

Coffee increases prediabetes risk in susceptible young adults

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Coffee increases the risk of prediabetes in young adults with hypertension who are slow caffeine metabolisers, according to results from the HARVEST study presented at ESC Congress today by Dr Lucio Mos from Italy. People who drank more than three cups of coffee per day doubled their risk of prediabetes.

Dr Mos said: "Lifestyle factors are very important for the prognosis of young people with [hypertension](#). In a previous analysis of HARVEST (Hypertension and Ambulatory Recording VEnetia Study) we found that coffee was a risk factor for the development of sustained hypertension and that the risk was modulated by the genetic background of the individual. Slow metabolisers of caffeine were at increased risk of hypertension."(1)
(2)

He added: "As type 2 diabetes often develops in hypertensive patients at a later stage, in the present study we examined the long term effect of coffee drinking on the risk of developing prediabetes in the participants of HARVEST, a prospective longitudinal study of young subjects screened for stage 1 hypertension."(3)

HARVEST included 1 180 patients aged 18 to 45 years who had stage 1 hypertension but did not have diabetes. Genotyping of CYP1A2, the enzyme that metabolises caffeine, was performed in 639 patients (4). Prediabetes was defined as fasting plasma glucose between 100 and 125 mg/dL at the final study visit.

The researchers found that 74% of participants drank coffee. Among the coffee drinkers, 87% drank 1-3 cups per day (moderate) and 13% drank more than 3 cups per day (heavy). Analysis of the CYP1A2 genotyping revealed that 42% of participants were fast metabolisers of caffeine and 58% were slow metabolisers.

After 6.1 years, prediabetes was diagnosed in 24% of patients. Moderate coffee drinkers (1-3 cups/day) had a 34% increased risk of developing prediabetes compared to abstainers and heavy drinkers (more than 3 cups/day) had a doubled risk. This association was stronger in patients who were overweight or obese.

However, the risk of prediabetes related to [coffee consumption](#) differed according to the CYP1A2 genotyping. The risk of prediabetes associated with coffee intake was increased only in slow caffeine metabolisers, with a hazard ratio of 2.78 (confidence interval 1.32-5.88, $p=0.0076$) for heavy drinkers. In contrast the risk of prediabetes was not increased significantly among the fast caffeine metabolisers.

Dr Mos said: "Our study shows that drinking coffee increases the risk of prediabetes in [young adults](#) with hypertension who are slow caffeine metabolisers. The risk is even greater if these individuals are overweight or obese, and if they are [heavy drinkers](#) of coffee."

He added: "Slow caffeine metabolisers are exposed for a longer time to the detrimental effects of caffeine on glucose metabolism. Thus, the effect of

coffee on prediabetes depends on two factors, the amount of daily coffee intake and the individual's genetic background."

He continued: "Young-to-middle-age people with hypertension should be aware that coffee consumption may increase their risk of developing diabetes in later life. Genotyping for the CYP1A2 gene polymorphism could help them to better know their risk. Carriers of the slow *1F allele, who are slow caffeine metabolisers, should abstain from drinking caffeinated coffee."

Dr Mos concluded: "The results of the HARVEST study suggest that in patients with hypertension, caffeinated coffee should be considered a dietary risk factor for [prediabetes](#). This risk applies especially to slow [caffeine](#) metabolisers and to [patients](#) who are overweight or obese. Our findings contradict previous epidemiologic studies that have advocated [coffee](#) consumption as a means to lower the risk of type 2 diabetes mellitus."

More information: (1) Palatini P, Ceolotto G, Ragazzo F, Dorigatti F, Saladini F, Papparella I, Mos L, Zanata G, Santonastaso M. CYP1A2 genotype modifies the association between coffee intake and the risk of hypertension. *J Hypertens.* 2009.;27(8):1594-1601. [DOI: 10.1097/HJH.0b013e32832ba850](#).

(2) CYP1A2 is the main enzyme responsible for the metabolism and detoxification of caffeine in the body. Activity of CYP1A2 varies in individuals and depends on the genetic polymorphism they carry. Carriers of the *1F allele (*1A/*1F and *1F/*1F genotypes) are slow caffeine metabolisers and are more exposed to the effects of caffeine. People with the fast *1A/*1A genotype are fast metabolisers and less exposed to caffeine which is rapidly eliminated from the body.

(3) The degree of hypertension is classified into 3 stages. Stage 1 hypertension is defined as a systolic blood pressure of 140 to 159 mmHg and diastolic blood pressure of 90 to 99 mmHg. Prediabetes is defined as having an impaired fasting glucose (fasting glucose of 100 mg/dL), impaired glucose tolerance (two-hour postprandial glucose of 140 mg/dL), or both. The HARVEST

study used the former definition. Prediabetes is a precursor of overt type 2 diabetes mellitus and is associated with insulin resistance and an increased risk for cardiovascular disease.

(4) Genotyping of CYP1A2 was performed in just 639 patients because only the four main HARVEST centres participated in the genetic study.

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