Reaction speed training effect on reaction time performance and change-of-direction speed among soccer players

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Abstract- Regular and systematic training makes enormous changes in the human system. Speed is one among the motor fitness components and it includes reaction speed also. Reaction speed is the ability to react as quickly as possible in minimum possible time under given condition. The aim of the present study was to examine the reaction speed training effect on reaction time performance and change-of-direction speed among soccer players. The study consisted of 24 male soccer players (age: 20.45 ± 1.04 years; height: 165.50 ± 5.45 cm; body mass: 65.70 ± 6.50 kg) were participated in the intercollegiate soccer players from Manonmaniam Sundaranar University, Tirunelveli District, Tamilnadu State in India. The players were randomly assigned to an experimental group (n=12) and a control group (n=12). Experimental group participated in a 8-week of reaction speed training program exercises for three days in a week including with proper warm-up and cool down exercises. Each training session lasted 45 min. Control group continued their regular training program. Training load was increased and followed by the systematic scientific principles of sports training. Pre and post-intervention on data collection from the two groups and the selected variables reaction time performance was measured by 20m swerve-sprint test (sec) and change-of-direction speed was measured by Illinois agility test (sec), were statistically analyzed by using dependent t’ test and analysis of covariance (ANCOVA). In all the cases the level of confidence was fixed at 0.05 significant. The result of the study indicated that the experimental group had shown significantly improved reaction time performance and change-of-direction speed among soccer players due to the effect of reaction speed training. However the control group did not shown any significant improvement on selected variables such as reaction time performance and change-of-direction speed.

Keywords- Reaction Speed Training, Reaction Time, Change-of-Direction Speed, Soccer Players, Swerve-sprint test, Illinois agility test

I. INTRODUCTION

In soccer, players are required to accelerate, decelerate, and change direction quickly throughout the game [1]. The capacity to quickly change direction while sprinting, also well known as a cutting makeover or change direction, is an important performance determinant in many team sports e.g., ice hockey, soccer, handball, basketball, etc. [2].

The reaction time is often overlooked and usually underestimated element in the selection of athletes for different sports. In sports and games, in which movements of a participant are conditioned by signals, by movements of opponents, or by motion of the ball, reaction time is of great importance [3]. The ability of football player to produce diverse high-speed actions and motor skills are known to influence performance. Agility is an essential component in a most field requiring high-speed action (acceleration, maximal speed) and specially team sports competition. High-speed actions can be categorized into actions requiring maximal speed, acceleration, reaction time (RT) and agility. In addition, agility is a combination of speed and coordination [4].

The speed which provides movements, the speed and coordination is an elementary technical demand for sportive performance in football. Therefore, there is no doubt that the cognitive component of agility is very important [5]. The ability to quickly change direction is important for football [6].

Therefore, the aim of the present study was to examine the training effect of reaction speed on reaction time performance, change-of-direction speed among soccer players.

II. METHODOLOGY

A. Participants

The study consisted of 24 male soccer players (age: 20.45 ± 1.04 years; height: 165.50 ± 5.45 cm; body mass: 65.70 ± 6.50 kg) were participated from Manonmaniam Sundaranar University intercollegiate soccer players during the academic year 2018-19 Tirunelveli District, Tamilnadu State in India. The players were randomly assigned to an experimental group (n=12) and a control group (n=12). After being informed on the testing procedure as well as risks and benefits involved, all players and their guardians gave their written consent for the player’s participation in the study.
B. Procedures

The players were randomly assigned to an experimental group (n=12) and a control group (n=12). Experimental group participated in a 8-week of reaction speed training program exercises for three days in a week including with proper warm-up and cool down exercises. Each training session lasted 45 min. Control group continued their regular training program. Training load was increased and followed by the systematic scientific sports training principles.

C. Variables and Measurement

Pre and post-intervention on data collection from the two groups and the selected variables reaction time performance was measured by 20m swerve-sprint test (sec) and change-of-direction speed was measured by Illinois agility test (sec).

D. 20-Meter Swerve-Sprint

The 20 m- swerve sprint test has been used in the assessment of field sport athletes. The 20 m- swerve sprint test measurements were carried out by using photoelectric cells placed at 0 m, and 20m. Photoelectric cells were positioned at 0 m (start) and at 20 m (arrival). The players stood 1 m behind the starting line and started on a verbal signal. Once ready, subjects were allowed to start in their own time and were instructed to run as fast as they could to complete the 20 m distance. They repeated the test 3 times with 30 s rest periods in between. The fastest of 3 trials was used for subsequent analysis [7].

![Diagram of 20-Meter Swerve-Sprint Test](image1)

Fig. 1 The above diagram shows the testing of reaction speed performance by 20 m- swerve sprint test

E. Illinois Agility Test

The length of the course is 10 meters and the width is 5 meters. Four cones are used to mark the start, finish and the two turning points. Another four cones are placed down the center an equal distance apart. Each cone in the center is spaced 3.3 meters apart.

Subjects should lie on their front (head to the start line) and hands by their shoulders. On the ‘Go’ command the stopwatch is started, and the athlete gets up as quickly as possible and runs forwards 10 meters to run around a cone, then back 10 meters, then runs up and back through a slalom course of four cones. Finally, the athlete runs another 10 meters up and back past the finishing cone, at which the timing is stopped. Several trials should be completed, with the best score recorded [8].

![Diagram of Illinois Agility Test](image2)

Fig. 2 The above diagram shows the testing of change-of-Direction speed by Illinois Agility Test
F. Statistical Analyses

Data analysis were performed by using dependent 't' test and analysis of covariance (ANCOVA). In all the cases the level of confidence was fixed at 0.05 significant.

III. ANALYSIS OF DATA

TABLE I
MEANS AND DEPENDENT ‘T’-TEST FOR THE PRE AND POST TESTS ON REACTION TIME PERFORMANCE AND CHANGE-OF-DIRECTION SPEED OF EXPERIMENTAL AND CONTROL GROUPS

<table>
<thead>
<tr>
<th>Criterion variables</th>
<th>Mean</th>
<th>Experimental Group</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reaction Time Performance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre test</td>
<td>6.98</td>
<td>7.01</td>
<td></td>
</tr>
<tr>
<td>Post test</td>
<td>6.43</td>
<td>6.97</td>
<td></td>
</tr>
<tr>
<td>‘t’-test</td>
<td>9.05*</td>
<td>1.54</td>
<td></td>
</tr>
<tr>
<td>Change-of-Direction Speed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre test</td>
<td>19.86</td>
<td>19.84</td>
<td></td>
</tr>
<tr>
<td>Post test</td>
<td>18.23</td>
<td>19.78</td>
<td></td>
</tr>
<tr>
<td>‘t’-test</td>
<td>14.56*</td>
<td>1.73</td>
<td></td>
</tr>
</tbody>
</table>

*Significant at .05 level. (Table value required for significance at .05 level for ‘t’-test with df 11 is 2.20)

From the table I the dependent-'t'-test values of reaction time performance and change-of-direction speed between the pre and post tests means of experimental groups were greater than the table value 2.20 with df 11 at 0.05 level of confidence, it was concluded that the experimental group had significant improvement in the reaction time performance and change-of-direction speed between while compared to control group.

A. Computation of Analysis of Covariance

The descriptive measures and the results of analysis of covariance on the criterion measures were given in the following tables.

TABLE – II
COMPUTATION OF MEAN AND ANALYSIS OF COVARIANCE REACTION TIME PERFORMANCE AND CHANGE-OF-DIRECTION SPEED OF EXPERIMENTAL AND CONTROL GROUPS

<table>
<thead>
<tr>
<th></th>
<th>Experimental Group</th>
<th>Control Group</th>
<th>Source of Variance</th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reaction Time Performance (Adjusted Post Mean)</td>
<td>6.41</td>
<td>6.95</td>
<td>BG</td>
<td>22.15</td>
<td>1</td>
<td>22.15</td>
<td>12.04*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>WG</td>
<td>38.64</td>
<td>21</td>
<td>1.84</td>
<td></td>
</tr>
<tr>
<td>Change-of-Direction Speed (Adjusted Post Mean)</td>
<td>18.19</td>
<td>19.74</td>
<td>BG</td>
<td>187.73</td>
<td>1</td>
<td>187.73</td>
<td>34.51*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>WG</td>
<td>114.24</td>
<td>21</td>
<td>5.44</td>
<td></td>
</tr>
</tbody>
</table>

* Significant at 0.05 level. Table value for df 1, 21 was 4.32.

The above table indicates the adjusted mean value on reaction time performance and change-of-direction speed of experimental and control groups were 6.41 & 6.95 and 18.19 & 19.74 respectively. The obtained F-ratio of 12.04 and 34.51 for adjusted mean was greater than the table value 4.32 for the degrees of freedom 1 and 21 required for significance at 0.05 level of confidence. The result of the study indicates that there was a significant difference among experimental and control groups on reaction time performance and change-of-direction speed.
Fig. 3: Pre test, post test and adjusted post test mean values of experimental group and control group on reaction time performance and change-of-direction speed.

IV. DISCUSSION ON FINDINGS

Reference [4] shows to conduct the study on speed, change of direction speed, and reactive agility of rugby league players. Reference [3] shows to conduct the study on auditory reaction time, visual reaction time and whole body reaction time in athletes. Reference [5] shows to conduct the study on evaluation of a new test of reactive agility and its relationship to sprint speed and change of direction speed. Reference [8] shows to conduct the study on the effects of a 6-week plyometric training program on agility. The following studies also proved the results of the present study result [9], [10], [11], [12], & [13]. From above those supportive studies the researcher intent to conduct this study, the result of my study also indicates that there was a significant improvement on reaction time performance and change-of-direction speed due to the reaction speed training effect among soccer players when compared to control group.

V. CONCLUSIONS

1. There was significant improvement on reaction time performance and change-of-direction speed due to the reaction speed training effect among soccer players of experimental group.
2. There was a significant difference between experimental and control groups reaction time performance and change-of-direction speed due to the reaction speed training effect among soccer players.
3. However the control group had not shown any significant improvement on any of the selected variables.
REFERENCES


