Smoking directly linked to a higher risk of subarachnoid hemorrhage

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Adults who smoke or who are genetically predisposed to smoking behaviors are more likely to experience a serious type of stroke called subarachnoid hemorrhage (SAH), according to new research published today in *Stroke*, a journal of the American Stroke Association, a division of the American Heart Association. The results of this study provide important evidence that there is a causal link between smoking and the risk of SAH.

SAH is a type of stroke that occurs when a blood vessel on the surface of the brain ruptures and bleeds into the space between the brain and the skull. It mainly affects middle-aged adults and has high rates of complications and death.

"Previous studies have shown that smoking is associated with higher risks of SAH, yet it has been unclear if smoking or another confounding condition such as high blood pressure was a cause of the stroke," said senior author of the study Guido Falcone, M.D., Sc.D., M.P.H, an assistant professor of neurology at Yale School of Medicine in New Haven, Connecticut. "A definitive, causal relationship between smoking and the risk of SAH has not been previously established as it has been with other types of stroke."

To determine whether there is a causal effect of smoking and SAH, researchers analyzed the genetic data of 408,609 people from the UK Biobank, ages 40 to 69 at time of recruitment (2006-2010). Incidence of SAH was collected throughout the study, with a total of 904 SAHs occurring by the end of the study. Researchers developed a genetic risk scoring system that included genetic markers associated with risk of smoking and tracked smoking behavior data, which was collected at the time each participant was recruited.

Researchers found that:

- the relationship between smoking and SAH risk appeared to be linear, with those who smoked half a pack to 20 packs of cigarettes a year having a 27% increased risk;
- heavier smokers, those who smoked more than 40 packs of cigarettes a year, were nearly three times more at risk for SAH than those who did not smoke; and,
- people who were genetically predisposed to smoking behaviors were at a 63% greater risk for SAH.

"Our results provide justification for future studies to focus on evaluating whether information on genetic variants leading to smoking can be used to better identify people at high risk of having one of these types of brain hemorrhages," said Julian N. Acosta, M.D., neurologist, postdoctoral research fellow at the Yale School of Medicine and lead study author. "These targeted populations might benefit from aggressive diagnostic interventions that could lead to early identification of the aneurysms that cause this serious type of bleeding stroke."

Researchers say while their findings suggest a more pronounced and harmful effect of smoking in women and adults with high blood pressure, they believe larger studies are needed to confirm these results. Their analysis is also limited by the type of data used in the UK Biobank, which, like all large information resources, rely on standardized treatment codes from medical charts, whereas smaller studies are focused on more detailed health records and information for each individual.

More information: *Stroke* (2021). DOI: 10.1161/STROKEAHA.120.031622

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