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CAFFEINE AND CARDIOVASCULAR RISK: A REVIEW

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ABSTRACT

Coffee is the leading worldwide beverage besides water and its exchange surpasses US \$10 billion worldwide. Controversies regarding its benefits and risks still exist as reliable evidence is becoming available supporting its health promoting potential; however, some researchers have shown concerns regarding the association of coffee consumption with cardiovascular complications.

From a physiological perspective, the potential bioactivity originates from caffeine, the di-terpenes; cafestol and kahweol found in the oil, and the polyphenols, most remarkably chlorogenic acid. We shall sift through the existing information on coffee & its bioactivity and also their link with and impact on the risk factors which are associated with heart disease such as lipids, blood pressure, inflammation, endothelial function, metabolic syndrome and potentially protective in vivo antioxidant activity.

Numerous epidemiological studies have scrutinized the relationship between coffee drinking and Coronary Heart Disease as a healthy habit.

Most prospective studies have not demonstrated a positive affiliation, though case-control studies in general have reported such an affiliation. This inconsistency could be clarified by an acute adverse effect of coffee, rather than a long-term adverse effect. We propose that coffee drinking may have an intense negative impact in activating coronary events in all age groups, and also post cardiovascular patients.

Key Words: Cardiovascular risk, Coronary artery disease, Dietary habits, Myocardial infarction

INTRODUCTION

Coffee, isn't just water with some beans, it contains a significant amount of vitamins and minerals. It is the second largest traded commodity on earth, is the most widely consumed beverage subordinate to water. Coffee and tea are certainly not included under the healthy food category and if possibly given importance it may be only because of the dietary sources of polyphenols. It is a multiplex of more than 1,000 chemical compounds that include caffeine; the main component, phenols, vitamin B3, magnesium, potassium, fiber, quinolones, etc. It is slightly acidic in nature, and has a stimulating effect on human due to its caffeine content.¹

It has now become one of the massive sources of antioxidants in modern living. It not only keeps one insomniac but also makes one smarter. The nature and action of the coffee is highly nourished by the processing and brewing of the coffee beans.^{2,4} Coffee epitomize as an ultimate contributor in the total anti-oxidant capacity of the diet. However, regular consumption of coffee presents its own pros and cons.

From a different prospect, coffee intake may turn down the risk of Type-2 Diabetes Mellitus and Hypertension, along with other possibilities of reducing obesity and depression. It has either beneficial or detrimental effects on cardiovascular system.³ Coffee has all the characteristics to control neurodegenerative disorders to a wide extent. Its consumption has been associated with a lower risk of death in a multitude of prospective epidemiological studies.

The present review aims to unfold the increasing talk about how coffee can possibly have an impact on Cardio-vascular diseases.

The Effectiveness of Caffeine:

Caffeine is by far the most discussed component in coffee. It is accountable for the strong habit-forming character of coffee on a large scale. The active ingredient in coffee; caffeine, is a stimulant and the most commonly consumed psychoactive substance in the world.

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Caffeine's most basic mechanism in the brain is blocking the effects of an inhibitory neuro-transmitter that is adenosine. The act of caffeine actually increases neuronal firing in the brain and the release of other neurotransmitters like dopamine and norepinephrine by blocking the inhibitory response mediated by adenosine. It also incorporates a connection with the elevated blood pressure, arterial stiffness, plasma renin activity, epinephrine and non-epinephrine.

Reviews of reliable journals have examined the effects of caffeine on the brain, demonstrating that it can improve mood, reaction time, memory, vigilance and general cognitive function. It raises the metabolic rate and helps to mobilize fatty acids from the fat tissues and can also enhance physical performance.¹⁰

Its dominant aftereffect is not only increased alertness and energy, but also other utilities as well as negative aspects to it. Its main drawbacks are addiction and overuse. Discontinuation from caffeine may end up into headaches, bad mood and a loss of focus.²⁸

The Other types:

There are about 10% of coffee lovers who would like to enjoy a good cup of coffee without the mild enlivening effect of caffeine. This type of coffee without the caffeine is known as decaffeinated coffee, which is coffee that has gone through a process of decaffeination to remove the caffeine. Most of the people drink decaffeinated coffee to escape weariness and lethargy. But some prefer it over regular coffee by the choice of taste.

The greatest challenge in decaffeination is to try to separate only the caffeine from the coffee beans while leaving the other chemicals at their intact concentrations. This is not easy since coffee contains somewhere around 1,000 chemicals that are important to the taste and aroma of this miraculous complex elixir.

The Possibilities:

The **risk factors** for **Coronary Artery Disease** are smoking, hypertension, hypercholesterolemia, diabetes, obesity, social deprivation, physical activity and **Dietary habits**.

The dietary habits also include the intake of beverages like coffee as it contains stimulants that may either enhance or minimize the productive output.

The possible conditions prevailing coffee intake are Coronary Artery Disease, Myocardial Infarction, Cardiac Arrhythmias, Congestive Heart Failure, Ischemic Heart Disease, Atrial Fibrillation, Stroke, etc.

From the past 2 decades there has been a consistent elevation in coffee consumption throughout the world in both men and

women. Young adults are also liable to boost the utilization of coffee in the modern world. The use of certain addiction generating substances should be at the lowest possible level and to an extent not harmful to normal body functioning. Consumption of coffee should be limited; a minimum of 2 to 3 cups of coffee per day comes out as safe.

In the past few years, the associations between coffee drinking and its risk to coronary heart disease (CHD) or coronary artery disease (CAD) remain disputable even after diverse studies. Coronary Artery Disease is one of the major causes of death worldwide in both men and women. Physical activity and dietary habits also pitch in as risk factors for Coronary Artery Disease.⁶

Alteration in nutritional routines can eventually increase or decrease these incidences. It is proclaimed that several characteristics of coffee should be taken into consideration, especially the preparation of coffee particularly boiled coffee as it lifts up serum lipids, homocysteine levels and also cholesterol levels.

Benefits:

Old research findings have linked coffee consumption with adverse cardiovascular effects plus an unpredictability of myocardial infarction. Recent studies have generally found no connection between coffee and an increased risk of heart disease. In fact, most studies find an association between coffee consumption and decreased overall mortality and possibly cardiovascular mortality, although this may not be true in younger people who drink large amounts of coffee.

Many studies have shown that drinking coffee on a daily basis is safe for the heart and may actually reduce risk for heart disease. For most healthy adults, moderate coffee consumption can be part of a healthy diet, and for individuals that experience side effects from coffee, decaffeinated coffee can be the best alternative.

Threadbare endothelial function increases the risk of heart attack and heart failure, because coffee helps improve endothelial function, it not only helps to protect from a heart attack to begin with, but can also reduce the risk of dying from cardiovascular disease.^{27,29}

The Health Professional follow up study states that intake of coffee of 4 cups per day – both caffeinated and decaffeinated coffee does not increase Coronary Heart Disease risk.⁶

The prospective study on Finnish men and women articulates that 7 cups/day Coffee drinking is not associated with Coronary Heart Disease risk and death. Scottish Heart Health Study, the cohort study on Coffee consumption published that ≥ 5 cups/day has a moderate benefit.²

Researchers found among women, drinking at least 2 cups of coffee per day was associated with protection of up to 25% against dying from cardiovascular disease. And in a group of patients, both men and women, who had suffered the most common kind of heart attack, 96% of patients who were given coffee during their stay in the coronary care unit had a favorable increase in their heart rate variability, a measure of protection against premature cardiovascular death.²⁹

Coffee consumption has been associated with improved insulin sensitivity and reduced risk of type 2 diabetes, but it has also been linked to increased cholesterol concentrations and heightened blood pressure.¹³ A study of type II diabetics showed that those who consumed 5 or more cups of coffee daily were about 31% less likely to die from all causes and about 30% less likely to die from cardiovascular diseases, compared to those who drank no coffee at all.¹⁴

Moderate coffee consumption lessens risk of clogged arteries and heart attacks, the people consuming three to five cups of coffee a day have a lower risk of clogging arteries, and those drinking a moderate amount of coffee daily are subordinate to develop clogged arteries that could lead to heart attacks.²⁰

According to the study conducted by HEART and Live Science, those who drank several cups of coffee a day had lesser menace of calcium buildups in the coronary arteries. Although these deposits are considered early warning signs of heart disease, the results do not mean that if you start drinking coffee you will be protected against this condition.¹²

On the other hand, research indicated that regular coffee drinkers may have a reduced risk of type 2 diabetes, which makes people prone to heart disease.

Drawbacks:

A lot of advanced epidemiological findings have analyzed the possible effects of coffee on Coronary Heart Diseases.

Caffeine is the complex link between coffee and Coronary Artery Disease. Although there is strong evidence associating coffee with heart disease, caffeine is a mild stimulant and, as such, can cause a small, temporary rise in blood pressure and heart rate.

The Health Professional follow up study voice out that decaffeinated coffee consumption of ≥ 4 cups/day moderately increases Coronary Heart Disease risk.⁶ Moreover it was also added that decaffeinated coffee was contrarily related to cardiovascular mortality. There was no evidence of decaffeinated coffee providing a protective effect.

However, certain researches appear to bear out some risks. High consumption of unfiltered coffee has been associated with mild elevations in cholesterol levels.⁷ And some studies found that two or more cups of coffee a day can increase the

risk of heart disease in people with a specific and fairly common genetic mutation that slows the breakdown of caffeine in the body. So, how quickly the coffee metabolizes may affect health risk.²¹

Caffeine, especially in higher quantities, can cause elevated blood pressure, nervousness, polyuria and gastric acid.¹¹ Drinking caffeine before bed can affect consciousness by making it harder to fall asleep, decreasing total sleep time and reducing the overall quality of sleep.

Although coffee may have fewer risks compared with benefits, addition of cream and sugar to a cup of coffee adds more fat and calories.

It's Competitiveness with other Beverages:

With Green Tea:

Both coffee and tea have their benefits, though it's always hard to pinpoint exactly what those are due to the large amount of contradictory studies. Coffee has higher caffeine content than tea; a typical cup of coffee has nearly three times the amount of caffeine than green tea.²² Though not enough has been studied to conclude whether tea does in fact reduce the risk of dying, tea has often been considered a therapeutic or medicinal drink that has both soothing and rejuvenating qualities.

Both have other nutrients in them that have been linked with significant health benefits. Studies have indicated that both the beverages may reduce a person's risk for heart disease, various types of cancer, Parkinson's disease and other neurological disorders, and also Type 2 diabetes.

Both beverages carry their own set of benefits that may help to maintain good energy and health, but when concerned about too much consumption of the stimulant it might be better to stick to green tea or any beverage containing a less amount of stimulant in it.²³

With other Caffeinated sources:

In general, coffee has more caffeine than soda and energy drinks. But coffee can provide additional naturally occurring nutrients while most sodas and energy drinks only have added sugars and artificially added vitamins.²²

With Decaffeinated coffee:

For many people, the pros outweigh the cons when it comes to drinking caffeinated beverages. A person may be able to gain more health benefits by choosing caffeinated products over decaffeinated as long as the consumption is in moderation.

Decaffeinated happens to be a better choice for people who drink more than three cups of coffee daily and are

prone to anxiety, stress, depression, sleep disturbances, palpitations, etc.²⁵ Despite the decaffeination process, a small proportion of caffeine however remains in the decaffeinated coffee which may be not less than 5%.

Conclusion: Coffee is 'Heart Healthy'!

Coffee is more in the favor of healthy living and should not be taken as a risk. After evaluating all the various prospective studies regarding the benefits and the drawbacks of coffee, we can say that coffee is highly beneficial to a person as it not only stimulates the Central Nervous System but also gives a helping hand in cardiovascular functions. It does have a minor effect on cardiac arrests and arrhythmias but that can be over looked.

The employment of coffee in our daily life has a vast amount of utility like it increases energy convenience, reduces fatigue and the perception of stress related with physical action. It increases alertness, wakefulness and focus. It helps in better coagulation of blood in the body. It enhances physical performance and cognitive performance. It strengthens short-term memory and increases the ability to solve problems requiring reasoning, and the ability to make correct decisions. It boosts cognitive functioning capabilities and neuromuscular coordination.

Taking coffee on a daily basis has no prime side-effect on Cardiovascular or any other vital organs. However there is still a question of whether to consume coffee after an episode of Myocardial Infarction or any other CVD or no; there is no evidence of coffee or caffeine increasing the casualties of CVD's to a higher extent. Therefore, as coffee shows no possibilities of limitations after an episode, it can be taken by anyone post Myocardial Infarction and Cardiovascular disease also.¹⁵

Drinking of decaffeinated coffee over a caffeinated one is a matter of choice, as some feel it doesn't make them jittery or keeps them awake. But few believe it's a much healthier alternative for them than regular, and may actually be beneficial. Decaf may be a better choice for people who drink more than four cups of coffee daily and are prone to anxiety, stress and depression.²⁴ But decaffeinated coffee does have a bit of caffeine present in it. It is better to avoid caffeinated coffee if there are certain medications which have the tendency to interact with the stimulant.

Coffee can be taken by everyone but it should be in a moderate amounts. 4-5 cups of coffee a day has been taken as a moderate count. People with DM should look out for sugar intake in coffee as it might add up to their flaw. Drinking more coffee has no major drawbacks but surely it is no much of good as well.

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