

PERSPECTIVES IN HYPERTENSION

Coffee and blood pressure: what is fact and what is fiction?

CLAUDIO BORGHI

Department of Medical and Surgical Sciences, University of Bologna, Bologna, Italy
IRCCS Policlinico S.Orsola



One of the most common requests we receive almost daily from our patients is: what should I do with my coffee? The connection between coffee and blood pressure has been very difficult to understand for many years because of the interference of uncontrolled “pseudo-scientific” rumors that insinuate the dangerous effects of drinking coffee on blood pressure control. However, science does not rely on rumors, but is based on evidence and the evidence is moving very fast in the opposite direction. Coffee is probably the most popular beverage after water, and it is largely consumed in different ways across the world. Its presumed negative effect on the human system has been extensively discussed, and the conclusion has been reached that drinking coffee has a favorable impact on human health and quality of life.¹ Does this revolutionary approach apply to hypertensive patients as well? The answer is positive, and I will try to support my point of view in this burning area by trying to answer a few simple questions.

A. Why is coffee OK for hypertensive patients?

The composition of coffee is much more complex than expected and includes over 1000 chemical constituents, and many of them are biologically active as antioxidant and anti-inflammatory compounds than can have a favorable effect on the cardiovascular system beyond the well-known effects of caffeine.² Coffee has a variable caffeine content depending on how it is prepared but the impact on blood pressure is largely comparable between the espresso and soluble coffee.³

B. What is the effect of coffee on blood pressure control?

Over 40 years ago, a seminal study reported an increase in blood pressure and sympathetic nervous system activation in non-habitual coffee drinkers.⁴ These findings have been confirmed by some additional studies⁵ which mainly tested the effects of the administration of unusually high doses of caffeine in a heterogeneous population of patients with different blood pressure values and levels of habitual coffee consumption. Conversely, more recent epidemiological studies^{6,7} and comprehensive meta-analyses have reported a neutral or protective effect of coffee in patients with arterial hypertension (**Table 1**). A remarkable difference in the effects of coffee on blood pressure values has been reported between naïve subjects and habitual coffee drinkers.⁵ A minimal increase in blood pressure values has been observed in non-consumers while the pressor effects of coffee in habitual drinkers are usually negligible and clinically non-significant. This is due to the tolerance to caffeine that develops in a few days thus enhancing the benefit of the biological substances with antihypertensive action (vitamin E, niacin, potassium and magnesium) and antioxidant compounds, such as polyphenols, which also have vasodilator and antihypertensive properties.²

C. Does coffee consumption increase cardiovascular risk in hypertension?

This important issue has been investigated by many cohort studies that have scrutinized the incidence of cardiovascular events in relation to

coffee consumption.⁸ The results consistently report the lack of any increase in the rate of cardiovascular events in drinkers of up to 5 cups of coffee per day when compared with lack of consumption. Conversely, a reduction in the risk of major cardiovascular events has been associated with coffee consumption with a greater benefit in subjects consuming between 3 and 5 cups of coffee per day. Furthermore, no relationship has been observed between coffee consumption and the incidence of ventricular arrhythmias, atrial fibrillation (where there is an inverse relationship!) and other cardiac rhythm disturbances.⁵

D. Does coffee increase cardiovascular/ all-cause mortality?

A reduction in all-cause mortality has been reported in a large data setting of regular coffee consumers. The benefit ranged from 7-12%

in the 500,000 European adults of the EPIC study (European Prospective Investigation into Cancer and Nutrition), followed over 16 years and compared to non-drinkers.⁹ To quantify the benefit, the intake of 3 to 5 cups of coffee a day was associated with the lowest CV risk and longer survival; that was recently confirmed by three large cohort studies including over 1 million subjects drinking an average of 2-3 cups/day followed for at least 10 years.⁸ In another large prospective cohort study of over 200,000 healthcare workers followed for 25 years, an inverse relationship between coffee consumption and all-cause mortality was reported.¹⁰ The reduction in risk for CVD and mortality included decaffeinated coffee, confirming the primary role of non-caffeine compounds as important factors associated with the successful survival results observed in coffee drinkers.

Table 1: Summary of studies investigating the effects of coffee and caffeine on blood pressure and prevalence of hypertension.

Author	Substance	Dose	Population	Outcome
Nurminen, et al. Eur J Clin Nutr, 1999	Caffeine	200-250 mg/single dose	Normotensive	SBP/DBP: -3-14/-4-13 mmHg
Jee et al. (9), Hypertension, 1999	Coffee	Various doses	Metanalysis	SBP/DBP: -2.4/1.2 mmHg
Klag et al, Arch Int Med 2022 (10)	Coffee	Various doses	Habitual drinkers vs. non drinkers	New onset HTN: 28.8% vs. 18.8%
Lane et al, Psychosom Med 2002 (11)	Caffeine	500 mg vs. placebo	Global population	Mean BP: -3-4 mmHg
Steffen et al, J Hypertens, 2012	Coffee	Various doses	Metanalysis (mix)	No excess in prevalence HTN
Xie et al, J Hum Hypertens 2018	Coffee	Various doses	Metanalysis (mix)	2% reduction of HTN/cup /day
Zhang et al, Am J Clin Nutr 2011	Coffee	≥ 4 cups/day	Global population	No excess in prevalence HTN
Winkelmayr et al, JAMA 2011	Coffee	1-6 cups/day	Women (NHS)	No excess in prevalence HTN
Brisighella,2023	Coffee	0-6 cups/day	Global population	Mean SBP: -5/-7 mmHg
PAMELA, 2023	Coffee	0-3 cups/day	Hypertensive	Mean SBP: 0,7 mmHg

E. What about the position of coffee in prevention guidelines?

One of the greatest pieces of news in terms of coffee, high blood pressure and cardiovascular disease is the unexpected upgrading of the recommendations for coffee drinking in the prevention guidelines. The ESC Guidelines on Cardiovascular Disease Prevention in Clinical Practice suggest that “moderate coffee consumption (3-4 cups/day) is probably non harmful, perhaps even moderately beneficial”. The 2023 ESH guidelines for the treatment of Hypertension state that: “Coffee has been reported to have a modest short-lasting pressor effect, but recent data appear to indicate that its moderate regular consumption does not adversely affect BP and the CV system.” The 2019 ESC/EASD Guidelines on Diabetes, Pre-diabetes and cardiovascular diseases report: “In a meta-analysis of 18 observational studies increasing coffee or tea consumption appeared to reduce the risk of diabetes Mellitus (DM)”. The same is true for many other consensus documents across the world dealing with the management of hypertension and this is opening a new era in the implementation of lifestyle changes in hypertensive patients who do not have to refrain anymore from the consumption of coffee or other coffee-based products.

Conclusion

Time is moving on and one of our steps forward is that one of the most popular companions must not be banned from our daily life if blood pressure increases above the limits. Paradoxically, it could be part of a strategic policy aimed at improving adherence to treatment by launching on the market a new concept of behavioral fix-dose combination based on morning cup of coffee + antihypertensive drugs with a better blood pressure control, a better quality of life and the perception of a friendly medicine.

Claudio Borghi – claudio.borghi@unibo.it

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