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The effect of physical preparation on the prevention of sports injuries among soccer players case study for the (USM Algiers U21) team," first professional league"

Kourdes Khaled [1*] Hadjidj Mouloud[2] Hadji Mohamed Larbi[3]

[1] University of Algiers 3, Kourdes.khaled@univ-alger3.dz.

[2] University of Algiers 3, Hadjidj.mouloud@univ-alger3.dz.

[3]University of Algiers 3, hadji.mohamedlarbi@univ-alger3.dz.

[1, 2]Science and Technology of Sports physical activity laboratory,[3]Motor Performance Sciences and pedagogical Intervention Laboratory.

ABSTRACT

This study aimed to identify the impact of the physical preparation process on the prevention of sports injuries in terms of some physical tests for soccer players. The study population represented in the reserve team class players class U21, the first national division, with 20 clubs for the season (2020-2021) the study sample included 22 players who were selected intentionally the from USM Algiers club, the descriptive method (case study) we first measured the players at the beginning of the physical preparation phase in each of the maximal aerobic speed (MAS), speed(10,20,30), explosive power, (FMS) functional movement screen, after the end of the preparatory stage, we did a post measurement for the same tests except for the FMS ,and follow up injuries through with the medical staff during the season , and we concluded that the physical preparation helped to improve some physical abilities under study, which is reflected in the prevention of future injuries.

Keywords: Physical preparation, Injury prevention, soccer.

[*] *Corresponding author*

INTRODUCTION

Modern soccer is a strenuous and stressful game that requires great physical effort, speed and high physical fitness, The organization of matches has developed and its number has increased until it reached 50 to 70 matches played by the team in one sports season, Therefore, it became necessary to prepare the player for this violent physical exertion (Sobhi, 2017, p.61).

The Physical preparation aims to provide the player with various physical qualities and abilities, that is the development and mastery of motor qualities through general and specific physical preparation, As the player without that cannot perform his duties in the match perfectly (Al Hiti, 2011, pp.24-25).

As the players performance in matches, especially in soccer, is a true interpretation of the level of development they have reached and the development of their abilities and skills through general and special physical preparation, Injury prevention is at the forefront of the soccer's physical preparation agenda.

Soccer injuries often result from overuse, poor preparation and conditioning, and a lack of rest or inadequate warm-up and above all this the soccer player requires special exercises that target muscular strength, endurance, flexibility and full range of motion, this is a reality especially in the case of injury to the muscle groups, ligaments, and tendons (Sabri Farag, 2017, p.169).

Where it was found that if the player was trained in a sound scientific way during the warm-up and the integration of the training elements into the elements of his physical fitness, the rates of injury to him in the stadiums are significantly reduced, On the other hand, if the training load of the player is not rated, and is not commensurate with his functional (physiological) and physical capabilities, he is exposed to the possibility of injury on the field continuously (Ahmed , 2008,pp.23-24).

Among the common causes of sports injuries are inadequate physical fitness and physical weakness and Improper training, taking these factors into account and taking appropriate action can help prevent many injuries, or at least reduce it as the correct training and level of fitness will reduce the risk of injury by making the body more able to withstand the physical demands of

activity, however improper training can cause injury (Newton and others, 1997, pp 3-5).

"Sound physical preparation is more secure, safe, and prevents injury, and physical fitness is one of the important factors to protect the player from injury" (Khalil, 2008, pp.14-18).

And from that we can see the role and importance of physical preparation not only to improve the physical fitness of the soccer player, but also to prevent injuries during the competitive season, which is done by developing and improving various physical and motor abilities.

From the perspective that professional soccer is a complex sport with a character of contact between players and requires aerobic and anaerobic capabilities, In recent years, the game has seen an increase in the speed of play and become more intense and requires a high level of physical fitness, Therefore, prevention of injuries is important to reduce the rate of injuries, Through the development of preparation and prevention programs to maintain the health of the player and reduce the possibility of its occurrence, The goal is always to reduce the contributing factors to injury, and we must point out that injuries cannot be completely prevented, But it is certainly possible to reduce the risks of its occurrence, and in light of the foregoing, and by reviewing many recent scientific studies, we have come to the following general question: Does physical preparation affect the prevention of sports injuries during the season for soccer players?

Under this main question, the following sub-questions fall:

- Does physical preparation affect the prevention of injuries in terms of some physical tests (maximal aerobic speed, speed (10, 20, 30 meters) explosive power)?
- Are there statistically significant differences between injured and uninjured players in the level of some functional physical abilities: maximal aerobic speed, speed (10, 20, 30) meters, explosive power, of the functional movement screen (FMS)?

To answer this problem, we proposed the following hypothesis:

- physical preparation affects the prevention of sports injuries during the season for soccer players.

Partial Hypotheses:

-The process of physical preparation affects the prevention of injuries in terms of some physical tests (maximal aerobic speed, speed (10, 20, 30 meters), explosive power).

-There are statistically significant differences between injured and uninjured players in the level of some functional physical abilities (maximal aerobic speed, speed (10,20,30) meters, explosive power, the functional movement screen FMS and in favor of the uninjured players.

The researcher seeks to achieve the most important objectives: to identify the impact of the process of physical preparation on the prevention of injuries in terms of some physical tests and to identify the significance of the differences between injured and non-injured players in the level of some physical abilities that are considered as an indicator for the prevention of self-injury.

Previous and similar studies:

Nasseri and others. (2021) study titled Sports injuries between first aid and physical preparation for soccer players during the competition stage, The study aimed to evaluate the sports injuries of the professional soccer player and their relationship to the physical preparation during the competition, two methods were used in the study, the descriptive method and the experimental method. it was conducted on a sample of 20 players (100%) from the Amal Arbaa team, Where the most important results obtained were: Lack of interest of players (especially injured) in the process of physical preparation before entering the sports competition, Insufficient warm-up before the start of each training or competition, lack of medical follow-up of the injured by the team doctor during training.

The study of Bokratom, and others. (2021) entitled the effect of muscle strengthening exercises Gainage Functional on avoiding sports injuries for U17 soccer players, The study aimed to know the effect of muscle strengthening exercises "Gainage Functional" on avoiding sports injuries among soccer players under 17 years old. The research sample consisted of 20 soccer players under 17 years of age from the Arieb municipality club, who are active in the honorary section championship of the Ain Defla Football league which was chosen intentionally. The results revealed that Gainage muscle strengthening contributes to maintaining the players' physical fitness and raising the level of

athletic performance, it also contributes to reducing sports injuries, whether at the level of muscles (bruises, cramps, lacerations) or at the level of bones (bruises, fractures) or at the level of joints (sprains, dislocations).

The study of Youssef and Saleh, (2015) entitled: An analytical study of the relationship of training variables with sports injuries and the reasons for their occurrence for handball players, Where the study aimed to identify the relationship of some training variables with common injuries and the reasons for their occurrence among handball players, The researchers used the descriptive approach on a sample of 138 high level players, and the most important results were: There are statistically significant differences in all types of sports injuries between the trainees four days and the trainees five days a week in favor of the trainees five days, There are statistically significant differences in all types of sports injuries between trained players 90 minutes and trainees 120 minutes in the unit training unit in favor of trainees 120 minutes.

The study of Aman Allah and others, (2014) entitled: Excess load and its implications for sports injuries among soccer players, The study aimed to find out the impact of overloading on sports injuries, The researcher used the descriptive approach, and the study tool was the questionnaire. The research sample consisted of 100 players from among four teams of the amateur soccer section, The most important results are: One of the important factors that have a direct impact on exposure to sports injuries, which is the lack of integration in training the elements of fitness on the one hand, and the failure to give correct rest periods to rest during exercises.

The study of (Grigorev , Semenova (2020) entitled: Examination of functional movement as a means to reduce injuries in fitness, The use of functional mobility examination aims to determine the potential risks of injuries and ways to reduce their number, The study was conducted on individuals aged 38-51 years who scored less than 14 on the FMS test (58 out of 200 people),The researcher concluded that the average score of the FMS test is 9.88 points out of 21 degree, which means that there is a risk of infection. After 3.5 months, a significant improvement was achieved (with an average of more than 14 points) in the group that exercised physical fitness, there was a decrease in the number of injuries, and the study confirmed the effectiveness of using the FMS test, as well as the use of the proposed exercises.

3.Defining concepts and terms:

3.1. Physical preparation:

3.1.1. Terminologically:

"Describes the processes that prepare individuals to be physically fit for any sport, Therefore, athletic preparation is the application of physiological information to improve the body's efficiency to respond to the physical challenges of athletic competition." (Mahmoud, 2016, p 10).

3.1.2. Procedurally:

Raising and improving some physical and motor abilities (maximal aerobic speed, speed (30,20,10) meters, explosive power, the functional movement screen (FMS) of the player), Through which it is reflected on the performance and as an indicator of the player's prevention and prediction of injuries, as proper physical preparation is more secure and safe and prevention of injury and physical fitness are important factors to protect the player from injury.

3.2. Injury prevention:

3.2.1 Terminologically:

The preventive and health level of athletes is one of the measures and indications that depend on the prevention of injury, so the prevention of injuries requires the presence of preventive exercises in many cases, especially before the injury, as its effect appears through the performance of preventive exercises that the player constantly performs because it increases blood circulation activity through muscle work, as well as hypertrophy of muscle fibers and an increase in the number of joint motor units in effort, and all of these naturally lead to an increase in the strength of the muscles working on the joint (Abdul Nabi & Khalif Jaber, 2015,p 32).

3.2.2 procedurally:

Are all the measures, means and procedures used during the physical preparation stage that aim to improve the player's abilities, which will positively affect the reduction of complications and risks of injury.

4.research methodology and field procedures:

4.1 survey study:

The researcher conducted an exploratory study on 7 players from USM Algiers club u21 (Omar Hamadi Stadium, Boulogine street, Algiers on 25,9,2020), which facilitated and paved the way to survey everything that would help in the possibility of conducting this study, and the selection of the sample. And collect all the data.

4.2. Method used in the study:

In view of the problem that we have raised, this study relied on the descriptive approach in the style of a case study in order to describe the phenomenon. And an attempt to reach a general and comprehensive conclusion of the studied phenomenon, which is defined as “the collection of accurate descriptions and information about the studied phenomenon as it actually exists in reality” (Saeed Nadia and others, 2017).

4.3. Study population and sample:

The original community of U21 reserve team players represented the first national division by 20 clubs for the football season (2020-2021). The research sample consisted of 22 players from the USM Algiers, who were chosen by the intentional method, The reason for choosing USM Algiers is due to the good relationship with the technical staff and the availability of all means and capabilities that allow the application of examinations and follow-up of injuries during the competition(the first part of the season) of going. Through the integrated medical staff.

4.4 Fields of Study:

4.4.1 Spatial Domain:

Omar Hammadi Stadium, Boulogine Street, Algiers.

4.4.2-time domain:

The duration of the study extended from: 9/29/2020 to 15/07/2021.

4.5. Study tools:

- Maximal speed test (10, 20, 30 meters) Purpose: To measure the maximal

transitional speed.

- Cmj vertical jump test: to measure the explosive power of the lower extremities.

- Yo-Yo Test IRT 1 Purpose: To measure maximal aerobic speed, MAS.

- Functional Movement Screen (FMS): Predicting injury by identifying deficiencies in strength, movement, and flexibility and stability of all joints in the body.

4.6. Scientific conditions of the instrument:

The meaning of stability is to ensure that approximately the same results will be obtained if the test is re-applied to the same group of individuals ,This means that there is little influence of chance or random factors on the test results, and stability was obtained through the method of re-applying the test with an interval of one week between the two tests on a sample of 7 players from the same club who were subsequently excluded, in order to ensure that the test is able to measure the characteristic or phenomenon for which it was developed, we calculated the subjective validity, which is the relationship between honesty and reliability, by calculating the square root of the reliability coefficient.

Table 1. Shows the reliability and validity coefficient of the study tests using the method of applying and re-applying the test to the exploratory sample (n = 7).

Test	N	Stability coefficient	Honesty coefficient
Speed 10 m	7	0,894	0,943
Speed 20 m		0,825	0,905
Speed 30 m		0,753	0,867
Cmj		0,897	0,974
Mas		0,703	0,838
Fms		0,761	0,872

Source: the author's ,2022

It is evident from Table 1: that the study tests have a strong correlation coefficient between the test and its re-application, and this indicates the reliability of the test as well as for subjective validity.

4.7. Statistical methods used in the study:

The results were analyzed using Excel 2019 and spss 26, Through the following tests: Arithmetic mean, standard deviation, skewness coefficient, SHAPIRO-WILK-test, T-test for two independent and correlated samples and Pearson's coefficient test.

Table 02. shows the values of the mean, standard deviation, skewness coefficient and SHAPIRO-WILK-SIG for measurements and tests on the sample in the pretest.

Measurements and tests	Measurements units	Mean	Standard deviation	Skewness coefficient	Shapiro-Wilk- sig
height	cm	176,0	6,27	0,180	0,54
The weight	kg	64,37	4,39	0,31	0,44
BMI	Kg/m	19,40	1,65	0,071	0,267
Speed 10 m	m/s	2,04	0,19	0,21	0,65
Speed 20 m	m/s	3,23	0,20	0,23	0,91
Speed 30 m	m/s	4,59	0,14	0,38	0,41
CMJ	cm	39,36	5,56	0,02	0,93
MAS	Km/h	17,28	0,69	0,38	0,26
FMS	Degree	14,45	2,33	0,23	0,29

Source: the author's, 2022

We note that the value of the skewness coefficient is between (_3, +3), from which the sample elements are distributed normally.

It was also found through the statistical treatment of the total tribal raw results of the research sample using the Shapiro-Wilk test, as shown in the table that all "sig" values, which ranged from (0.26) as the smallest value to (0.91) as

the largest value, are smaller than the value of the significance level (0.05). This means that the data follow a normal distribution.

5. Exposure, analyses and result exam:

Table 3: Shows the results of the tests between the first and second measurements of physical abilities.

Axles / Variables	Pre-t		Post-t		Calculated-t-value	Tabular t-value	Statistical index
	$\bar{x}$	sd	$\bar{x}$	sd			
Speed 10 m	2,04	0,19	2,02	0,16	1,40	2,08	Not statistically significant
Speed 20 m	3,23	0,20	3,20	0,15	0,86		Not statistically significant
Speed 30 m	4,59	0,14	4,35	0,20	5,29		Statically significant
CMJ	39,36	5,56	41,51	5,77	3,20		Statically significant
MAS	17,28	0,69	18,40	0,98	5,41		Statically significant
A sample Volume 22			Level of signification 0.05			Level of trust 95%	

Source: the author's, 2022

The results of the study show as shown in Table no 3 that the calculated t-test value.

Between pre and post measurements of the speed 10-meter test, the calculated t-value was 1.40, and in the speed 20-meter test it was 0.86, which is less than the tabular t-value of 2.08, and therefore these values are not considered statistically significant. It can be said that there was a slight improvement in the results, but it was not enough for the differences to be

statistically significant, based on the mean values that were better in the post-measurement. in the speed 30-meter test, the calculated t-value was 5.29, in the vertical jump test it reached 3,20, and in the maximal aerobic speed test it reached 5.41,These values are considered statistically significant, because all of them are greater than the tabular t-value, which amounted to 2.08, which indicates the existence of statistically significant differences between the pre- and post-measurement, so that this significance is in favor of the post-test, based on the values of the arithmetic averages.

Table 4 shows the significance of the differences between injured and uninjured players in the pre-test of physical abilities.

axles / Variables	Injured players		Uninjured players		Calculated-t-value	Tabular t-value	Statistical index
	$\bar{x}$	sd	$\bar{x}$	sd			
Speed 10 m	2,04	0,21	2	0,20	0,40	1,72	Not statistically significant
Speed 20 m	3,27	0,21	3,09	0,18	2,18		statistically significant
Speed 30 m	4,64	0,15	4,55	0,21	1,02		Not statistically significant
CMJ	38,84	5,32	42,22	4,82	1,56		Not statistically significant
MAS	17,10	0,84	17,45	0,68	1,09		Not statistically significant
FMS	13	2,7	15,14	1,82	2,60		statistically significant
A sample Volume 22		Level of signification 0.05				Level of trust 95%	

Source: the author's,2022.

The results of the study appear as shown in Table N 4 of the results of the tribal tests of physical abilities between injured and uninjured players The calculated T value for the speed 10-meter test reached 0.40, reached 1.02 in the

speed 30-meter test, 1.56 in the vertical jump test, and 1.09 in the MAS maximal aerobic speed test, which is lower than the tabular T value of 1.72. Therefore, these values are not statistically significant, it can be said that the results of the uninjured players were better than the injured, but that was not enough for the differences to be statistically significant, based on the values of the arithmetic averages

As for the speed 20-meter test, the calculated T value reached 2.18, and in the functional movement screen test, it reached 2.60. These values are statistically significant because all of them are greater than the tabulated T-value of 1.72, which indicates that there are statistically significant differences between injured and uninjured players in favor of uninjured players.

6.Discuss the results:

The first hypothesis: the process of physical preparation affects the prevention of injuries in terms of some physical tests (maximal aerobic speed, speed (10, 20, 30 meters) , explosive power).

Through Table N. 3, and after presentation and analysis, the results showed an improvement in all physical abilities, including those who did not reach the level of statistical significance, but the improvement was slight. Such as the 10- and 20-meters speed test through the difference between the arithmetic mean of the pre- and post- test, while the rest of the abilities were statistically significant which is the 30 meters speed test, vertical jump (CMJ) and maximal aerobic speed

The development in some physical abilities during the physical preparation process for the players is attributed to the applied training program, which led to changes targeting various body systems, especially changes in the nervous system.

Whereas Samia Khalil (2008) sees that the motor coherence and compatibility are shared by both the muscular and nervous systems, and it is a reflexive relationship of voluntary movements, this seems clear in speed training. The development of speed is related to the basic degree of the work of the central nervous system, as well as the flexibility of nervous processes resulting from the athlete’s ability to quickly perform different movements and complete compatibility in the functions of specific nerve centers. All of these factors are important and contribute to the development of speed, Also during training, strength development occurs, and the adaptation of the nervous system appears in the event of an increase in muscle strength without a significant increase in its size by mobilizing the largest number of muscle fibers to

participate in the contraction as well as increasing the synchronization of the work of the motor units (p.55).

This was confirmed by the study of Boukratam and others. (2021) that muscle strengthening contributes to reducing sports injuries, whether at the level of muscles (bruises, cramps, lacerations) or at the level of bones (bruises, fractures) or at the level of joints (sprains, dislocations).

According to Aman Allah and others. (2014) found some important factors that have a direct impact on exposure to sports injuries, which are the lack of integration in training the elements of physical fitness on the one hand and the failure to give correct rest periods to rest during the exercises.

According to Abul-Ela, a trained individual can recruit an average of (85-95%) of muscle fibers, while this percentage is lower for untrained individuals, so that a maximal of (55-60%) of muscle fibers is recruited.

The neuromuscular coherence between muscles can also be explained by reducing the phenomenon of mutual deficit (bilateral deficit), the principle of which is that the muscle protects itself by performing a muscle reflex through sensory organs located in the tendons such as the Golgi tendon that reduces the power of contraction Muscular (Adeeb, 2015, p194).

According to Newton and others, (1997) that if players are not fit enough to practice the sport or activity of their choice, the physical stresses they are exposed to during that may cause injuries, where a lack of strength, speed, flexibility or endurance can contribute to injury and in many sports, Lack of stamina can tire players out in the later stages of a match, this can affect their coordination, lower their skill level, lose focus and make mistakes, all of which can make them or their opponents more vulnerable to injury (pp. 4-5)

On the other hand, Hawkins and Fuller 1999 consider that endurance is a major factor in the prevention of injuries, especially team sports such as soccer. It was found that the incidence of muscle injuries is at the end of the game halves. In 1996, Mair et al. indicated that the increased likelihood of fatigue-related injuries could be explained by the fact that tired and tired muscles had a reduced ability to absorb energy. It was found that the muscle strength of the eccentric hamstring muscles decreases with increased fatigue towards the end of the match, which indicates a greater risk of injury. Improving endurance leads to increased exercise tolerance and improved fatigue resistance, which helps reduce the risk of injuries ... (Wohlfahrt and others, 2013, pp. 372-375).

The second hypothesis: There are statistically significant differences between injured and uninjured players in the level of some functional physical

abilities (maximal aerobic speed, speed (10,20,30) meters, explosive power, the functional movement screen FMS and in favor of the uninjured players.

Through Table N.4, which shows the comparison of the arithmetic mean of some functional physical abilities between the injured and uninjured players in the initial test, we note that there are differences between the two groups in favor of the uninjured players, this indicates a high physical fitness. In both the 20 m speed component and the functional movement screen, while we did not find a significant difference. Statistically in both the 10m and 20m speed components, cmj vertical jump and maximal aerobic speed.

This is consistent with the study of Youssef and others (2015), in which he concluded that there are statistically significant differences in all types of sports injuries between the trained players four days and the trainees five days a week in favor of the trainees five days, and there are statistically significant differences in all types of sports injuries among the trained players 90 Minutes and 120 minutes for trainees in one training unit for the benefit of trainees 120 minutes.
As according to Nasseri and others (2021), the lack of interest of the players, especially those who have been injured, in the process of physical preparation before entering the sports competition, and the neglect of the players for adequate warm-up before the start of each training or competition.

As for the FMS functional movement screen test, the results are in agreement with the findings of the researcher Grigorev and Semenova, (2020) that the average score of the FMS test is 9.88 points out of 21, which means that there is a risk of injury after 3.5 months, a significant improvement has been achieved (with an average of more From 14 points) in the group that exercises physical fitness, there was a decrease in the number of injuries, and from it the study confirmed the effectiveness of using the FMS test for prevention and prediction of injuries.

The researcher attributes the differences between the injured and uninjured players in the FMS tests to the fact that the injured players suffer from a deficiency and deficit in the movement and stability of the hips and shoulders, and the stability of the pelvis, knees and ankles, as well as a lack of flexibility of some muscles, such as the back muscle and the motor deficit as a result of muscle stiffness before falling into the injury, and this is confirmed by the average overall result of the FMS tests, which reached 13 in the injured players.

The researcher also believes that the prevention of the football player from injury is much more important than the methods and forms of treatment. if the training program and preventive exercises are not carefully considered, it is possible for the player to be away for life if he suffers an injury that is difficult to treat, and therefore the protection of the player has become the important and decisive role in any training program.

7. Conclusion:

Through the field study on the research sample, the following results were reached: The physical preparation program helped to improve some physical abilities, which are 30 meters speed, explosive power and maximal aerobic speed, where the differences were statistically significant in favor of the post test, which may affect the prevention of future injuries. While we did not find a statistically significant difference in the 10- and 20-meters speed test, despite the slight improvement in the post test. There are statistically significant differences between the injured and uninjured players in favor of the uninjured players in both the 20-meter speed component and the functional movement screen, while we did not find a statistically significant difference in the 10- and 20-meters speed component, the cmj vertical rise, and the maximal aerobic speed

Finally, we formulated a number of suggestions represented in:

Implementation of (preventive) physical exercises before and during the season due to its importance in the prevention and improvement of the level of performance of the players. The necessity of making the most of the exercises used in the physical preparation program, because improving the functional physical capabilities of the footballer gives him the correct construction of the various devices in the body, and this helps to avoid sudden injuries that may occur in the future, whether during training or competition because exposure to self-injuries depends on the player's physical competence. Application of functional screen tests for movement and for different age groups for their effective role in detecting dysfunction and functional motor deficits in different areas of the body at an early stage (predicting injury before it occurs). Attention in training programs to focus on exercises based on strengthening and increasing flexibility, stability and balance for the areas of the body most vulnerable to injury through the deficit observed in the preventive tests.

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