

UNIVERSITI TEKNOLOGI MARA

**EFFECT OF FATIGUE INDUCED BY
YoSFS⁵ AFTER FIFA 11+ INJURY
PREVENTION PROGRAM ON
ANTERIOR CRUCIATE LIGAMENT
INJURY RISK AMONG YOUTH
MALE RECREATIONAL SOCCER
PLAYERS**

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ABSTRACT

Injury among youth soccer players is increasing as more youth population participates in this sport. Thus, injury prevention program such as FIFA 11+ is crucial to reduce the rate of injury. However, FIFA 11+ has not been tested for effect on the youth population during fatigue state. Therefore, this study aimed to investigate the effect of eight weeks of FIFA 11+ injury prevention program on isokinetic strength, dynamic balance and biomechanics during landing following fatigue induction among youth soccer players. This study was divided into two phases. In the first phase, there are two objectives have been investigated. Firstly, was to determine the reliability and validity of a newly developed high-intensity Youth Soccer Fatigue Simulation (YoSFS⁵). Twenty recreational male youth soccer players (age:15.9±0.87, years old, BMI =19.52±2.58 kg/m²) performed the YoSFS⁵ in 5 minutes after performing a dynamic warming-up. Heart rate (HR), rate of perceived exertion (RPE), and countermovement jump (CMJ) height were recorded immediately after completing the YoSFS⁵. After a week, the participants repeated the same procedure and measurements. Secondly, this study was to investigate the effect of YoSFS⁵ on the isokinetic strength, dynamic balance and biomechanics during landing of the lower limbs in youth soccer players. Thirty-nine youth soccer players performed tests on isokinetic strength, dynamic balance, and biomechanics during landing before the fatigue simulation (PRE), immediately after simulation (POST5), and 20-min (POST20), and 35-min (POST35). Lastly, to investigate the effect of 8 weeks FIFA 11+ injury prevention program on isokinetic strength, dynamic balance, and biomechanics during landing following YoSFS⁵ among youth soccer players. Thirty participants were volunteers and randomly allocated into two groups (FIFA11+ vs control). The participants followed the same procedures in objective two, then went to intervention 2 times/week for 8 weeks long. After that, all participants have repeated the same procedure before the intervention. The result of the first objective has shown that the relative and absolute reliability was considered between good to excellent (ICC = 0.72-0.92). The absolute reliability showed a small percentage of CVs for HR, RPE, and CMJ at 0.9%, 5.5%, and 8.35%, respectively. The second objective is shown dynamic balance was significantly reduced after simulation in all directions for both legs (p<0.005). Significant reductions in the hamstring eccentric, hamstring concentric, and quadriceps concentric were also observed (p<0.05). However, no significant reductions in the Conventional Hamstring: Quadriceps ratio and Functional Hamstring: Quadriceps ratio. The total score of the Landing Error Scoring System within PRE and others (POST5, POST20, and POST35) was significant (p= 0.001). The last objective showed no significant differences in individual muscles, Conventional Hamstring: Quadriceps ratio and Functional Hamstring: Quadriceps ratio after the FIFA 11+ injury prevention program. Meanwhile in dynamic balance, posterior lateral (POST5 and POST20) and posterior medial (PRE, POST5, and POST20) directions are significantly affected after FIFA 11+ in the dominant leg. Lastly, the Landing Error Scoring System only showed significant improvement in Pre, POST 5, POST 20, and POST35 in FIFA 11+ group. In conclusion, eight weeks of 11+ shows some improvement in dynamic balance and landing biomechanics, however inadequate to see the greater changes in muscles strength towards ACL injury.

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CHAPTER ONE

INTRODUCTION

1.1 Introduction

Soccer is classified as a contact sport, with 22 players competing for the ball, and intentional or unintended physical contact. According to an analysis performance study, soccer involves 11546 meters of covered, 1044.2 meters high intensity running, and 224.4 meters of sprinting during the match (Pettersen & Brenn, 2019). Soccer also involves 1200 cyclical and random changes in movement every 3 to 5 seconds, requiring 30 to 40 sprinting, more than 700 turning, and 30 to 40 tackling and jumping (Mohr, Krustup, & Bangsbo, 2005). This nature of the game has put players at high risk of injury. A total of 480,580 cases of soccer-related injury have been recorded in the emergency department in the United States and it cost more than 700 million in US dollars from 2010 to 2013 (Flores, Giza, Bates-jensen, Brecht & Wiley, 2021). Constant vigorous activities in a soccer match have explained why soccer players tend to suffer more injuries than participants in other sports.

1.1.1 Prevalence of Anterior Cruciate Ligament Injury

According to Pfirrmann, Herbst, Ingelfinger, Simon and Tug, (2016), youth and adult soccer players were injured more on match days compared to the training day. A previous study stated that among male first-division youth soccer players in Brazil, 187 injuries were documented in 122 players (65.2%) and caused 4792 days of loss from soccer activities(Cezarino, Gruninger, & Silva, 2020). Meanwhile, another reported that approximately 20,000 players had sports injuries over ten years, with 6434 of them having injuries related to the knee (Majewski, Susanne & Klaus, 2006).

One of the most commonly injured ligaments is the anterior cruciate ligament (ACL) (Alentorn-Geli et al., 2014; Gianotti, Marshall, Hume, & Bunt, 2009; Raja Azidin, Sa, Bossuyt, & Paraplegic, 2015). The incidence of ACL injury in soccer is reported to occur between 0.06 to 3.7 per 1000 game hours (Bjordal, Arnoy, Hannestad & Strand, 1997; Faunø & Wulff Jakobsen, 2006; Rekik et al., 2018). This injury occurs