Driving and hands-free talking lead to spike in errors, study shows

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Talking on a hands-free device while behind the wheel can lead to a sharp increase in errors that could imperil other drivers on the road, according to new research from the University of Alberta.

A pilot study by Yagesh Bhambhani, a professor in the Faculty of Rehabilitation Medicine, and his graduate student Mayank Rehani, showed that drivers who talk using a hands-free cellular device made significantly more driving errors—such as crossing the centre line, speeding and changing lanes without signalling—compared with just driving alone. The jump in errors also corresponded with a spike in heart rate and brain activity.

"It is commonplace knowledge, but for some reason it is not getting into the public conscience that the safest thing to do while driving is to focus on the road," said Rehani, who completed the research for his master's thesis in rehabilitation science at the U of A.

The researchers became interested in the topic in 2009 shortly after Alberta introduced legislation that banned the use of handheld cellphones while driving but not hands-free devices. In this study, they used near infrared spectroscopy to study the brain activity of 26 participants who completed a driving course using the Virage VS500M driving simulator at the Glenrose Rehabilitation Hospital.

Near infrared spectroscopy is a non-invasive optical technique that allows researchers to examine real-time changes in brain activity in the left prefrontal lobe. Participants were first tested in a control condition, using the simulator to drive in city street conditions using no telecommunications device. They were tested again while talking on a hands-free device during two-minute conversations that avoided emotionally charged topics.

The research team found there was a significant increase in brain activity while talking on a hands-free device compared with the control condition. A majority of participants showed a significant increase in oxyhemoglobin in the brain, with a simultaneous drop in deoxyhemoglobin—a sign of enhanced neuronal activation during hands-free telecommunication.

"The findings also indicated that blood flow to the brain is significantly increased during hands-free telecommunication in order to meet the oxygen demands of the neurons under the 'distracted' condition," said Bhambhani.

He added the results did not reveal a significant relationship between enhanced neuronal activation and the increase in the number of driving errors, most likely because the near infrared spectroscopy measurements were recorded from a single site, the prefrontal lobe.

The findings are considered novel on a topic that is receiving considerable attention by policy-makers globally. Rehani's contribution to the project earned him the 2013 Alberta Rehabilitation Award for Innovation in Rehabilitation (Student).

The researchers note this is a preliminary study and hope that it can be part of a larger body of literature that can help inform policy-makers about the safety implications of using hands-free devices while driving.

For Rehani, the work was part of rewarding academic journey at the U of A, which gave him opportunities to do research in a number of areas in neuroscience. He said he received outstanding support from both the faculty and colleagues at the Glenrose—including Quentin Ranson, the occupational therapist and rehabilitation technology lead who helped facilitate the simulator research.

"To have a Faculty of Rehabilitation Medicine, which is the only free-standing faculty of its kind in Western Canada, and to have a hospital like the Glenrose dedicated to rehabilitation, is amazing,"

he said. "Both workplaces have such a collegial environment, with quality faculty and staff who are both working toward patient betterment. These institutions connect so well, it's fantastic."

Provided by University of Alberta