

Exposure to tobacco before birth found to significantly increase risk of type 2 diabetes in adults

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Tobacco exposure before birth and beginning smoking during childhood/adolescence were significantly associated with the development of type 2 diabetes in adulthood, especially for people with a high genetic risk of type 2 diabetes, according to preliminary research presented at the American Heart Association's [Epidemiology and Prevention | Lifestyle and Cardiometabolic Scientific Sessions 2024](#), held March 18–21, in Chicago.

Tobacco exposure in adulthood is a well-established risk factor for type 2 [diabetes](#), and previous research has found that people who smoke cigarettes are 30%–40% more likely to develop type 2 diabetes than people who don't smoke.

"However, how early-life tobacco exposure may impact the development of type 2 diabetes, as well as whether this association varies by different genetic predisposition to type 2 diabetes are unclear," said senior study author Victor Wenzhe Zhong, Ph.D., a professor and chair of the department of epidemiology and biostatistics at Shanghai Jiao Tong University School of Medicine in Shanghai, China.

In this study, researchers reviewed data for almost 476,000 adults in the UK Biobank to estimate the associations of tobacco exposure before birth and beginning smoking during childhood (ages 5–14) or adolescence (ages 15–17) with the development of type 2 diabetes. A polygenic risk score for type 2 diabetes was used to assess the possible interactions and joint effects between early-life tobacco exposure and genetic susceptibility on the development of type 2 diabetes.

The researchers also investigated whether adherence to a healthy lifestyle as an adult, such as eating a healthy diet, exercising, getting sufficient sleep, maintaining normal weight and not smoking may have

affected the development of type 2 diabetes among high-risk individuals.

The analysis found:

- Early-life tobacco exposure, before birth and/or beginning to smoke in childhood or adolescence, were significantly associated with the development of type 2 diabetes, with a higher risk for individuals with a genetic predisposition for the condition.
- Tobacco exposure before birth was associated with a 22% increased risk of developing type 2 diabetes compared to people who never smoked.
- People who started smoking in childhood had double the risk of type 2 diabetes; those who started smoking as adolescents had a 57% higher risk, while those who started smoking as adults had a 33% higher risk of developing type 2 diabetes compared to those who never smoked.
- Compared with participants having no early-life tobacco exposure and a low genetic predisposition for type 2 diabetes, people with a high genetic risk score had a 330% higher risk of developing type 2 diabetes if they were also exposed to tobacco before birth, a 639% higher risk if they started smoking in childhood and a 427% higher risk if they started smoking in adolescence.
- This increased risk of type 2 diabetes due to early-life tobacco exposures and high genetic risk was reduced by 67% to 81% among individuals who followed a healthy lifestyle in later life compared to individuals who did not.

"Although early-life tobacco exposure and [genetic predisposition](#) are not things children can control, our results provide evidence that lifestyle factors may powerfully modify the risk of type 2 diabetes. It's important for individuals, particularly those exposed to tobacco early in life and with a high genetic risk of type 2 diabetes, to adhere to a [healthy](#)

[lifestyle](#) to reduce their risk of developing type 2 diabetes as adults," Zhong said.

"While our study identified an association between early life tobacco exposure and type 2 diabetes, this does not mean that tobacco exposure definitively caused type 2 diabetes."

Study background and details:

- The UK Biobank is a large biomedical database and research resource with health records of about 500,000 adults—enrolled from 2006 until 2010—who live in the U.K and received health care through the U.K.'s National Health Service. In January 2023, the researchers accessed the data, which had been last updated in November 2022.
- The study included 475,957 participants who did not have type 2 diabetes when they enrolled. 23,480 people developed type 2 diabetes during the median follow-up time of 14.6 years.
- The mean age of participants at time of enrollment in the UK Biobank was 56.2 years old.
- At the time of enrollment, 55.7% of participants analyzed for this study self-identified as women; 44.3% self-identified as men. 90.8% of participants included in the study self-identified as white; 9.8% self-identified as other.

The study had several limitations. It is an observational study, meaning the findings indicate an association and do not confirm direct cause and effect. Information about tobacco exposure was self-reported by participants, therefore, the data may include possible errors in memory. In addition, there was the potential presence of other unmeasured sources of early-life tobacco exposure (such as second- and/or third-hand tobacco exposure in early life, including long-lingering residues in dwellings and on surfaces).

Finally, more than 90% of the study population from the UK Biobank self-identified as white, meaning the findings are not generalizable to people of other races or ethnicities.

"Tobacco use by adults is hazardous for many health outcomes, including cancer, cardiovascular disease, type 2 diabetes and other complications. However, for new-onset type 2 diabetes in adults, the timing of tobacco exposure and a diagnosis of type 2 diabetes has not been elucidated, nor has the contribution of multiple genes or polygenic risk for type 2 diabetes been assessed," said Robert H. Eckel, M.D., FAHA, a past president (2005–2006) of the American Heart Association, who was not involved in the study.

"When participants who had no early-life tobacco exposure and a low polygenic risk score were compared to those with a high [polygenic risk score](#), an alarming escalation of risk for developing T2D was seen in utero, in childhood and in adolescence," said Eckel, a professor emeritus of medicine in the Division of Endocrinology, Metabolism and Diabetes and the Division of Cardiology and the Charles A. Boettcher Endowed Chair in Atherosclerosis at the University of Colorado Anschutz Medical Campus.

"As with all [observational data](#), validation is needed, and causation was not proven, however, the Association continues to strongly recommend abstinence from [tobacco exposure](#) throughout life."

Provided by American Heart Association

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