



AUDITORY REACTION TIME IN BASKETBALL PLAYERS AND HEALTHY CONTROLS

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Article Received on: 12/07/13 Revised on: 21/07/13 Approved for publication: 19/08/13

DOI: 10.7897/2230-8407.04851

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ABSTRACT

Reaction is purposeful voluntary response to different stimuli as visual or auditory stimuli. Auditory reaction time is time required to response to auditory stimuli. Quickness of response is very important in games like basketball. This study was conducted to compare auditory reaction time of basketball players and healthy controls. The auditory reaction time was measured by the reaction time instrument in healthy controls and basketball players. Simple reaction time and choice reaction time measured. During the reaction time testing, auditory stimuli were given for three times and minimum reaction time was taken as the final reaction time for that sensory modality of that subject. The results were statistically analyzed and were recorded as mean \pm standard deviation and student's unpaired t-test was applied to check the level of significance. The study shows that basketball players have shorter reaction time than healthy controls. As reaction time gives the information how fast a person gives a response to sensory stimuli, it is a good indicator of performance in reactive sports like basketball. Sportsman should be trained to improve their reaction time to improve their performance.

Keywords: Auditory Reaction Time, Basketball, Alertness, Response.

INTRODUCTION

Reaction is a purposeful voluntary response to stimulus. There is a certain time period between application of stimulus and appropriate motor response. Auditory reaction time is time required to response to auditory stimuli. Reaction time is having mainly 2 components¹. (1) Mental processing time: which is time required for responder to perceive stimulus, identifying and analyzing of stimulus and decide the proper motor response. (2) Movement time: it is time required to perform movement after selection of response. Luce and Welford described three types of reaction time.²⁻⁶ (1) Simple reaction time: here there is one stimulus and one response. (2) Recognition reaction time: here there are some stimulus that should be responded to and other that should not get response. (3) Choice reaction time: here there are multiple stimulus and multiple responses. Skills like rebounding, shot, block, ball handling, dribbling, shooting and passing are of utmost importance for a player at any level of play.⁷ Basketball player has to give proper and quick response during the game. They have to throw ball in proper direction. The study has been undertaken to see the effect of sports training, which involves selecting response, decision making and motor response during game, on speed of mental processes (reaction time) and to compare with control group which is not involved in regular sports activity.

MATERIAL AND METHODS

After obtaining Approval from institutional review board; present study was conducted in 50 controls and 50 basketball players of Bhavnagar district. Personal history and medical history of both groups was collected in pre-designed Performa. Medical history was taken to rule out any medical or surgical disease which would affect reaction time of individual. After taking consent, Reaction time was measured with multiple choice apparatus 653 MP (reaction time apparatus) with accuracy of \pm 0.001 seconds. Auditory reaction time was measured under two categories. (1) Simple reaction time, where subject has to respond to auditory stimuli by pressing key and (2) choice reaction time; where subject has to respond to different auditory stimulus by pressing respective key. For auditory stimuli low and high frequency pure sounds were given. Subjects were given practice session in which the subject responded to auditory stimuli till near about constant values of reaction time come and then auditory stimuli were given for 3 times and minimum reaction time was taken as a final reaction time for that sensory modality of that subject.

Statistical Analysis

Data was collected and was statistically analyzed. Reaction time were taken as mean \pm SD. The level of significance between basketball players and controls was tested by students Unpaired T test. The observation was taken as a significant of P value $<$ 0.05.

Table 1: Difference in Simple Auditory Reaction Time in 50 Healthy Controls and in 50 Basketball Players

Simple ART* (Healthy Controls)	Simple ART* (Basketball Players)	P value
0.16186 \pm 0.02274	0.14478 \pm 0.02274	Significant

*ART = Auditory Reaction Time

Auditory reaction time found to be significantly (P value $<$ 0.05) less in basketball players as compared to controls in choice reaction time task.

Table 2: Difference in Choice Auditory Reaction Time in 50 Healthy Controls and in 50 Basketball Players

Choice ART* (Healthy Controls)	Choice ART* (Basketball Players)	P value
0.30724 \pm 0.06850	0.27952 \pm 0.05250	Significant

*ART = Auditory Reaction Time

RESULT

Auditory reaction time found to be significantly (P value < 0.05) less in basketball players as compared to controls in simple reaction time task (Table 1)

DISCUSSION

Present study indicates difference in performance of two groups of subjects under study; basket ball players and healthy controls. Basketball players were found to have significantly faster reaction time than controls. Reaction time is an important indicator of speed of response to any stimuli. It requires to be as less as possible in case of sports, driving etc. Results from present study parallel which have been found in past literature. Kambe *et al.*⁷ observed in his study that auditory reaction time was significantly less in basketball players than controls. Kramer *et al.*⁸ found in his study that participants who completed a six month aerobic exercise program exhibited improvements in reaction time. Nougier, Ripoll and Stein⁹ suggest that athletes has better reaction time as compared to control subjects. More et al stated that the reaction time of the successful sportsmen was shorter compared to others.^{10,11} It was reported in another study that the reaction time of the physically healthy individuals was faster.⁵ Chandra *et al.*¹² observed significant decrease in both of the visual and the auditory reaction periods after the exercise, In the study where the effect of the exercise and heat load of the university students on the simple reaction time was investigated, Researchers have also established that exercise and sports improves cognitive function.¹³⁻¹⁷ Wilkinson conducted study of reaction time in group of non-athletes and athletes including basketball players and it was observed that athletes have significantly faster reaction time than non athletes.¹⁸ Motor response execution is a physical task, so it is logical that people trained in physically reactive sports like basket ball may have superior ability to select a correct motor response.³ Different direct and indirect mechanisms could explain relationship between exercise and mental processing. Perhaps the most popular mechanism is the idea that exercise at moderate to intense levels improves cerebral blood flow which results in improvements in cognitive functioning due to increased supply of necessary nutrients, such as oxygen and glucose.^{19,20} Research on trained athletes suggest that physical reactive sport players have superior reaction time compared to healthy controls.²¹ The quicker reaction time in basketball players compared to controls is due to improved performance in speed and accuracy task, alertness, better muscular co-ordination and improved concentration.²²

Limitation of study

Our study conducted in small group size. For more information study should be conducted on larger size of sample.

CONCLUSION

Our study concluded that persons involved in sports are having good reaction time as compared to controls. Nowadays children's are more involved in videogames like indoor games, while involvement in outdoor games would make them physically healthy as well also improve their alertness, concentration and ultimately reaction time, which would also be helpful them in day to day life as while driving it is more important to take certain decisions as quickly as possible.

Besides physical fitness in basketball, mental processing time is also important in game. Coach can also concentrate on factors improving reaction time and train athletes in way for good performance.

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Cite this article as:

Ghuntla Tejas P., Mehta Hemant B., Gokhale Pradnya A., Shah Chinmay J. Auditory reaction time in basketball players and healthy controls. *Int. Res. J. Pharm.* 2013; 4(8):255-256 <http://dx.doi.org/10.7897/2230-8407.04851>