Sitting for long hours found to reduce blood flow to the brain

August 20 2018, by Bob Yirka

Credit: CC0 Public Domain

A team of researchers with Liverpool John Moores University in the U.K. has found evidence of reduced blood flow to the brain in people who sit for long periods of time. In their paper published in the *Journal*

of Applied Physiology, the group outlines the experiments they carried out with volunteers and what they found.

Most people know that sitting for very long periods of time without getting up now and then is unhealthy. In addition to contributing to weight gain, sitting for a long time can cause back pain and leg problems and possibly other ailments. And now, evidence has been reported that it can reduce blood flow to the brain—something shown in the past to contribute to the likelihood of developing neurological disorders such as dementia.

Suspecting that sitting for a long time could cause circulation problems to the brain, the researchers enlisted the assistance of 15 adult volunteers—each of them had a day job that required long hours of sitting. Each of the volunteers participated in three exercises over a period of time—each came to the lab on three separate occasions and sat for four hours. On each visit, they were fitted with a headband that measured blood flow to the brain using ultrasound. Each subject also wore a face mask that captured and measured carbon dioxide levels.

During the first exercise, the volunteers were asked to sit at a desk for four straight hours, leaving their chairs only to use the restroom. For the second exercise, each rose from their chair every 30 minutes and walked on a treadmill for two minutes. In the third exercise, each subject remained in their chair for two hours and then walked on the treadmill for eight minutes, then returned to the chair.

The researchers found evidence of reduced blood flow in all of the volunteers during all of the exercises. However, they also found that normal blood flow was restored by walking breaks. They report that the best outcome was when the volunteers took frequent two-minute walking breaks.

More information: Sophie E. Carter et al. Regular walking breaks prevent the decline in cerebral blood flow associated with prolonged sitting, *Journal of Applied Physiology* (2018). DOI: 10.1152/japplphysiol.00310.2018

Abstract

Decreased cerebrovascular blood flow and function are associated with lower cognitive functioning and increased risk of neurodegenerative diseases. Prolonged sitting impairs peripheral blood flow and function, but its effects on the cerebrovasculature are unknown. This study explored the effect of uninterrupted sitting and breaking up sitting time on cerebrovascular blood flow and function of healthy desk workers. Fifteen participants (10 male, 35.8±10.2 years, BMI: 25.5±3.2 $kg \cdot m^{-2}$) completed, on separate days, three 4-hr conditions in a randomised order: a) uninterrupted sitting (SIT), b) sitting with 2-min light intensity walking breaks every 30-min (2WALK) or c) sitting with 8-min light intensity walking breaks every 2-hrs (8WALK). At baseline and 4-hrs, middle cerebral artery blood flow velocity (MCAv), carbon dioxide reactivity (CVR) of the MCA and carotid artery were measured using transcranial Doppler (TCD) and duplex ultrasound respectively. Cerebral autoregulation (CA) was assessed with TCD using a squat-stand protocol and analysed to generate values of gain and phase in the very low, low, and high frequencies. There was a significant decline in SIT MCAv (-3.2±1.2 $cm.s^{-1}$) compared to 2WALK (0.6±1.5 $cm.s^{-1}$, p=0.02), but not between SIT and 8WALK (-1.2±1.0 $cm.s^{-1}$, p=0.14). For CA, the change in 2WALK very low frequency phase (4.47±4.07 degrees) was significantly greater than SIT (-3.38±2.82 degrees, p=0.02). There was no significant change in MCA or carotid artery CVR (p>0.05). Results indicate that prolonged, uninterrupted sitting in healthy desk workers reduces cerebral blood flow, however this is offset when frequent, short-duration walking breaks are incorporated.