

Field : Physiology

Type : Research Article

Received: 25.10.2016 – Accepted: 13.12.2016

The Relationship between Body Fat Percentage with Speed, Agility and Reaction Time of Male Football Players of Bangladesh

Arif MOHAMMAD¹, Abu TAREQ²

¹Assistant Professor of Physical Education, Department of Teacher Training and Non Formal Education (IASE), Jamia Millia Islamia, New Delhi, INDIA

²Senior Research Officer & HoD, Department of Sports Biomechanics, Bangladesh Krira Shikkha Protisthan (BKSP), Dhaka, BANGLADESH

Email: amohammad3@jmi.ac.in, tareqbksp@gmail.com

Abstract

The purpose of this study was to explore the relationship between body fat percentage with speed, agility and reaction-time of Bangladesh Krira Shikkha Protisthan (BKSP) male football players. To work on the purpose 16 football players who were in their age of 15 to 16 years and having training in BKSP, were recruited as the subjects. The data on the variables such as percentage of body-fat (BF), speed, agility and reaction-time (RT) were collected by using standard tools and techniques. BF were obtained by using skinfold caliper, 50 meters dash was used to test the speed of the subjects, agility was obtained by using 6×10 meters shutter run, a software (Topend sports) was used to record reaction-time of the participants. After collecting data, it was analyzed by using SPSS-23 (IBM, United States). The results of the study documented that there is no significant relationship exists between percentage of body-fat with speed, agility and reaction-time of BKSP male football players.

Keywords: BKSP, footballers, body-fat percentage, speed, agility, reaction-time

Introduction

Football is the most popular and oldest sport in the world. It is a flexible sports offering the enjoyment of children, even in some side-street, school playground or park and for professionals competing at international level. Throughout history, football has been the most popular sport in Bangladesh (Melik, 2011) and is governed by the Bangladesh Football Federation (BFF). The issue of Bangladesh football has recently grown in its importance, recent development in the field of football have led to revamped the school, college, university, clubs, national and international level (FIFA, 2006).

An investigation of football performance by Akenhead, (2014) showed that there is a lot of limitation which impedes performance of football players. It is indisputable, skill related physical fitness, including speed, agility, and reaction time contribute to a lot in enhancing the performance of football player. Physical fitness components such as speed, agility and reaction time contribute a lot significantly, to perform a sport or activity (Fahey, Roth, & Insel, 2003). These skills related fitness best developed through practice and tends to be sport specific. Agility, and speed are an important component of football player's performance needed to play football. These abilities can be developed through taking part in systematic and regular training as well as playing football at different levels of participation.

Results of the numerous studies suggested percentage of body-fat, speed, agility, and reaction-time are the major components which theoretically and practically plays a significant role is performance enhancement (Williams, 2005; John, 2014; Parseh & Solhjoo, 2015; Silassie & Demena, 2016; Thakur, 2016). Apparently body-fat percentage, speed, agility, and reaction-time are becoming more and more imperative in football game situation (Sporiš, Milanović, Trajković, & Joksimović, 2011). It is not surprising, the intensity of the game, the attacking movements the breaks from out of defense and changes in the tempo of the game all requires greater and nonstop speed endurance on the part of the players (Fahey, *et al.*, 2003; Thakur, 2016). Speed plays a significant role as a recent study by Berahim and Kassim (2016), defines merit as the ability of individuals to perform movements in a row quickly in a short period of time according to the direction and speed of having connections with the response time and moving time. The features such as speed, response time, the time to move are being practiced in modern football, adopted by all clubs at all levels of competition.

Talent of an athlete has a close relationship with the skill level of agility too (John, 2014). Football is no exception based on quickness especially the legs. Ability to change direction quickly are the keys in this game. Williams (2005), stated sports which involve explosive movements requires inter-related agility and speed to achieve the best performance for both components. According to directions, the ability of athletes are to perform a series of explosive movements quickly and in different angle (Dove-Edwin, 2009). Kassim and Berahim (2015) stated agility is the ability to change the direction of the position of the body or body part quickly and fast. The statement was endorsed by practitioners of sports science and physical education as AAHPERD (1976), Barrow and McGee (2000). The aspects of agility are selected by researchers because it is an important element in the modern football.

Studies published revealed that percentage of body fat, speed, agility, and reaction time has been the fundamental components of successful football performance (Nepolion & Rani, 2014). Similarly, research studies have been sufficient evidence that in game situation, agility, reaction time and speed are the components of better performance of football players (John, 2014). Very few researchers have been investigated percentage of body-fat and speed, agility and reaction-time separately and independently. Thus, there is no sufficient evidence to show

the relationship among body fat percentage, with speed, agility, and reaction time of football players (Chomiak, Junge, Peterson, & Dvorak, 2000). Similarly, there is no sufficient literature which revealed to what extent there is relationship exist between body-fat percentage, speed, agility, and reaction-time (Martens, 1977). In conformity with this, in sufficient literature has been observed in Bangladesh context especially in football setting. As a result, the researchers aimed to investigate the relationship of body-fat percentage with speed, agility, and reaction-time of BKSP, Dhaka, Bangladesh.

Methods and Materials

Study Area and Ethical Considerations

This research was conducted on the male football players of Bangladesh Krira Shikkha Protisthan (BKSP), Dhaka, Bangladesh.

All participants signed BKSP, Dhaka, Bangladesh ethical clearance guideline and approved written consent form that indicated they understood the purpose of the study. The participants were assured of confidentiality and anonymity as they were told that their names would not be mentioned in the study. The participants were healthy enough to perform various physical activities and were willing to participate in the experimental procedures.

Selection of Subjects

To work on the purpose i.e. to enquire about the status of the relationship between body-fat percentage and speed, agility and reaction-time a total of 16 football players who were in their age of 15 to 16 years were recruited as the subjects. All selected subjects were the trainee of BKSP, Dhaka, Bangladesh. At the time of data collection, the average training years of the subject was 2.5 years. The average height and weight of the subjects were 149.31 cms, and 53 kg, respectively. The selected subjects were belongs to low socio-economic group.

Variables and Tools used in the Study

The data on the variables such as percentage of body-fat (BF), speed, agility and reaction-time (RT) were collected with standard tool and techniques.

Percentage of Body Fat: Percentage of BF were obtained by using Jackson-Pollock 3-site skinfold formula.

Body Fat Percentage = $(0.29288 \times \text{sum of skinfolds}) - (0.0005 \times \text{square of the sum of skinfolds}) + (0.15845 \times \text{age}) - 5.76377$

Here the skinfold sites (measured in mm) were Pectoral (diagonal fold halfway between the nipple and the upper portion of the pectoral muscle at the armpit), Abdominal (vertical fold taken one inch to the right of the navel), and Thigh (vertical fold taken halfway between the patella and the inguinal crease). For measurement skinfold caliper (Mitutoyo, Japan) was used.

Speed: Players speeds were measured by 50 meters dash test. Stopwatch (Casio Stopwatch - HS-70W-1, Japan) was used to measure players' speed in the seconds.

Agility: Agility was obtained by using 6×10 meters shutter run, stopwatch was used to records the time in the seconds.

Reaction Time: Hand-eye reaction time was recorded. A software (Topend sports) was used to record RT of the subjects.

Method of Data Analysis

After obtaining data from field test were tabulated and analyzed by SPSS-23 software (IBM, United States). Descriptive statistics such as mean and SD was used to analyze BF, speed, agility, and RT that help to describe, show or summarize data of respondents in a meaningful way. In addition to this, Pearson product moment correlation coefficient a statistical test was used to examine the relationship between BF and speed, agility and RT. The results are presented in the following heading.

Results

Table 1. Descriptive statistical values of the selected variables of participants (N=16)

	Body Fat (%age)	Speed (50 m) (Seconds)	Agility (6×10 m) (Seconds)	Reaction Time (Seconds)
Mean	14.72	7.06	14.05	0.37
SD	± 1.63	± 0.22	± 0.39	± 0.06

In the above cited Table 1 the mean and standard deviation (SD) values on the selected variables is reported. It is vivid from the table that the average speed (tested y 50 meters dash) of the players was found 7.06 (\pm 0.22) seconds, average agility (measured by 4×10 meters shuttle run) was found 14.05 (\pm 0.39), and average RT (reported by a software) is 0.37 (\pm 0.06) seconds.

Table 2. Pearson correlation results of association between BF and Speed

Variables	Mean	SD	r value	Sig.
Body Fat (%)	14.72	±1.63		
Speed (s)	7.06	±0.22	0.02	0.942

Tabulated $r_{0.05}(14) = 0.49$

Readings of the Table 2 shows that the obtained r value (0.02) is found less than tabulated value (0.49) at 0.05 level of significance, hence there is no significant relationship found between BF and speed among male football players of BKSP, Dhaka, Bangladesh.

Table 3. Pearson correlation results of association between body fat and agility

Variables	Mean	SD	r value	Sig.
Body Fat (%)	14.72	±1.63		
Agility (s)	14.05	±0.39	-0.10	0.690

Tabulated $r_{0.05}(14) = 0.49$

An examination of the readings of the Table 3 shows that the obtained r value (-0.10) is found less than tabulated value (0.49) at 0.05 level of significance, hence there is no significant relationship found between BF and agility among male football players of BKSP, Dhaka, Bangladesh.

Table 4. Pearson correlation results of association between body fat and reaction time

Variables	Mean	SD	r value	Sig.
Body Fat (%)	14.72	±1.63		
Reaction Time (s)	0.37	±0.06	-0.31	0.237

Tabulated $r_{0.05}(14) = 0.49$

Values of statistical calculation presented in the above Table 4 revealed that the obtained r value (-0.31) is found less than tabulated value (0.49) at 0.05 level of significance, hence there is no significant relationship found between BF and RT among male football players of BKSP, Dhaka, Bangladesh.

Discussion

The study was aimed to probe whether any correlation exists between BF with speed, agility, and RT. The findings of this study demonstrate that there is no relationship exists between BF with speed, agility, and RT. The results also documented that the average body fat percentage is 14.72 which falls in acceptable category for this age group as suggested by Jeukendrup, and Gleeson (2010). Nikolaidis, Knechtle, Clemente, and Torres-Luque, (2016) in their work reported 17.4% BF for the age of 15 years and for the age of 16 years they reported 15.3 BF.

The findings indicated that there is no significant relationship found between BF and speed. The accuracy of these findings are proved by contemporary researchers who have been worked in this regard (GanjiSaffar, Aminaei, & Ranjbar, 2013; Gioldasis, Bekris, Michelinakis, & Gissis, 2015). Parseh and Solhjoo (2015), who studied the relationship between BMI with speed found the same results. Ziaee, Fallah, Rezaee, and Biat (2007) in their investigation reviewed BMI and physical fitness of medical students. He reported in his study that there is an opposite significant correlation between score of physical fitness tests and percent of body fat. This finding is correspond with the outcome of our study. Taghinejad (2013), in his work studied the relationship between anthropometric measurements and physical fitness factors of female students and found opposite significant relationship between BMI with speed this finding is also consistent with the results of present study. Shafizadeh (2010) in his study documented significant opposite relationship between variables of weight and speed running skill. This finding is also supported our results of the study.

Razavi, Ravasi, Soheli, and Soori, (2007), investigated the percentage of body fat and speed relationship along with other variables, and reported similar findings as no significant relationship between speed with body fat.

Pertaining to the results it was found that no significant correlation exists between BF and agility. Sheppard and Young (2006) in their work reported if weight of the subjects increases that will causes weakening their performance in agility test, same results are yielded by our study. Our findings are also supported by the research results of Farhad, Hasan, and Amir, (2010), Ziaee et al., (2007). Moradi and Esmailzadeh, (2015), who conducted a study on high school students, concluded that the correlation between BMI and speed as well as agility is not significant.

The findings of this investigation infers that there is no significant relationship exists between BF and the RT. Outcome of this study is consistent with the ones reported by Taghinejad (2013), Ziaee et al., (2007) and Salimi (1997).

Conclusion

Within the limits and limitations of the study it is concluded that there is no statistical significant relationship exists between body fat percentage with speed, agility, and reaction time of male football players of BKSP, Dhaka, Bangladesh.

Pertaining to the obtained results of this study, it may be concluded that BF has no significant correlation with recorded running speed, agility and RT. On the other hand, BF of BKSP players was fall in acceptable category as suggested by Jeukendrup and Gleeson (2010). Values of other variables were also fall inline with results of contemporary researchers. In most sports speed is considered one of the important physical fitness factors. Along with speed, agility is also considered one of the important factor of performance in sports fields.

Therefore, it is recommended that training programs should be planned in a manner to improve these three factors and also BF. No relationship between BF with variables of speed, agility and RT indicates that the success of football depends on other factors too.

Conflict of Interest

The authors have not declared any conflicts of interest.

REFERENCES

- AAHPERD (1976). Youth fitness test manual. American Alliance for Health, Physical Education, and Recreation, Washington, DC.
- Akenhead RM (2014). Examining the physical and physiological demands of elite football. (Published doctoral dissertation, Northumbria University) Ph.D. Thesis, Faculty of Health and Life Sciences and in collaboration with Newcastle United Football Club, Northumbria University Newcastle.
- Barrow HM, McGee R (2000). Practical measurement and assessment (5th ed.). Philadelphia, Lippincott Williams and Wilkins.
- Berahir M, Kassim M (2016). Analysis of physical fitness test on junior football players. *Journal of Scientific Research and Development* 3(4), 15-23.
- Chomiak J, Junge A, Peterson L, Dvorak J (2000). Severe injuries in football players: Influencing factors. *American Journal of Sports Medicine*, 28(5S), S58-S68.
- Dove-Edwin FH (2009). The fitness parameters if 14-17 year old children in Sierra Lione. Michigan, ProQuest Dissertations and Theses.
- Fahey TD, Roth WT, Insel PM (2003). Fit & well: core concepts and labs in physical fitness and wellness with online learning center bind-in card and daily fitness and nutrition journal (4th ed.), (pp.31-32). USA, McGraw-Hillcompanies, Inc.
- Farhad R, Hasan D, Amir T (2010). Relationship between underweight and overweight with fitness and socioeconomic status of students. *Sport Biosciences (Harakat)*, 1(3), 127-144.
- FIFA (2006). The general aspect of coaching, (p.42). FIFA Coaching Manual.

- GanjiSaffar M, Aminaei M, Ranjbar R (2013). Comparing anthropometric characteristics, body fat percentage and fitness between 13-17 years old girls. *International Research Journal of Applied and Basic Sciences*, 7(6), 375-381.
- Jackson AS, Pollock M (1985). Practical assessment of body composition. *Physician Sport Medicine*, 13, 76-90.
- Jeukendrup A, Gleeson M (2010). *Sport nutrition: An introduction to energy production and performance* (2nd Ed.). USA, Human Kinetics.
- John FG (2014). Agility training for athletic performance. Online available at: <http://www.performbetter.com/webapp/wcs/stores/servlet/PBOnePieceView?storeId=10151&catalogId=10751&pagename=347> (Accessed 15 August, 2015).
- Kassim M, Berahim M (2015). Football training Development Programme under-15 years old state level. *Australian Journal of Basic and Applied Science*, 9, 35-42.
- Martens R (1997). *Successful coaching* (2nd ed.). USA, Human Kinematics.
- Melik J (29 April, 2011). BBC News - Bangladesh football vies with cricket for sponsorship. Available online at: <http://www.bbc.com/news/business-13158011> (Accessed 15 October 2016).
- Moradi A, Esmailzadeh S (2015). Association between reaction time, speed and agility in schoolboys. *Sport Sciences for Health*, 11(3), 251-256.
- Nepolion M, Rani U (2014). Predict of football playing ability on selected skill related Variables & motor fitness variables of school level male football players. *Indian Journal of Applied Research*, 4(5), 540-541.
- Nikolaidis PT, Knechtle B, Clemente F, Torres-Luque G (2016). Reference values for the sprint performance in male football players aged from 9-35 years. *Biomedical Human Kinetics*, 8, 103-112.
- Parseh A, Solhjoo MH (2015). Studying the relationship between body mass index with speed, agility and balance in male students of 15-13 years old. *Indian Journal of Fundamental and Applied Life Sciences*, 5(S2), 382-387.
- Razavi TA, Ravasi AA, Soheli SH, Soori R (2007). The comparison of body composition and some physical factors in elite wrestlers and non athletes. *Harakat*, 30, 05-14.
- Salimi F (1997). Comparison of anthropometric features and general physical fitness play handball players of different posts, the correlation between them and the provision of standard norms for players trained women, Master thesis, Tehran University.
- Shafizadeh A (2010). Relationship between anthropometric parameters youth football schools with their interpersonal skills. *The Quarterly Journal of Applied Exercise Physiology*, 5(10).
- Sheppard JM, Young WB (2006). Agility literature review: Classification, training and testing. *Journal of Sport Sciences*, 24(9), 919-932.
- Silassie AG, Demena T (2016). A study of agility, coordination and speed as related to dribbling and kicking performance of Jimma, Woliso and Sebeta town male football players. *Journal of Physical Education Research*, 3(1), 47-55.
- Sporiš G, Milanović Z, Trajković N, Joksimović A (2011). Correlation between speed, agility and quickness (SAQ) in elite young soccer players. *Acta Kinesiologica*, 5(2), 36-41.

Taghinejad S (2013). Relationship between anthropometric measures (weight, height, body mass index) with some elements of physical fitness (agility, speed, balance) in girls ages 12 to 14. Master thesis, Islamic Azad University.

Thakur JS (2016). Association of obesity with agility and speed of university level kabaddi players. *International Journal of Physical Education, Sports and Health*, 3(2), 254-256.

Williams AG (2005). Specificity of acceleration, maximum speed, and agility in professional soccer players. *Journal of Strength Conditioning and Research*, 19(1), 76-78.

Ziaee V, Fallah J, Rezaee M, Biat A (2007). The relationship between body mass index and physical fitness in 513 medical students. *Tehran University Medical Journal*, 65(8), 79-84.