



## **Coordinative Abilities of Soccer Players: A Comparative Analysis**

**Sanjit Mandal<sup>1</sup>, Gopal Chandra Saha<sup>2\*</sup> and Manoj Kumar Murmu<sup>3</sup>**

<sup>1</sup>Department of Physical Education, Netaji Mahavidyalaya Arambagh, Hooghly, West Bengal, India.

<sup>2</sup>Department of Physical Education & Sport Science, Vinay Bhavana, Visva-Bharati (Central University), Santiniketan, West Bengal, India.

<sup>3</sup>Government Institute for Physical Education, Banipur, North 24 PGS, West Bengal, India.

### **Authors' contributions**

*This work was carried out in collaboration among all authors. Author MKM wrote the protocol and the manuscript; managed the statistical analyses. Author GCS was advisor and also designed the study. Author SM managed collection of data of the study and the literature searches of the study. All authors read and approved the final manuscript.*

### **Article Information**

DOI: 10.9734/AJMAH/2021/v19i1030378

#### Editor(s):

(1) Dr. Ashish Anand, GV Montgomery Veteran Affairs Medical Center, USA.

#### Reviewers:

(1) Noor R Abady, Al-Qasim green university, Iraq.

(2) Sushman Sharma, Hemchandracharya North Gujarat University, India.

(3) Ahmed Chyad Abbas AL-Barqaawee, The Norwegian Directorate of health, Norway.

Complete Peer review History: <https://www.sdiarticle4.com/review-history/73987>

**Original Research Article**

**Received 18 July 2021**  
**Accepted 25 September 2021**  
**Published 06 October 2021**

### **ABSTRACT**

**Background:** The environment and lifestyle of most children has led to the reduction of their motor activity, as they live in small spaces and lack the proper playing conditions. Coordination is about controlling all the body parts while doing different activities of children. It is about making and maintaining connections between the brain and the muscles that control movement of the children.

**Objective:** To compare the coordinative abilities between rural and urban male soccer players.

**Methodology:** A group of sixty (N=60) male soccer players aged between 13-18 years were randomly allowed for this study from different club of north 24 parganas district, West Bengal. They were further divided into two groups of 30 each (i.e., N1=30; rural players and N2=30; urban players). The purposive sampling technique was used to attain the objectives of the study. Orientation ability, Differentiation ability, Reaction ability, Balance ability and Rhythm ability were the Coordinative abilities selected for the study. The independent sample t- test statistical technique was used to analyzed the significant difference of coordinative abilities between rural and

urban male soccer players and the level of significance was set at 0.05 levels.

**Results:** The results showed that there was significant difference between rural and urban male soccer players, in respect to their Coordinative abilities on the sub variables i.e. reaction ability, orientation ability and differentiation ability. However insignificant difference was found for rhythm ability.

**Conclusions:** It can be concluded that the rural male soccer players were better in Orientation ability, Differentiation ability, Reaction ability and Balance ability in comparison to urban male soccer players.

*Keywords: Soccer players; coordinative abilities; rural; urban.*

## 1. INTRODUCTION

Games and Sports are very necessary in life. Games and sport are necessary for the harmonious development of heart, mind and soul. Games and sport provide us a good exercise to keep us healthy and physically fit. To lead a happy and successful life physical and mental fitness is indispensable. Regular exercise helps to increase the overall quality of life. Playing sports acts as a beautiful blend of recreation and physical activity. It is a combination of both enjoyment and exercise. In past five motor abilities were recognized as components of physical fitness. These were strength, endurance, speed, flexibility and agility. But since one and a half decade the term agility has been gradually replaced by the term co-coordinative abilities [1-2].

Coordination is the harmonious functioning of your limbs, muscles, brain and senses when executing the body's movements and the ability to repeatedly execute movements smoothly and accurately. Coordination of some form is vital for everyday living and everything we do requires some form of coordination. For example, without coordination a human could not walk, this is because walking requires the coordination of your legs in sync with each other. The developing tendencies in international sports are identified as the increase in game tempo, tougher body game and greater variability in technique and tactics. In principle, an increase in performance level can only be achieved by better exploitation of all major components i.e., technique co-ordination, tactics, physical fitness and psychological qualities of the sportsman. The component technique co-ordination however, plays a greater role in sports. Individual and collective factor can become competitively effective only by a certain coordinative mastery of the technique [3].

The most popular of these sports world wide is association football, more commonly known as

just "soccer" played at all levels and ages. Scientific information is provided on fitness level of players [4- 5]. Sports science and modern technology has had a major effect on soccer training over the past 10 years (Gary & George, 1997). Soccer is a game of physical fitness components. The soccer players must be very physically fit. Soccer players must concentrate on the development along with other qualities. The playing ability of the soccer players has a very important association with Coordinative abilities. Reaction ability, speed of movements, orientation ability, differentiation ability, rhythm ability, balance ability etc. are the very important component of coordination ability which has a vital role in achieving high level of performance in soccer. Increase in the speed of the game, tougher tackling and tactical developments are some of them especially in team sports. All technical, tactical and conditional performance components need to be trained and practiced for highly advanced performance [6]. Showing maximal performance in a short time, exhibiting frequent movements successively in moments requiring power and explosiveness, teaching technique in sports requiring advanced technical capacity and making it permanent are related to development level of coordinative abilities in sports requiring high strength [6]. In addition to performance development, coordinative abilities play an important role in demonstration of tactical skills in situations showing changes constantly in team sports [7].

During a soccer match, players perform several dynamic movements (i.e., kicks, sprints, tackling, jumps), which require high strength and power of leg muscles [8], proper timing, and transfer of energy between segments. Much research has stressed the importance of fine multi joint control to improve soccer performance [8-9], suggesting that neural coordination should be trained to improve the player's abilities. The coordinative ability at one hand and at physical fitness the other, are equally important to maintain

equilibrium of the player. Coordinative abilities are an important prerequisite for the good performance sports. They are dependent on the motor control and regulation process of central nervous system (CNS) for each of the coordinative ability, the motor control and regulation function in a definite manner. When a particular aspect of these functions is improved then the sports person is in a better position to do the certain group of movements, when for their execution depend on this type of CNS functioning pattern [10]. Coordinative abilities become effective in movement only through the motor abilities and activity determined drives and cognitive process [1].

The investigator talks about the rural and urban male soccer players. Both are present with different lifestyles and different perception of life with contrasting characters. The living conditions caused by urbanization limit the activities of individuals, leading to a sedentary lifestyle. Previous studies have reported that the adolescents living in rural areas are usually more active than those from urban areas [11-14]. The main reason is that city provides variety of opportunities in every discipline of life. Without any shadow of doubt urban life is dominant. We also found the number of actively living individuals to be higher in rural areas compared to urban areas [15]. Considering this view the present researcher felt the importance of coordinative abilities not only in our daily life activity but also take a significance role in game and sports. The present study, therefore, aims to evaluate the coordinative abilities of the rural and urban male soccer players.

## 2. MATERIALS AND METHODS

### 2.1 Selection of Subjects

The subjects of the present study were selected randomly (purposive) from different clubs of North 24 parganas district of West Bengal. The researcher selected 60 male soccer players aged between 13-18 years, divided into two groups, rural group (RG) consisting of 30 male soccer players (N-30), and urban group (UG) consisting of 30 male soccer players (N-30). Both the children and their parents were informed about the nature of the research study and the involvement of the student volunteers in this study. The consent were taken from parents and also was taken from each individual before the measurement.

### 2.2 Selection of Variables

The following five coordinative abilities were selected for the purpose of this research.

- ▲ **Orientation ability** was measured by numbered medicine ball run test and was recorded in 1/ 100th of second. Three trials were given and the best was recorded as the score.



**Pic. 1. Numbered medicine ball run test - orientation ability**

- ▲ **Differentiation ability** judged through 1kg medicine ball touching the mat- 1 point, 1 kg medicine ball touching the circle line- 2 points, 1kg medicine ball touching inside the circle-3 points, 1 kg medicine ball touching the 2kg medicine ball – 4 points and was recorded in points.



**Pic. 2. Backward medicine ball throw test - differentiation ability**

- ▲ **Reaction ability** was the distance measured in centimeters from the top of the planks to the point where the subject stopped the ball. Three trials were given and the best was recorded as the score.
- ▲ **Balance ability** was measured by bass stick balance test and was record in 1/100th seconds.



**Pic. 3. Ball reaction exercise test - reaction ability**



**Pic. 4. Bass stick balance test - balance ability**

- ^ **Rhythm ability** was measured by sprint at the given rhythm test and was scored as difference between the timing of the first and second attempt was taken as a score.



**Pic. 5. Sprint at the given rhythm test - rhythm ability**

### 2.3 Statistical Procedure

Descriptive statistics including mean scores and standard deviations were computed for all variables. Independent 't' test statistics was applied to investigate the significance difference between rural and urban male soccer players. The level of significance was set at 0.05.

### 3. RESULTS

The results pertaining to significant difference if any between rural and urban male soccer players were assessed using the independent t-

test statistics and results are presented in Table 1.

It is evident from Table 1 that significant differences was found in Orientation ability between the rural and urban male soccer players, since the calculated 't' value 2.11 was greater than tabulated 't' value 2.00 at 0.05 level of significance. Thus it was found statistically significant. It was observed that rural soccer players have demonstrated significantly better on orientation ability than the urban soccer players.

Table-1 presents the results of rural and urban male soccer players, with regards to differentiation ability. The descriptive statistics shows the calculated 't' value 2.25 was greater than tabulated 't' value 2.00 at 0.05 level of significance. Thus it was found statistically significant. It was observed that rural soccer players have demonstrated significantly better on differentiation ability than the urban soccer players.

The results of rural and urban male soccer players, with regards to reaction ability. The descriptive statistics shows the calculated 't' value 2.37 was greater than tabulated 't' value 2.00 at 0.05 level of significance. Thus it was found statistically significant. It was observed that rural soccer players have demonstrated significantly better on reaction ability than the urban soccer players.

The results of rural and urban male soccer players, with regards to balance ability. The descriptive statistics shows the calculated 't' value 2.21 was greater than tabulated 't' value 2.00 at 0.05 level of significance. Thus it was found statistically significant. It was observed that rural soccer players have demonstrated significantly better on balance ability than the urban soccer players.

Table-1 also shows that no significant difference was found in rhythm ability between the rural and urban male soccer players.

### 4. DISCUSSION

The statistical analysis of data shows that there were significant differences for coordinative abilities i.e. Orientation Ability, Differentiation Ability, Reaction Ability and Balance Ability between rural and urban male soccer players. The results of presents study showed that the rural soccer players had performed significantly

better in Orientation Ability, Differentiation Ability, Reaction Ability and Balance Ability as compared to urban soccer players. As supported by [16].

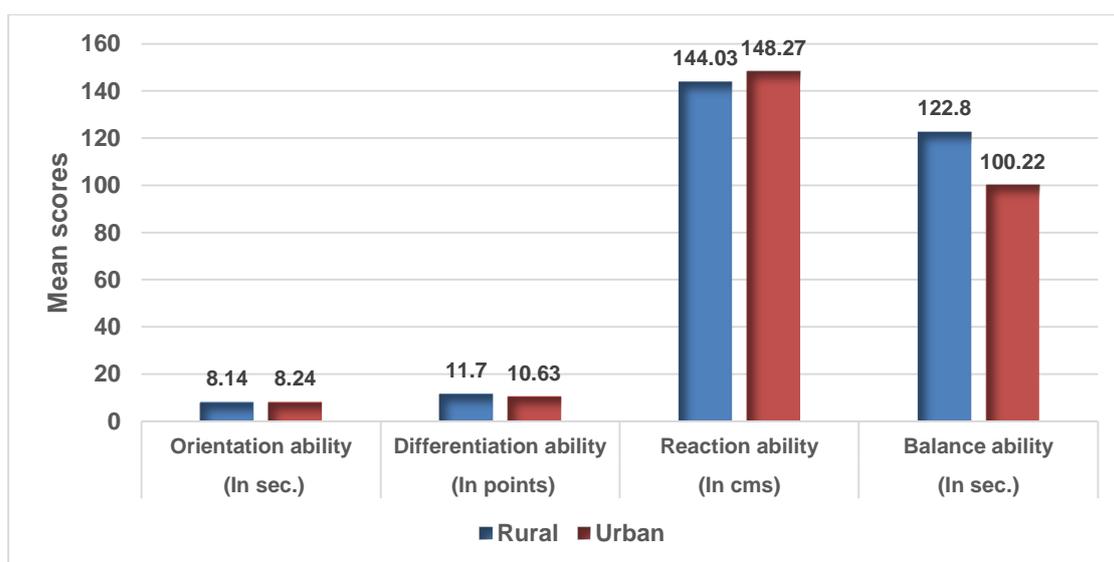
On the other hand, insignificant difference was found in the rhythm ability between rural and urban male soccer players.

**Table 1. Mean, standard deviation and t-value of rural and urban male soccer players**

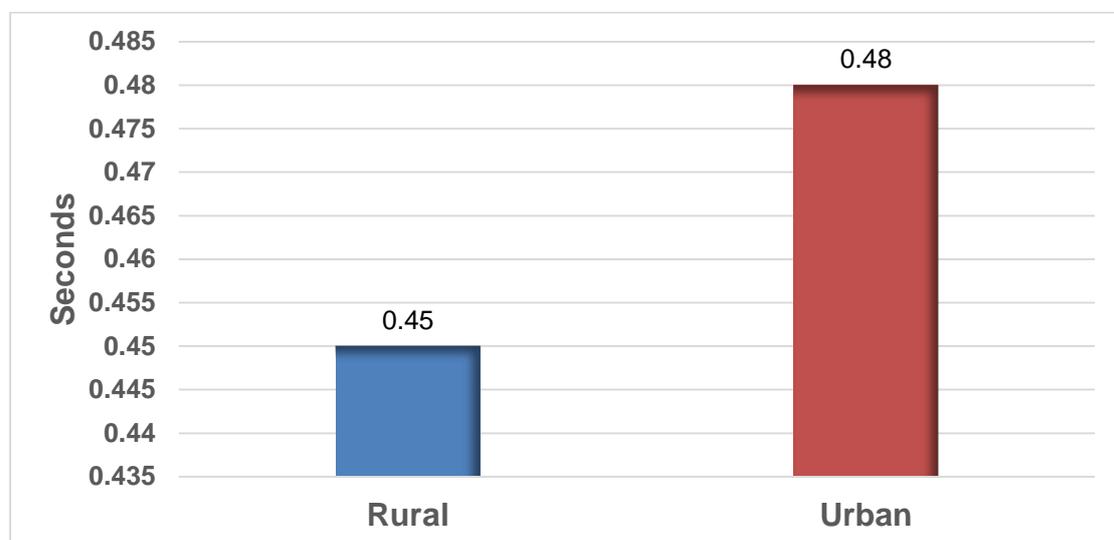
Variables	Rural		Urban		t-value
	MEAN	SD	MEAN	SD	
Orientation ability	8.14	± 0.17	8.24	± 0.19	2.11*
Differentiation ability	11.7	± 1.97	10.63	± 1.63	2.25*
Reaction ability	144.03	± 6.20	148.27	± 7.38	2.37*
Balance ability	122.80	± 45.55	100.22	± 30.95	2.21*
Rhythm ability	0.45	± 0.19	0.48	± 0.11	0.83

\*Significant at .05 level of confidence with 58 degree of freedom were 2.00

\*SD: Standard Deviation



**Fig. 1. Graphical representation of Orientation ability, Differentiation ability, Reaction ability and Balance ability between rural and urban male soccer players**



**Fig. 2. Graphical representation of Rhythm ability between rural and urban male soccer players**

The present data also agreed with the Wilczewski et al. [17] Ozdirenc et al. [18] Saha and Haldar [19] Das and Chatterjee [20] the reports from Poland, Turkey and Bengal proposed that rural children were fitter than their urban counterparts. Raghupati & Krishnaswamy [16] suggested that need to create awareness among urban school boys and their parents about physical growth and health which can be improved by providing proper care and nutrition right from early childhood period.

Coordinative exercise of both low and moderate intensities may also increase visuospatial perception, attention resources, working memory and shorten the time needed for neurocognitive processing [21]. These might be explained by the fact that the coordinative component of the movement increases synapses in important brain areas such as the cerebellum [22]. Complex movement patterns engage the cerebellum which affects areas such as attention and memory functions that are affected by cerebellum [23]. Smidu [24] also suggested that the importance of coordinative abilities in achieving athletic performance depends on biological factors, motor factors and psychological factors. Singh [25] says that rural children were better in physical fitness than the urban children, it might be due to more activity oriented routine in rural areas, engagement in agriculture related work, more open spaces and play fields compared to cities, clean air etc in the rural areas of Punjab.

The orientation ability is the ability determined and changed the position and movement of the body in time and space in relation to definite field of action. The orientation ability may be attributing to the reason that there is a greater need of awareness of footballer teammates and oppositions players in football and the training that there is a sensor developed without any conscious effort. Significant difference in the rural and urban soccer players might be due to the reason that rural soccer players have high kinesthetic sense organs assume more importance of orientation than urban soccer players [16]. Differentiation ability is the ability to achieve a high level of fine tuning or harmony of individual movement phases and body part movements. The differentiation ability may be argued that kinesthetic sense of awareness is most required in the game of football. It is due to the reason that there is a need to give passes when condition demand without being seeing the players on the bases of previously seen moment of players. Therefore, during training and competition the regular conditioning of such

ability helps the footballers to develop better differentiation ability. Significant difference between rural and urban soccer players in relation to differentiation ability might be due to the reason that the different level of tuning and harmony of individual movement phase and body part movements. Rural school soccer players might have high level of tuning and harmony due to less weight. This result is reliable with the results reached by Bakhit [26]. The results have also shown that there is significant difference in reaction time of rural soccer players as compared to urban soccer players. Footballer emphasized a lot of reaction in training during their practice session because they have to tackle the ball with their body and at the same time they need dribbling and fainting maneuvers with their own body. It has been reported in recent studies that environmental factors, lifestyles, diet, family structure, cultural differences, and several other factors are closely related with physical fitness and physical activity [27-31]. Other studies observed varied results regarding physical fitness test among urban and rural young people, there were significant differences for the standing broad jump, sit-ups, 20m shuttle run, and hand grip tests [32]. The statistical analysis shows that significant differences exists in balance ability between rural and urban soccer players. Significant difference in the rural and urban soccer players might be due to the reason that rural soccer players have the ability to rhythmically transfer their center of gravity (COG) from left to right and forward to backward with more excursions than urban soccer players [16].

Rhythm ability allows athletes to perceive an externally given rhythm and to reveal it during an action. In addition to this, athletes can reproduce a rhythm which is in the motor memory due to their rhythm abilities [6]. The rhythmic ability was found insignificant of rural and urban male soccer players' reason due to the similar kind of coordinated and rhythmic moments required during the dribbling and feinting to the opponents in match situations. This finding is in agreement with previous studies [33]. Tsimeas et al. [34] did not find any difference for the measured physical fitness components (flexibility, muscular fitness, cardio respiratory, speed and agility) among rural and urban young people.

Another possible explanation for the differences in coordinative abilities among rural and urban male soccer players may be the differences in the physical activity, food habits, environment,

nutritional status and socioeconomic status in rural and urban areas. Comparing the overall results, rural male soccer players scored significantly better than urban male soccer players in Orientation ability, Differentiation ability, Reaction ability, Balance ability, suggesting rural soccer players engaged in a higher number of physical activities and more strenuous activity than urban male soccer players.

## 5. CONCLUSIONS

It is concluded from above findings that significant differences were found in Orientation ability, Differentiation ability, Reaction ability, Balance ability. The rural male soccer players had better Orientation ability, Differentiation ability, Reaction ability, Balance ability in comparison to urban male soccer players. The insignificant difference was found in rhythm ability, though rural male soccer players had better rhythm ability in comparison to urban male soccer players. Thus, the coordinative abilities of individual, affected by different environmental, locality, food habits, life styles, nutritional status, socioeconomic status and all factors act together on coordinative abilities of an individual.

## ETHICAL APPROVAL

Ethical clearance was obtained from ethical review committee of the department of physical education, jadavpur university.

## CONSENT

The requirements of the data collection, experimental procedures, testing as well as exercise schedules were explained and informed consent was obtained from the study participants so as to avoid any ambiguity of the effort required on their part and prior to the administration of the study, the investigator got the individual consent from each subject.

## ACKNOWLEDGEMENTS

We wish to acknowledge the University of Jadavpur, Department of Physical Education for their technical support and comments during conceptual development of the research work. We also thank study participants for their good will and cooperation.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

## REFERENCES

1. Hirtz P. *Koordinative Faehigkeiten in Schulsport*. Berlin, Volk and Wissen Volkseigener Verlag; 1985.
2. Harre D. *Principles of Sports Training*. Berlin, Sport Verlag; 1982.
3. Nordman N. *Koordinative Faehigkeiten in Hockey' Refresher Course Material for Instructors*, Berlin. 1994;9.
4. Bangsbo J. Energy demands in competitive soccer. *J Sports Sci*. 1994;12S:5-12.
5. Tessitore A, Meeusen R, Tiberi M, Cortis C, Pagano R, Capranica L, et al. Aerobic and anaerobic profiles, heart rate and match analysis in older soccer players. *Ergonomics*. 2005;48:1365-1377.
6. Minz AK. *Relationship of Coordinative Abilities to Performance in Badminton*. India, Lakshmi Bai National Institute of Physical Education Deemed University Degree of Master of Physical Education. 2003;1-91.
7. Kalb L. *Introduction into General Theory and Methodics of Training - The Performance Factor Coordination-Technique*. New Delhi, D.V.S. 1989;15-25.
8. Dorge H, Bull-Andersen T, Sorensen H, Simonsen E, Aagaard H, Dyhre Poulsen P, et al. EMG activity of the iliopsoas muscle and leg kinetics during the soccer place kick. *Scand J Med Sci Sports*. 1999;19:155-200.
9. Hodges NJ, Hayes S, Horn RR, Williams AM. Changes in coordination, control & outcome as a result of extended practice on a novel motor skill. *Ergonomics*. 2005;48:1672-1685.
10. Singh H. *Science of Sports Training*. D.V.S. Publication, New Delhi; 1991.
11. Joens-Matre RR, Welk GJ, Calabro MA, Russell DW, Nicklay E, Hensley LD, et al. Rural-urban differences in physical activity, physical fitness, and overweight prevalence of children. *J Rural Health*. 2008;24(1):49-54.
12. Bathrellou E, Lazarou C, Panagiotakos DB, Sidossis LS. Physical activity patterns and sedentary behaviors of children from urban and rural areas of Cyprus. *Cent Eur J Public Health*. 2007;15(2):66-70.
13. Peer N, Bradshaw D, Laubscher R, Steyn N, Steyn K. Urban-rural and gender differences in tobacco and alcohol use, diet and physical activity among young black South Africans between 1998 and

2003. Glob Health Action. 2013;29;6:19216.
14. Vitariusova E, Babinska K, Kostalova L, Rosinsky J, Hlavata A, Pribilincova Z, et al. Food intake, leisure time activities and the prevalence of obesity in schoolchildren in Slovakia. Cent Eur J Public Health. 2010;18(4):192-7.
  15. Ucar B, Kilic Z, Colak O, Oner S, Kalyoncu C. Coronary risk factors in Turkish schoolchildren: randomized cross-sectional study. Pediatr Int. 2000;42(3):259-67.
  16. Raghupati K, Krishnaswamy PC. Comparative Analysis of Coordinative & Balancing Abilities Among 10-15 Years of Rural and Urban School Boys. Global Research Analysis. 2013;2:5.
  17. Wilczewski A, Sklad M, Krawczyk B. Physical development and fitness of children from urban and rural areas as determined by EUROFIT test battery. Biology of Sport Warsaw. 1996;13:113-26.
  18. Ozdirenc M, Ozcan A, Akin F, Gelecek N. Physical fitness in rural children compared with urban children in Turkey. Pediatrics International. 2005;47(1):26-31.
  19. Saha G, Haldar S. Comparison of health related physical fitness variables and psychomotor ability between rural and urban school going children. Journal of Exercise Science and Physiotherapy. 2012;8(2):105-108.
  20. Das P, Chatterjee P. Urban-rural contrasts in motor fitness components of youngster footballers in West Bengal. India J Hum Sport Exerc. 2013;8(3):797-805.
  21. Yu-Kai C, Yu-Jung JT, Tai Ting C, Tsung-Min H. The impacts of coordinative exercise on executive function in kindergarten children: an ERP study. Exp. Brain Res. 2013;225:187-196.
  22. Donnelly JE, Hillman CH, Castelli D, Etnier JL, Lee S, Tomporowski PD, et al. Physical activity, fitness, cognitive function, and academic achievement in children: a systematic review. Med. Sci. Sports Exerc. 2016;48:1197-1222.
  23. Guillamon AR, Canto EG, García HM. Motor coordination and academic performance in primary school students. J. Hum. Sport Exerc. 2020;16:(in press).
  24. Smidu N. The importance of coordinative abilities in achieving athletic performance. The Bucharest University Economic Studies. 2014;6(1).
  25. Singh KM. Comparative study of physical fitness parameters among 12 years old rural and urban children. European Journal of Physical Education and Sport Science. 2017;3(10).
  26. Bakhit MA, Hamed YH. Complex Coordinative Abilities as an Indicator for Selection of Youngsters. World Journal of Sports Sciences. 2010;3:230-234.
  27. Clark MC, Ferguson SL. The physical activity and fitness of our Nation' children. J. Pediatr. Nurs. 2002;15:250-252.
  28. Finn K, Johannsen N, Specker B. Factors associated with physical activity in preschool children. J. Pediatr. 2002;140:81-85.
  29. Hussey J, Gormley J, Bell C, Kirby B, Watkins D. Physical activity in Dublin children aged 7-9/ Commentories. Br. J. Sports Med. 2001;35:268-273.
  30. Rowlands AV, Eston RG, Ingledaw DK. Relationship between activity levels, aerobic fitness, and body fat in 8-to-10-year-old children. Eur. J. Appl. Physiol. 1999;86:1428-1435.
  31. Strauss RS, Pollack HA. Epidemic increase in childhood overweight, 1986-1998. JAMA. 2001;286:2845-2848.
  32. Tinazci C, Emiroglu O. Physical fitness of rural children compared with urban children in North Cyprus: a normative study. J Phys Act Health. 2009;6:88-92.
  33. Sharma S, Gangwar N. Comparison of selected coordinative abilities between football and hockey male players. International Journal of Physical Education, Health and Social Science. 2014;3(2).
  34. Tsimeas P, Tsiokanos A, Koutedakis Y, Koutedakis Y, Tsigilis, N, Kellis S, et al. Does living in urban or rural settings affect aspects of physical fitness in children? Anallometric approach. Br J Sports Med. 2005;39(9):671.

© 2021 Mandal et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:  
 The peer review history for this paper can be accessed here:  
<https://www.sdiarticle4.com/review-history/73987>