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Research Article

Body Composıtıon Assessment of Adult Football Players Before and Wıthın the Covıd-19 Pandemıc Process and Comparıng Between Leagues

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Abstract

Introduction and Aim: It is known that the anthropometry values of professional football players is very important in the return period of the players to the field, in catching his previous performance, in injury risk and performance outcomes. The aim of this study is to determine the effects of interim decisions given to leagues on body composition of professional football players and to compare the differences between leagues.

Method: This study was planned as a retrospective analysis of the body composition data (2019-2020 season) on totaly 50 professional football players aged between 18-35 with similar demographic characterictics who are playing at a football clubs in Türkish Football Federation Super League (n = 25) and 1th League (n = 25). The anthropometric data were taken with the same method periodically every month in both teams throughout the season. Anthropometric measurements of individuals were evaluated at the beginning of the season (August 2019), before the pandemic began (February 2020) and immediately after the break given to the leagues (June 2020).

Results: Body fat percentages of the super League team at the beginning of the season, before and after the pandemic were %7.60 ± 1.51, %7.56 ± 1.41, %7.57 ± 1.51, respectively ($p > 0.05$). Body fat percentages of the 1th league team were determined as %7.23 ± 0.85, %7.06 ± 0.84, %7.54 ± 1.18, respectively. The difference between the measurements of before and after the pandemic is statistically significant in 1th league team ($p < 0.05$). Body fat percentage averages of both teams are similar for the same period data ($p > 0.05$).

Conclusion: In this study; It has been observed that changes in body composition in professional football players during the interim period given within the scope of COVID-19 measures. For this reason, it is thought that individual nutritional counseling for players during the pandemic process that is predicted to continue can be effective.

Keywords: Pandemic; Anthropometry; Soccer; Nutrition

Introduction

The severe acute respiratory syndrome caused by the virus named COVID-19, which was detected in Wuhan, China for the first time in December 2019, has become a pandemic. The virus spread rapidly across the country and then all over the world [1], leading to an unprecedented outbreak [2], forcing governments to mandate a global lockdown. At the beginning of 2020 (January-March), an indefinite lockdown period has been entered by all world govern-

ments, during which all sports events are gradually postponed and all sorts of organizations are prohibited [3]. Due to the increase in COVID-19 cases in the sports sector and the anxiety of experiencing an unknown period, Organizations, national championships, and world championships in many sports branches have been canceled or postponed. UEFA has decided to postpone all Champions League matches and European League matches to the next year. NBA matches were postponed for a while, and Formula 1 races were canceled. The Tokyo Olympic Games-2020 were postponed to 2021, while the Wimbledon Tennis Tournament in the UK was canceled for the first time. The European Volleyball Confederation (CEV) postponed the club, national team, and beach volleyball organizations in 2019/2020 volleyball season to 2021, and Turkey suspended leagues in all sports branches for a while [4-7].

As a result of the decision made by the TR Ministry of Youth and Sports, the 2019-2020 season, which began in August 2019, was suspended on 19 March 2020. This break continued until June 2020, and in the meantime, which took 2.5-3 months, the athletes kept on their personalized training designed for them in the home setting. Although individual at-home workout plans-programs have been prepared, given the fact that the professional athletes who perform high-intensity and long-term individual and team training almost every day of the week, it is considered that these changes in daily activities might cause changes in the body composition of the athletes. Lockdown restrictions have brought along problems such as not being able to provide organized training, not providing a competitive environment, insufficient communication between athletes and their trainers-health professionals, as well as unfavorable training conditions [8,9].

Restriction of outdoor activities has led to changes in individuals' routine daily activities, including regular physical activity and exercise [10]. The lockdown situation causes the individual to stay away from her/his daily routine life, causing both a change in her/his mood and more sedentary life. The increase in the time spent at home, the news about the pandemic that is constantly listened to and watched, increased anxiety, the desire to consume food (specifically carbohydrate foods) due to mood, and the decrease in physical activity may lead to undesirable increases in body composition [11].

It is well-documented that the anthropometry values of professional soccer players who perform high-intensity long-term exercise programs are very effective in the return time of the athlete, in catching up with his/her old performance, in the risk of injury as well as in performance outcomes [12]. Hence, during this period, changes in body composition are of great importance for professional athletes. In today's world, where exercise and nutrition scheduling is of great importance and missing a few days may impact performance, the fact that the break given to the leagues started in the 7th week and that the break lasted for a long time may have adversely affected the 15-week intensive preparation process, including 8 weeks pre-season and 7 weeks during the season, until this period. Within this regard, the objective of the research is to determine the effects of the decision of the Ministry of Youth and Sports to suspend all sports competitions due to the measures taken within the scope of COVID-19 precautions in our country, on the body compositions of professional soccer players and to compare the differences between leagues.

Materials and Methods

This research was conducted during the Turkish Football Federation (TFF) 2019-2020 season with a total of 50 healthy male individuals aged between 18-35, consisting of 25 professional soccer players of a soccer (football) club in the TFF Super League and 25 professional soccer players of a soccer club in TFF 1st League with similar demographic characteristics. The group of athletes included in the study consists of soccer players who perform moderate-to-vigorous exercise 5-6 days a week for about 11 months of the year and compete once or twice a week. The study was designed as a retrospective analysis of the body composition data of these two football clubs for the TFF 2019-2020 football season. Athletes who had an injury during the break from the league and athletes aged under 18 years and over the age of 35 were excluded from the study. To determine the sociodemographic characteristics (age, marital status, educational status, etc.) of the individuals included in the research, a questionnaire form with multiple choice and/or open-ended questions was administered. The questionnaire was administered by the researcher with the individuals included in the study via face-to-face interview technique. The data used were taken by the researchers with the same method periodically every month during the season in both teams. Anthropometric measurements of individuals were analyzed by categorizing data as the beginning of the season (August 2019), before the start of the pandemic (February 2020), and just after the break given to the leagues (June 2020), based on the records.

Anthropometric measurements were performed on all individuals by the researcher. The body weight of the individuals was measured via a Tanita BC 418 brand body analyzer, which was calibrated with light clothing and shoes off, before breakfast after fasting at night, while height was measured with a Seca brand height meter (stadiometer) when the feet were side by side and the head was in the Frankfurt plane (eye triangle and the top of the auricle are parallel to the ground at the same level) [13]. Body fat percentage was calculated by measuring skinfold thicknesses from 7 regions (biceps, triceps, subscapular, chest, suprailiac, abdominal, and thigh) with Holtain LTD brand Skinfold Caliper, before breakfast and on the right side of the body, following overnight fasting. The measurement of skinfold thickness was performed by pulling the subcutaneous fat layer thickness between the thumb and forefinger slightly upwards to separate it from the muscle tissue. The caliper was placed nearly 1 cm away from the fingers with the gauge pointing upwards and the thickness of the subcutaneous fat layer grabbed was read from the gauge on the caliper and recorded in millimeters (mm). Measurements were repeated twice for each region and care was taken to ensure that the difference was not more than 2 millimeters. The body fat percentages of the individuals were calculated by inserting the recorded skinfold thicknesses into Erdal Zorba's 7-region fat percentage formula (formula 1) [10].

Formula 1: Percent Body Fat (VYY)= 0.990 + 0.0047 x (VA) + 0.132 x (sum of skinfold thickness in millimeters of 7 regions) [14]

Body fat mass and lean body mass were calculated by the researchers over bodyweight after calculating body fat percentage. For instance, for a soccer player with a bodyweight of 80 kg and a body fat percentage of 7.0%, Body Fat Mass was computed as 80 x 7% = 5.6 kg.

The software of the SPSS 17 statistical package program was used in Windows for the statistical analysis of the data. The significance level (odds of Type I error) was considered as $p< 0.05$ in the analyzes of all hypothesis tests. The data collected from continuous (quantitative) variables obtained by measurement within the scope of the research are presented as mean (X), and standard deviation (SD). Data obtained from categorical (qualitative) variables were summarized with numbers (N) and percentages (%). The non-parametric "Mann Whitney U test" was used for the comparison of the means of two independent groups for those who did not meet the normal distribution. For dependent samples, the "Wilcoxon t-test", which is the non-parametric equivalent of the t-test, was used.

Results

Data regarding body compositions of individuals at the beginning of the season, before the pandemic, and after the break given to the league, according to the teams are presented in table 1 and table 2.

	Beginning of season (August 2019) (N ±S D)	**Beginning of season (August 2019) (N ± SD)**	**Beginning of season (August 2019) (N ± SD)**
Mean body weight (kg)	77.92 ± 6.05	77.89 ± 5.92	78.54 ± 6.08
Mean body fat mass (kg)	5.96 ± 1.48	5.92 ± 1.39	5.99 ± 1.52
Mean lean body mass (kg)	71.95 ± 5.06	71.96 ± 4.97	72.54 ± 5.01
Mean body fat percentage (%)	7.60 ± 1.51	7.56 ± 1.41	7.57 ±1.51
p: Mann-Whitney U test			

Table 1: Mean body composition values of the super league team at the beginning of the season, before the pandemic, and after the break given to the league.

	Beginning of season (August 2019) (N ± SD)	**Beginning of season (August 2019) (N ± SD)**	**Beginning of season (August 2019) (N ± SD)**
Mean body weight (kg)	74.07 ± 4.82	74.07 ± 4.82	74.07 ± 4.82
Mean body fat mass (kg)	5.37 ± 0.89	5.37 ± 0.89	5.37 ± 0.89
Mean lean body mass (kg)	68.69 ± 4.09	68.69 ± 4.09	68.69 ± 4.09
Mean body fat percentage (%)	7.23 ± 0.85	7.23 ± 0.85	7.23 ± 0.85
p: Mann-Whitney U test			

Table 2: Mean body composition values of the 1st league team at the beginning of the season, before the pandemic, and after the break given to the league.

Regarding demographic characteristics, the mean age for the Super League team was 24.32 ± 3.38 years and the mean height was 180.84 ± 4.56 cm, while the mean age for the 1st League team was 22.56 ± 3.99 years and 181.16 ± 5.65 cm, respectively. The body compositions (body weight, body fat mass, lean body mass, body fat percentage) of the teams are tabulated in table 3. The mean body composition of the teams was determined to be similar ($p > 0.05$).

		Beginning of season (August 2019) (% ± SD)	Before the league break (February 2020) (% ± SD)	After the league break (June 2020) (% ± SD)	p
Body fat percentage (%)	Super League team	$7.60 \pm 1.51^{a,c}$	$7.56 \pm 1.41^{a,b}$	$7.57 \pm 1.51^{b,c}$	$^{a}p = 0.90$ $^{b}p = 0.88$ $^{c}p = 0.97$
	1st league team	$7.23 \pm 0.85^{x,y}$	$7.06 \pm 0.84^{x,*}$	$7.54 \pm 1.18^{*,y}$	$^{x}p = 0.74$ $^{*}p < 0.05$ $^{y}p = 0.21$
Lean body mass (kg)	Super League team	71.95 ± 5.06	71.96 ± 4.97*	72.54 ± 5.01*	*p < 0.05
	1st league team	68.69 ± 4.09	68.96 ± 4.13	68.73 ± 4.17	p > 0.05
Body fat mass (kg)	Super League team	5.96 ± 1.48	5.92 ± 1.39	5.99 ± 1.52	p > 0.05
	1st league team	5.37 ± 0.89	5.26 ± 0.83	5.62 ± 1.05	p > 0.05
p		p > 0.05	p > 0.05	p > 0.05	
p: Wilcoxon signed-rank test					

Table 3: Analysis of body compositions of individuals at the beginning of the season, before the pandemic, and after the break in the league.

According to table 3, the body fat percentages of the super league team at the beginning of the season, between the pandemic and before and after the pandemic was found to be 7.60 ± 1.51, 7.56% ± 1.41, 7.57 ± 1.51%, respectively, and the difference were not significant ($p > 0.05$). The body fat percentages of the other team in the first league were determined as 7.23 ± 0.85%, 7.06% ± 0.84%, and 7.54% ± 1.18%, respectively. The difference between the measurements of the first league team before and after the break given to the league was determined to be significant ($p < 0.05$). The lean body mass of the super league team at the beginning of the season, before and after the pandemic was 71.95 ± 5.06 kg, 71.96 ± 4.97 kg, 72.54 ± 5.01 kg, respectively, and the difference between before and after the break given to the league was significant ($p < 0.05$). On the other hand, in the 1st league team, the difference in lean body mass was not significant. The difference between the two teams in terms of body fat mass was not significant ($p > 0.05$). Body fat percentages of both teams for the same period were similar ($p > 0.05$).

Discussion

Due to the COVID-19 pandemic, the Turkish Football Federation's super league and 1st league competitions were suspended for about 3 months in the 2019-2020 season. Albeit the athletes are not considered in the risky group, it is well-known that the unexpected and unplanned break in the active competition period due to the pandemic and getting sick have an adverse impact on both the mental and athletic performance of the athletes [15,16]. In addition to catching the Covid-19 disease, due to reasons such as not being able to continue their training regularly, future anxiety, and uncertainty, an escalation has been also observed in the psychological problems of the athletes [17].

For athletes, COVID-19 not only causes health problems but may also disrupt training and competition programs [15,16]. The COVID-19 period is considerable in terms of interruptions in the training programs of athletes and adverse effects on the respira-

tory system and exercise capacity in the short/long term. Moreover, given the fact that professional athletes who do high-intensity and long-term team exercise in the training field 5-6 days a week, despite the implementation of personalized at-home workout plan-programs, it is predicted that these changes in daily activities might lead to changes in the body composition of the athletes.

With the decrease in the physical activity levels of the athletes due to the isolation and lockdown restrictions, the decreases in exercise performance and related parameters (body composition, etc.) occurred rapidly within weeks after the cessation of training. These losses in aerobic performance reduce cardiovascular function and metabolic potential in muscles. Specifically, significant decreases in VO2max have been reported within 2-4 weeks after cessation of training. Furthermore, initially, a rapid decrease in VO-2max, decrease in blood volume, changes in heart muscle, decrease in total hemoglobin content, decrease in capillaries in skeletal muscle, and deterioration in temperature regulation have been reported as well [18]. It is well-known that to protect the physical and mental well-being of the athletes during the period of the pandemic, recommendations such as performing a certain conditioning exercise routine at home (preventing significant decreases in VO2max by adding endurance work-outs to their exercises), giving importance to diet, meditation for mental health, and relaxation techniques have been given [19].

The body fat ratio of professional soccer players is required to be between 7-15% in males [20]. In this study, when the data at the beginning of the season are analyzed, it is seen that the football players in both the super and 1st league teams have the mean body fat percentage that they need to have. A significant increase was observed in the fat percentages of the players in the 1st league team due to the break due to the pandemic; however, this expected increase is not seen in the super league team. It is considered that the increase in the level of professionalism and the continuation of the personalized training and nutrition program during the competition period prevented this increase. In the study conducted by Spyrou K., *et al*. [21] with 10 elite futsal athletes, the effects of a 70-day break on performance outcomes and body composition were investigated, similar to this study. Ultimately, it was revealed that there was no significant difference in body composition before and after measurements, contrary to the findings of our study. Contrary to their hypothesis, the lack of significant difference between the measured periods was associated with the frequent routine checks of the team dietitian. In the study of Yasuda., *et al*. [22] with 43 elite level fencers (22 males, 21 females), body composition measurements immediately after the break (2 months) and 4 months later were compared with the measurements just before the break for the pandemic. As a result of the study, no significant difference was found in the body compositions of males, whereas the fat mass measured immediately after the break in females was determined to be significantly higher than before. In the next measurement, in the 4th Month, this difference is similar to before. Differences in lean body mass are insignificant.

Due to the limited number of studies on this subject during the period of the pandemic, other similarly planned studies were reviewed. In the study of Ormsbee., *et al*. [23] with swimmers, it was revealed that the body compositions of the participants were adversely impacted, similar to the results of this study, after more than a month of untrained break-term after the last competition of the season. Likewise, in the study of Koundourakis., *et al*. [24], it was demonstrated that body composition was negatively affected in the case of a 6-week training interruption, similar to this study.

The small sample size is one of the limitations of this study. Yet, this limitation is due to the fact that there is an average of 25-30 licensed athletes in a professional football team. Hence, the power of the study can be increased by raising the number of teams included in the study.

Conclusion

In the study, it was found out that there were changes in body compositions because of the change in physical activity levels and diets due to the break given within the scope of COVID-19 measures in professional soccer players who performed vigorous-intensity long-term exercise programs. It is well-documented that these changes are crucial in the athlete's return to the field, catching up with his previous performance, risk of injury, and performance output. Hence, it is considered that individual nutrition counseling and continuous monitoring for athletes during the period of the pandemic, which is expected to continue, could be effective in reducing the adverse effects that occur or will occur on body composition.

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