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FATIGUE-INDUCED BIOMECHANICAL AND NEUROMUSCULAR DETERMINANTS OF LOW BACK PAIN RISK AMONG YOUTH HOCKEY PLAYERS: A CROSS-SECTIONAL ANALYSIS

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ABSTRACT

Background: Low back pain (LBP) is a common affliction in sports, with youth athletes, particularly hockey players, facing an elevated risk due to factors such as repetitive movements, prolonged trunk flexion and fatigue. Fatigue impair the ability to maintain proper spinal alignment and effectively coordinate lower limb joint movements, thereby increasing susceptibility to LBP. Therefore, the purpose of this study aimed to identify the determinants of LBP risk before and during fatigue in youth hockey players. Methodology: Sixty males (age:14.34 ± 1.16, BMI: 19.27 ± 3.41) and Sixty females (age:14.41 ± 1.19, BMI: 19.25 ± 3.42) youth hockey players were recruited for this study. They were recruited from hockey talent high school. Functional Movement Screen (FMS) was used to indicated risk of LBP, and the possible associated factors or determinants for LBP injury risk were musculoskeletal screening tools which were pelvic kinematics (Single Leg Vertical Drop Jump), core stability (plank test), trunk extensor endurance (Sorensen test), dynamic balance (Y-Balance test) and pain scale (VAS). Data for all outcome measures were taken for PRE (before fatigue simulation), POST0 (immediately after fatigue simulation) and POST15 (15minutes after fatigue simulation). Modified Repeated Sprint Ability (RSA) that mimics hockey game was used as a fatigue simulation which consists of sprint, jog, walk, stride and agility. Simple Linear Regression and Multiple Linear Regression was performed to analyse the data statistically. Result: The result showed that fatigue negatively affects FMS and all the musculoskeletal screening tools. Determinants for FMS during PRE ($R^2 = 0.354$), POST0 ($R^2 = 0.307$) and POST15 ($R^2 = 0.244$) are right pelvic kinematics among youth hockey players ($P<0.001$). Meanwhile, trunk extensor endurance and right posteromedial dynamic balance were significant determinants of FMS scores at PRE ($P<0.001$) ($R^2 = 0.165$) and right pelvic kinematics emerged as the primary determinant at POST0 ($P<0.001$) ($R^2 = 0.137$) and POST15 ($P<0.001$) ($R^2 = 0.278$) among participants who at risk of LBP (PRE: 50.83%, POST0: 68.33%, POST15: 91.67%). Conclusion: In conclusion, fatigue negatively impacts youth athletes and right pelvic kinematics, trunk extensor endurance as well as right posteromedial dynamic balance are the key factors associated with LBP risk. Hence, this study will help physiotherapist, coaches and sport scientist in tailoring exercise regime to prevent LBP among athletes.

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CHAPTER 1
INTRODUCTION

1.1 Research Background

Hockey is one of the world's most popular sports. The growth of public institutions such as Eton is largely responsible for the establishment of the modern game of hockey in England in the mid-18th century. In 1876, the UK's first Hockey Association was established, and it created the sport's first official set of regulations. The current international official body that is responsible to manage and organize is hockey called The Fédération Internationale de Hockey, also referred to as FIH. It is the organization that oversees field hockey and indoor field hockey internationally. Switzerland's Lausanne is the location of the headquarters. Field hockey's major international competitions, including the Hockey World Cup, are organized by FIH. It houses five Continental Federation which are the African Hockey Federation, European Hockey Federation, Oceania Hockey Federation, Asian Hockey Federation and Pan American Hockey Federation (FIH, 2020). Field hockey is an Olympic sport that is played by both men and women at the leisure and professional levels. The International Hockey Federation has 132 member associations, including five continental associations, demonstrating its global prominence. However, field hockey, like all competitive sports, includes the danger of injury (Barboza et al., 2018).

Field hockey, which is often known as hockey, is not an indoor sport in which two teams consisting of 11 players each try to score goals for their opponents by using sticks with curved striking ends. It is called hockey to distinguish it from the same game played on ice. 2 teams will play on a rectangular field. The field is 91.4 metres (100 yards) long by 55 metres (60 yards) wide, with a centre line and two 22.86 metres lines. The goals have a height of 7 feet (2.13 metres) and a width of 4 yards (3.66 metres). A goal (worth one point) must be scored when the ball reaches the goal and hits an attacker's stick while still within the shooting circle (semicircle). The ball was originally supposed to be a cricket ball (cork centre, string winding, leather cover), however, plastic balls are acceptable as well. It measures around 23 cm (9 inches) in circumference. The stick typically weighs 12 to 28 ounces and measures 36 to 38 inches