Heart Rate and Blood Lactate Responses during Execution of Some Specific Strokes in Badminton Drills

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The present article is an attempt to investigate the physiological demand of the most popular strokes, like, over head smash, over head toss, over head drop and the shadow movements in badminton drills on the basis of heart rate and blood lactate concentration. The study will certainly help the coaches and other specialists in finding out the demands and intensities of these badminton strokes and movements on the court. In the 1st phase of the study, VO$_2$max of all the players was determined in the laboratory following a graded exercise protocol on a bicycle ergometer, till exhaustion. The 2nd phase of the study consisted of playing over head smash, over head toss, over head drop and shadow movement on the court on different days. The player had to play on one side of the court and he was fed the shuttle from the opposite side. The heart rate was measured on a PE 3000 (Polar Electro, Finland) polar sport tester (heart rate telemetric device) for every 5 sec interval and the blood lactate concentration; on an YSI 1500 sport model lactate analyzer. The mean VO$_2$max of the present players was 57.4±7.02 ml/kg/min. The mean heart rates during overhead smash, overhead drop, overhead toss and shadow movements were 183±5, 180±6, 178±8 and 182±7 beats/min, while the mean blood lactate were 11.6±1.9, 10.2±1.2, 10.7±1.1 and 12.2±2.1 mMol/L, respectively. The study indicated that the heart rate and blood lactate responses during execution of overhead smash, overhead drop, overhead toss and shadow movements were high and no differences existed among them. Theses popular and common badminton strokes exerted high cardiovascular and metabolic stress on the players. Repetitive execution of these strokes during training may develop both the aerobic and anaerobic capacities of the players.

key words: Blood lactate, Heart rate, Overhead drop, Overhead toss, Overhead smash, Shadow movement

Introduction

Badminton is a popular game not only in the whole world, but also in Asian
countries from where most of the World Champions emerged. The game contains execution of various strokes in combination with smooth and quick movements to the different corners of the court from the middle to secure points and win over the opponent. Most scientific works in badminton have been carried out on biomechanics and on physiology than any other sports science subjects.

Physiological studies have investigated the demands of badminton on the basis of heart rate (Coad et al., 1979, Mikkelsen, 1979, Abe et al., 1989; Kim et al., 2002), heart rate and blood lactate responses (Mikkelsen, 1979, Abe et al., 1990, Ghosh et al., 1990) and metabolic responses during simulated matches (Coad et al., 1979, Mikkelsen, 1979, Faccini and Dal Monte, 1996; Cabello et al., 2004). On the other hand, the biomechanical studies have mostly been carried out in match analysis and strokes and movement analysis (Gowitzke, 1978; Gowitzke & Waddell, 1977a, 1977b, 1978, 1979; Hong, 1993; Jack et al., 1978; Jack & Adrian, 1979). The characteristics of competitive badminton on the basis of energy requirements, temporal structures and movements in the game indicate the performance level (Cabello & Gonzalez-Badillo, 2003; Cabillo et al., 2004). However, the physiological studies on analysis of badminton strokes including the shadow movements on the court are scanty in the World Literature.

The present paper is an attempt to investigate the physiological demand and intensity of popular and common badminton strokes, like, over head smash, over head toss, over head drop and the shadow movements during on court drills on the basis of heart rate and blood lactate concentration. In a game, these drills are executed from the center of the court to different corners. The study will certainly help the coaches and other specialists in finding out the demands and intensities of execution of these strokes and movements on the court during badminton drills. The main hypothesis is to investigate the amount of stress being exerted by these drills on the cardiovascular and metabolic systems.

Method

Investigation Materials

The study was conducted on 8 national level players from India, with a playing