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Cardiovascular Effects of Coffee: Is It a Risk Factor?

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References

Heart minute volumes and cardiac index rise acutely after coffee consumption,[5] an effect which may in part be due to direct stimulation of cardiac myocytes or central and humoral activation. The effect of caffeine is more pronounced in subjects who do not drink coffee regularly compared with habitual coffee drinkers, who show minimal effects on the CV system. Tolerance to coffee is of clinical importance and should be considered in the assessment of coffee consumption as a CV risk factor.

The acute CV effects of coffee are most likely related to the antagonistic binding of caffeine on adenosine receptors,[6] which results in vasoconstriction and an increase in peripheral resistance.[1,6] This response may explain the observed rise in diastolic blood pressure (BP) compared with systolic BP. Moderate doses of coffee have been shown to reduce resting heart rate due to a moderate increase in BP.[7,8] The decrease in heart rate is generally associated with vagally mediated slowing as the baroreceptors respond to BP elevations after caffeine administration.[1] Higher doses can produce heart rate acceleration, but such effects are not commonly associated with typical patterns of consumption. The underlying mechanisms for the effect of coffee on the CV system have not been elucidated.

Small doses of coffee induce similar decreases in heart rate both in habitual and nonhabitual coffee drinkers. This bradycardic effect has been described in an early research study.[9] High doses of caffeine, a main ingredient in coffee, as well as methylxanthine[10] can lead to tachycardia and may even induce arrhythmias in predisposed subjects. Coffee-induced arrhythmias are more frequent in nonhabitual coffee drinkers compared with habitual coffee drinkers.[11] The effect of coffee on BP and heart rate disappears after 1 hour and is correlated with plasma concentrations of caffeine.[3] A recent study demonstrated that there was no correlation between consumption of coffee or beverages containing caffeine and higher risk of atrial fibrillation or flutter.[12]

Coffee has a favorable effect both on autonomic failure hypotension and postprandial hypotension and has been recommended as a preventive or therapeutic measure in these conditions.[13]

Coffee consumption may also affect the CV response to physical activity. During physical activity, heart rate and BP normally increase. Because of the assumed risk of an excessive BP rise during physical activity, patients have been advised to abstain from coffee consumption when beginning physical activity. In 338 normotensive and nonsmoking subjects, an inverse correlation was found between coffee consumption and the BP rise during cycloergometric testing.[14] This suggests that regular coffee consumption has a stabilizing effect on BP, with a smaller increase in baseline values and modest increase during physical activity.

Under acute conditions, coffee intake affects glucose metabolism by increasing plasma glucose and insulin concentrations[15] while decreasing insulin sensitivity.[16,17] and fat metabolism[18] (i.e., it increases free fatty acids). Plasma concentration of free fatty acids rises significantly after caffeine administration[19] and after coffee drinking.[20] The increase in free fatty acids induced by coffee does not differ in habitual and nonhabitual coffee drinkers. In contrast, the effect of coffee on plasma concentrations of cholesterol and lipoproteins is contradictory. Many studies of coffee consumption have shown that lipid concentrations increase, while others suggest they do not.[18,21] Moreover, a recent study demonstrated that regular coffee ingestion may modestly reduce the susceptibility of low-density lipoproteins (LDLs) to oxidation.[22]

The stimulating effect of coffee on the central nervous system reduces tiredness and somnolence, decreases response time, improves concentration, and extends intellectual efficiency.[1,23,24] Simple mental tasks are solved faster after coffee consumption; however, coffee can adversely affect complicated motor tasks requiring fast response times or optimal muscle coordination because it causes a small tremor and a reduction of fine movement control.[25] Duration and quality of sleep are clearly affected by coffee; drinking a coffee beverage 30-60 minutes before going to sleep extends sleep latency, shortens total sleep duration, and significantly worsens subjective sleep quality.[26] Coffee does not reverse the sedating effect of alcohol.[27] Coffee also influences the respiratory system, with activation of the bulbar breath center. This effect increases respiratory rate up to 20%, due most likely to an increase in sensitivity of the central chemoreceptors to P_{CO2}.[28]

A recent retrospective analysis of the Honolulu Heart Program, in which 8004 Japanese-American men,

aged 45-68 years, were followed for up to 30 years, has shown an inverse relation between coffee and caffeine intake and the incidence of Parkinson disease.[29] Despite its stimulating effect on the central metabolism of catecholamines, including dopamine,[30] caffeine does not modify the therapeutic response to levodopa in primary Parkinsonism.[31]

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