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Cholesterol levels vary by season, get worse in colder months

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Cholesterol levels fluctuate based on the time of year with more unfavorable lipid profiles seen in the colder months, a trend that may be driven by related behavior changes, according to research to be presented at the American College of Cardiology's 63rd Annual Scientific Session.

While previous studies have shown that heart attacks and heart-related deaths increase during the winter months, researchers at Johns Hopkins Ciccarone Center for the Prevention of Heart Disease were interested in finding out whether cholesterol parameters might follow a similar pattern among a sample of 2.8 million adults – the largest study to look at seasonal lipid trends in U.S. adults to date. Abnormal cholesterol levels are a well-known cardiovascular risk factor.

"In this very large sample, we found that people tend to have worse cholesterol numbers on average during the colder months than in the warmer months – not by a very large amount, but the variation is significant," said Parag Joshi, M.D., cardiology fellow, Johns Hopkins Hospital, and lead investigator of the study. "It confirms findings from smaller studies and raises a lot of interesting questions, including what might be driving these [fluctuations]."

Researchers caution these findings do not mean patients should have their cholesterol checked more frequently or at certain times of the year; the data instead validates a clear seasonal pattern and underscores the need to pay attention to behaviors that are critical to minimizing

cardiovascular risk.

"In the summer, we tend to get outside, we are more active and have healthier behaviors overall," Joshi said. "In the colder months, we tend to crawl into our caves, eat [fat-laden] comfort foods and get less exercise, so what we see is that LDL and non-HDL [bad cholesterol markers] are slightly worse. So you have a lipid signature of higher risk, but it's probably driven by a lot of behaviors that occur with the changing seasons."

Researchers speculate the shorter days of winter – and limited time spent outside – also mean less sun exposure and, subsequently, lower concentrations of vitamin D, which has also been associated with the ratio of bad to good cholesterol.

In this cross-sectional study, researchers analyzed lipid profiles in more than 2.8 million consecutive U.S. adults who were referred for testing by their doctors from 2006 to 2013. Samples were categorized by the time of year when cholesterol was measured and comparisons were made across the seasons. The study also compared gender-stratified lipids and the prevalence of national guideline-based goal attainment for low density lipoprotein (LDL), non-high density lipoprotein (non-HDL) and high lipoprotein (HDL) by season.

Total cholesterol, LDL cholesterol and non-HDL cholesterol levels were all higher in the winter than in the summer. LDL and non-HDL cholesterol were 4 mg/dL higher in men and 2 mg/dL higher in women during the colder vs. warmer months – a 3.5 percent and 1.7 percent increase, respectively. Non-HDL – total cholesterol minus good HDL cholesterol – is a more comprehensive marker of risk. Triglycerides were 2.5 percent higher in men during the winter compared with the summer. Women and men had variations in total cholesterol of approximately 2 mg/dL and 4 mg/dL, respectively, between the summer

to winter. HDL did not vary much between seasons. Ratios of atherosclerotic risk were lowest in the spring and summer.

Attainment of National Cholesterol Education Program Adult Treatment Panel III goal LDL-C and non-HDL-C was more prevalent in the summer compared to the winter, while HDL-C was lowest in the fall. Authors also found that while women had more favorable risk profiles overall, a lower percentage of women met the ATP III targets compared to men. The difference between average cholesterol values in the fall and winter were not statistically significant.

Researchers said the distribution of these lipid profiles is analogous to a representative national sample of the current U.S. adult population. Samples were provided through a commercial lab (Artherotech, Birmingham, Ala.), which was not involved with the study or its analysis.

Interest for this study grew out of a sub-analysis from the PROVE-IT trial, a randomized controlled trial looking at the use of low- and high-dose statins after heart attack to see if there was a reduction in events. In this study, the authors also looked at cholesterol values over the year and by season. While this earlier study had similar findings, they were not statistically significant likely because of the smaller sample size, Joshi explained.

Despite these latest findings, he says more research is needed to further tease out what might be behind these seasonal variations.

Provided by American College of Cardiology