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High-temperature tea and esophageal cancer

by Farhad Islami[1,2] | Scientific Director; Farin Kamangar[1,3] | Professor; Reza Malekzadeh[1,4,5] | Professor

[1]: Digestive Oncology Research Center, Digestive Diseases Research Institute, Tehran University of Medical Sciences, Tehran, Iran
[2]: Surveillance and Health Services Research, American Cancer Society, Atlanta, GA, United States;
[3]: Department of Biology, School of Computer, Mathematical, and Natural Sciences, Morgan State University, Baltimore, MD, United States
[4]: Digestive Disease Research Center, Digestive Diseases Research Institute, Tehran University of Medical Sciences, Tehran, Iran;
[5]: Liver and Pancreatobiliary Diseases Research Center, Digestive Diseases Research Institute, Tehran University of Medical Sciences, Tehran, Iran

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ABSTRACT

We measured tea drinking temperatures of over 50,000 people and followed up with them over a time span of 10 years. In our study, drinking tea at temperatures above≥60°C was associated with an increased risk of developing esophageal cancer.

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Billions of people start their day by drinking hot beverages, such as tea, coffee, or mate (a commonly used infusion in South America), and many enjoy drinking them throughout the day as well.

However, drinking very hot beverages might not be entirely safe, as earlier studies suggested that people who drink very hot drinks have higher risk of developing esophageal cancer. [Reminder: the esophagus is a tube-shaped organ connecting the throat and stomach]. The previous evidence was limited though, as it was mostly based on perception of tea drinking temperature described by study participants for example as cold, hot, or very hot. Everyone may perceive temperature differently, and we cannot verify exactly how hot is the tea people describe as “hot” or “very hot”. No one has ever measured actual beverage drinking temperature among people and assessed whether it influences the future development of esophageal cancer. This is called a prospective study because we assess the risk of disease development in healthy patients.

It is important to collect data prospectively if we want to correlate drinking hot beverages with esophageal cancer. Many esophageal cancer patients cannot swallow properly for some time before the diagnosis and thus they intuitively change their diet. That means that a patient might start to drink colder or warmer beverages due to the disease

and thus measuring of these temperatures can be misleading.

In a study of over 50,000 patients residing in northeast Iran, we examined the association between the drinking temperature of the tea, and the future risk of developing esophageal squamous cell carcinoma (ESCC), which is generally the most common subtype of esophageal cancer. To overcome the limitation of previous studies we recorded the tea temperature both with a thermometer as well as the heat that patients perceived.

Our trained staff interviewed patients in person asking them about a wide range of personal characteristics and potential risk factors of ESCC. We also asked how much tea participants drink, how many minutes they wait between pouring the tea and drinking it, and finally whether they drink tea warm/lukewarm, hot, or very hot.

Furthermore, we measured tea drinking temperature using a method that had shown good reliability in our earlier assessments: two fresh cups of tea were prepared at the time of the interview, one for the participant and the other for the interviewer to measure the temperature using a digital thermometer.

Then, the study participants were followed-up for next 10 years.

Some factors, known as confounding factors, could cause spurious associations in epidemiological studies. For example, if smoking is more common among alcohol drinkers than non-drinkers, simple analysis might show an increased risk of lung cancer associated with alcohol drinking, which may only be related to higher smoking rates among alcohol drinkers rather than the effects of alcohol per se. Here, smoking is a confounding factor for the association between alcohol drinking and lung cancer. We used statistical techniques to control for multiple potential confounding factors, including sex, urban/rural residence, ethnicity, education, wealth, cigarette smoking, alcohol consumption, opium use, and fresh fruit and vegetable consumption.

All measures of higher tea temperature in this analysis (higher measured temperature, reported preference for very hot tea drinking, and shorter time from pouring tea to drinking) were associated with higher ESCC risk. We observed that drinking 700 ml or more of the tea per day at ≥60°C [≥140°F] (compared to less than 700 ml/day at <60°C) was associated with significantly higher risk of ESCC. Further analysis showed that the observed associations were independent from smoking and alcohol drinking as they persisted among those who never smoked and never drank alcohol.

Taken all together, our results provide strong evidence for an association between drinking beverages at very high temperatures and developing ESCC. However, people could still enjoy their favorite beverages without increasing their cancer risk by drinking them cooler, at <60°C, which does not appear to increase the risk. More studies are needed on mechanisms of this association and the effects of drinking tea at lower temperatures.