One hookah tobacco smoking session delivers 25 times the tar of a single cigarette

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As cigarette smoking rates fall, more people are smoking tobacco from hookahs—communal pipes that enable users to draw tobacco smoke through water. A new meta-analysis led by the University of Pittsburgh School of Medicine shows that hookah smokers are inhaling a large load of toxicants.

The findings, published online and scheduled for the January/February print issue of the journal *Public Health Reports*, represent a meta-analysis, or a mathematical summary of previously published data. The research team reviewed 542 scientific articles potentially relevant to cigarette and hookah smoking and ultimately narrowed them down to 17 studies that included sufficient data to extract reliable estimates on toxicants inhaled when smoking cigarettes or hookahs.

They discovered that, compared with a single cigarette, one hookah session delivers approximately 125 times the smoke, 25 times the tar, 2.5 times the nicotine and 10 times the carbon monoxide.

"Our results show that hookah tobacco smoking poses real health concerns and that it should be monitored more closely than it is currently," said lead author Brian A. Primack, M.D., Ph.D., assistant vice chancellor for health and society in Pitt's Schools of the Health Sciences. "For example, hookah smoking was not included in the 2015 Youth Risk Behavior Surveillance Survey System questionnaire, which assesses cigarette smoking, chewing tobacco, electronic cigarettes and many other forms of substance abuse."

Dr. Primack and his co-authors note that comparing a hookah smoking session to smoking a single cigarette is a complex comparison to make because of the differences in smoking patterns. A frequent cigarette smoker may smoke 20 cigarettes per day, while a frequent hookah smoker may only participate in a few hookah sessions each day.

"It's not a perfect comparison because people smoke cigarettes and hookahs in very different ways," said Dr. Primack. "We had to conduct the analysis this way—comparing a single hookah session to a single cigarette—because that's the way the underlying studies tend to report findings. So, the estimates we found cannot tell us exactly what is 'worse.' But what they do suggest is that hookah smokers are exposed to a lot more toxicants than they probably realize. After we have more fine-grained data about usage frequencies and patterns, we will be able to combine those data with these findings and get a better sense of relative overall toxicant load."

The research team also notes that these findings may be helpful in providing estimates for various official purposes.

"Individual studies have reported different estimates for inhaled toxicants from cigarettes or hookahs, which made it hard to know exactly what to report to policy makers or in educational materials," said co-author and expert in meta-analysis Smita Nayak, M.D., research scientist at the Swedish Center for Clinical Research and Innovation. "A strength of meta-analysis is that it enables us to provide more precise estimates by synthesizing the currently available data from individual studies."

These estimates come at an important time: The Centers for Disease Control and Prevention recently reported that, for the first time in history, past 30-day use of hookah tobacco was higher than past 30-day use of cigarettes among U.S. high school students. Additionally, about

one-third of U.S. college students have smoked tobacco from a hookah, and many of those individuals were not previous users of other forms of tobacco.

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