

Is Co-Administration Curcumin and Piperine a Benefit in Preventing Metabolic Syndrome?

Carmine Finelli ^{1,2*}

¹Department of Internal Medicine, Ospedale Cav. R. Apicella – ASL Napoli 3 Sud, Via di Massa, 1, 80040 Pollena (Napoli), Italy.

²Covid Hospital Boscotrecase - ASL Napoli 3 Sud, Via Lenza, 3, 80042 Boscotrecase (Napoli), Italy.

***Corresponding Author:** Carmine Finelli, Department of Internal Medicine, Ospedale Cav. R. Apicella – ASL Napoli 3 Sud, Via di Massa, 1, 80040 Pollena (Napoli), Italy.

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Abstract

The metabolic syndrome, which includes obesity, insulin resistance, dyslipidemia, and hypertension, has gained importance due to its link to the development of cardiovascular disease and type 2 diabetes.

Key words: dyslipidemia; and hypertension; cardiovascular disease

INTRODUCTION

The metabolic syndrome, which includes obesity, insulin resistance, dyslipidemia, and hypertension, has gained importance due to its link to the development of cardiovascular disease and type 2 diabetes [1]. Metabolic problems are becoming a big problem in both developed and developing countries in today's world. Metabolic syndrome is becoming more prevalent over the world, posing a serious danger to global health because it accounts for 6-7 percent of all deaths. People with metabolic syndrome are five times more likely than those without it to develop type 2 diabetes and are twice as likely to die from a heart attack or stroke [2, 3]. It is one of the world's most important public health crises, affecting more than one-third of the world's population, and it is spreading at an alarming rate. Despite considerable advancements in medical and pharmaceutical medication research, food, exercise, and nutritional supplementation play an important role in maintaining a healthy lifestyle and overall well-being, especially in the case of cardiovascular diseases. As a result, in the current circumstances, there is a pressing need to examine and focus our research on nutraceuticals and their role in metabolic syndrome.

Curcumin is a nontoxic, very promising natural chemical with anti-inflammatory [4], hepato- and nephroprotective [5, 6], antioxidant, antibacterial, anticarcinogenic [7], and thrombosis-suppressing activities [8]. Curcumin comes from the root of the *Curcuma longa* Linn plant (family Zingiberaceae). Curcumin's therapeutic activities are limited by its water solubility and alkaline pH degradation, which reduces its bioavailability. Despite the fact that *Curcuma longa* has been examined for its medicinal benefits, more research into its anti-diabetic, antioxidant, and lipid peroxidation levels in diabetic rats is required. As a result of the

mentioned, curcumin, piperine, and quercetin in combination are in great demand.

Piperine is an alkaloid present in plants such as *Piper nigrum* L, or black pepper, that has been demonstrated to help in drug absorption. It increases the bioavailability (serum concentration) of oral curcumin by inhibiting glucuronidation metabolism [9]. Because it aids in the prevention of curcumin metabolic conversion, a second bioavailability booster, such as quercetin, can boost absorption even more.

Pepper's principal pungent component, piperine, is an alkaloid with a variety of therapeutic benefits. It's also been shown to improve the bioavailability of nutritional and botanical compounds. Despite its exceptional therapeutic capabilities, piperine's pharmacological activities have been limited due to its low water solubility. The bio-active molecule's low solubility in aquatic environments underscores the need for new approaches that can help with long-term natural product extraction while also being environmentally friendly and energy-efficient. Among the advanced techniques used for piperine extraction are supercritical CO₂ extraction, ultrasound and microwave-assisted extractions, as well as IL and enzyme-assisted extractions, all of which have some strengths and advantages over traditional methods. However, each method has its own set of flaws and limitations. Although some research has been done on extracting piperine from pepper and purifying it for biomedical uses, nothing has been done on using the derived piperine directly for medicinal purposes. Piperine's low water solubility is a major stumbling barrier in its development as a drug in the lab. Despite recent efforts to increase piperine bioavailability using nanoformulations and lipid body encapsulation, there is still a long way to go before it can be utilized as a pharmaceutical. The earliest results for medicinal usage of nanoformulated piperine are promising, and a bright

future for piperine therapeutic exploitation can be predicted thanks to recent breakthroughs in biotechnology.

Therefore, the co-administration of curcumin and piperine seems to be a feasible strategy to increase the bioavailability of curcumin and to potentiate their effect on the blood lipids reduction at the same time. Although proposed mechanisms of action were previously reported [10-12], preclinical and clinical trials describing the effect of curcumin and piperine co-administration on serum lipids and cardiovascular events are restricted [13 - 15]. In animal and human clinical investigations, the combination of curcumin and piperine had a favorable effect on lipid profile by lowering total cholesterol, triglycerides, and LP(a) while boosting HDL-C. Despite the fact that no long-term clinical trial evaluating the effect of curcumin and piperine co-administration on cardiovascular events has been conducted, secondary serum markers such as glucose, AST, and ALP, as well as an increase in CAT and SOD, have been identified as ways to reduce cardiovascular risk. A meta-analysis or a more standardized long-term clinical trial should be conducted as a result.

In conclusion, research suggests that co-administration of curcumin and piperine at different doses can help decrease serum lipids. There is insufficient direct evidence of the benefit of decreasing cardiovascular risk in preventing cardiovascular events and metabolic syndrome. The issue of safety and toxicology is still up in the air.

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