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Impact of resistance training on biokinetic abilities, functional variables, and the skill of free-throw shooting in female basketball players

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ABSTRACT

The objective of this study was to evaluate the impact of resistance training on biokinetic abilities, functional variables, and the skill of free-throw shooting in female basketball players. The research method utilized by the two researchers was the experimental method, specifically employing a one-group design. The research sample was selected using a random method, with 12 players chosen to represent the college basketball team. The following tests were employed: tests for biokinetic abilities, functional tests and tests of offensive basketball skills. SPSS was utilized to statistically analyze the data. The results showed that resistance training positively impacted the development of basketball free-throw skills by accelerating the development process and enhancing shooting focus. Also, this training method played a significant role in enhancing the biokinetic capabilities of the female basketball players, through diverse exercise volume and repetition. Finally, the use of resistance training effectively enhanced the studied functional variables in the research sample, by promoting functional adaptation through exercise repetition and variation.

KEYWORDS

Biokinetic Abilities; Functional Variables; Skills; Free-Throw Shooting

1. INTRODUCTION

In recent times, societies have been striving to advance individuals and communities to achieve the highest levels of development. This is accomplished through promoting sound health and physical well-being, as well as through extensive research and studies that provide valuable insights for progress in various scientific fields, particularly sports science (Khleel Ibrahim, 2023; Mashkoor & Hameed, 2022).

Resistance training, particularly when supplemented with auxiliary methods, has emerged as a crucial training approach aimed at achieving specific goals. In this study, researchers employed resistance training exercises to enhance individuals' strength levels in terms of quantity, quality, and timing. Additionally, it aimed to contribute to the development of biokinetic capabilities, functional variables, and skill levels, enabling players to perform with high efficiency and proficiency in competitive sports settings. Resistance training is widely utilized across various sports activities due to its organized and graded approach, targeting different muscle groups to enhance specific skills and performance abilities. Therefore, the significance of this research lies in identifying the effects of resistance training on key biokinetic, functional, and skill variables, particularly the free-throw basketball skill, among female players. By doing so, this research aims to elevate sports achievement levels in general, with a specific focus on basketball events, where player performance directly impacts team success (Munadi, Jabbar, & Tuama, 2022).

Furthermore, the research has two primary objectives: first, to prepare resistance training, and second, to assess the effects of resistance training on key biokinetic capabilities, functional variables, and free-throw basketball skills among female players. The study also hypothesizes that significant differences will be observed in the post-test results of the research group, indicating the effectiveness of resistance training in improving biokinetic abilities and free-throw basketball skills. Additionally, significant differences are expected in the post-test results of the experimental research group, demonstrating the impact of resistance training on functional variables among female players.

2. METHODS

2.1. Design and participants

The research method utilized by the two researchers is the experimental method, specifically employing a one-group design. This approach was chosen due to its suitability for addressing the nature of the problem at hand.

The research community comprised students of the fourth stage in the Department of Physical Education and Sports Sciences at the College of Education for Women, totalling 45 students. The research sample was selected using a random method, with 12 players chosen to represent the college basketball team, accounting for 83% of the research community. Selecting the research sample is a critical aspect that significantly influences the research process, as it forms the basis for extracting measurements and results upon which the researchers conduct their work (Wajih, 2001).

2.2. Instruments and materials

The researchers used several tests and some materials. The materials used in this study were: 5 legal basketballs, whistle, 2 medicine balls of 3 kg, blood pressure monitor (Omax), computer, and electronic stopwatch. The tests used in this research were: 1) Tests for biokinetic abilities, 2) Functional tests, 3) Tests of offensive basketball skills.

The tests for biokinetic abilities were the throwing of medicine ball of 3 kg (Bahrain Olympic Committee, 2021) and the vertical jump test (Muhammad, 1999). The functional tests used were the Vo2Max measurement through Cooper's 12-minute running test (Penry et al., 2011) and the measurement of blood pressure with a blood pressure monitor (Omax). Finally, the offensive basketball skills were evaluated with the Consistency Free Throw Test, according to the indications of Ali (2004).

2.3. Procedures

The researchers carried out an exploratory experiment on 20/1/2022 to identify the suitability of the tests to the research sample, to know the time taken to conduct and implement the tests, to identify the problems that the researchers could face in this research, and to know the efficiency of the assistant work team.

After selecting the sample, the researchers conducted pre-tests for the research sample. Two units were given to familiarize the players with the skills under study. The pre-tests (explosive ability of the arms, explosive ability of the two legs, maximum oxygen consumption, blood pressure, free shooting from stability) were carried out on 3-2-2022, in the hall of the Department of Physical Education and Sports Sciences of the College of Education for Women of University of Kufa.

After reviewing the practical sources in the science of sports training and basketball and the opinions of experts, the two researchers prepared a training curriculum that includes resistance exercises to develop some biokinetic and functional variables and free shooting in basketball. The curriculum had a duration of 8 weeks, with a total of 16 lessons (two per week). This intervention program started on Sunday 6/2/2022 and finished on Thursday 31/3/2022.

The post tests were conducted for the research sample after the completion of the implementation of all training units, on Sunday 3/4/2022. The researchers followed the same methods and conditions as in the pre-tests.

2.4. Statistical analyses

SPSS was utilized to statistically analyze the data, and various applications within the software were employed for this purpose. The statistical methods used were arithmetic mean, standard deviation, and t tests. The significance level was $p<0.05$.

3. RESULTS AND DISCUSSION

The results are presented in Table 1, through a comparison between pre-tests and post-tests. The results of the post-test were significantly better ($p<0.05$) than those of the pre-tests, in all the variables studied.

Table 1. Comparison between pre-tests and post-tests

Variables	Pre-test		Post-test		t	p
	Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation		
Explosive ability of the arms (medicine ball)	4.84	1.06	5.10	1.13	4.52	<0.05
Explosive ability of the legs (vertical jump)	19.41	1.20	23.52	1.05	3.95	<0.05
Maximum oxygen consumption (VO2max)	14.92	0.98	15.53	1.02	3.45	<0.05
Systolic blood pressure	12.9	1.13	12.02	1.03	2.98	<0.05
Diastolic blood pressure	7.89	0.32	8.03	0.89	5.01	<0.05
Free-throw shooting	6.75	1.21	8.71	1.96	9.23	<0.05

It was observed that statistically significant differences existed between the pre- and post-tests for biokinetic abilities (explosive ability of the arms and legs), favoring the post-test. The researchers attribute this development to the implementation of the resistance training program, which contributed to enhancing the kinetic capabilities of female players at the College of Education for Women, University of Kufa. This improvement motivates coaches and players to invest greater effort in resistance training, resulting in improved proficiency in executing basic game skills.

This finding aligns with Roemmich & Sinning (1996), who emphasize the importance of well-planned training programs utilizing tools and appropriate load management, based on age and training stage, to enhance physical abilities and skill performance. Additionally, the progression of performance levels through exercises with specific resistances, including aerobic exercises, positively impacts physical performance.

Furthermore, a noticeable development in the values of research variables in the post-test was observed, indicating an improvement among the research sample individuals. This improvement led to significant differences favoring the post-test values over those of the pre-test across all studied

variables. The researchers attribute this to repeated performances and the continued application of units dedicated to develop functional variables (e.g. maximum oxygen consumption, systolic and diastolic blood pressure) and basketball skills (e.g. free shooting from stability).

4. CONCLUSIONS

Based on the obtained results, the researchers concluded the following: Firstly, resistance training positively impacts the development of basketball free-throw skills by accelerating the development process and enhancing shooting focus. Secondly, this training method plays a significant role in enhancing the biokinetic capabilities of the research sample, achieved through diverse exercise volume and repetition. Lastly, the use of resistance training effectively enhances the studied functional variables of the research sample, by promoting functional adaptation through exercise repetition and variation. Therefore, the researchers recommend the use of resistance training in training programs for female basketball players.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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