RBPFEX
Revista Brasileira de Prescrição e Fisiologia do Exercício

SPECIFIC EXERCISES ENHANCE BALANCE IN BASKETBALL PLAYERS: A BRIEF COMMUNICATION

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ABSTRACT

Introduction: In basketball, static and dynamic balance is crucial for sports performance and injury prevention. Objective: This study investigated the effects of an intervention protocol with balance exercises. Materials and Methods: 17 male university athletes participated, performing two weekly sessions over 8 weeks. The Modified Balance Error Scoring System (BESS) was used to assess balance before and after the intervention. Results: 53% of the athletes adhered to the protocol by more than 70% (n=9), and they improved their balance in tandem and single-leg support. In the post-test, 89% improved the score with single-leg support and 78% improved with tandem support. In athletes who did not adhere to the protocol (n=8) there was no change in the test score. Discussion: Statistical analysis showed a significant improvement in balance among athletes who consistently adhered to the protocol, highlighting the importance of adherence to the benefits of the pre-training exercise protocol. Conclusion: The proposed exercise protocol was effective in improving the postural balance of basketball athletes.

Key words: Balance. Basketball. Sports physiotherapy. Sensorimotor.

RESUMO

Exercícios específicos melhoram o equilíbrio em jogadores de basquete: uma comunicação breve

Introdução: No basquete, o equilíbrio estático e dinâmico é crucial para o desempenho esportivo e a prevenção de lesões. Objetivo: Este estudo investigou os efeitos de um protocolo de intervenção com exercícios de equilíbrio. Materiais e Métodos: participaram 17 atletas universitários do sexo masculino, realizando duas sessões semanais ao longo de 8 semanas. O Sistema Modificado de Pontuação de Erros de Equilíbrio (BESS) foi utilizado para avaliar o equilíbrio antes e depois da intervenção. Resultados: 53% dos atletas aderiram acima de 70% ao protocolo (n=9), sendo que estes apresentaram melhora no equilíbrio nos apoios tandem e unipodal. No pós-teste, 89% evoluiram o escore no apoio unipodal e 78% evoluiram no apoio tandem. Em atletas de não aderiram o protocolo (n=8) não houve alteração no escore do teste. Discussão: A análise estatística mostrou uma melhoria significativa no equilíbrio entre os atletas que aderiram consistentemente ao protocolo, destacando a importância da adesão para os benefícios do protocolo de exercícios pré-treinamento. Conclusão: O protocolo de exercícios proposto foi efetivo na melhora do equilíbrio postural dos atletas de basquetebol.

Palavras-chave: Equilíbrio. Basquetebol. Fisioterapia esportiva. Sensoriomotor.

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INTRODUCTION

In basketball, athletes often encounter physical contacts and situations of instability, such as accelerations, decelerations, and abrupt changes of direction. In this context, training focused on static and dynamic balance can optimize postural control and ankle stability, resulting in improved athletic performance and minimizing injuries (Domeika et al., 2020; Hall et al., 2018; Minoonejad et al., 2018).

Prevention is essential and aims not only to assess and tailor training to the specificities of each athlete but also to enhance their functional capacity in relation to the demands of each sport.

Thus, the functional assessment of the athlete and continuous monitoring are essential, allowing the analysis of aspects such as strength, power, endurance, posture, movement patterns, neuromuscular control, mobility, flexibility, and balance.

This mapping facilitates the identification of dysfunctions and injury prevention (Riva et al., 2016).

This study focused on the impacts of an intervention protocol with exercises on the balance of basketball players.

MATERIALS AND METHODS

This study employed an experimental design approved by the Research Ethics Committee of the aged between 20 and 35 years participated in the study.

A balance-focused exercise protocol was administered twice a week over an 8-week period. Athletes with injuries preventing them from participating in the intervention protocol were excluded. The protocol was implemented 20 minutes before weekly training sessions. Only those athletes who attended at least one session and completed the defined test for pre and post-protocol evaluation were included in the study.

The assessment instrument used was the modified Balance Error Scoring System (BESS) (Linens et al., 2014). Static balance and ankle stability were evaluated before and after the 8-week intervention.

The athlete performed unipodal support with closed eyes on a stable surface, tandem stance with closed eyes on a stable surface, single legged support with closed eyes on an unstable surface, and tandem stance with closed eyes on an unstable surface (Figure 1).

In all positions, athletes were instructed to keep their hands on their waist. Three familiarization attempts were conducted for each position, maintaining the test position for 20 seconds with a 20-second interval between attempts. On the fourth attempt, the examiner recorded the number of execution errors in each test. Examiners were selected and previously trained for standardization. The test started with the non-dominant limb (Bell et al., 2011).

Figure 1 - The modified Balance Error Scoring System (BESS).

Identifiable execution errors included, in unipodal support: opening the eyes; trunk movements; removing the index fingers from the anterior-superior iliac spines (ASIS); hip movements; supporting the lower limb in suspension on the ground; and removing the

tested lower limb from the demarcated area. In tandem support: opening the eyes; trunk movements; removing the index fingers from the ASIS; lifting the hallux, plantar arch, or calcaneus from the ground; and moving the lower limbs out of the tandem position or demarcated area (Linens et al., 2014).

The errors are added together, ranging from 0 to 21, where more errors result in a worse score and fewer errors in a better score. The duration of the test was approximately 50 minutes for each athlete, and the order of the test was randomized for each athlete.Throughout the season, athletes were monitored with weekly visits to training sessions for protocol application, discussions with the coaching staff, and adherence monitoring. A protocol adherence above 70% was considered good by the researchers. Recognizing the importance of proprioception in balance control, especially in the ankle, the exercise protocol was designed to maximize sensorimotor training benefits, taking into account the specific demands of basketball. Each exercise was meticulously described in its execution, considering biomechanics and practical application for basketball athletes and the improvement of their balance (Table 1). Figure 2 shows examples of exercises.

Figure 2 - Examples of protocol with balance exercises.

Table 1 - Exercise Protocol for Balance Improvement

Exercises	Execution	Repetitions
Single-leg Stiff Leg Deadlift with Shoulder Development	In a vertical position, a dumbbell in each hand, leaning the torso parallel to the ground while lifting one leg. Upon returning to the starting position, flex the hip and knee of the lifted leg, simultaneously raising the dumbbell above the head and extending the elbows.	2 sets / 10 repetitions
Unilateral Squat (Pistol)	Unilateral hip and knee flexion and extension movements, using a chair behind the athlete as support.	2 sets / 8 repetitions
Triarticular Mobility with Weight Oscillation	Isometric hip, knee, and ankle flexion for 30 seconds, followed by 30 seconds of weight oscillation between the legs.	2 sets
Scapular Stabilization	With a partner, the athlete stands, performing scapular adduction, shoulder abduction, and elbow flexion to 90°. Leans backward while the partner supports and returns them to the initial position. Maintaining a stable trunk and adducted scapulas.	2 sets/ 5 repetitions
Dynamic Plank	With the body parallel to the ground supported by extended arms and legs, bounce a tennis ball between the hands, keeping the body stable and activating the abdomen. Elbows aligned with shoulders.	2 sets / 30 seconds
4 with leg and trunk rotation	The athlete crosses the leg forming a "4" while maintaining balance, rotates the trunk, and passes the ball to the partner next to them.	10 repetitions with each leg
Disturbed Landing	The athlete jumps from an unstable surface, is disturbed by the partner, and lands on one foot, maintaining balance.	2 sets / 5 repetitions witch each leg

Statistical Analysis

Statistical analysis was conducted using the SPSS software. Initially, a univariate analysis was performed to assess participant adherence and calculate the means before and after the intervention. Subsequently, a Generalized Estimated Equations (GEE) - Bonferroni test was conducted to compare the pre and post-intervention means, providing a comprehensive approach to evaluate the effects of the intervention on athletes who adhered or did not adhere to the protocol. A significant difference was considered when $p < 0.05$.

RESULTS

When investigating adherence to the protocol concerning participants progression within the BESS score, it was possible to identify a variety in the frequencies of sessions conducted by the participants.

The analysis revealed that in the post-intervention results, both in unipodal support and in tandem, athletes who participated in more than 70% of the sessions (11 or more) showed a considerable improvement in their assessments, contrasting with athletes who did

not maintain good adherence to the exercise protocol (Table 2).

Table 2 - Average of errors recorded Pre and Post Intervention.

		before protocol	after Protocol	p
Adhesion (n=9)	Tandem support	8.11	3	0.0005*
	Single legged support	12	5	0.0006*
No adhesion (n=8)	Tandem support	7.4	8.4	0.8999
	Single legged support	13.9	14	0.5991

*statistically significant difference – GEE-Bonferroni test

DISCUSSION

The findings of this study indicate that the implementation of a specific pre-training exercise protocol, applied twice a week over eight weeks, can play a significant role in improving the balance of basketball athletes. However, it is crucial to note that this improvement occurs when there is a commitment and persistence of at least 11 sessions.

Domeika et al., (2020), evaluated the application of balance platform training in basketball athletes for 24 sessions, resulting in improvements in both static and dynamic balance.

Another study conducted by Hall et al., (2018), which assessed strength and balance using the BESS, concluded that specific training with 18 sessions of approximately 20 minutes each yielded statistically significant results in balance improvement. Our results, even with college athletes, showed that positive effects of the protocol are observed in as few as 11 sessions.

Therefore, this protocol stands out as a valuable tool for enhancing the balance of basketball players, emphasizing the importance of its regular and consistent implementation to achieve the best results and, consequently, maximize athletic performance and assist in injury prevention during practice.

The main limitation of the study is that the sample was not randomized, and divided according to the team athletes' participation in the protocol.

CONCLUSION

It was possible to affirm that athletes who adhered to the specific exercise protocol for at least 11 sessions improved their static balance. However, those who did not maintain regular attendance to the exercises did not alter their score on the test.

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Received for publication in 28/05/2024
Accepted in 13/09/2024