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RESEARCH ARTICLE

SIMPLE VISUAL REACTION TIME IN BADMINTON PLAYERS: A COMPARATIVE STUDY

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Background: Adequate sports activity improves health and physical development by increasing muscle strength, alertness, sensory development, muscle coordination, speed, strength, and stamina. Many researches show that sports activity reduces reaction time, which is a reliable indicator of rate of processing of sensory stimuli by central nervous system. So the present study is undertaken to evaluate effect of playing badminton on reaction time.
Aims & Objective: To compare visual reaction times of badminton players with those of age-matched controls.
Materials and Methods: We estimated the visual reaction times of 50 male badminton players of 18–22 years age group who were practicing badminton for 2–3 h/day for a minimum of 2 years. The visual reactions were compared with those of 50 age-matched healthy male students of Dr SCGMC Nanded (Maharashtra, India) who formed the control group.
Results: Visual reaction time of dominant as well as non-dominant limb of badminton players was significantly less than that of the control group who were not practicing any sports activity.
Conclusion: Our study results support the view that playing badminton is beneficial in improving eye–hand reaction time, muscle coordination, cognitive functions, concentration, and alertness.

INTRODUCTION

Nowadays people are more involved in playing videogames, watching TV and movies, and exploring the Internet. With modernization, sports such as table tennis, volleyball, badminton, cricket, football are less preferred.[1] Adequate sports activity improves health and physical development by increasing muscle strength, alertness, sensory development, muscle coordination, speed, strength, and stamina. Playing badminton requires a constant analysis of the court, forcing the player to react precisely and quickly. That is why experienced badminton players have the ability to react quickly to the situation during the match and anticipate the opponent's movements. Research shows that a badminton player in the defensive position has 0.1 s to react to the opponent's attack.[2] Hence, sports such as badminton, table tennis, and squash have been classified as reaction sports.[3]

Reaction time is defined as the period of time that elapses between the occurrence of a stimulus and initiation of the movement.[2] It involves reception of the stimuli by the sense organ, conduction of the information through the nerve to the brain and from the brain to the muscle contraction, and the movement of the muscle. The contribution of the central processes in the brain is usually far larger than all the others put together.[4]

Visual reaction time is the time taken by an individual to react to a visual stimulus. Reaction time acts as a reliable indicator of rate of processing of sensory stimuli by central nervous system and its execution in the form of motor response.[5] It determines the alertness of a person because how quickly a person responds to a stimulus depends on his reaction time. There are various factors such as age, sex, left or right hand dominance, central versus peripheral vision, practice, fatigue, fasting, exercise, type of personality, and medical condition that influence reaction time.[6]

Many researches show that more experienced players react more quickly than their less experienced counterparts, and there is significantly decreased reaction time in athletes as compared to nonathletic persons.[7,8] A study by Ghuntla et al.[9] found that basketball players had faster reaction time than healthy controls. Another study carried out by Bhabhor et al.[1] found decreases in the visual

reaction time of table tennis players. So, the present study was carried out to compare the visual reaction time in experienced badminton players with control group not involved in regular sports activity.

Objectives

The objectives of this study were to determine visual reaction time of dominant and non-dominant hand in badminton players and age-matched controls and to compare the visual reaction times of badminton players with those of age-matched controls.

MATERIALS AND METHODS

This cross-sectional study was carried out in the Department of Physiology, Dr. Shankarrao Chavan Government Medical College (Dr SCGMC Nanded, Maharashtra, India). The study population was divided into two groups, that is, study group and control group with same age by convenient sampling. The study group consisted of 50 male badminton players who were practicing badminton for 2–3 h per day for a minimum of 2 years and aged between 18 and 22 years, selected from Arts, Commerce, and Science faculties of various colleges in Nanded city. . Most of them had participated in badminton events at university level also. Fifty age-matched healthy males (control group) were selected from undergraduate students of Dr SCGMC Nanded.

The ethics committee clearance was sought before commencement of the study and an informed written consent was obtained after explaining the purpose of the study to the subjects. Information regarding personal and medical history was obtained, and detailed clinical examination of both groups was carried out in a predesigned format. Medical history was evaluated to rule out any medical or surgical disease that would affect reaction time of individual.

In this study, visual reaction time of all subjects was calculated by using a visual reaction time recorder after familiarizing the subjects with the instrument. The procedure was repeated three times and three readings were obtained. The last reading was taken as subject's best visual reaction time and was included in the subject's record profile. The experiments were carried out at the same time of the day (i.e., in the morning) to prevent tiredness caused by daily duties, which can affect the results. The visual reaction time was recorded in a well-illuminated, soundproof room, in the presence of the researchers only. Each subject took part in a test involving his both limbs, always starting with his dominant hand. Data were collected and analyzed by using OpenEpi, version 2.3, for unpaired *t*-test. The significance level was set at 0.05.

RESULTS

In this study, the mean simple visual reaction time for dominant limb among badminton players was 130.46 ± 10.34 ms whereas that in the control group was 173.19 ± 45.22 ms, and the difference was statistically significant ($p< 0.05$). The mean simple visual reaction time for non-dominant limb among badminton players was 131.27 ± 23.16 ms whereas that in control group was 187.33 ± 59.71 ms, and the difference was statistically significant ($p< 0.05$).

Table 1: Simple Visual Reaction Time (ms) in Study and Control Groups

	Limb	Badminton Players (Group I)	Control (Group II)	S/NS ($p \leq 0.05$)
Reaction Time (ms)	Dominant	130.46 ± 10.34	173.19 ± 45.22	S
	Non-Dominant	131.27 ± 23.16	187.33 ± 59.71	S

Abbreviations: S, significant; NS, not significant.

DISCUSSION

This study aimed to determine the simple visual reaction time of badminton players and to compare it with the results in control groups. Analysis of the results shows that those who practiced badminton had shorter visual reaction time when compared with those that did not. The differences in the reaction time values were statistically significant. This shorter reaction time in badminton players may result from regular training and its effects such as better muscular coordination, improved concentration, and alertness to external environment on their bodies. Reaction time is one of the important methods to study a person's stimulus to response speed, which involves cerebral processing and coordinated peripheral response. Results supporting our study are also observed by others. Nougier et al.[7] suggest that athletes have better reaction time as compared to control subjects. Smith et al.[8] found that participants who completed a 6-month aerobic exercise program showed improvements in reaction time. Besides these, various studies show that exercise and sports activities result in a mild enhancement of cognitive

function.[8–13]

Developments resulting in reduced reaction times can be also observed in other sports disciplines. Hascelik et al.[14] found decreases in the visual reaction time of male volleyball players, from 214.55 ms to 200 ms. Ghuntla et al.[9] found significant shorter visual reaction time among basketball players when compared with that in the control group. Mamoglu et al.[15] found that the visual reaction time among professional soccer players was shorter when compared with that among part-time soccer players. Bhabhor et al.[1] also found shorter visual reaction time in table tennis players than that in healthy controls.

Yet the exact mechanism behind exercise and human information processing has not been identified. Perhaps the most probable explanation is that those who exercise have higher rates of cerebral blood flow. This may lead to improvements in cognitive functioning due to increased supply of necessary nutrients, such as oxygen and glucose.[11,12]

CONCLUSION

Our study results support the view that playing badminton is beneficial in improving eye–hand reaction time, muscle coordination, cognitive functions, concentration, and alertness.

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