

Comparison of physiological characteristics in male players of different sports

[Science](#), [Biology](#)



The purpose of this study was to compare the selected three (3) physiological characteristics in three (3) different sports. The selected physiological parameters are VO₂max, average anaerobic power, and fatigue index. These parameters were studied in athletics, badminton, and kabaddi. VO₂max was predicted indirectly by 20m multi-stage fitness test. Average Anaerobic Power and Fatigue Index were predicted indirectly through RAST test. The study was done on a total of 21 male subjects, which are from the PFWS (Police Families Welfare Society). The VO₂max test was sub-maximal; the values obtained from them gave the predicted values of VO₂max.

Maximal Oxygen Consumption (VO₂max)

With an increase in the intensity of exercise performed, the oxygen consumption of the body also increases. However, a stage comes when there is no further increment in the oxygen consumption by the body, with respect to the intensity of the exercise. The point where the plateau is reached, it can be referred to as aerobic power (or aerobic capacity or maximal oxygen consumption or VO₂max). It is the maximum amount of oxygen in milliliters, one can use in one minute per kilogram of body weight. Fit individuals are seen as having higher VO₂max values and can exercise with more intensity than those with lower training. Various studies proved that the VO₂max level can be increased by working out at an intensity that raises the heart rate between 65 and 85% of its maximum for at least 20 minutes three to five times a week.

From the study, it was seen that the VO₂max of kabaddi players was higher than the other two groups (Badminton and Athletics). There was a significant

difference between the VO₂max value of kabaddi and athletics, also, kabaddi and badminton.

The athletes taken in this study are sprint runners of 100 – 200m track. Sprint runners use anaerobic metabolism predominantly, slightly relying on the mitochondrial respiration for the energy production. They mainly require a sudden burst of energy, which sufficiently fulfills the requirement of their sports type. Due to this reason, sprint players tend to lack endurance in them and have lesser aerobic fitness compared to distance runners. The VO₂max for sprinters is found to be 47.2 ± 2 ml/kg/min (Barnard et. al., 1979).

Badminton is a single sport and a double sport as well. It can be played individually, and with a companion too. While playing a single event, the player needs to cover the entire court which requires good aerobic fitness. However, in a double event, there are two players to cover the court area, which requires lesser aerobic fitness, but a faster reaction time. Therefore, the players require maintaining good aerobic fitness, to achieve great single tactics. A singles game is a patient positional maneuvering, unlike doubles game which is extremely fast and is aggressive as well. The VO₂max for badminton has been reported to be 64.6 ± 4.3 (juniors) and 63.2 ± 3.7 (seniors) (Heller, 2010).

Kabaddi is a contact team sport, having 7 seven players in each team. The game requires high aerobic fitness because kabaddi requires endurance due

to the long duration of the game. However, while raiding, the main energy source is anaerobic metabolism (Khanna et. al., 1996).

It is reported that VO₂max of 48 ml/kg/min will be satisfactory for a kabaddi player, but higher values will be advantageous.

The obtained VO₂ max values are 26. 02 ± 2. 65, 28. 28 ± 3. 82 and 38. 08 ± 0. 81 for athletics, badminton, and kabaddi, respectively.

Anaerobic Power

Anaerobic power is the maximal power developed during the physical activity, whether playing or exercising, is done. It is a form of short-term physical effort done by the players. Anaerobic Power reflects the energy-output capacity by the body from intramuscular high energy phosphates (ATP and PCr) and/or anaerobic glycolysis.

In a study done on top athletes by Crielaard and Pirnay (1981), the anaerobic power was found to be 1, 021 W or 14. 16 W/kg for sprinters and lower values were obtained for the distance runners, i. e. 551 W or 8. 93 W/kg. From this study, it can be concluded that the sprint runners require more anaerobic power than aerobic power as compared to distance runners.

Badminton at elite level performances requires aerobic as well as anaerobic systems, which depend on the duration of the sport (Chin et. al., 1995).

In our study, it was seen that there is a significant difference between the average anaerobic power of badminton players and kabaddi players. It can

be due to the reason that both the groups have a significant age difference between them ($p < 0.05$). The prevailing energy demand in badminton rally is alactic anaerobic metabolism (Angioluci et. al., 2009). It can be suggested that the anaerobic power output of kabaddi players is significantly different from badminton players, and prior one requires higher anaerobic power.

The obtained difference, in our study, can be due to the age difference ($p < 0.05$) found between the comparison groups. Also, the sample size is small and the subjects are in their training phase.

Fatigue Index

Fatigue index (FI) is a measure of anaerobic capacity, or endurance, at which power declines in each individual athlete. The running-based anaerobic sprint test — or RAST — for fatigue index combines the statistics from a series of six sprints (shuttles), using maximum power, minimum power and the average of sprints to arrive at a given the fatigue values in watts per second. The greater the fatigue index value is, the lower is the ability to maintain power over a series of sprints. During a training programme, a high fatigue index value represents athletes who need to improve their lactate tolerance for better performances.

In a study conducted by Hirvonen et. al. (1992), it was concluded that after 200 m the speed of running decreased, although Creatine Phosphate was not depleted and lactate concentration was not at maximum level. Complete fatigue occurred when Creatine Phosphate stores were depleted and Blood – Lactate and Muscle – Lactate attained an individual maximum.

In our study, we observed that there is a significant difference ($p < 0.05$) between the fatigue index values of badminton and kabaddi players. Since Fatigue index is related to anaerobic capacity, the difference can be due to it. The players should be trained to increase their anaerobic capacity and lactate removal capacity.