

Evaluation of nutritional status on football players' performance

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Abstract—Currently, one of the most popular sports in the world is football. Whatever their country of origin or location, elite and semi-professional and professional football players must have a variety of skills, including quickness, stamina, flexibility, dribbling ability, and the capacity to make split-second decisions while playing. **Result:** The prevalence of unhealthy habits in the nutritional pattern of young football players has shown its impact on their athletic performance and their body shapes, as 20.9% of the players were underweight and were suffering from thinness and were missing one of the main meals, especially breakfast, and they were consuming fast food that was rich in fat on a weekly basis. They rarely have access to sources of healthy fats, and their consumed of the amount of water during the day is not plentiful and not suitable for a young football player, and most of all, they did not have a nutritionist in the club to consult him and to plan meals and diets that are suitable for them. **Objective:** The main aim of the present study was to examine the effect of food consumption among football players and their effect on athletic performance. **Methods:** Correlational study was used in Derna - Libya, and samples were collected by voluntary technique. The total number of samples was 43 junior players in the Libyan Darence Club, and their ages ranged between 14-19 years. Their anthropometric measures were taken such as height, weight, hip circumference waist circumference. Data was collected on their eating habits, and a database was created on Microsoft Excel, then the social package of statistical science (SPSS) version 26 program was used for analysis. A value of $P < 0.05$ was interpreted as statistically significant. **Conclusion:** The target sample in the study was 43 young players, their average age was 16.53 (± 1.66), their height was 168.87 (± 9.6), and their weight was 60.97 (± 21.62). The study showed that the players did not eat a balanced diet that met their needs to perform the exercises to the fullest. It was also found that there was a lack of carbohydrate consumption, which is the main fuel for the body, while the consumed of large amounts of processed fats, oils and sugars. All of this is to be expected as long as there is no dietitian supervising of young players and their diet

Keywords; football players; Diet: BMI: weight: score.

I. Introduction

The energy for muscle contraction comes from the breakdown of ATP into adenosine diphosphate (ADP) and inorganic phosphate (Pi) by a particular muscle enzyme called myosin ATPase (1). The energy balance is "positive" and leads to weight gain when energy intake exceeds energy expenditure. The energy balance is "negative" and weight loss occurs when energy intake is lower than energy expenditure (2). The muscles and liver each hold between 300 and 500 g and 75 to 100 g of glycogen, respectively. This amount of carbohydrates allows for a 20-mile run at a moderate pace (3). The majority of the structural elements in muscle, as well as the brain, neurological system, blood, skin, and hair, are made of proteins. This crucial macronutrient is essential for maintaining fluid and acid-base balance in the body as well as acting as the body's transporter for iron, vitamins, minerals, lipids, and oxygen (4). In resistance and endurance training, protein plays crucial roles. Both forms of physical activity increase muscle protein synthesis (5). Particularly foods consumed before, during, and after exercise, should be a combination of carbohydrates and protein at about a 3:1 ratio (6). The amount of carbohydrates used during prolonged, difficult exercise is directly related to how much energy the working muscle requires. In contrast, there are fewer restrictions on how fat is used while exercising (7).

Fat loading, a nutritional strategy in which an athlete increases fat consumed in an effort to have a ready supply of fat as an energy source, has drawn attention, nevertheless (8). In order to maintain a healthy immune system, endurance athletes must consume enough vitamins and minerals in their diets (9, 10). More than 60% of athletes admitted to taking vitamins. The most often utilized supplements were those that included vitamin C (97.5%), vitamin E (78.3%), and multivitamins (52.2%), according to research (11). Athletes will not require vitamin and mineral supplements if they eat enough energy from a range of meals to maintain their body weight (12).

II. MATERIAL AND METHODS

A. Study Design:

Correlational study and descriptive design was used to conduct the study.

Study Setting:

Football players were selected from the youth academy of Darnes Club in Libya, using the intentional sampling technique.

B. Target Population:

From August 23, 2022, to September 21, 2022, the study's participants were young football players in the under-17 (U 17), and under-20 (U 20), age groups.

C. Sampling Design:

43 teenaged football players in all had their height, weight, waist, and hip circumferences measured. Following the measurement, the researcher used a questionnaire to gather information on the player's diet, eating habits, and overall health. The athlete was then observed during two-hour training sessions, and evaluated by the coach and sports director evaluation scale from 1 to 10, based on his performance, as well as his individual talents, standing, physical strength, and speed. The 24-hour recall was used to document the player's food for the previous 24 hours, including the three main meals and any in-between-meal snacks. Anthropometric Measurements Height and weight of each player were measured according to the methods described below: Weight was recorded to the nearest 0.1 kg. Height was measured using a stadiometer attached to scales to the nearest 0.5 cm. Body Mass Index (BMI) was calculated according to WHO. as shown in table 1.

Table 1: Classification of BMI according to WHO.

underweig ht	Norma l	overweigh t	Obes e	Sever obesity
<18.5	18.5 – 24.9	25 – 29.9	30 – 34.9	≥35

The waist-to-hip ratio (WHR) is found by dividing the waist circumference in centimeters by the hip circumference in centimeters. The formula is: $WHR = \text{waist circumference} / \text{hip circumference}$. The players were rated using the following categories, as shown in table 2

Table 2: Classification of WHR.

Excellent	Good	Average	At Risk
<0.85	0.85-0.89	0.90-0.95	≥0.95

The waist to height ratio (WHtR) is found by dividing the circumference of the waist in centimeters by the height in centimeters. The formula is $WHtR = \text{waist circumference} / \text{height}$. After that, the players were rated using the following categories, as shown in table 3

Table 3: Classification of WHtR.

Extremel y Slim	Healthy	Overweig ht	Very Overweigh t	Morbidl y Obese
≤0.42	0.43 to 0.52	0.53 to 0.57	0.58 to 0.62	+0.63

III. STATISTICAL ANALYSIS:

Results were originally represented as mean and standard deviation (\pm SD), in an Excel file. Using SPSS version 26, chi square calculations were made in order to examine the data. The descriptive statistics and X2 test are used to assess the association between categorical variable. A P- value < 0.05 was the criterion of statistical significant.

IV. RESULTS AND DISCUSSION

The total number of the sample was 43 players divided into two groups, players under 17 years old (U17) and players under 20 years old (U20). The U20 category constituted 51.2% of the sample, while the U17 category constituted 48.8 %. The mean age of the U17 players was 15.05 (\pm 0.65) while the U20 players had 17.95 (\pm 0.78). The majority of players were playing in the midfielder, 32.6%, and attackers, defenders and goalkeepers, 30.2%, 25.6%, and 11.6%, respectively, as shown in table 4.

Table 4: General characteristics of players.

Youth system	No.	%
Under-17y	21	48.8
Under-20y	22	51.2
Football Positions		
Defender	11	25.6
Forward	13	30.2
Goal Keeper	5	11.6
Midfielder	14	32.6
Total	43	100

The total mean age of the players was 16.53 (\pm 1.66), and the Mean height was 168.87 (\pm 9.6), while the weight and BMI represented 60.97 kg (\pm 21.62) and 21.3 kg/m², (\pm 7.065) respectively. On other hand The total mean of waist circumference, (WC), hip circumference (HC), WHR and WHtR were 75.6, (\pm 5.78) , 93.2, (\pm 6.75) , 0.81 (\pm 0.39) and 0.44, (\pm 0.0325) respectively as shown in table 5.

Table 5: Mean of anthropometric measurement of players according Youth system:

Variables	Mean		
	Total	U17	U20
Age	16.53 \pm 1.66	15.05 \pm 0.65	17.95 \pm 0.78
Height	168.87 \pm 9.6	164.76 \pm 10.5	172.78 \pm 6.9
Weight	60.97 \pm 21.62	52.44 \pm 10.8	69.11 \pm 26.1
BMI	21.3 \pm 7.065	19.17 \pm 2.5	23.28 \pm 9.22
WC	75.6 \pm 5.78	74.85 \pm 7.15	76.39 \pm 4.12
HC	93.2 \pm 6.75	90.03 \pm 6.82	96.20 \pm 5.24
WHR ratio	0.81 \pm 0.39	0.82 \pm 0.04	0.78 \pm 0.02
WHtR ratio	0.44 \pm 0.0325	0.45 \pm 0.03	0.44 \pm 0.03

According to Anthropometric measurements of players' positions, where the mean height of goalkeepers was 176.3 (\pm 5.9), while the mean height of defenders, midfielders and Forward was 166.3 (\pm 8.2), 168.0 (\pm 10.4), 169.0 (\pm 10.5), respectively. On the other hand, the midfield players had the highest mean of BMI 23.3 (\pm 11.7), as shown in table 6.

Table 6: Mean of anthropometric measurement of players according football positions.

Variables	Mean			
	Goal Keeper	Defender	Midfielder	Forward
Age	16.6 ± 2.4	16.3 ± 1.3	16.8 ± 1.7	16.4 ± 1.6
Height	176.3 ± 5.9	166.3 ± 8.2	168.0 ± 10.4	169.0 ± 10.5
Weight	72.0 ± 12.8	55.7 ± 8.9	65.9 ± 34.3	55.7 ± 9.9
BMI	23.0 ± 2.9	19.9 ± 2.1	23.3 ± 11.7	19.5 ± 2.7
WC	77.9 ± 7.1	75 ± 4.78	77 ± 6.5	73.4 ± 2.7
HC	99.6 ± 7.3	91.3 ± 5.4	93.2 ± 6.9	88.3 ± 6.6
WHR ratio	0.77 ± 0.02	0.82 ± 0.04	0.82 ± 0.004	0.79 ± 0.04
WHtR ratio	0.43 ± 0.03	0.45 ± 0.03	0.45 ± 0.03	0.43 ± 0.03

The BMI categories of the targeted players in the study, where the results showed that 33.3% of the players U17 were underweight, and 66.6% of them were normal. On the other hand, only 9.1% of U20 were underweight, and 86.3% were normal, and only 4.5% had the Overweight among U20 players as shown in table 7.

Table 7: BMI for the U17 and U20 categories according to WHO.

BMI category	U17	U20
	No.%	No.%
Underweight	7(33.3)	2(9.1)
Normal	14(66.6)	19(86.3)
Overweight	0(0)	1(4.5)

Table 8 showed categories of WHR of the targeted players in the study, where the results showed that 80.9% of the U17 players were excellent, and 19.2% of them were good. On the other hand, the majority 95.4% of U20 players was excellent, and only 4.6% was good.

Table 8: WHR among players according youth system.

WHR Category	U17	U20
	No. (%)	No. (%)
Excellent	17 (80.9)	21 (95.4)
Good	4 (19.1)	1 (4.6)

According to categories of WHtR for players, the findings indicated that 66.6% of U17 were healthy and that 33.3% of them were extremely slim. However, the majority of U20 players 90.9% were healthy, and 9.1% of them were extremely slim as shown in table 9.

Table 9: WHtR among players according youth system.

WHtR Category	U17	U20
	No. (%)	No. (%)
Extremely slim	7 (33.3)	2 (9.1)
Healthy	14 (66.6)	20 (90.9)

The results of the study showed that 7% of the players were smokers, while 93% of them were non-smokers, as shown in figure 1.

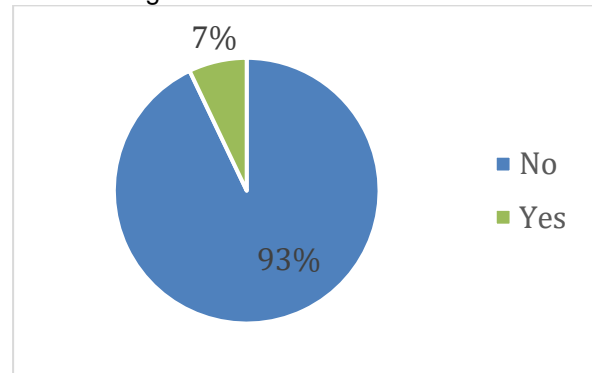


Figure 1: Percentage of smokers among players. According to couch assessment from 1 to 10 score, table 10 and 11 revealed the association between couch assessment and type of diet.

Table 10: Association between assessment score level of players and type of diet.

Assess ment By Couch /10	No. (%)	Unhealth y diet	Healt hy diet	X2	P- value
		No. (%)	No. (%)		
5	6 (13.9)	6 (100)	0 (0)	12.17	0.01 6
6	16 (37.2)	8 (50)	8 (50)		
7	13 (30.2)	4 (30.7)	9 (69.3)		
8	6 (13.9)	1 (16.6)	5 (83.3)		
9	2 (4.6)	0 (0)	2 (100)		
Total	43	19	24		

The study showed that the BMI of the majority of players was normal, 21.2791 (±7.065). The incidence of overweight among football players was 2.3%. This finding contrasts with the findings of Abdullai(13), who reported a prevalence of overweight and obesity of 39% in Division I players in Tamale, Ghana, but similar to the findings of Stiefel et al.(14), which reported 19.8% overweight and 10.1% obesity among student football players. This study revealed that the mean BMI of U17 players was 19.17kg/m² (±2.5) while that of U20 players was 23.28kg/m² (±9.22), which was slightly in contrast with the results of Campa et al which showed that the BMI of Italian football players for U14, U17 and U20 was 16.9 kg/m²(±1.4), 17.1 kg/m² (±1.5), and 18.7kg/m² (±1.7), respectively. In addition, the current study evaluated whether there were differences in body composition between different field situations. The results showed how the

goalkeepers had a more height ratio 176.3cm (± 5.9) than the forward 169.0 cm (± 10.5) as observed in the BMI increase from more defensive to more offensive positions.

In addition, it is seen that there is a decrease in BMI levels when the player moves away from the goalkeeper (Goalkeepers > Defenders > Midfielders > Attackers). A very high BMI was more prevalent among goalkeepers 4.5% than in other playing positions. These results agreed with previous studies (15, 16). This result can be attributed to the fact that goalkeepers undergo a lower metabolic rate than other players during matches and training (17, 18). Our study showed that there was also a clear increase in waist and hip circumferences with increasing age, as the average waist circumference of U17 players was 74.85 (± 7.15) and hip circumference 90.03 (± 6.82), while the waist and hip circumferences of U20 players were 76.39 (± 4.12) and 96.20 (± 5.24), respectively, this increase due to a large quantities fat consumed and fast food at dinner and lunch, and the consumption of soft drinks and sweets as snacks for U20 players more than U17.

Diet plays an important role in the height difference of the players, the most important of which is the consumption of milk, as only 79% of the players had consumed milk. On the other hand, environmental, geographical and genetic factors play a role in the height difference. Contrary to the findings of previous studies on the 2018 World Cup in Russia (19), our study showed that the average height of the players was 168.87 cm. The average height of players came from France (180.5 cm), Brazil 180.4 cm, Spain 179.5 cm, and Argentina 179.4 cm.

A player can improve their performance by eating breakfast, and it can help them recuperate from the previous day's strenuous physical activity (20). According to Kürklü's study (21), 57.7% of the players skipped breakfast. In addition, Şanlıer and Arıkan (22) stated that 51.4% skipped breakfast. As they found in another study (23), that 58.6% of players skipped breakfast and 41.4% were lunch. Bulduk et al (24), stated that 47% of player skipped breakfast, 46% skipped lunch and 7% skipped dinner. While the results of our study showed that 16.3% of the players skipped breakfast, while 2.3% skipped lunch and 7% skipped dinner. Dietary intakes observed in this study were lower compared to the studies by Rico Sanz (25), Leblanc et al, (26), and Iglesias-Gutiérrez et al. (27). In our study, the use of nutritional supplementation for football players was found to be 5%. According to this study, 100% of the players who received a score of 6 had an unhealthy diet (The intake of fried food, fast food, food prepared in harmful ways with saturated fats and oilsetc.), while the number dropped to 50% for those who received a score of 7; nevertheless, those who had scores of 8 and 9 had the highest consumption of a healthy diet, 83.3% and 100% respectively. The rate of healthy diet consumed increases in direct proportion to the coach assessment score. In addition, the correlation between assessment score level and diet was

statistical significant ($p \leq 0.05$). All of the players had high-level score a (9 score) ate a variety of proteins for breakfast, including tuna, sardines, and eggs. The protein that the body need to make new muscle and make up for lost muscle tissue is present in this group. In our study as 100% of those who scored 9 consumed bread and cereal in the morning in contrast to those who scored 8, 7, 6, and 5 scores were 83%, 61.6%, 75% and 50% respectively, this proves that whenever bread and cereals are consumed, a good need of carbohydrates is provided that the player needs in order to obtain the energy to perform his exercises to the fullest, and this has been noted from the evaluation. In the results of the study, it was concluded that those with a low score from 5 to 6 consumed sweets and biscuits at morning and evening, at a rate of 66.6% and 62.5% respectively, while the 76.9% of those who scored 7 consumed sweets only morning, and none of those who scored 9 consumed sweets. We conclude that the consumption of sweets, biscuits, and chocolate that contain added sugar has a negative impact on the player's performance. The results of the study in the 24h recall showed that, 18.6% of the players relied on dairy products as snacks in the evening, and 20.9% of them depended on tuna and eggs as snacks during the same period. Consumed of snacks was equivalent to 100% of those who got a score of 9. While they were with 5 score level did not consumed.

The study showed that the consumed of fast food was high during the dinner period, than lunch 34.8%, 2.3%, respectively. 83.3% of players had score was 5 consumed fast food, while it gradually decreased for those had high score was 6 and 7, by 37.5% and 30.8%, respectively. While it was did not consumed in players who had major marks 8 and 9. The levels of fat and sugar in fast foods makes it work less effectively, and feel tired quickly during physical activities.

The target sample in the study was 43 young players, their average age was 16.53 (± 1.66), their height was 168.87 (± 9.6), and their weight was 60.97 (± 21.62). The study showed that 16.3% of the players skipped breakfast, while 2.3% skipped lunch and 7% skipped dinner. 100% of the players who received a score of 6 had an unhealthy diet. The correlation between assessment score level and diet was statistical significant ($p \leq 0.05$). The results of the study in the 24h recall showed that, 18.6% of the players relied on dairy products as snacks in the evening, and 20.9% of them depended on tuna and eggs as snacks during the same period. 83.3% of players had score was 5 consumed fast food, while it gradually decreased for those had high score was 6 and 7, by 37.5% and 30.8%, respectively. A balance of complex carbohydrates, lean protein, healthy fats, fruits, and vegetables should be present at every meal. Foods that should be avoided by the player in his diet such as Soft drinks, Foods associated with bloating, Foods full of unhealthy saturated fats, Excessive consumption of stimulants and caffeine.

V. CONCLUSION

The study showed that the BMI of the majority of players was normal, 21.2791 (± 7.065). The incidence of overweight among football players was 2.3%. This finding contrasts with the findings of Abdullai [13] who reported a prevalence of overweight and obesity of 39% in Division I players in Tamale, Ghana, but similar to the findings of Stiefel et al. [14], which reported 19.8% overweight and 10.1% obesity among student football players. This study revealed that the mean BMI of U17 players was $19.17 \text{ kg/m}^2 (\pm 2.5)$ while that of U20 players was $23.28 \text{ kg/m}^2 (\pm 9.22)$, which was slightly in contrast with the results of Campa et al which showed that the BMI of Italian football players for U14, U17 and U20 was $16.9 \text{ kg/m}^2 (\pm 1.4)$, $17.1 \text{ kg/m}^2 (\pm 1.5)$, and $18.7 \text{ kg/m}^2 (\pm 1.7)$, respectively [43]. In addition, the current study evaluated whether there were differences in body composition between different field situations. The results showed how the goalkeepers had a more height ratio 176.3cm (± 5.9) than the forward 169.0 cm (± 10.5) as observed in the BMI increase from more defensive to more offensive positions.

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