

**The effects of metabolic syndrome on arterial stiffness: A concise review**Syed Ali Wijdan<sup>1</sup>, Saljok Ali<sup>2</sup>, Abia Mirza<sup>3</sup>, Mahavash Nadeem<sup>4</sup>

The term "metabolic syndrome" describes a collection of diseases that escalates a person's risk of cardiovascular disease, stroke, adult-onset diabetes, and other severe health issues. It is also known as Insulin resistance syndrome. A major cause of metabolic syndrome is the development of resistance to insulin due to high levels of fats.<sup>1</sup> Multiple risk factors, including abdominal and central obesity, increased blood pressure, low amount of HDL, and higher amount of LDL and triacylglycerides characterize it. Metabolic syndrome and arterial stiffness are interconnected conditions that can significantly impact cardiovascular health.<sup>2</sup> Arterial stiffness is a condition that considers the rigidity of the arterial wall. It involves modification of the automated aspects of the walls of arteries. The macroscopic geometry as well as the intrinsic characteristics of the artery, play a role in its stiffness.<sup>3</sup>

Several mechanisms lead to arterial stiffness in metabolic syndrome patients, the first being inflammation. Upon excess nutrition, adipocytes increase in size and number, which causes decreased perfusion, causing hypoxia. Cell necrosis with the invasion of macrophages and the synthesis of adipocytokines, which consist of the pro-inflammatory mediators, might result from this condition.<sup>1</sup> The increased vascular inflammation will promote vascular fibrosis, smooth muscle cell proliferation, and endothelial-mediated vasodilation, which will ultimately increase arterial stiffness.<sup>4</sup>

Metabolic syndrome is also related to insulin resistance, lipidemia, and central obesity. Chronic hyperglycaemia and hyperinsulinaemia may enhance sympathetic nervous system activity, vascular inflammation, and renin-angiotensin system activity. Vascular tissue's angiotensin-aldosterone system results in fibrosis and wall

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enlargement. Middle-aged people transitioning from gaining body weight to established conditions like hypertension and type 2 diabetes experience arterial stiffness. This transition typically starts with a few minor changes, but Metabolic Syndrome develops when several risk factors are present.<sup>5</sup>

In conclusion, there is evidence to suggest arterial stiffness and metabolic syndrome are closely related and have significant implications for the well-being of an individual. It is essential to address both conditions as they may lead to atherosclerosis, followed by more frequent cardiovascular events and higher mortality. There are various strategies to counter the rise of arterial stiffness, like adding exercises to routines and vitamin K-rich foods to the diet, which will in turn reduce the occurrence of metabolic syndrome disorders in individuals, thus leading to a healthier society.

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