The differences of muscle growth between male and female college soccer athletes ...

Sociology, Women

ABSTRACT

Soccer is the most popular sport in United States with an estimate of 20 million players and statistics shows that the yearly participation rose by 20%. Rise in number of females who are participating in soccer all over the world however has not resulted to a similar increase in numbers of the biomechanical studies which concentrates in kicking patterns for the females to find out whether there are many differences that exists between the female and male players. The significance of the experiment was find out whether there is any differences in kinematic instep kicking between elite male and female soccer players in dominant and no dominant limbs. The participant included eight skilled soccer athletes, six females and two males who underwent a three- dimensional electromyography and motion analysis of seven muscles (gluteus medius, gluteus maximus, vastus lateralis, iliacus, vastus medialis, gastrocnemius, and hamstring) as a control group. Their ages were 19- 22 years and were free from orthopedic and physical injury, which would hinder them from exerting maximal effort during instep kicking. The participants took a two angled approach of 45-60 degrees to a stationed soccer ball placed between two force platforms and participated in instep kicks; they kicked as hard as they could into netting which was mantled from the ceiling. The velocity of the ball was taken to be dependent variable. Muscle activation was recorded as a ratio of maximum voluntary isometric contraction. An identifiable difference in muscle activation and knee alignment exist between men and women especially when kicking a soccer ball. The study also evaluated other six variables that have previously shown to be significant predictors of instep kicking ball speed. The results showed

that males generally kicked the ball faster than the counterpart females and displayed greater kinematic variables, including ball contact, ball velocity, maximum toe velocity, mean toe velocity, ankle velocity, and mean toe acceleration at ball contact, all of which resulted to faster ball speed. There was an exception; one elite female kicked faster than the two elite males and showed similar, or higher kinematic patterns when compared to males. The conclusions were that women do not instep kick the ball as fast as males though there may be exceptions as the study reveal.

INTRODUCTION

In soccer, instep kicking (IK) is the most common and frequent used skills. In mature athletes, the instep kick, which is fundamental, requires subsequent support foot contact (SFC) with the ground, complex interaction with the ball which goes hand in hand with sequenced transfer of momentum from proximal to distal body segments in the kicking or swing limb. The support foot as per the angled methodology should be put side by side and alongside the ball while the toe of the support foot is faced into the direction of the movement of the ball. The kicking foot at SFC is in a position of knee flexion, hip extension, and ankle plantar flexion. During powerful IK, following body preparation of the kicking limb, the knee is sequentially extended and the hip forced to flex so that forces generated can be focused into propelling the ball. Skilled and powerful kickers keep foot and ankle in a complex lock and in a plantar flexed manner to maximize the force of propelling the ball. Various studies in the literature on the biomechanics of instep kicking focus on many variables in distinct populations, they aim at establishing the

optimal variables or variable which can serve best in predicting the success in instep kicking, where success is measured in terms of resultant ball velocity. Research has been conducted from the youngest age brackets to skilled professionals; where there is a conviction that experienced athletes consists of greater temporal proximity of the kicking movement features, and less mechanical variability as compared with naïve and unskilled athletes.

Basic factors influencing swing limb velocity include hip rotation accompanied by hip flexion and appropriate extension of the knee before ball contact (BC). Transfer of momentum from the thigh to the leg is crucial instep kicking, yet no study which has justified this claim. The speed of principle summation cannot be supported by the research as the relocation of a single part within a system which is joined is inconsistent hence no association with the movement of the muscles and single segment acting forces.

Second, the complexity of instep kicking motion is a multiplanar movement. Instep kicking is complex movement individuals make; segmental role quantification is hectic to measure.

There is limited information on instep kicking and in differences on dominant and non dominant sides, and the gradual increase in female soccer in the world, has declined to lead to simultaneous growth in the study of female kicking design. Research analysis shows prove that there are mechanical differences between dominant and non-dominant side instep kicking and between sexes; however, there are no approved studies of this principle skill among female soccer players with skills. Thus, the aim of study is to examine

selected kinematic differences between skilled female and male soccer players in instep kicking with dominant and non- dominant limbs. Hypothesis was that males using the instep kicking would kick the ball faster than the counterpart females and would generally incur larger kinematic variables in the swing limb, thus resulting to greater resultant ball velocity as compared with skilled females.

Injury risk in soccer varies by sex. It has been found that female soccer players stand at a higher risk of patellofemoral and anterior cruciate ligament injury while male players are prone to sport hernia symptoms. Data from recent scientific research, revealed that during the motion of the side foot and instep side kicks- which are the most kicks in soccer; males activate certain leg and hip muscles more than females. This may serve as an explanation as to why female players are more than twice as susceptible as males to suffer an Anterior Cruciate Ligament (ACL) injury

Purpose Statement

The main aim of this particular study is to find out whether there were vital differences in the strength of the quadriceps and hamstring between female and male soccer players using three strengthening programs which are different.

Research Question

Are there any differences in muscle growth between male and female college soccer athletes given similar programs?

Null Hypothesis

There existed no material differences between the female and male colligate

soccer participant’s levels of strength in the strength in the hamstring and quadriceps.

Dependent Variable

Muscular strength.

Independent Variable

Exercise program and exercises in the program.

Subjects

Male and female colligate soccer athletes.

Definition of Terms

Colligate athlete- they are non-professional, collegiate and university-level athletes who take part in competitive sports and games which encompass physical skill, the system of training that make then better suited for competitive performance.

Exercise program- this is a regular physical activity which aim at achieving boost of mood to improve sex life, health benefits. Physical exercise is beneficial to individuals regardless of their sex, age, and physical ability. Exercise can also help to reduce health diseases and conditions, control weight, and increase moods.

Muscle growth- this is working out with weights with an aim of growing or inflating muscles. This is based on the fact that muscles are in a transient state. The size of the muscle depends on the external stresses that are impacted on it, specifically exercise. In addition, muscle growth depends on mechanical influences, nutritional factors, drugs, and genetic that can change the size of a muscle.

Muscle of strength- this is the ability individuals have to exert force on physical objects using muscles. Muscle strength helps individuals to lift things, move, and push up against a resistance. It may also be defined as a force that a muscle can exert in a one contraction, which enable individuals to generate force at a given velocity of movement.

Methods

Study Design

The study design was a quasi- experimental design. The participants were pre-tested and post-tested using 60 seconds between the kicks and two minutes of when sides were changed to test the results.

Participants

The participant included eight elite soccer players, six females and two males both dominant and non-dominant instep side kicks in soccer. Their ages ranged from 19 to 22 years who participated in the sixty seconds and two minute instep side kicks exercise program. The two males were control group and experimental group of fourteen. University of North Carolina’s school of medicine is mandated to accredit the Participants use through its Institutional Review Board. The subjects were free from orthopedic and physical injury, which would prevent them from exerting maximum instep kick.

Instruments

Procedures

The instantaneous Velocities of the soccer ball, ankle and the knee joint of

the kicking limb, the toe of the kicking foot, and instantaneous angular velocity of the knee joint were approximated using MotionSoft MS Kime Computer program package version 4. 0 (Motion Soft, Chapel Hill, NC). The optimal velocity and the velocity during ball contact of the toe kicking the ball were recorded. The mean acceleration and velocity of the toe of the kicking foot were also approximated between the support foot the ball contact and the support foot contact with the ground. The kinematic variables selected for analysis, were put across as; First, Maximum Toe Velocity (Max T Vel) was taken to be the maximum velocity attained at the distal end of the kicking foot between SFC with the ball contact (BC) and the floor. Second, Toe Velocity at ball contact (BC Toe Vet) was the velocity attained at the distal extreme of the kicking toe at the point of BC. Third, the average velocity of the distal end of the kicking foot between SFC and BC in total trials was the mean Toe Acceleration between BC and SFC. Fourth, the average obtained from acceleration of the distal ends of the kicking foot between SFC and BC is the mean Toe Acceleration. Fifth, velocity of the centroid of the lateral Malleolus of the kicking foot at BC was obtained from the Ankle Velocity. Sixth, the Angular velocity of the knee BC was the angular velocity obtained by relatively to the thigh segment at BC.

The study selected the trials with the greatest ball velocity for dominant and non dominant for data analysis.

Data Analysis

ANOVA was conducted to compare the kinematic variables of kicking between dominant and non dominant limbs and between genders. 0. 05 alpha levels were used to show statistical significance. All statistical analysis

was carried out using SAS Software (SAS-Cary, NC). Parametric statistics were significant since they accounted for individual effects, that are effects of gender on the outcomes of interest, and effects due to dominant and non dominant limbs.

Results

This study was conducted using eight male and six female athletes and two male as a control experiment. They were engaged in an instep kick to test the results. Their age bracket was between 19-22 years old.

Descriptive statistics

Statistical Analysis

Discussion

There have been various studies on the mechanics of instep kicking starting from youths to skilled level but most don’t capture the female subjects. There has been no investigation of differences in kinematic variable capturing skilled female athletes. Excellent conceptualization of kinematic variable differences may be important in training and teaching aspiring young female soccer athletes. The temporal interactions involved in the experiment were obtained in previous studies and were crucial for instep instep kicking. The IK was used in the analysis since there was no former study on the female elite soccer players and the significance of this skill in soccer. Dominant and non dominant feet were examined to help in development of bilateral activity, especially in significance skill such as instep kick, which enable the success in soccer.

Overall hypotheses were backed up the data analyses by the experiment. In general women showed less ball velocity than males on dominant and non dominant sides. In addition, kinematic variables were lower in females than in males although the differences were statistically insignificant. There was an exception where 9one of the females showed great ball velocity in two to three instep kicks than the men on the dominant side.

Conclusion

The examination carried on kinematic variables in instep kicking showed that there was a slight difference between males and females. Taking the dominant participants from both sexes, males indicated higher values. The only variable where males demonstrated a great difference was mean toe velocity, which place them at an advantage since it is a protective mechanism to prevent hyperextension at the knee which may be as a result of a powerful kick by the dominant males and the one elite female. Females showed greater angular velocity than males, which put them at a higher risk of hyperextension.

Recommendations

First, females are able to instep kick on dominant and non dominant sides leading to identical kinematic features as men. Secondly, seven kinematic variables were examined on dominant and non dominant sides, and six of them males had higher values than females. Angular velocity at ball contact which is a significant feature which aid in propelling the ball was slower in male kickers as compared to female participants. These place men at an advantage since they can gain greater stamina of the distal segment before

BC. It allows them to have ample time prior to BC for the hamstring to develop a decrease in knee angular velocity as BC approaches to reduce cases of hyperextension. Third, slower angular velocity at the knee in dominant males may be important since it may slow the limb before BC approaches, this reduces injury.

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