Body composition, Vo2max and maximal oxygen debt in 679 Japanese athletes

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Excess post-exercise oxygen consumption after exhausting exercise was studied in 396 male and 283 female Japanese athletes. Oxygen consumption during 40 minutes after exhaustion by 45–105 second of 5-degree slope treadmill running was measured. The measurement was defined as an estimate value of maximal oxygen debt (MOD), and its relationship with sex, age, body size and composition, Vo2max, and resting metabolic rate (RMR) were analysed. Vo2max was measured by 6–13 minute of 5-degree slope treadmill running. And, RMR was also measured after at least 30 minutes of resting. The Dalgas bag method was used. Body density was measured by the underwater weighing method.

Male subjects on average were 16.7 years old (range: 14–35) of age, 171.0 cm of height, 62.0 kg of weight, and 21.2 kg/m² of BMI. Their mean percentage body fat (%Fat) was 9.8% with 55.8 kg of fat-free mass (FFM) and 6.2 kg of fat mass (FM). Female subjects on average were 17.6 years old (range: 12–24), 163.8 cm, 56.9 kg, 21.2 kg/m², respectively. Their mean %Fat was 18.6% with 46.2 kg of FFM and 10.7 kg of FM. Mean Vo2max was 3.80 l/min or 61.7 ml/kg/min for men and 2.82 l/min or 50.21 ml/kg/min. Mean RMR was 0.253 l/min or 4.11 ml/kg/min for men and 0.203 l/min or 3.61 ml/kg/min.

Mean MOD (per 40 minutes) of men was 8.72 l or 140.6 ml/kg, and that of women was 6.02 l or 106.3 ml/kg. Proportions of excess post-exercise oxygen consumption to MOD were 63.7% during the first 10 min, 72.9% during the first 15 min, and 86.0% during the first 25 min for males. Those for females were 68.2%, 76.2%, and 87.9%, respectively.

MOD was related with weight (r=0.543 for males and 0.348 for females) as well as with FFM (r=0.576 for males and r=0.450 for females). In males MOD/FFM was still related with FFM and weight (r=0.127 and r=0.124, respectively; both p<0.05). In females, MOD/FFM was negatively related with %Fat (r=−0.172, p<0.01). MOD/FFM was related with Vo2max/kg in females (r=0.338, p<0.001) but not in males. MOD/FFM of males was negatively related with RMR/kg (r=−0.232, p<0.001).

Proportions of excess post-exercise oxygen consumption in the first 10 min to 40-min MOD were negatively related with MOD/FFM in both sexes (r=−0.628 for males, and r=−0.577 for females, both p<0.001). Those who had larger capacity of oxygen debt relative to their FFM tended to return their oxygen debt in longer duration after exercise.

Influence of Jet Lag on adaptation to new time zone interpreted from Jet Lag questionnaires and sleep-wake rhythm

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Air travel across several time zones causes disturbances of sleep and wakefulness. That is called Jet lag syndrome. Recently, many people go abroad. There are few studies about the sleep-wake rhythm and fatigue after jet lag in nursing science. This aspect is important for nursing science to support people’s healthy life. However, there are not so many basic data about jet lag syndrome. The purpose of this study is to collect the basic data about jet lag syndrome for appropriate nursing interventions.

Four female (mean age: 36, range: 27–50) were studied during their travel from Osaka (Japan) to Copenhagen (Denmark) for 16 days, including one week before and after this travel on June 2001. They were working in the same institution. They were in good health, anyone had any sleep disorders by self-report. Copenhagen is seven time zones to west from their home time zone. They obeyed their own schedule with regard to sleep time and activities. After arrival in Copenhagen, they adopted local time for sleep, activities and meals. During the first 7 days after arrival in Copenhagen and after return to Osaka, they were required to answer the Jet-Lag Questionnaire at times of 08:00, 12:00, 16:00, 20:00 and 24:00 h. For 7 days before departure to Copenhagen and after return to Osaka, they measured their sleep-wake rhythm using Actiwatch (Mini-Mitter, USA).

In sensation of Jet Lag syndrome, the mean scores of all participants for one week from west to east were higher than those from east to west. In sensation of fatigue, the scores of recovery from east to west were smoothly restored compared with from west to east. These results were supported by data of Actiwatch, because time in bed was longer in all participants after return to Osaka. They adjusted themselves to Japanese life by long sleep time.