

Preventive exercises after warming up help to reduce injuries in football

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Summary

Injuries are a major problem in professional and amateur soccer. Most of them occur in the lower limbs (89.6%), specifically in thigh (31.4%), ankle (12.5%), groin (10.9%), and, to a lesser extent, knee and calves. There are several studies focusing on the effectiveness of preventive methods but, nevertheless, the prevalence of injuries, mainly muscular, remains alarming. The International Football Federation designed the program FIFA 11+, which has proven to be effective in preventing knee injuries, but not thigh or groin injuries. Therefore, the aim of this study was to assess the effectiveness of a prevention program to reduce lower extremity injuries in amateur soccer. A total of 84 amateur footballers volunteered to participate (experimental group (GE) = 40 players (age: 23.1 ± 3.8 years) and control (GC) = 44 players (age: 24.7 ± 4.1 years)). The number and type of injuries that occurred during the first phase of the 2015/16 season was recorded. The GE completed a preventive protocol after the warm up, while the GC did not perform any specific work. A total of 42 injuries was recorded, 83.4% of which in lower extremities, specifically: thigh (35.7%), ankle (23.8%), adductors (14.3%), knee (4.8%) and calves (4.8%). The number of injuries in lower limbs was higher in the group that did not perform the preventive work (82.9%) than in the group that performed it (17.1%). Therefore, including a preventive program after warm up helps reduce the risk of injury in the lower limbs in amateur soccer players.

Key words:
Injuries. Soccer. Strength.
Proprioception.

Los ejercicios preventivos tras el calentamiento ayudan a reducir lesiones en fútbol

Resumen

Las lesiones suponen un gran problema en el fútbol profesional y amateur. La mayoría se localizan en las extremidades inferiores (89,6%), concretamente en: muslo (31,4%), tobillo (12,5%), ingle (10,9%), y en menor medida rodilla y gemelos. Son varios los estudios sobre la eficacia de los métodos para prevenir lesiones; sin embargo, la prevalencia de éstas, sobre todo musculares, sigue siendo alarmante. La Federación Internacional de Fútbol creó el FIFA 11+, que ha demostrado ser eficaz en la prevención de lesiones de rodilla, pero no para lesiones en muslo, ingle... Por ello, el objetivo de este estudio fue comprobar la eficacia de un programa de prevención para reducir lesiones en las extremidades inferiores en el fútbol amateur. Se realizó un seguimiento de un total de 84 futbolistas amateur (GE = 40 jugadores [edad: $23,1 \pm 3,8$ años] y GC = 44 jugadores [edad: $24,7 \pm 4,1$ años]). Se registró el número y tipo de las lesiones que se produjeron durante la primera vuelta de la temporada 2015/16. El grupo experimental llevó a cabo un plan preventivo tras el calentamiento, mientras que el grupo control no realizaba ningún trabajo de este tipo. Se registraron un total de 42 lesiones, el 83,4% en las extremidades inferiores, concretamente: muslo (35,7%), tobillo (23,8%), aductores (14,3%), rodilla (4,8%) y gemelos (4,8%). El número de lesiones en las extremidades inferiores fue mayor en el grupo que no realizaba trabajo preventivo (82,9%) que en el grupo que sí lo realizaba (17,1%). Por tanto, incluir un programa preventivo tras el calentamiento ayuda a reducir el riesgo de sufrir lesiones en las extremidades inferiores en futbolistas amateur.

Palabras clave:
Lesiones. Fútbol. Fuerza.
Propiocepción.

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Introduction

Injuries are a limiting factor in performance, and appear frequently in the world of sport, especially in football, in which they pose a particularly major problem in both professional and amateur football¹.

The majority of the injuries acquired are located in the lower limbs (89.6%), specifically in the: thigh (31.4%), ankle (12.5%), groin (10.9%) and in lesser measure in the knee and calves². Therefore it is not surprising that various studies have been conducted regarding the efficiency of different injury-preventing methods³. However, the prevalence of these injuries continues to be alarming⁴. Specifically, muscle-type injuries constitute one of the main problems to affect football players and to most concern the teams, with between 20-37% of injuries forcing professional players off the pitch for a certain amount of time, and 18-23% of amateur-level players^{5,6}. In fact, the latest epidemiological studies reveal that muscle injuries constitute over 30% of all injuries, representing an average of 12 muscle injuries per season in a professional football team, which represent over 300 days of player absence from the pitch⁷⁻¹⁰. A study performed in professional Spanish football affirms that around 6-9 injuries occur for every 1,000 hours of football play¹¹.

Furthermore, these injuries that occur in football entail quite high economic costs. In the Netherlands, for example, losses of up to 4.5 million euros occur each year¹², but even more alarming are these figures in England, where losses have reached up to 118 million euros each year¹³.

For these reasons, it comes as no surprise that one of the main concerns within the world of football is to find strategies to prevent the appearance of injuries and to reduce the incidence rate. Specifically, the International Federation of Association Football (FIFA) designed an injury prevention programme, entitled FIFA 11+, to try and solve this issue. Despite this programme being proven to be effective in the prevention of injuries in female footballers' knees, it is not applicable to muscle injuries in the thigh, groin, etc.¹⁴.

Another of the aspects proposed to contribute to the advancement of the search for solutions to this issue is to assess the epidemiology of the injuries, establishing the risk of suffering from them and the circumstances in which they occur¹⁵. This data could be very useful because it could provide a good definition of which are the main injuries that occur in football and therefore, the path that should be taken to orientate planned preventive strategies. Despite the frequency with which they occur, the understanding of the factors that predispose players to suffering from a muscle injury is limited¹⁶, and there is little scientific evidence regarding the prevention and treatment of these injuries.

Considering the aforementioned, the aim of this study was to check the efficiency of a preventive exercise programme in the reduction of injuries in muscle groups and joints of the lower limbs in amateur football.

Material and method

A total number of 84 amateur footballers constituted the sample of this study. The experimental group (EG) was composed of 40 players (age: 23.1 ± 3.8 years) and 44 players in the control group (CG) (age: 24.7 ± 4.1 years). The number and type of injuries suffered by the players was recorded, during the first round of the season 2015/16, as well as the minutes of training and play in each session and match, and the role of the player and the player substitute in each day. An injury is considered to be the alteration or damage caused to a part of the body due to a blow, illness, etc., which impedes the player from participating in competitions or some training sessions¹⁷.

Moreover, an intervention was performed on the EG, consisting of the inclusion of a preventive exercise plan after warming up, twice a week, which included strength and proprioception exercises of the main leg muscle groups. To carry out individual follow-up on each player, an Excel Sheet was designed.

The exercises included in the programme were the following:

- Face-down plank resting on the elbows. 2 x 30-second repetitions with 10 seconds recovery between sets.
- Lateral plank resting on the forearm and raising one leg. 2 x 30-second repetitions with 10 seconds recovery between sets.
- Face-up lying hip lift. 2 x 20-second repetitions with 10 seconds recovery between sets.
- Face-down plank resting on the hands with trunk rotation and 3-second hold in lateral position. 1 set of 10 repetitions on each side, with a 2-second hold with the body stretched in a side position. 10-second recovery time whilst changing sides.
- 90° isometric squat with the back resting against a wall. In the event there are no walls, perform the exercise between two people back to back, keeping a straight back. 2 x 30-second repetitions with 10 seconds recovery between sets.
- Nordic hamstring exercise. 2 sets of 8 repetitions with 30 seconds recovery between sets.
- Lifting the bent leg on all fours with the back straight and the stomach tight. 1 set of 10 repetitions on each side.
- Leg abduction on all fours. 1 set of 10 repetitions on each leg (dynamic).
- Leg adduction lying on the side. 1 set of 10 repetitions on each leg (dynamic).
- Static proprioception tracing an asterisk with the free leg in monopodal support. 1 set of 20 repetitions on each leg (dynamic).
- Proprioception Circuit in all directions on a monopodal support holding balance for two seconds after each support. 1 repetition of 30 seconds on each leg. 10 seconds of recover between the repetition with each leg.

Results

A total number of 42 injuries were recorded, 83.4% of them to the lower limbs, specifically in the: thigh (35.7%), ankle (23.8%), adductor

(14.3%), knee (4.8%) and calves (4.8%). The number of injuries to the lower limbs was greater in the CG, comprising 82.9% compared to the 17.1% from the EG. Furthermore, when comparing the injuries in both groups depending on the muscle group or the joint, the same thing occurs: thigh (CG = 12 and EG = 3), ankle (CG = 7 and EG = 3), adductor (CG = 6 and EG = 0), knee (CG = 2 and EG = 0) and calf (CG = 2 and EG = 0) (Tables 1-3).

Moreover, upon calculating the number of injuries for every 1,000 hours of play in both groups, the EG also had much fewer injuries than the CG, with 8 against 41 injuries for every 1,000 hours of play, respectively (Table 4).

Table 1. Recorded injuries and their position.

Injuries - N = 42 (83.4% in LL)					
Position	Thigh	Ankle	Adductor	Knee	Calf
Percentage	35.70%	23.70%	14.30%	4.80%	4.80%

Table 2. Difference between groups in lower limb.

Percentage injuries LL	
Control group	82.9%
Experimental group	17.1%

Table 3. Difference in the number of injuries by position between groups.

	Thigh	Ankle	Adductor	Knee	Calf
Control group	12	7	6	2	2
Experimental group	3	3	0	0	0

Table 4. Comparison no. injuries every 1,000 hours of play between groups

No. injuries/1000 hours	
Control group	41.2
Experimental group	8.5

Discussion

The purpose of the study was to check if a preventive exercise programme applied after warming up could help reduce the number and risk of suffering injuries among amateur footballers. The results obtained reveal that the aforementioned programme can contribute to reducing the risk of the appearance and the number of injuries in amateur-level football players. These results align with those found in

other studies, which reveal that performing a preventive programme after warming up reduces the risk of suffering injuries⁴. However, in contrary to the programme suggested by the International Federation of Association Football - FIFA 11+ - the results obtained in this study reveal that the programme proposed helps reduce the risk of suffering injuries, and the number of them in all the joints and muscle groups in the legs, and not just in the knees as observed in previous research studies with the approach proposed by FIFA¹⁴.

Furthermore, considering the existing concern regarding muscle-type injuries, the results obtained in this study reveal the possibility that including the designed programme after warming up could contribute to reducing the number of muscle injuries that occur, given that the number of injuries in each muscle group is considerably lower in the group that performed preventive work compared to the group that did not include any work of this kind.

On the other hand, the results obtained in terms of the number of injuries that occur in every 1,000 hours of play coincide with other research studies performed in professional football - specifically in the Spanish First Division - in which it is revealed that around 6-9 injuries occur with every 1,000 hours of play¹¹, coinciding with the results for the EG of 8-9 injuries for every 1,000 hours of play in this study. However, the values obtained in this section for the CG in this research study differ considerably to those presented in the aforementioned study¹¹, being much higher, and presenting a value of 40-41 injuries for every 1,000 hours of play for the CG. This could, among other multiple factors, be due to the failure to include preventive exercises in the sessions developed throughout the season, given that both the EG of this study and professional teams in general include preventive work in various training sessions throughout the season, whilst the CG used in this study did not perform any work of this kind.

To conclude, we can affirm that including a preventive strength and proprioception exercise programme after warming up twice a week can help reduce the number and risk of suffering an injury in the lower limbs of amateur footballers.

In future research studies, it would be interesting to control the nutritional aspects of the different participants, as well as selecting a more homogeneous sample within the same group to see if the programme really is as effective when the participants perform the same type and volume of training and competing. It would also be interesting to perform follow up over various seasons, as well as to create a history of each player to take into account injury antecedents of each of them, in possible relapses. This way the search to achieve greater possible control over factors that influence the injury incidence rate could evolve, given the multi-factorial nature of injuries¹⁸.

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Campaña de aptitud física, deporte y salud



La Sociedad Española de Medicina del Deporte, en su incesante labor de expansión y consolidación de la Medicina del Deporte y, consciente de su vocación médica de preservar la salud de todas las personas, viene realizando diversas actuaciones en este ámbito desde los últimos años.

Se ha considerado el momento oportuno de lanzar la campaña de gran alcance, denominada CAMPAÑA DE APTITUD FÍSICA, DEPORTE Y SALUD relacionada con la promoción de la actividad física y deportiva para toda la población y que tendrá como lema SALUD – DEPORTE – DISFRÚTALOS, que aúna de la forma más clara y directa los tres pilares que se promueven desde la Medicina del Deporte que son el practicar deporte, con objetivos de salud y para la mejora de la aptitud física y de tal forma que se incorpore como un hábito permanente, y disfrutando, es la mejor manera de conseguirlo.