lower risk of death in men and 26% death of women, Alzheimer 's disease, and Dementia that mainly occur in peoples whose ages are 65 and more [62-64]. Some of the health benefits are described in Table 3 below.

Health risks of coffee consumption

In contrary from its positive health, a recent study finds coffee does not always offer protective benefits. Overdrinking 28 cups of coffee or more per week increased a person's probability of dying prematurely by 21 percent was reported. This risk was more than 50 percent higher in adults under 55 years old [65]. Also, heavy coffee consumption associated to higher death risk Excessive caffeine intake raises health risks because it increases a person's heart rate and blood pressure and slightly increases peripheral arterial stiffness; distal vascular tone [66]. Recently reported shows that coffee consumption increases the long-term risk of coronary heart disease but habitual moderate coffee drinking was associated with a lower risk of coronary heart disease in women [67]. Coffee has been around for a long time and blamed for many ills from stunting our growth to causing heart disease. Recent studies have generally found no connection between coffee and an increased risk of heart disease or cancer [45,46]. In fact, a few studies have found an association between coffee consumption and decreased overall mortality and possibly cardiovascular mortality, although the suggestion is not a fact in young aged people who consume large amounts of coffee [23,67,68]. High doses of coffee intake during pregnancy increase the risk of miscarriage, independent of pregnancy-related symptoms [69].

Epidemiological studies report also suggest that drinking of boiled coffee is associated with elevated risk for cardiovascular disease. This is mainly due to the two diterpenes identified in the lipid fraction of coffee grounds, cafestol, and kahweol. These compounds promote increased the plasma concentration of cholesterol in humans [35]. Also, coffee drinking causes hepatocellular carcinoma were also reported in Italy [70]. Also, higher levels of coffee drink have lower a rate of incident arterial fibrillation (AF) [71]. Glucose tolerance is reduced shortly after ingestion of caffeine or caffeinated coffee in human and which is suggested that coffee consumption could increase the risk of diabetes [72,73]. Coffee drinking is beneficial when we drink in moderation 2-4 cup per day it has a negative effect on our health when we drink more than considerable range [1]. Also, Nonsmokers who rapidly metabolize caffeine may be at increased risk for having infants with decreased birth size when consuming ≥ 300 mg of caffeine per day [74].

A few of those risks of coffee consumption include adrenal fatigue, irregular heartbeat, hallucinations, accelerates bone loss and tremors are reported [75,76]. Chronic, heavy caffeine ingestion may cause or exacerbate anxiety and may be associated with depression and increased use of antianxiety drugs. Caffeine may cause anxiety and panic in panic disorder patients and may aggravate the symptoms of premenstrual syndrome. Chronic users who are caffeine-sensitive may have symptoms of caffeine at relatively low doses. Those who regularly consume moderate to heavy amounts of caffeine may develop caffeinism, or they may show signs of caffeine withdrawal syndrome after abstaining from the drug [77]. Some negative impacts of coffee consumption are summarized Table 4 below.

Summary and conclusions

Coffee is the most widely consumed caffeine containing psychoactive beverage in the world. Most of the prospective reports recommended that long-term consumption of coffee and decaffeinated coffee can reduce the risk of many diseases. Among health benefits of coffee drinking it boosts our physical performance, burn fat, reduces risk of stroke, liver, prostate and colorectal cancer by 20%, risk of Parkinson's disease by 25%, lower risk of Type II diabetes, reduces risk of dementia and protects our mind, brightens our mood, helps us to fight depression and minimize risk of suicide by 50%. Moreover, coffee consumers have less risk of heart disease, with strongly integrated DNA, Reduced risk of heart attack death. Also reports that coffee drinking has also naturally extended sleep latency, minimizes total sleep time and its effectiveness, and worsened supposed sleep feature. Its health beneficial aspects were differing in adult and old aged people. For instance, the sleep of older adults is more sensitive to coffee consumption as compared with teenagers. Reports in a potential reduction in diabetes risk due to habitual consumption of caffeinated coffee suggest that tolerance does develop to the short-term decrease in glucose tolerance and insulin sensitivity or that coffee with no caffeine constituents that enhance glucose tolerance and insulin sensitivity. A number of reports support that habitual consumption of decaffeinated coffee protects against diabetes risk. A little initial evidence exists that coffee constituents like chlorogenic acid improve glucose tolerance and sensitivity to insulin. It can help consumer lose weight by attenuating the assimilation of glucose from the small intestine. However, the harmful effects of coffee consumption are occasionally harder to get information rather than all of the reported beneficial aspects. Some reports suggest that coffee consumption has a negative impact on our health. Some of these are drinking coffee above 4 cups per day associated with early death, also increase blood pressure in a consumer with hypertension, and reduce fertility in women and men, caffeine in coffee augmented nervousness/anxiety, hopelessness/depression and the need for anxiety medication. Moreover, other negatives impact such as adrenal fatigue, irregular heartbeat, hallucinations, accelerate bone loss and tremors. on the other hand, those coffee consumers should be aware of how caffeine in coffee interacts with their bodies in regard to their own individual health condition. In conclusion, most recent reports exist that coffee consumption could be better suitable for our health especially for that of decaffeinated coffee. More research will be necessary to make clear that both the short and long-term effects of coffee consumption and its constituents on health benefits and risks of the coffee consumption.

Micronutrient	Per 100 ml (1 dl)	Per cup of coffee (1.25 dl)
Sodium	Very little	Very little
Potassium	92 mg	115 mg
Magnesium	8 mg	10 mg
Manganese	0.05 mg	0.06 mg
Riboflavin	0.01 mg	.,01 mg
Niacin	0.7 mg	0.9 mg

Table 1: The mineral and vitamins concentrations in 100 ml of coffee.

Nutrient	Unit	1 Value per 100 g	1 serving 2 tbsp=13.0 g
Proximates			
Water	g	1.7	0.22
Energy	kcal	460	60
Protein	g	5.29	0.69
Total lipid (fat)	g	15.87	2.06
Carbohydrate, by difference	g	74.04	9.63
Fiber, total dietary	g	1.9	0.2
Sugars, total	g	58.2	7.57
Minerals			
Calcium, Ca	mg	271	35
Iron, Fe	mg	0	0
Magnesium, Mg	mg	68	9

Phosphorus, P	mg	251	33
Potassium, K	mg	1033	134
Sodium, Na	mg	317	41
Zinc, Zn	mg	0.96	0.12
Vitamins			
Vitamin C, total ascorbic acid	mg	0.6	0.1
Thiamin	mg	0.031	0.004
Riboflavin	mg	0.028	0.004
Niacin	mg	2.263	0.294
Vitamin B-6	mg	0.055	0.007
Folate, DFE	µg	9	1
Vitamin B-12	µg	0.45	0.06
Vitamin A, RAE	µg	1	0
Vitamin A, IU	IU	5	1
Vitamin E (alpha-tocopherol)	mg	0	0
Vitamin D (D2 + D3)	µg	0	0
Vitamin D	IU	0	0
Vitamin K (phylloquinone)	µg	1.5	0.2
Lipids			
Fatty acids, total saturated	g	4.934	0.641
Fatty acids, total monounsaturated	g	8.934	1.161
Fatty acids, total polyunsaturated	g	1.053	0.137
Fatty acids, total trans	g	0	0
Cholesterol	mg	0	0
Other			
Caffeine	mg	360	47

Table 2: Summary of micronutrients in coffee [78].

Health benefit of coffee consumption	Description of action	Sources
Coffee appears to have protective effects on the liver, which is important body organ, that maintains a number of functions in our body. And lower liver stiffness in patients with non-alcoholic fatty liver disease, hepatitis c, and hepatitis b	A number of known diseases largely influence the liver, such as hepatitis and fatty liver disease. People who take above 4 cups per day lower risk of cirrhosis about 80%.	[79-82]
Coffee drinking lower 40% risk of liver cancer and 15% of colorectal cancer and prostate cancer.	Coffee consumption has effects on antioxidants in blocking mutations and carcinogen metabolism and increases in glutathione in colonic cells.	[45,47,83-85]
Coffee/Caffeine consumption lower in the range of 32-60% the risk of Parkinson's diseases	It is a neurodegenerative disease, right after Alzheimer's. it mainly by the death of dopamine-producing neurons in our brain	[86-91]
Coffee consumption protects against 65 or more aged people from Alzheimer's disease and dementia. It lower 65% risk of Alzheimer's disease	The neurodegenerative disease most common in old people over 65 years of age and above	[64,89,91-93]

Coffee drinking lower risk by 23-67% of type II diabetes	Diabetes mellitus type 2 (also known as type 2 diabetes) is a long-term metabolic disorder that is characterized by high blood sugar, insulin resistance, and relative lack of insulin in both men and women.	[32,61,94-101]
Coffee consumption can lower about 26% probability of colorectal cancer, especially distal colon cancer. It is known as a healthy beverage for the prevention of colorectal cancer.	It has nutraceutical approach that can able to reduce colorectal cancer	[11,20,43,45,68,102]
The caffeine can significantly improve our physical performance	Through reducing rating of perceived exertion during and after exercise	[103-106]
Coffee consumption can fight stress and make active our brain and it has beneficial influence on mood, cognitive function, performance and hydration	Through improvements in physical endurance, cognitive function, particularly alertness and vigilance, mood and perception of fatigue.	[50]
Coffee consumption not associated with risk heart disease and it can lower the risk of stroke in woman	Coffee consumption may modestly reduce the risk of stroke.	[10,107]
Coffee consumption is the principal supply of antioxidants in the western diet; reduce the risk of cardiovascular and other inflammatory diseases in postmenopausal women.	Through inhibiting inflammation	[16]
Coffee drinking burn fat and regulatory of our body weight and improve energy levels	By increasing energy expenditure and decreasing Energy intake. caffeine and coffee consumption could also help individuals lose weight by reducing body fat	[26]
Lower risk of Coronary heart disease	Lightly reduced risk for coronary heart disease was observed, with the lowest risk in the group consuming 2-3 cups per day1	[108-111]
Coffee consumption is associated with a reduced risk of gallbladder cancer	Mediated via reduced gallstone formation or through other mechanisms such as reduction of oxidative damage and inflammation and regulation of DNA repair, phase II enzymatic activity, apoptosis, angiogenesis, and metastasis	[83]

Table 3: Summary of health benefits of coffee consumption.

Health risks of coffee consumption	Mode of action	Sources
Caffeine had a negative impact on the appetite levels and it reduces appetite for food	Inducing satiety and smoking augments	[17]
Affect pregnant women if they drink more than a cup of the day.	Drinking coffee when pregnant, caffeine will also reach the fetus, and child is highly sensitive to caffeine. Therefore, heavyweight coffee drinker while pregnant, at least reduce coffee intake not more than one cup per day.	[112-114]
Coffee consumption has a negative impact on people with cholesterol when they drink unfiltered coffee.	Coffee beans contain cafestol and kahweol, two ingredients that appear to raise LDL cholesterol levels.	[43,45,115,116]
Coffee can cause insomnia and restlessness.	Above the recommended maximum amount of caffeine is 400 milligrams, which obtained from 4 cups of coffee. Through making chronic inability to fall asleep or to enjoy uninterrupted sleep.	[117-120]
Coffee drinking for children may increase bedwetting	Drinking of coffee affects 5-7-year-old children may increase enuresis bedwetting.	[121-123]
Coffee can cause death if we drink 80-100 cups (23 liters) per month	A poisonous and will amount in 10-13 grams of caffeine in our body. It vomits consumer while drinking.	[65,124]
Coffee drinking increase risk of blood pressure on adults and risk of heart attacks among teenagers'	Consumption of coffee with high caffeine boosts energy and increase blood pressure level even in a people with normal blood pressure. Longer-term coffee consumption and increased blood pressure or between habitual coffee consumption and an increased risk of CVD in hypertensive subjects.	[125-127]

Coffee consumption associated with risk of gout attacks	Drinking four servings of caffeinated beverages in the previous 24 hours was associated with an 80% increased risk of recurrent gout	[128]
Breast tissue cysts in women	If females who drink 31-250 mg of caffeine/day had a 3/2-fold rise in the chances of developing fibrocystic breast disease and females who drink over 500 mg/day had a 2.double increase in the probability of developing cysts.	[129-133]
Coffee drinking cause incontinence	Women who drink more than 329 mg of caffeine daily caffeinated coffee exposed for about 70% or more likely to build up incontinence	[134-137]
Coffee drinking associated with digestive disorders	Upset stomach or indigestion occurs when we drink caffeine	[138,139]
Coffee drinking can cause headaches	Over drinking of coffee cause symptom of a headache due to its caffeine chemical compound.	[140]
Coffee drinking decrease fertility in female	Reduce a chance of woman's to be pregnant by about 27%.	[141,142]
Caffeine and miscarriage risk	Both men and women who consumed at least two caffeinated beverages a day during the weeks prior to conception slightly increased the risks of a miscarriage	[143,144]
Coffee consumption associated with risk of Allergies.	Anaphylaxis due to caffeine	[145,146]
Caffeine causes more forceful heart contractions	Coronary artery disease, the risk may be increased in individuals who with slow metabolizers of caffeine and drink two or more cups of coffee per day. The ingestion of large quantities of caffeine might be associated with arrhythmic and cardiovascular events, especially in patients with underlying heart disease.	[147]
Worse menopause symptoms.	Menopausal women who consumed caffeine had a greater degree of vasomotor symptoms.	[148]
Caffeine consumption can lead to increased anxiety, depression and the need for anxiety medication	Caffeine during coffee drink can produce feelings of anxiety and even be a catalyst for a full-blown panic attack. It also causes anxiety and panic in panic disorder patients and which may exaggerate the symptoms of premenstrual condition	[149,150]
Coffee consumption has risk that inhibits collagen production in the skin of human being	Coffee drinking cause caffeine-induced inhibition of collagen production in human skin fibroblasts	[151,152]
Coffee drinking can damage hearing loss improvement	A daily dose of caffeine was found to impair the recovery of hearing after an After Acoustic Overstimulation Events	[153,154]
Coffee drinking due to its caffeine does not help with extended sleep deprivation:	a recent study reported that coffee consumption due to its caffeine chemical constituents it causes following restricting sleep up to 5 hours per night, use no longer improved alertness or performance after three nights. results show that relative to placebo, caffeine significantly improved psychomotor vigilance task performance during the first two days, but not the last three days of sleep restriction.	[48,155]
Coffee drinking interferes with ossification and could also lead to greater risk of bone fractures	Coffee drink associated with raising the risk of bone fractures, particularly for women.	[156,157]
Coffee drinking cause indigestion	Coffee drinking due its caffeine content cause upset stomach and or problem of digestion when consumed on before eating food.	[139]
Coffee intake cause male infertility	Influence semen parameters, but also sperm DNA integrity	[158]

Table 4: Summary of health risks of coffee consumption.

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