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Application of FIFA 11+ Kids: Method to minimize sports injuries in youth football

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ABSTRACT

Football is one of the sports with the highest risk of injury, with injuries to children around 3% per year with serious injuries occurring at only 0.69% per year. The objective of the study is to investigate the application of FIFA 11+ Kids in minimizing sports injuries in youth football through enhancement components of physical condition, namely, leg muscle power and muscle flexibility. This study is an quasi-experimental research by using a pre-test - post-test control group design. The sample in this study are 20 people, divided into control and treatment groups. In this study, the sample is determined using a purposive sampling technique, with the following inclusion criteria: 1) male, 2) 11-12 years old, 3) practicing football regularly, 3) willing to be a research sample. In contrast, the criteria exclusion is experienced injured and unwilling to be a research sample. The distribution of control and treatment groups using matching subject ABBA technique. Instruments used in this research are the standing broad jump test to measure leg muscle power and sit and reach test to measure muscle flexibility. The data analysis is a t-test regression analysis with a level of 5% significance. This study found that the application of FIFA 11+ Kids can be used as a method to minimize sports injuries in youth football. The limitation of this study is that the sample is limited to only 20 children. This research is important because it contributes to the science of football coaching in terms of preventing injuries to children. Future research is expected to thoroughly examine the components of other physical conditions related to injury prevention, and use a larger sample from various age groups of soccer school students.

Keywords: FIFA 11+ kids; injury; football; powers; flexibility

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INTRODUCTION

One of the forums for football development in Indonesia is the nursery of prospective football athletes, which is accommodated in the football academy (SSB). SSB in Indonesia is often found in various regions, which indicates the rapid development of football coaching in Indonesia (Arjuna, 2019). Football is a sport played by eleven players for each team. The goal of football is to score as many goals as possible against the opponent. Therefore, it is necessary to master a football player's technical, tactical, physical, and mental abilities to achieve maximum performance (Irawan & Anam, 2022). Soccer techniques can be divided into techniques with and without the ball (Anam et al., 2019). Techniques with the ball include: 1) kicking techniques (Rabello et al., 2021; Hunter et al., 2021), 2) holding and controlling the ball, 3) dribbling techniques, 4) heading the ball, 5) throwing the ball, and 6) goalkeeping techniques (Anam et al., 2021). While the techniques without the ball include: 1) stealing the ball, 2) body cart technique, 3) deception without the ball, 4) running technique, 5) jumping technique, and 6) goalkeeping technique (Anam et al., 2018).

Sports injuries in football coaching are what players fear the most (Kurittu et al., 2021; Liporaci et al., 2021; Safar Cherati et al., 2021). Sports injuries can affect anyone as a sports player (McCunn et al., 2017). Sports injury is a condition of damage to cells or organs due to external forces that the body cannot accept (Hardyanto & Nirmalasari, 2020). Injuries can be divided into acute and overuse injuries. Injuries in football can take the form of joint injuries or dislocations (Light et al., 2018; Szymski et al., 2021; Sillanpää et al., 2022), muscle injuries (O'Boyle et al., 2020; Ménard et al., 2020), and ligament injuries (Silvers-Granelli et al., 2017; Rolley et al., 2022).

Football is one of the sports with the highest risk of injury (Volker et al., 2021; Liporaci et al., 2021). Cases of injury to children are about 3% per year, but serious injuries occur only at 0.69% per year. In children aged under 12 years, sports injuries are still very few, so that sports are still safe for prepubertal children. A very sharp increase in injuries occurred in boys aged 14 years, and this continued with increasing age (Robles-Palazón et al., 2022; Puspitasari, 2019).

One way to prevent sports injuries is to improve the components of physical condition, which include: agility, flexibility, power, speed, endurance, and strength (Eshghi et al., 2020; Vatovec et al., 2020; O'Brien et al., 2018; Kilic et al., 2017; Puspitasari, 2019; Kaneko et al., 2017). In addition, there is also a FIFA 11+ injury prevention program for adult footballers (Lopes et al., 2019a; Lopes et al., 2019b; Lopes et al., 2020; Zarei et al., 2018; Silvers-Granelli et al., 2017). In addition, specifically for children, there is the FIFA 11+ Kids warm-up program which is a warm-up program that has been designed to improve spatial orientation, prediction and attention, improve body stability, movement coordination, and finally teach proper landing techniques (Zarei et al., 2018).

This study will conduct a study on the application of FIFA 11+ Kids to muscle power and muscle flexibility in children, which can then be linked as an effective method of minimizing sports injuries. Previous studies only intervened in the provision of FIFA 11+ Kids for 4-10 weeks (Tseng et al., 2021; Teixeira et al., 2021; Zarei et al., 2019), and did not explicitly mention the study of the effect of muscle power and muscle flexibility in minimizing injury in football.

The research method is what distinguishes this study from previous studies. The pretest-posttest control group design is used, with sample selection using the purposive sampling technique and sample grouping using the subject matching technique A-B-B-A. Furthermore, FIFA 11+ Kids treatment lasts 12 weeks with two meetings per week for children aged 11 to 12. This study also investigates the role of muscle power and muscle flexibility in reducing injury in football. The goal of this study is to determine the effectiveness of FIFA 11+ Kids in reducing sports injuries in youth football by improving physical condition components such as leg muscle power and muscle flexibility. This research is critical in assisting coaches in selecting a program to reduce the appearance of injuries to children while playing football. This is because cases of youth injury must also be taken seriously.

This research will be important because it contributes to the science of football coaching in terms of preventing injuries to children. With evidence of the role of FIFA 11+ Kids in minimizing injuries from this research, coaches will be confident in implementing FIFA 11+ Kids. This is because FIFA 11+ Kids has been

designed to improve spatial orientation, prediction and attention, improve body stability and movement coordination, and teach proper landing technique.

METHOD

This study is an experimental research, which seeks to determine the effect of specific treatments on other variables in conditioned situations. The purpose of this study is to see how FIFA 11+ Kids affected leg muscle power and muscle flexibility in 11-12 year old youth football players. This study employs a pre-test-post-test control group design, which divides the research sample into two groups: control and experimental (Hidayat et al., 2020). The sample in this study are 20 people, divided into control and treatment groups. In this study, the sample is determined using a purposive sampling technique, with the following inclusion criteria: (1) male, (2) 11-12 years old, (3) practicing football regularly, (4) willing to be a research sample. At the same time, the exclusion criteria were injured and not willing to be the research sample.

Table 1. Characteristics Demographics Group Study

	Age (years) Mean ± SD	Height (cm) Mean ± SD	Weight (kg) Mean ± SD	BMI Mean ± SD
Treatment Group (n=10)	11.3 ± 0.4	147.9 ± 6.6	40 ± 7.7	18.19 ± 3.7
Control Group (n=10)	11.4 ± 0.5	150.05 ± 8.1	39.1 ± 14.4	17.04 ± 4.5

The instrument used in this study is the standing broad jump test to measure leg muscle power (Krishnan et al., 2017; Pérez-Castilla et al., 2021; Tai et al., 2021; Pinoniemi et al., 2021; Zulrafli & Kamaruddin, 2021). To measure muscle flexibility, use sit and reach test (Fredrick & Silverman, 2020; Blackshear et al., 2018; Lindsay et al., 2021; Ayán Pérez et al., 2020; Mier, 2011; Abate Daga et al., 2021). The division of the treatment group and the control group in this study used the A-B-B-A subject matching technique. Data analysis in this study uses regression analysis to test the effect of research variables (Arisetiawan et al., 2020). A T-test is conducted to test the effect of the FIFA 11+ Kids variable on leg muscle power and muscle flexibility variables.

RESULTS AND DISCUSSION

The results of this study indicate that the use of FIFA 11+ Kids has an effect on increasing leg muscle power and muscle flexibility. As a result of this research, it is possible to conclude that FIFA 11+ Kids can be used to reduce sports injuries in youth football. Minimizing this injury is possible because FIFA 11+ Kids can affect physical condition components such as leg muscle power and muscle flexibility. This study discovered that FIFA 11+ Kids can increase leg muscle power and muscle flexibility in children based on data analysis. Description of research data in the treatment group and control group can be seen in Table 2 below.

Table 2. Statistical Descriptive of Research Data

Statistics	Treatment Group				Control Group			
	Leg Muscle Power (kg)		Muscle Flexibility (cm)		Leg Muscle Power (kg)		Muscle Flexibility (cm)	
	Pretest	Posttest	Pretest	Posttest	Pretest	Posttest	Pretest	Posttest
Mean	158	176.4	31.9	35.7	171	164.5	30.1	28.1
Median	171	183	31.5	35	169.5	165.5	31.5	29.5
Standard deviation	28.84	21.82	6.13	6.21	21.52	21.37	4.2	4.65
Min.	121	141	24	27	127	120	24	21
Max.	198	206	42	46	206	196	36	33
Sum	1580	1764	319	357	1710	1645	301	281
Count	10	10	10	10	10	10	10	10

Based on Table 2, it is found that the average pre-test leg muscle power in the treatment group is 158 ± 28.84 kg with a score range of 121-198 kg. Meanwhile, the posttest average of leg muscle power in the treatment group is 176.4 ± 21.82 kg with a score range of 141-206 kg. The average pretest of muscle flexibility in the treatment group is 31.9 ± 6.21 cm with a score range of 24-42 cm. Meanwhile, the posttest average of

muscle flexibility in the treatment group is 35.7 ± 6.21 cm with a score range of 27-46 cm. The average pretest leg muscle power in the control group is 171 ± 21.52 kg with a score range of 127-206 kg. Meanwhile, the posttest average of leg muscle power in the control group is 164.5 ± 21.37 kg with a score range of 120-96 kg. The average pre-test muscle flexibility in the control group is 30.1 ± 4.2 cm with a score range of 24-36 cm. Meanwhile, the posttest average of muscle flexibility in the control group is 28.1 ± 4.65 cm with a score range of 21-33 cm.

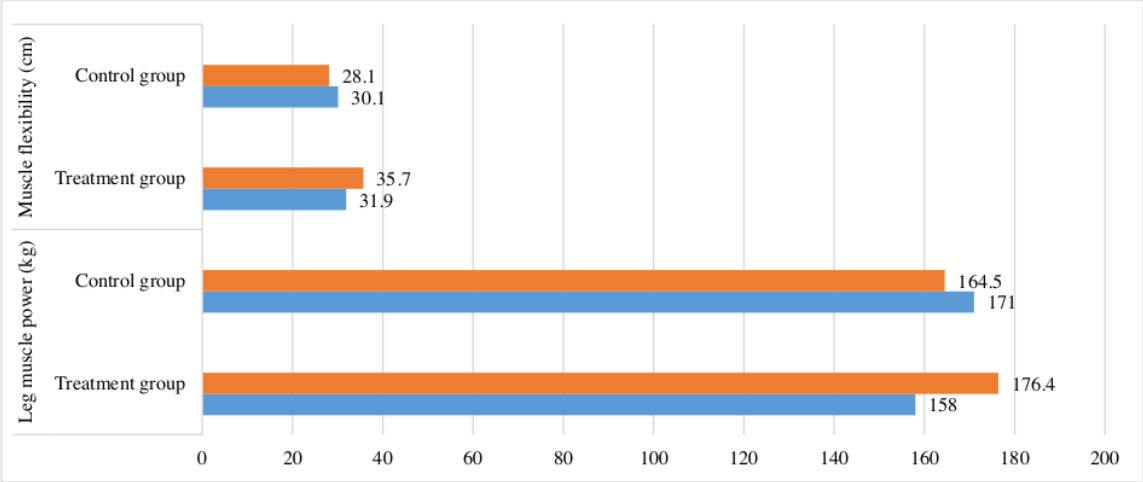

Figure 1. Bar Chart Average Leg Muscle Power and Muscle Flexibility

The normality test and homogeneity test had been performed as prerequisites for the regression test. A regression test was conducted to test the effect between research variables. Regression analysis used was a t-test to test the effect of the FIFA 11+ Kids variable on leg muscle power and muscle flexibility variables. The average difference test of pretest data and posttest data was carried out to determine whether there was an increase before and after the treatment was given (Anam et al., 2021). Furthermore, data analysis was performed using paired sample t-test. The results of the calculation of the average difference test will produce t count and significant sig. (2-tailed) which is used to test the hypothesis and effect. If the p-value > 5%, then H_0 is accepted, and H_a is rejected. If p < 5%, then Ho is rejected, and Ha is accepted. The calculation of the average difference test of the paired sample t-test is presented in Table 3 below:

Table 3. Paired Samples Test Treatment Group

Paired Samples Test									
		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	Power_Pretest - Power_Posttest	-18.40	12.04	3.80	-27.01	-9.78	-4,83	9	.001
Pair 2	Flexibility_Pretest - Flexibility_Posttest	-3.80	1.47	.46	-4.85	-2.74	-8,14	9	.001

Based on Table 3 above, it was found that the significance (2-tailed) of the variable leg muscle power in the treatment group was 0.001 (p < 0.05). This means that Ha, which reads there is an effect of FIFA 11+ Kids on leg muscle power", is accepted, and Ho is rejected. These results indicate that the data from the pretest and posttest results of leg muscle power experienced a significant (meaningful) change. In addition, the significance (2-tailed) of the muscle flexibility variable in the treatment group was 0.001 (p < 0.05). This

means that Ha, which reads "there is an effect of FIFA 11+ Kids on muscle flexibility", is accepted, and Ho is rejected. These results indicate that the data from the pretest and posttest results of muscle flexibility experienced a significant (meaningful) change.

The purpose of this study is to examine the impact of using FIFA 11+ Kids as a method to reduce sports injuries in youth football. Minimizing this injury is possible because FIFA 11+ Kids can affect physical condition components such as leg muscle power and muscle flexibility. This study discovered that FIFA 11+ Kids can increase leg muscle power and muscle flexibility in children based on data analysis. According to previous research, giving FIFA 11+ Kids can improve physical fitness and attention (Tseng et al., 2021), increase physical performance (Pomares-Noguera et al., 2018), and also increase vertical jump results (Teixeira et al., 2021).

The results of this study indicate that there is an influence from the application of FIFA 11+ Kids in increasing leg muscle power and muscle flexibility. This happens because FIFA 11+ Kids consists of seven types of exercises, and consists of 5 levels in each practice. Exercise 1 is the "alertness running game" although it focuses on improving balance and coordination, but some movements involve leg muscle strength. Exercise 2 is "skating jumps" which focuses on improving the stability of the legs and knee joints, this exercise also involves leg muscle strength and back flexibility. Exercise 3, namely "single-leg stance" focuses on improving balance, this exercise also involves leg muscle strength because it must rest on one leg. Exercise 4, namely "press-ups", focuses on strengthening core and arm muscles. Exercise 5 "single-leg jump" which focuses on improving leg muscle strengthening, balance, and coordination, this exercise also involves leg power training because the exercise jumps on one leg. Exercise 6, "Spiderman" focuses on strengthening the core muscles and the hamstrings.

Sports injuries are something that athletes fear in football coaching (Kurittu et al., 2021; Liporaci et al., 2021; Safar Cherati et al., 2021). Sports injuries can affect anyone as a sports player (McCunn et al., 2017). Sports injury is a condition of damage to cells or organs due to external forces that the body cannot accept (Hardyanto & Nirmalasari, 2020). Injuries can be divided into acute and overuse injuries. Injuries in football can take the form of joint injuries or dislocations (Light et al., 2018; Szymski et al., 2021; Sillanpää et al., 2022), muscle injuries (O'Boyle et al., 2020; Ménard et al., 2020), and ligament injuries (Silvers-Granelli et al., 2017; Rolley et al., 2022). Cases of childhood injuries are about 3% per year, but serious injuries occur only at 0.69% per year. In children aged under 12 years, sports injuries are still very few, so sports are still safe for prepubertal children. A very sharp increase in injuries occurred in boys aged 14 years, which continued with increasing age (Robles-Palazón et al., 2022; Puspitasari, 2019).

The causes of sports injuries themselves can be divided into internal factors and external factors. Internal factors include anatomical factors, muscle weakness, technical errors, low fitness, and overuse. Meanwhile, external factors include the type of sport, the equipment factor, and the field condition factor. One way to prevent sports injuries is to improve the components of physical condition, which include: agility, flexibility, power, speed, endurance, and strength (Eshghi et al., 2020; Vatovec et al., 2020; O'Brien et al., 2018; Kilic et al., 2017; Puspitasari, 2019; Kaneko et al., 2017). In addition, there is also a FIFA 11+ injury prevention program for adult footballers (Lopes et al., 2019a; Lopes et al., 2019b; Lopes et al., 2020; Zarei et al., 2018; Silvers-Granelli et al., 2017). In addition, specifically for children, there is the FIFA 11+ Kids warm-up program which is a warm-up program that has been designed to improve spatial orientation, prediction, and attention, improve body stability and movement coordination and ultimately teach proper landing techniques (Zarei et al., 2018). Based on research conducted by FIFA 11+ Kids, it can also improve the components of physical condition, namely leg muscle power and muscle flexibility, so that it can indirectly minimize the occurrence of sports injuries.

The results of this study can be used as a reference for football coaches in training. The results of this study can also be used by football coaches in selecting effective methods to minimize sports injuries in children. This study is limited to a small number of research samples, namely 20 children, and the age group is only limited to the age range of 11-12 years. Future research is expected to carry out further research using more samples and diverse age groups. In addition, further research is also expected that more components of physical conditions are studied.

CONCLUSION

According to the resuls of this study, FIFA 11+ Kids can be used to reduce sports injuries in youth football by increasing muscle power and flexibility. This is based on data analysis, which shows that FIFA 11+ Kids has an effect on increasing leg muscle power and muscle flexibility in youth football. As a result, FIFA 11+ Kids can be used to reduce sports injuries in youth football by increasing muscle power and flexibility. Future research is expected to thoroughly examine the components of other physical conditions related to injury prevention, as well as use a larger sample of soccer school students from various age groups.

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CONFLICT OF INTEREST

All Writers in the article have stated no conflict of interest in the study.

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