Hind Alzahrani et al., Anat Physiol 2016, 6:4 (Suppl)
http://dx.doi.org/10.4172/2161-0940.C1.002

Continuous beat to beat monitoring the cardiovascular parameters in response to autonomic stress tests

Hind Alzahrani, Ian Macdonald and **Peter Mansell**
University of Nottingham, UK

Study Objective: The aim of this study was to develop a method of assessing cardiovascular function (heart rate (HR), cardiac output (CO), blood pressure (BP)) in response to deep breathing, standing maneuver and handgrip exercise at 60% of MVC, using a Finometer.

Subjects: Twenty subjects (10 males and 10 females) were healthy, young mean age 24.4 years males and 26.7 years females, non-obese mean±SD of BMI was 23.4±7.4, 22.8±4.5 males and females respectively.

Methods: Beat to beat heart rate and blood pressure variability were monitored during deep breathing test, posture change to standing position and handgrip exercise using a Finometer. This involves a finger cuff pressure which placed in the middle left finger and arm cuff pressure on the upper left arm. Then, automatic calibration was made followed by recording of baseline measurements for 3 minutes, and then physiological maneuvers were performed starting with deep breathing (2 minutes), standing (2 mniutes) and handgrip exercise at 60% of MVC (1 minute). This event separated by time for recovery.

Results: A significant increased and decreased in cardiovascular parameter during inspiration and expiration in both gender respectively ($p<0.05$). Orthostatic maneuver caused a significant reduction of systolic blood pressure and cardiac output whereas HR ($p<0.05$) and DBP ($P>0.05$) increased in both genders. Cardiovascular parameters showed a significant increased during handgrip exercise at 40% and 60% of MVC whereas 20% of MVC had no significant changes of cardiovascular parameters.

Discussion: The cardiovascular changes during inspiration and expiration caused a stimulation or inhibition of pulmonary stretch receptors respectively; this was accompanied with changes of abdominal and intra-thoracic pressures. It was confirmed in the study that a significant reduction of the parameters during inspiration and increased during expiration was completely driven by parasympathetic nervous system. Posture maneuver causes blood pooling to the lower part of the body resulting in decreasing in cardiac output and venous return which stimulated the sympathetic and inhibited parasympathetic nervous system which causes an increases of heart rate to maintain a reduction of blood pressure. A significant increase of cardiovascular parameters during handgrip exercise resulted from a stimulation of sympathetic discharge and inhibition of vagal tone as well as peripheral reflexes which originated from exercising muscle. Gender differences responses were observed which might related to several factors such as body-size, muscle mass and sex hormone. Overall, a variability of cardiovascular parameters during physiological maneuvers reflected the integrity and effectiveness of neuro-cardiovascular control. In the future study, the patients suffering from diabetic neuropathy will be involved and therefore developed a method to evaluate the autonomic disorders.

Biography

Hind Alzahrani is a PhD student at University of Nottingham, UK.

mbziam@exmail.nottingham.ac.uk

Notes: