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EFFECTS OF THE FIFA 11+ WARM-UP PROGRAM ON VERTICAL JUMP AND DYNAMIC BALANCE AT U16 LEVEL IN FOOTBALL

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Abstract: *The FIFA 11+ warm-up program was developed as an injury prevention alternative to traditional warm-up methods in football. Numerous studies have confirmed its effectiveness in reducing injuries, as well as its potential impact on performance. The objective of this study is to investigate the effects of the FIFA 11+ program on explosive force and dynamic balance, utilizing the Opto Jump equipment by Microgate. A total of 39 players were divided into two groups based on their respective teams: the intervention group (n=19) and the control group (n=20). The intervention group followed the FIFA 11+ warm-up three times a week for 12 weeks, while the control group continued with their regular warm-up routine. The results indicated no statistically significant differences between the two groups in the vertical jump test. However, in the dynamic balance test, the intervention group demonstrated significantly better results in power and reactive strength index compared to the control group. In conclusion, implementing the FIFA 11+ program for a minimum of 12 weeks, three times a week, can enhance dynamic balance and serve as a viable alternative to traditional football warm-up routines.*

Key Words: FIFA 11+, Explosive Force, Dynamic Balance.

INTRODUCTION

Football is a widely popular sport enjoyed by individuals of all genders worldwide. However, due to the physical nature of the game, there is an inherent risk of injury for players (Pfirrmann et al., 2016). According to Khuddus (2017), football is a fast-paced sport that requires athletes to develop a comprehensive set of motor skills to meet the demands of the game and improve their overall health and performance. Hanief et al.

(2017) emphasize that physical fitness is a fundamental requirement for athletic improvement, and it cannot be compromised or postponed. Scheunemann (2012) highlights various components of physical fitness essential for football players, including speed, strength, endurance, flexibility, accuracy, power, coordination, reaction, balance, and agility. In this study, we focus on strength and balance as critical factors in reducing the risk of injuries and enhancing performance.

In response to these concerns, FIFA developed the FIFA 11+ injury prevention program in 2006 in collaboration with the Oslo Sports Trauma Research Center and the Santa Monica Orthopaedic and Sports Medicine Center (Silvers-Granelli et al., 2017). The effectiveness of this program has been investigated through numerous studies, which have not only focused on injury prevention but also on enhancing sports performance, yielding promising outcomes (Bizzini et al., 2013). An effective warm-up program for football should adequately prepare players for the demands of the game while being enjoyable and practical for both players and coaches to implement.

According to Silvers-Granelli et al. (2015), the FIFA 11+ program is divided into three parts.

Part 1 consists of six running exercises that are performed for a total of eight minutes. These exercises include running straight ahead, running with hip out, running with hip in, circling a running partner, using shoulder contact for proper landing, and quick running forwards and backwards.

Part 2 focuses on strength, plyometric, and balance exercises. Each exercise is divided into three levels of difficulty, and examples include static bench, static sideway bench, Nordic exercise, single-leg stance, squats, and jumping. The difficulty level increases as the athlete progresses through the levels, and more advanced exercises like walking lunges and box jumps are included. Part 2 lasts for 10 minutes.

Part 3 involves running exercises and lasts for two minutes. Activities in this part include running across the pitch, running with high bounding steps, and running in changing directions.

Overall, the FIFA 11+ program combines running exercises, strength training, plyometrics, and balance exercises. The program is designed to gradually increase in

difficulty and duration, with the aim of improving the physical conditioning of the athletes.

METHODS

The purpose of this study was to assess the impact of the FIFA 11+ program on motor qualities, explosive force, and dynamic balance in U16-level football players. A quasi-experimental design with pre- and post-intervention testing was employed. The initial testing was conducted separately for both groups until February 25, 2022. The intervention program was implemented from March 1, 2022, to May 30, 2022, three times a week, for a total of 12 weeks. Final testing took place after June 1, 2022, for both teams.

A total of 39 players from two different academies participating in the U16 Elite League in Romania were initially selected for the study. They were divided into two groups: the intervention group consisting of 19 players and the control group consisting of 20 players. The intervention group had an average height of 175.1 cm and an average weight of 61.84 kg, while the control group had an average height of 179.2 cm and an average weight of 65.85 kg.

The Opto Jump system, which utilizes optical technology, was used for performance measurements. It consists of a transmission and reception bar that captures and records physical fitness parameters in real-time. The system's software enables precise measurement of an athlete's performance, including parameters such as contact time, flight time, jump height, power, rhythm, and reactive strength index. The BFS Vertical Jump test and the Ski test were performed to assess explosive strength and dynamic balance, respectively.

Data analysis was conducted using SPSS 24 software. Various statistical indicators were calculated, including mean, standard deviation, Student's t-test, average differences (ΔXTI-TF), confidence interval, percentage of progress, and effect size (Cohen's d). Effect sizes were interpreted as small, medium, and large based on Cohen's guidelines. Statistical significance was set at $p < 0.05$ for all analyses, indicating that results with a p-value below this threshold were considered statistically significant.

RESULTS

The analysis of the data presented in Table 1 indicates that none of the results obtained from the BFS vertical jump test are statistically significant across all parameters. The parameter that showed the highest progress is jump height, with an increase of 4.6%. The power of jump parameter demonstrated a modest increase of 1.75%. However, no progress was observed in the reactive strength index parameter.

Table 1. BFS vertical jump test – intervation group

Test	Parameters	Ti-X	Tf-X	ΔXTI-TF	95% C.I. Lower; Upper	PG%	t	*p*
BFS vertical jump	Height of jump	36.05	37.71	1.66	-5.11; 3.24	4.6	-0.48	0.63
	Power of jump	24.48	24.05	0.43	-4.91; 4.53	1.75	0.10	0.91
	RSI	0.54	0.54	0	-0.21; 0.25	0	0.18	0.52

Ti—initial test, Tf—final test, X—arithmetic mean, t—Student test, (ΔXTI-TF—average differences betweenfinal test and initial test, 95% C.I—interval of confidence lower and upper, PG %—percent of progress, RSI—ReactiveStrength Index

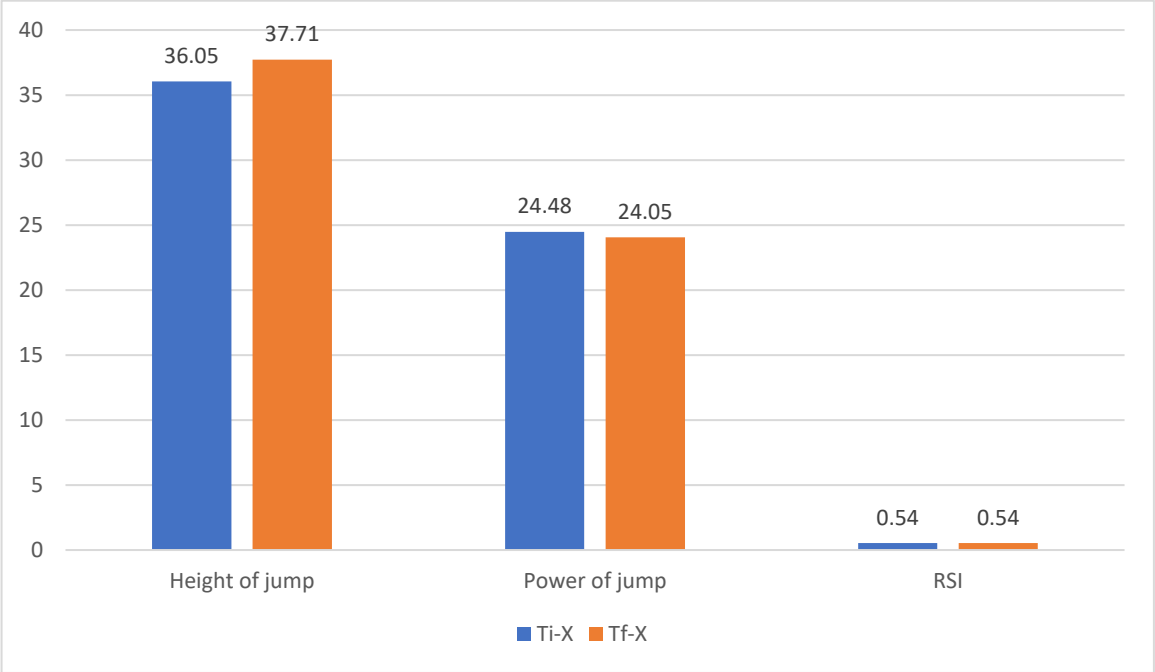

Figure 1. BFS vertical jump test – intervation group

The analysis of the data presented in Table 2 reveals that all the results obtained from the BFS vertical jump test are statistically significant for all parameters, except for jump

height. In the final test, the power of jump showed a decrease of 7.98%, and the reactive strength index demonstrated a decrease of 15.51%. On the other hand, the height of jump experienced a slight decrease of 0.11%.

Table 2. BFS vertical jump test – control group

Test	Parameters	Ti-X	Tf-X	ΔXTI-TF	95% C.I. Lower; Upper	PG%	t	*p*
BFS vertical jump	Height of jump	34.14	34.10	0.04	-3.44; 3.52	0.11	0.02	0.98
	Power of jump	24.17	22.24	1.93	-4.91; 4.53	7.98	2.10	0.04
	RSI	0.58	0.49	0.09	-0.21; 0.25	15.51	2.81	0.00

Ti—initial test, Tf—final test, X—arithmetic mean, t—Student test, (ΔXTI-TF—average differences betweenfinal test and initial test, 95% C.I—interval of confidence lower and upper, PG %—percent of progress, RSI—ReactiveStrength Index

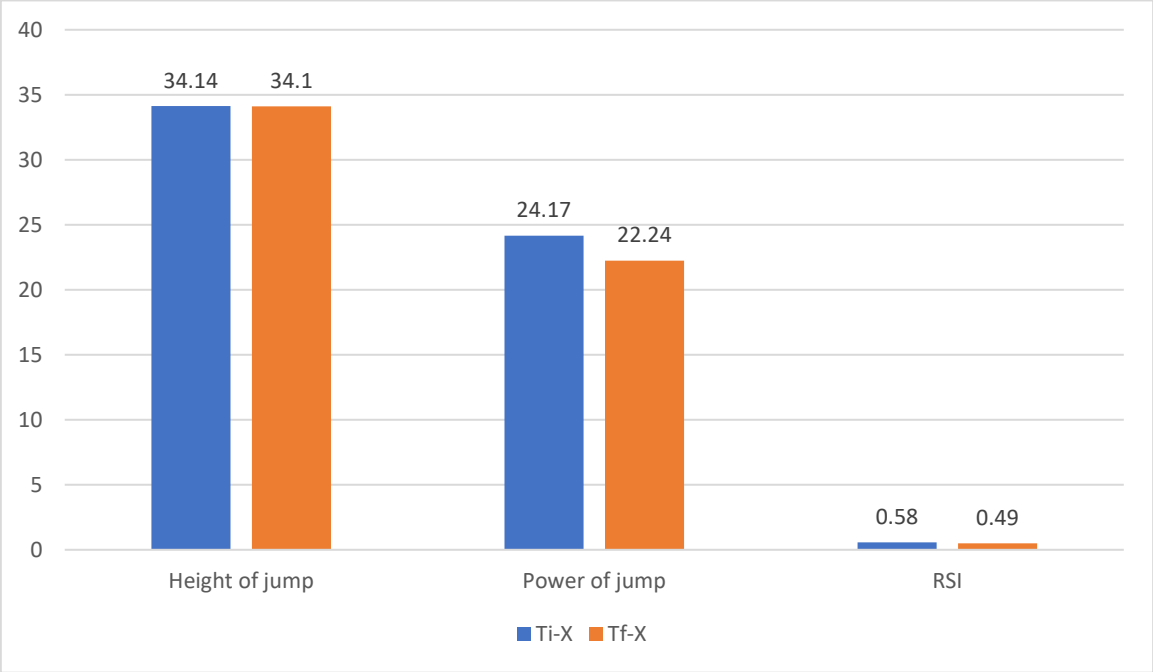

Figure 2. BFS vertical jump test – control group

The analysis of the data presented in Table 3 reveals that all the results obtained from the Ski test are statistically significant for all parameters, except for pace. The most significant progress was observed in the reactive strength index (RSI) parameter with an improvement of 123.07%. Additionally, the power of jump showed a significant improvement of 57.92%, and limb asymmetry demonstrated a notable improvement of 52.76%.

Table 3. Ski test – intervation group

Test	Parameters	Ti-X	Tf-X	ΔXTI-TF	95% C.I. Lower; Upper	PG%	t	*p*
BFS vertical jump	Power of jump	9.46	14.94	5.48	-7.23; -3.82	57.92	-7.06	0.00
	Limb asymmetry	16.43	7.76	8.67	-1.06; 25.82	52.76	2.00	0.06
	Pace	0.97	1.00	0.03	-0.14; 0.17	3.09	0.21	0.83
	RSI	0.13	0.29	0.16	-0.20; -0.10	123.07	-6.79	0.00

Ti—initial test, Tf—final test, X—arithmetic mean, t—Student test, (ΔXTI-TF—average differences betweenfinal test and initial test, 95% C.I—interval of confidence lower and upper, PG %—percent of progress, RSI—ReactiveStrength Index

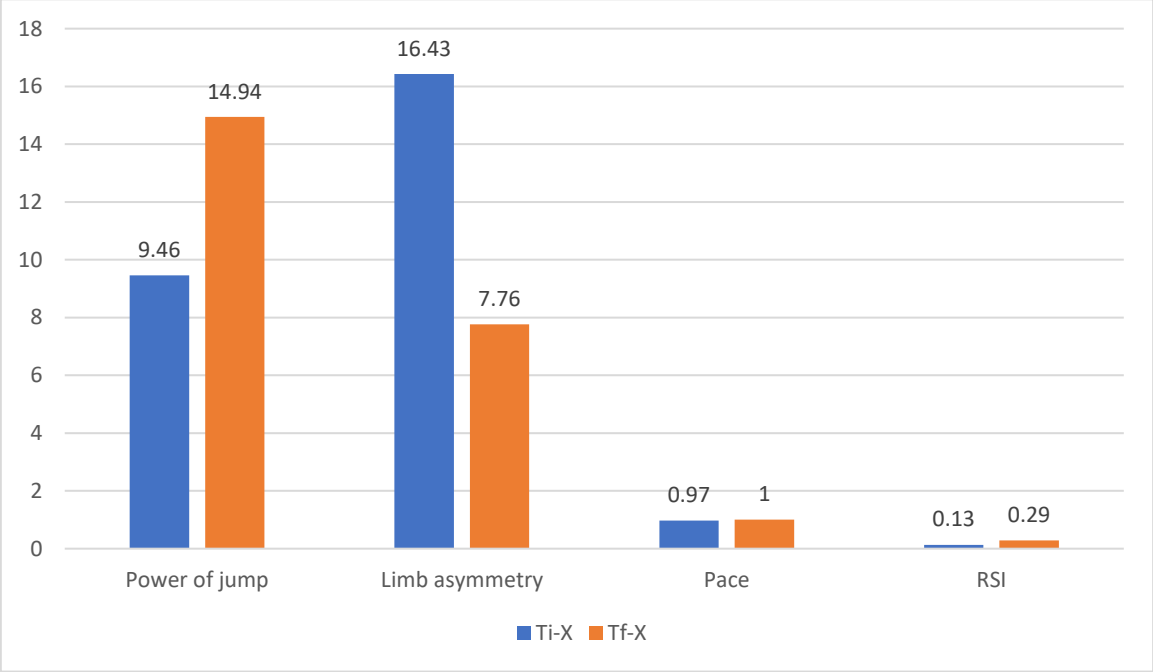

Figure 3. Ski test – intervation group

The analysis of the data presented in Table 4 indicates that none of the results are statistically significant for the parameters of the Ski test. The highest progress was observed in the limb asymmetry parameter with an improvement of 32.43%, while the lowest progress was observed in the pace parameter with an improvement of only 2.27%.

Table 4. Ski test – control group

Test	Parameters	Ti-X	Tf-X	ΔXTI-TF	95% C.I. Lower; Upper	PG%	t	*p*

BFS vertical jump	Power of jump	7.40	8.08	0.68	-2.18; 0.70	9.18	-0.93	0.36
	Limb asymmetry	10.73	7.25	3.48	-2.81; 9.77	32.43	1.12	0.26
	Pace	1.32	1.29	0.03	-0.11; 0.07	2.27	0.44	0.65
	RSI	0.11	0.12	0.01	-0.04; 0.01	9.09	-0.91	0.37

Ti—initial test, Tf—final test, X—arithmetic mean, t—Student test, (ΔXTI-TF—average differences betweenfinal test and initial test, 95% C.I—interval of confidence lower and upper, PG %—percent of progress, RSI—ReactiveStrength Index

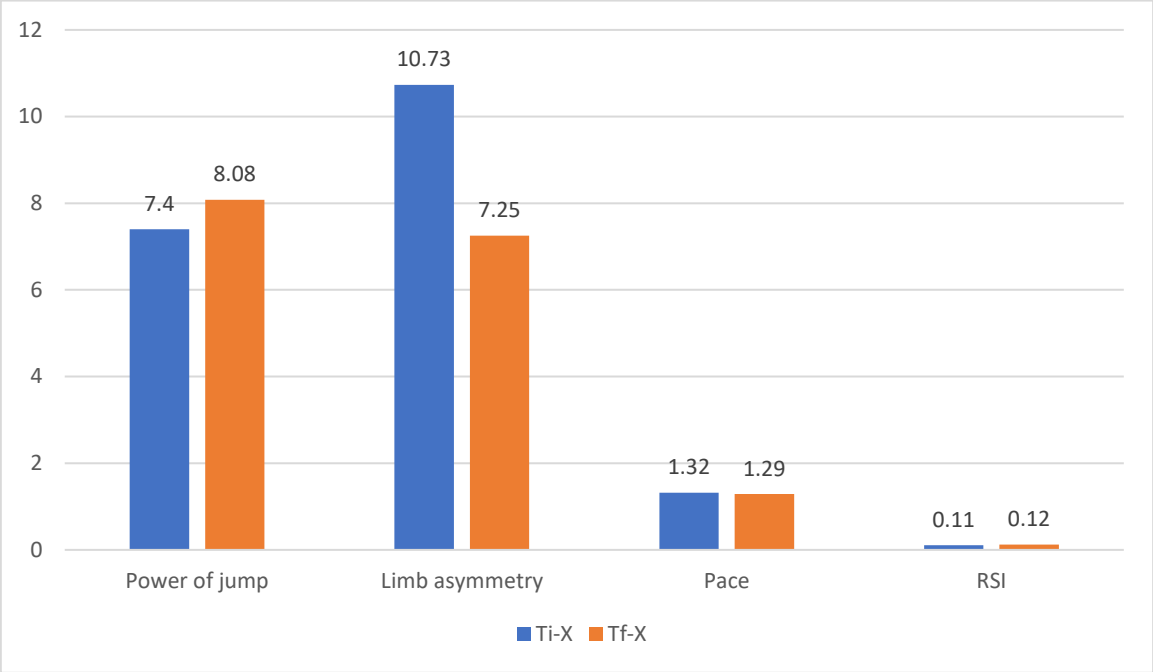

Table 4. Ski test – control group

DISCUSSION

The study aimed to evaluate the effects of the FIFA 11+ warm-up program on explosive force and dynamic balance when implemented three times a week for 12 weeks at the U16 level. In the BFS vertical jump test, the intervention group maintained their values for the reactive strength index and power of jump, while experiencing a slight increase in jump height. In contrast, the control group showed a statistically significant decrease in power of jump and reactive strength index, while maintaining jump height. Although the intervention group did not demonstrate significant progress, their explosive power remained stable, which is crucial considering the age of the players.

In the Ski test, the intervention group showed statistically significant improvements in all parameters except pace, while the control group showed slight improvements in the parameters. The extracted data indicates a statistically significant improvement in dynamic balance in the intervention group. Therefore, it can be concluded that the FIFA 11+ program can enhance dynamic balance when applied for a minimum of 12 weeks, three times a week.

According to Zarei et al. (2018), the implementation of the FIFA 11+ warm-up program yielded positive outcomes in various physical performance tests such as the Illinois agility test (IAT), vertical jump test, and Bosco counter movement jump (BCMJ) test. However, there were indications of a potential decrease in performance in the dribbling test.

CONCLUSIONS

When comparing the FIFA 11+ program to the traditional warm-up used in football at the U16 level in terms of explosive force and dynamic balance, it is evident that the FIFA 11+ program has improved dynamic balance and maintained explosive force in this age group. Considering that the FIFA 11+ program was specifically developed to prevent injuries in football, it can be concluded that this program should be implemented in all clubs in Romania as a first step for a minimum of 12 weeks. Subsequently, the program can be adapted based on the specific needs of each team.

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