'Holiday heart syndrome': Researchers explore binge drinking and arrhythmia link at times of celebration

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Credit: American Heart Association

Binge drinking (five drinks within two hours for men and four drinks

within two hours for women) is common around the world. Recent research has also found the incidence of atrial fibrillation (AFib), the most common type of irregular heart rhythm or arrhythmia, continues to rise, according to the study.

"Around the holidays, opportunities for celebration—often accompanied by heavy drinking—occur during a brief period of time. Unfortunately, this sometimes sends revelers, even those with no previous heart condition, to the hospital with a racing or abnormally beating heart," said Saugat Khanal, Ph.D.

Khanal is a post-doctoral scholar in the department of physiology & cell biology at The Ohio State University College of Medicine in Columbus, Ohio, and lead author of the study being presented at the American Heart Association's Basic Cardiovascular Sciences Scientific Sessions 2024, held in Chicago, July 22–25, 2024.

"Our study in mice explored the mechanism of alcohol-induced arrhythmia and a possible way to prevent it in the future."

"Repeated binge drinking can lead to serious arrhythmias. This includes AFib, which is the most common type of arrhythmia." Said Khanal. "AFib can raise the risk of stroke and heart failure. About one-third of new AFib diagnoses are related to alcohol use. Recurrence of AFib is common in habitual binge drinkers.

"The link between repeated binge drinking and arrhythmia at times of celebration is so well-known that medical professionals call it holiday heart syndrome, which is caused by repeated binge drinking over the holidays."

Previous animal research by this research team found binge-drinking-related arrhythmias are induced by elevations in a stress-induced protein

called JNK2. This can cause heart cells to mishandle calcium and misfire, resulting in the heart beating too fast or irregularly. The new study suggests, for the first time, that the molecule Alda-1 may prevent the activation of JNK2 that leads to AFib.

The study found:

- In this study, more than 70% of the mice that were given alcohol mimicking binge drinking developed AFib, compared with none of those who also received the investigational cardiac protective agent Alda-1.
- Exposure to binge drinking levels of alcohol doubled levels of JNK2 activity compared to a control group that did not mimic binge-drinking. This activated JNK2 increased the AFib susceptibility in the mouse models mimicking binge drinking.
- Both JNK2 enzyme activity and calcium handling remained normal in the heart cells of the mice treated with Alda-1.

"Abstinence from alcohol can prevent most alcohol-associated AFib risks. Unfortunately, despite nationwide education efforts, binge drinking among all age groups continues to rise. Our findings suggest that developing new drugs, including Alda-1 and other JNK2-specific inhibitors, may be an effective anti-AFib strategy for people with holiday heart syndrome," Khanal said.

The study was limited because researchers used a mouse model to replicate human holiday heart syndrome. Although the mouse model showed promising results, it may not have fully captured the complexities of binge drinking in humans and related cardiovascular consequences.

"Studies using larger animals will be a future direction to translate our exciting findings into clinical applications," Khanal said.

Study background and details:

- Mice used in the study were divided into three groups: a holiday heart syndrome group, subject to four every-other-day doses of alcohol, mimicking holiday binge drinking in humans; an Alda-1 group, who received the alcohol regimen plus the cardioprotective agent Aldi-1; and controls, who received saline (no alcohol) or Alda-1 exposure.
- Outcome measures were obtained 24 hours after the last alcohol exposure. Measures used included:
- Electrophysiological studies assessed burst pacing-induced atrial arrhythmias;
- Calcium imaging studies investigated the impact of Alda-1 on JNK2-dependent Calcium mishandling; and
- Biochemical assays examined the effects of alcohol on ALDH2 expression and apoptotic signaling pathways.

More information: Study: An Anti-arrhythmic Action and Novel Molecular Mechanisms of Alda-1 in Holiday Heart Syndrome

Provided by American Heart Association

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