T.C.

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DEPARTMENT OF SPORTS PHYSIOTHERAPY

THE EFFECT OF THE FIFA 11+ PROGRAM ON AGILITY, BALANCE AND PROPRIOCEPTION PARAMETERS FOR THE PROFESSIONAL FOOTBALL PLAYERS

MASTER THESIS

HAMED M.H. GHANNAM, PT.

Istanbul - 2024

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APPROVAL

This thesis has been deemed by the jury in accordance with the relevant articles of Yeditepe University Graduate Education and Examinations Regulation and has been approved by Administrative Board of Institute with decision dated ..... and numbered .....

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DECLARATION OF ORIGINALITY

I hereby declare that this thesis is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which has been accepted for the award of any other except where due acknowledgment has been made in the text.

Hamed M.H. Ghannam

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LIST OF ABBREVIATIONS

ABD	Abduction
ADD	Adduction
ANT	Anterior
α	Alpha
γ	The gamma
B	Bilateral
BMI	Body mass index
CM	Centimeter
°C	The degree Celsius
DF	Dorsiflexion
ER	External rotation.
Ext	Extension
FIFA	International federation of football association
Flex	Flexion
GTO	The Golgi tendon organ
IAT	Illinois agility test
LT	Left
PH	potential of hydrogen
PM	Posteromedial
PL	Posterolateral
RT	Right
Rot	Rotation
SPSS	Statistical package for the social sciences
T0	Before FIFA 11
T1	After applying the FIFA 11 program.
TFF	Turkish football federation
YBT	Y balance test

ABSTRACT

Ghannam, H.M. (2024). The Effect Of The FIFA 11+ Program On Agility, Balance And Proprioception Parameters For The Professional Football Players, Department of Sport Physiotherapy and Rehabilitation, Master Thesis. Istanbul.

This study was conducted to evaluate the effect of the FIFA 11+ training program applied to young football players on the agility, balance and proprioception of professional football players in the Palestinian team (mean age: 27.8 ± 4.7 years, height = 180.09 cm ± 24. 0). The study was applied to the Palestinian professional football team, which includes 22 football players (18 years and over). In our study, measurements were taken before and after warm-up exercises for the game FIFA 11. The researcher applied for the Illinois T agility test. The Y test, which is used to test balance for athletes and football players, has been applied. Proprioception was assessed by the soccer players' ability to reposition the knee at 30, 45, and 60 degrees for both the player's right and left leg. SPSS version 22 for WINDOWS was used for statistical analysis. The results in the balance test showed at a significance level ($P<0.05$) that the values after applying FIFA 11 for the left leg increased to 68.87±6.0 from 68.50±4.0 and for the right leg from 68.19±2.0 to 68.99±5.0. The results showed that there was a significant difference in the results of the agility test before and after applying the FIFA exercises ($P<0.05$), as the Illinois test time values decreased from 16.55±1.22 seconds before applying the FIFA 11 program to 16.33±1.15 after performing the FIFA 11 training exercises ($P < 0.05$). As shown by the results of the proprioception test, it was found that there was a significant difference in the results of proprioception before and after applying the FIFA 11 training exercises ($P<0.05$). The differences between the pre- and post-absolute value measurements decreased after the post-test for the right and left legs and at angles of 30, 45 and 60, while the value of the proprioception test for the left leg increased. From 25.4±5.49 to 27.8±4.66 (4.6-2.2) at an angle of 30 degrees. The results of the study revealed greatly the importance of the FIFA 11 program for football players, as the results showed that there were statistically significant differences before and after applying the FIFA 11 warm-up program.

In conclusion, the FIFA 11 program should be applied as a warm-up program for football players, as it increases the player's ability during the match, improves his agility and balance, and leads to increasing the players' ability to receive proprioception.

Keywords: FIFA 11, agility, balance, proprioception, performance.

ÖZET

Gannam, H.M. (2024). Profesyonel Futbolculardan FIFA 11+ Programının Çeviklik, Denge Ve Propriosepsiyon Parametrelere Üzerine Etkisi, Spor Fizyoterapi ve Rehabilitasyon Anabilim Dalı, Yüksek Lisans Tezi.İstanbul.

Bu çalışma, genç futbolculara uygulanan FIFA 11+ antrenman programının Filistin takımındaki profesyonel futbolcuların (yaş ortalaması: 27,8±4,7 yıl, boy=180,09 cm±24) çeviklik, denge ve propriyosepsiyon üzerine etkisini değerlendirmek amacıyla yapıldı. 0). Araştırma, 18 yaş ve üzeri 22 futbolcunun yer aldığı Filistin profesyonel futbol takımına uygulanmıştır. Çalışmamızda FIFA 11 oyununa yönelik ısınma egzersizleri öncesi ve sonrası ölçümler alındı. Araştırmacı Illinois T çeviklik testini uyguladı. Sporcularda ve futbolcularda dengeyi test etmek amacıyla kullanılan Y testi uygulandı. Propriyosepsiyon, futbolcuların dizini hem sağ hem de sol bacak için 30, 45 ve 60 derecelerde yeniden konumlandırma yeteneği ile değerlendirildi. İstatistiksel analiz için WINDOWS için SPSS sürüm 22 kullanıldı. Denge testi sonuçları anlamlı düzeyde (P<0,05) FIFA 11 uygulandıktan sonraki değerlerin sol bacak için 68,50±4,0'dan 68,87±6,0'a, sağ bacak için ise 68,19±2,0'dan 68,99±5,0'a yükseldiğini gösterdi. Sonuçlar, FIFA egzersizleri uygulanmadan önce ve uygulandıktan sonra yapılan çeviklik testi sonuçlarında anlamlı bir fark olduğunu gösterdi (P<0.05), Illinois test süresi değerleri FIFA 11 programı uygulanmadan önceki 16.55±1.22 saniyeden 16.33± 16.33±'ye düştü. FIFA 11 antrenman egzersizlerini yaptıktan sonra 1,15 (P < 0,05). Propriyosepsiyon testi sonuçlarının da gösterdiği gibi, FIFA 11 antrenman egzersizlerinin uygulanmasından önce ve sonra propriosepsiyon sonuçlarında anlamlı bir farklılık olduğu tespit edildi (P<0.05). Sağ ve sol bacaklarda ve 30, 45 ve 60 derecelik açılarda yapılan son test sonrasında mutlak değer öncesi ve sonrası mutlak değer ölçümleri arasındaki farklar azalırken, sol bacak için propriyosepsiyon testi değeri arttı. 30 derecelik açıyla 25,4±5,49'dan 27,8±4,66'ya (4,6-2,2). Çalışmanın sonuçları, FIFA 11 programının futbolcular için önemini büyük ölçüde ortaya koyarken, sonuçlar FIFA 11 ısınma programını uygulamadan önce ve uyguladıktan sonra istatistiksel olarak anlamlı farklılıklar olduğunu gösterdi.Sonuç olarak, FIFA 11 programının futbolculara yönelik bir ısınma programı olarak uygulanması, oyuncunun maç sırasındaki yeteneğini arttırması,

çevikliğini ve dengesini geliştirmesi ve oyuncuların propriyosepsiyon alma yeteneğinin artmasına yol açması nedeniyle uygulanmalıdır.

Anahtar Kelimeler: FIFA 11, çeviklik, denge, propriyosepsiyon, performans.

1.INTRODUCTION AND PURPOSE

Football is a team sport played between two teams, each consisting of 11 starting players, using a ball. This sport is considered the most popular and widespread in the world. Football is played on a rectangular field, where the game aims to score goals by kicking the ball into the goal.

soccer; Since it is a team sport that requires control, it requires high athletic performance such as endurance, strength, and speed. Therefore, players in all positions, including goalkeepers, must possess all types of motor traits[1].

Football players need to train regularly to maintain and increase their physical performance. These training programs should include parameters such as strength, cardiovascular endurance, balance, agility, running, and proprioception exercises. Agility and balance are two very important factors in soccer. Agility exercises help the player acquire the skill of simulating the movements that occur on the field. The player may have to decide to change his direction and head towards one of the opposing team's players to recover the ball. Balance exercises in football also help prevent players from falling on the field when changing movements, and they also reduce injuries[2,3].

Practicing proprioception exercises reduces the risk of injury, and helps soccer players adapt to rapid movements, or sudden shifts in balance, to prevent common injuries, such as ankle sprains.

In football, these exercises are considered part of the warm-up program that is applied before the start of the match.

The term warm-up refers to simple exercises that a person performs that prepare his body to perform a specific exercise. It gradually stimulates the heart and blood vessels, also known as the cardiovascular system, by raising body temperature and increasing blood flow to the muscles. When you do warm-up exercises, they may also help relieve muscle soreness and reduce the risk of injury. A warm-up is a set of general and specific actions performed before training or a match to adapt football players physically and mentally to the goal achieved. Maximum performance and injury prevention. The primary purpose of the warm-up, whether before a training session or a match, is to prepare the player to perform in the ideal conditions of football activity [3,4].

Football today relies on the FIFA 11 warm-up program before the start of the match for team players, as football has become more developed in technical skills, improved tactical thinking, and increased physical needs. The increase in physical demands, exercise intensity and total distance traveled is a result of the large number of competitions that the best teams have with their best players. Football shows that it depends on physical and physiological characteristics because it is played on a large field and the tasks assigned to the players are different. soccer; Since it is a team sport that requires control, it requires high athletic performance such as endurance, strength, speed and agility. Therefore, it requires players in all positions, including goalkeeper, to have all types of motor qualities. [5-7].

When we look at the literature, we can notice that most studies on FIFA 11 focused on agility and physical performance of soccer players, and most studies found that there is a positive effect of FIFA 11 on these parameters [8,9]. At the same time, we can note that there are very few studies examining the effect of the FIFA 11+ training program on agility, balance and proprioception in professional players, especially in developing countries such as Palestine. In addition, previous studies relied on focusing on one or two dimensions, such as balance and agility, but they neglected the other dimension that was taken into consideration in this study, which is proprioception. For this reason, it might be thought that the results of our study would be important in terms of contributing to the literature and broadly highlighting the integral impact of FIFA 11 on the agility, balance and deep reception parameters of professional football [9].

The importance of this study comes from the fact that some studies found that there was a positive impact of the FIFA 11 program on these parameters, but some studies found that the program did not have a significant impact on these parameters, in addition to that when reviewing the literature it was found that there was not a significant impact on these parameters [10-12]. Therefore, this study seeks to examine the effect of the FIFA 11+ program on the standards of agility, balance, and natural grip among professional football players.

2.THEORETICAL FRAMEWORK AND LITERATURE REVIEW

2.1. Football Meaning and Scope

Football is a team sport played between two teams of eleven players each, played with a ball. Football is played by 250 million players in more than two hundred countries around the world, making it the most popular and widespread sport in the world. Football is played on a rectangular field with two goals on either side. The goal of the game is to score goals by kicking the ball into the goal [13].

Football is considered the most popular game throughout the world. It has the largest number of followers and the largest number of players who play it. According to reports by the International Football Association, Football is considered a sport accessible to everyone, as it can be practiced. In various places such as gyms, official stadiums, or even streets, parks, or many other places [14,15].

Football is a team sport based on the principle of cooperation and team spirit where two teams are formed, each of which consists of eleven players. By passing the ball between them with the aim of putting it into the opponent's goal, during which they are prohibited from using their hands to handle the ball, except for the goalkeeper, who is allowed to do so as long as he is inside what is known as the penalty area, and the game ends with the victory of the team that scores the largest number of goals against the opponent's goal [15].

The laws of football do not force any player to be positioned in a specific place, including the goalkeeper. However, players are often divided into 4 main sections according to their jobs on the field, which are directly related to their position on it. The positions are goalkeeping, defense, or back line. His task is to prevent the opposing team from scoring in their own goal and the midfield, and he specializes in delivering the ball to the attackers or making plays [16]. The offensive line and his main task are to score goals. The number of defenders, attackers, and midfielders varies from one team to another, and this often depends on the plan followed in the game. If it is offensive, the number of attackers or midfielders increases, and so on. goal [17].

2.1.1. The Advent of Football

Although there is no definitive information about the period in which football began to be played and the geographical area in which it appeared, and there are various myths and rumors about the origin of the Olympic Games, there is also information about the game of football attributed to many ancient nations [17,18].

It is said that the game "Harpatsam", which was generally played among soldiers in Rome after Christ, was similar to modern football that is played today, and that the Romans developed this game by drawing inspiration from a Greek game called "Episkiris". The game called 'Le Souie', played by Roman and French soldiers in the Middle Ages, is thought to have many similarities to football played today. We have seen in the past that kings invite all people to play this game. Football has been an element of balance in the social fabric since those times [19]. One of the people who made football very popular at that time was King II. became Charles. The second one was forced to seek refuge in Italy for a while. When Charles and his nobles returned to Britain, they spent a lot of effort and time spreading the game of "Gioco del Calcio", which was similar to the football they had watched in Italy, throughout the country [20,21].

Zuo Kuo, a type of football similar to Football, was played in China from the time of the Yellow Emperor until the 9th century and is known as a game played with great enjoyment in different periods. Divan-ı Lûgat-it Turk offers a lot of information about the sporting and leisure life of 11th-century Turkish geography. Regarding games played with a ball, sports games such as tebok, kojun, ball rolling, and many concepts related to them were mentioned. Among these games, Tipuk is one of the games that raise question marks in the history of Turkish sports because the way the game is played cannot be adequately explained [22].

Football took its form most similar to the one played today in 17th century England. Football, which enjoyed great interest among the public and nobility, showed great development and went through stages of maturity while spreading very quickly in the British Isle. Compared to its popularity in England and the British Isle [23].

One of the most important developments was that representatives of 11 different clubs met in London, the capital of England, and created the Football

Association, the first association in the world of football, the English Football Association [24].

Other important developments include taking the first step towards the professionalization of football by bringing good footballers from Glasgow to Dunvin with money and offers of work in 1879, and the formal acceptance of professionalism in football by the English Football Association in 1885. Football in Denmark and the Netherlands since 1889 has further developments in terms of the stages of development and maturity of football [25].

At the beginning of the 19th century, football clubs gradually began to settle in Europe. It is said that the establishment of the English Football Association is what led to the opening of these clubs. The formation of the world football association began in Paris in 1904. The World Federation of Association Football (FIFA) was founded in 1904, and the European Football Association (UEFA) was founded in 1957 [26].

2.1.2. The development of football in the world

Although it is not known exactly when football appeared and when it was played, very ancient sources mention many football games played by the Chinese, Romans, Egyptians, Greeks, and Mayans. Although it is not known exactly where it originated, it is known that football has been played in England since the 17th century. In the 17th century, football became the most-played game in England [27,28]. The first rules of the game of football were recorded in writing by the London Football Association in 1863. It is known that the game of football was taken from the British Isle by those who went to India, South Africa, Europe, and South America to trade [29]. The world's first football club is known as Sheffield FC and was founded in 1857. Football began to be played in 1862 according to the rules of the game written by John Charles Thring, a teacher at Uppingham College. After this date, the football movement began to emerge. Football, which was unstoppable and developed very quickly, became official in 1863 with the organization of the English Football Association (Football Association, FA) and quickly spread throughout the world [30].

FIFA was founded in France on 21 May 1904 and was joined for the first time by the football associations of France, Belgium, the Netherlands, Sweden, Switzerland, Denmark and Spain. Later, it expanded further with the

participation of European countries [31]. The first FIFA World Cup was held in Uruguay in 1930. Uruguay hosted and won the first World Cup. At the end of the nineteenth century, the game of Football was brought to America. It was a game played by immigrants in America in the early days. The American Football League (Football) was founded in the 1970s. Football participated for the first time in the Olympic Games, which were held in London, the capital of Great Britain, in 1908, and the British team won the first gold medal in the Olympic Games [32].

2.2. Performance Requirements in Football

2.2.1. Strength in Football

Today, football players' need for strength is undoubtedly important. Sports scientists have explained strength with different definitions. However, in its most comprehensive definition, power; can be defined as the ability to resist an element of resistance, overcome resistance, and move one's body or an object forward. Dilek, (2010). defined strength as the ability of a muscle group to resist an element of resistance by first tensing and then relaxing. The strength characteristics most needed in football are shooting, jumping, kicking, and running strength. For this reason, muscle groups specific to performance must be developed in a purposeful and planned manner [33,34].

2.2.1.1. Maximum strength

It is defined as the maximum weight that a person can lift simultaneously with instructions issued by the neuromuscular system. Reiman [35] defines maximal force as the amount of force that produces the greatest amount of energy by contracting the neuromuscular system with maximum contraction. In short, maximal force is the highest amount of force that football players can produce in one repeated exercise. [36].

2.2.1.2.Rapid strength

It is defined as the ability to overcome resistance through the contraction of a muscle or muscle group that performs the movement in the shortest time and with the greatest force [37,38].

2.2.1.3.Continuity of strength

It is defined as the body's ability to resist fatigue in long-term competitions

or training where strength is required. It can also be defined as a combination of strength and endurance at a certain level. The ability to maintain force is a very important motor ability, especially in the long-term branch of football [39].

2.2.2.Speed in football

Speed is a person's ability to move himself from one place to another at maximum speed. Speed is an inherited trait and can only be improved and reached through conscious training. Speed is the distance traveled per unit of time, and speed is the distance traveled per unit of time. Although speed is presented as a very important element in a soccer player's physical fitness, it must be taken into consideration which element of speed is effective in soccer [40-43]. In this context, according to sports scientists and analysts interested in the game of football, a football player uses speeds of up to 30 meters on the field. Since the speed up to 30 meters is known as "sprinting speed" in coaching science, the speed in football reflects the running speed. During soccer matches or training, soccer players suddenly need to change direction while running at a high pace. Such movements occur thanks to features such as speed, balance, coordination, and agility[44]. This is called the asymmetric speed advantage. Reaction speed includes the time from the moment a stimulus is given until the first sign of movement is noticed. Reaction speed mostly covers the first 5 meters of sprints. The part between 5-10 meters is called ascent speed. Since football is a sport that requires making sudden decisions, the speed of reaction and exit is important [45].

Many factors affect speed. Although a football player's genetic makeup influences speed, this does not fully determine speed potential. The fact that there is a greater amount of fast-twitch muscle fibrin than slow-twitch muscle fibrin leads to faster movement. However, speed can be improved with proper training. In addition, the fact that speed is affected by the ability of muscles to contract strongly shows that strength training is essential for speed training [46].

2.2.3.Endurance in football

The endurance is the body's ability to resist fatigue in long-term exercise and maintain high-intensity loads for a long time [47]. In general, long-term or high-intensity training. Studies covering this are related to resilience. Endurance

plays an important role in successful performance in football. It ensures that the footballer can meet the needs of the sport on the field for as long as possible without feeling tired. In past years, endurance training was only done in the pre-season, but with the advancement of science, it is now known that endurance training should also find a place in in-season training [48]. For a footballer to be successful in match performance, his technical, tactical, adaptive, mental, and psychological characteristics must be at the highest level. Even if all a football player's skills such as technique, tactics, strength, speed, and quickness are at a high level, if he gets tired early, he may not be able to use his important football skills. For this reason, a football player's endurance must be increased above a certain level to be able to use his skills for 90 minutes [49].

Football is a discipline with long training and competition periods, and since it is a contact sport, football players in all positions must have high levels of endurance [50,51]. However, the responsibilities placed on footballers during competition may differ between different positions in terms of their physical and physiological needs. For example, side players perform the most intense activities with attacking players. It is noted that midfielders perform moderate-intensity activities. It is noted that there is no significant difference between sites in low-intensity activities [52].

2.2.4.Flexibility in football

The concept of flexibility can be defined in different ways depending on the branch of science or the purpose of research. In physical education and sports science, flexibility is simply defined as the range of movement of muscles, joints, or joint groups. We can examine flexibility under two main headings: static and dynamic. Static flexibility is defined as the ability to resist movement by joints. Dynamic flexibility is defined as freedom of movement around joints or the ability to extend the body in different directions [53].

Flexibility, unlike other motor properties, decreases with age. In studies, it is most common between the ages of 10 and 12 years. [54]. It is seen that a low elasticity value is reached. However, it has been observed that flexibility increases after this age towards youth. Values cannot be achieved in early childhood. Flexibility decreases with age after puberty. Flexibility directly affects football players' techniques and coordinated skills one by one. For this

reason, flexibility training should be an indispensable part of the training process [55].

Flexibility is a prerequisite for good ball technique in soccer players. In addition, soccer players may experience sudden and difficult-to-control forces arising from themselves, the opposing player, or the soccer ball. In such cases, injuries occur in football players who do not have sufficient flexibility. For this reason, maintaining flexibility appears to be an important factor in protecting against injuries [56]**.**

2.2.5.Coordination in football

Coordination appears to be the most complex skill among motor skills. All other motor skills are managed appropriately. It is closely related to strength, speed, endurance, and flexibility skills. A football players 's body requires coordination in unusual circumstances. In addition, the football player needs coordination when he loses his balance. The football players 's coordination level must be trained according to specific training objectives. Coordination is an indicator of a football players 's ability to perform difficult movements at various levels more quickly [57-59].

Coordination between soccer players is especially valuable in movements with the ball. For example, under pressure, coordination becomes very important when deceiving the opponent, making tackles, shooting on goal, and heading the ball. Players with advanced coordination skills can find the most appropriate solution, move through difficult situations in a short time, and show a high level of applicability in uncertain game conditions [60,61].

2.2.6. Balance in Football

The meaning of balance is the state of stopping without overthrowing an object or a person. Balance is a general term that describes the dynamics that prevent the fall of the body mass. Balance can be defined as the ability to maintain the body's stance on the support area [62].

It can also be expressed as the ability of the body to protect the center of gravity on the support center with maximal stability. Although Balance is not one of the first concepts that come to mind when it comes to sports, it has an

important place among the main features of the sport. Balance is one of the sensorial organs of the organism and is the phylogenetical but least known in the senses such as taste, smell, touch, vision, and hearing [63,64].

Balance is special for the sports branch. In other words, a person cannot gain a general balance ability to provide good balance in all branches or all cases. In other words, balance is special for the skill to be applied and is based on the sporting branch that is balanced. Balance control is a complex motor ability that includes the planning and application of flexible movement forms as well as the integration of sensory inputs [65].

Balance requires the integrity of sensory knowledge through coordination of many muscles. In particular, all motor activities containing hip, knee, and ankle are for the body to establish the center of gravity on the ground. When we stand constant, our sense of proprioception has a primary role in maintaining our position. In this case, visual and vestibular systems are in the second important position. When we stand in a curved place, visual and vestibular systems help to balance. Walking on ice or snow and moving in the forest is the joint work of all these systems [66].

Very complicated motor tasks in daily life take place without considering and automatically. This organization is based on visual, somatosensorial, and vestibular information that is constantly flowing into the motor system. [67-69].

2.2.6.1. Balance Types

Balance is divided into two static and dynamic balances.

-Static balance

The ability to provide the balance of the body in a certain place or position is called static balance. The static balance is a stable level of support automatically provided to protect the general posture or body sections in a certain position without the need for any extreme force.

-Dynamic balance

It is the balance provided by the neutralization of the muscle and joint circumference of the external forces that are effective in the body by soft tissues.

Dynamic equilibrium, walking, activities that transfer weight, stairs, going down and going to the chair, such as daily life activities such as different movement patterns and these patterns. Balance control is dynamic while the

person is in motion [67].

2.2.6.2. Control of balance

As you move from one movement to another, the principles required for the body to adapt and maintain its balance are as follows [68,69]:

* Wide resistance surface, wide,
* Close to the endurance surface of the body gravity center,
* Body gravity line, passing through or close to the gravity center,
* The body gravity line falls into the support area.

One of the biggest problems in the control of the balance is the time to reach the signals related to the velocity of positions and movements from various parts of the body. As in the Spino cerebellar efferent system, even on the fastest sensory roads (120 m per second), there is a delay of 15-20 milliseconds in the uprising nerve message [70]. Therefore, it is impossible for the signals arising from the peripheral part of the body to reach the brain at the same time. Signals from the periphery tell the brain not only the positions of different parts of the body but also how fast and in what direction they move. It is believed where different parts of the body will be in the next few milliseconds, and the calculation of these speeds and aspects is the function of the vestibular cerebellum. The results of these calculations are the key to the brain process for the next order movement [71,72].

Thus, when regulating balance, it is thought that the information from the vestibular apparatus is used in a Feedback control circuit to pre-correct the postural motor signals required to maintain balance even in very fast movements, including very rapid change [73].

To control the balance in any movement, first of all, it is necessary to be fully aware of the current condition of the body. However, after this awareness, movement selection can be made. Everything that exists in the world outside of us and influences us constitutes our perceptual environment. Required to ensure the balance [74].

We create our perceptual environment in our brains thanks to the data flowing from visual (visual), vestibules, and body sensation (somatosensory) receptors.

2.2.6.3. Importance of balance in terms of sporting performance

Balance is the basis for good performance and is defined as a transmitter within the nervous system. The human ability to balance can be defined as a decisive factor in the development of other motor systems. It is thought that balance is a factor in the distinction between sports skills, good performances, and those who cannot show and provide a positive acceleration for physical development where motor skills are exhibited [75]. It is known that balance plays an important role in maintaining the body composition required for successful performance in sports. Therefore, it is the basis for dynamic sports containing sudden changes in the movement pattern. All sports contain a certain level of balance [76,77].

Some tasks are important in maintaining an orientation at the expense of stability. In football, to save a goal or in basketball, to achieve the capture of the ball in the air, the player is always associated with the ball, sometimes to prevent or capture the lake requires falling to the ground. In this way, While postural control is a common requirement of most movements, the requirements of stability and orientation with each movement change [78].

In balance measurements made on ballet dancers, rhythmic gymnasts, and tower jumps, motoric properties have been observed to affect the balance of mobility, quickness, and durability. It is thought that the loss of balance is an important source of the inability to perform the best performance of motoric properties with equilibrium measurements [79].

2.2.6.4. Evaluation of Balance

Since balance is a complex sensory-motor skill, a single and simple test is not sufficient. There are many tests for the evaluation. Different tests evaluate different parameters of balance [80].

Since there are too many tests, it is necessary to ask some questions when deciding which test is appropriate. Although there are many evaluation methods used in the evaluation of the balance, none of them are defined as the gold standard. Balance tests should be taken as soon as possible and should be reliable and measurable for monitoring balance changes. Balance measurements

can be performed by clinical balance tests or laboratory tests. Factors such as the characteristics of the population, time, and cost are effective in deciding which of these tests will be applied [81-83].

Evaluating the balance in the clinic should cover both static and dynamic evaluation, and all methods should be repeated separately while the eyes are open and closed.

It is recommended that training and sport cause the development of a particular muscle system according to the applied model. In football, players use both limbs equally in football skill activities and shots, and therefore only raids one side. For example, in a football match, most players do not focus on falling on both legs while jumping [84]. The dominance of a leg can cause asymmetry between the opposite side muscle groups and develop a tendency to injury in the leg with a weaker muscle force. Therefore, it is vital to teach football players not only to run fast but also to give their feet to their feet [84].

In the evaluation of the balance, methods such as timely equilibrium tests, balance devices, and force platforms that measure changes in postural stability are used. In addition, it is stated in many studies that computed static and dynamic balance platforms that give objective results are used [85].

One of the equilibriums measuring devices used in the clinical environment is a portable computed kinesthetic balance device. This device is a balance platform designed for functional evaluation and training of the neuromuscular control system. [85].

2.2.7. Agility In Football

It is a term used in agility, strength, and condition and is considered an important element of many sports and activities. A boxer survived the fist, a ballet dancer who completes his return on his feet, and a wrestler who finished downloading his opponent to the ground can be all examples of agility. However, football players who participate in performance development look at the locomotor skill that allows the football player to change direction. Such movements are often frequently observed in field runway sports such as basketball, football, tennis, and Lacrosse (hockey-like ball game) [86].

In the heat of this, agility is widely defined as the effective unification of stopping, changing direction, and acceleration while maintaining engine control

in either vertical or horizontal direction [86].

Although agility is a necessary feature in the majority of sports activities, it has different definitions in the literature. Some of these definitions are as follows: Agility is the rapid and correct movement of the whole body in a perceived stimulus. According to another definition, agility defines the aspects of the body or parts as the ability to quickly and correctly change [87]. In another definition, agility defines it as the ability to quickly change direction by maintaining balance without loss of speed. When the definitions of agility are examined, it is seen that agility is defined with the help of certain biometer properties. In this context, agility consists of certain biometer properties and is a significant affected feature of some [87].

The football player who has good agility will often have other qualities such as dynamic balance, spatial awareness, and rhythm as well as visual processing [87]. Thus, although agility can be defined as the ability to stop rapidly and start a movement, there is a high degree of complexity in this motor skill.

2.2.7.1. Factors Affecting Agility

• It has been seen that there were many Factories affecting agility in the studies.

•Body weight; Increasing body weight may adversely affect agility.

• Length: Tall or disproportionate leg can adversely affect agility.

• Balance: Since agility is one of the equilibrium parameters, the balance affects agility.

• Reaction time: The consequences of agility tests for those with short reactions are better [88].

• Movement speed and accuracy: Speed agility during movement affects agility and if the person does not reach the desired point during the test, the agility does not perform.

• Movement Distance: The distance should be kept short in agility tests. Because the energy mechanism used by the football player is anaerobic. Sports passes to the aerobic energy system; this is not an agility test.

• The direction of the movement: The consequences of agility may vary because the rural tests are performed in the form of side, although the distance of

the further and extensive running are different [88].

• Seeing by seeing the point determined, and the movement increases as a result of realizing the movement

• Muscle tone: Decreases or increases in muscle tone affect agility.

• Age: Especially in later ages, agility is adversely affected [89].

• Fatigue: Negative affect agility.

• The sensitivity and accuracy of the sensory organs: If the person has problems such as vertigo, they affect agility. Because the inputs related to agility only come from the sensory organs such as the ear and eye from muscle and joint receptors. [89].

• Level of conditional properties: A person's training or high level of condition affects agility positively.

• Movement with poor technique: The incorrect learning of the sports-specific agility parameter in the football player, for example, hurts the agility made against “dribbling "in football, “Dribbling “in football.

• Training and Movement Experience: The absence of a training program for agility negatively affects.

• Thinking or sports intelligence: Those who have an intellectual ability to determine how to make the desired movement in less time can be more agile [89].

2.2.7.2. Importance of agility

Agility is mainly an important feature in sports performance for three reasons. The first is the development of agility will provide a strong basis for the control of the nerve-muscle system and motor skills. Later, Direction changes are a common cause of injury, thus reducing the risk of injury by developing appropriate individual movement mechanics as the third; The football player's maturity will increase the overall performance in both attacks and defense [90-91].

Raise is an important physical component necessary for a successful performance in football.

It is the most basic performance component that determines the quality of a football player's movements such as sudden acceleration and stopping and is a feature that distinguishes the elite footballer better than other field tests

compared to the general population.

The physical characteristics of agility performance, cognitive processes, and technical skills are accepted. So, agility and motor learning include biomechanical and strength components [91].

Together with agility, it has an important place in sports branches in balance. To perform most of the activities in daily life, the right posture depends on the establishment of balance and the development of agility.

Raise is an important physical component necessary for a successful performance in football. Agility is also the most basic performance component that determines the quality of a football player's movements such as sudden acceleration and stopping at high speed, and is a feature that distinguishes the elite footballer better than other field tests compared to the general population [91].

2.2.7.3. Development levels of agility

Learning to be agile requires the development of appropriate motion models. However, in connection with the novice arm movement, a generally unbalanced stance, and connection with the lack of general timing and coordination, movement yield is weak. Demonstrate the strategies for reaching appropriate motor skills can start at approximately 5 years old with the critical periods of 9-12 years old [91].

It should be kept in mind that individuals will develop at different speeds and that there are difficult gender differences for critical periods, and the mourning intervals given are not an unchanging rule, but a temporary guide [57].

Nevertheless, to improve agility properly, both general and special exercises are used within a certain period. For example, in the range of 5-8 years, versatility should be at the forefront of various general motion models to improve the basis of motor skills. During this period, which will provide a structure to learn movement models, timing, and coordination, planned (also called closed) exercises should be weighed [92].

The relationships between body structure and size such as height, body composition, center of gravity, and agility were not examined in detail. Theoretically, the amount of body fat and the length of body segments may affect the performance of agility, from two football players with the same body

weight to a high body fat percentage and low muscle mass [92]. The owner has to produce more force per unit of muscle mass during negative and positive acceleration due to high inertia resistance. The most interesting aspect of the agility feature is that so many features are coordinated in a very short time unit and put forward as a whole [93].

With agility, the main objective is to bring the whole organs of the body to the ideal angular values that need to be done. For this reason, we can define the ability to fulfill the movement, position, situation, or event as a result of a stimulation, position, situation, or event, from the valuation of the angles of the organism to the valuation of the ideal angles required by the situation. [93]**.**

2.2.8. Proprioception

2.2.8.1. Definition of Proprioception

The word proprioception was first used by Sherrington in 1906 and consists of the combination of the words ’proprio’ and caption ’in Latin. Proprio is specialized and Caption means detection. The term proprioception is used to indicate motor control, equilibrium, audio-visual-motor coordination, and joint stability of the posture formed. Proprioception is generally the ability to perceive the body's position in space for the awareness of body segments [94].

Proprioception allows a person to maintain joint stability during static and dynamic posture, a special variation of sensory modality, involving the feeling of joint movement and joint position. Joint position feeling: It is the ability to be aware of the position or movement, to produce an active or passive predetermined joint angle. Proprioception covers the static and dynamic aspects of position sense. Static sensation allows one body part to give a conscious direction to the other and the position of the position [94,95].

The neuromuscular feedback provides neuromuscular feedback about the direction and velocity of a movement and can be defined as the feeling of the movement.

Afferent is a complex neuromuscular process that provides body stability and orientation in static and dynamic activities. In the lithotrite, proportions are divided into two levels, consciously (voluntary) and unconscious (reflex-onset). Conscious proprioception; It provides the appropriate function of joints in daily life activities and sporting activities. Unconscious proprioception starts the

reflex stabilization of the joints thanks to the receptors in the muscles and adjusts the function of the muscles [96].

2.2.8.2. Control Level of Proprioception

Proprioception: It is a combination of somatosensorial, vestibular, and visual systems used to regulate muscle activity around the joint that provides common stabilization by the central nervous system [96]. Recorders responsible for providing a feeling of position and movement are proprioceptors. These receptors are mechanical signals such as pressure or tissue deformation; They consists of oxidants that transmit pain, touch, and heat information. The tasks of proprioceptors are to report sensory stimuli from muscles, tendons, joints, and skin to the central nervous system. Sensory information received by proprioceptors is sent to the medulla spinalis for processing, thus leading to the formation of spinal reflexes and regulating muscle activity [96].

In addition to the stimulation of Afferent information, the engine response is also dependent on the processing area of Afferent inlets within the central nervous system. This can take place in three different regions in the central nervous system: medulla spinalis, brain stem- cerebellum, and cerebral cortex. Spinal reflexes: They occur in the fastest response to the shortest neuronal paths and the afferent stimuli [97]. These answers are typically the same and are modified by the intensity of Afferent Warnings. Spinal reflexes vary from simple monosynaptic reflexes to multicentric reflexes that provide coordinated activity of muscle groups. Spinal reflexes occur quickly, but cannot be modified by training to help dynamic joint stability [97].

The response cycle, which is caused by the sensory means to the brain stem and cerebellum, is often called long-loop reflex (Long-loop reflex). Since sensory information is carried at more distance before processing, the answers typically occur in a longer period than spinal reflexes because this information is carried by roads to the upper centers to create proprioception [98].

Almost all of the sensory inputs come to the ganglion spinal with medulla spinalis with the dorsal roots of the spinal nerves. The impulses from mechanoreceptors come to the spinal of the medulla and move from here to the relevant upper centers using these ways. However, since these paths are potentially multi-emotional reflexes with more sensory input sources, they can

adapt when correct information about the development of long loop reflexes and can also adapt well [98].

Therefore, these roads are thought to be important in the preservation and maintenance of dynamic joint stability. Both voluntary movements and involuntary movements are processed at the cortical level of the brain and create motor responses. Voluntary movements are formed by processing multiple variables and can adapt extremely. On the other hand, involuntary movements emerge from pre-programmed and coordinated reactions that occur in response to the Afferent stimuli that make them move. Because of their pre-programmed nature, involuntary movements take place a little faster than voluntary movements but may not be able to adapt to conditions in atypical cases [98].

- Mechanoreceptors

It is accepted that proprioception or sensation is caused by warnings from muscles, joints, tendons, ligaments, and mechanoreceptors in the skin. Mechanoreceptors convert neural impulses to mechanical stimuli, which consist of structural changes in the tissues of the tissues in terms of position, voltage, and pressure of the joints and muscles in the body [99].

There are many different mechanoreceptors in our bodies and the presence of different mechanoreceptors has been proven in histological studies. The most well-known of these mechanoreceptors can be listed as muscle spindle, Golgi tendon organ receptors, free nerve termination, Pacinian corpuscula, and Ruffini. Mechanoreceptors are classified as slowly adapted, fast adapted, stimulated by a low threshold, and stimulated by a high threshold [99]. According to the texture it is located in, mechanoreceptors can divide it into three groups in the form of muscle receptors, joint receptors, and boxed receptors. Mechanoreceptors are not found in the same amount in the same tissue but are more intense in some tissues [86,97].

Pacini receptors are generally stimulated by pressure, while Ruffini receptors are generally stimulated by voltage. Pacini-like bodies respond only to movement, while the Ruffini termination responds to both motion and position.

- Muscle receptors

It is considered the most important source of prepromotion, which are contracting fibers of the skeletal muscle, and which are in all skeletal muscles in parallel with the extrafusal muscle fibers stimulated by alpha (α) motor neurons.

The muscle spindle is a peripheral receptor on the body of the skeletal muscles. [88,97].

The primary sensory axons from the muscle spindle innerve the muscle with the muscle spindle (α) motor neuron and monosynaptic connection in the ventral roots of the spinal cord. As a result of any changes in the muscle spindle, alpha (α) motor neuron stimulates muscle contraction [64].

Extrafusal fibers are in the form of a bunch of thick muscle fibers, alpha (α) is inhaled by the motor neuron and responsible for producing power. Intrafusal fibers that provide feedback to the central nervous system are in the form of fine muscle fibers and the gamma (γ) is modular on the motor neuron side. The gamma (γ) motor neuron system, which modulates changes in muscle length, ensures that the muscle spindle is functional during every contraction. Sensory stimuli from the muscle spindle are slowly adapted, triggered at low thresholds, and detect the sense of joint position during the joint movement [90,97].

Muscle spindle: It detects information about muscle length and changes in muscle length and notifies the medulla spinalis with self-related sensory afferents. It provides data to the central nervous system with information from the receptors in the joints and skin about the relationship between the extremity positions to control the joints with each other [99].

Intrafusal fiber is the main receptor part of the actin and non -myosin -non-myosin-free receptor section and is sensitive to stretching. The end sections contain contractile proteins and the gamma (γ) is innervated by the motor neuron. Intrafusal fibers consist of two types of fiber; 2-3 pieces in the muscle spindle, nucleus are collected in the medium equatorial region (1) nuclear bag (nuclear pouch) and 6-7 pieces in each muscle spindle, the nuclear chain (2) nuclear chain [74-89]. When the length of the intrafusal fibers is prolonged, it extends in intrafusal fibers or shortens the height in the intrafusal fibers when the length of the intrafusal fibers is shortened. Both the nuclear pouch and nuclear chain fibers, the fastest sensory fibers in the body, IA afferents spiral surrounds. Group II afferents connect to Nuclear chain fibers in the form of a bundle of flowers from two ends [99].

Nuclear pouch fibers are sensitive to sudden elongations in the muscle neck, while nuclear chain fibers are sensitive to the slow shortening and

remaining of the neck of the muscle during relaxation. In cases where the muscle is suddenly stretched, the nuclear pouch fibers are stimulated and this warning is quickly sent to the spinal with the medulla, alpha (α) motor neurons respond to the extractuzal muscle fiber quickly, thus a dynamic response occurs [99]. Nuclear chain fibers continue to cause a warning as long as the length of a relaxed muscle remains long (static, passive stimulus), these warnings are transported to the medulla spinalis with relatively slower Group II fibers. In response to this stimulus, with stimuli from alpha motor neurons, it creates a contraction in muscle fibers and ensures that the tone is optimum [55,98]. The stimulation of these afferents causes contraction in the relevant muscle and the facilitation of antagonist and synergist muscles. In this way, motor control is provided in harmony with the extremities in harmony, to initiate or maintain the target movement [92-95].

The Golgi Tendon Organ (GTO) is slowly adapting mechanoreceptors and is located in the muscle-tendon junction, close to the tendon. GTO is a sensory receptor in the tendon and is translated by the capsule. Each Golgi is connected to the tendon organ about 10-15 muscle fibers in series. The Golgi tendon organ is stimulated by the tension in the small muscle bundle. The signals resulting from the arousal are transported with a wider, faster stimulus transmitting type IB type nerve fibers than the Golgi Tendon organ. IB-type nerve fibers are slightly smaller than primary endings in muscle spindles, and the average diameter is up to 16 microns [69].

GTO moves more during an active muscle tension after a passive muscle tension. The Golgi tendon organ provides affairs information about the tension of the Musculo's keeper Kas-Tendon and perceives the degree of stress in cases of stretch or withdrawal in the muscle and tendon. They transmit the tension to the central nervous system and serve as preventive or stopping structures in cases where muscle contraction is high. This event, which has a protective reflex function during excessive tension at the muscle-tendon junction and results in the contraction of the agonist's muscles, the contraction of antagonist's muscles, is called tendon reflex[58].

The Golgi tendon organ produces dynamic (when sudden muscle stress increases) and static reflex signals, like the task of the primary receptor of the muscle spindle. In a very short time, it is adjusted to a fixed discharge value,

almost proportional to muscle tension. In this way, Golgi Tendon organs provide information that delivers the voltage degree in the smallest segment of all muscles to the central nervous system. IB-type nerve fibers carrying the formed impulses from the Golgi Tendon organ to the central nervous system are wide and fast transmitting nerve fibers from the Golgi tendon organ [76].

These fibers carry impulses such as primary endings to both local spaces in the medulla spinal and to the cerebral cortex in the cerebellum and other tracts with spinocerebellar tracts. Local medulla spinalis signal stimulates a single inhibitor intermediate neuron, which inhibits the front horn alpha motor neuron. This local circuit, without affecting neighboring muscles, directly inhibits the muscle [80]. With the rise of muscle tension, the medulla spinalis message of signals from Golgi tendon organs leads to the development of reflex effects in that muscle. However, this reflex carries an entirely inhibitory character to the reflex of muscle spindle reflex (stretching reflex) and provides a negative feedback mechanism that prevents the development of excessive stress in the muscle [25,90].

The warnings occurring in the muscle spindle and Golgi tendon organ, which is one of the muscle receptors of proprioception, are unconscious, involuntary, and provide information about the muscle activity of the cerebral cortex, cerebellum, basal ganglion and medulla spinalis, thus controlling movements. The main difference between the Golgi Tendon organ and the muscle spindle determines the tension of the muscle, while the muscle spindle determines the relative length of the muscle [75,90].

- Muscle receptors Joint receptors

Afferent information caused by joint receptors continuously transmits sudden movements in the joints to the central nervous system.

The extent to which the movements of the joints affect the receptor and the direction of the joint moves to the central nervous system.

Joint receptors: They are various afferent receptors in the capsule of synovial type joints and in the ligaments that cross the joint and are divided into groups as group I, II, III, and IV according to the fiber type. Four types of afferent sensory ending in joint capsules and ligaments are seen. Structures responsible for the sensation of joint position and movement perception; [80,100].

Pacinian Corpuscular - Ruffini receptors - receptors similar to the Golgi Tendon organ are free nerve endings that carry the sense of pain [98,100].

Ruffini receptor endings are slow-adapted mechanical receptors with a low mechanical voltage threshold and continue to discharge in response to a continuous mechanical stimulation. They are found in the joint capsule and superficial layers. These receptors have high sensitivity to mechanical stress. The intraarticular pressure can detect the static stability of the joint, and the limits and speed of the joint movement. [81,97].

Pacinian corpuscles are located in the deep layer of the joint capsule. Pacinian corpuscles can quickly adapt during high-speed changes in the joint (accelerated or slowed) and are thought to be suppressed. Pacinian corpuscles, which are sensitive to low mechanical stimuli, are active in dynamic joint changes. For this reason, this receptor is quiet in static conditions but is very sensitive to acceleration or slowdown in the joint [10,98].

Golgi tendon organ-like receptors are the largest joint mechanoreceptors, a slow adaptable mechanoreceptor with a high activation threshold. Some researchers: Golgi state that receptors similar to the tendon organ have a high threshold of activation, indicating that it is suitable for detecting the sensitivity of the last parts of the normal joint movement. [83,97].

- Sensory Receptor

Sensory receptors: Afferents that are both quickly adapted and slowly adapted. The rapidly adapted afferents are generally responsible for transporting information about the sense of vibration, joint, extremity position, and slow changes in the position. Slowly adapted Afferents are responsible for the transport of this information by detecting sudden changes in the senses such as stress on the skin and movements such as acceleration-warming. The sensory information from the sensory receptors is processed in the central nervous system with the information from joint and muscle receptors. [89,99].

In response to possible harmful stimuli and initiation of reflexive responses such as the Flexion retreat reflex, the role of boxed receptors has an important role. Leather receptors can carry information about joint position and movement when the skin is stretched. However, there are also studies showing that boxes do not have a significant contribution to the joint stability of boxes [14,100].

The contribution of muscle receptors and joint receptors is much higher,

while the box receptors contribute minimally to joint proprioception. Vestibular and visual systems also have an important role in the proprioceptive process extending from mechanoreceptors to the central nervous system and from there to the target texture [96]. Proprioceptive detection varies when the eyes are closed or open, and vestibular and visual systems are healthy or sick. When the information from the vestibular and visual systems is added to the information carried to the central nervous system through mechanoreceptors, the process is clearly understood [12,99].

2.3.Football Training

There are some general exercises that players do before the start of the matches and before starting to warm up to play the match, and they are to test the player's ability to follow the matches and examine his functional movement, which are the deep squat, obstacle step, forward step, shoulder movement, active straight leg raise, and stability push. [94,100].

2.3.1.Deep squat

The motor functions of the deep squat form the foundation for many different functional movements. It is very important to provide the required strength to the deep lower extremities. The deep squat test tests whether your whole body mechanics are adequate. In a person's deep squatting motion, there should be flexion in the hips, dorsiflexion in the ankles, and flexion in the knees. For a person to perform the movement correctly, the trunk must be stable and the hips and shoulders must move in a symmetrical position [90-94].

2.3.2.Hitch step

The obstacle step test aims to evaluate bilateral stability and adaptation to the movement of the ankles, knees, and hips. The test requires continuous coordination between the upper body and hip, consistent with stability and movement during walking and pulling movements, as well as standing balanced on one leg. The hitch step test detects bilateral functional mobility and stability of the hips, knees, and ankles. [98,99].

In this test, subjects can pass their feet over an obstacle in an asymmetrical

fit that divides their body in two, touch their heel to the ground, and pull their foot back to the starting position without losing balance. The length of the tibia of the test subjects is measured and the obstacle rope is set to this height [100].

2.3.3.lunge in line

In addition to assisting in performing daily activities, balance plays an important role as a key factor in increasing athletic performance.The forward stepping test is important to evaluate rotation, deceleration, and lateral movements in body position. Stepping up the line challenges body position and provides the opportunity to evaluate proper rotation and alignment of the lower and upper extremities. The purpose of the forward stepping test is to measure hip mobility, ankle mobility and stability, quadriceps flexibility, and knee stability [16,97].

2.3.4.Shoulder movement

The shoulder motion test includes bilateral shoulder motion. It combines flexion movements, adduction and extension movements, and external rotation movements with abduction and flexion movements. In addition, scapula mobility and extension of the thoracic spine are needed. The test is applied after the distance between the wrist of the person doing the measurement and the longest finger is taken, and scoring is based on the distance between the two fists [66,98].

2.3.5.Active straight leg raise

The active straight leg raise brings one leg to your hip bend while lying on your back. The purpose of the active straight leg raise test is to measure the flexibility of the gastrocnemius, soleus, and hamstring muscles. In the supine position, one leg should be in motion while the other leg should remain in a neutral position and the ankle should be in dorsiflexion [90,97].

2.3.6.Raised torso stabilizer

The purpose of the trunk stability push test is to measure the core strength of the body. Core muscles, three movements while doing push-ups to stabilize the torso. It also holds the body at its level. Trunk stability push-ups are a

symmetrical movement and require proper stability in the shoulders while performing this movement. This movement involves moving the body into a static push-up position, holding the body in a fixed position, in balance with the strength of the arm and core muscles [78,98].

2.3.7.Rotary stability

The purpose of the rotational stability test is to measure the body's resistance to rotation. The rotational stability test also analyzes muscle capacity similarly to the trunk stability press test, except that the rotational stability test is asymmetric. While the trunk is stable, each side of the body performs different movements [84,94].

2.4. Warming-Up Programs in Football

It is the name given to the whole of the studies applied by the football player football player before an exercise or competition, to make himself physically and psychologically ready. It prepares the physiological state of the football player by increasing the temperature in the muscles and accelerating metabolic reactions in the muscles. Although the body temperature increases with warming up, an increase in blood circulation is observed. [77,90].

The concept of warming-up in sports sciences is handled under 2 basic headings, general warming and special warming-up [56,99].

. The organism can be physiologically warming up through physical studies. Sweating, which emerges after the study, is considered as an indicator of physiological warming-up. Physiological warming: It covers headings such as general warming, special warming-up, and kinetic warming-up [100].

2.4.1. General Warming-up

General warming is the work to prepare the football player for the competition by increasing the functions of the body to the highest level. During general warming, large muscle groups of the body are activated. Activities are general exercises in the form of walking, jogging, opening, stretching, and jumping. Another purpose of general warming is to prevent sports injuries [19,97].

2.4.2. Special Warming-up

Special warming includes the work for the person and the sport to be performed in the process following the general warming. It is directed to the character of competition and training. They prepare the organism for psychological and physiological competition. A characteristic feature of special warming is the study of special muscle groups. Asymmetric, severe, and high coordination levels are applied [69,99]. One of the objectives of special warming is the coordination between muscles. The warming-up techniques that the football players are applying also vary according to the branch and football players. Special warming in sporty warming-up is examined in 3 basic groups active warming-up, passive warming-up, and mental warming-up [15,99].

2.4.3. Active Warming-up

It is the warming-up that football players perform with active exercises. Football players are actively carried out by football players during this warming-up. It is also called physiological warming. Active warming is applied to balanced football players who do not have problems psychologically. Active warming is based on multiple components, which are the time of violence, scope, and recovery. The changes in the characteristics of warming may be the main factors that affect the results of the performance to be exhibited in the future [91-95].

2.4.4. Passive Warming-up

Passive warming-up is the warning of the muscles as a result of stimulation of the organism with external factors and ready for exercise. Passive warming-up is a method of warming up recommended to football players because the flexibility of muscle and joint ligaments is important in sports disciplines that require high-level flexibility [94]. With passive warming-up, body temperature increases expansion in the capillaries occurs and the amount of blood flow is increased. Sporty massage, sauna, heated sleeping bags, and temperature pomades can be used in passive warming, but these methods never replace the active warming-up for football player's warming-up [100].

2.4.5. Mental (psychological) Warming-up

The football player is psychologically, mentally, and mentally ready for training or competition. A football player's psychologically good warming-up and the development of the mental state may have a positive effect on the active warming-up of the football player. It positively affects the self-confidence, mental energy, and emotional domination of a football player. Research shows that the warming-up should take away by the psychological state of the football player. The fact that this aspect of warming-up by coaches is not paid attention to the football player s can enter the training or competition with a low or high voltage and cannot show the success they can show [85,98].

2.4.6. Kinetic Warming-up

Kinetic warming-up or the kinetic stretching of the muscle is forced to stretch the muscle through a movement. The stretching of a football player who will do a row shaking his legs or shaking his arms of a basketball player can be included in this way of warming up. [70,99].

2.4.7. Physiological Effects of Warming-up

The organism of a football player who has not heated is not ready for heavy loads before the competition. The nervous system may not be able to remove serious loads. The rising heat in the body allows the nervous system to move faster. In this respect, the reaction and contraction rates of the muscles also increase. It is known that the body temperatures of people who are not exercised are between 36-38 ºC. In addition, the rectal temperature is 37ºC and the oral temperature is 36.5 - 37ºC is considered normal. Circulating or acting in general means that heat rises in different muscle groups. For sports to rise to the desired performance level, the most appropriate body temperature should be between 38.5ºC and 39ºC [99].

Warming has several effects on human physiology. With the mobility developed during warming-up, the amount of blood sent to the capillary increases and the amount of blood reaching the tissues increases. With the warming up, the muscle contraction time is shortened by 12 %and the time to relax is shortened by 22 %. With warming up, an increase is observed in the

oxygen need of the organism. Oxygen This increase is effective in increasing the amount of blood sent to the muscles and therefore causes the heart to increase the minute volume of the heart. [99].

The resistance in the vessels decreases with warming up and the amount of blood reaching the muscles increases. In this way, it is possible to reach the muscles to the muscles and to remove the toxic substances from the muscles. Thus, acid accumulation in the muscle is prevented and the pH of the blood remains at a level that does not prevent muscle work capacity. The heated muscle group is observed in the flexible, movement area and contraction rate. It is known that the muscle group with the heated muscle group consumes the same amount of energy during exercise, but more sporty efficiency is obtained than the heated muscle group [97-99].

2.4.8. Psychological Effects of Warming-up

It is also known that warming in sports affects the psychological state of football players. Warming can be described as the motivational preparation and concentration of a football player for a competition. The psychology of each football player is in before the competition is different. While some football players stay calm, some football players feel more excitement. Football players strive to prepare themselves psychologically, concentrate, and reduce their stress during warming-up. [99].

They aim to increase their confidence in themselves and to keep their opponents under pressure. The studies indicate that warming should exhibit a structure by the psychological state of the football player, not paying attention to this detail, the football player may take place in the competition with very low or very high psychological voltage and perform low performance. [86,98]. With good warming, the technical, tactical, and combined skills of the football players reach the highest level, and the warnings from the MSS are transmitted to the case as soon as possible [97].

2.4.9. Protective effects of Warming-up

It is known that people participating in sporting activities face dangers of injury at different levels. Although football is a sports branch with a high risk of

injury, warming-up studies and then cooling works are widely implemented before the competition. Increasing the temperature in muscle fibrils during warming-up is important because the fibrils are connected to the tendon. Antagonist muscles need to have relaxation, supporting the antagonist muscles with large force and sudden relaxation of antagonist muscles to the tendon will facilitate the increase in body temperature. With sporty warming, the amount of heat found in muscles, tendons, fibrils, and vineyards increases thus ensuring that disabilities are prevented [95].

2.4.10. Duration of Warming-up

The scope, duration, and content of the forms of warming-up that football players have applied before competition and training have been discussed by the world of sports sciences. The duration and severity of warming-up for a good warming-up should be made considering the branch of the sport. The warming-up, which should be done before training, exercises, competitions, and the second half of the competitions, should start 30-40 minutes at the latest and should be terminated 10-15 minutes before the game and should be finished 5 minutes before the competition [94]. Today, studies on the subject continue to be carried out and when the literature is examined, it is seen that the warming-up studies can extend from 2 minutes to 1 hour 30 minutes. It was observed that short-distance runners of the USA performed for about 1 hour before the competitions held at the 1968 Olympic Games of Mexico. In the world instrumental gymnastics final built in 1971, Japanese gymnasts performed 1 hour and 30 minutes of warming up and performed the longest warming according to other football players [99].

2.4.11. FIFA 11+ Warm-Up Program

FIFA 11+ is a football warm-up software package created by many experts. It combines features that are generally included in every warm-up, such as balance, core exercises, leg strength, and dynamic flexibility, in a structured and harmonious way.

It is the program that brought it a recommended training program for football teams by the International Federation of Association Football (FIFA) and the Turkish Football Federation (TFF). This warm-up protocol aims to

increase the athletic performance of Football players and protect them from injuries [94].

This warm-up program, which essentially consists of 3 parts, can be done as a stand-alone workout. For ease of application, it is recommended to implement this program as standard in the warm-up section, which should be included in every training program, or warm-up at least twice a week with FIFA 11+. It is also recommended that pre-match warm-ups include FIFA 11+ Parts 1 and 3 exercises [95]. Since the program includes plyometric exercises, it is suitable for football players aged 14 years and over, but it is possible to apply variations in lower age groups, shaped by the experience of the coaches. In addition, it is of course possible for coaches to make changes to the program after understanding well the key points for football players of all ages and levels of competition, ages 14 and up. Provided that each coach adheres to the principles of implementing the program, he can implement the program in the best possible way in line with the needs of his team and the players on his team [97].

The warm-up program for FIFA 11+ consists of three parts consisting of 15 different exercises. These exercises should be performed in the order specified before training. The first part includes slow running exercises with active stretching movements and controlled contact with a partner. The second part includes six sets of exercises that focus on strengthening the trunk and legs, balance, plyometrics, and agility. Each exercise in Level 2 has three levels of increasing difficulty. In the third part, there are running exercises at medium and fast paces with movements changing direction [99,100].

Figure 1

FIFA 11 warm-up programme [14]

Figure 2

FIFA 11 warm-up programme [14]

The important point of the program is to use proper technique in all exercises. Keeping the legs in the same alignment, keeping the knee in line with the toe, and ensuring correct body posture and body control when landing on the ground, especially in running and jumping exercises, are the basic points to take. [98].

For the exercises in Part II, 3 levels of increasing difficulty are defined: Beginner, Intermediate, and Advanced. Care must be taken to ensure that there are individuals of different physical fitness in the team and that the players can apply the correct technique in the first few exercises when they are just starting to train as a team, and in subsequent studies, the appropriate technique. Players from the above three levels should be preferred. [98].

3. MATERIAL AND METHOD

3.1. Subjects

The study was applied to the Palestinian male football team, as this study included 22 football players (18 years and above). The sample group consists of professional players with an average age of 27.8 ± 4.7 years.

3.1.1. Inclusion criteria

• Players must be 18 years or older

• Professional Footballers: Individuals who currently play professional football and actively participate in training and matches.

• Coaching experience: Participants with at least two years of professional soccer coaching experience.

• Being voluntary to participate in the study.

• Health Condition: Participants who do not suffer from any medical conditions that would hinder their ability to perform the required exercises.

3.1.2. Exclusion Criteria

• Players who are under 18 years of age or older.

• Players who suffer from an acute injury such as a severe ankle injury.

• A player who has had previous surgeries.

• Players who suffer from cardiovascular disease or other medical conditions that prevent them from engaging in physical activity..

• The players are currently undergoing rehabilitation due to lower extremity injuries.

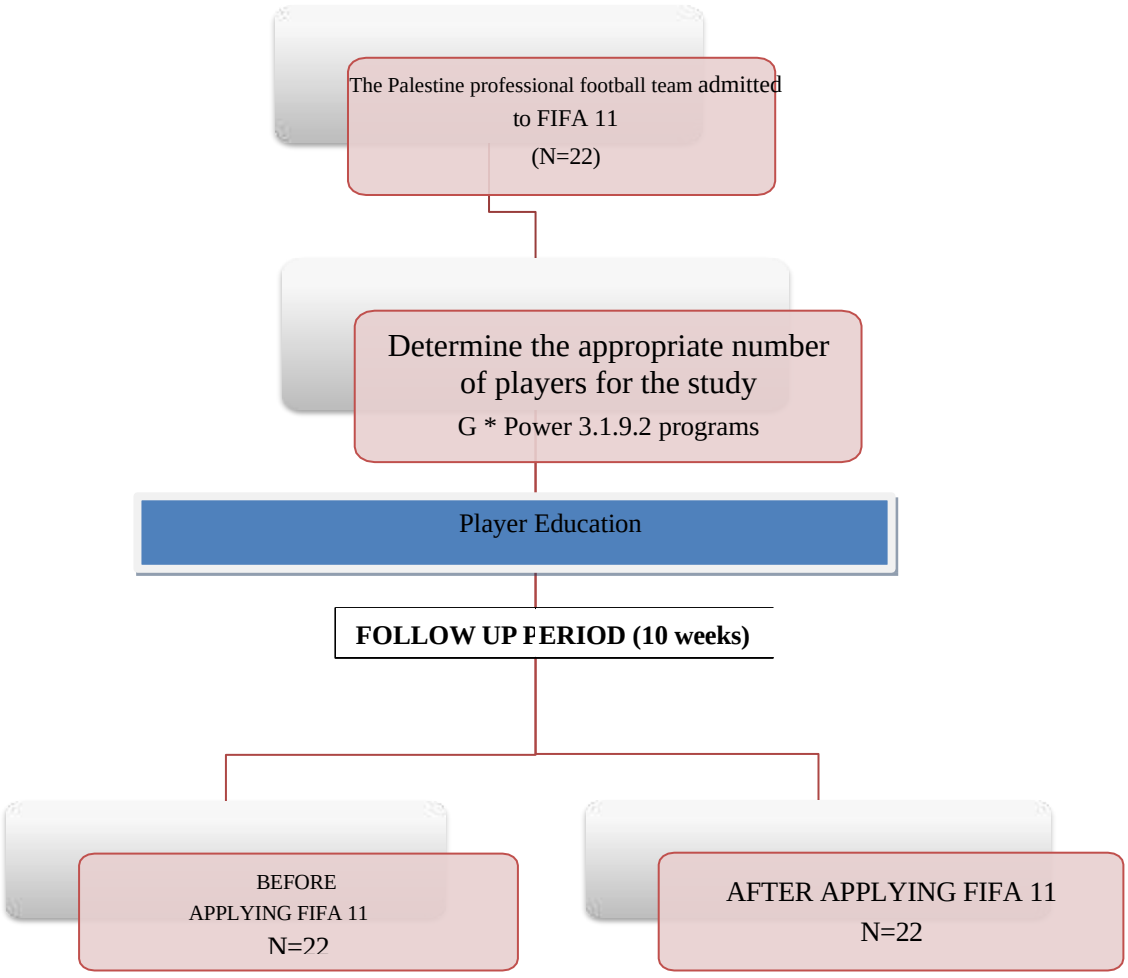
The study protocol was approved by the University Ethical Committee at the date of 28.09.2024 and the issue number was 92 (Appendix 1). Participants were involved in the study voluntarily. The aim and plan were explained and informed written consent was obtained from each patient (Appendix 2).

3.1.3. Flow Chart : Study Process

During the study, 22 football players (18 years and older) from the Palestinian professional football team were accepted according to the inclusion criteria. Then measurements and analyses were conducted before and after the specified FIFA 11 exercises.

Figure 3

Flow Chart of Study



3.1.4. Study Protocol

The FIFA 11 warm-up program was applied to the Palestinian professional team football players. The study was applied from before and after applying for the FIFA 11

warm-up program. In line with this study, the warm-up program for FIFA 11+ and the method it will be used to measure agility, balance, and motivation have been outlined. Participants repeated the movements of the third difficulty level out of five sequential difficulty levels created for the FIFA11+ warm-up program in succession. A sample of 22 players from the Palestinian national team was allowed to participate in the warm-up program for FIFA 11+ in two versions. After the sample members learned about the warm-up program for FIFA 11+. The tests to be performed on the specimen and the Illinois agility test were explained, and the tests were then performed by the specimen on at least two attempts. After learning and consolidating these tests, the tests, Y-balancer test, and the proprioception test were explained.

3.2. Evaluation

Football players were evaluated twice. Before and after applying for the FIFA 11 program. All measurements were recorded before and after applying the program.

T0: Before FIFA 11

T1: After applying to the FIFA 11 program

3.2.1. Structured questionnaire

The structured questionnaire prepared by the researchers was applied to face-to-face interviews. The questionnaire included simple questions for the players participating in the study about age, gender, educational level, profession, social and demographic conditions, chronic and common diseases or injuries suffered by the players, years of experience in football training/playing, and exercise behaviors (Appendix 3).

3.2.2. Measuring height and body weight

Body weight measurements of study subjects were taken using a Philips brand electronic scale (Figure 1), and height measurements and leg length measurements were taken using a Seca stadiometer (2).

Figure 4

Measuring height and body weight ***[13].***

Figure 5

Height measurements and leg length measurements [8].

3.2.3. Agility Test

The Smart Speed photocell device (Figure 3) was used to measure the agility of the football players participating in the study, and training cones and boards were used to create speed and agility trajectory protocols.

Figure 6

Agility measuring tool [12].

Measurements Experiment Day 1 The researcher applied the Illinois T-test for agility. The Illinois Agility Test (IAT) is one of several agility tests. Agility is one component of physical fitness that should be tested. “Agility is described as the ability to change direction to achieve a specific purpose (e.g., dribbling/bluffing/reacting to an opponent, creating space). The FIFA 11+ player warm-up program was administered to the sample for 48 hours after the familiarization study, and it Then the Illinois Agility Test was administered and the first test was completed. Experiment day 2 On the second day, there was a 10-minute warm-up, after which the Y test was applied, which is used to test balance for football players and football players. Soccer players must balance on one leg while reaching as far as possible with the other leg in three different directions: anterior, posterolateral, and posteromedial. [92].

As a result, this test evaluates soccer players' strength, stability, and balance in a variety of directions. Experiment Day 3 Forty-eight hours after the end of the second experimental day, subjects were present at the experimental site for the third experimental day. First, a FIFA 11+ warm-up program has been implemented for players. On the third day: a 10-minute warm-up test and an active joint position sense test were applied to test the players' proprioception. the exams Illinois agility test The test track, which consists of three cones arranged in a straight line, 5 meters wide, 10 meters long, and 3.3 meters apart in the middle section, was set up on an artificial turf

football field. The test consists of a 40-meter flat run and a 20-meter slalom between the cones, with 180-degree turns every 10 meters. Before testing, football players were allowed to try it at a low pace after introducing the course and providing the necessary explanations. Football players started at the start line of the test track, lying face down with their hands touching the ground at shoulder level. At the beginning and end of the cycle, the completion time was recorded in seconds using a two-door photocell stopwatch. Lightness cycle. [92].

Figure 7

Illinois T-test

3.2.4.Y-Balance test

Dynamic Y-Balance test the Y-Balance test was applied to measure people's dynamic balance performance. Before testing, leg length was recorded by measuring the pelvic bones from head to heel using a metal measuring tape. For the Dynamic Y-Balance test, reach lengths established on the measurement floor were placed in the anterior (anterior), posterolateral (posterior), and posteromedial (posterior diagonal) directions according to the test protocol. The measuring lines were placed so that they were 70 cm wide, with wide angles of 135 degrees and narrow angles of 90 degrees. Test lines were fixed to the floor with a cloth measuring tape, and test subjects were allowed to participate in the test in bare feet. The reach distances of the football players, whose balance performance was measured by standing on both feet and reaching in three directions, were calculated using the Y dynamic balance test formula, and the data were noted. The validity and reliability of this test have been reported as (ICC = 0.99-0.01 and interrater range 0.85-0.01) [99].

Figure 8

Y-Balance test tool [9].

Figure 9

Y-Balance test

3.2.5. Proprioception test

Proprioception was assessed by the football players 's ability to reposition the knee at 30, 45, and 60 degrees for both the player's right and left leg is measured using the Goniometer-Pro. The angle was measured 3 times for each player, 3 times before and 3 after applying FIFA11+, and the average values were taken and compared. The researcher asked the players to close their eyes. The researcher placed each player's knee joint at 30-, 45-, and 60-degree angles and asked them to maintain this position for 6 seconds. Next, players were asked to sit in the original sitting position on the bed. Then, when they were ready, they were asked to bend their knees again until they returned exactly to the same position the researcher had placed them in when their eyes were closed. When repositioning, the angle was measured three times, with the final

number taken from the average of the three measurements. The absolute value of the difference between the measured angles was recorded.

Figure 10

Proprioception test

3.3. FIFA 11+ Training Protocol

After the football players participating in the study were announced, they were informed of the days and hours of the study and asked to bring the materials they would use during the study. An information meeting was held two days before the warm-up and test day, and participants were briefed on the research design at this meeting. One study session was conducted for subjects to learn the warm-up and testing protocols to reduce the margin of error during measurements.

In our study, the first stage of research data collection was to identify the topics to be measured and the measurement area.

Participants repeated the movements of the third difficulty level out of five sequential difficulty levels created for the FIFA11+ player warm-up program, respectively. The tests to be performed on the sample and the Illinois Agility Test were explained, and the tests were then administered by the sample in at least two attempts. After learning and standardizing these tests, the tests, Y-balance test, and the proprioception test were explained.

Every training session should begin with a warm-up and stretching of all the major muscle groups, followed by "The 11." To guarantee the exercises' effectiveness, precise execution is crucial. Exercises should be completed in the prescribed order. A

condensed version of "The 11" (only exercises 4, 5, and 8) should be performed before every game.

The program's advantages include decreased risk of injury and enhanced performance. You can further lower your risk of harm as well as that of other players by adhering to Fair Play.

The FIFA 11+ consisted of these parts (Table 1 and 2), the first of which involved running exercises (part 1). The second part covered six exercises, all of which comprised three levels of difficulty and were aimed at improving strength, balance, muscle control, and core stability (part 2).

Table 1

FIFA 11+ warm-up programme.

Exercise	Duration
Part 1: Running exercises	8 minutes
1. Straight ahead	2 sets over 30 m each exercise
2. Hip out	
3. Hip in	
4. Circling partner	
5. Shoulder contact	
6. Quick forward & backward	
Part 2: Strength—Plyometric—Balance	10 minutes
7. The bench: alternate legs	3 sets x 40 s (lifting 2 s each leg in turn)
8. Sideways bench: raise and lower hip	3 sets x 20 repetitions on each side
9. Hamstrings: intermediate	1 set x 7 repetitions
10. Single-leg stance: throwing ball with partner	2 set x 30 s each leg
11. Squats: walking lunges	2 sets x 10 repetitions on each leg
12. Jumping: lateral jumps	2 set x 15 jumps (30 s approximately)
Part 3: Running exercises	2 minutes
13. Across the pitch	2 sets x 30 m (70–80% maximum pace)
14. Bounding	2 sets x 30 m
15. Plant and cut	2 sets x 5 repetitions (80–90% maximum pace)

m: meters, s: seconds;
Source: [88]

Table 2

Harmoknee warm-up program.

Exercise	Duration
Part 1: Warm-up	10 minutes
1. Jogging	4 minutes
2. Backward jogging on the toes	1 minute
3. High-knee skipping	30 s
4. Defensive pressure technique	30 s
5. One and one	2 minutes
Part 2: Muscle activation	2 minutes

6. Calf	4 s each leg/side
7. Quadriceps	
8. Hamstrings	
9. Hip flexor muscles	
10. Groin muscles	
11. Hip and lower back muscles	
Part 3: Balance	2 minutes
12. Forward and backward double-leg jumps	30 s
13. Lateral single-leg jumps	
14. Forward and backward single-leg jumps	
15. Double leg jump with or without ball	
Part 4: Strength	4 minutes (1 min each exercise)
16. Walking lunges in place	15 repetitions on each leg
17. Hamstring curl	12 repetitions
18. Single-knee squat with toe raises	12 repetitions
Part 5: Core stability	4 minutes (1 min each exercise)
19. Sit-ups	2 sets x 12 repetitions
20. Plank on elbows and toes	2 sets x 20 s
21. Bridging	2 sets x 12 repetitions

Source: [88]

3.4. Data Analysis

Statistical analyses were performed by using the SPSS (IBM SPSS Statistics 22) Package Program. Descriptive statistics were used to define the features of study groups. The SPSS 22.00 package was used to analyze the data obtained from the research measurements. After assessing the normality of the data through the Shapiro-Wilk test, the “Independent Samples T” test and the “Paired Samples T” test were used to compare the pretest and posttest values in analyzing the data, which provided the assumption of normality. In this study, the level of statistical significance was accepted as 0.05.

4. RESULTS

The SPSS 22.00 package was used to analyze the data obtained from the research measurements. After assessing the normality of the data through the Shapiro-Wilk test, the “Independent Samples T” test and the “Paired Samples T” test were used to compare the pretest and posttest values in analyzing the data, which provided the assumption of normality. In this study, the level of statistical significance was accepted as 0.05.

The research examined the effect of the “FIFA 11” warm-up program, which was implemented for 10 weeks, on agility, balance performance, and proprioception. The age group over 18 years was tabulated for the 22 players participating in the study using statistical methods and interpretation of values.

The results are in table 4.1. showed that the average age of the football players is 27.8, with a standard deviation of 4.7. It was also shown that the average height of the Palestinian football team players is 180.09 cm, with a standard deviation of 0.24, and that the average body mass of the players is 73.4.

Table 3

Descriptive Findings of the Study Group

	N	Mean	Standard deviation
Age	22	27.8	4.7
Height (m)	22	180.09 cm	0.24
Body mass (kg)	22	73.4	4.2
BMI (kg/m^2)	22	22.6	3.31

Illinois test was applied to evaluate the agility of football players before and after the FIFA 11 ProgramThe results analyzed by Paired T-test on effect of FIFA 11 program training on agility performance show an overall significant decrease ($p<.05$) of 1.68% after FIFA 11 program. T-test shows that the comparison was statistically significant decrease in agility performance time from pre-test (M = 16.55) to post-test (M = 16.33).

There is a significant difference in the effect of FIFA 11 program on agility between the pre and post FIFA 11 program as the value for this comparison was found

to be smaller than the significant level (p = < 0 .05) as shown in Table 4 The present research has shown that FIFA 11 training program affects T-test agility and reduces time.

Table 4

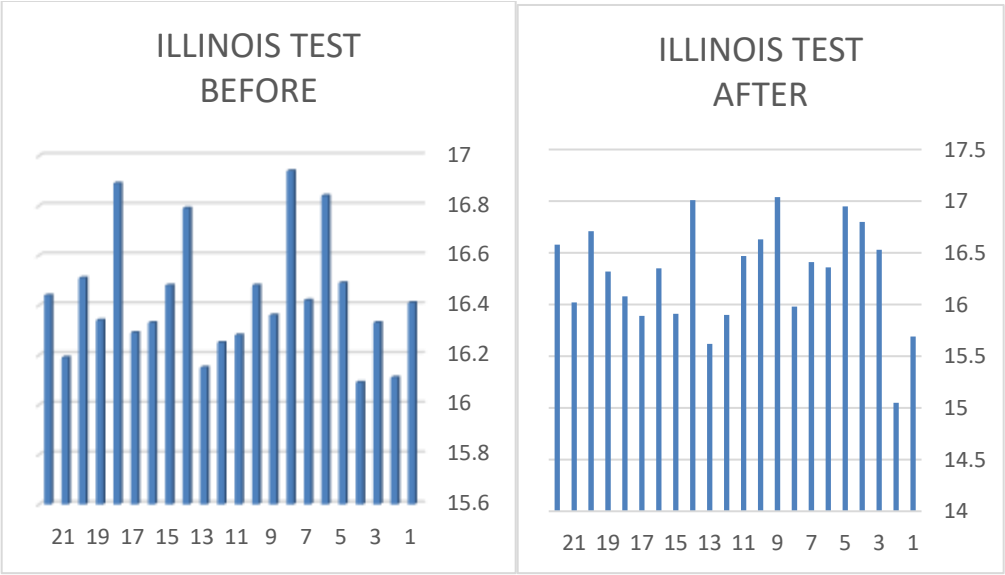
Illinois Test To Evaluate The Agility Of Football Players

Measure		All Football Players (n=22) X±SS	T	P
Illinois agility test	T0	16.55±1.22	1.68	0.000
	T1	16.33±1.15		

***$p < .005$.

Figure 11

Illinois agility test before and after FIFA 11



From the results obtained in the table 5 to make a comparison of y balance results before and after applying the fıfa 11 training program the maximum reach distance (%MAXD) was used to adjust the reach distances to the tip length. This normalization approach accommodates individual differences in limb length and allows comparisons between right and left limbs and also between participants. The mean of the values of Y

balance tes both legs and standard deviations were calculated. Paired samples t-tests were used to compare reach lengths between tests and for each leg.

According to paired t-test, the findings showed that the means of Y balance scores were improved before and after FIFA 11 excerssizes fort he left and right leg ($p<0.05$, Table 4.3).

Table 5

Comparison of Differences between Pre and Post-Measurements of Variables

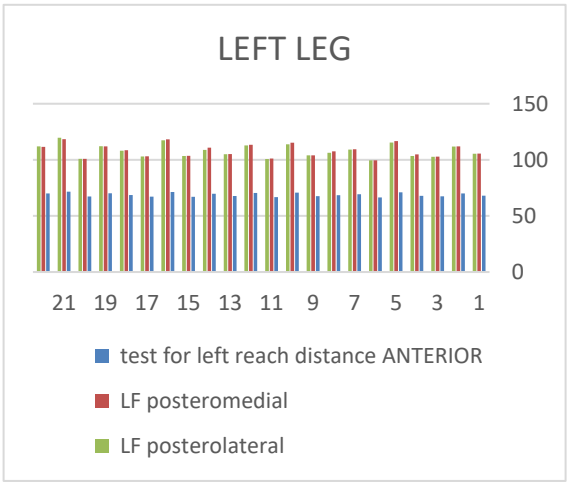
Direction		LEFT LEG **mean ± S. D**	t P value	RIGHT LEG **mean ± S. D**	t P value
Anterior	T_0 T_1	68.50±4.0 68.87±6.0	t=-0.74 ,000	68.27±5.0 68.99±2.0	t=-1,16 ,000
Posteromedial	T_0 T_1	107.61±5.0 108.37±3.0	t=-1,06 ,000	107.26±3.0 107.51±3.0	t=-1,77 ,000
Posterolateral	T_0 T_1	107.45±4.0 107.97±8.0	t=-1,13 ,000	103.59±7.0 104.61±7.0	t=-0,76 ,000

****p* < .005.

WHERE T0: BEFORE FIFA 11, T1 AFTER FIFA 11

Figure 12

Y Balance results for left and right leg before FIFA 11



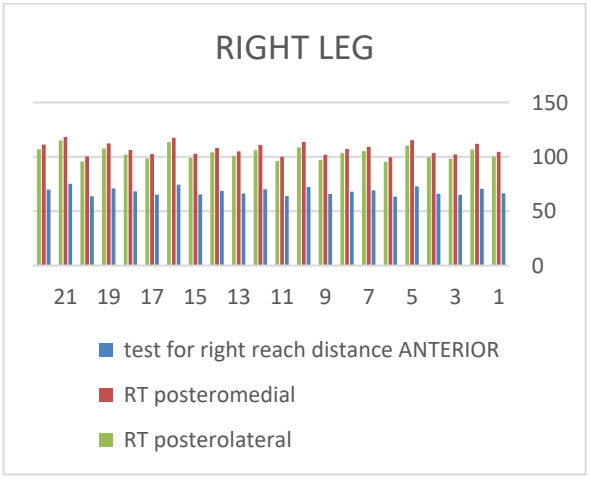


Figure 13

Y Balance results for left and right leg after FIFA 11

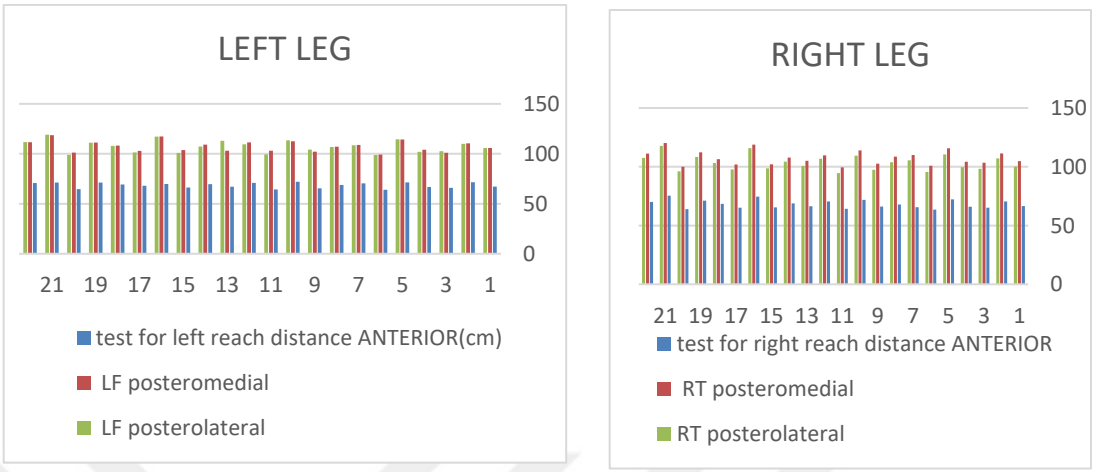


Table 4.4 shows the results of the proprioception test for the football players of the Palestine team according to the statistical analysis of the paired sample test. Proprioception scores of right and left leg at 30,45 and 60 angle were presented fort he professional football players before and after the warm-up protocol and right leg. As it was found that there were statistically significant differences of 5% between . As it was seen in table 4.4 the differences between the absolute value between pre and post measurements with specified angle was decreased after Post-Test for right and left leg and at 30,45 and 60 angle ($p<0.05$, Table 6).

Table 6

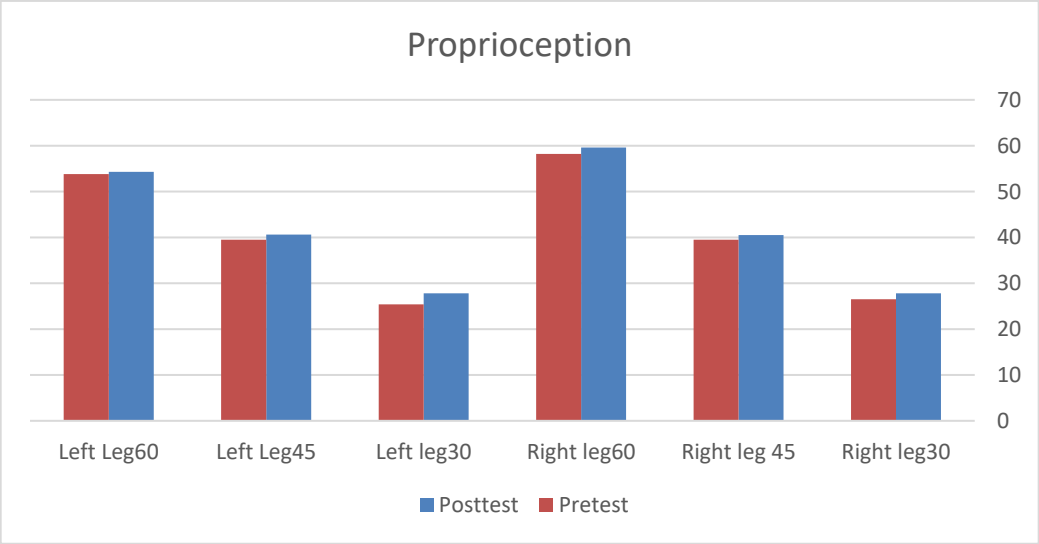
Comparison of differences between pre-and post-measurements of Proprioception

MEASRMENT	**Pre-Test**	**Post-Test**	**|Pre-Angle|**	**|Post-Angle|**	**P**
Right Leg 30	26.5±5.75	27.8±4.66	3.5	2.8	0.001
Right Leg 45	39.5±5.34	40.5±3.49	5.5	4.5	0.024
Right Leg 60	58.2±4.68	59.6±2.66	1.8	0.4	0.027
Left Leg 30	25.4±5.49	27.8±4.89	4.6	2.2	0.004
Left Leg 45	39.5±3.27	40.6±4.39	5.5	4.4	0.007
Left Leg 60	53.8±2.65	54.3±3.26	6.2	5.7	0.00

****p* < .005.

Figure 14

Proprioception test



5. DISCUSSION

Football is a world-famous team sport that relies on many technical skills and tactical thinking in addition to high physical abilities. Football requires control and balance and requires high athletic performance such as endurance, strength, speed, and agility, in addition to proprioception exercises. Before starting the football match, it is necessary to warm up and warm up for at least five to fifteen minutes, so that the body becomes active and ready to perform exercises in general. Before the players start the match, they are physically prepared through the warm-up. As the warm-up is all the means used to prepare and prepare the body to carry out the physical effort that will befall it efficiently. It is a group of exercises that prepare the body and its various organs to be ready to interact with the activity and physical effort experienced during training. It is important and has a good effect on compatibility in performing the skill movements that make up the game. To develop the performance of players in football, many training strategies and methods have been developed to protect against injuries and to prepare the player before the match through warm-up operations. Therefore, the FIFA 11 program was prepared, which helps prepare the body for sports, as sports movements can be performed more easily after the warm-up and avoid the possibility of injury because the muscles will become more flexible. FIFA 11 has beneficial effects in injury prevention and is designed to help improve the physical performance and motor skills of football players.

Balance exercises help the football players control their body and not fall while running or dodging the opposing player on the field. On the other hand, balance helps a soccer player prepare for sharp twists and lunges that can help the player get past defensive players, and improve muscle capacity to help the player maneuver safely on the field. The warm-up program for FIFA 11+ had a significant impact on the balanced performance of football players, [10]. A total of 20 healthy, physically active female college students participated in a study that examined the effects of exercise using a balance disc on dynamic balance and body stability. According to the final pre-test and post-test values after the exercises, it was shown that the exercises created using the vestibular balance disc for 6 weeks had a positive effect on the performance of dynamic balance

and postural control in the applied group.

FIFA 11 could be considered a tool to reduce injury risk as it may improve dynamic balance and agility and could be considered for inclusion in football players' training according to both as found by [23] who conducted a study on 20 young football players. The football players were given neuromuscular exercises for 8 weeks. The effect of these exercises on the balanced performance of football players has been studied. Through the pre-and post-test of the star scale after the exercises, it was revealed that there was a noticeable improvement in the balance performance of the experimental group compared to the control group. There was a difference between the pre-test and the post-test in the participants' astral balance test values [30]. It has been reported that anteroposterior balance scores were higher in athletes who had greater hip flexion, extensor, and abductor strength. FIFA 11+ warm-up program had a significant impact on the balanced performance of football players [18]. The results of our study showed that there were differences in the direction of reaching on both legs between the YBT values after applying the FIFA 11 training program and the YBT values before using the FIFA 11 warm-up program. Where it was found for the Anterior exercise that the values after applying FIFA 11 for the left leg increased to 68.87±6.0 from 68.50±4.0 and for the right leg from 68.19±2.0 to 68.99±5.0. For the Posteromedial exercise the values after applying FIFA 11 for the left leg were increased to 108.37±3.0 from 107.61±5.0 and for the right leg from 107.26±3.0 to 107.51±3.0. For the Posterolateral exercise the values after applying FIFA 11 for the left leg were increased to 107.97±8.0 from 107.45±4.0 and for the right leg from 103.59±7.0 to 104.61±7.0.

Agility and reaction are two very important factors in soccer. Agility consists of these specific bio-motor features and appears as an attribute that greatly influences a player's performance. Agility exercises help the body gradually prepare the muscles for the match. Agility is very important for a striker in football to avoid the ball-handling techniques of opposing players as the striker is trained to execute at different speeds and angles and may include feints to beat the opposing player. The agility exercises in the 11+ football warm-up program, in general, had a positive effect on football players [28, 22]

indicated that agility exercises in the 11+ football warm-up program, in general, had a positive effect on football players. As it increased the physical ability of the players and led to an improvement in their performance in addition to enhancing the player's speed and ability to maneuver during the match. In this study, the results of the Illinois agility test for the Palestinian national football team players were examined before and after the group exercise program. It was found from the results that there is a significant difference in the results of the agility test before and after applying FIFA 11 training exercises ($P<0.05$), where Illinois test time values decreased from 16.55±1.22 sec Before applying the FIFA 11 program to 16.33±1.15 after performing FIFA 11 training exercises ($P < 0.05$).

A proprioception exercises help football players adapt to rapid movements and reduce pain and the risk of injury in general. Proprioception exercises also allow soccer players to control their limbs without having to look at them directly. Where, for example, a soccer player can kick the ball with one leg without looking down. Based on the results of the statistical analysis in this study, it was found that warm-up exercises for FIFA 11+ led to an improvement in players' proprioception. The participants' deep sense improved significantly after the FIFA 11 training programs, according to both [23]. In a study conducted on a group of basketball players, they found that proprioception exercises increase blood flow. These exercises also measure the body's ability to sense its place in the space surrounding it, move its limbs freely, and adapt to sudden changes in the environment around it, especially those related to strength, tension, and body position. In our study the differences in tests pre-and post-applying the FIFA 11 training program were tested it was found that there is a significant difference in the results of the Proprioception before and after applying FIFA 11 training exercises ($P<0.05$). As it was seen in table 4.4 the differences between pre and post measurements of absolute value were decreased after Post-Test for right and left leg and at 30,45 and 60 angle, where the value of the Proprioception test for the left leg was increased from 25.4±5.49 to 27.8±4.66 (4.6-2.2) at a 30-degree angle and from 39.5±3.27 to 40.6±4.39 (5.5-4.4) at a 45-degree angle and from 53.8±2.65 to 54.3±3.26 (6.2-5.7) at a 60-degree angle. The value of the Proprioception test for the right leg was increased from 26.5±5.75 to 27.8±4.66 (3.5-2.8) at a 30-degree angle and from 39.5±5.34

to 40.5±3.49 (5.5-4.5) at a 45-degree angle and from 58.2±4.68 to 59.6±2.66 (1.8-0.4) at a 60-degree angle.

In the literature, there is a gap regarding the FIFA 11 protocol, its implementation, and which exercises should be focused on. In general, there are recent studies on proprioception exercises and their effect on football players. In addition, there are no published studies that included balance, proprioception, and agility exercises together and studied their effect on football players through the FIFA 11 program. That is why we studied the effect of performing agility, proprioception, and balance exercises, and it became clear that it is necessary to focus on these exercises in the protection program. FIFA 11 for football players contributes to increasing the players' performance and increasing their ability to maintain a good level of play during the match. In light of the results reached in the study, it was found that the FIFA 11 exercises applied to football players were effective in performing agility, sense of depth and balance. We believe that our study will make significant contributions to the literature in understanding and disseminating the importance of improving performance in football players through adherence to proprioception, balance, and agility exercises in soccer players.

The limits of the study

There was a need for a long-term follow-up of the impact of the FIFA 11 program on more than one team in more than one country to assess the impact of the program in general.

CONCLUSION

Based on the obtained results, it can be concluded that the FIFA 11 warm-up program has proven effective in developing the agility performance of elite football players. FIFA 11 exercises positively affect agility performance by improving proprioceptive reflex control at the spinal level in elite soccer players. The results showed that the warm-up program for FIFA 11 improves the balance performance of elite football players. Which leads to reducing injuries among football players and contributes to increasing fitness and maneuverability during play, which prevents the player from falling. The FIFA 11 warm-up program has proven effective in developing proprioception skills in elite soccer players. This may help players relax, provide better range of motion, and reduce muscle tension and pain.

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APPENDIX 1. ETHICAL COMMITTEE APPROVAL

Republic of Türkiye
MARMARA UNIVERSITY
Health Sciences Faculty
Ethical Board of Non-Invasive Clinical Studies

PROJECT TITLE	: "The Effect Of The FIFA 11+ Program On Agility, Balance And Proprioception Parameters For TheProfessional Football Players"
PRINCIPAL INVESTIGATOR	: Dr. Öğr. Üyesi Elif Tuğçe ÇİL
PROJECT TEAM	: PT. Hamed Mohammad GHANNAM
APPROVAL DATE AND NUMBER	: 28.09.2023/92

To: Dr. Öğr. Üyesi Elif Tuğçe ÇİL

Your project titled "The Effect Of The FIFA 11+ Program On Agility, Balance And Proprioception Parameters For TheProfessional Football Players" with protocol number "92" has been reviewed by the Ethical Board of our Faculty and unanimously decided to be ethically appropriate.

Prof. Dr. Mehveş TARIM
Ethics Committe, Head

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APPENDIX 2. INFORMED WRITTEN CONSENT

INFORMED CONSENT FORM

Within the scope of Yeditepe University Institute of Health science, Department of Sport Physiotherapy, Master Thesis, we are planning to investigate the effectiveness of the FIFA 11+ program on agility, balance and proprioception parameters for the professional football players. The study you will participate in is a scientific research. The title of the research; It was determined as **"The Effect of The FIFA 11+ Program in Agility, Balance and Proprioception Parameters for The Professional Football Players"**. Participation in the study is on a voluntary basis. Before you decide whether you want to participate, it's important that you understand why and how the research will be done, how your information will be used, and what the study entails. Please take the time to carefully read the information below. If there is something that you do not understand and is not clear to you, or if you want more information, please ask us. We would like to inform you about the research before your decision. If you want to participate in the research after reading and understanding this information, please sign the form.

The purpose of this research is to determine the effect of the FIFA 11+ training program applied to young football players on the agility, balance and proprioception for the football players. Today's football depends on more complex technical skills and requires improved tactical thinking and increased physical capabilities. The increase in capabilities and physical fitness, and the ability to continue at the same level of performance is the result of the large number of exercises that the best teams perform with their players. football ; Since it is a team sport that requires control, it requires athletic performance such as high endurance, strength and speed. Therefore, it requires players in all positions, including the goalkeeper, to possess all kinds of motor features, Agility is important for a striker in football to avoid defenders holding the ball as the striker is trained to implement techniques at different speeds and angles and may include feints to beat the opposing player, on the other hand, balance helps a footballer prepare for sharp twists and lunges that can help you outrun defensive players, and the muscles it works are very important to help you maneuver safely on the field, as for

proprioception, it allows soccer players to control their limbs without having to look at them directly. Where, for example, a soccer player can kick the ball with one leg without looking down, Therefore, this study seeks to study the effect of the FIFA 11+ program on the standards of agility, balance and natural grasping of professional soccer players.

If you volunteer to participate in this research, Pt. Hamed Ghannam will apply the FIFA11+ protocol to your club which includes 22 football players (18 years and over), The FIFA11+ protocol will be applied to the players for a period of 10 weeks twice a week according to the schedules for the protocol, the researcher will apply different tests in order to measure agility, balance and proprioception of professional football players, to measure the agility of the professional football players the Illinois T test will be applied. The Illinois Agility Test (IAT), to measure the balance for players the Y test will be applied on the second day after a ten-minute warm-up, On the third day, the sense test will be applied in the active joint position to test the proprioception.

You will not be paid for your participation in this research; In addition, no fee will be charged from you or the social security institution you are affiliated with for all examinations, examinations, tests and physiotherapy services within the scope of this research. Participation in this research is entirely at your own discretion. You can refuse to participate in the research or leave the research at any stage; this will not result in any penalties or impediments to your benefits. You fail to fulfill the requirements of the applied study scheme, disrupt the study program, etc., within the knowledge of the researcher or against your will. reasons may exclude you from the study. The results of the research will be used for scientific purposes; In the event that you withdraw from the study or are removed by the investigator, the medical data about you can also be used for scientific purposes, if necessary. All your test results and identity information will be kept confidential, and your identity information will not be disclosed even if the research is published, but research audiences, pollsters, ethics committees and official authorities can access your test results information when necessary. You can also access your own test results information whenever you want.

Supervisor: Assistant Prof . ELİF TUĞÇE ÇİL **Researcher:** Pt. Hamed Ghannam

Yeditepe University
Faculty of Health Sciences
Department of Physiotherapy and Rehabilitation

Yeditepe University
Faculty of Health Sciences
Department of Physiotherapy and Rehabilitation

Volunteer's Statement

I have read all the explanations on the informed consent form. Written and verbal explanation about the research whose subject and purpose is stated above. Pt. Originally made by Ghannam. I have been given sufficient confidence that my personal information will be carefully protected during the use of research results for educational and scientific purposes. I can withdraw from the research without giving any reason during the conduct of the research; however, I am aware that it would be appropriate to inform the researchers in advance that I would withdraw from the research in order not to put the researchers in a difficult situation. I do not take any financial responsibility for the expenses to be made for the research. I will not be paid either. When I encounter a problem during the research; at any hour, Pt. Hamed. I know that I can reach Hamed Ghannam at Yeditepe University, Faculty of Health Sciences. I have fully understood all the explanations given to me. After a certain period of reflection on my own, I agree to participate in the research in question of my own free will, without any pressure or coercion. A copy of the signed form will be given to me.

Volunteer:
Institution:
Surname:
Phone:
Signature:
Address:
Date:

Researcher:
Name,
Phone:
Signature:
Address:
Date:

APPENDIX 3. STRUCTURED QUESTIONNAIRE

Participant Information:
1-Name (Optional):
- First Name:
-Last Name:
2-Gender:
Male
Female
3- Age:
Football-Related Information:

1-Number of Years of Football Training/Playing Experience:

2-Current Football Club or Team (if applicable):

Educational Background:
1-Highest Level of Education Completed:
-Elementary School
-Middle School
-High School
-College/University (Bachelor's Degree)
-Postgraduate Degree (Master's, Ph.D., etc.)

Employment Status:
Are you currently employed?
Yes
No

If employed, what is your occupation?

Health and Medical History:

1-Do you have any known medical conditions or injuries that may affect your participation in this study?

-Yes (please specify):
-No

2-Are you currently taking any medications?

-Yes (please specify):
-No
Additional Information:

1-How did you hear about this research study
2-Is there any other information you would like to provide that may be relevant to the study?

APPENDIX 4. FIFA 11 PROTOCOL


FIFA 11+

APPENDIX 5. Curriculum Vitae

Personal Informations

Name	HAMED	**Surname**	GHANNAM

Education

Degree	Department	The name of the Institution Graduated From	Graduation year
Doctorate			
Master	Sport Physiotherapy	Yeditepe University	
University	Physiotherapy And Rehabilitation	Arab American University Palestine	
High school		Aqqaba High School	

Languages	**Grades (#))**
Arabic	Native
English	TOFEL

All the grades must be listed if there is more than one (KPDS, ÜDS, TOEFL; EELTS vs),

Work Experience (Sort from present to past)

Position	Institute	**Duration (Year - Year)**
Physiotherapist	AL-Omar physiotherapy and rehabilitation center	2020-2021
		-

Computer Skills

Program	**Level**
Microsoft office word	Good
Microsoft office Excel	Good

***Excellent , good, average or basic**

Scientific works

The articles published in the journals indexed by SCI, SSCI, AHCI

Articles published in other journals

Proceedings presented in international scientific meetings and published in proceedings book.

Journals in the proceedings book of the refereed conference / symposium

Others (Projects / Certificates / Rewards)

Sport Physiotherapy Rehab Course
Sport Injuries Course
Course Workshop in Management of mechanical cervical spine
Workshop about All About the knee