



Coffee a Worldwide Trend with Health Benefits

Adronikos S Ballis*

Department of Food and Nutrition Science, Greece

*Corresponding Author: Adronikos S Ballis, Department of Food and Nutrition Science, Greece.

Received: January 16, 2019; Published: February 20, 2019

Abstract

Coffee is enjoyed by millions of people around the world every day, it is commonly consumed and beloved for its many properties. People around the world consider coffee as a synonym of joy and a need to start their day [1]. By the opening of the first coffee house, coffee consumption has greatly increased all around the world. In 2010, coffee production reached over 8.1 million tons worldwide [1]. That means more than 500 billion cups of coffee for that year. The rapid increase of coffee consumption is considered an outcome of an excellent cup quality, because of well selected varieties, breeding and developed agricultural practice. Furthermore, the health benefits of coffee consumption are a decisive reason for making coffee a beloved daily routine. Nowadays, coffee is referred as a functional food, because of its high content of compounds, which are highly antioxidant [2]. The unique flavor, aroma and color of coffee make it a particularly interesting beverage, with numerous mental and health benefits [3].

Keywords: Coffee; Health Benefits

Introduction

The coffee tree belongs to the Rubiaceae family, genus *Coffea*, but more than 80 coffee species have been identified worldwide, only two are economically important. *Coffea Arabica* is known for its superior flavor and aroma, widely consumed reaching 70% of the worldwide coffee consumption. On the other hand, *Coffea canephora* or Robusta coffee is reported as a species with a bitter flavor and better resistance to natural plant diseases and pests [1]. The harvested coffee fruits arrive to the consumer after a long series of processes. Every process has a unique and special role for producing a splendid quality coffee. There are two main ways, which are commonly used to process coffee: the wet and the dry methods, which have the power to influence the final tasting notes of the coffee. Nevertheless, only by roasting the seeds it is achievable to gain the specific aroma and flavor of coffee [4]. During roasting, the characteristic coffee taste aroma components are formed, along with the typical brown color of the beans. More than 1000 different aroma components of coffee are known, that's why only by following specific roasting methods it is possible to achieve the unique flavor profile of the final coffee according to the preferences of the consumer. Green coffee beans are roasted for 1.5 to 20 min-

utes are heated between 180°C and 240°C. Darker color, more intense aroma and flavor will be generated by stronger roasting [4]. As a result of the Strecker and Maillard reactions, carbohydrates (reducing sugars), proteins, and other classes of compounds, with low and high molecular weight compounds like melanoidins are simultaneously produced [5]. In this process light brown seeds are becoming black. It is rather usual during the extraction of water-soluble components such as nicotinic acid, chlorogenic acids, soluble melanoidins, caffeine, and hydrophilic volatile compounds to be extracted and it is more effective at higher pressures and temperatures [6]. Chlorogenic acid, which grants coffee most of its functional properties, is greatly extracted during brewing coffee at home reaching 80% - 100% of the total amount. It leads to a brew with 35 - 100 mg chlorogenic acids/100-mL per cup of Arabica coffee and 35 - 175 mg/100-mL cup of Robusta coffee [8]. Moreover, a total amount of 50 - 100 mg caffeine, 40 - 50 mg trigonelline, and approximately 10 mg nicotinic acid are contained in a cup of coffee [9].

Materials and Methods

Article was written by reviewing literature from Google Scholar and PubMed.

Results and Discussion

Coffee consumption benefits

Coffee has many health benefits, which are not very renowned but they have great effects in overall human health. One of the major reasons why coffee has a key role is the great amount of people all over the world consuming it [10].

Coffee and mental performance

Coffee consumption leads to an increase in alertness and performance, due to caffeine. Caffeine is a psychoactive substance, which is widely known to provide coffee its bitter characteristics. Its concentration in *C. canephora* is approximately twice that found in *C. arabica* [11]. Caffeine stimulates the central nervous system as an adenosine-receptor antagonist. On the other hand, caffeine's effects on health are controversial. Studies in humans provide data, which declare that coffee improves many aspects of brain function - including, mood, vigilance memory, reaction times, energy levels and general mental function [12]. The European Food Safety Authority (EFSA) has come to the result, that there is a relationship between the caffeine, contained in a normal cup of coffee, alertness (concentration) and increased attention. The effects of caffeine can be very useful in multiple daily circumstances, like better concentration during night shifts, late time driving and with jet lag. The consumption of caffeine can help the problem of sleep inertia (a feeling of tiredness after an abrupt awakening), explaining the need of coffee after waking [13-15].

The consumption of coffee has also been associated with effects on reaction time and mood. Furthermore, frequent consumption of caffeine can lead to improved mood over the day, particularly in fatigued individuals. On the other hand, high intakes may lead to an increase in tense arousal including anxiety, jitteriness (i.e. feeling shaky or uneasy) and nervousness. Finally many researches indicate that, coffee brews are natural antidepressants [15,16].

Coffee may help protect against type 2 diabetes, blood cholesterol and gastrointestinal microbiota.

Galactomannans and type II arabinogalactans are the types of soluble fiber with the greatest importance [17]. Dietary fiber helps to keep the gut healthy and have a major role in helping to reduce the risk of diseases such as diabetes, coronary heart disease and bowel cancer. Furthermore, fiber passes through the large bowel undigested, where it is fermented by bacteria. The by-products that result from this fermentation are carbon dioxide, methane, hydrogen and short-chain fatty acids (SCFAs) [18]. This process lowers the colonic pH, preventing the growth of *Bifidobacterium* species and other beneficial lactic acid bacteria [19]. Resistant starch and

dietary fiber also operate as prebiotics (bacteria). Moreover fibers slow down the amount of time it takes for food to pass through the stomach into the small intestine. This reduces the glucose absorption into the bloodstream, and has the advantages of keeping you feeling fuller for longer, helping to control the levels of sugar in the blood, that are significant for the diabetes management [20-23].

Coffee contains essential nutrients

Long-term coffee consumption is associated with a lower risk of gout incident [24]. Many of the nutrients in coffee beans make their way into the finished brewed coffee, making coffee a very essential source of vitamins and minerals, which are essential nutrients that the body needs in small amounts to work properly. The majority of people should be able to receive all the required nutrients by eating a diverse and balanced diet. Although a single cup of coffee boosts the daily intake of micronutrients as it contains, riboflavin (vitamin B2): 11% of the Reference Daily Intake (RDI), pantothenic acid (vitamin B5): 6% of the RDI, manganese and potassium: 3% of the RDI and magnesium and niacin (vitamin B3): 2% of the RDI [1,13,25]. Out of these elements, only the magnesium content appears to vary considerably between species (1 - 3 mg/100 g for *C. canephora* and 2.5 - 6 mg/100 g for *C. arabica*). Trace minerals in coffee include the elements zinc, strontium, silicon, manganese, iron, copper, barium, boron and aluminium. The trace minerals profile in coffee diversifies according to soil composition, which suggests that there may be a possibility to differentiate coffees grown in different kinds of soil by their mineral profile [9].

Coffee consumption effects total body fat reduction

Caffeine is found in almost every commercial fat burning supplement, it's one of the few natural substances proven to aid fat burning. A great number of studies indicate that caffeine is able to boost metabolic rate by 3 - 11%. Other studies show that caffeine is able to especially raise fat burning by as much as 10% in obese individuals and 29% in lean people [25]. Nevertheless, there is a possibility that these outcomes decrease in long-term coffee consumers.

Coffee and Parkinson's disease (PD)

Coffee and Parkinson's disease (PD). Nowadays, a significant amount of epidemiological studies report an inverse relationship between coffee/caffeine and the risk of developing PD which is responsive to the dose. The consumption of coffee shows to decrease or delay the evolution of PD and caffeine is the most possible causal factor. In females, however, the interaction between caffeine and hormonal therapy yet requires further declaration [26].

Coffee and liver cancer

Researchers have found that people who drink more coffee are less likely to develop hepatocellular cancer (HCC), the most common form of primary liver cancer and the effect was even found in decaffeinated coffee [27,28]. A number of papers have suggested that caffeine, and in particular its main primary metabolite, paraxanthine, can suppress the synthesis of CTGF (connective tissue growth factor) via a cascade of control cycles, thereby slowing down the growth of this type of tissue, which in turn slows down the progression of liver fibrosis, alcoholic cirrhosis and liver cancer. However, some of the epidemiological studies did not find an association with tea, which suggests that the mechanism of action might be not dependent solely on caffeine (via paraxanthine) [29].

Other reported effects

Naturally coffee contains multiple compounds that display antioxidant properties, such as melanoidins and chlorogenic acids help to deactivate oxidants [6,30,31]. Numerous studies suggest that coffee consumption increase blood antioxidant levels. Unfortunately, in Western diets coffee may be one of the healthiest habits. It is commonly noticed that people get more antioxidants from coffee than vegetables and fruits combined [12]. It is true that there is a need for further research on the bioactive roles of coffee components, but it is well accepted that different effects on human body are showed by different antioxidants.

Conclusion

Coffee is a worldwide phenomenon with a surprising variety of health benefits. It improves physical performance, can help an individual feel more energized, reduce total body fat percentage, lower the risk of several conditions, such as type 2 diabetes, cancer Alzheimer's and Parkinson's disease. Additionally, coffee is strongly connected with longevity, as it is rich in antioxidants. For that reason further research about the effects of coffee is recommended to be done, while it is more important than a daily pleasant beverage.

Bibliography

1. A Farah. "Coffee Constituents". *Coffee: Emerging Health Effects and Disease Prevention* (2012): 21-58.
2. JECFA. Evaluation of Certain Food Additives and Contaminants. Sixty-First Report of the Joint FAO/WHO Expert Committee on Food Additives. *WHO Technical Report Series 922*; WHO Geneva (2004): 127-132.
3. A Farah and CM Donangelo. "Phenolic compounds in coffee". *Brazilian Journal of Plant Physiology* 18.1 (2006): 23-36.
4. A Farah., et al. "Effect of roasting on the formation of chlorogenic acid lactones in coffee". *Journal of Agricultural and Food Chemistry* 53.5 (2005): 1505-1513.
5. EK Bekedam., et al. "Roasting Effects on Formation Mechanisms of Coffee Brew Melanoidins". *Journal of Agricultural and Food Chemistry* 56.16 (2008): 7138-7145.
6. A Santini., et al. "Influence of different coffee drink preparations on ochratoxin A content and evaluation of the antioxidant activity and caffeine variations". *Food Control* 22.8 (2011): 1240-1245.
7. M Ogawa., et al. "Contents of Tocopherols in Coffee Beans, Coffee Infusions and Instant Coffee". *Nippon Shokuhin Kogyo Gakkaishi* 36.6 (1989): 490-494.
8. C Delgado-Andrade., et al. "Assessing the Antioxidant Activity of Melanoidins from Coffee Brews by Different Antioxidant Methods". *Journal of Agricultural and Food Chemistry* 53.20 (2005): 7832-7836.
9. W Dong., et al. "Characterization of Fatty Acid, Amino Acid and Volatile Compound Compositions and Bioactive Components of Seven Coffee (*Coffea robusta*) Cultivars Grown in Hainan Province, China". *Molecules* 20.9 (2015): 16687-16708.
10. Y Kondo., et al. "Effects of Coffee and Tea Consumption on Glucose Metabolism: A Systematic Review and Network Meta-Analysis". *Nutrients* 11.1 (2018): E48.
11. N Tamanna and N Mahmood. "Food Processing and Maillard Reaction Products: Effect on Human Health and Nutrition". *International Journal of Food Science* (2015): 526762.
12. YF Chu and Institute of Food Technologists. "Coffee: emerging health effects and disease prevention" (2012).
13. C Agostoni and Bresson. "Scientific Opinion on the substantiation of health claims related to caffeine and increase in physical performance during short-term high-intensity exercise (ID 737, 1486, 1489), increase in endurance performance (ID 737, 1486), increase in endurance capa". *EFSA Journal* 9.4 (2011): 2053.
14. ISIC. "Coffee & Health: Mental Performance" (2012): 1-10.
15. TM McLellan., et al. "A review of caffeine's effects on cognitive, physical and occupational performance". *Neuroscience and Biobehavioral Reviews* 71 (2016): 294-312.
16. NM Pham., et al. "Green tea and coffee consumption is inversely associated with depressive symptoms in a Japanese working population". *Public Health Nutrition* 17.3 (2014): 625-633.
17. D Gniechwitz., et al. "Dietary Fiber from Coffee Beverage: Degradation by Human Fecal Microbiota". *Journal of Agricultural and Food Chemistry* 55.17 (2007): 6989-6996.
18. J Slavin. "Fiber and prebiotics: Mechanisms and health benefits". *Nutrients* 5.4 (2013): 1417-1435.

19. M El-Salhy, *et al.* "Dietary fiber in irritable bowel syndrome (Review)". *International Journal of Molecular Medicine* 40.3 (2017): 607-613.
20. Y Kim and Y Je. "Dietary fibre intake and mortality from cardiovascular disease and all cancers: A meta-analysis of prospective cohort studies". *Archives of Cardiovascular Diseases* 109.1 (2016): 39-54.
21. SA Bingham, *et al.* "Dietary fibre in food and protection against colorectal cancer in the European Prospective Investigation into Cancer and Nutrition (EPIC): an observational study". *Lancet* 361.9368 (2003): 1496-1501.
22. TS Kahlon, *et al.* "Cholesterol-Lowering Effects in Hamsters of β -Glucan-Enriched Barley Fraction, Dehulled Whole Barley, Rice Bran, and Oat Bran and Their Combinations". *Cereal Chemistry* 70.4 (1993): 435-440.
23. JW Anderson, *et al.* "Health benefits of dietary fiber". *Nutrition Reviews* 67.4 (2009): 188-205.
24. P Towiwat and ZG Li. "The association of vitamin C, alcohol, coffee, tea, milk and yogurt with uric acid and gout". *International Journal of Rheumatic Diseases* 18.5 (2015): 495-501.
25. T Wilcox and A Hirshkowitz. "NIH Public Access". 85.1 (2015): 1-27.
26. A Singh-Manoux, *et al.* "Timing of onset of cognitive decline: results from Whitehall II prospective cohort study". *British Medical Journal* 344 (2012): d7622.
27. RM Seifried, *et al.* "Chapter 16 - Antioxidants in Health and Disease A2". Coulston Ann M, CJ Boushey, MG Ferruzzi and LMBTN in the P. and T. of D. (Fourth E. Delahanty, Eds. Academic Press (2017): 321-346.
28. D Suchecka, *et al.* "Antioxidative and anti-inflammatory effects of high beta-glucan concentration purified aqueous extract from oat in experimental model of LPS-induced chronic enteritis". *Journal of Functional Foods* 14 (2015): 244-254.
29. Jonathan A Dranoff, *et al.* "How does coffee prevent liver fibrosis? biological plausibility for recent epidemiological observations". *Hepatology* 60.2 (2015): 464-467.
30. N Balasundram, *et al.* "Phenolic compounds in plants and agri-industrial by-products: Antioxidant activity, occurrence, and potential uses". *Food Chemistry* 99.1 (2006): 191-203.
31. Manach C., *et al.* "Polyphenols: Food sources and Bioavailability". *American Journal of Clinical Nutrition* 79.5 (2004): 727-747.

Volume 3 Issue 3 March 2019

© All rights are reserved by Adronikos S Ballis.