



## Exercise Biochemistry Review

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Proceedings of IBEC 2018, Beijing, China, October 23-25

PL-014

### The gaseous metabolism characteristics of overweight adult women during exercise stress test

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**Objective** Overweight was a global public health problem. In recent years, the number of overweight people in China had been increasing. Being overweight had a serious impact on health. 31.1% of overweight people had aggregation of risk factors for cardiovascular metabolic diseases. And overweight people were more likely to suffer from some diseases, such as hypertension, diabetes, dyslipidemia and arthritis. This study compared the gas metabolism index differences between overweight and normal weight women when they did exercise under different load, and summarized gas metabolism characteristics of overweight women, in order to lay the foundation for instructing overweight women to do exercise scientifically, reduce the risk factors of chronic diseases such as cardiovascular disease, and enhance and improve physical fitness and health.

**Methods** Adult women between 20 and 30 years were taken as subjects. After measuring their height and weight, they were divided into normal weight group (BMI=18~23.9kg/m<sup>2</sup>) and overweight group (BMI>24kg/m<sup>2</sup>) according to body mass index (BMI). There were 15 participants in each group. After the baseline test, using modified Bruce treadmill protocol, the air metabolism indexes of two groups were determined by Cortex MetaMax 3B portable gas metabolic analyzer, including oxygen uptake (VO<sub>2</sub>), minute ventilation (MV), breathing frequency (BF), expiratory end-tidal CO<sub>2</sub> concentration (ETCO<sub>2</sub>), expiratory end-tidal O<sub>2</sub> concentration (ETO<sub>2</sub>), arterial blood carbon dioxide partial pressure (PaCO<sub>2</sub>), carbon dioxide output (VCO<sub>2</sub>), oxygen pulse and maximal voluntary ventilation (MMV), etc. The differences of gas metabolism indexes among resting, exercise, and recovery stages were compared and analyzed.

**Results** (1) Most of indexes such as VO<sub>2</sub>, VCO<sub>2</sub>, and MV rose gradually with the load increase during exercise stress test except for ETO<sub>2</sub> and PaCO<sub>2</sub>. VO<sub>2</sub>, PaCO<sub>2</sub>, VCO<sub>2</sub> and ETCO<sub>2</sub> of overweight group were significantly lower than normal weight group during the same load. PaCO<sub>2</sub> of overweight group at grade 4 was significant lower than normal weight group by 5.6 mmHg (P<0.05). VCO<sub>2</sub> of overweight group at grade 5 was significant lower than normal weight group by 0.6L/min (P<0.05). ETCO<sub>2</sub> of overweight group at grade 3 and 4 were significant lower than normal weight group about 0.5% and 0.6% respectively (P<0.05). (2) During recovery stage, most of indexes decreased gradually, such as MV and BF, while ETO<sub>2</sub> presented a rising trend. At a certain time during the recovery stage, ETCO<sub>2</sub> of overweight group was significantly lower than normal weight group (5.3% vs 5.8%), while MMV, MV and oxygen pulse were significantly higher than normal weight group (P<0.05). MMV of overweight group at 2, 3 and 4 minutes were significant lower than normal weight group by 1L/min, 1L/min and 0.9L/min, at the same time, MV of overweight group were significant lower than normal weight group by 17.8L/min, 20.1L/min and 16.9L/min. The oxygen pulse of overweight group during whole 5 minutes recovery period were significantly higher than normal weight group by 2.7L/min, 3.9L/min, 3.9L/min, 2.9L/min and 2.0L/min. (3) The gaseous metabolism between two groups was significantly different when they did 7.1 and 10.2 METs exercise.

**Conclusions** Although there was no difference in gas metabolism between overweight and normal weight adult women in resting state, the respiratory function of overweight women was weaker than normal weight women during exercise, especially at the intensities of 7.1 and 10.2 METs. During the recovery period after exercise stress test, the recovery rate of gas metabolism in overweight adult women was slower than that of normal weight women.