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Comparison of Eye Foot Coordination among Offensive and Defensive Football Player at Hyderabad

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Abstract

To measure variables were height, weight, fat, muscle mass, testosterone, 10m sprint, agility, counter movement jump, peripheral awareness, Eye-Foot coordination, passing skill, dribbling skill and on-the-ball skills (performance time and passing accuracy) in soccer-specific laboratory test. A significant main effect by age was found in all measured variables except in fat, in peripheral awareness and in passing accuracy. In discriminate analysis 63.9% ($\lambda = 0.603$, $F = 4.600$, $p < 0.01$) of the players were classified correctly based on physical fitness and general perceptual motor skills into three ability groups originally classified with performance time in soccer-specific laboratory test. Correlation co-efficient analysis with-in age groups revealed that variables associated with performance time in soccer-specific laboratory test were peripheral awareness ($r = 0.72$, $p < 0.01$) in defensive skill ($r = 0.73$, $p < 0.01$) and passing skill ($r = 0.73$, $p < 0.01$).

Corresponding relationships with passing accuracy were weight ($r = 0.59$, $p < 0.05$), fat ($r = 0.66$, $p < 0.05$), 10m sprint ($r = 0.71$, $p < 0.01$) and countermovement jump ($r = -0.64$, $p < 0.05$) in Group-I; Eye-Foot coordination ($r = 0.63$, $p < 0.05$) in 14-year- olds. The relationship between soccer-specific anticipation time and performance time in soccer- specific laboratory test was significant only in the group-II ($r = 0.76$, $p < 0.01$). To conclude, on-the-ball skill performance in soccer-specific laboratory test improved with age and it seemed that soccer-specific perceptual skills became more and general perceptual motor skills less important with age in soccer-specific test.

INTRODUCTION

We all know about football. Kicking a ball with the foot is what we refer football game. Nowadays football is one of the most popular sports in the world. "Soccer" is the other name of football. It has a long history. Ancient people started to play first football. During the 20th century various types of football are getting more popular like rugby, American football, Canadian football etc. We all know various forms of football are identified in history. Basically football is played by two teams. Each team consists of 11 players and extra players are waiting outside the line if any player injured or depends on coach's decisions to change the players. By scoring goals or points is the result of this game. Two teams try to goal their opposite components. In that case players only use their feet or body without using hands to play this game. Players are being required to move the ball by kicking, passing and carrying. There are many roles to play in this game. Players are must abide this role. They cannot hit any players. The total time of this

game is 90 minutes, with the most scored team considered as a winner.

A game played by two teams of 11 players each on a rectangular, 100-yard-long field with goal lines and goalposts at either end, the object being to gain possession of a ball and advance it in running or passing plays across the opponent's goal line or kick it through the air between the opponent's goalposts.

- Any of various forms of team game involving kicking (and in some cases also handling) a ball, in particular (in the UK) soccer or (in the US) American football .
- A ball used in football, either round (as in soccer) or oval (as in rugby and American football) and typically made of leather or plastic and filled with compressed air.

TACTICAL BEHAVIOR:

To evaluate the tactical behavior of the players, the System of Tactical Assessment in Soccer (FUT-SAT) was used. The conceptual structure of FUT-SAT is based on the ten core tactical principles of soccer, being five for the offensive phase: penetration, offensive coverage, depth mobility, width and length and offensive unity; and five for the defensive phase: delay, defensive coverage, balance, concentration and defensive unity. These principles were chosen since they represent the core aspects of the process of teaching and training of tactical skills. Besides that, this set of principles objectively measures players' motion according to the management of playing space performed by them.

FUT-SAT comprises two macro-categories, seven categories and 76 variables that are organized according to the type of information dealt with by the system. The Macro-Category Observation comprises three categories and 24 variables. This Macro-Category, named Tactical Principles, comprises ten variables. The category Place of Action in the Game Field features four variables and the category Action Outcomes features ten variables. The Macro-Category Outcome features four categories and 52 variables. In this Macro-Category, all four categories Tactical Performance Index (TPI), Tactical Actions, Error Percentage and Place of Action Related to the Principles (PARP) comprise the same thirteen variables. The Macro-Category Outcome is so called becasue its variables are dependent on the information provided by the variables that compose the Macro-Category Observation. The FUT-SAT's field test (Goalkeeper +3 vs. Goalkeeper +3) is performed during four minutes in an area of 36 meters long by 27 meters wide, according to the official laws of soccer, except by the offside rule.To assess tactical behavior we used players' Offensive, Defensive, and Game Tactical Performance Index values.

EYE FOOT COORDINATION:

Coordination is the ability to get your muscles and your senses to work together to smoothly and efficiently accomplish a task. The right muscles need to contract at the right time with the right amount of force. Coordination can be improved with practice but like strength it is very specific. Improving your hand-eye coordination does not improve your foot-eye coordination. Getting better at shooting targets in a video game will not do much to improve your hand-eye coordination for badminton or basketball. To get better at a specific task you should practice that specific task or something

very similar. To improve your overall coordination practice doing different types of tasks. As the names suggest hand-eye coordination is getting your muscles to move your hand to the right place at the right time. Foot-eye coordination is getting your feet to move to the right spot at the right time. A lack of coordination can make it seem like you are very unlucky. Bad things happen to clumsy people.

It takes time for your body to learn how to do something. Some muscles contract that should not contract, some don't contract at the right time and some contract with too much or not enough force. After some practice the muscles start work together more efficiently. The timing gets better and the movements become smoother. Having good coordination is important because without it your strength, speed, balance, endurance and flexibility are wasted. You need coordination to succeed.

Figure 1: Eye –Foot Coordination

Statement Problem:

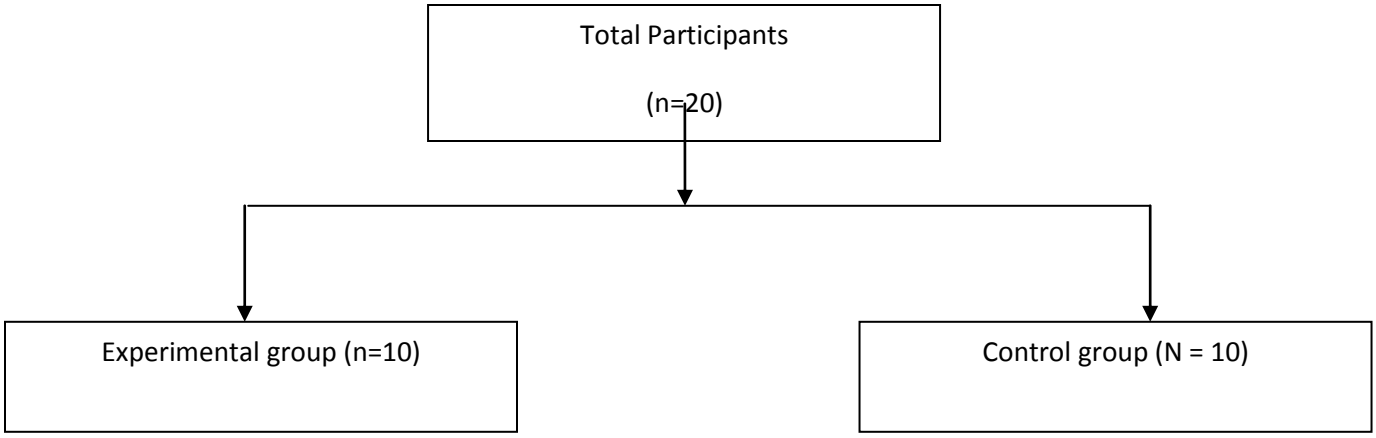
To study and investigate the modern tactics by football players and the role of eye-foot coordination in football sport. To examine the eye-foot skills among football players and analyze the modern techniques of football play. The research study compares the eye-foot co-ordination performance among football players.

SAMPLE:

A total of 20 elite Football players participated in the study. The subjects included students of the Osmania University. The average age was 18 ± 1 years (mean ± SD), the average body height was 196 ± 7,39 cm, the average body weight equaled to 84,07 ± 7,77 kg. Informed consent was obtained from each subject.

Groups	Number of Players
experimental group	10
control group	10

Table 1: Participants



DESIGN OF THE STUDY:

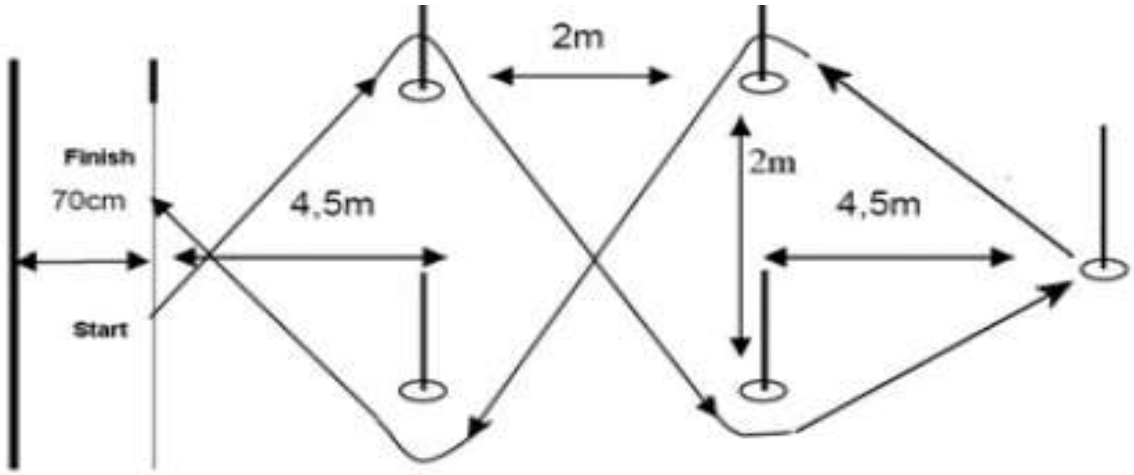
Participants' general perceptual motor skills were measured with peripheral awareness (PAT) and Eye-Foot coordination (EF) tests. PAT was measured using the Wayne Peripheral Awareness Trainer in which participants stood 60 cm away from the central cylinder, with eight peripheral lights mounted on 50 cm long rods in the cardinal and ordinal directions.

Participants were asked to concentrate on the central light in the middle of the cylinder and, using a joystick, respond as quickly as possible to eight peripheral lights that were illuminated in random order. An average time of the eight directions was calculated, with the best out of three trials being selected. In the EHF test, the participants extinguished, in 30 seconds, and in a predetermined manner using their hands (29 lights) and feet (four lights), as many as possible of the randomly illuminated lights in the Wayne Saccadic Fixator. Hand positions were pressed with the right or left index finger and foot positions by pressing pedals on the ground (North=forward, East=right, South=back, West=left). The number of extinguished lights was counted and the best out of three trials was selected.

COLLECTION OF SAMPLE:

The samples were collected from Osmania University of Telangana a state of India. The analysis is carried out from players who play in this selected Football.

Figure 2: Illustration showing agility test.



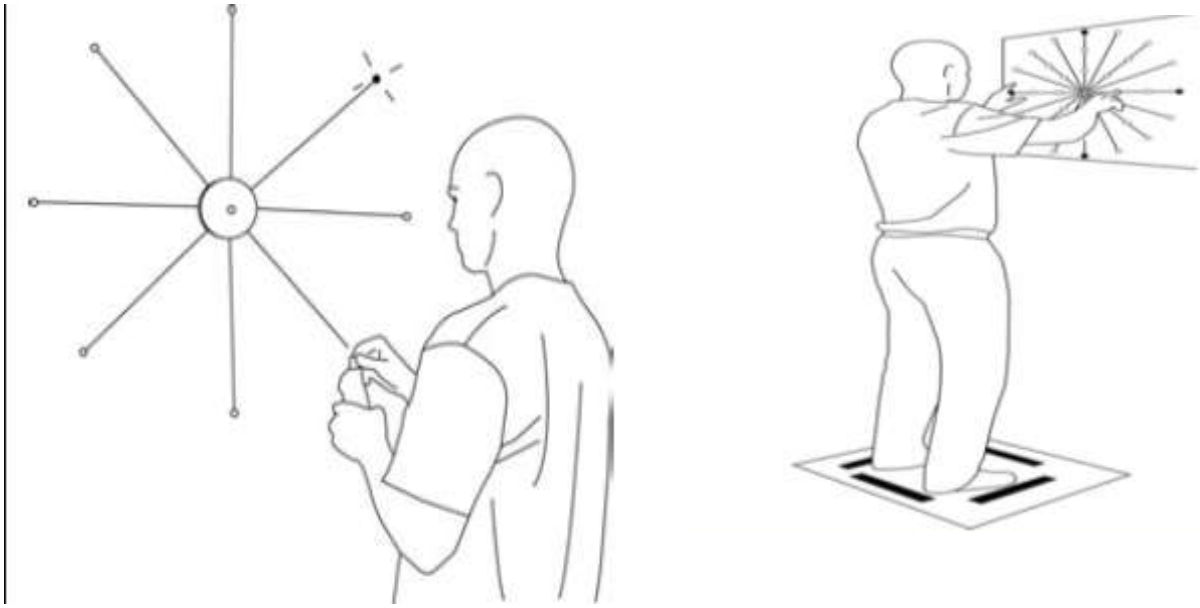


Figure 3: Illustration (top) showing peripheral awareness (PAT) test. Illustration (bottom)showing Eye-Foot coordination (EF) test.

TEST:

Soccer skills were measured with the dribbling and passing tests used in the youth skill competitions in Finland. In traditional soccer skill tests, the participants were also instructed to perform three trials but at least one successful trial was required from each player. Trail was stopped immediately if the ball was lost. More than three trials was needed in 8 cases out of 72 (dribbling +

passing) and every player succeeded in five trails. The results of the dribbling and passing test were also combined to variable ∑skill (=passing + dribbling) which was used in part of the statistical analysis.

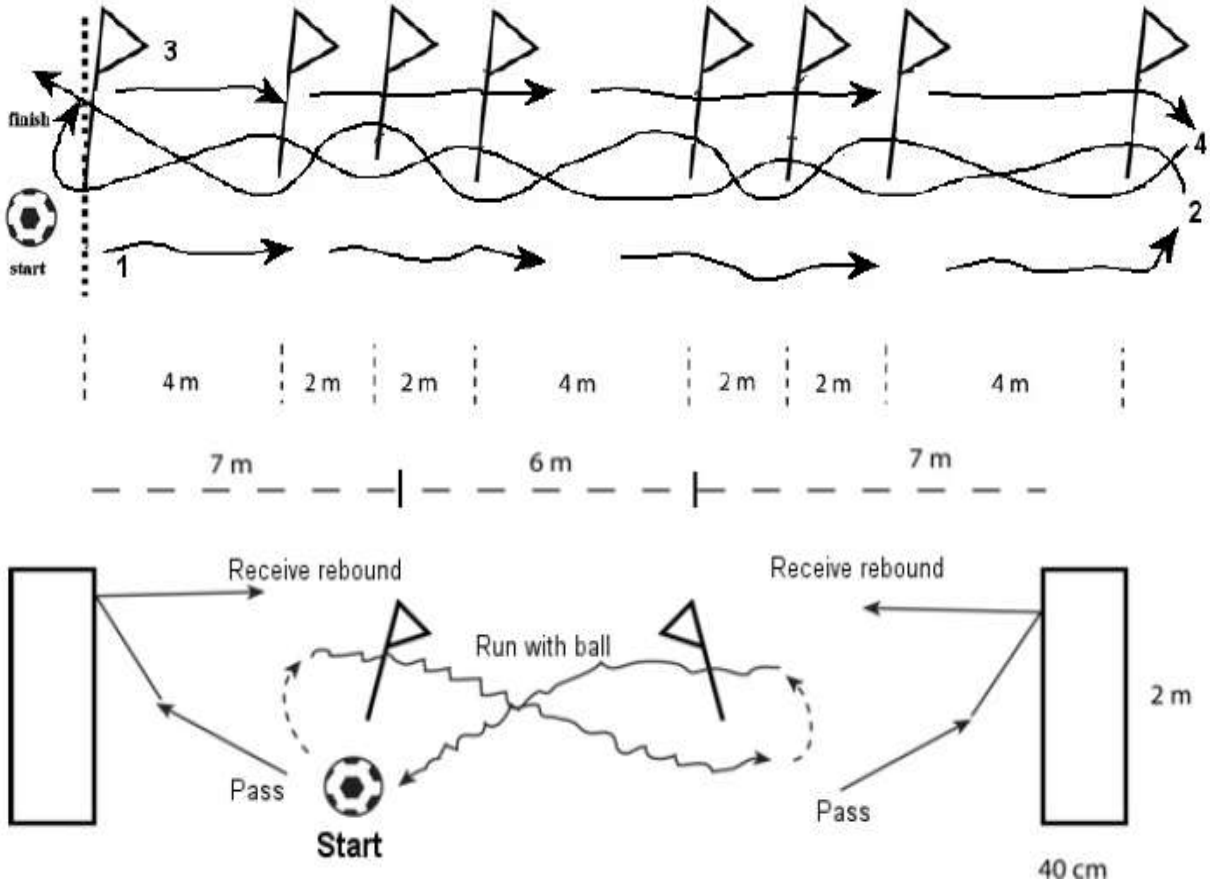
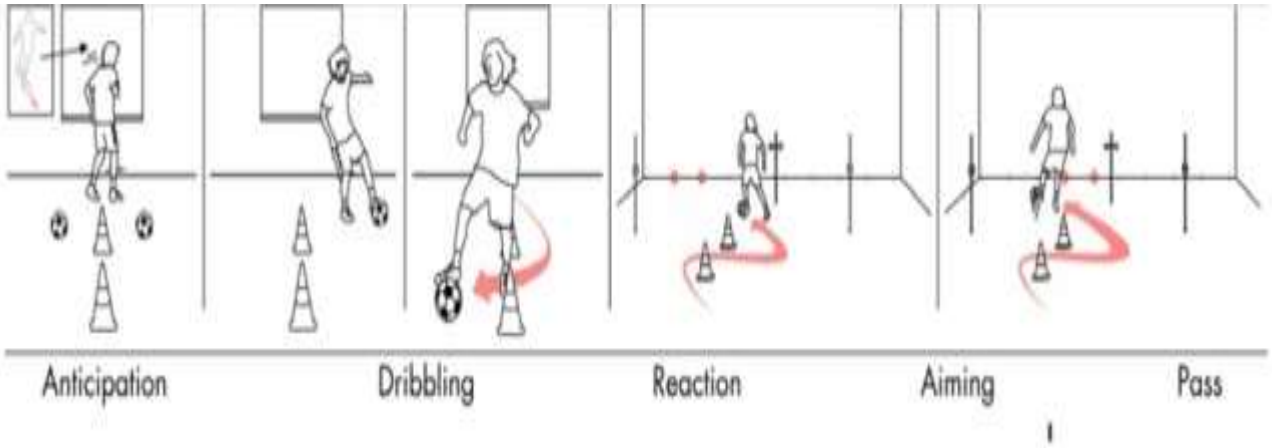


Figure 4: Illustration (top) showing dribbling test. Illustration (bottom) showing passing test.

A laboratory test track was constructed in order to measure soccer-specific perceptual motor skills in simulated `on-the-ball` performance. The test included a chain of typical soccer actions: anticipation, receiving, dribbling, feinting and passing. Firstly, the participant (1) of a soccer player receiving the ball, running a short distance towards the participant, and passing to the right or left. The player correspondingly anticipated the pass and took the ball (2) located on his left or right hand side. Secondly, the participant dribbled the ball between two cones (3) and through the photocell-gate (4) which triggered a light (5) on the left or right hand side of a pole placed 5m in front of the photo-cell gate.

Figure 5: Test



The signal light determined which side of the pole the pass (6) should be given. Thirdly, the participant was instructed to direct a pass between two switched lights in a running light track (7) proceeding at the speed of 4.17 $m \cdot s^{-1}$.

The participants were instructed to complete the entire performance as quickly and accurately as possible. In the soccer-specific laboratory test, the participants had 4 familiarization and 16 actual test trials (8 on each side in a random order) with a resting period of 45 seconds between each trial.

Table 2: Mean (± SD) for anthropometrical, hormone profile, physical fitness, general perceptual motor skill, soccer skill and soccer-specific laboratory test variables.

		Group -I	**Group -II**
Anthropometrics	**Height (m)**	1.44 (.06)	1.57 (.11)
	Weight (kg)	33.2 (4.0)	42.3 (8.4)
	Fat (%)	9.4 (3.5)	9.7 (3.8)
	Muscle Mass (kg)	15.9 (1.9)	20.8 (4.8)
Hormone Profile	**Testosterone (nmol/l)**	.15 (.52)	9.78 (7.05)
Physical Fitness	**10m (s)**	2.08 (.07)	2.02 (.05)
	Agility (s)	7.57 (.22)	7.38 (.17)
	CMJ (cm)	27.8 (4.2)	29.5 (3.4)
General Perceptual Motor Skills	**PAT (s)**	.36 (.07)	.33 (.06)
	EHF (times/30s)	28.8 (3.0)	34.2 (2.5)

Soccer Skills	**Dribbling (s)**	29.4 (1.7)	29.0 (1.8)
	Passing (s)	42.2 (2.8)	39.4 (2.9)
	∑ Skill (s)	71.6 (4.1)	68.4 (4.5)
Soccer-Specific Laboratory Test	**Time (s)**	5.62 (.30)	5.54 (.30)
	Anticipation (s)	.17 (.04)	.15 (.04)
	Dribbling (s)	2.84 (.25)	2.84 (.20)
	Reaction (s)	.36 (.07)	.33 (.06)
	Aiming (s)	1.43 (.26)	1.53 (.16)
	Passing (s)	.82 (.10)	.69 (.09)
	Accuracy (penalty pts.)	1.75 (.58)	1.47 (.32)

CMJ = counter movement jump, PAT = peripheral awareness, EHF = Eye-Hand-Foot Coordination

The analyzed variables were:

Anticipation time = the moment from the pass on the video sequence to the first movement towards the ball.

Dribbling time = time from the first ball touch to the moment of entering the photocell-gate.

Reaction time = time from illumination of the direction stimulus (triggered by photocell-gate) to the moment when the gaze moved away from the stimulus light.

Aiming time = the moment of removing the gaze from the stimulus light to the moment of passing impact;

Passing time = the moment from passing impact to the moment when the ball entered the running light track. Passing accuracy = "penalty points "according to the distance between the ball and switched light-pair when the ball entered the line of the running light track (0 points = hit, 1 point = one light-pair in front or behind, 2 points = two light-pairs in front or behind , etc..The validity of the test track was examined by comparing adult players of the regional level players (n = 10, 18.8 ± 3.5y) and comparing adolescent players selected (n = 10; 22.5 ± 1.5y) for regional talent camp organized by the Osmania University football association.

Selection for talent camp was done by youth national team coaches. According to independent samples t-test elite adult players (4.10 ± 0.20s) performed significantly better than sub-elite players (4.73 ± 0.29s) in the soccer-specific laboratory test ($t = 6.106$, $p < 0.001$, 95%CI 0.41-0.86) and according to discriminant analysis 87.5% ($\lambda = 0.503$, $x^2 = 14.758$, $p < 0.001$) of the adolescent players were classified correctly into the appropriate soccer expertise group based on performance time in the soccer-specific laboratory test. Reliability of the soccer-specific laboratory test was examined by analyzing twice the trials from 10 adolescent soccer players (22.6 ± 1.6y). The Pearson coefficient

correlation for intra-observer (5.48 ± 0.62s vs. 5.49 ± 0.62s), inter-observer (5.48 ± 0.62s vs. 5.46 ± 0.60s) and test-retest (5.48 ± 0.60s vs. 5.42 ± 0.52s) reliability for the performance time in the soccer-specific laboratory test were 0.93 ($p < 0.001$), 0.86 ($p < 0.001$) and 0.81 ($p < 0.01$), respectively.

Tests were carried out in three separate days during preparation season. First testing day included anthropometrical, hormone profile and physical fitness tests. Second testing day included traditional soccer skill tests and third day general perceptual motor skill tests and soccer-specific laboratory test. Testing days were scheduled to teams training program so that no training took place in the day preceding the tests.

One-way ANOVA with Tukey's post hoc test was applied to detect differences between the age groups. Effect sizes determined with eta-squared (η^2) are reported for interpretative purposes with 0.01 regarded as a small effect, 0.06 a moderate effect and 0.14 a large effect.

A stepwise discriminatory analysis (with probability of F: entry = 0.05, remove = 0.10) was applied to determine if combined variables could predict group membership of performance time or passing accuracy in the soccer-specific laboratory test when all players were treated as one group. A grouping variable for discriminant analysis was constructed by categorizing the players in each age group into three groups based on their performance time or passing accuracy in the soccer-specific laboratory test: good (best 25%, n =10), average (50%, n = 10).

Combined variables were used as independent variables. These variables were constructed by ranking players in each age group in each of the measured variables (from 1 = best result to 10 = worst result) and combining variables by averaging ranked values to describe muscle-hormone profile (muscle mass, testosterone), physical fitness (10m, agility, counter movement jump), general perceptual motor skills (peripheral awareness, Eye-Foot coordination) and soccer skills (dribbling, passing). With-in each age group Pearson's correlation coefficient was applied to examine the relationships between single variables and performance time in the soccer-specific laboratory test and between single variables and passing accuracy in the soccer-specific laboratory test.

In addition, a linear regression was applied to examine the relationship between anticipation time and performance time in the soccer-specific laboratory test in order to estimate the role of soccer-specific perceptual skills in different age groups.

RESULTS

Results of the measured variables are presented. A significant main effect by age was found in other measured variables except in percentage of body fat and in peripheral awareness. More detailed analysis between consecutive age groups revealed that all other measured anthropometrical, hormone profile, physical fitness, general perceptual motor skill and soccer skill variables improved with age but the differences in 10m, CMJ and offensive and defensive skill in the 18 to 22-year age group.

Table 3: Effects of age for physical fitness, general perceptual motor skill, soccer skill and soccer-specific laboratory test variables.

		Main Effect			groups (p<)	
		$F_{(2,33)}$	p<	η^2	Group-I	Group-II
Anthropometrics	**Height (m)**	22.604	.001	.57	.01	.001
	Weight (kg)	27.937	.001	.63	.01	.001
	Fat (%)	1.203	ns.	.07	-	-
	Muscle Mass (kg)	30.866	.001	.65	.001	.001
Hormone Profile	**Testosterone (nmol/l)**	31.778	.001	.66	.01	.001
Physical Fitness	**10m (s)**	21.639	.001	.57	.001	.001
	Agility (s)	14.023	.001	.46	.05	.001
	CMJ (cm)	13.903	.001	.46	.01	.001
General Perceptual Motor Skills	**PAT (s)**	1.555	ns.	.09	-	-
	EHF (times/30s)	21.371	.001	.56	ns.	.001
Soccer Skills	**Dribbling (s)**	12.102	.001	.42	.01	.001
	Passing (s)	12.623	.001	.43	.05	.001
	∑ Skill (s)	13.407	.001	.45	.01	.001
Soccer-Specific Laboratory Test	**Time (s)**	3.378	.05	.17	ns.	.05
	Anticipation (s)	15.012	.001	.48	.01	.001
	Dribbling (s)	1.087	ns.	.06	-	-
	Reaction (s)	2.895	ns.	.15	-	-
	Aiming (s)	1.581	ns.	.09	-	-
	Passing (s)	11.402	.001	.41	ns.	.001
	Accuracy (penalty pts.)	2.504	ns.	.15	-	-

CMJ = counter movement jump, PAT = peripheral awareness, EHF = Eye-Hand-Foot Coordination

In the soccer-specific laboratory test, a significant main effect by age was found in performance time, anticipation time and passing time. In reaction time, the differences just failed to attain a level of significance ($p = 0.069$).

More detailed analysis between age groups revealed that in performance time ($p < 0.05$) and in passing time ($p < 0.001$), the group-I was faster in anticipation time, was faster than the group-II ($p < 0.01$). Only significant difference between 18 and 22-year groups was found in passing time ($p < 0.05$). An example of performance in the soccer-specific laboratory test, in which overlay video technique is used to demonstrate typical differences between these two age groups. In overlay video, players' performances were time synchronized to the moment when the passing impact.

Based on discriminant analysis 63.9% ($\lambda = 0.603$, $F = 4.600$, $p < 0.01$) of the players were classified correctly based on physical fitness and general perceptual motor skills into three ability groups originally classified with performance time in the soccer-specific laboratory test. Combined variables were not able to classify group membership of passing accuracy. With-in each age group the relationships between single variables and performance time in the soccer-specific laboratory test as well as the relationships between single variables and passing accuracy in the soccer-specific laboratory test are presented. The relationship between anticipation time and performance time was significant only in the oldest, group –II ($r = 0.764$, $p < 0.01$) as presented.

Table 4: Correlation coefficients between soccer-specific tests variables (time and accuracy) and anthropometrical, hormone profile, physical fitness, general perceptual motor skill and soccer skill variables in different age groups.

		Performance time		**Passing accuracy**	
		Group - I		**Group - II**	
Anthropometrics	**Height**	.10	.30	.06	.38
	Weight	.18	.59*	-.10	-.28
	Fat	-.02	.66*	-.47	-.24
	Muscle Mass	.17	.39	-.00	-.18
Hormone Profile	**Testosterone**	-.10	.07	-.17	-.11
Physical Fitness	**10m**	.52	.71	-.26	.07
	Agility	.79	.35	-.02	-.21
	CMJ	-.62	-.64	-.21	.03
General Perceptual Motor Skills	**PAT**	.33	-.13	.25	.08
	EF	-.44	-.43	-.10	.63
Soccer Skills	**Dribbling**	.80	-.01	-.27	-.26
	Passing	.58	-.06	-.21	-.24
	∑ Skill	.70	-.04	-.24	-.26

CMJ = counter movement jump, PAT = peripheral awareness, EHF = Eye-Hand-Foot Coordination,

	Scores		**Goals**
	Offensive	**Defensive**	
EXPERIMENTAL GROUP –I	**35**	**18**	**21**
CONTROL GROUP -II	**28**	**14**	**09**

Table 5: Offensive defensive skill performance

CONCLUSION

To conclude, a well-known, age-dependent development pattern in physical fitness and in soccer skills among adolescent soccer players was found in the present study. Although general and soccer-specific perceptual motor skills also developed with age, it seemed that soccer-specific perceptual skills became more important with age and general perceptual motor skills less important.

Nevertheless, more research is warranted in order to understand the development of general and soccer-specific perceptual motor skills during growth. In addition, research lay-out in the soccer-specific laboratory test used in the present study was very simple compared to those situations that players have to face in the real game. Soccer-specific laboratory test involved some uncertainty compared to traditional soccer skill tests but was still a test from pre-determined start to pre-determined finish. In real game each player possess unique starting situation which is then followed by decisions and motor actions affected by the actions of teammates and opponents. Decisions and actions in the game are also influenced by the team`s playing style and tactics selected. Therefore, more research is also needed in order to develop tests that measures essential soccer skills in more game-like simulation or even in the game itself.

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