



RESEARCH ARTICLE

Positional Comparison of Footballers' Ball Kicking Techniques, Leg Strength and Shooting Accuracy Percentages

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Abstract

The aim of the study was to investigate the differences of foot pressure points, shot accuracy percentages, leg strength values of footballers at the moment of kicking the ball with different techniques according to their positions. The research group consisted of U-17 and U-19 football players of Erzurumspor FK team. W-INSHOE brand device was used to determine the knee and hip strength of the footballers at 60° angular velocity and foot pressure points at the moment of kicking the ball. SPSS v20 package programme was used for data analysis and statistical significance was accepted as $p < 0.05$. The normal distribution of continuous variables was analysed by Shapiro Wilk-W test, Kolmogorov Simirnov test, Q-Q graph, skewness and kurtosis. According to the results, it was determined that there was a statistical difference in favour of defenders in the pressure parameter in the L2 and L5 sensors inside the foot and in the L2 sensor outside the foot, in favour of forwards in the L6 sensor above the foot, in favour of forwards in the technical score parameter the second score when kicking the ball outside the foot and in the total score outside the foot, in the knee and hip strength parameter, in the peak torque extension movement in the hip joint, in favour of forwards. As a result, it is seen that the strikers who participated in the study are better in both technical scoring and hip strength in line with the needs of the position they play compared to other positions.

Keywords

Positional, Ball Kicking Techniques, Leg Strength, Shooting Accuracy Percentages

INTRODUCTION

Football is a popular sport that millions of people around the world are passionate about and follow with great interest. The skills of soccer players have a decisive influence on their performance in the game. Especially shooting skill is an important factor that can determine the outcome of matches. Soccer players' kicking techniques and leg strength have a significant effect on the accuracy of their shots (Duffield, & Drinkwater 2008).

Wireless plantar foot pressure systems, which have been increasingly used in recent years, aim to provide low-cost systems for mobile gait analysis, activity monitoring and rehabilitation. These systems are used by placing them as insoles

inside the shoe. Thanks to the instantaneous data received from the sensors in the insoles, it can be determined which part of the foot is used and how intensely. On the other hand, the position and anatomical posture are associated with the data obtained. Today, the foot pressure system guides doctors both for scientific research purposes and for surgical decision-making (Firth et al., 2007).

When the literature is examined, it is seen that most of the studies examine temporal-spatial gait parameters. These parameters are walking speed, stride length and stride duration. 3D gait analysis is generally difficult and reporting of spatiotemporal gait parameters is also less common (Murphy et al., 2005). Among the factors affecting the physical performance of soccer players, leg strength plays an important role. For example, in

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one study, leg strength was found to increase performance parameters such as kick speed, jump height and running speed of elite level soccer players. (Yilmaz et al., 2023).

There is a relationship between leg strength and shooting accuracy in soccer players. It is important for soccer players to have strong legs in order to take a good shot. Leg strength increases the ability to put more power on the ball during the shot and to send the ball faster. Strong legs can also increase the chances of scoring from long range. (Korkmaz, 2022).

As in all sports branches, it is known that technical skill training is one of the most important criteria that determine the performance of the player in soccer. Skills such as dribbling, shooting and tackling play an important role both for the performance of the athlete and for the pleasure of the fans. (Bangsbo, 1994; Reilly et al., 2000).

While the factors that make soccer more interesting and interesting can be listed as aggressive and exciting duos, skillful combinations and transitions between regions, different and interesting dribbling, fast-paced play, exhilarating goal positions and goal kicks, and the incredible physical placement of goalkeepers, the importance of technical skill cannot be ignored in order for soccer players to do these in the best and fastest way (Bizanz, 1991). For this reason, technical skill is of great importance for soccer (Ilxomovich, 2023).

When soccer players shoot, which part of the foot they apply pressure to can vary depending on the type of shot and how they shoot. In general, soccer players use three main areas when shooting. These are the ankle, the inside of the foot and the outside of the foot. Footballers shoot using different areas depending on their technical skills and preferences. Shooting techniques are also related to the player's skills, position and style of play. In addition, body balance and movement are also important when soccer players shoot. Therefore, training and practice are of great importance for correct shooting technique. (Ma, 2023). The aim of this study was to determine the specific shooting skills and leg strength of soccer players at different positions and to analyze the effects of these characteristics on shooting accuracy percentages. It is thought that this type of research can contribute to football coaches, performance specialists and soccer players to

optimize their individual abilities and physical characteristics.

MATERIALS AND METHODS

Statement of Compliance with Ethical Principles

I have obtained the data, information and documents I have presented in this thesis within the framework of academic and ethical rules; I present all information, documents, evaluations and results in accordance with scientific ethics and morals; I declare that I have made full reference to all data, thoughts, results and information that do not belong to me in this study, in accordance with scientific ethical rules, and that I have cited the source. This study was conducted with ethical and informed consent in accordance with the rules stated in the Declaration of Helsinki.

Participants

The population of the research is the U-17 and U-19 teams of Erzurumspor FK team, which competes in the Turkish Football Federation Development Leagues (Elite League). The sample of the research was formed by a total of 37 football players in the positions of defender, midfield and striker.

Research Location

Laboratory measurements were made at Atatürk University Sports Sciences Application and Research Center and field measurements were made at Erzurumspor FK facilities.

Data Collection

Anthropometric Measurements

Footballers' height (cm) was measured using a portable stadiometer.

Body Composition

BODPOD Gold Standard tracking system, which provides high accuracy, safe, comfortable and fast test results, was used to determine the body composition of soccer players. Body fat percentage, body mass index, body weight, body fat-free mass and basal metabolic rate data were obtained with the device. Before the measurements, soccer players were informed about the device and the rules to be followed during the measurements were specified.

Foot Sole Pressure Measurements

W-INSHOE brand device was used. Insoles were placed in both the right and left shoes of the soccer players before they made their shots in the determined kicking techniques and trial shots were made to fully understand the exercise protocol. The

soccer players were given a total of nine throws averaging both the maximum amount of pressure they applied and how actively they used it for the

from three throws each. Data were obtained by three throws made in each striking technique.

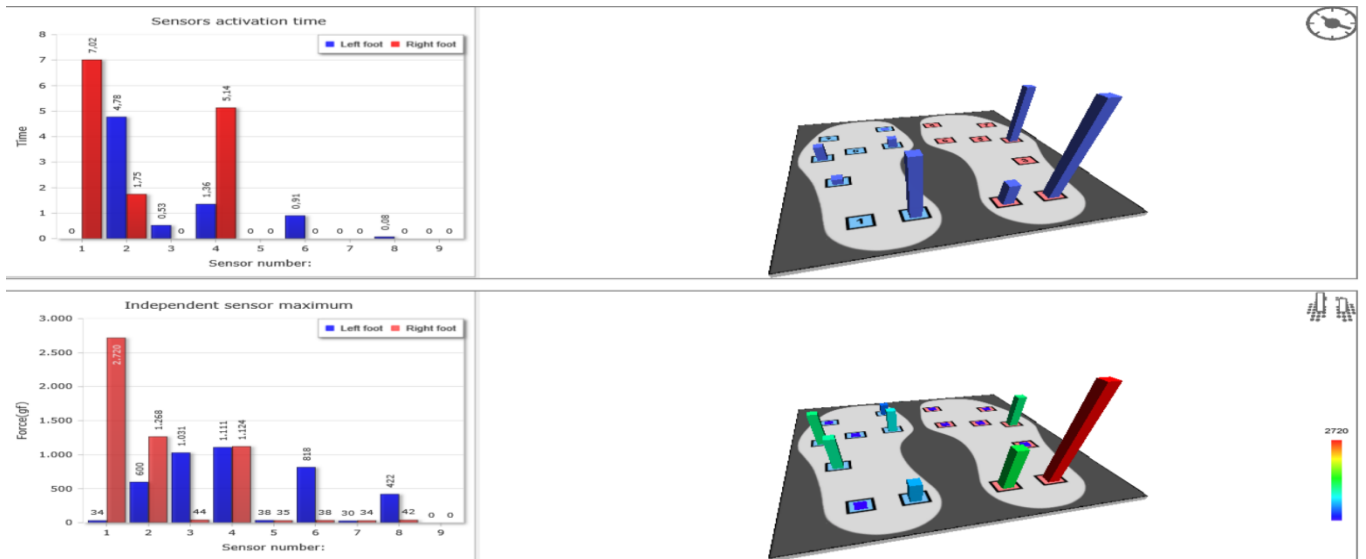


Figure 1. Example of foot sole pressure analysis of soccer players

Leg Strength Measurement

ISOMED 2000 isokinetic measuring device was used to determine the leg strength of soccer players. Knee and hip flexion/extension measurements were taken. Before starting the test, soccer players were warmed up for 15 minutes. In this warm-up, 5 minutes of general warm-up was done with wattbike at 70-80 kw load and the remaining 10 minutes of special warm-up was done to ensure that the knee flexor and extensor

muscles, joints, tendons and ligaments were ready for exercise. The dynamometer equipment was positioned in accordance with the instructions specified specifically for each soccer player. After the axis of the dynamometer was adjusted to the lateral epicondyle of the femur, the load sensor was placed on the ankle. For the knee joint, the test speed was 60° m/s and 10 repetitions were performed.

Table 1. Reference Values for Isokinetic Knee Flexion/Extension Measurements (Yılmaz, 2023)

Reference Values for Knee Flex/Elex	
Dynamometer Direction	90 to the floor°
Dynamometer Inclination	Neutral - 0°
Seat Orientation	90 to the floor°
Seat Tilt	70 -85°°
Axis of Rotation	Lateral Femoral Condyle in the Sagittal Plane.
Starting Position	Full extension



Figure 2: Technical analysis visualisation

Technical Analysis Measurement

Technical analysis measurements were carried out in the wall training section of the training field in Erzurumspor FK facilities. Footballers were made to hit the target numbered from 1 to 9 at a distance of 20 meters in-foot, on-foot and off-foot respectively. The average of the three shots made in each kicking technique was taken and the data in different kicking techniques were obtained. Technical scoring system;

Statistical Analysis

Analyses were performed with IBM SPSS 20 statistical analysis programme. Data were presented as mean, standard deviation, median, minimum, maximum, percentage and number. Normal distribution of continuous variables was analysed

by Shapiro Wilk-W test, Kolmogorov Simirnov test, Q-Q plot, skewness and kurtosis. In the comparison of continuous variables with more than two independent groups, ANOVA test was used when the normal distribution condition was met, and Kruskal Wallis test was used when it was not met. Post-hoc tests after ANOVA test were performed using Tukey's test when variances were homogeneous and Tamhane's T2 test when variances were not homogeneous. For post-hoc tests after Kruskal Wallis test, Kruskal Wallis 1-way ANOVA (k samples) test was used. Statistical significance level was taken as $p < 0.05$.

RESULTS

Table 2. Foot strike time of soccer players in different kicking techniques

	Location						P
	Defense		Midfield		Striker		
	Mean	Median (Min-Max)	Mean	Median (Min-Max)	Mean	Median (Min-Max)	
				Insole			
L1	1,53 ± 1,20	1,47 (0,19-3,71)	1,89 ± 1,57	1,8 (0,21-5,26)	1,59 ± 1,76	0,82 (0,50-5,67)	0.818
R1	2,30 ± 1,48	2,44 (0,49-4,68)	1,80 ± 1,44	1,36 (0,48-4,56)	1,35 ± 0,82	1 (0,56-2,51)	0.328
L2	2 ± 1,18	1,54 (0,43-4,16)	1,46 ± 1,21	1,29 (0,20-3,41)	0,93 ± 1,18	0,42 (0,12-3,41)	0.064
R2	2,11 ± 1,58	1,71 (0,10-4,80)	1,08 ± 1,09	0,76 (0,18-3,31)	0,93 ± 0,92	0,51 (0,13-2,82)	0.123
L3	2,03 ± 0,90	1,86 (0,98-3,51)	2,66 ± 1,83	2,51 (0,64-6,31)	1,66 ± 1,93	1,04 (0,38-6,25)	0.142
R3	2,16 ± 1,73	1,67 (0,62-6,43)	2,9 ± 1,47	3,25 (0,68-4,45)	1,35 ± 0,97	1,3 (0,34-3,41)	0.122
L4	5,34 ± 2,74	5,14 ± (0,84-9,13)	3,16 ± 3,04	3,15 (0,16-9,76)	3,03 ± 2,60	2,3 (0,93-9)	0.140
R4	5,14 ± 2,38	4,69 ± (1,21-8,88)	5,38 ± 2,19	5,48 (2,69-9,16)	3,09 ± 2,18	2,83 (0,27-7,75)	0.103
L5	2,16 ± 1,33	2,55 ± (0,41-4,19)	1,95 ± 1,49	1,61 (0,30-4,37)	2,51 ± 1,25	2,46 (0,97-4,70)	0.707
R5	2,62 ± 2,61	1,78 ± (0,17-8,72)	1,93 ± 1,47	1,52 (0,11-4,94)	1,54 ± 0,44	1,62 (0,72-2,22)	0.467
L6	3,76 ± 2,72	3,27 ± (0,41-7,71)	3,38 ± 2,24	2,96 (1,02-6,81)	2,44 ± 1,22	2,69 (0,64-3,97)	0.459
R6	3,21 ± 2,17	2,42 ± (0,97-7,76)	2,87 ± 1,43	3,15 (0,37-4,40)	2,12 ± 0,70	2,16 (1,25-3,36)	0.371
L7	1,56 ± 0,95	1,87 ± (0,17-2,84)	1,35 ± 1,63	0,65 (0,17-4,18)	1,09 ± 1,17	0,65 (0,08-3,80)	0.492
R7	1,2 ± 1,08	0,56 ± (0,12-3,05)	1,95 ± 1,49	1,44 (0,16-4,28)	1,49 ± 0,88	1,65 (0,21-2,59)	0.426
L8	1,96 ± 1,94	1,49 ± (0,53-6,68)	2,48 ± 1,11	2,20 (1,08-3,91)	2,19 ± 1,24	2,02 (0,37-4,21)	0.779
R8	2,23 ± 1,43	2,06 ± (0,81-5,52)	1,84 ± 1,68	1,33 (0,24-5,36)	1,58 ± 0,54	1,52 (1,02-2,73)	0.599
				Out of foot			
L1	1,38 ± 0,95	1,11 (0,14-2,78)	1,92 ± 0,93	1,6 (1,03,63)	1,07 ± 0,89	0,9 (0,06-2,71)	0.205
R1	1,96 ± 0,99	1,79 (1,09-4,19)	1,96 ± 1,21	2,07 (0,40-3,73)	1,49 ± 1,15	1,42 (0,25-3,62)	0.621
L2	1,62 ± 0,78	1,65 (0,41-2,99)	1,8 ± 1,34	1,6 (0,14-4,03)	0,94 ± 0,63	0,79 (0,17-2,11)	0.186
R2	2,05 ± 1,01	2,25 (0,18-3,28)	1,29 ± 1,39	0,73 (0,17-4,29)	1,29 ± 0,79	1,34 (0,23-2,48)	0.163
L3	1,91 ± 1,02	1,77 (0,52-3,41)	3,12 ± 3,01	2,28 (0,64-9,57)	1,49 ± 1,06	0,98 (0,24-3,04)	0.220
R3	3,36 ± 2,84	2,11 (0,22-8,45)	3,16 ± 1,58	2,87 (1,08-5,71)	2,52 ± 2,18	1,88 (0,08-6,07)	0.744
L4	4,03 ± 2,55	3,22 (0,88-9,17)	3,88 ± 3,20	3,37 (0,14-9,80)	2,55 ± 1,68	2,79 (0,67-4,94)	0.444
R4	5,09 ± 1,81	4,35 (3,21-7,44)	6,28 ± 2,98	7,19 (2,08-9,66)	3,54 ± 1,45	3,69 (1,92-6,09)	0.088
L5	2,3 ± 1,56	1,88 (0,84-5,84)	1,94 ± 1,61	1,52 (0,37-4,79)	2,52 ± 1,71	2,05 (1,12-6,60)	0.554
R5	3,01 ± 2,25	2,22 (0,15-6,22)	1,38 ± 0,73	1,59 (0,18-2,11)	2,36 ± 1,07	2,44 (0,62-4)	0.115
L6	2,62 ± 1,89	2,07 (0,17-5,21)	3,11 ± 1,73	2,82 (1,21-5,79)	2,38 ± 0,92	2,42 (0,95-3,94)	0.650
R6	2,74 ± 1,95	2,55 (0,55-6,83)	2,77 ± 1,30	2,53 (1,11-4,74)	2,91 ± 0,98	2,91 (1,32-4,23)	0.968
L7	1,28 ± 1,05	1,38 (0,22-3,76)	1,6 ± 1,35	1,29 (0,19-3,77)	1,71 ± 0,80	1,81 (0,63-2,68)	0.501
R7	1,97 ± 2	1,49 (0,31-5,49)	2,76 ± 2,47	1,8 (0,55-7,36)	1,54 ± 1,09	1,50 (0,20-3,04)	0.569
L8	2,03 ± 1,25	1,38 (0,80-3,95)	2,06 ± 1,18	1,91 (0,72-4,14)	2,18 ± 0,90	2,44 (0,67-3,16)	0.843
R8	1,62 ± 0,49	1,42 (1,12-2,46)	2,01 ± 1,27	1,76 (0,52-4,68)	2,39 ± 0,97	2,16 (1,21-3,76)	0.272

Table 2. Continue

	Location						P
	Defense		Midfield		Striker		
	Mean	Median (Min-Max)	Mean	Median (Min-Max)	Mean	Median (Min-Max)	
	Insole						
On Foot							
L1	1,45± 1,11	1,41 (0,12-3,33)	1,88± 0,93	1,90 (0,67-3,46)	1,43 ± 0,87	1,57 (0,17-2,46)	0.582
R1	1,89± 1,20	1,82 (0,41-3,86)	2,18± 1,68	1,67 (0,18-4,56)	1,76 ± 1,42	1,54 (0,39-4,77)	0.836
L2	1,48 ± 0,83	1,5 (0,27-2,88)	1,28 ± 1,37	0,85 (0,28-4,53)	1,05 ± 0,71	0,92 (0,24-2,21)	0.491
R2	2,43 ± 1,92	2,13 (0,11-6,40)	0,89 ± 0,71	0,66 (0,11-1,83)	1,37 ± 1,12	1,05 (0,10-3,47)	0.080
L3	2,38 ± 2,35	1,75 (0,36-8,06)	2,5 ± 1,32	2,23 (1,32-5,28)	1,65 ± 1,14	1,76 (0,05-3,16)	0.552
R3	2,04 ± 2,23	1,38 (0,55-7,67)	1,85 ± 1,10	2,17 (0,26-3,11)	1,67 ± 1,23	1,81 (0,13-3,35)	0.857
L4	4,1 ± 1,96	4,47 (1,77-7,96)	2,75 ± 2,01	2,26 (0,14-6,25)	2,72 ± 2,20	1,68 (0,69-6,60)	0.301
R4	5,08 ± 2,61	5,93 (1,53-9,21)	5,35 ± 2,72	6,46 (0,55-8,37)	3,27 ± 1,71	3,33 (1,14-5,91)	0.189
L5	2,52 ± 1,50	2,41 (0,34-5,83)	1,52 ± 1,52	1,33 (0,12-4,93)	3,28 ± 1,70	3,04 (1,29-5,75)	0.055
R5	2,66 ± 2,38	2,09 (0,95-8,72)	1,21 ± 0,99	1,13 (0,18-3,37)	2,05 ± 1,08	1,9 (0,72-3,63)	0.216
L6	2,48 ± 2,46	1,06 (0,28-6,68)	2,87 ± 2,13	2,18 (0,81-6,02)	2,66 ± 1,40	2,50 (0,96-5,01)	0.928
R6	2,56 ± 2,12	1,49 (0,84-7,27)	2,62 ± 1,73	2,61 (0,55-5,25)	2,46 ± 1,42	2,46 (0,85-5,42)	0.985
L7	1,62 ± 1,82	1,07 (0,11-5,72)	1,32 ± 1,27	1,07 (0,07-3,77)	1,59 ± 1,31	1,35 (0,15-3,67)	0.885
R7	1,23 ± 0,56	1,03 (0,48-2,25)	2,33 ± 2,42	0,88 (0,16-6,63)	1,29 ± 0,97	1,15 (0,16-3,36)	0.981

When table 2 was analysed, it was determined that there was no statistically significant difference between the foot strike times of footballers in different kicking techniques.

Table 3. Pressure applied by footballers in the foot area in different kicking techniques

	Location						P	Post-Hoc
	Defense (D)		Midfield (M)		Striker (S)			
	Mean	Median (Min-Max)	Mean	Median (Min-Max)	Mean	Median (Min-Max)		
	Insole							
L1	2974,11±3217,20	1905 (184-8919)	4328,13±3704,84	3727,5 (854-12443)	2367±2808	1647,5 (97-5811)	0.441	
R1	4768,66±2915,02	3687 (1421-11119)	4705,13±2845,46	4953,5 (99-8736)	4200,63±2056,35	4454,5 (1537-6754)	0.893	
L2	2243,78±1745,24	1627 (481-6281)	2380,88±1703,09	1850,5 (795-5956)	798,5±841,29	404 (84-2005)	0.045*	
R2	3179,11±1818,87	3224 (1037-6575)	2084±1460,76	1761 (115-4823)	2410,25±1656,81	2343 (80-5544)	0.389	
L3	1630,44±984,41	1643 (77-3314)	1984,75±1428,89	1534 (820-4910)	1741±472,37	1823 (1032-2331)	0.734	
R3	2295,11±1706,18	1720 (654-6375)	2577,38±2375,73	1805 (1319-8441)	1815,75±292,06	1730,5 (1452-2165)	0.919	
L4	3613,22±26838	2251 (1443-9285)	2864,13±2025,33	1893 (1424-7160)	2745,5±1552,73	2099,5 (1817-6417)	0.591	
R4	4005,11±2876,93	3140 (897-9494)	4481,13±3740,04	3228 (1836-13466)	5307±2518,71	5347,5 (1206-8796)	0.422	
L5	2942,89±1994,95	1949 (1261-6595)	2109±2166,55	1533,5 (364-7202)	4025,5±3596,44	2776,5 (1905-12597)	0.044*	
R5	3040,22±2876,54	1999 (1214-10408)	2378±1468,58	1963,5 (656-5340)	2720±1178,01	2486 (1239-4379)	0.764	
L6	4641,67±3887,18	3628 (1434-14189)	3166,38±2663,67	1969 (1690-9526)	6766,875±4561,22	6808 (1634-13148)	0.223	
R6	4657±2745,68	4459 (1542-8608)	5835,13±4326,37	5073,5 (934-11614)	4936,625±3998,93	2883,5 (1792-12751)	0.942	
L7	1012,22±879,43	941 (64-2187)	1581,63±820,67	1674,5 (72-2890)	1849,375±1099,46	1749 (471-3941)	0.192	
R7	1437,56±599,15	1667 (69-2096)	1927,63±1736,79	1401,5 (65-5135)	2317±962,67	1963,5 (1399-4217)	0.140	
L8	1646,78±308,58	1696 (1108-2185)	2788,63±2523,68	1722 (674-7374)	1955,63±422,99	1896 (1203-2647)	0.275	
R8	2607,89±1157,82	2050 (1707-5207)	2115,88±670,35	1879,5 (1710-3744)	2000,75±306,32	1934,5 (1640-2542)	0.558	
Out of foot								
L1	4611±3286,90	2154 (495-9391)	2933,25±2079,13	1904 (1241-6404)	4737,5±4015,62	3627 (718-12126)	0.717	
R1	4479,33±2504,54	3364 (1954-9936)	4064,13±2619,39	3647 (195-8897)	4658,38±3106,34	4471 (114-9048)	0.906	
L2	2420,56±1394,25	1971 (834-5494)	1987,25±1821,47	1572,5 (608-6303)	1093,63±1355,52	833,5 (80-4190)	0.039*	D-S
R2	2783,22±1312,03	2540 (1055-4874)	1756,38±979,93	1853 (149-3210)	2022,63±976,07	2022,5 (79-3398)	0.162	
L3	3125,89±3133,85	1768 (941-11127)	2621±2142,04	1830 (954-7512)	1889,38±550,37	1822,5 (1041-2931)	0.958	
R3	3350,89±3083,40	2637 (1256-11302)	2737,38±1842,57	2217 (1438-7141)	1651,38±639,92	1807,5 (286-2190)	0.190	
L4	4599,78±3849,69	3185 (941-12157)	3723,88±3420,39	2567,5 (876-10706)	3593,5±2841,72	2318 (1730-9981)	0.925	
R4	6183,33±3748,36	4847 (1845-13683)	4900,63±2931,22	4394 (1741-10906)	4483,5±2551,79	4372 (1839-7741)	0.501	
L5	3370,11±3617,20	2154 (921-12804)	2887,5±2105,26	1876,5 (1204-6725)	3728,25±2091,26	2690,5 (1994-7214)	0.183	
R5	4250,44±2831,67	4024 (1514-9367)	2827,38±1948,29	1969 (1009-6606)	2623,75±1469,19	2092 (1353-5917)	0.265	
L6	4328,22±4459,96	2179 (854-14461)	2876,75±1715,95	2100,5 (1595-6724)	7332,63±5706,43	6083 (1329-16933)	0.195	
R6	5099,89±3160,68	5887 (818-9567)	5964,88±5178,25	3674 (1540-15353)	4879,63±4347,44	3782,5 (984-14241)	0.941	
L7	1668,11±616,02	1519 (941-2846)	2506,13±3346,51	923 (163-8256)	2208,13±1409,17	1762 (164-4165)	0.339	

Table 3. Continue

	Location						P	Post-Hoc
	Defense (D)		Midfield (M)		Striker (S)			
	Mean	Median (Min-Max)	Mean	Median (Min-Max)	Mean	Median (Min-Max)		
R7	1558,56±460,80	1653 (779-2193)	2498,75±2388,38	2014,5 (64-7909)	1914,5±370,06	1836,5 (1339-2628)	0.338	
L8	1780,89±446,86	1980 (779-2154)	2504,5±1594,12	1778 (854-5395)	1805,13±801,10	1816,5 (100-2791)	0.958	
R8	2943,11±1685,93	2268 (1454-6115)	3301,25±3299,43	2204,5 (1859-11183)	2310,75±574,59	2127,5 (1690-3341)	0.984	
	On foot							
L1	2307,11±1430,41	1942 (258-5303)	2543,63±1276,22	2276,5 (812-4282)	2219,63±1827,75	1805 (99-4888)	0.908	
R1	4619,33±2435,77	5068 (1424-9401)	3799±2632,49	3468 (168-8736)	4618,13±3385,13	4280,5 (699-10693)	0.798	
L2	2215,44±1327,02	1661 (841-4863)	1913,13±2047,14	1662,5 (81-6741)	1225±996,01	1154 (88-3274)	0.221	
R2	2924,44±1463,74	3069 (672-5030)	1967,25±1664,13	1536 (153-4823)	2412±1286,75	2131 (692-4880)	0.424	
L3	2831,44±2325,21	1814 (1054-8247)	2478,13±1861,28	1789,5 (842-5826)	2101±1056,87	1858 (811-4227)	0.884	
R3	2014,11±621,03	1836 (1341-3349)	2238,5±827,28	1887,5 (1319-3636)	2537,378±58	1971,5 (1447-5838)	0.670	
L4	4919±3897,88	3072 (841-12164)	2615,38±1762,99	2032,5 (854-5450)	2830,5±1236,94	2584 (1682-5305)	0.226	
R4	4003,67±2584,63	3366 (512-7992)	5069,63±3149,44	4387 (1567-9834)	5881,88±4103,25	3808 (2665-14651)	0.492	
L5	1883,67±1029,61	1801 (71-3965)	2976,63±2968,22	1308 (724-8958)	3144,378±1989,57	2616,5 (1584-7840)	0.290	
R5	2707,78±1933,55	2052 (941-7575)	2271,13±1973,39	1686 (656-6958)	2934,38±1745,88	2211 (1570-6638)	0.346	
L6	4171,78±3655,37	2824 (954-12966)	3718,63±4667,66	1854 (1548-15183)	9283,63±4252,97	11471,5 (3038-13619)	0.018*	S-M
R6	4703,11±3850,19	3760 (1214-12317)	4378,63±4005,15	2883 (934-11657)	4026,5±3946,32	2807 (1234-13418)	0.944	
L7	1156,89±591,97	1270 (64-1787)	1176,5±1165,45	904 (62-3580)	1677,75±808,80	1754 (67-2781)	0.410	
R7	1609,22±719,86	1630 (826-3282)	1616,25±1254,91	1781 (68-3682)	2157,38±527,50	2056,5 (1460-3152)	0.371	

Table 3 When the pressure applied by footballers to the foot area in different kicking techniques is analysed by position, it is determined that there is a statistically significant difference between L2-L5 sensors when kicking the ball inside the foot, there is a statistically significant

difference between defenders and forwards in favour of forwards in L2 sensor when kicking the ball outside the foot, and there is a statistically significant difference between forwards and midfielders in favour of forwards in L6 sensor when kicking the ball above the foot.

Table 4. Positional comparison of knee and hip strength of football players

	Location						P	Post-Hoc
	Defense (D)		Midfield (M)		Striker (S)			
	Mean	Median (Min-Max)	Mean	Median (Min-Max)	Mean	Median (Min-Max)		
PTF-RK	146,98±24,74	142,6 (116,10-192,10)	145,36±16,39	140,95 (127,30-183,10)	147,93±45,19	133,7 (116,80-253,60)	0,594	
PTF-LK	139,31±28,72	142,3 (107,80-192,60)	140,44±17,52	139,1 (119,80-172,60)	126,49±14,61	122,1 (110,40-146,40)	0,367	
PTE-RK	226,62±36,90	240,9 (151,60-254,10)	231,24±36,64	219,85 (185,80-293,80)	213,73±42,55	216,35 (160,60-265,30)	0,814	
PTE-LK	217,9±40,49	218,8 (149,40-268,30)	225,98±39,52	220,85 (180,60-279,10)	207,28±42,62	214,45 (144,10-259,60)	0,661	
PTF-RH	148,61±19,67	144,6 (126,60-191,80)	151,74±30,20	146,45 (124,30-219,60)	172,88±28,49	175,85 (135,90-219,10)	0,175	
PTF-LH	145,54±27,87	134,8 (120,10-186,90)	155,73±32,62	147,95 (125,40-218,80)	165,34±25,57	164,6 (130,30-203,10)	0,241	
PTE-RH	281,17±45,88	290,8 (206,10-346,60)	334,86±40,59	337,1 (263,10-379,30)	344,59±50,84	341,6 (240,10-398,10)	0,019*	D-S
PTE-LH	296,24±49,74	291,9 (198,10-379,30)	311,45±40,11	308,2 (249,10-371,80)	324,38±52,09	334,85 (228,90-390,60)	0,488	

PTF-RK: Peak Torques Flex Right-Knee , PTF-LK: Peak Torques Flex Left-Knee , PTE-RK : Peak Torques Ext. Right-Knee, PTE-LK: Peak Torques Ext. Left-Knee , PTF-RH : Peak Torques Flex Right-Hip , PTF-LH : Peak Torques Fleks Left-Hip, PTE-RH : Peak Torques Ext. Right-Hip , PTE-LH : Peak Torques Ext. Left-Hip,

In Table 4, when both knee and hip strengths of the football players were examined, it was determined that Peak Torques Ext. Right-Hip there

was a statistically significant difference between defenders and forwards in favour of forwards.

Table 5. Technical scoring system of footballers

	Location						P	Post-Hoc
	Defense (D)		Midfield (M)		Striker (S)			
	Mean	Median (Min-Max)	Mean	Median (Min-Max)	Mean	Median (Min-Max)		
Insole-1	4,22±2,17	5 (1-8)	4,88±3,44	4 (0-9)	6,5±1,77	6,5 (4-9)	0,194	
Insole-2	3,78±3,46	3 (0-9)	5,13±3,18	4,5 (1-9)	3,38±3,85	2,5 (0-9)	0,444	
Insole-3	6,11±2,85	7 (2-9)	3±2,62	3 (0-9)	4±2,98	4 (0-8)	0,088	
Total inside the foot	166,67±63,25	150 (70-260)	143,75±47,79	135 (80-230)	161,25±68,54	125 (110-280)	0,684	
On foot-1	4±3,94	5 (0-9)	3,63±3,62	3 (0-8)	3,13±3,52	2 (0-8)	0,840	
On foot-2	4,11±4,17	4 (0-9)	4,13±4,45	3,5 (0-9)	3,5±3,93	2,5 (0-9)	0,910	
On foot-3	7,22±2,54	8 (1-9)	4±4,31	3,5 (0-9)	5,63±2,72	5,5 (0-9)	0,142	
Total on foot	183,33±60,62	200 (90-280)	141,25±93,57	110 (0-280)	137,5±79,42	135 (0-280)	0,416	
Out of foot-1	2,33±2,06	2 (0-5)	4,38±4,21	4 (0-9)	3,88±3,23	3 (0-9)	0,570	
Out of foot-2	2,44±3,05	1 (0-9)	3,13±2,75	2,5 (0-9)	6,88±2,90	7,5 (0-9)	0,046*	D-S
Out of foot-3	2,33±2,78	1 (0-8)	4,63±3,42	4 (0-9)	5,25±2,71	5 (0-9)	0,125	
Total out of-foot	88,89±65,28	80 (20-190)	156,25±90,70	140 (50-290)	186,25±68,23	195 (80-290)	0,039*	D-S
Total	447,78±150,65	410 (230-660)	440±139,08	445 (280-620)	478,75±138,82	460 (310-750)	0,849	

DISCUSSION

The aim of this study was to investigate the different kicking techniques, leg strength and shot accuracy percentages of soccer players in terms of position. Erzurumspor FK U-19 team, which competes in the T.F.F. development league, participated in the study. This study was considered because both physical and technical training were not performed together. When the findings of the study are examined, it is seen that there is a statistically significant difference between defenders and forwards in favor of defenders in the L2 and L5 sensors when kicking the ball inside the foot, between defenders and forwards in favor of defenders in the L2 sensor when kicking the ball outside the foot, and between forwards and midfielders in favor of forwards in the L6 sensor when kicking the ball above the foot.

When the findings of the study in terms of technical scoring are examined, it is seen that there is a statistically significant difference between defenders and strikers in favor of strikers in the 2nd kick score, and between defenders and strikers in favor of strikers in the total out-of-foot score. It is estimated that the reason for this situation is both because strikers have better technical capacity than defenders and because they are at a better level in terms of finishing than defenders. When the findings of the study in terms of knee and hip strength are examined, it is seen that there is a statistically significant difference between the defenders and forwards in the peak torque

extension movement in the hip joint in favor of the forwards. It is estimated that this is due to the fact that the forwards constantly engage in bilateral struggles with the opposing defenders during the competition and especially when shooting, they start the striking step from the hip to increase the shooting speed. In a study by Menard et al. in which the risk of foot and ankle injuries in soccer players was investigated using a sole pressure system, it was reported that soccer players had a risk of injury due to the heel outer part of the sole of the foot and the arch in the fourth and fifth part of the forefoot (Ménard et al.,2021).

In a study examining the variables of body mass index and foot pressure in soccer players and non-footballers on static and dynamic ground, it was reported that BMI had a statistical relationship with the mean pressure of the dominant foot only in the control group and there was no statistically significant difference in soccer players (Hawrylak,2021). In a different study conducted on soccer players, in a biomechanical analysis of the sole pressure during walking in soccer players with normal hip alpha angle (NA) and above normal hip alpha angle (IA), it was reported that IA soccer players produced both lower power in the heel of the foot and lower relative power in the heel of the foot. They reported that the relative power of IA soccer players increased in the middle region of the sole of the foot and in the toe (Hagen et al.,2015). Carvallahis (2013) performed isokinetic evaluations at 60 %/sec and 300 %/sec angular velocity in their study on 164 professional soccer

players from different positions and reported that peak torque and total work values were at normal levels, there was no difference in peak torque, total work and fatigue index evaluations according to positions, and knee flexors had a higher fatigue index than knee extensors in both legs (Carvallahis et al.,2013). Wong and Wong (2009) evaluated the isokinetic strength of elite soccer players at angular speeds of 60 °/sec, 120 °/sec, 180 °/sec and 240 °/sec and stated that peak torque and relative torque had significant differences between angular speeds, while H/Q ratio did not create a difference, increased with increasing speed and remained within normal values (Wong, & Won, 2009).

Śliwowski vd.(2021) compared peak torque and H/Q ratios at an angular velocity of 60 °/sec and total work parameters at an angular velocity of 240 °/sec. As a result of the study, it was determined that there were bilateral differences in both flexor and extensor muscles in the national level subjects, while there were bilateral differences only between the flexor muscles in the international level subject group. In addition, it was determined that H/Q ratios were at normal levels in both groups and there was no difference between dominant and non-dominant legs. At 240 °/sec angular velocity, it was stated that the results were similar to the results of peak torque values at total work levels (Śliwowski et al.,2021). In the study examining the effect of different narrow field games on the technical skills of female soccer players, it was reported that both 26 x 34 m and 30 x 40 m playgrounds can be applied for a short period of time in studies for the development of technical actions of female soccer players. (Say et al.,2020). In the study examining the effect of coordination training on the technical development of development league soccer players, it was reported that there was a statistically significant difference between the experimental groups and the control group and that there was an 11.83% improvement in shooting technical skill (Köksal,2020).

In the study in which the technical parameters and motor performances of life kinetic exercises on young soccer players were examined, it was reported that the exercise protocols positively affected both technical parameters and motor performances, especially in dribbling, accurate passing and accurate shooting performance parameters (Arslan & Ermiş 2023). In the study in which the relationship between some

motoric characteristics and technical skills of soccer players in the development league was examined, it was reported that when the relationship between attention skills and technical and motor skill performances of Soccer Players Was Examined, There Was A Low Level Negative Significant Relationship Between Tm And Hufa1 And 30 M-St Results, There Was A Low Level Negative Significant Relationship Between Tm-H And Hufa1, Hufa2, Ist And 30 M-St, And There Was A Low Level Negative Significant Relationship Between Kp And Hufa2 Test.(Kurt & İnce 2022). In a different study on footballers in the development league, they reported a statistically significant difference between the 8-week complex training on football skills, especially on ball bouncing with the head, accurate shooting and shooting speed.(Kılıç & Taşkıran (2023).

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Conflict of interest

The authors declare no conflict of interest. No financial support was received.

Ethics Statement

Approval for the study was obtained from Atatürk University Faculty of Sports Sciences Scientific Research Ethics Committee. (Protocol number 70400699/11.00-190066441).

Author Contributions

Study Design, GA; Data Collection, GA and Statistical Analysis, FK; Data Interpretation, GA and FK; Manuscript Preparation, GA; Literature Search, GA and FK. All authors have read and agreed to the published version of the manuscript.

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