

# A Study of Selective Motor Fitness Components Empowers On Playing Ability among Low and High Performers of State Level Football Players

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## Abstract

Motor fitness is a present aptitude for physical skills, includes strength and co-ordination enriches today's Manpower in players performance. The study focuses on selected motor fitness components to ensure the playing ability among low and high performers of State level Football players. To achieve this study, One hundred and fifty men Football players were randomly selected as subjects from Tamilnadu State level men Football Tournament held at Chennai in 2008-09. Their age ranged from 20 to 25 years. Selected subjects were classified into three equal groups of each fifty members. Group 1 served as -Chennai Team, Group-II as Salem and Coimbatore Team and Group III Trichy and Madurai Team. All the subjects were oriented the purpose of the test and procedure of conducting this test. Regular activities and training were given that aplomb the player's ability to perform the game. Questionnaire preparation was also done by our Research Scholar with the reference to the review of the literature. The investigator has provided onto the following selected motor fitness variables such as Cardio-vascular Endurance, Speed, Agility and Explosive Power. The data is collected with the help of five PhD Scholars, Department of Physical Education who were well versed with the conduct of test and collections under the direct supervision of our Research Scholar. Resulting data will be collected before and after the competition and statistically analyzed using ANOVA and DMRT. Hence the study concluded that playing ability solely depends on the physical fitness, stress free mind more than that it relates the socio-economic status to perform the better strategy of playing games.

**Keywords:** Agility, Cardiovascular endurance, Explosive power, Speed, Football Players

## INTRODUCTION

Football is a game that requires skill and speed. Speed is the ability to perform a movement within a short period of time (Neiman, 1995). Speed training is an important football related skill related component of physical fitness which enables a player to move from one point to another with faster response time. It has been shown that to improve speed each athlete needs to work on acceleration, starting ability, stride rate, speed endurance, and stride length (Mackenzie, 2001).

Football is one of the most popular games in the world in general. Football being most competitive sport, a player who is Physically fit does not only enjoy more but he is also capable of using all the skills attained and mastered by him throughout, right from beginning to end of the game. The twin combination of both skill and physical fitness is indispensable for a player without either of which he will not be able to achieve much, specifically in order to play any ball game competently (Nabhendra Singh, 2010).

However, the word physical fitness and motor fitness are often used interchangeably. The term motor fitness was developed

to describe a broad concept than physical fitness. This extensive term means the ability to perform basic motor. A Comparative Study of Motor Performance Level 409 skills efficiently and effectively. Power, balance, agility, speed, reaction time and kinesthetic perception are the traits of motor performance, and these traits plays major role in enhancing the performance of any game's skills. With a good and well efficient combination of all these motor performance traits a player can give all his/her utmost throughout the most strenuous of competitive matches. (Nabhendra Singh, 2010)

Muscular power, often referred to as explosive power, is a combination of speed and strength an important in vigorous performance because it determines how hard a person can hit, jump and push etc. There are various means and method to increase power by increasing strength without sacrificing speed, by increasing speed of movement without sacrificing strength and by increasing both can be stressed by applying strong force through rapid motion. (Nabhendra Singh, 2010)

Agility is the ability to change the direction of body or its parts rapidly' is dependent on strength, reaction time, speed of movement and muscular coordination. Quick start and stops and quick changes in direction are fundamental to good performance in Football (Nabhendra Singh, 2010)

Running speed is not only an athletic event itself, but it is an important factor in almost all court and field games it can result the difference in whether a performer is able to gain an advantage over his/her opponent. It is determined by the length and frequency (speed) of strides and mostly dependent upon speed of muscular and neuromuscular coordination. (Nabhendra Singh, 2010)

Balance is involved to some degree with all motor

Received: Jan 12, 2012; Revised Feb 13, 2012; Accepted March 12, 2012.

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performances and some performances heavily depend upon balance. Dynamic and stable both are of great importance in all body contact sports such as sports and games athletics, football, Soccer, baseball and hockey. (Nabhendra Singh, 2010)

Reaction time is extremely important in all performances, requiring quick response. It has special significance in events in which an individual depends on each other and thereby respond to each other's movement. (Nabhendra Singh, 2010)

Training is an essential part of preparing for sports competition. If training for soccer is to be effective it must be related to the demands of the game. Fitness for the sport assumes that the player is capable of meeting these demands; otherwise he or she may not be able to cope with the physiological stress of match-play. In this instance the player has to raise fitness levels or risk not being selected. (Thomas Reilly, 2005)

Despite the world-wide popularity of the game of association football (soccer), comparatively little scientific information is available concerning the physiological characteristics of the professional participant; although, some information is available concerning the amateur player (Bell and Rhodes, 1975; Caru et al., 1970; Fardy, 1969). Soccer players must combine speed, strength, agility, power, and endurance as basic qualities before the individual skills inherent to the playing of soccer can be utilized. The understanding of the physical and the mental demands of the sport will enable a more scientific approach to the training of soccer players than has been prevalent heretofore. (Raven et al., 1976)

This study represents an initial attempt to define the physical and physiological characteristics of soccer players performing at the professional level, thereby establishing a base line to which future investigations can be compared. The present study, the scholar wanted to investigate new scientific approach for boosting up performance of Football players. Therefore, he took up this comparative study of motor performance level among categorized skilled football players from different teams participated in Tamilnadu State level men Football Tournament held at Chennai in 2008-09 and to know the contribution of motor fitness to achieve excellence in football performance.

## METHODOLOGY

The purpose of the study was to find out the significant difference on motor fitness components and the ability of performance among Chennai Team, Salem and Coimbatore Team; Trichy and Madurai Team football players

### Selection of subjects

One hundred and fifty Tamil Nadu state level men players were selected as subjects and their age ranged between 20 to 25 years, they were in selected sports and games, from Football participated in Tamilnadu State level men Football Tournament held at Chennai in 2008-09 and they were divided in to three categories with fifty numbers in each

- Group I** served as Chennai Team,
- Group II** as Salem and Coimbatore Team and
- Group III** served as Trichy and Madurai

### Selection of Variables

The variables were selected based on the discussions with experts, feasibility of the criteria, availability of tools, and the relevance of the variables to the present study. The investigator selected the following variables.

### Motor Fitness Variables

1. Cardio-vascular Endurance
2. Speed
3. Agility
4. Explosive Power.

## COLLECTION OF THE DATA

The first step in the process of data collection for the study was to establish contact with the Football Team Managers / Coaches of the Tamil Nadu state (Boards and standard sports clubs), which fell within the sampling frame of the present study.

Accordingly, letters were posted to coaches/boards, chief of the selected state teams, seeking their permission to administer the questionnaire and tests on the players. After confirmation of permission from the respective Head, Coaches/Team Managers were informed of the tentative dates of visits of the places. The permission letter is produced by the concerned head.

The first task of the investigator on beginning the administering of the questionnaire to the players was to brief the players about the purpose of this study and assured them the information gathered from them would be kept confidential. With this introduction, the investigator was able to persuade the respondents to give reliable information regarding the income of the household.

After distributing the questionnaire in the classroom and hostel room, the investigator explained every item in the questionnaire and the students subsequently filled the questionnaire. The investigator clarified the doubts of the students whenever the students raised any. After the completion of filling up the questionnaire the investigator with the help of his assistant collected the questionnaire.

The investigator started his data collection from football state level teams, clubs and Boards, covered Chennai, Salem and Coimbatore, Trichy and Madurai.

In the present survey, every possible effort was taken to reduce, as far as possible the Non-sampling error. The purpose of the study was explained and enough confidence was created in the minds of the respondents so as to make them reveal their family financial position if necessary with relevant information.

### Administration of Questionnaires

The data were collected with the help of five Ph.D., Scholars of Department of Physical Education who were well versed with the conduct of test (questionnaire), and collections under the direct supervision of the research scholar.

To ensure the co-operation of subjects, the investigator has personally met all the subjects selected from the study. The investigator gave very clear instructions regarding the method of answering the questionnaire. All the questionnaires were administered by the investigator in a face to face relationship with the subjects.

The subjects were asked to tick the statements giving

personal information on the front page and then to answer questions. All the questionnaires were in simple English enabling the students

to read and understand and respond to the questions. Time was not restricted but every one completed it within thirty minutes.

#### Test Administrations

Sl.No.	Motor Fitness Variables	Methods	Equipment/Test Items	Unit/Measures
1	Cardio-vascular Endurance	Cooper's 12 Minutes Run/Walk	400 meters Track, Flag Markers, Score Sheet, Whistle and Stopwatch	Sec
2	Speed	50 Meters Run	Electronic Stopwatch, Starting Clapper	Sec
3	Agility	Shuttle Run	Playfield Area, Measuring Tape, Stopwatch, Whistle and Two Wooden Blocks	Sec
4	Explosive Power	Standing Broad Jump	Measuring Tape and Marking Powder	Cm

#### Statistical analysis

Variables were assessed before and after competition period. The resulted data were collected and analyzed using ANOVA and

the group means were compared by Duncan's Multiple Range Test (DMRT). There differences was considered to be significant when  $p \leq 0.05$ .

#### RESULTS

Table 1. shows the mean and standard deviations of Chennai Team, Salem and Coimbatore Team and Trichy and Madurai Team of low and high level performers of football players on cardiovascular endurance

Sl.No.	Participants Team	Mean and Standard Deviation
1.	Chennai Team	2735.40 $\pm$ 130.2 <sup>a</sup>
2.	Salem and Coimbatore Team	2625.33 $\pm$ 136.4 <sup>b</sup>
3.	Trichy and Madurai Team	2300.67 $\pm$ 139.9 <sup>c</sup>

Data represents mean $\pm$  SD from 50 subjects in each group.

Values not sharing a common superscript letter (a,b,c,) differ significantly at  $p < 0.05$  (Duncan's multiple range test)

Group comparison: Group one with all, Group 2 and 3 with 1.

The table value required for significance at 0.05 level of confidence with df 2 and 149 is 1.697

Table 1 results showed that there was a significant difference among Chennai, Salem and Coimbatore and Trichy and Madurai team players on cardiovascular endurance. Effective training was

given to the team members and the better exposure was observed by the Chennai team. It was also found that Chennai Team proved to be effective in the high level performance than other teams.

Table 2. shows the mean and standard deviations of Chennai Team, Salem and Coimbatore Team and Trichy and Madurai Team of low and high level performers of football players and the variations on speed

Sl.No.	Participants Team	Mean and Standard Deviation
1.	Chennai Team	7.63 $\pm$ 0.12 <sup>a</sup>
2.	Salem and Coimbatore Team	7.72 $\pm$ 0.05 <sup>b</sup>
3.	Trichy and Madurai Team	7.84 $\pm$ 0.06 <sup>c</sup>

Data represents mean $\pm$  SD from 50 subjects in each group.

Values not sharing a common superscript letter (a,b,c,) differ significantly at  $p < 0.05$  (Duncan's multiple range test)

Group comparison: Group one with all, Group 2 and 3 with 1.

The table value required for significance at 0.05 level of confidence with df 2 and 149 is 1.697

Table 2 results shows that there were significant changes on speed parameter in Chennai team when compared to Salem and Coimbatore and Trichy and Madurai team. This was due to the

socioeconomic status; psychological factors and the effective training that influence the players' performance at higher levels.

Table 3 shows the mean and standard deviations of Chennai Team, Salem and Coimbatore Team and Trichy and Madurai Team of low and high level performers of football players and the variations on Agility

Sl.No.	Participants Team	Mean and Standard Deviation
1.	Chennai Team	11.67 $\pm$ 0.05 <sup>a</sup>
2.	Salem and Coimbatore Team	11.95 $\pm$ 0.01 <sup>b</sup>
3.	Trichy and Madurai Team	12.70 $\pm$ 0.04 <sup>c</sup>

Data represents mean $\pm$  SD from 50 subjects in each group.

Values not sharing a common superscript letter (a,b,c,) differ significantly at  $p < 0.05$  (Duncan's multiple range test)

Group comparison: Group one with all, Group 2 and 3 with 1.

The table value required for significance at 0.05 level of confidence with df 2 and 149 is 1.697

Table 3 shows the significant changes on agility in Chennai team players than Salem and Coimbatore and Trichy and Madurai

team. Agility sustains the player's ability to perform at higher levels.

Table 4 shows the mean and standard deviations of Chennai Team, Salem and Coimbatore Team and Trichy and Madurai Team of low and high level performers of football players and the variations on explosive power

Sl.No.	Participants Team	Mean and Standard Deviation
1.	Chennai Team	52.58±0.05 <sup>a</sup>
2.	Salem and Coimbatore Team	50.15±0.25 <sup>b</sup>
3.	Trichy and Madurai Team	48.33±0.26 <sup>c</sup>

Data represents mean± SD from 50 subjects in each group.

Values not sharing a common superscript letter (a,b,c,) differ significantly at  $p < 0.05$  (Duncan's multiple range test)

Group comparison: Group one with all, Group 2 and 3 with 1.

The table value required for significance at 0.05 level of confidence with df 2 and 149 is 1.697

Table 4 shows significant changes on explosive power in all the team players. Better effect was found in Chennai team on exhibiting the explosive power was due to the exposure and the practice.

## DISCUSSIONS

The study shows the effect on motor fitness components among state level football players.

In the present study, the players of Chennai team showed better physical fitness, agility, speed and cardiac endurance than Salem and Coimbatore; Trichy and Madurai teams.

Sport is competitive in nature and every sportsman strives to better the previous records and records are broken more rapidly now days. "Sports", is an ideal character building school for youth. The very nature of sport requires certain amount of skill and physical fitness. (Singh, 1994). To succeed in elite soccer, players require a high level of physical fitness to cope with the demands of the game and to allow for their technical and tactical skills to be used to their full throughout a match. (Reilly, 1997).

The most important variables for measuring performance in soccer are physical condition, technical skills and tactical performance (Rosch et al., 2000). In terms of physiological demands, soccer is a hybrid sport characterized by intermittent exercise with bouts of short intense activity alternated by longer periods of low-level, moderate-intensity exercise (Reilly, 1997).

Cardio vascular endurance is the sustained effort in activities involving motion of the entire body (Carl E. Willgoose., 1961).

Cardio-respiratory endurance is considered to be one of the prime bases of physical fitness. Numerous studies have been done in this regard to assess its contribution towards fitness. (Stone et al., 1991; Thompson and Namey 1990; Cox, 1991).

Braun (1991) says that Endurance exercise training produces numerous metabolic and cardio-vascular effects. Cardio-vascular effects of training include a decrease in resting heart rate and heart rate response to sub maximal exercise, an increase in resting and exercise stroke volume, an increase in maximal cardiac output; an increase in arteriovenous oxygen difference.

In our present study, selected motor fitness variables such as cardio vascular endurance, speed, agility and explosive power were analyzed under categorized skilled football players of different teams participated in Tamilnadu State level men Football Tournament held at Chennai in 2008-09. Cardiac vascular endurance in Chennai

Team found to be increased than other team members. This is due to their effective training, supportive environment, better exposure in learning and practices and skills to perform the playing ability. The factors such as socioeconomic status, psychological factors and the motor fitness components support the medium of the performance in game of football players.

Recently, the 'speed, agility, quickness' (SAQ) training method has been proposed as an effective way of conditioning in sport in general and field games like soccer in particular (Pearson, 2001).

Speed, agility, quickness originated in the USA and was developed in the 1980s and made popular by various coaches working in American football. Since then, the programme has been refined for use in other sports (Brown et al., 2000). The SAQ method of training is a system of progressive exercises with instruction aimed at developing fundamental motor abilities to enhance the capabilities of athletes to be more skilful at faster speeds and with greater precision (SAQ Ireland, 2001).

High performance athletes involved in multidirectional (agility) sports have demonstrated superior decision- making strategies over less skilled athletes during reactive agility tasks involving sport related stimuli (Farrow et al., 2005). Agility and speed sustain the player's ability to perform their game in a successful way. The resulted study illustrates that Chennai team players showed their speed and quickness in the direction of game in decision making and the factor agility declines in this level when they concentrate more in performance and shrewdness in them. Physical fitness and the metabolic changes occur due to the nutritional food intake and also influence the speed, quickness and alertness in their mind.

Motor fitness a major component in player's life ability to meet with opponents, play well improves the playing ability and performance in any game. In our study we have categorized their skills from different team of football players. It shows that player's life plays a major part in socioeconomic status, psychological factors and motor fitness components to enhance the playing ability.

Study shows that of women's soccer player and their requirements, appear to be very similar to those of the men's game, with high levels of aerobic capacity (Mohr et al., 2003) muscular strength and endurance (Wisloff et al., 1997), speed, speed endurance, agility (Little and Williams, 2003) and flexibility (Bloomfield and Wilson, 1998) being fundamental for success at the highest level by both male and female players.

The components of SAQ are said to be very trainable with the

right coaching techniques, and if the methods used are planned and progressive, improvements in motor coordination, acceleration, balance, agility and reaction are possible (Brown et al., 2000). To this end, special accreditation courses have been developed to educate coaches in the principles of SAQ conditioning (SAQ International, 2003). Furthermore, the use of specialized equipment is being encouraged (Pearson, 2001). Speed, agility, quickness training can be delivered at low to high training intensities depending on the competence of the athletes involved. Ultimately, soccer-specific SAQ exercises are said to result in the development of multi-directional, explosive speed essential for the improvement of soccer players' physical performance (Pearson, 2001). Speed, agility, quickness training would appear to be an effective way of improving physical conditioning in an intermittent sport like soccer (Reilly, 1997). It could provide a more systematic approach to build a solid foundation upon which match fitness can ultimately be developed.

Explosive power, together with reaction time, decides the results of competitions in the first 2–3 meters (Akgun, 1996). Since soccer requires 1–3-second explosive sprints, the importance of this feature becomes much more obvious in the performance of players. Research has shown that speed can be improved by strengthening the muscles (Akgun, 1996). To enhance explosive muscle power and dynamic athletic performance, complex agility training can be used. Because of that agility exercises are usually used at the start of the main part of a training session when the body is at full work rate (Goran Sporis et al., 2010).

In our findings; better effect was proved by Chennai team players over explosive power to promote success in the game. However this parameter is related to one another speed, quickness and the muscular strength and the total fitness achieved by the conditioning and training programme.

One of the most important biomotor abilities required in sports is speed or capacity to travel or move very quickly. From a mechanical point of view, speed is expressed through a ratio between space and time. The term speed incorporates three elements: (1) reaction time; (2) frequency of movement per time unit; and (3) speed of travel over a given distance (Bompa 1994). Studies have revealed that reaction time is independent of speed (Paradis et al., 2004; Yakut 2004).

Factors affecting the playing ability in football players are socioeconomic status, psychological factors and motor fitness components. They are interrelated; to pay the cost of difficulty and success in their life the player should undergo better training, mentally strong and have a good socioeconomic status to fulfill their needs.

Previous research on psychological parameters and socioeconomic status of high and low physical fitness among University male and female students states that socioeconomic status have negative correlation with physical fitness and other independent variables like regression, neuroticism and aggression are not significant however related in the order of priority to the physical fitness of the male students. (Yobu, 1993)

The results of the study indicate that neuroticism and socioeconomic status only showed significant difference between the high and low fitness groups. The low fitness male's socio-economic status was better than the high fitness male's socio-economic status. This may be due to the reason that the students of a better socioeconomic status are not inclined to participate in sports and games. Usually they are accustomed to take more nutrients which resulted in obesity. Sometimes they may have the feeling of superiority, lack of

awareness and chronic diseases that lead to (possess) low level fitness. The neuroticism was greater among the low fitness students, which may be due to reasons such as ill-health, malnutrition, worry, stress, prolonged and emotional conflicts. Hence the low fitness students have more neuroticism than the high fitness group. (Un published Thesis Yobu, 1993)

The results from the present study suggest that there is a strong positive association between socioeconomic status and physical fitness in Chennai team football players. The selected variables of cardiovascular endurance, speed, agility and explosive power objectively assessed physical activity. Overall, the associations observed presented a medium to large effect. These findings could be interpreted as an overall influence of socioeconomic status on the physical fitness performance. A higher socioeconomic status could allow the players to have more facilities to practice exercise in terms of sport equipments acquisition, extracurricular sport sessions as well as a major awareness of their parents regarding the importance of having a healthy fitness.

Speed-agility, muscular fitness, and cardio respiratory fitness (CRF) are considered important health related markers already in youth. Genetics greatly determines physical fitness, but there is little doubt that environmental factors also play an important role.

Socioeconomic status is associated with several health outcomes (e.g., birth weight, obesity, diet, etc.) and with mortality. To better understand the specific role of different indicators of socioeconomic status on health-related fitness markers will enable a more efficient physical fitness promotion. (Jimenez Pavon et al., 2010).

Moreover, (Freitas et al., 2007) reported a positive association between socioeconomic status and speed-agility performance (5 x 10 m shuttle run test). They also reported a higher upper-body muscular strength (handgrip) in those boys with medium socioeconomic status compared to those with lower socioeconomic status. In contrast, our findings showed positive associations between socioeconomic status and cardiovascular endurance (20 m shuttle run test), associations for speed-agility (4 x 10 m shuttle run test) and explosive power (vertical Jump) were found. Thus in our study, we have a positive correlation, states that better exposure and good socioeconomic status and motor fitness supports to progress in their field of game showing their excellence in learning, performance, playing ability and skills in Chennai team players. It also helps to keep the players mind stress free, well relaxed, and sound in concentration and penetrates the self confidence in them.

## Conclusion

We believe that this paper can contribute to safer and more efficient planning and programming of training with young soccer players, because the results of our tests helped us detect the basic motor abilities that are predominantly responsible for the success of the performance of situational motor abilities. Therefore, we will provide suggestions that in our opinion can improve the training process:

1. Training content which in its structure contains exercises of acyclic character should be represented in the training process because they largely contribute to the development of cognitive abilities (above all perceptive), which is very important for young soccer players; then, training content of soccer aerobic, exercises for leg work and for general movement technique, all in the function of optimal development of young soccer players. These exercises will

certainly contribute to the development of specific coordination in young soccer players.

2. Agility is considered an essential element for athletic success, yet it remains one of the most under researched areas of sports performance. Basic movement structures which are of vital importance for successful participation in any sport. If the movement technique is better, the athlete achieves better effects of a training process and is more effective in competition.

3. We are also of opinion that further advancement of technical preparedness is not possible without parallel development of basic motor abilities;

4. In this study there were detected the abilities of most influence on improving results in tests of motor abilities; such information can contribute to selecting the training assessment that would apply to working with young soccer players.

At the end we have to say that excellent success is only possible if the athletes' preparation process and sport itself are based on scientifically founded tendencies, and this is probably the only and the right way in guiding our league competition towards contemporary attainments of the soccer game. Ultimately, it is also likely that effective training procedures to improve motor fitness that Footballers made the biggest progress.

## REFERENCES

- [1] Akgun N 1996. Physiology of Exercise, Volume 1, 6th edition. I • zmir, Turkey: Ege University Press. [In Turkish]
- [2] Bell W and Rhodes.G.1975. "The morphological characteristics of the association football player." *British JSports Med*, 9: 196-200.
- [3] Bloomfield J and Wilson G. 1998. Flexibility in sport. In *Training in Sport: Applying Sport Science* (edited by B.Elliott), pp. 239–285. Chichester: Wiley.
- [4] Bompa TO 1994. *Theory and Methodology of Training*, 3rd edition. Iowa, USA: Kendall/Hunt Publishing, USA.
- [5] Braun LT. 1991. Exercise physiology and cardiovascular fitness. *Nurs.Clin.North.Am*, (1); 135-47.
- [6] Brown L, Ferrigno, VA. and Santana, JC. 2000. *Training for Speed, Agility and Quickness*. Champaign, IL: Human Kinetics.
- [7] Carl E. Willgoose. 1961. *Evaluation in Health Education and Physical Education*, (New York: McGraw Hill Book Co., p.16.
- [8] Caru BL, Lecoultre P. Aghenis and Pinera Limas F, 1970. "Maximal aerobic and anaerobic muscular power in football players." *J.Sports Med.Phys.Fitness*, 10: 100-103.
- [9] Cox MH. 1991. Exercise Training programs and cardio respiratory adaptation. *Clin.Sport.Med*. 10(1) 19-32.
- [10] Fardy PS. 1969. "Effects of soccer training and detraining upon selected cardiac and metabolic measures." *Res.Q.Am.Assoc.Health Phys. Educ*, 40: 502-508.
- [11] Farrow D, Young W and Bruce L. 2005. The development of a test of reactive agility for netball: a new methodology. *Journal of Science and Medicine in Sport*, 8(1), 52-60.
- [12] Feritas D, Maia J, Beunen G, Claessens A, Thornis M, Marques A, Crespo M and Lefever J. 2007. Socioeconomic status, growth, physical activity and fitness; the Madeira Growth study. *Annals of Human Biology* 34 (1): 107-122.
- [13] Goran Sporis, Luka Milanovic, Igor Jukic, Darija Omrcen and Javier Sampedro Molinuevo. 2010. The Effect of Agility Training On Athletic Power Performance. *Kinesiology*, 42:65-72
- [14] Jimenez Pavon D, Ortega FB, Ruiz JR, Espana Romero V, Garcia Artero E, Moliner Urdiales D, Gomez Martinez S, Vicente Rodriguez G, Manios Y, Beghin L, Repasy J, Sjostrom M, Moreno LA, Gonzalez Gross M and Castillo MJ.2010. Socioeconomic status influences physical fitness in European adolescents Independently of body fat and physical activity: the HELENA Study. *Nutr Hosp*, 25(2):311-316.
- [15] Little, T. and Williams, A. 2003. Specificity of acceleration, maximum speed and agility in professional soccer players. In *Scienceand Football V: Book of Abstracts* (edited by F. Alves, J. Cabri, J.A. Diniz and T. Reilly), 144–145.
- [16] MacKenzieB.2001. *SpeedTrainingSports Coach* [On-line] Available [www.brianmac.demon.co.uk](http://www.brianmac.demon.co.uk)
- [17] Mohr, M., Ellingsgaard, H., Andersson, H., Bangsbo, J. and Krstrup, P. 2003. Physical demands in high-level female soccer – application of fitness tests to evaluate match performance. In *Science and Football V: Book of Abstracts* (edited by F. Alves, J. Cabri, J.A. Diniz and T.Reilly), 37–38.
- [18] Nabhendra Singh. 2010. A Comparative Study of Motor Performance Level among Categorized Skilled Hockey Players. *International Journal of Educational Administration*, Volume 2, (2), 403-410.
- [19] Neiman D. 1995. *Fitness and Sports Medicine: A health-related approach*. (3rd ed.). Mountain View, California, Mayfield Publishing Company.
- [20] Paradis G, Zacharogiannis E, Tziortzis S 2004. Correlation of reaction time and performance in 60 and 200 m sprint running. *Med Sci Sports Exerc*, 36(Suppl):S310
- [21] Pearson A. 2001. *Speed, Agility and Quickness for Soccer*. London: A & C Black.
- [22] Raven, PB, Gettman LR, Pollock ML and Cooper KH.1976. A physiological evaluation of professional soccer players. *Br J Sports Med*, 10:209-216.
- [23] Reilly T. 1997. Energetics of high-intensity exercise (soccer) with particular reference to fatigue. *Journal of Sports Sciences*, 15: 257–263.
- [24] Rosch D, Hodgson R, Peterson TL, Graf-Baumann T, Junge A, Chomiak J and Dvorak J. 2000. Assessment and evaluation of football performance. *The American Journal of Sports Medicine*, 28: 29-39.
- [25] SAQ International 2003. *SAQ Awards: Excellence Through Experience*. Available at: <http://www.saqinternational.com/training/index.asp> (accessed February 2003).
- [26] SAQ Ireland 2001. *Benefits of Using the SAQ Training Program*. Available at: <http://www.saqireland.net/benefits.html> (accessed 22 November 2001).

- [27] Singh, Simerjeet, Sharma RM and Singh Hardayal.1994. "A Comparative Study of Motor Abilities of Attackers Set-uppers in Volleyball". *NIS Scientific Journal*,17: 11.
- [28] Stone MH. et al. 1991. Health and performance related potential of resistance training. *Sports.Med*, 11 (4) 210-31.
- [29] Thomas Reilly. 2005. Training Specificity for Soccer. *International Journal of Applied Sports Sciences*, Vol. 17, No. 2, 17-25.
- [30] Thomson WG and Namely TC. 1990. Cardiovascular complications of inactivity. *Rheum.Dis.Chin. North.Am*, 16(4): B03-13
- [31] Wisloff U, Helgerud J and Hoff J. 1997. Strength and endurance of elite soccer players. *Medicine and Science in Sports and Exercise*, 3: 462–467.
- [32] Yakut C 2004. Reaction time cannot be relied on to predict movement performance. *Med Sci Sports Exerc*, 36(Suppl):S310.
- [33] Yobu. A. 1993. Analysis of selected psychological parameters and socio-economic status of high and low physical fitness among university male and female students. (Unpublished Thesis)