Impact of coffee on human health

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Abstract

Coffee is considered as one of the most popular beverages in the world. There are many different methods of preparation which can change the taste but also it could limit the level of dipertenes which raise blood cholesterol. For many years it was thought that the impact of coffee on human health is not very positive. Surprisingly coffee consumption is associated with lower risk of the type 2 diabetes mellitus and lower cancer risk. It also decreases mortality from cardiovascular disease, coronary heart disease, and stroke. Summarizing, the results of the analyzed studies show positive impact of coffee on human health. To maintain the advantages of this beverage, amount of caffeine, intake of sugar or cream should be limited.

Key words: coffee; caffeine; cardiovascular diabetes

Introduction

Coffee is one of the most popular beverages all over the world - over 80% of adult Poles declare drinking coffee regularly, most of them (60%) drink coffee at least one a day and 16% drink a few cups of coffee every day. The average annual coffee consumption per capita in Poland is about 2.8kg. 7 tons of coffee are drunk every year around the world. [1,2] There are many types of coffee which depends on the degree of roasting, type of beans and method of preparation. Coffee is one of the main sources of caffeine to the diet. [3] Caffeine content varied widely, ranging from 40 to 180 mg per cup of coffee depending on type of beans, roasting methods etc. [4] Impact of coffee and caffeine on human's health has been discussed by many researchers.

Methods of preparation

Coffee contains a whole lot of different substances, one of the most important being caffeine. In recent years, attention has been paid to the methods of preparing coffee, which vary slightly from country to country. Moreover, it has been proven that the method of preparing coffee has an influence on the lipid fraction. The lipid content and composition of boiled, filtered, dripped, Turkish and espresso coffees prepared from roasted beans of Coffea arabica and Coffea robusta. While coffee brews filtered through filter paper contained less than 7 mg lipids, those prepared by boiling without filtering and espresso coffee reached 60–160 mg lipids/150-ml cup. Coffee brew filtered through a metal screener contained 50 mg lipids/150-ml cup. [5]

On this basis, attempts are made to develop the most favorable recommendations for coffee consumption, which should take into account the method of its preparation, the amount consumed as well as predisposing risk factors, such as hypertension, hyperlipidemia. [6]

The semi-automatic espresso machine, also known as a manual, semi-automatic or lever coffee machine, is the most popular coffee machine.

Due to the very short contact between the water and the ground coffee beans, it must be ground properly. If the beans are ground too coarsely, the water will flow through them too quickly, the brewing process will not take place properly and the coffee will be too weak.

For one cup of espresso, about 7 grams of ground coffee are needed, although you can make a single serving with 16 grams of ground coffee. [7]

French press (press pot, coffee press, cafetiere or cafetiere a piston), as the name suggests, was invented in France, but it gained the greatest popularity in Denmark and Great Britain. It was first patented in 1929 by the Italian designer Attilio Caliman.

It is a glass or metal cylinder with a piston inside, at the end of which there is a strainer, corresponding to the width of the vessel. This is one of the fastest and easiest ways to make coffee. The main advantage of this type of device is the ability to separate the coffee grounds from the infusion by means of a piston with a sieve.

When brewing coffee in French press, as with other brewing methods, the proportions are important. About 6 grams of coffee should be used for about 100 ml of water.

AeroPress is an easy-to-use device - it resembles a large syringe. It was invented in 2005 by Alan Adler, so it is the youngest device for drip coffee brewing. It combines the advantages of French press and drip. The entire coffee brewing process takes only a few minutes. The device consists of a piston, a sieve with a filter and a cylinder through which the finished coffee brew is pressed. AeroPress extracts maximum juiciness and natural fruity notes from coffee, it also emphasizes its acidity. Aeropress also allows the coffee to be brewed using the reverse method, thanks to which different taste qualities of coffee are obtained using the same beans. [8]

The coffee maker was created as an alternative to the espresso machine, it was invented in the 1930s by Antonio Bialetti in Italy. The brewing process should be a slow, gentle stream. [9]

Drip is the most classic method of preparing coffee. For this purpose, we use a special device that heats the water by itself and floods the coffee with it - a filter coffee maker or a glass or porcelain vessel, which we place directly on the cup - drip, chemex. The infusion is delicate, with a more tea-like consistency, and rich in fruity aromas and caffeine. Chemex gives a clear, even tea infusion with a velvety texture and a delicate body. [10]

The siphon was invented in the 1830s. This is one of the oldest methods of brewing coffee.

Turkish coffee dates back to the 16th century and is probably the oldest coffee made today. In 2013, the tradition of brewing and drinking coffee in Turkey was entered on the UNESCO intangible heritage list. [11]

Cold brew is coffee prepared without the use of hot water. Due to the lower acidity level of cold brew coffee, it is also sweeter in taste. Cold brews also contain more caffeine than traditional coffee because the maceration process coffee beans are in contact with water longer. [8]

Caffeine
Caffeine (1,3,7-trimethylxanthine) is the most commonly consumed stimulant worldwide. [12] The main natural sources of caffeine in diet are coffee beans, tea leaves, guarana, cocoa beans and kola nuts. [13] Caffeine is also an ingredient in energy drinks, chocolate and in medications. Because of its wide consumption and presence many scientists have investigated the effect of caffeine on human health. [14] Consequently regulatory agencies worldwide have evaluated caffeine safety and have issued guidance regarding daily intake amounts. [15] In 2003 Nawrot et al. proved that for the healthy adult population daily caffeine intake at dose level up to 400 mg/ day, for pregnant women 300mg/day and 2.5mg/kg/day has not adverse effects in five main outcomes such as 1.general toxicity,2. cardiovascular, 3.bone and calcium, 4.behavior, 5. development and reproductive toxicity. The potential lethal dose of caffeine is about 10g. [14]
Wikoff et al. perform systematic review of the potential adverse effects of caffeine consumption taking into consideration 740 full-text review. The study confirmed Nawrot's caffeine acceptable doses.

However intake below 400 mg/day may affect some sensitive individuals who are prone to anxiety or sleep disruption. [16] Also Schubert et al. examined literature that assessed the effects of caffeine and coffee on energy intake, gastric emptying, appetite- related hormones and perceptual measures of appetite. The study showed that coffee administered 3-4.5h before a meal affects food and macronutrient intake minimally, but caffeine administered 0.5-4h before a meal may suppress acute energy intake. [17]

Cardiovascular disease

The effect of caffeine on the cardiovascular system has been studied in numerous research papers, which shows that coffee consumption was associated with a lower risk of mortality from cardiovascular disease, coronary heart disease, and stroke in a non-linear relation. It was estimated that the largest reduction in relative risk was at three cups a day. There was no apparent variation of this association by sex. There was no significant association between consumption and risk of venous thromboembolism. [18]

In the population U.S. adults were investigated the relationship between caffeine and direct and indirect caffeine metabolites with hypertension. It was concluded that final metabolites of caffeine (namely 3-MU, 7-MU, 3-MX and 7-MX), but not caffeine, significantly reduce the chances of hypertension in this population. [19]

Coffee consumption seems to be associated with decreased mortality in general and caffeinated-beverages seem to be related with lower risk of high blood pressure in non-smokers. Despite the widespread consumption of coffee and caffeine in food and beverages there is no specific recommendation regarding coffee or caffeine intake in current hypertension guidelines. It is thought that there is currently no evidence that people with high blood pressure should refrain from caffeine when taken in reasonable amounts. [20]

Caffeine effects on cholesterol were investigated in trials, with exposures ranging from 180 to 475 mg caffeine/day. Research results showed a lack of effect of caffeinated-beverages on cholesterol at intakes below and above the comparator.

Summarizing the results in the cardiovascular effects category, there was no consistent effect of caffeine on heart-rate variability at intakes below 40 mg or above 500 mg , which confirms that 400 mg caffeine/day in healthy adults is an acceptable intake and is not associated with significant change in heart-rate variability. [21]

Diabetes mellitus

Coffee consumption is also associated with lower risk of the type 2 diabetes mellitus. It is caused by anti-inflammatory, antioxidative and thermogenic effects. The obtained results suggest that caffeinated and decaffeinated coffee have similar impact on diabetes mellitus. Filtered coffee such as Drip brewed contains the lowest amount of dipertenes which raise blood cholesterol and triglyceride levels in contrast to unfiltered coffee like Turkish or French press. Coffee consumption was also associated with higher levels of adiponectin and lower leptin levels in serum. It also caused reduced markers for inflammation and metabolic dysfunction. [22]

Is coffee a carcinogen?

Coffee contains acrylamide which is considered as "probably carcinogen". It is produced by roasting coffee beans in high temperature. Many animals studies have shown that acrylamide is a carcinogen. [23] Nevertheless studies used doses about 1000-10000 times higher than normal consumption in food so there is no evidence that coffee is a definitely carcinogen. [24] *Tian* et al have shown the association between drinking coffee and lower risk of colorectal and colon cancer. [25] Coffee intake can also reduce liver and prostate cancer risk. On the other hand, there is an association between high coffee intake, especially among non-smoking men and the higher risk of the bladder cancer. The effect on breast cancer depends on caffeine metabolism. CYP1A2 is involved in metabolism of caffeine but it also an estrogen metabolism. Estrogens have a significant role in ER+ breast cancer pathogenesis. CYP1A2*F genotype and coffee consumption may slow the risk of the breast cancer. [24]

Conclusion

Results of the analyzed studies show positive impact of coffee on human health. Coffee consumption is associated with lower risk of the type 2 diabetes mellitus and lower cancer risk. It also decreases mortality from cardiovascular disease, coronary heart disease, and stroke. It is also important to take under consideration the proper type of brewing or limit the use of milk, cream and sugar.

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