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Electromyographical analysis of biceps femoris and rectus femoris during instep kick in football

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Abstract
Objective: The aim of the study was to compare Biceps femoris and Rectus femoris muscles during Instep kick in Football.
Methodology: The investigator had selected Eight male soccer players of inter University/national level were selected as subjects for the study. Hence, purposive sampling was considered for selection of subjects. The age of subjects ranged from 18-25 years. All the subjects were selected from Banaras District. These players had represented inter University/national level and had no lower extremity injuries or any bone joint disparities in the past years. By reviewing the literature and in consultation with the expert, the research scholar carried out an intensive study and selected major muscles such as Biceps femoris and Rectus femoris. The criterion measure adopted for this study was measured by Neuro track Myoplus 2/4 channel. After a brief warm-up, and electrode placement, participants performed the instep kick. Descriptive statistics was used to analyze the data.
Results: Results of this study have shown that, mean value of Rectus femoris muscles (192.05) is higher than the Biceps femories muscles (189.00).
Conclusion: On the basis of result and finding it may be concluded that while Instep kicking in football Rectus femoris muscles was highly activates than the biceps femoris muscle because Rectus femories muscles is the main muscles for extension of the knee.

Keywords: EMG, biceps femories, rectus femories, football

Introduction

Electromyography (EMG) is a technique for evaluating and recording the electrical activity produced by skeletal muscles. EMG is performed using an instrument called an electromyograph, to produce a record called an electromyogram. An electromyograph detects the electrical potential generated by muscle cells. The signals can be analyzed to detect medical abnormalities, activation level, or recruitment order or to analyze the biomechanics of human or animal movement. (Wikipedia, the free encyclopedia)

The EMG signal provides a view of the electrical activity in the muscles during contraction. The electrical view is highly dependent on where the electrode is overlying the muscle of interest. Since electrode placement determines the electrical view of a muscle, then it is important in EMG measurement to be consistent in the placement of the electrodes for a subject over consecutive recording sessions and between different subjects.

The game of soccer is one of the most popular team sports worldwide. Soccer kick is the main offensive action during the game and the team with more kicks on target has better chances to score and win a game. For this reason, improvement of soccer instep kick technique is one of the most important aims of training programs in young players (Weineck, 1997).

The quadriceps femoris also called simply the quadriceps, quadriceps extensor, or quads, is a large muscle group that includes the four prevailing muscles on the front of the thigh. It is the great extensor muscle of the knee, forming a large fleshy mass which covers the front and sides of the femur. It is subdivided into four separate portions or 'heads', which have received distinctive names: Rectus femoris occupies the middle of the thigh, covering most of the other three quadriceps muscles.

The hamstring tendons make up the borders of the space behind the knee; the muscles are involved in knee flexion and hip extension. In quadrupeds, the hamstring is the single large tendon found behind the knee or comparable area. The three muscles of the posterior thigh (semitendinosus, semimembranosus, biceps femoris long & short head) flex (bend) the knee, while all but the short head of biceps femoris extend (straighten) the hip. The three 'true' hamstrings cross both the hip and the knee joint and are therefore involved in knee flexion and hip extension. Therefore, the aim of this study was to investigate EMG muscle activity of Biceps femoris muscles and Rectus femoris muscles during Instep kick in Football.

Methodology

Subjects: For the purpose of this study Eight male football player were selected. All the subjects selected were represented inter University/national level football tournament. The age of subjects ranged from 18-25 years. All the subjects were selected from Banaras District. EMG analysis of the subjects was evaluated for their Biceps femoris muscles and Rectus femoris muscles during Instep kick in Football.

Tools: For the reason of testing EMG Analysis in this study Neuro track Myoplus 2/4 channel instrument was used. The data was recorded in micro volt (µv).

Procedure: The data for the selected muscles were obtained with the help of the instrument Neuro track Myoplus 2/4,

operated by the investigator during the execution of instep kick. Before the actual testing, the subjects were given a complete demonstration of instep kick. After the demonstration and explanation, electrode points was marked in the presence of specialized persons and physiotherapist, and then subjects were allowed to take practice trials in order to get familiar with the test. The data was collected only for right leg instep kick from penalty spot at football ground (Amphitheater) of Banaras Hindu University, Varanasi. After making all entries of the subject pertaining to his profile on the software, the subject were performed the instep kick and their readings was recorded in microvolt (μv).

Analysis of data and Results of the study

The obtained data thus collected were statistically analyzed by employing descriptive statistics. The results are depicted with the help of table: 1

Table 1: Descriptive Statistics of Biceps Femoris and Rectus Femoris during Instep Kick

S. No.	Biceps femoris	Rectus femoris
N	8	8
Mean	189.0000	192.0500
Std. Error of Mean	14.02919	12.22369
Std. Deviation	39.68055	34.57381
Variance	1574.546	1195.349
Skewness	-.049	-.680
Std. Error of Skewness	.752	.752
Kurtosis	-.876	-.977
Std. Error of Kurtosis	1.481	1.481
Range	119.80	96.00
Minimum	128.90	134.60
Maximum	248.70	230.60

It is thus, evident from the table- 1 that, the mean value and standard deviation of Biceps femoris muscles and Rectus femoris muscles has been found 189.00 & 192.05 and 39.68 & 34.57 respectively and range of score was 119.80 & 96.00 respectively where as standard error was found 14.02 & 12.22 respectively.

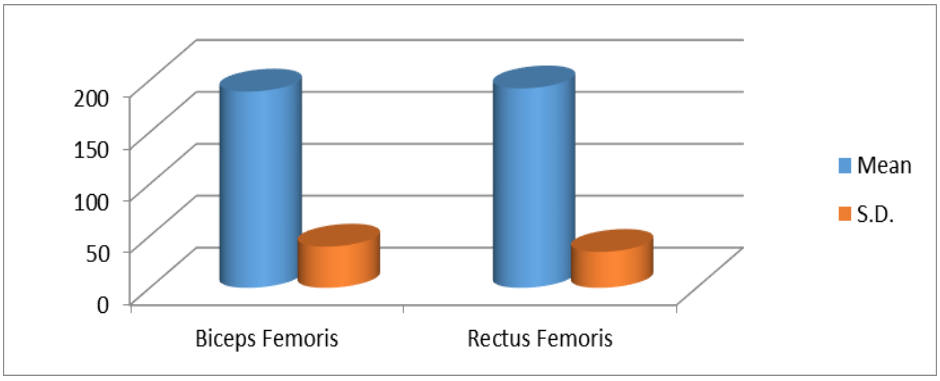

Fig 1: Graphical Representation of Mean Score of Biceps Femoris and Rectus Femoris during Instep kick

Discussion of findings

Results of this study have shown that, mean value of Rectus femoris muscles (192.05) is higher than the Biceps femories muscles (189.00). This means that the Rectus femories muscles plays important role in executing the instep kick. All four quadriceps are powerful extensors of the knee joint. They are crucial in walking, running, jumping and squatting. Because rectus femoris attaches to the ilium, it is also a flexor of the hip. This action is also crucial to walking or running as it swings the leg forward into the ensuing step. The instep drive uses the quadriceps muscles of the thigh to provide the most powerful kick available in the game, forcing the top of the foot (instep) to propel (drive) the soccer ball forward.

Conclusion

Rectus femoris muscles showed the highest contraction, it is the longest muscles of quadriceps and attached to the Vastus Lateralis muscles which help for the lower limb internal rotation and knee extension during kicking the ball. Biceps femoris muscles showed the lowest activation level. It attached to the Semimembranous muscles and helps the hip joint for extension and flexion for the knee, during instep kicking.

On the basis of result and finding it may be concluded that while Instep kicking in football Rectus femoris muscles was highly activates than the biceps femoris muscle because Rectus femories muscles is the main muscles for extension of the knee.

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