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Under The Patronage of his Excellency Dr Yousef Goussous

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The Effect of Breath-Holding on Cardiovascular Parameters, and Differences between Smokers and Non-Smokers

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Abstract

Background: Breath holding test is one of the simple clinical bedside respiratory function tests, which was used to provide a quantitative idea of the magnitude of the respiratory disorder since the eighties of the last century. Prolonged breath-hold during diving is known to develop cardiac autonomic changes such as brady-arrhythmias, peripheral vasoconstriction, and splenic contraction, reduced cardiac output and increased arterial blood pressure. Similar changes, but to lesser extent, is observed in non-divers.

The aim of this study is to:

1. Demonstrate the electrophysiological changes in the cardiovascular system that may accompany breath holding in normal non-smokers and smokers.
2. Evaluate the role of peripheral chemoreceptor role in determining the Breath-Holding time, and the potential effect of smoking on this role.
3. Find out if it is possible to use breath holding as a prognostic mean to unveil potential cardiac pathologies.

Methods: The sample of the study was total number of 114 healthy volunteers participated in the study. Non-Smokers involved 58 participants, and 56 Smokers. The study community is the Hashemite University. Cardiac functional parameters were recorded using the ECG analysis system. A pulse oximetry was used for the non-invasive monitoring of heart rate (HR) and arterial hemoglobin oxygen saturation (SatO₂).

Results: Breath-Holding time was significantly lower in Smokers participants (36.48±17.25 second) than in Non-smokers participants (46.03±26.95). Oxygen saturation (SatO₂) significantly lowered in both groups at the break point of Breath-Holding. Heart rate and mean blood pressure revealed insignificant decrease at the end of Breath-Holding compared to before Breath-Holding in both groups.

Breath-Holding time was poorly correlated with BMI among Smokers and Non-Smokers. Both groups revealed a trend of a decrease in Breath-Holding time with increasing BMI.

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Conclusion: Breath-Holding time is significantly lower in Smokers than in Non-Smokers suggesting enhanced peripheral chemoreceptor sensitivity to smoking. Breath-Holding results in significant decrease in SatO_2 . Breath-Holding time was poorly correlated with BMI. Strongest dynamical interaction was observed between SatO_2 and breath holding time parameters.

Breath-Holding test cannot be used as a bedside test to expose cardiac anomalies due to lack of sympathetic stimulation at the break point breath holding.

Keywords: Breath-Holding, Smoking, BMI, Oxygen Saturation

Biography

I am an Associate Professor of Physiology at Faculty of Medicine, The Hashemite University, in JORDAN. I received my bachelor's degree in Medicine and Surgery (M, B, Ch, B) from the Faculty of Medicine, University of Baghdad, IRAQ in 1977. After serving the internship program I was appointed as a demonstrator in the Department of Physiology, the Faculty of Medicine, University of Baghdad for one year. Then I left to CANADA where I obtained my PhD degree in Physiology from the University of Saskatchewan in 1987. I returned to IRAQ and joined the Faculty of Medicine as a teaching staff and a researcher in the department of Physiology, University of Baghdad where he supervised many M.Sc. students. In 2001 I left IRAQ to JORDAN and joined first the University of Mu'tah where I acted as the Head of the Department of Physiology for many years. Currently I am one of the teaching staff in the Hashemite University. My research interests lie in the field of Physiology and medical education.