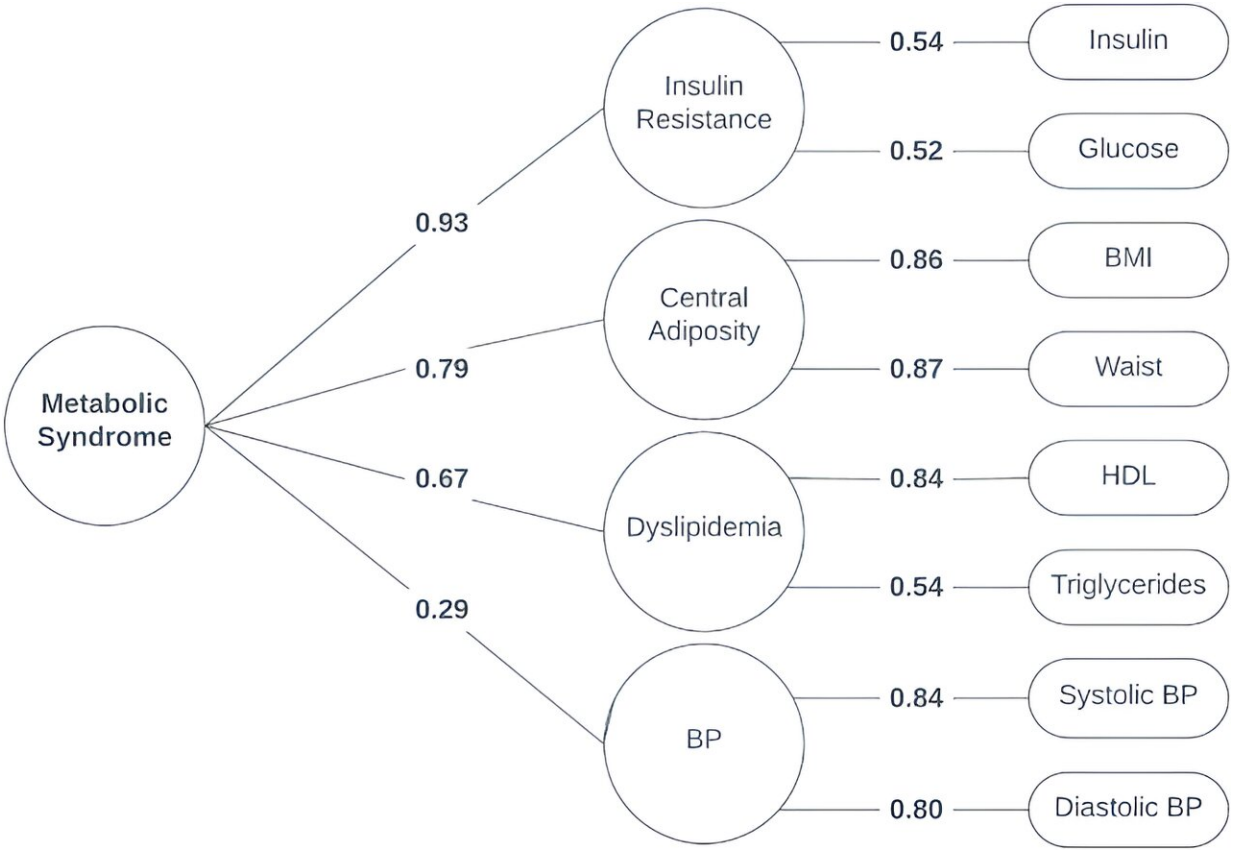
Medical Xpress

Stress, via inflammation, is linked to metabolic syndrome

January 12 2024



Confirmatory factor analysis model of metabolic syndrome. $\chi^2 = 117.6$, df = 17, N = 648; CFI = 0.97, TLI = 0.96, RMSEA = 0.06, SMSR = 0.05.Note. BMI = Body Mass Index. Waist = waist circumference (cm). BP = Blood Pressure. CFI = Comparative Fit Index. TLI = Tucker-Lewis Index. RMSEA = root mean squared error of approximation. SMSR = standardized root mean square residual.

Lifestyle and genetics, and a range of other factors within and outside our control, are known to contribute to development of metabolic syndrome, a cluster of conditions that add up to increased risk for serious health problems.

A new study has found that stress, through its propensity to drive up inflammation in the body, is also linked to metabolic syndrome—leading researchers to suggest that cheap and relatively easy stress-management techniques may be one way to help improve biological health outcomes.

"We were specifically examining people in midlife—a time that is critical to determine those who will experience accelerated aging. Stress is an important contributor to several negative health outcomes as we age," said senior author Jasmeet Hayes, associate professor of psychology at The Ohio State University.

"There are many variables that influence metabolic syndrome, some we can't modify, but others that we can. Everybody experiences stress," Hayes said. "And stress management is one modifiable factor that's cost-effective as well as something people can do in their daily lives without having to get medical professionals involved."

The research was published recently in *Brain, Behavior, & Immunity—Health*.

Links between stress and biological health are established, but few previous studies have looked specifically at the involvement of inflammation in stress's connection to metabolic syndrome.

People with metabolic syndrome are diagnosed with at least three of five factors that increase the risk for heart disease, diabetes and other health issues—excess belly fat, high blood pressure, low HDL (good) cholesterol, and high levels of fasting blood glucose and triglycerides, a

type of fat in the blood. The condition is also referred to as insulin resistance syndrome.

Using data from a sample of 648 participants (average age 52) in a national survey titled Midlife in the United States, first author Savana Jurgens built a statistical model to gauge how inflammation may fit into the relationship between stress and metabolic syndrome. Information from respondents' reported perceived stress, blood biomarkers for inflammation, and physical exam results indicating risk factors for metabolic syndrome were used for the analysis.

"There's not much research that has looked at all three variables at one time," said Jurgens, a psychology graduate student in Hayes' lab. "There's a lot of work that suggests stress is associated with inflammation, inflammation is associated with metabolic syndrome, and stress is associated with metabolic syndrome. But putting all those pieces together is rare."

Inflammation composite scores were calculated using biomarkers that included the better-known IL-6 and C-reactive protein as well as E-selectin and ICAM-1, which help recruit white blood cells during inflammation, and fibrinogen, a protein essential to blood clot formation.

The statistical modeling showed that stress does indeed have a relationship with metabolic syndrome, and inflammation explained over half of that connection—61.5%, to be exact.

"There is a small effect of perceived stress on metabolic syndrome, but inflammation explained a large proportion of that," Jurgens said.

The results made sense—stress is just one of many factors that can launch health markers into a state of disarray. Other factors include a range of behaviors, including inactivity, unhealthy eating habits,

smoking, and poor sleep, as well as low socioeconomic status, advanced age, and being female.

But considering that an estimated 1 in 3 American adults has metabolic syndrome, knowing how to lower risk or prevent it altogether is important, Hayes said. The findings also add to evidence that stress and its connection to inflammation can have a big impact on biological health in general.

"People think of stress as mental health, that it's all psychological. It is not. There are real physical effects to having chronic stress," Hayes said. "It could be inflammation; it could be metabolic syndrome or a number of things. This is another reminder of that."

Future work will include a closer look at whether stress has a causal effect on metabolic syndrome and assessing stress management techniques that may be best for helping reduce inflammation.

More information: Savana M. Jurgens et al, Inflammatory biomarkers link perceived stress with metabolic dysregulation, *Brain, Behavior, & Immunity—Health* (2023). DOI: 10.1016/j.bbih.2023.100696

Provided by The Ohio State University