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ORIGINAL ARTICLE

The Effect of Game Strategies on the Physiological, Physical, and Technical Loads of Soccer Players

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ABSTRACT

Background. The study aims to determine position-specific loads by different tactical strategies. Eighty Turkish Super League U21 players (19.35 ± 1.6 years, 179.4 ± 2.3 cm, 75.6 ± 4.1 kg; M ± SD) were involved in this study. **Objectives.** The players completed eight different 11v11 training games. While one team practiced the ball possession and "defense as a team" strategy, the other team implemented the counterattacking strategy. **Methods.** The formation was kept as "4-2-3-1". The games were played for 2x20 minutes by using two-thirds of the field. Blood lactate, heart rate, ratings of perceived exertion (RPE), and physical and technical performance were analyzed. Compared to tactical strategy, player load (PL) values were found to be different in all positions ($P<0.05$). **Results.** The position-specific loads of wingbacks, wingers, and strikers are the positions affected mainly by the strategy. Center-backs demonstrated low values in physical and physiological loads; however, their PL values caused fatigue. Players' high-intensity running and sprint numbers are highly correlated with PL values ($P<0.05$). **Conclusion.** In conclusion, the present study demonstrates the effectiveness of tactical strategy on the position-specific load. Therefore, coaches should consider the game strategy to select the accurate player for the position and specify their training plan.

KEYWORDS: ***Soccer, Strategy, Time Motion, Player Load, Performance Analysis.***

INTRODUCTION

In soccer, the strategy can be defined as the overall game plan combining the offensive and defensive targets of the team (1). In other words, it is the playing style incorporating the interaction between team and player tactics before the game (2). With this characteristic, a rapid increase was observed in the game tempo and the changing game strategies in the last decade (3, 4). In previous studies comparing the former seasons and the current one, it was observed that there was a significant increase in the sprint and high-intensity running distances (5-7). Physical activity positively contributes to soccer results (8), whereas several others reported that the influence of technical capacity is more significant (9). Nowadays, independently from the tactical formations, it is thought that combining the physical and technical data with the tactics would yield better results in soccer depending on playing based rapid transition games. For this reason, it was reported that examining the teams from tactical and strategic aspects would be more efficient for understanding the effectiveness of positions (10, 11).

The kinematic analysis incorporating technological instruments such as Global Positioning System (GPS) and multiple video systems is one of the multipurpose instruments used in physically measuring the movements of soccer players during the game, as well as determining the training load (12, 13). The running distances at different speeds, such as total running distance, acceleration and deceleration, direction changes, high-intensity running, and sprints, can be measured during the game (14). Many teams started using this

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system in official competitions upon FIFA's approval to use a GPS tracking system in the official games in the year 2015 (15).

In the previous studies analyzing the soccer movements, it was reported that soccer players performed approx. 150-250 different movements and changed their directions approx. 1100 times during a game (5, 13). Besides that, previous studies also stated that a soccer player runs approx. 10-13 km during a game, soccer players differ in physical and physiological aspects depending on their positions, and their physical activity ranges between 4 and 6 seconds (16-19). Another critical physical factor is the movement pattern regarding the acceleration, deceleration, and momentum that soccer players frequently use during competition. In previous studies carried out in recent years, it was concluded that the metabolic effect of acceleration is higher than that of high-intensity running distance and that the metabolic load of a player further increases depending on the acceleration even if the player runs at the low speed (20).

From the physiological aspect, it was stated in a previous study that the workload of soccer players during a soccer game equals 85% of maximal heart rate (21), and their blood lactate levels may vary between 2 and 10 mmol (22, 23). However, it was also found that the young players' average blood lactate level is close to 4 mmol (23). These data are directly proportional to the mean heart rate and suggest that the physiological data in the soccer are at the level of the lactate threshold.

In conclusion, although the physiological and physical requirements that are specific to the soccer were specified (24), it is attention-grabbing that, to the best of our knowledge, the number of studies on the physical and physiological performance analyses in 11v11 game format and those considering the tactics and positions is limited (10).

The present study aimed to compare the physical, technical, and physiological parameters of elite-level soccer players by their positions in the counterattack and ball possession strategies within the frame of 11v11 fixed team formation ("4-2-3-1"). The multidimensional performance analyses for this purpose are of significant importance since they would guide the trainers in planning the players by their positions and assigning them. Thus, the players' capacities can be optimized, and their in-game performance can be improved.

MATERIALS AND METHODS

Participants. In this study, 80 players in U21 and U17 age groups and playing in the soccer academy of a Turkish Super League club in the 2018-2019 Season were involved (mean age:19.35 ± 1.6 years, height: 179.4 ± 2.3 cm, weight: 75.6 ± 4.1 kg; M ± SD). The study group consists of soccer players training five days a week (2 hours per day) and playing in an official competition once a week. As selection criteria for the players, the participants were required to have a minimum 5-year training experience and to be at the same competitive level. The players were divided into five groups center-back (CB), wingback (WNB), center midfield (MC), wing (WNG), and striker (ST). The distribution of players by their positions is shown in Table 1. The goalkeepers were excluded from this study. All the players and trainers were informed about this study's procedure, necessities, benefits, and risks. For the players younger than 18-year-old, parents' written consent was obtained. The health status of the players before the training was evaluated and approved by the club's physician and physiotherapist. The study protocol followed the guidelines stated in the Declaration of Helsinki and was approved by the Ethics Committee of the School of Medicine of Marmara University (Protocol No: 09.2017.731).

Table 1. The seasonal distribution of players and games by the game strategies

Strategy and Month (Games), No = 80	CB	WNB	MC	WNG	ST
Ball Possession					
August (2 games)	4	4	6	4	2
November (1 game)	2	2	3	2	1
March (2 games)	4	4	6	4	2
May (3 games)	6	6	9	6	3
Counter Attack					
August (2 games)	4	4	6	4	2
November (1 game)	2	2	3	2	1
March (2 games)	4	4	6	4	2
May (3 games)	6	6	9	6	3

Experimental Design. The present study was carried out during the 2018-2019 season's competition period in 4 different parts (August, November, March, and May). Moreover, two different strategies based on the structure of this study were applied by eight teams in 8 training games (Table 1). Before each game, a 25-min goal-oriented warm-up was implemented, and a "11v11" training game (2x20min) was played on 2/3 (90x68m) of an artificial turf field. During the study period, the team formation was maintained as 4-2-3-1, which is a popular system today. The strategies were designed as "Depth in Defense and Counterattack (CA)" and "Possession of Ball and Defense as a Team (BP)." In the CA strategy, the teams were asked to drawback to their half-field, which is called the pressure zone of the team, and then to press at that zone and perform a fast attack with the ball. However, in the BP strategy, the teams were asked to attack by possessing the ball and then regain the ball by pressing where they lost it. In order to ensure the continuity of the game, the balls having the same features (Nike Turkish Super League Ball) were placed on all the edges of the field, and the game was not let stop. 2. The players were not exposed to a heavy exercise until 24 hours before the training, and no official game was played during the 72 hours.

Data Collection. All the participants' body heights and weights were measured at the beginning of this study. Each of the eight training games was planned to take 2x20 minutes and then recorded using a camera (Sony CX625 Exmor R® CMOS Handycam G Lens) position at a place that enables the entire field to see the entire field. GPS recorded the spatial-temporal data at a 10Hz sampling rate (Catapult Team Sport 5.0 GPS). A GPS device was attached to the back of the players by using a suitable belt. The validity and reliability of >10 Hz GPS systems have been reported in previous studies (25, 26). The players' physiological, physical, and technical data were recorded at the 10-min halftime and the end of the game, and the mean values were calculated.

Data Analysis. Physiological Data. Heart rate (HR): It was reported that players' heart rates provide reliable physiological and physical data (27)**.** The players' mean and maximum heart rate (bpm) data were gathered using a GPS.

Lactate: It was thought that using only the heart rate data in assessing the metabolic effects would not be enough due to the factors increasing the heart rate, such as dehydration and mental stress (28), and the effects of results would be increased by making use of data obtained from the blood lactate measurement. Moreover, the previous studies also observed that the blood lactate level is directly proportional to aerobic endurance, total running distance, and heart rate data (23, 29). Thus, the blood lactate levels of the players were measured by taking the blood samples from the finger 1 minute after the end of every half and using the Lactate Scout Laktat Analyzer device (23).

Rate of perceived exertion (RPE): This is a method introduced by (30) and allows determining the severity of training by making use of the player's answer to the question "how was your workout." In the present study, the modified 10-point RPE (31) was employed, and the load on players at the end of the training was determined by asking them to rate the severity between 1 and 10. It was reported that this value could be determined before or after the 30-min period after the load (31). Therefore, the fatigue index of players was determined at the end of each break, when the resting HR is at the lowest level. The direct proportion of RPE with HR, blood lactate, and ventilation data enable positive results in the aerobic endurance of athletes (32).

Physical and Technical Data. The physical and technical data determined in the present study were gathered in parallel with the literature (13, 18, 33, 34).

The physical parameters were total distance (TD), high intensity (HIR) (19-24km/h) running distance and number, sprint (24 km/h and higher) running distance and number, maximum speed, and player load. All the data were gathered using a GPS tracking system. Considering the similar studies in the literature, the distance run was divided by the time, during which the ball stayed in the game. Since the game did not stop in the present study, the in-game time of the ball was 40 minutes.

Player Load (PL): This term developed by Catapult Team Sport 5.0 is about the acceleration of players. PL is calculated by dividing the sudden change of players' acceleration in 3 different axes (anterior-posterior, vertical, and medial-lateral) by a specific scale (26). In physics, the sudden change in acceleration refers to shock, which is a derivative of acceleration. The formula is below, where ay means forward, ax means

sideway (medial-lateral), az means vertical acceleration, and t refers to time.

$$PlayerLoad^{TM} = \sqrt{\frac{(a_{y(t)} - a_{y(t-1)})^2 + (a_{x(t)} - a_{x(t-1)})^2 + (a_{z(t)} - a_{z(t-1)})^2}{100}}$$

The validity and reliability of the fact that PL accurately determines the change of external load on the player, especially in narrow space, was proven in a short time (26)**.**

Technical Data: they were determined to be ball retention (ball possession time divided by the number of touching the ball), number of accurate passing, number of regaining possession (tackle + interception), dribbling (decreasing man or dribbling for longer than 4 seconds), and the number of shots. Mathball game analysis software was used in analyzing the technical data.

Statistical Analysis. NCSS (Number Cruncher Statistical System) 2007 (Kaysville, Utah, USA) software was used in statistical analyses. The descriptive statistical methods (mean values, standard deviation, frequency, percentage, minimum, and maximum) were used in analyzing the study data. The normal distribution of quantitative data was tested using the Shapiro-Wilk test (along with the coefficients of skewness and kurtosis and performing the visual analysis of box-plots, normal q-q plots, and histograms) and graphical methods. The intergroup comparisons of normally distributed quantitative data were performed using an independent samples t-test. Effect size (ES) was used in determining the size of the effect of strategy on the differences (35). The sizes (36) were classified as (<0.2), small (>0.2-0.6), moderate (>0.6-1.2), large (>1.2-2.0), and very large (2.0-4.0). Pearson's correlation analysis was used to determine the level of relationship between the qualitative parameters. The statistical significance was set at P<0.05.

RESULTS

Physiological, Physical, and Technical Variables. The strategies' physiological and physical data analysis is shown in Tables 2 and 3. RPE value shows a statistically significant difference between the positions (except for the center-forward) by the strategies (P < 0.05), and the effect is at a moderate level in WNBs and a high level in the other positions (Table 2). HR value in WNB and WNG players with moderate effect size (WNB: P=0.007 ES:1.023; WNG: P=0.013, ES:0.939) and max HR data in MC (ES=medium) and in ST (ES=very large) players differ significantly by the strategies. From the physical aspect, the PL value showed a statistically significant difference between all the positions by the strategies (P<0.05) but the size of the effect was extensive only in ST (ES=1.920) and moderated in the other positions. Statistical significance was found only in HIR number in CB (P=0.017, ES=moderate), whereas a significant difference was observed in max speed (P=0.045, ES=small) and PL (P=0.007, ES=moderate) in MC players. In WNG, statistically significant differences were observed in all the physical data (P<0.05). The effect size was moderate in TD value and large in other data. In ST, large effect sizes and statistically significant differences were observed in all the physical data, except for TD (Table 3).

The technical data are presented in Table 4; passing, ball regaining, dribbling, and shot data showed statistically significant differences between all the positions by the strategies (P<0.05). The effect size of the strategy is large in the number of passing for MCs (ES=1.615) and moderate in other data (ES>0.6-1.2). In ST position, the strategy affects all the data at a high level (>1.2-4.0). In the ball retention ratio, statistically significant differences were observed among the wing players (WNB: ES: Large, P<0.001 and WNG: P=0.003, ES: Moderate).

Since all the variables showed statistically significant differences between the strategies, the PL variable was taken into Pearson's correlation analysis and other physiological, physical, and tactical variables. There is no correlation between lactate and PL by the positions (p>0.05). However, the highest levels of difference were observed in HR, HIR, and sprint numbers by the positions (Figures 1, 2, and 3). The angle of values of WNG and ST positions presented in the graph suggests a positive correlation between PL and HR, sprint, and HIR numbers.

Table 2. Analysis of the physiological parameters by the strategies and positions

	Strategy			
Position	**BP**	**CA**	**[a]p**	**d**
Lactate				
CB	5.04 ± 0.85	5.79 ± 1.35	0.067	0.665
WNB	6.98 ± 1.45	7.85 ± 1.48	0.107	0.594
MC	7.08 ± 1.47	6.91 ± 1.41	0.682	0.118
WNG	7.73 ± 2.18	8.73 ± 0.93	0.101	0.597
ST	7.13 ± 2.15	7.49 ± 1.47	0.695	0.195
HR				
CB	162.28 ± 8.65	163.75 ± 6.19	0.585	0.195
WNB	176.38 ± 6.26	182.44 ± 5.57	0.007**	1.023
MC	175.58 ± 8.06	174.92 ± 6.60	0.755	0.089
WNG	178.31 ± 6.28	183.25 ± 3.98	0.013*	0.939
ST	171.69 ± 5.07	176.00 ± 4.82	0.103	0.871
Max HR				
CB	186.59 ± 10.81	184.56 ± 9.52	0.577	0.199
WNB	204.72 ± 8.08	201.19 ± 8.37	0.234	0.429
MC	197.31 ± 8.72	189.67 ± 9.50	0.006**	0.838
WNG	195.19 ± 7.84	198.75 ± 8.06	0.215	0.448
ST	186.75 ± 1.98	195.25 ± 5.51	0.001**	2.053
RPE				
CB	7.38 ± 0.43	6.44 ± 0.44	<0.001**	2.161
WNB	7.16 ± 0.75	7.91 ± 0.64	0.005**	1.075
MC	7.63 ± 0.63	6.60 ± 0.53	<0.001**	1.769
WNG	7.16 ± 0.77	8.03 ± 0.64	0.002**	1.228
ST	7.31 ± 0.37	7.31 ± 0.53	0.999	0

Table 3. Analysis of the physical parameters by the strategies and positions

	Strategy			
Position	**BP**	**CA**	**[a]p**	**d**
TD				
CB	102.88 ± 10.18	100.55 ± 6.41	0.444	0.274
WNB	114.8 ± 9.55	116.03 ± 5.52	0.658	0.158
MC	122.87 ± 9.07	129.44 ± 9.14	0.016*	0.721
WNG	112.28 ± 8.67	118.09 ± 6.96	0.045*	0.739
ST	111.86 ± 11.07	115.99 ± 6.51	0.378	0.455
HIR				
CB	1.63 ± 1.09	1.01 ± 0.69	0.064	0.679
WNB	4.54 ± 1.34	4.68 ± 0.94	0.724	0.121
MC	1.99 ± 1	2.11 ± 0.7	0.644	0.139
WNG	3.48 ± 0.94	4.71 ± 0.83	<0.001**	1.387
ST	2.56 ± 0.76	4.73 ± 0.54	<0.001**	3.291
Number of HIR				
CB	6.06 ± 3.86	3.38 ± 1.75	0.017*	0.894
WNB	16.06 ± 4.60	16.75 ± 4.31	0.666	0.155
MC	6.54 ± 2.60	7.88 ± 2.36	0.07	0.540
WNG	11.00 ± 2.90	16.00 ± 3.65	<0.001**	1.517
ST	8.63 ± 2.07	15.88 ± 2.10	<0.001**	3.477
Sprint				
CB	1.12 ± 1.34	0.58 ± 0.31	0.129	0.555
WNB	3.2 ± 1.19	4.5 ± 1.54	0.012*	0.944
MC	1.04 ± 0.81	1.14 ± 0.82	0.676	0.123
WNG	1.82 ± 0.6	4.97 ± 1.63	<0.001**	2.564
ST	1.65 ± 0.2	3.94 ± 0.63	<0.001**	4.899
Number of Sprint				
CB	3.63 ± 4.05	1.88 ± 1.26	0.109	0.583
WNB	8.88 ± 3.07	13.88 ± 5.06	0.002**	1.194
MC	3.00 ± 1.22	3.50 ± 2.02	0.305	0.299
WNG	4.88 ± 0.96	14.56 ± 5.51	<0.001**	2.447
ST	5.50 ± 1.41	11.25 ± 1.16	<0.001**	4.453
Max Speed				
CB	24.06 ± 2.41	23.22 ± 1.40	0.235	0.426
WNB	28.97 ± 1.56	30.47 ± 0.87	0.002**	1.188
MC	25.08 ± 1.49	26.00 ± 1.59	0.045*	0.597
WNG	27.66 ± 0.94	30.03 ± 1.28	<0.001**	2.110
ST	27.75 ± 1.28	29.50 ± 1.49	0.024*	1.260
Player Load				
CB	5.56 ± 0.73	4.91 ± 0.61	0.010**	0.966
WNB	6.06 ± 0.6	6.63 ± 0.48	0.005**	1.049
MC	6.4 ± 0.62	6.83 ± 0.42	0.007**	0.812
WNG	6.08 ± 0.52	6.53 ± 0.46	0.014*	0.917
ST	5.32 ± 0.47	6.07 ± 0.29	0.002**	1.920

Table 4. Analysis of the technical parameters by the strategies and positions

	Strategy			
Position	**BP**	**CA**	**[a]p**	**d**
Ball Possession				
CB	121.19 ± 36.24	46.19 ± 15.30	<0.001**	2.696
WNB	113.69 ± 35.91	83.81 ± 19.55	0.007**	1.033
MC	142.04 ± 43.37	78.29 ± 23.59	<0.001**	1.826
WNG	98.25 ± 17.06	98.63 ± 16.93	0.951	0.022
ST	68.25 ± 23.37	76.63 ± 14.00	0.399	0.435
Ball Touches				
CB	63.31 ± 17.61	23.06 ± 4.31	<0.001**	3.139
WNB	59.75 ± 23.45	31.00 ± 9.19	<0.001**	2.862
MC	67.88 ± 23.73	34.75 ± 7.80	<0.001**	1.875
WNG	48.88 ± 15.31	36.69 ± 6.75	0.007**	1.030
ST	34.00 ± 9.29	30.88 ± 3.23	0.384	0.448
Ball Retention				
CB	1.97 ± 0.63	2.02 ± 0.60	0.823	0.081
WNB	2.00 ± 0.36	2.81 ± 0.66	<0.001**	1.523
MC	2.18 ± 0.43	2.28 ± 0.64	0.525	0.183
WNG	2.15 ± 0.59	2.73 ± 0.41	0.003**	1.142
ST	2.07 ± 0.71	2.48 ± 0.33	0.166	0.740
Passes				
CB	43.88 ± 10.93	14.00 ± 3.27	<0.001**	3.704
WNB	34.06 ± 14.31	20.75 ± 4.8	0.001**	1.247
MC	56.13 ± 23.84	27.42 ± 7.95	<0.001**	1.615
WNG	28.44 ± 10.47	17.13 ± 3.14	<0.001**	1.463
ST	24.63 ± 14.09	11.13 ± 2.30	0.018*	1.337
Regaining Possession				
CB	7.31 ± 2.24	9.44 ± 1.55	0.004**	1.106
WNB	6.31 ± 1.89	8.00 ± 1.86	0.016*	0.901
MC	8.13 ± 2.33	6.29 ± 2.77	0.017*	0.719
WNG	6.63 ± 2.45	2.56 ± 0.63	<0.001**	2.275
ST	5.63 ± 2.67	2.13 ± 0.35	0.002**	1.838
Dribbling				
WNB	6.06 ± 2.84	9.25 ± 1.77	0.001**	1.348
MC	2.88 ± 1.08	4.75 ± 2.88	0.004**	0.860
WNG	6.44 ± 2.22	13.19 ± 2.93	<0.001**	2.597
ST	4.75 ± 2.12	11.63 ± 2.62	<0.001**	2.887
Cross				
WNB	4.69 ± 1.49	5.19 ± 1.83	0.404	0.299
WNG	3.81 ± 1.38	4.31 ± 1.25	0.291	0.379
Shot				
MC	2.46 ± 0.93	4.04 ± 2.12	0.002**	0.965
WNG	4.44 ± 1.36	5.69 ± 1.08	0.007**	1.017
ST	6.25 ± 2.12	12.00 ± 2.14	<0.001**	2.699

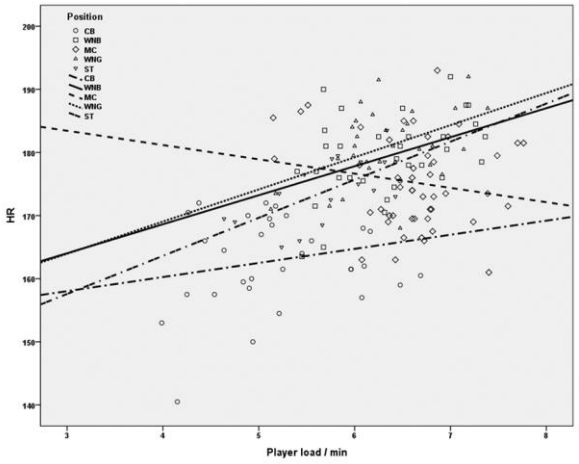

Figure 1. Correlation of Player Load and HR by the positions

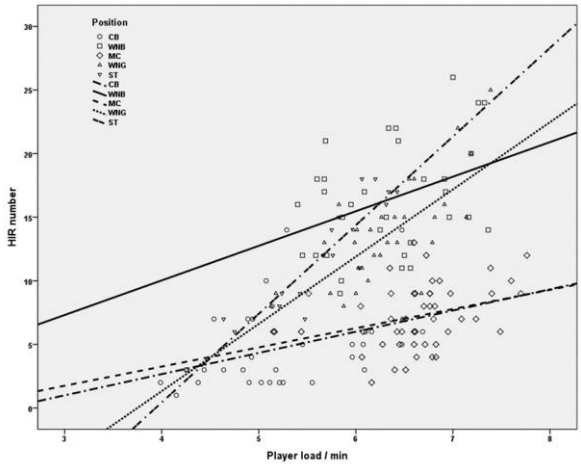

Figure 2. Correlation of Player Load and HIR number by the positions

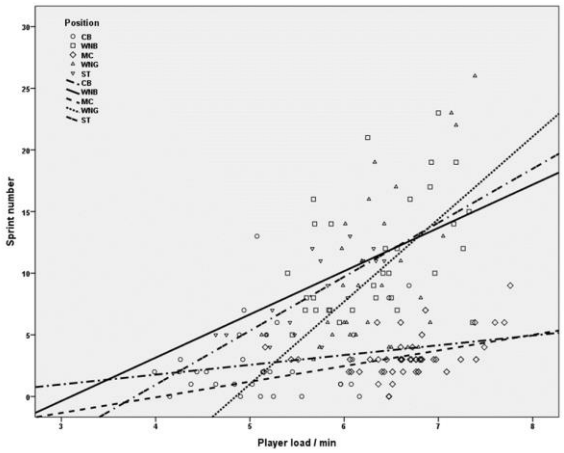

Figure 3. Correlation of Player Load and Sprint number by the positions

DISCUSSION

In the present study, players' physiological, physical, and technical parameters in all the positions in different strategies were individually discussed based on the 11v11 format and specifically to the soccer rules, and the interactions between these variables were investigated. Although various studies have been carried out on team formation (34, 37) and ball possession ratios (9, 38) in the last decade, many studies examining the specific qualifications for the strategies and positions are limited. Previous studies also drew attention to this point (10). The present study is critical because it is the first study carried out specific to 11v11 format and soccer rules and within the frame of inter-position performance criteria.

The main finding of this study is that it was hypothetically determined and proven with the facts that, in soccer, there would be differences between the loads on players in the same team formation (4-2-3-1) but different strategies (BP and CA) depending on their position. Besides that, as reported in the present study and some of the previous studies, it can be said that the technical data would cover all the factors which bring success when combined with physical and physiological data (39).

Centrebacks. The positions of these players do not change, and they are generally at the center zone even when the game strategy changes. Analyzing the results, it can be seen that they ran shorter distances during the competition and performed high-intensity runs at the lowest number. From this aspect, the present study corroborates with the literature (4, 18). Although there was no difference in CB players' other physical and physiological requirements, statistically significant differences were found in RPE (ES: extensive) and PL (ES: moderate) values. In a similar study, it was reported that there were differences based on the acceleration, although the physical data of CB players showed similarities (11). Since the BP strategy is based on passing and support, CB players defend a more extensive zone and need to accelerate and decelerate to fulfill their duty constantly. This increases the number of acceleration and causes significant differences between the strategies in PL. The non-significant but remarkable increase in the number of HIR (BP: 6.06±3.86; CA: 3.38±1.75) and the correlation of PL with the number of HIR and maximum heart rate found in the correlation analysis also corroborate this. Considering that the significant increase in PL values causes metabolic fatigue (40), it shows parallelism with the variability of RPE values. From the technical aspect, the effect size of the strategy draws attention (ES: passing; ES: high for dribbling; ES: moderate for regaining possession). In general, the differences between the number of passing and overall time of playing with the ball were reported in a similar study for the CB players (4). Moreover, since the player's objective in CA strategy is to regain possession in his half field, the ball comes to Zone 1 more frequently, and it explains the increase in the CB players' number of regaining the ball.

Wingbacks. The physiological and physical variables of players in WNB position (except for several parameters) show remarkable variance with the moderate effect of strategies (Tables 2 and 3), and it suggests that this position requires specific qualifications depending on the strategy employed. Since the number and distance of sprint of WNB players in CA strategy, the load on the players in this zone increases. With the strategy's moderate level effect, a 1mmol increase in the blood lactate level corroborates this theory (BP: 6.98, CA: 7.85). The correlation of PL value with HR, HIR, and sprint numbers corroborates the increase in load due to the acceleration. In similar studies, it was reported that the back players have longer sprint distances and higher sprint numbers (8, 34). However, these data overlap with CB in the present study but not MC and WNB players. This relates to the reaction that the player will show depending on the score

since he plays with the same strategy throughout the game. The WNB players may not prefer supporting the team's offensive actions after gaining the score advantage, and their sprint values may decrease. From technical data, the strategies' moderate and high levels of effectiveness can be seen among the WNB players (Table 4). They pass the ball more in the BP strategy, whereas the CA strategy's ball retention rates and dribbling numbers are higher. The significant increase in ball regaining in Zone 1 in the CA strategy emphasizes the importance of this fact.

Midfielders. They show similarity with CB players since their ball retention rates are the same, and the effect of the strategy is insignificant, although they have longer ball possession time and higher ball possession numbers. MC players have to touch the ball more since they are the bridge between defense and offense players in the BP strategy. The high number of passing is corroborated in the present study. In similar studies, it was determined that the teams' rate of ball possession positively influenced the same technical data of MC players (39, 40). The importance of pressure in Zone 2 in the BP strategy is explained by the difference in MC players' number of ball regaining. In the CA strategy, possessing the ball for a shorter time and fast passing Zone 2 affect the players' number of HIR and sprint at a moderate level, and it caused a significant increase by affecting the RPE values at a high level. Higher PL values in BP strategy and the correlation of this value with HR, HIR, and sprint numbers affirm this conclusion. In this parallel, it was reported that MC players have high PL rates because they have responsibilities requiring maneuverability (41). The significant difference in the number of dribbling in CA strategy emphasizes the open area game.

Wingers. WNG players have longer high-intensity (HIR+Sprint) running distances and higher numbers in the CA strategy, and their maximum speed reaches up to 30km/h. These values suggest that the load on this position increased with a 1mmol increase in blood lactate level (BP=7.73mmol, CA= 8.73 mmol) and the significant difference in mean heart rates and the moderate level effect of strategy. This conclusion explains the correlation with PL in HR, maximum HR, HIR, sprint numbers, and several dribbling. In general, most previous studies reported that the winger players have longer distances and a higher number of high-intensity running (11, 14). However, in analyzing the World Cup 2014, it was determined that, together with the decrease in ball possession rates, the strikers had longer high-intensity running distances. However, the data was not statistically significant, and the factor influencing the result was the number of entries to Zone 3 and finalization (39). In this parallel, the moderate increase in the number of shots corroborates the fast finalization of attacks, which lays the foundation of this strategy. With the moderate level effect of strategy on the ball retention rate, the number of dribbling doubles. In today's soccer, the numbers of passing, dribbling, crossing, and shots were observed to increase between the 2006 and 2013 Premier League seasons and in World cups for the last 40 years (6, 7). As with the midfield players in BP strategy, the significant increase in the number of regaining the ball compared to CA (ES: very high) stresses the importance of regaining the ball in Zones 2 and 3.

Strikers. Among the players in the ST position, the physiological effect of the strategy is very high on HR and almost zero on RPE (ES for Max HR:2.053, ES for RPE:0). However, the physical data show similarity with WNB, and the effect of strategy on all the physical data, except for TD, is at a very high level. It was observed that PL data showed differences, and a load of physical activity increased in CA strategy because of the acceleration. Furthermore, the correlation of ST players' PL value with almost all the variables explains the load effects on the players. These data are supported by the significant increase in players' maximum speeds and maximum HR values. The differences at a maximum speed correspond to the complete acceleration and long-distance of high-intensity running (13). For this reason, the indifference between the physiological requirements of the players should be evaluated together with the increase in the physical requirements. The counterattack game requiring a high level of effort in large areas increased the high-intensity and acceleration-based physical load on strikers. In the CA strategy, this conclusion is corroborated by the fact that the maximum heart rates of strikers reached up to approx. 195 bpm. It was reported in previous studies that the HR and sprint distances of strikers in the Premier League and UEFA European League are at a high level, especially during the offensive action (9, 13). From the technical aspect, the remarkable increase in the

number of dribbling in the CA strategy highlights the characteristics of playing on a large area and decreasing men, as in the WNG.

Moreover, the increase in the number of shots in CA strategy with high ES value again underlines the most important factor affecting the score. Although players in ST position play at the same tempo in both strategies, the importance of their role in the transition to attack becomes more prominent in the CA strategy. It was reported that the most critical factor influencing the score more than ball possession and several passing do while playing against equivalent opponents in the UEFA Champions League is the number of shots on target (38). A previous study reported that the increase of ST players' increasing high-intensity running distance and number of shots on the target English Premier League (9) and the increase of strikers' running speed by approx. 0.1 km/h in Bundesliga (11) positively contributed to the score. In the BP strategy, however, the significant difference arising from the high level of effect on the numbers of passing and ball regaining highlights the importance of high passing and pressure quality of players in Zone 3.

The present study sample is limited to the U21 players having an education at the Turkish Super League football academy. Moreover, the measurements were not made during the official competition but in training games. The present study should be supported with measurements in official competitions at the professional level.

CONCLUSION

In the present study, it was revealed that there are differences between the positions in soccer in terms of specific physical, physiological, and technical parameters depending on the strategy. These findings suggest that the main practical conclusion to be drawn from this study for coaches and strength-conditioning professionals is that these requirements arising depending on the differences between playing strategies necessitate for trainers to select the players by considering the position and plan the training within the frame of specialization principle.

In conclusion, the analysis data showed that the players' physical, physiological, and tactical loads depend on their positions, and these data may vary between the strategies depending on the positions of the strategy. It will enable the trainers to maximize the training according to the planned strategy and select the players by considering the tactical roles assigned to them.

APPLICABLE REMARKS

- From this aspect, the requirements of each position were separately examined.
- Acceleration-based physical fatigue should be considered for CB, faster center-back players with higher quality and technique of passing for BP strategy, and center-back players with a higher rate of a win in the man-to-man competition for CA strategy.
- For the WNG players, the physical and physiological load on the players is higher in CA strategy, and from the technical aspect, these players with a higher rate of ball regaining and being capable of decreasing man by running a distance with a ball in the open area are believed to play a more critical role thanks to the CA strategy.
- The high number of MC players' positive passing in the BP strategy highlights the importance of players' passing quality in this strategy.
- Moreover, the significant difference between the numbers of ball regaining emphasizes the importance of MC players' ability to regain the ball, in contrast with the back and center-back players.
- Among the WNG players, the physical and physiological loads vary significantly because of the strong effect of strategy.
- Since the WNG players can tolerate, the loads mentioned above, the player selection and the training design are essential.
- Moreover, the increase in the number of shots, which is the most critical factor affecting the score in the CA strategy, should be considered in planning the training aiming to improve the capacity of players who play in this field to finalize the action.
- Several fundamental factors such as regaining the ball and quality of passing should be considered while selecting the wing players suitable for the BP game.
- For the ST position, the effect of strategy for the specified parameters is at the highest level.
- In the CA strategy, the physical and technical qualifications such as running distance in large areas and decreasing man should be combined with high-quality shots.
- In the BP game, the most prominent qualification is the ability to pass, pressure-based ball regaining, and shooting.

- In both strategies, the finalization capability of ST players should be improved as for WNG players.

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