



Assessment of Visual Skills and Motor Performance of Soccer Players in Ethiopian Youth Sport Academy

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Abstract

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The purpose of this study was to assess the visual skills and motor performance of soccer players in Ethiopian youth sport academy. Cross-sectional study design was used. From the available subjects 62 youth soccer players (28 male and 34 female) were participated using simple random sampling techniques. The primary sources of data such as demographic characteristics (age group, sex, and playing position), the visual skill tests (visual acuity, and color vision) and motor performance (eye hand coordination, eye foot coordination and reaction time) were measured. The results were presented as mean \pm SD, Frequency proportions and figures was used to show the visual skill and motor performance status, Multivariate Roy's Largest Root Tests was used to examine the impacts of visual skills on motor performance and ANOVA was used to see the difference of visual skills and motor performance in playing positions. Whereas, Pearson product moment correlation coefficient was used to test the relationship between visual skills and motor performance. Significance level was set at 0.05 levels for each of the statistical tests. SPSS version 20 software was used for all statistical analysis. The result indicates that color blindness and visual acuity status of the players independently and in group exercising couldn't bring significant change on players motor performance. There was no difference between the playing positions of the player in color blindness, visual acuity, eye hand coordination and reaction time, while there was difference between playing positions in eye foot coordination. Color blindness test significantly and positively correlated with motor performance to reaction time. Visual acuity significantly and positively correlated with motor performance to eye hand coordination. Therefore, the Ethiopian youth sport academy and the concerned body should check the players visual skill as well as their motor performance and incorporate in selection criteria

Introduction

Vision involves two basic categories of function: visual motor and visual perceptual skill. Visual motor skill is probably the easiest category to relate to sport-specific performance. If athletes

cannot move their eyes quickly and effectively, they cannot perform sport-specific tasks optimally. In any position of any sport, vision provides the athlete with information regarding where, when and what to do the ability to quickly

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and correctly process visual information; regardless of physical strength, speed, and technical skill of an individual. It is estimated that 85–90% of sensory information regarding the external environment is obtained visually (Loran & MacEwen, 1995). The vast majority of studies reported that developed visual skills (or sports vision) would play a positive role in sports performance (Hitzeman & Beckerman, 1993; Knudson & Kluka, 1997; Zwierko *et al.*, 2010; Du Toit, *et al.*, 2010). Improvements in the athlete's visual skills can lead to quicker decision making and faster motor response (Du Toit, *et al.*, 2011). Thus, an advanced visual skills set is likely to have a positive effect on athletes' performance in many different sports (Du Toit, *et al.*, 2010). Coordination is the ability to repeatedly execute a sequence of movements smoothly and accurately. This may involve the senses, muscular contractions and joint movements. Everything that we participate in requires the ability to coordinate our limbs to achieve a successful outcome from walking to the more complex movements of athletic events like the pole vault. All sports require the coordination of eyes, hands and or feet and may be an implement and a ball. Racket sports (e.g. tennis and squash) require the coordination of hand, eyes and racket to connect the rackets with the incoming ball as well as position our body in an appropriate position to return the ball in an efficient and effective manner. Hockey requires the coordination of hands, eyes and hockey sticks to connect with the ball. Football primarily



requires the coordination of feet, eyes and ball and Rugby the coordination of hands, eyes and ball (Tanuja and Tanveer, 2013). Few studies about visual skills done in soccer refer to goalkeepers (Savelsbergh *et al.*, 2005; Hanvey, 1999; Savelsbergh *et al.*, 2002). Other studies, with field players, were focused on kids rather than elite players (Du Toit, *et al.*, 2009). Those studies dealt with perceptual skills, eye-foot coordination or reaction time instead of visual skills (Williams, 2000; Montes- Mico *et al.*, 2000; Vaeyens *et al.*, 2007; Ward & Williams, 2003). The studies found with elite soccer players, investigated visual search (eye movement) instead of visual skills (Williams, *et al.*, 1994; Williams & Davids, 1998). But, there is no information about visual skills and motor performance of youth soccer players, and there is no information on positional differences although such differences are marked in terms of movement patterns and studies had not been conducted so far on the subject in Ethiopia. Therefore, the purpose of the study was to assess the visual skills and motor performance of soccer players in Ethiopian youth sport academy. Furthermore, this study was also aimed to assess visual skills and motor performance difference in playing positions. Having the aforementioned problem in mind, this study was deeply aimed to answer the following basic questions.

What is the current visual skill and motor performance status of Ethiopian youth sport academy soccer players?

Does a visual skill have an impact on motor performance of soccer players?



Does Ethiopian youth sport academy soccer players have visual skills score difference in playing positions?

Is there the relationship between visual skills and motor performance of soccer players?

Objectives of the Study

General objective

To assess the impact of visual skills on motor performance of soccer players in Ethiopian youth sport academy.

Specific objective

To show the visual skill and motor performance status of Ethiopian youth sport academy soccer players. To examine the impacts of visual skills on motor performance of soccer players.

To compare visual skills and motor performance differences of Ethiopian youth sport academy soccer players in playing positions.

To find out the relationship between visual skills and motor performance of soccer player

Materials and Methodology

Study Area and Design

The study was takes place in an Ethiopian youth sport academy, which is found in the capital of Ethiopia (Addis Ababa). Cross-sectional study design had been involved to assess the visual skills and motor performance of soccer players in Ethiopian youth sport academy; using a range of participants with different backgrounds, age group, sex and playing position from the overall subjects.

Study Subjects

From the available subjects 62 youth soccer players (28 male and 34 female) were participated using simple random sampling techniques.

Source of Data

For this study primary source of data was used because of the nature of the problem. The primary data such as demographic characteristics (age group, sex, and playing position), the visual skill tests (visual acuity and color vision) and motor performance (eye hand coordination, eye foot coordination and reaction time) of the players were measured.

Methods and Procedures of Data Collection

Quantitative data was collected through the appropriate demography test (age group, sex, and playing position) to know the demographic characteristics of the study participant.

The visual skill tests (visual acuity, and color vision) were used to assess the visual skill of the players. Visual acuity was assessed using norms for visual acuity as obtained by Buys and Ferreira (2008) for athletes with the use of a Snellen VA chart at a test distance of six (6) meters. The color vision test was assessed with the pseudo-isochromatic Ishihara plates, which are most useful for detection of red-green congenital anomalies. Subjects were asked to seat in a room with sufficient light and read the chart keeping it 33cm away from the eyes. Then the types of color blindness will be differentiated and categorized. For absolute judgment only about 30 colors can be identified reliably (Bishop and Crook, 1961). The motor performance of the players (eye hand coordination, eye foot coordination and reaction time) was measured to examine the impacts of visual skill on motor performance of the players.



Eye hand coordination test objective is to monitor the ability of the athlete's vision system to coordinate the information received through the eyes to control, guide, and direct the hands in the accomplishment of catching a ball (hand-eye coordination and eye foot coordination). Reaction Time assessed using the Yardstick test is an established test for measuring reaction time (Hoeger & Hoeger, 2004).

Data Quality Control

To ensure the data quality, only standardized tests was used and to minimize the mistake replication method was used by the researcher.

Method of Data Analysis

Descriptive statistics was produced for each of the parameters. The results were presented as mean \pm SD, and Frequency proportions. Multivariate Roy's Largest Root Tests was used to examine the impacts of visual skills on motor performance and ANOVA was used to see the difference of visual skills and motor performance in playing positions. Whereas, Pearson product moment correlation coefficient was used to test the relationship between visual skills and motor performance of Ethiopian youth sport academy soccer players. The significance level was set at 0.05 levels for each of the statistical tests. SPSS 20 software was used for the statistical analysis.

Results

Demographic Characteristic of the respondents: The players sex distribution on this study was shown that 28(45%) were male and 34(55%) were female. To this effects, it was been female subjects participation greater than male

subjects. The players age group/team distribution on this study was shown that 28(45%) were U15 and 34(55%) were U17. The out puts of player playing position demonstrates that 5(8%), 21(34%), 28(4%), and 8(13%) were goalkeepers, defense, midfield and striker respectively. The result had the implication of the subjects were selected from all playing position.

Visual Skill and Motor performance of the Players

Players color blindness status: The result can show that players color blindness status 26(42%) had no color blindness, 32(52%) had some degree of color blindness and 4(6%) of them had weak color blindness status. The large number of players found under the status of some degree of color blindness. While, few were under the weak degree of identifying the red green colors. One can easy draw a conclusion that majority of the players had some complication whereas, few were had weak complication.

Players visual acuity status: The result can shows that the visual acuity status of the players right eye visual acuity results 4 (6.50%) players were scored 6/18, 2 (3.20%) players were scored 6/12, 10 (16.10%) players were scored 6/9 and 46(74.20%) players were scored 6/6. This can show that the majority the players had normal visual acuity status of their right eye and, left eye of the players visual acuity result indicated that 3 (4.80%) players were scored 6/18, 8(12.90%) players were scored 6/12, 5(8.10%) players were scored 6/9 and 46(74.20%) players were scored 6/6. This can show that the majority players had



normal visual acuity status of left eye. In line with this both eye of the players visual acuity result 3(4.80%) players were scored 6/12, 8(12.90%) players were scored 6/9 and 51(82.30%) players were scored 6/6. This also can show that the majority players had normal visual acuity status of both eyes.

Players eye hands coordination status: The result can shows that 2(3%) of the players were score above average, 2(3%) of the players were score average, 17(28%) of the players were score below average and 41(66%) of the players were score low score. From the result understand that more than half of the players had low performance in eye hands coordination.

Players eye foot coordination status: The result can shows that 1(1%) of the players were score above average, 55(89%) of the players were score average, 5(8%) of the players were score below average and 1(2%) of the players were score low score. From the result understand that more than half of the players had average performance in eye foot coordination.

Players reaction time status: The result can shows that 12(20%) of the players were score excellent, 33(53%) of the players were score above average, 12(19%) of the players were score average, and 5(8%) of the players were score below average. From the result we understand that half of the players had above average reaction time performance.

Multivariate Roy’s Largest Root Tests

The multivariate Roy’s Largest Root test summery table for the split effect visual skill on motor performance is shown in the above table. Color blindness is insignificantly different from the correct model $P > 0.253$, visual acuity is insignificantly different from the correct model $P > 0.111$, and also insignificant difference were observed between both color blindness and visual acuity on motor performance at $p > 0.457$. The abovementioned analysis in disagreement with independently exercising and in group couldn’t bring significant change on players’ motor performance.

Effect of visual skills on motor performance

Multivariate Roy's Largest Root Tests ^a

Effect	Value	F	Hypothesis df	Error df	Sig.
Correct Model	16.807	296.917 ^b	3.000	53.000	0.000
Color Blindness	0.078	1.400 ^c	3.000	54.000	0.253
Visual Acuity	0.117	2.100 ^c	3.000	54.000	0.111
Color Blindness * Visual Acuity	0.049	.881 ^c	3.000	54.000	0.457

a. Design: Intercept + Color Blindness + Visual Acuity + Color Blindness * Visual Acuity

b. Exact statistic

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

One way ANOVA test in playing Position

As illustrated in table 2 analyses, one-way ANOVA revealed that there was no significant differences of color blindness test between playing position in score of $F = 0.472, P > 0.05$, visual acuity test between playing position in score of $F = 0.640, P > 0.05$, eye hands

coordination test between playing position in score of $F = 1.585, P > 0.05$ and reaction time test between playing position in score of $F = 0.344, P > 0.05$ whereas, there was significant differences of eye foot coordination test between playing position in score of $F = 3.669, P < 0.05 (0.017)$

Visual skills and motor performance differences

		ANOVA in Playing Position				Reaction Time	
		Sum of Squares	df	Mean Square	F	Sig.	Correlation
Color Blindness Test	Between Groups	0.529	2	0.2645	0.472	0.627	0.700
	Within Groups	21.664	58	0.374			
	Total	22.194	60				
Visual Acuity Test	Between Groups	0.478	2	0.239	0.640	0.525	0.570
	Within Groups	16.361	58	0.282			
	Total	16.839	60				
Eye Hands Coordination	Between Groups	2.367	3	0.789	1.585	0.203	0.498
	Within Groups	28.875	58	0.498			
	Total	31.242	61				
Eye Foot Coordination	Between Groups	6434.218	3	2144.739	3.669	0.017	0.669
	Within Groups	6465.548	61	106.174			
	Total	12900	64				
Reaction Time	Between Groups	0.742	2	0.371	0.344	0.559	0.793
	Within Groups	41.645	58	0.718			
	Total	42.387	60				

From the aforementioned analysis one can easily understand that there was no difference between the playing positions of the player in color blindness, visual acuity, eye hand coordination and reaction time tests, while there was significant difference between the playing positions of the player in eye foot coordination tests.

Relationship between Visual skills and motor performance status

Pearson product moment correlation coefficient matrix between Visual Skill and Motor Performance Tests

performance to reaction time ($r = -0.050, r^2 = 0.0025, P > 0.05$), in contrast with this both color blindness and visual acuity insignificantly correlated negatively with motor performance to eye foot coordination ($r = -0.027, r^2 = 0.00072$ and $r = -0.021, r^2 = 0.00044$ respectively at $P > 0.05$). For the above analysis one can be understand that color blindness significantly and positively correlated with motor performance to reaction time. This could mean that color blindness can decrease the motor performance



One way ANOVA test in playing Position

Subscale	Color	Visual
	Blindness	Acuity
Eye Hands Coordination	-0.108	0.317*

specially reaction time. And also visual acuity significantly and positively correlated with motor performance to eye hand coordination.



This could mean that visual acuity can decrease the motor performance specially eye hand coordination.

Discussion

The multivariate Roy's Largest Root test summery table for the split effect visual skill on motor performance is shown that disagreement with independently exercising and in group couldn't bring significant change on players' motor performance. In contrast with these result children who are having visual problem they are lacking in motor activities such as eye hand coordination, eye foot coordination and reaction time (Tanuja and Tanveer, 2013). Other study also indicated that, in football nothing affects performance more than the ability to see clearly and correctly. Whether an athlete is tracking a fly ball, it is his eyes that lead his body (Williams, 2000). According to Loran and Griffiths (2000) the correlation of visual and football skills suggests that the best players have the best visual performance. It does not follow that players with a good visual performance will automatically become good players, but it is tempting say that given two equally motivated and physically similar players, the one with the better all-round vision will become the more skillful (Loran and Griffiths, 2000).

The result of this study can shows that there was no difference between the playing positions of the player in color blindness, visual acuity, eye hand coordination and reaction time tests, while there was significant difference between the playing

positions of the player in eye foot coordination tests. But, other studies conducted that the difference between a top football player and mediocre performer is in the way they move their eyes. High quality players survey the field of play for clues about what their opponents will try to do in a manner which varies strikingly from the visual search patterns used by less experienced performers (Williams *et al.*, 1994) that's why the subjects of this study were junior football players the result have not shown different in playing position.

Experienced players are better at discerning relevant portions of the field of play. While inexperienced players fixated on the ball and the player actually passing the ball, experienced players focus on peripheral aspects of play, such as the movement of other players not in close contact with the ball players who were moving into open areas of the field in which they might eventually receive a strategic pass (Williams *et al.*, 1994).

From the results of this study one can be understand that color blindness significantly and positively correlated with motor performance to reaction time. This could mean that color blindness can decrease the motor performance specially reaction time. And also visual acuity significantly and positively correlated with motor performance to eye hand coordination. This could mean that visual acuity can decrease the motor performance specially eye hand coordination. The relationship between football



and vision suggests that sport is more difficult or impossible with low vision (Woods *et al.*, 1997). Moreover, football without vision is unthinkable for most people (Obstfeld, 2003).

The basic premise of sport vision is that eyes feed information to the brain, which interprets the data and then sets muscles into a coordinated motion. When the eyes' messages are inaccurate or incomplete, performance suffers (Zupan *et al.*, 2006). The athlete who is not visually fit is not physically fit (Garner, 1991), thus poor vision can be a barrier to high achievement in football (Griffiths, 1999).

Conclusions

The purpose of the present research was to assess the impact of visual skills on motor performance of soccer players in Ethiopian youth sport academy. To this effect, the investigator draws, the below mentioned conclusions.

The majority of the players had some complication of color blindness. Half of the players had shown low performance in eye hand coordination while average and above average performance in eye foot coordination and reaction time respectively. Visual skills of the players independently and in group couldn't bring significant change on players' motor performance.

There was no difference in visual skills and motor performance (eye hand coordination and reaction time) in playing positions, while there was difference in eye foot coordination between playing positions. Color blindness test

significantly and positively correlated with motor performance to reaction time. Visual acuity significantly and positively correlated with motor performance to eye hand coordination.

Recommendations

From the results and conclusion of the study the following points has been listed as recommendations: so that some of the players should re-check and start color blindness treatment. The coaches should help the players to give care in color blindness and visual acuity. To develop the players' motor performance **additional motor training should be delivered for the players.** Finally, the Ethiopian youth sport academy should give emphasis on selection of the players by considering the visual skill as well as their motor performance.

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Conflict of interest: The authors declare that; have no conflict of interest.



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