Engineer cautions pregnant women about speed bumps

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UBCO researcher Hadi Mohammadi cautions that accelerating over speed bumps poses a danger for pregnant women and their fetuses. Credit: UBC Okanagan

Slow down. Baby on board.

So says UBC Okanagan researcher and Associate Professor of Mechanical Engineering Hadi Mohammadi. His new research, conducted in collaboration with Sharif University of Technology, determines that accelerating over speed bumps poses a danger for pregnant women and their fetuses.

"There is lots of research about the importance of movement for women during pregnancy," explains Mohammadi, who teaches in the School of Engineering. "Our latest research looked specifically at the impacts of sudden acceleration on a pregnant woman."

Using new modeling based on data from crash tests and fundamental dynamic behaviors of a pregnant woman, Mohammadi and his co-authors found that accelerating over speedbumps raises concern. If driven over quickly, they caution this can lead to minor injuries to the fetal brain, cause an abnormal fetal heart rate, abdominal pain, uterine contraction, increasing uterine activity and further complications.

Occupants in a vehicle, especially pregnant women, are subjected to relatively large forces suddenly and over a short period when a vehicle accelerates over a speed bump, he explains.

Mohammadi is particularly interested in vibrations, and in this case their impact on human organs. This recent study looked at the effect of these vibrations on a woman in her third trimester of pregnancy.

Their investigation included many factors such as the speed of the car as it goes over the speed bump, the size of the speed bump as it can cause a drag on the uterus as it goes up and then down, and the fact that all this movement puts pressure on the amniotic fluid that is protecting the fetus.

"We took all these factors into account to ensure a comprehensive

differential model that mirrors real-world responses and interactions of the woman and fetus."

As a result, the researchers were very specific in their recommendations. Slow down.

In fact, they advise slowing a vehicle to less than 45 km/h when hitting a speed bump, and preferably as low as 25km/h to reduce risk to the fetus.

"Obviously, there are other variables at play when a driver approaches a speed bump, but we hope our findings provide some evidence-based guidance to keep drivers and their occupants literally and figuratively safe," says Mohammadi.

Furthermore, he hopes the findings can help researchers better understand how a pregnant woman and her fetus are subjected to risk caused by a vehicle passing bumpy terrain such as speed bumps. His end goal is for his research to make vehicular safety improvements for pregnant women.

More information: Mostafa Irannejad Parizi et al, Interaction analysis of a pregnant female uterus and fetus in a vehicle passing a speed bump, *Journal of Biomechanics* (2021). DOI: 10.1016/j.jbiomech.2021.110257

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