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A comparative study on the foot reaction time and hand eye coordination among the different positional footballer players

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Abstract

The purpose of the study was to find out and compare of foot reaction time and hand eye coordination of football players in respect of playing positions. A total number of 319 male positional football players classified into four groups, were selected as subjects from Kolkata suburban different football coaching camps. In this research, Foot reaction time and hand eye coordination variables were measured by standard procedures and SPSS software was used to analysis of data. One-way ANOVA and Post hoc compare of means was used to find out the significant difference among the groups as well as to observe which group was different from the other groups. The result showed that significant difference in mean was found in Foot reaction time and hand eye coordination among the positional groups. Result also found that Foot reaction time goalkeeper group was significantly superior in comparison to all positional group of football players. Likewise, goalkeeper group was significantly superior in hand eye coordination when comparison with defender group and midfielder groups. The Foot reaction time and hand eye coordination variables of footballers play significant role in respect of playing position and overall game performance.

Keywords: Physical fitness, foot reaction time and hand eye coordination

Introduction

Association football is widely recognized as football or soccer, one of the most popular games on Earth. Football incorporates multifunctional motor execution-oriented skills - sprinting, jogging, walking, changing direction in motion, tackling, pushing, heading, jumping, landing and shooting like nature movement executions during practice and competitions.

Football is a unique skilful, tremendously competitive and high intensity body contact game. Now a days it has become faster than earlier. So, the physical fitness of a football player is the key factor for the high-level performance. The importance of specific physical fitness components such as speed, power, muscular strength, reaction time, endurance, flexibility and co-ordination are play significant role to achieve the success in Football game.

In a match of Football, goalkeeper generally covers 4 km approx. by running and walking along with jumping and sprinting. The training of Goalkeeper is based on reaction ability, hand eye coordination, explosive strength, flexibility, self-confident etc. The defender and Midfielders performed great role in attacking as well as defensive play. The forwards have higher aerobic capacity with high reaction ability and coordination during the game. They develop explosive strength, muscular strength, sprinting ability, agility, reaction ability and endurance and team coordination.

A vast number of researches had conducted by the previous researchers on same variables. Reaction times were significant differences between the groups of football players (Leonardo Ricotti, J., Rigosa, A. and Niosi, A. M. 2013) [18]. The goalkeepers had performed better in vergence and eye-hand coordination, compared to other positional players (Rostami, R., Mohammadi, H., and Alborzi, M. 2015).

Now researcher is highly interested in tracing out the status of reaction time and hand eye coordination and also compare among the four groups in respect of their specific playing positions. Therefore, the present investigation is largely concentrated on reaction time and hand eye coordination along with their positional play as practiced in modern football.

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1.1. Purpose of the study

The purpose of the present study is to find out and also compare the foot reaction time and hand eye coordination among the different positional footballer players, such as Goalkeeper, Defender, Midfielder and Forward groups.

2. Materials and Methods

2.1. Subject of the Study

In the present investigation, 319 male positional football players with age ranging from 18 to 24 years were selected as subjects from different football coaching camp of Kolkata suburban area. The subjects were selected to the following

purposive sampling criteria-

- a) Minimum three years training age.
- b) Level of participation district, state, Kolkata club competitions and inter university.

The total number of 319 football player were classified into four positional groups as follow-

- 1. Goalkeeper (N=49), 2. Defender (N=100), 3. Midfielder (N=100) 4. Forward (N=70).

2.2. Criterion Measures and along with Instruments and tools used of Reaction time and coordination

Table 1: Criterion Measures along with Instruments and tools used of selected variables

Sl. no	Variables	Name of the Test	Unit of Measurement	Instruments and tools used along with Descriptions
1.	Reaction time	Foot reaction time	second	<ul style="list-style-type: none"> ➤ 1-meter mark long yellow wooden scale. ➤ The obtained score was recorded in cm scale. The scale distance that we have obtained has to be converted into reaction time, which is based on following formula- $t = \sqrt{2d / g}$.
2.	Coordination	Wall Pass for Hand Eye Coordination	Max. no./time	<ul style="list-style-type: none"> ➤ A flat wall space of at last 8 feet square with line 9 feet from the wall for a restraining line, one stopwatch, football. ➤ The final score was the number of times the ball had hit on the wall in the given time period of fifteen seconds.

2.3. Statistical Analysis

In the present study, for the analysis of Data Statistical Package for the Social Science (SPSS, Ver.20.0) was used. Mean, Standard Deviation of reaction time and hand eye coordination variables were used under the investigation. After that One-way ANOVA was used to find out the significant difference among the football player according to there playing position. Finally, Post Hoc Comparison of Means (Scheffe Test) was used after the one-way ANOVA to

determined which group was different from the other groups.

3. Results and Discussions

In the present study Reaction Time and Coordination variables along with personal data of deferent positional football players are presented in the following tables.

3.1 Personal Data

Table 2: Descriptive statistics of personal data of footballers in respect to specific playing positions are presented in the table.

Groups	Goalkeeper (N= 49)	Defender (N = 100)	Midfielder (N = 100)	Forward (N= 70)
Variables	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Age (years)	21.35 ± 2.02	21.02 ± 1.97	20.63 ± 2.07	20.50 ± 1.88
Height (cm.)	173.24 ± 4.62	169.95 ± 5.09	166.87 ± 3.98	168.81 ± 5.17
Weight (kg.)	63.67 ± 5.69	59.74 ± 6.34	55.18 ± 3.61	57.44± 5.42

3.2 Foot reaction time and Hand eye coordination Variables

Table 3 represents that descriptive statistics and analysis of variance of Reaction time and Coordination are presented in the above table. It is evident from the table that significant mean differences were found in Reaction time and

Coordination among the positional groups.

As F-value of all these two variables were found significant, post hoc multiple comparisons (Scheffe Test) was used to find out the actual status among the group, i.e. goalkeeper, defender, midfielder and forward.

Table 3: Comparisons of physiological profile of footballers in respect to specific playing positions.

Groups	Goalkeeper (N = 49)	Defender (N = 100)	Midfielder (N = 100)	Forward (N = 70)	F value	P value (sig.)
Variables	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD		
Reaction time (sec)	0.175±0.02	0.188±0.02	0.189±0.02	0.186±0.01	5.72*	0.00
Coordination (no.)	13.22±1.42	12.16±1.30	12.43±1.42	12.63±1.62	6.33*	0.00

In one-way ANOVA, *= sig. when p<0.05, ns= not sig.

Table 4: Scheffe's F test for multiple comparison of Foot reaction time and Hand eye co-ordination variables in relation to playing positions.

Variables	Field Playing Positions		Mean Difference	Sig.(p-value)
Foot reaction time (sec.)	Goalkeeper (0.175)	Defender (0.188)	-.01300*	0.00
		Midfielder (0.189)	-.01410*	0.00
		Forward (0.186)	-.01107*	0.04
	Defender (0.188)	Midfielder (0.189)	-.001 ^{ns}	0.98
		Forward (0.186)	.002 ^{ns}	0.94
	Midfielder (0.189)	Forward (0.186)	.003 ^{ns}	0.82
Hand eye co-ordination (Max. no./time)	Goalkeeper (13.22)	Defender (12.16)	1.06449*	0.00
		Midfielder (12.43)	.79449*	0.01
		Forward (12.63)	.596 ^{ns}	0.17
	Defender (12.16)	Midfielder (12.43)	-.270 ^{ns}	0.62
		Forward (12.63)	-.469 ^{ns}	0.22
	Midfielder (12.43)	Forward (12.63)	-.199 ^{ns}	0.85

In Scheffe's test, the mean difference is significant at the 0.05 level; * = sig. (when $p < 0.05$), ns = not sig.

Table 4 shows that post hoc multiple comparisons in respect of Foot reaction time and Hand eye co-ordination among the four positional football players.

Table represents that the mean difference in respect of foot reaction time when goalkeeper to compare with defender, midfielder and forward were statistically significant as the p-value of these mean were 0.00, 0.00 and 0.04 respectively, which are lesser than 0.05. On the other hand, there were no statistically significant difference were found in foot reaction time of remained three separate comparisons.

Table also represents that the mean difference in respect of hand eye coordination when goalkeeper to compare with defender and midfielder were statistically significant as the p-value of these mean were 0.00 and 0.02 respectively, which are lesser than 0.05. Further, there were no statistically significant difference noticed in case of hand eye coordination remained four comparisons of the groups.

3.3. Discussions on Finding:

3.3.1 Foot reaction time

In Football reaction ability is required to react quickly and effectively to various signals changing situation. Reaction time can be improvised and developed with continuous practice, knowledge. Skill and stage of maturity have direct influence on reaction time (Patrick, 1949). Reaction time of different body parts are different. Arms are faster than leg and hands are faster than arms. (Singh, H 1991). In the present investigation reaction time of football players was measured by Foot reaction test.

In the present study the Foot reaction time of goalkeeper was significantly superior than that of forward, defender and midfielder. Similar result was noticed that reaction time is significantly different between the groups in respect to Football playing position, (Leonardo Ricotti, J., Rigosa, A., Niosi, A.M., 2013) [18]. The Reaction time of football player is largely dependent on functional capacity of sense organ e.g., eyes, ears, etc., coordinative process of central nervous system, selection and decision making, attention and concentration and also anticipation. In modern football, coaches consider positional specific reaction ability for the development of football performance.

3.3.2 Hand eye coordination

Coordination is the ability of an individual to integrate separate types of movement using sensory modalities to produce efficient movement into desired goal which is of curtail important in football games and practice time.

So, from the present study, it is evident that hand eye coordination of Goalkeeper was higher than that defender and midfielder. Similar result has been found by Rostami, R.,

Mohammadi, H., & Alborzi, M. (2015). The motor coordination ability is depending not only on central nervous system but also perception, cognition, efference and memory. In sports science seven coordination ability are important such as differentiation ability, orientation ability, coupling ability, reaction ability, balance ability, rhythm ability and adaptation ability. So, it is very easy to understand that the development of coordination ability is based on according to their specific playing positions and demand of the game. As the goalkeeper is the last defence of the team, his inner urge and concentration in relation to coordination movement helps to developed hand eye coordination. Moreover, goalkeeper is such a positional player that he can only use his hands within his goal area during game. In competitive football, expert coaches concerned the development of positional specific coordination ability as a whole or separately (component of coordination ability) of the football players.

4. Conclusion

4.1. Personal Data

The age, height and weight of goalkeeper was higher than those of other positional football players, whereas midfielder was shortest and leanest player among the groups as per the descriptive statistics.

4.2. Physical fitness Variables

4.2.1. Reaction time

In performance of foot reaction time, it was clearly found that goalkeeper group was significantly superior in comparison to all positional group of football players.

On the other hand, no significant differences observed in respect of foot reaction time when comparison between the existed four groups.

4.2.2 Hand eye co-ordination

In respect of hand eye co-ordination, it has clearly noticed that goalkeeper group was significantly superior in comparison to defender group and midfielder group.

Further, there was no significant differences noticed in hand eye co-ordination compared between goalkeeper group and forward group, compared between defender group and midfielder group and also compared between midfielder group and forward group.

5. Recommendations for Practical Application

The present research work has provided following suggestions for practical application for the development of football which are mentioned below-

1. Personnel who are related with competitive football should consider not only the positional play and coaching

on formations rather should give equal importance on Foot reaction time and Hand eye co-ordination which have been derived from the findings of the present study.

2. Football players as well as coaches are interested in performance improvement specially related to positional play.
3. The result of the research work may be well applicable on various aspects of talent identification, player selection, prediction on future performance of the player in relation to positional play.

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