



# Acute Effects of Static, Dynamic and Mini-Band Warm-Up Protocols on Some Biomotor Characteristics in Basketball Players

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## Abstract

**Background.** The most effective warm-up programs chosen before training or competition are critically important in terms of performance. This is especially evident in basketball, due to the nature of the game, which requires players to make quick changes of direction and explosive movements. Implementing the most effective warm-up program not only reduces the risk of injury but also ensures that players are fully prepared for the game.

**Objectives.** This study aimed to determine the acute effects of static warm-up (SWU), dynamic warm-up (DWU) and mini-band warm-up (MBWU) protocols applied to basketball players on speed, jump, strength, flexibility and anaerobic power.

**Materials and methods.** Ten male basketball players (age:  $21.10 \pm 1.97$  years) from the university basketball team participated in the study voluntarily. The experimental model, one of the quantitative research methods, was used in the study. The study was designed as a three-day program, during which a different warm-up protocol was applied to the same athletes on each day, with 48-hour intervals. After performing SWU, DWU and MBWU protocols, the basketball players underwent a series of assessments, including 10-m sprint, countermovement jump (CMJ), back strength, flexibility and Wingate anaerobic power test (WAnt). The collected data were then recorded. The statistical analysis of the data was conducted using the SPSS package program. The normality level of the data was determined by Shapiro-Wilk test. Repeated Measures ANOVA test was used in the analysis of normally distributed data. The Bonferroni post hoc test was applied for intragroup comparisons.

**Results.** The findings of this study indicate a significant difference between the warm-up protocols in 10-m sprint, CMJ and peak power (PP) values ( $p < 0.05$ ), while no substantial difference was found in back strength, flexibility, average power (AP) and fatigue index (FI) values ( $p > 0.05$ ).

**Conclusions.** To sum up, it was determined that the DWU protocol applied to basketball players provided positive developments in speed and CMJ values, while the MBWU protocol led to enhanced improvements in speed, CMJ and PP values. The MBWU protocol demonstrated a beneficial impact on athletic performance compared to the DWU and SWU protocols. It is suggested that the MBWU protocol may be a preferable for warming up in basketball training.

**Keywords:** anaerobic power, basketball, countermovement jump, sprint, warm-up.

## Introduction

Basketball is a popular sport after football today. In this sport, which is played both individually and as a team, gaining an advantage over the opponent requires athletes to adapt to the complex structure of this sport (Kılınç & Özen, 2024). Basketball is related to the fact that individuals

of all age categories can easily practice this sport, as well as athletes having high physical, biomotor and psycho-mental characteristics. In basketball competitions or training, the place of biomotor skills is also very important in addition to some characteristics of athletes (Kılınç, 2008). Basketball is played at a very high tempo, and it includes some biomotor characteristics such as sudden changes of direction, high jumps and sudden acceleration. This situation requires basketball athletes to be athletic, to have basketball skills such as agility, conditioning and explosiveness (Bavli, 2008).

Warm-up is an important factor in order to maximize performance efficiency in training or competitions. Warm-up increases muscle temperature (Kapnia et al., 2022). It is stated that warmed muscles increase the functionality of the central nervous system and increase the speed of nerve impulses (Karvonen & Lemon, 1992). The muscle-nervous system becomes more efficient due to the increase in temperature, which also increases balance efficiency (Bishop, 2003). It is important for athletes, especially in sports such as basketball, which have high levels of complex body movements, to react quickly to various stimuli.

Sports injuries can occur due to various reasons and at different levels of severity. Individual factors such as muscle strength, performance level, fatigue, warm-up status, and sports technique play a determining role in the occurrence of these injuries (Koç & Yasun, 2024). Especially, an effective warm-up performed before training or competition stands out as an important protective factor in reducing the risk of injury. Warm-up exercises performed before training or competitions are important in terms of athlete performance, as they increase efficiency and cool-down exercises performed afterwards provide advantages in terms of rapid recovery and minimize the risk of injury in both cases (Thacker et al., 2004). SWU exercises are a type of warm-up frequently used before competitions and training. These warm-up exercises increase muscle flexibility at an optimal level, thus improving performance and reducing the risk of possible muscle injuries. DWU exercises are one of the multiple stretching methods that include many movements such as swinging and additional springing in a way that will maintain control without exceeding an athlete's own body weight and joint mobility (Yüksel, 2002). In MBWU exercises, athletes increase their muscle resistance by stretching the band. This increased resistance force in the muscle also increases muscle mass. In addition, MBWU exercises enable athletes to perform movements that cover both single and multiple joints at the same time, allowing for efficient training performance. Resistance enables muscle tension in direct proportion to the stretching of the elastic band, where further increase in muscle tension is related to the thickness and color of the resistance band (Özsu, 2018; Page & Ellenbecker, 2019).

When the studies on warm-up exercises in basketball are examined in the literature, it is seen that warm-up types have a positive effect on performance levels (Meckel et al., 2009; Galazoulas et al., 2012). However, since no study has been found on the effects of SWU, DWU and MBWU exercises on some biomotor characteristics of basketball players, this study was necessary. This study was conducted to determine the acute effects of SWU, DWU and MBWU protocols on some biomotor characteristics. It was assumed that DWU and MBWU protocols would positively affect biomotor characteristics, while SWU protocol would negatively affect them.

## Materials and Methods

### Study participants

The research group consisted of 10 male basketball players (age:  $21.10 \pm 1.97$  years) from the basketball team of Muş Alparslan University (Turkey). The players participated

in the study voluntarily. The research was conducted in accordance with the Declaration of Helsinki. Before starting the research, Ethics Approval was obtained from the Scientific Research and Publication Ethics Committee of Muş Alparslan University with the decision number 14/51 dated 06.12.2024.

### Study Organization

The experimental model, which is a quantitative research method, was used in the study. Athletes who had a chronic disease, had a musculoskeletal injury within the last year and needed to use continuous medication were not included in the study. The participants were shown how to apply the tests in the study, how to use the instruments to be measured and warm-up protocols practically under the supervision of an athletic performance trainer on a day before the study started. The athletes were made to try out the tests to be used in the measurements. The height and body weight measurements of the research group were taken on the same day. All participants were given the necessary instructions to follow regular eating habits on and before the measurement days and not to take any ergogenic supplements and stimulants during the study. They were also advised not to do heavy physical activity for 48 hours before the measurements and not to consume caffeine for 24 hours. The 10 athletes who participated in the study were randomly divided into three groups. Warm-up protocols were applied to the athletes in three groups with an interval of 48 hours, Day 1; Group A (4) SWU, Group B (3) DWU, Group C (3) MBWU, Day 2; Group C (3) SWU, Group A (4) DWU, Group B (3) MBWU, Day 3; Group B (3) SWU, Group C (3) DWU, Group A (4) MBWU (Figure 1). After each warm-up protocol on the measurement days, basketball players were subjected to 10-m sprint, CMJ, back strength, sit and reach flexibility and WAnt tests. Warm-up protocols and tests were performed at the same time (16.00-18.00) on the application days.

Information Day	Rest	Day 1	Rest	Day 2	Rest	Day 3
Providing information about the research and explaining the purpose of the research		Group A (n=4) SWU protocol and tests		Group C (n=3) SWU protocol and tests		Group B (n=3) SWU protocol and tests
Taking anthropometric measurements, introducing the application of warm-up protocols	48 hours	Group B (n=3) DWU protocol and tests	48 hours	Group A (n=4) DWU protocol and tests	48 hours	Group C (n=3) DWU protocol and tests
Introduction of biomotor tests and application of trial tests		Group C (n=3) MBWU protocol and tests		Group B (n=3) MBWU protocol and tests		Group A (n=4) MBWU protocol and tests

Fig. 1. Warm-up protocols and application scheme of tests

### Data Collection Tools

**10-m sprint test.** Athletes' 10-m sprint test was recorded with a photocell device (Fusion Sport Smart Speed, Australia) on a polyurethane coated indoor sports hall floor, with two gates placed at both points with a precision of 0.01 seconds in a 10-m area marked with a start and finish point, and when the athletes felt ready, they ran through the gates at their highest speed from 50 cm behind the start point and two trials were recorded with a 3-min interval. The athletes' best degree was evaluated.

**Countermovement jump (CMJ).** The athletes' vertical jump skills were measured with a jumping mat (Fusion Sport Smart Jump, Australia), both hands on their waists, feet shoulder-width apart and posture upright, and when the athletes were ready on the mat, they were asked to jump to the highest point they could without taking a step and bending their knees 90°. After jumping, the athletes fell back onto the mat and their jump heights were measured with a precision of 0.1 cm and the two attempts were recorded and the highest degree was evaluated (Atan, 2019).

**Back strength.** The athletes' back strength was measured with a Takei brand (Japan) back dynamometer. The athletes were placed on the dynamometer stand, stepping on the part where the foot marks were. The athletes were allowed to grip the dynamometer bar with their hands in an inverted position (palms up) while their knees and arms were stretched, their backs were straight and their bodies were slightly bent forward. In this position, the length of the dynamometer chain was adjusted according to the physical characteristics of each athlete and the athletes were asked to pull the dynamometer bar vertically up to the maximum level by taking force from their legs. The test was repeated twice and the best value was recorded in kg.

**Sit and reach flexibility test.** The test is to extend the body forward as much as possible in a sitting position. The test was performed using a bench with a lower surface length of 35 cm, an upper surface length of 55 cm, a width of 45 and a length of 32 cm. The upper surface of the bench on the subject's side was graded from 0 to 50 cm from the edge and a 30 cm ruler was placed next to this graduation. After the athletes were seated with the soles of their feet on the lower edge of the bench, the distance they could push the ruler on the bench by leaning forward without bending their knees was measured in cm. The athletes were given two attempts and the best degree was recorded (Pense & Serpek, 2010).

**Wingate anaerobic power test (WAnT).** To determine anaerobic power parameters, WAnT was applied to athletes. The test was performed on a lower extremity bicycle ergometer (Monark 894E, Monark, Varberg, Sweden). WAnT consists of pedaling at maximum speed for 30 s on a bicycle ergometer with a load of 0.075 kp·kg<sup>-1</sup> applied for each kilogram of body weight (Ramírez-Vélez et al., 2016). Age, body weight and height of the athletes were recorded on the computer connected to the ergometer via the software of the device. The load to be applied to the athletes was determined by the software and placed on the pan of the ergometer. The saddle height of the ergometer was adjusted according to the height of the athletes. The feet of the athletes were fixed to the pedals with the help of clips. After a 5-min free warm-up period, the athletes performed a 3-min pedaling exercise without exceeding 50-60 rpm without load on the ergometer. After the determined load was placed on the bicycle pan, the athlete started the test when he/she felt ready. After reaching the maximum pedal speed, the load on the pan was automatically reduced and the resistance caused by the weight was reflected to the pedal. After this stage, the participants were asked to complete the test with maximum effort by maintaining the pedal speed for 30 seconds. The athletes were motivated verbally while applying WAnT. After completing WAnT, the PP and MP anaerobic power parameters were determined by the software of the ergometer. It was calculated from the formula Fatigue Index = (Peak Power-Minimum Power) / (Peak Power) × 100 (Zagatto et al., 2009).

## Warm-up Protocols

**Static warm-up protocol.** The static warm-up protocol consists of two parts. The first part consists of 5 min of low-tempo running, and the second part consists of 15 different movements for the upper and lower extremities and other parts of the body. The exercises were continued for 15 sec and then a 10 sec rest was given. Static warm-up exercises were applied as 1 set in a 20 x 20-m area according to the order of movements under the supervision of an athletic performance trainer (Table 1). The static warm-up protocol lasted a total of 15 min, consisting of 5 min of running and 10 min of warm-up exercises.

**Table 1.** Static warm-up protocol

Static Warm-Up Exercises	Set	Exercise Direction	Exercise Time (sec)	Rest Time (sec)
Overhead Arm Stretch	1	Single	15	10
Overhead Triceps Stretch	1	Double	30	20
Cross Body Shoulder Stretch	1	Double	30	20
Chest Stretch	1	Double	30	20
Rear Shoulder Stretch	1	Single	15	10
Side Stretch	1	Double	30	20
Crouch Leg Stretch	1	Double	30	20
Quadriceps Stretch	1	Double	30	20
Floor Touch	1	Single	15	10
Calf Stretch	1	Double	30	20
Butterfly Stretch	1	Single	15	10
Head to Knee Stretch	1	Double	30	20
Hamstring Stretch	1	Double	30	20
Double Knee to Chest Stretch	1	Single	15	10
Abdomen Stretch	1	Single	15	10
Total			600 sec	

**Dynamic warm-up protocol.** The dynamic warm-up protocol consists of two parts. The first part consists of 5 min of low-tempo running, and the second part consists of 11 different movements for the upper and lower extremities and other parts of the body. The exercises were continued for 15 sec and then a 10 sec rest was given. Dynamic warm-up exercises were

**Table 2.** Dynamic warm-up protocol

Dynamic Warm-Up Exercises	Set	Exercise Direction	Exercise Time (sec)	Rest Time (sec)
Shoulder Circles	2	Single	15	10
Arm Swings	2	Single	15	10
Hip Circles	2	Single	15	10
Jumping Jacks	2	Single	15	10
Leg Swings	2	Double	30	20
Walking High Kicks	2	Single	15	10
Squats	2	Single	15	10
High Knees	2	Single	15	10
Butt Kicks	2	Single	15	10
Walking Lunge	2	Single	15	10
Ankle Hops	2	Single	15	10
Total			2 × 300 = 600 sec	

applied in 2 sets in a 20 × 20-m area, according to the order of movements, under the supervision of an athletic performance trainer (Table 2). The dynamic warm-up protocol lasted a total of 15 min, 5 min of running and 10 min of warm-up exercises.

*Mini band warm-up protocol.* The mini band warm-up protocol consists of two parts. The first part consists of 5 min of low-tempo running, and the second part consists of 10 different movements for the upper and lower extremities and other parts of the body. The exercises were continued for 15 sec and then a 10 sec rest was given. The mini band warm-up exercises were applied in 2 sets in a 20 × 20-m area, according to the order of movements, under the supervision of an athletic performance trainer (Table 3). The mini band warm-up protocol lasted a total of 15 min, consisting of 5 min of running and 10 min of warm-up exercises.

**Table 3.** Mini band warm-up protocol

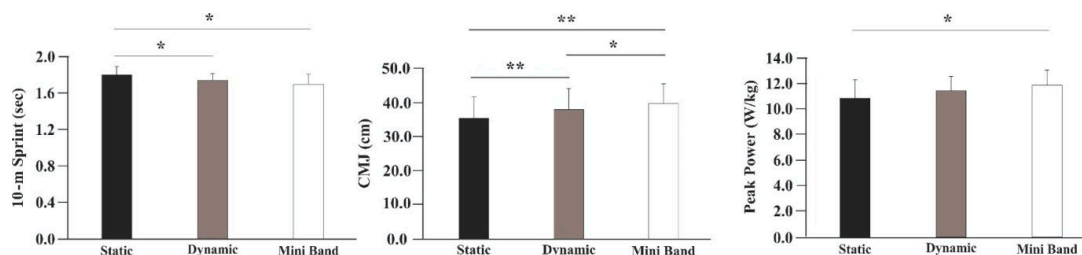
Mini Band Warm-Up Exercises	Set	Exercise Direction	Exercise Time (sec)	Rest Time (sec)
Overhead Pulses	2	Single	15	10
Arm Pulses	2	Single	15	10
Lat Pulldown	2	Single	15	10
Jumping Jacks	2	Single	15	10
Lateral Walk	2	Single	15	10
Squats	2	Single	15	10
Bicycle Crunch	2	Single	15	10
Hamstring Curl	2	Double	30	20
Clamshell	2	Double	30	20
Butterfly Bridge	2	Single	15	10
Total		2 × 300 = 600 sec		

**Statistical Analysis**

SPSS package program was used for processing the data obtained from the research, descriptive statistics and

**Table 5.** Biomotor test results of warm-up protocols

Biomotor tests	Warm-up protocols (n=10)			F	p	Post Hoc
	Static <sup>1</sup> Mean ± SD	Dynamic <sup>2</sup> Mean ± SD	Mini Band <sup>3</sup> Mean ± SD			
10-m Sprint (sec)	1.80 ± 0.09	1.74 ± 0.08	1.70 ± 0.11	5.277	0.016	2<1 - 3<1
CMJ (cm)	35.35 ± 6.25	37.93 ± 6.11	39.65 ± 5.77	37.307	0.000	2>1 - 3>1,2
Back Strength (kg)	142.95 ± 18.01	145.20 ± 23.01	152.25 ± 14.43	2.569	0.104	p>0.05
Flexibility (cm)	33.15 ± 6.09	33.10 ± 5.78	35.60 ± 6.37	3.244	0.098	p>0.05
Peak Power (W/kg)	10.87 ± 1.44	11.44 ± 1.15	11.87 ± 1.20	6.233	0.009	3>1
Mean Power (W/kg)	7.78 ± 0.60	7.93 ± 0.62	7.96 ± 0.41	1.151	0.339	p>0.05
Fatigue Index (%)	58.90 ± 7.15	59.73 ± 3.20	65.25 ± 9.39	2.854	0.084	p>0.05



**Fig. 2.** Values of 10-m sprint, CMJ and peak power tests

statistical analysis of the data. The normality assumption of the data was tested with the Shapiro-Wilk test. Repeated Measures ANOVA from parametric tests and Bonferroni test from Post Hoc tests were applied to the data showing normal distribution. The significance level in the research was accepted as p < 0.05.

**Results**

Descriptive statistics of the general characteristics of the basketball players participating in the study are presented in Table 4. The results of the biomotor tests of the basketball players belonging to the SWU, DWU and MBWU protocols are presented in Table 5 and Figure 2.

**Table 4.** Descriptive statistics of the general characteristics of the participants

General characteristics	n	Mean	SD
Age (years)	10	21.10	1.97
Height (cm)	10	184.00	7.44
Body Weight (kg)	10	81.74	12.59
BMI (kg/m <sup>2</sup> )	10	24.05	2.58

According to the findings in Table 5, a significant difference was found between the warm-up protocols in 10-m sprint, CMJ and PP tests (p < 0.05). No significant difference was found between the warm-up protocols in back strength, flexibility, MP and FI values (p > 0.05).

In the 10-m sprint test of basketball players, it was determined that the DWU and MBWU protocols had lower values than the SWU protocol. In the CMJ test, it was found that the DWU protocol had higher values than the SWU protocol, while the MBWU protocol had higher values than the SWU and DWU protocols. In the PP value, it was determined that the MBWU protocol had higher values than the SWU protocol.

## Discussion

One of the important findings of this study is that warm-up has an effect on biomotor characteristics. Especially DWU and MBWU provided an increase in athletic performance as assumed. There are studies showing that SWU protocols neither improve nor decrease athletic performance or are not beneficial (Galazoulas, 2017; Aydođdu & Atlı, 2021; Needham et al., 2009; Yamaguchi & Ishii, 2005). In the present study, a significant difference was determined between the warm-up protocols in the 10-m sprint test of basketball players. It was found that DWU and MBWU protocols had lower values than SWU protocol in the 10m sprint test. In a study applied to basketball players, it was determined that DWU protocol provided more positive results compared to SWU protocol in the 10m sprint test (Galazoulas, 2017). MBWU exercises after activation in university athletes showed statistically significant improvements in speed test (Singh et al., 2023). It was found that the values obtained after DWU in the speed test of young basketball players were statistically lower than the values obtained after SWU (Aydođdu & Atlı, 2021). In a study conducted on young basketball players, it was observed that DWU exercises performed before the 20-m sprint test had a positive effect on the 20m sprint (Akyüz et al., 2017). In the 20-m sprint test, the FIFA 11+ warm-up protocol values of young futsal players were found to be lower than the DWU and SWU protocols, and the DWU protocol values were also found to be lower than the SWU protocol (Kahraman et al., 2023). It can be said that the results in our study are similar to the studies in the literature. However, there are also studies in the literature with different results. In another study conducted on university women's football team athletes, there was no significant difference between the SWU and MBWU protocols in the 10m sprint test (Christensen et al., 2020). The difference between the results in our study and the results in this study is due to the differences in the branch and warm-up protocols.

In the current study, a significant difference was determined between the warm-up protocols in the CMJ test of basketball players. While the DWU protocol was found to have higher values than the SWU protocol in the CMJ test, the MBWU protocol was found to have higher values than the SWU and DWU protocols. A study conducted on young male basketball players showed that the FIFA 11+ warm-up protocol was more beneficial than the DWU protocol in the vertical jump test (Işıkdemir et al., 2020). A different study applied to basketball players determined that the DWU protocol provided more positive results compared to the SWU protocol in the CMJ test (Galazoulas, 2017). Another study found that the DWU protocol applied to athletes with and without weight vests increased vertical jump performance more than the SWU protocol (Faigenbaum et al., 2006). It was determined that DWU exercises increased drop jump performance and that a 10-min dynamic exercise period affected drop jump performance more positively than 5-min and 15-min warm-up periods (Kızılca & Okut, 2024). It was determined that the vertical jump values after DWU in young basketball players were statistically higher than the values obtained after SWU (Aydođdu & Atlı, 2021). It can be said that the results of our study are similar to the studies in the literature. However, there are also studies in the literature with different results. There was no significant difference between the

SWU and MBWU protocols in the vertical jump test in female football players (Christensen et al., 2020). It has been determined that static warm-up exercises have a positive effect on CMJ performance in basketball players (Sarıkaya et al., 2023). The difference between the results in our study and the results in this study is due to the difference in warm-up protocols.

In the current study, no significant difference was found between the warm-up protocols in the back strength and flexibility tests of basketball players. In a study conducted on young basketball players and supporting the results in our study, it was determined that SWU and DWU protocols had no effect on back and leg strength (Akyüz et al., 2017). However, there are also studies in the literature with different results. After dynamic stretching exercise, the latency of isometric contraction in the elbow flexor muscles was reduced and an increase in strength was determined after 10 min of rest (Veevo et al., 2012). It was determined that there was a statistically significant difference in the flexibility values of chronically applied static and dynamic warm-up exercises in adolescent basketball players (Esmer & Eskiyecek, 2020). It was found that SWU exercises applied before the sit-and-reach flexibility test in young basketball players had a positive effect on flexibility (Akyüz et al., 2017). It has been determined that the flexibility values obtained after DWU in basketball players are statistically higher than the values obtained after SWU (Aydođdu & Atlı, 2021). The difference between the results in our study and the results in the literature is due to the number of exercises in the warm-up protocols, the preference of different exercises and the difference in the application time.

In the present study, a significant difference was determined between the warm-up protocols in the PP anaerobic parameter of basketball players. It was determined that the MBWU protocol had higher values than the SWU protocol in the PP value. No significant difference was found in the FI and PP anaerobic parameters between the general warm-up and SWU protocols without warm-up (Amani et al., 2016). It was determined that different warm-up times did not create a significant difference in the PP and MP anaerobic parameters in handball players (Harmançı et al., 2014). In a study conducted on basketball, handball and volleyball players, it was found that there was no significant difference in the peak torque muscle strength values between the active, passive and combined warm-up groups during extension and flexion applied slowly and quickly (Ahsan & Mohammad, 2018). The difference between the results in our study and the results in these studies is due to the differences in the branches and warm-up protocols. There are also studies in the literature supporting the results of the study. After activation, MBWU exercises did not provide an improvement in muscle strength peak torque at high speeds (120°/s) but showed improvements at low speeds (60°/s) (Singh et al., 2023). It has been determined that a high-intensity specific warm-up protocol has higher values in 1-maximum repetition squat performance in basketball players than a low-intensity specific warm-up and a low-intensity 5-min running protocol alone (Eken, 2021).

## Conclusions

According to the results obtained from the research, a significant difference was found between the warm-up protocols applied to basketball players in the 10-m sprint, CMJ

and PP tests. No significant difference was found between the warm-up protocols in back strength, flexibility, MP and FI values. It was determined that the DWU and MBWU protocols had lower values than the SWU protocol in the 10-m sprint test of basketball players. While the DWU protocol was found to have higher values than the SWU protocol in the CMJ test, it was found that the MBWU protocol had higher values than the SWU and DWU protocols. It was determined that the MBWU protocol had higher values than the SWU protocol in the PP value. As a result, the MBWU protocol applied to basketball players provided more improvement in athletic performance compared to the DWU and SWU protocols. It is suggested that the MBWU protocol may be a preferable warm-up protocol in basketball training.

### Conflict of Interest

The authors declare that they have no conflicts interests.

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## Ефективний вплив застосування протоколів статичної, динамічної розминок та розминки із використанням міні-стрічок на певні біомоторні характеристики баскетболістів

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Авторський вклад: А – дизайн дослідження; В – збір даних; С – статаналіз; D – підготовка рукопису; Е – збір коштів

Реферат. Стаття: 8 с., 5 табл., 2 рис., 35 джерел.

**Історія питання.** Вибір найефективніших програм розминки перед тренуванням або змаганням має вирішальне значення з точки зору результативності. Особливо яскраво це простежується в баскетболі, оскільки характер цієї гри вимагає від гравців швидкої зміни напрямку руху та виконання вибухових рухів. Впровадження найбільш ефективної програми розминки не тільки знижує ризик травмування, але й забезпечує комплексну підготовку гравців до гри.

**Мета дослідження.** Мета цього дослідження полягала у визначенні ефективного впливу застосування протоколів статичної розминки (СР), динамічної розминки (ДР) та розминки із використанням міні-стрічок (МСР) для баскетболістів на показники швидкості, стрибка, сили, гнучкості та анаеробної потужності.

**Матеріали та методи.** У дослідженні добровільно взяли участь десять баскетболістів-чоловіків (вік: 21,10 ± 1,97 роки) з університетської баскетбольної команди. У дослідженні використовувалася експериментальна модель, що є одним із

кількісних дослідницьких методів. Дослідження було розроблено за триденною програмою, під час якої щодня, з інтервалом у 48 годин, до тих самих спортсменів застосовувався різний протокол розминки. Після виконання протоколів СР, ДР та МСР баскетболісти пройшли низку тестів, що включала спринт на 10 метрів, стрибок із контррухом (КРС), оцінювання показників сили м'язів спини, гнучкості та тест Вінгейта на визначення анаеробної потужності (ВАНт). Наступний етап передбачав фіксування зібраних даних. Статистичний аналіз даних проводився із використанням програмного забезпечення SPSS. Рівень нормальності даних визначався за допомогою критерію Шапіро-Вілка. З метою аналізу нормально розподілених даних використовувався дисперсійний аналіз із повторними вимірами. Для внутрішньогрупових порівнянь застосовувався post-hoc тест Бонферроні.

**Результати.** Результати цього дослідження вказують на значну різницю між протоколами розминок у показниках спринту на 10 метрів, КРС та пікової потужності (ПП) ( $p < 0.05$ ), тоді як суттєвої різниці у показниках сили м'язів спини, гнучкості, середньої потужності (СП) та індексу втоми (ІВ) не встановлено ( $p > 0.05$ ).

**Висновки.** Підсумовуючи, було визначено, що застосування протоколу ДР для баскетболістів, забезпечило позитивні зміни в показниках швидкості та КРС, тоді як протокол МСР призвів до значного поліпшення показників швидкості, КРС та ПП. Протокол МСР продемонстрував сприятливий вплив на спортивну результативність, порівнюючи з протоколами ДР та СР. Висловлюється припущення, що протокол МСР можна вважати оптимальним варіантом для розминки під час тренувань з баскетболу.

**Ключові слова:** анаеробна потужність, баскетбол, стрибок із контррухом, спринт, розминка.

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