Turkish Online Journal of Qualitative Inquiry (TOJQI)
Volume 12, Issue 9, August 2021: 7586-7590

Research Article

To Investigate the Significant Differences in Anaerobic Capacity Among Soccer Players of Different Playing Positions

[1] Thokchom Somorjit Singh
Research Scholar
Department of Physical Education and Sports Science.
Manipur University, Imphal, India.
E-Mail. - somorjit1957@gmail.com
Phone No. 8837301310

[2] Dr. Laishram Thambal Singh
Assistant Professor
Department of Physical Education and Sports Science.
Manipur University, Imphal, India.
E-Mail – thambalsingh@gmail.com
Phone No. 8787723920

Abstract

The main purpose of this study was to compare anaerobic capacity in different playing positions of soccer players. For this study, a total of 45 (N=45) players, 15 each forward, midfielder, and defender players between 18 to 30 years of age who had been participating in at least state league tournaments were selected randomly. Sargent Jump-Lewis Nomogram was administered to obtain the pertaining data for anaerobic capacity. To find out the characteristics and means difference among the three groups, descriptive analysis, analysis of variance (ANOVA) were employed and tested at 0.05 level of confidence. The finding of the study reveals that there were significant mean differences in the comparison of the means among forward, midfielder, and defender as the obtained values of F=8.35 is greater than the table value F=3.22 at 0.05 level of confidence (P<0.05). Hence, further post hoc test was applied by using Scheffe's method to determine paired means differences of the different playing positions of soccer players.

Keywords: Anaerobic Capacity, Soccer, Sargent Jump-Lewis Nomogram.

1. Background

Soccer is a team game however contribution of individual performance is very important in a soccer match. Therefore, the physical fitness of an individual is a vital role in winning a match. In physical fitness, the energy demands of aerobic and anaerobic metabolism is the main domain of performance and their outcome are also different. Soccer is a sport that uses a combination of both aerobic and anaerobic capacity (Surwase et al., 2015). In soccer, match players are performed short and long-lasting activities are performed over the entire game, so, both aerobic and anaerobic capacities are very important to exhibit better performance (Malcovic et al., 1994). Anaerobic power is power used in high-intensity exercise activities lasting fewer than ten seconds (Pennington,2014). Football is related to anaerobic energy actions that required sudden accelerations, direction changing, abrupt halts, head out to the ball and shooting (Scott, 2011). Specific positional roles within each playing position may demand unique physiological attributes (Reilly et al., 1990). These are reflected in the physical and physiological fitness of the soccer players (Reeves et al., 1999).

Soccer players frequently perform different rapid and sudden movement as quick development of force, sprinting, jumping, changing direction, high power shooting, different body impacts etc. Therefore, the players required high-intensity anaerobic capacity to perform various burst actions in actual situations. Anaerobic capacity is the ability to perform at maximum capacity for short period of time and to minimize the amount of lactic acid production in the working muscle at a level of insufficient oxygen availability (Singh, 2006).

2. Objective

The main objective of this study was to investigate the significant differences (if any) in anaerobic capacity among different playing positions of soccer players.

3. Methodology

For this study, forty-five (N=45) soccer players, fifteen (15) each forward, midfielder and defender were selected randomly. The age of the subjects was ranged between 18 to 30 years and the level of participation was at least senior state league tournament. The pertaining data of anaerobic capacity was collected by administering the Sargent Jump-Lewis Nomogram and expressed in the unit of Kg-m/sec. Descriptive and analysis of variance (ANOVA) statistical techniques were employed to find out the characteristic of data and significant mean differences of anaerobic capacity among the forward, midfielder and defender. The level of significance was set at $P \leq 0.05$.

4. Results

The pertaining data of anaerobic capacity were treated by using the descriptive analysis to find out the range (R), minimum, maximum, mean (M), standard errors (SE), standard deviation (SD) and variance (Var) shows in table 1.

Table 1: Descriptive Analysis of Anaerobic Capacity in Different Playing Positions of Soccer Players

Variable	N	R	Min	Max	M	SE	SD	Var.
Forward	15	46.89	95.71	142.60	112.80	3.45	13.37	178.71
Midfielder	15	28.25	87.96	116.21	100.39	2.23	8.64	74.68
Defender	15	45.96	99.03	144.99	118.87	3.87	15.00	225.11

Table 1 shows that the mean (M) and standard deviation (SD) of the anaerobic capacity of forward, midfielder and defender players were 112.80 ± 13.37, 100.39 ± 8.64 and 118.87 ± 15.00 respectively; range were 46.89, 28.25 and 45.96 respectively; standard errors were 3.45, 2.23 and 3.87 respectively and the variance were 178.71, 74.68 and 225.11 respectively.

The result of analysis of variance (ANOVA) used to find out the significant mean differences of anaerobic capacity among the three different playing positions of soccer players is shown in table 2.

Table 2: Mean Comparison of Anaerobic Capacity in Different Playing Positions of Soccer Players

Group	Mean	SD	F	Sig. (P-value)
Forward	112.80	13.37	8.35	0.001
Midfielder	100.39	8.64		
Defender	118.87	15.00		

*Significant at 0.05 level of confidence, where, $F_{(0.05)(2,42)} = 3.22$

Table2 reveals that there were significant mean differences of anaerobic capacity in different playing positions of soccer players as the calculated F- ratio = 8.35 is greater than the tabulated F-value = 3.22 at 0.05 level of confidence ($P<0.05$). Hence, further post hoc test was applied by using the Scheffe's method to determine paired mean differences of the different playing positions of soccer players and results have been presented in table 3.

Table 3: Paired Mean Differences for the Anaerobic Capacity in Different Playing Positions of Soccer Players

Mean			Mean Difference	SE	Sig. (p-value)
Forward	Midfielder	Defender			
112.80	100.39		12.41*	4.61	0.04
	100.39	118.87	-18.48*	4.61	0.00
112.80		118.87	6.07	4.61	0.43

**Significant at 0.05 level of Confidence (P≤0.05).*

From table 3 shows that there was found significant mean difference of anaerobic capacity between the forward and midfielder, and midfielder and defender as their mean difference were 12.41 and -18.48 respectively (P<0.05). However, there was found insignificant mean difference of anaerobic capacity between the forward and defender as their mean difference of 6.07 (P>0.05).

The mean differences of anaerobic capacity in different playing positions of soccer players have been graphically presented in figure 1.

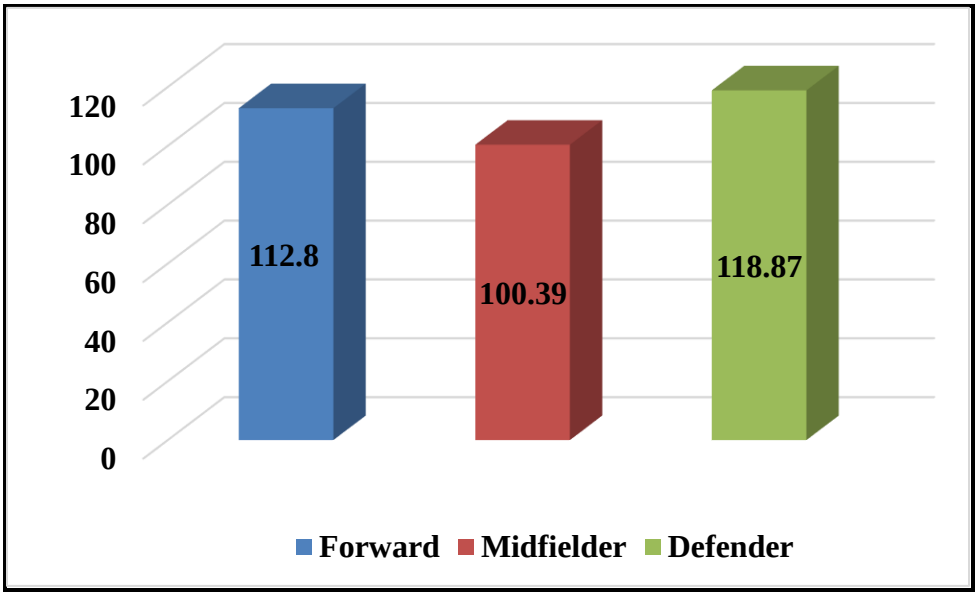

Figure 1: Mean comparison of Anaerobic Capacity among the Different Playing Positions of Soccer Players.

5. Discussion

The finding of statistical analysis of variance (ANOVA) revealed significant differences in anaerobic capacity among the three different soccer playing positions i,e. forward, midfielder and defender. Further, the post hoc test was applied using Scheffe's method to determine paired means differences of the different playing positions of soccer players. A significant mean difference in anaerobic capacity was found between the forward and midfielder and midfielder and defender. The differences in anaerobic capacity between the forward and midfielder and midfielder and defender might be the reasons for the load volume and intensity differences among these playing positions. Midfielders are more responsible for working harder and associating with both forwards and defenders to balance the game. By the nature of the works, midfielders are more adapted in aerobic actions than anaerobic ones. However, both forwards and defenders are more intensive anaerobically during the offensive and defensive actions.

One might expect that players in different play positions may differ in aerobic and anaerobic power due to different work demands related to their position (Nilsson and Cardinale, 2015). In elite football, forwards are the fastest players and time observations show that they sprint the most during a match (Rienzi et al., 2000). Forward players are the most explosive kind of work activities like often quick movement with changing direction, quick kicking the ball, suddenly high jumping action, shooting the ball and sudden acceleration, etc. likewise defender also the same action during the play. Whereas, midfielder players manage to maintain high work intensity during the match. The typical pattern concerning distance covered during the game according to playing position in numerous studies of elite football players is that midfielders always show the highest mean values in comparison with those in other playing positions (Reilly & Thomas, 1976; Bansgbo et al., 1991; Mohr et al., 2003). It means that midfielder players are more aerobic endurance capacity than forward and defenders. So, the highest oxygen consumption values have been found in midfielders (Stølen et al., 2005).

The present study found an insignificant mean difference in anaerobic capacity between the defender and forward. Because these two positions have similar load intensity and volume during the game, both positions dominate the explosive work activities like the high-intensity sprint, jumping performance, kicking the ball, quick movements and sudden acceleration, etc. The anaerobic effort is a determinant in repeated sprint bouts, jumping, tackling and duel play (Reilly 1994 and Rhea 2009). Therefore, midfielder players have the best aerobic fitness and defender and attackers have the most anaerobic power (Davies et al., 1992).

6. Conclusion

From the above finding, significant differences were found in mean comparisons of anaerobic capacity among the different playing positions of soccer players. Further, the paired means comparisons showed the means differences in anaerobic capacity between the forward and midfielder and midfielder and defender; and the insignificant mean difference was found between the forward and defender.

Reference:

7. Bansgbo, J., Norregaardl, L., & Thorso, F. (1991). Activity profile of competition soccer. *Cananadian Journal Sport Science*,16, 110–116.
8. Davies, J.A., Brewer, J., Atkin, D. (1992). Pre-season physiological characteristics of English first and second division soccer players. *Journal of Sports Sciences*. 10(6):541-7
9. Malkovic, B.R., Jankovic, S. and Heimer, S. (1994). Physiological profiles of top Croatian soccer players. In T. Reilly; J. Clayers & A. Stibbe (Eds.), *Science in football II (37) (1st ed.)*. E & F Spon: London.
10. Mohr, N.I., Krustrup, P., & Bangsbo, J. (2003). Match performance of high standard soccer players with special reference to development of fatigue. *Journal Sports Science*, 21 (7), 519-528.
11. Nilsson, J. and Cardinale, D. (2015). Aerobic and anaerobic test performance among elite male football players in different team positions. *LASE Journal of Sport Science*, 6 (2), 71-90.
12. Pennington, C. (2014). Determining the anaerobic power output differences between the genders in untrained adults. *American International Journal of Contemporary Research*, 4 (4).
13. Reilly, T., Thomas, VA. (1976). Motion analysis of work-rate in different positional roles in professional football match-play. *Journal Human Movement Studies*, 2, 87-97.
14. Reeves, S.L., Poh, B.K., Brown, M., Tizzard, N.H. & Ismail, M.N. (1999). Anthropometric measurements and body composition of English and Malaysian footballer. *Mal. J. Nutr*, 5, 79-86.
15. Rienzi, E., Drust, B., Reilly, T., Carter, J. E., & Martin, A. (2000). Investigation of anthropometric and work-rate profiles of elite South American international soccer players. *Journal Sports Medicine Physical Fitness*, 40, 162–169.
16. Reilly T (1994). Motion characteristics: In Handbook of Sports Medicine and Science: Football (soccer) Edited by Ekblom B. Oxford: Blackwell Scientific Publications.
17. Reilly, T., Sechei, N., Snell, P. and Williams, C. (1990). Physiology of sports. London: E & FN Spon.
18. Rhea MR, Lavinge DM, Robbins P, Esteve-Lanao J, Hultgren TL (2009). Metabolic conditioning among soccer players. *J Strength Cond Res*, 23, 800-806.
19. Scott, C. (2011). The effect of time-under-tension and weight lifting cadence on aerobic, anaerobic, and recovery energy expenditures: 3 submaximal sets. *Appl. Physiol. Nutr. Metah*, 37, 252-256.
20. Singh, L. T. (2006). Construction of talent search test in soccer. Doctoral Thesis, LNIPE, Gwalior, India) p. 29-30.

21. Stolen,T., Chamari, K., Castagna, C., & Wisloff, U. (2005). Physiology of soccer, an update. *Sports Medicine*, 35, 501-536.

22. Surwase, S. P., Deore, D. N., Pallod, K.G., Khan, S.T., (2015). Comparative study of aerobic and anaerobic power in football players and control group. *IOSR Journal of Dental and Medical Science*, 14 (5) ver. VI, p 53-56.