



Correlation Of Lower Limb Strength And Dominance In Contact Sports

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Abstract

Background: Contact sports is practiced world-wide. Leg dominance appears to have no effect on single-leg postural control in healthy people. Muscular strength plays important role in every game. **Objective:** This study has been undertaken to find out the correlation of lower limb strength and dominance in contact sports. It is important to know, whether dominance has any effect on strength of lower limb in contact sports. **Methodology:** This observational Study was conducted with 30 contact sports players at sports clubs in and around Pune. **Result:** Correlation with Right Hip flexor with $r=-0.2196$, with Right Hip Extensor with $r=-0.1337$ and with Right Knee Flexor with $r=0.1640$. **Conclusion:** In this study we concluded that there is no correlation between dominance and lower limb strength in contact sports.

Keywords: Contact sports, Lower limb, Strength, Dominance, Correlation.

Introduction

The term limited-contact sports include baseball, volleyball, and squash, and the term contact sport is used to refer to sports such as basketball, kabaddi, football, handball.¹ Sports practice has expanded worldwide. Injury rates have risen in tandem with increased physical activity, particularly among the young. For this reason, injury prevention and adequate rehabilitation have become topics of interest.² Sports participation leads to positive effects on children's and adolescents' health, education, and behaviors.³ Athletes in contact sports like basketball and soccer make touch with one other or inert objects on a regular basis, although with less force than in collision sports. Contact with other athletes or inanimate objects is rare or unintended in limited-contact sports like softball and squash.¹ However, it has been speculated that professional athletes who practice a sport that requires a constant preference of one leg during training or

competition (i.e., single-leg-dominant athletes) could develop significant asymmetry between their dominant and nondominant legs.² Leg dominance is a topic that is frequently debated among both healthy and injured sportsmen. Leg dominance appears to have no effect on knee open kinetic chain proprioception or single-leg postural control in healthy people.⁴ Athletes who practice professional or amateur sports with a perpetual dominance of one leg during training or competition (i.e., football) could develop significant asymmetry between dominant and non-dominant legs in terms of muscular strength and power.³ The sphygmomanometer, a tool used to commonly measure blood pressure, has been used as a cost-efficient alternative to provide objective strength values for the testing of lower limb muscles in players playing contact sports. The validity of assessing strength with the sphygmomanometer ranges from moderate to high intra-rater reliability (ICC = 0.61 to 0.92) and high inter-rater reliability (ICC = 0.77 to 0.91) and the reliability of assessing strength with the sphygmomanometer ranges from moderate to high intra-rater reliability (ICC = 0.61 to 0.92).⁵

Methodology

Ethical approval was taken from institutional ethical committee. Informed consent was taken from the participant. This observational Study was conducted with 30 contact sports players at sports clubs in and around Pune. Players involved in contact sports more than 1 year, aged between 18 to 25 years of age. Players who were having recent injuries, fractures underwent any single or unilateral leg surgery in past 3 years were excluded from study. The WFQ-R questionnaire was distributed to the participants and thoroughly explained, and it is a self-reported leg dominance. The WFQ-R was used in order to identify the participant's own experienced leg dominance. The participants were asked to complete the questionnaire first, before the tasks were performed, and they were unaware of the fact that some tasks, which were part of the questionnaire, had to be performed later.

Tests were performed on hospital beds of similar construction and mattress type. The patient was lying flat on the back, arms by the sides, thighs supported on a standard adjustable board so that the hip and knee are flexed at 45° and 90° respectively from the neutral position. The methods were explained to each patient and pretested on the opposite leg. For the cuff and sand bag methods, test procedures involved the following steps: (a) the valve was closed tightly then the system was inflated to 100 mm Hg to remove wrinkles in the bladder, (b) the pressure was reduced to a baseline of 20 mm Hg providing a measurement interval of 20-300 mm Hg, the valve closed tightly again to prevent leakage, (c) the cuff or bag was placed above the ankle longitudinally, immediately proximal to the line traced, (d) the scale was positioned within full view of the observer, (e) the observer raised the leg to a position of 30° of flexion at the knee, then asked the patient to hold that position and applied pressure gradually with the flat of the hand along the length of the cuff, the force recorded on the scale in mm Hg pressure was the maximum the patient was able to sustain without movement. The pressure applied by the observer was increased gradually, matched at each phase by the patient, reaching a peak at the count of 5 set, then held there for 2 more set at which time the scale was read. Maximal resistance was defined as the maximum effort the subject was able to sustain in the position without movement. To minimize the reading of their own grip, observers were instructed not to grip the cuff or bag, but to place the hand flat on the cuff. For the weight method, the patient assumed the

same position on the bed. The observer raised the leg to 30° of flexion at the knee and instructed the patient to hold that position while applying maximal manual pressure above the ankle, in order to estimate the maximum weight, the patient could hold. The estimated weight was then placed above the ankle, the leg raised to 30° of flexion, and the subject asked to hold the weight through his own effort for 3 sec. In order to reduce the confounding effects of fatigue, a maximum of three trials was allowed.

RESULTS

Muscle Group	Strength	Dominance	r value
Right Hip Flexor	134.81 ± 21.904	0.8 ± 0.2279	-0.2196
Right Hip Extensors	70.7407 ± 20.834	0.8 ± 0.2279	-0.1337
Right Knee Flexor	72.59 ± 13.89	0.8 ± 0.2279	0.1640
Right Knee Extensor	108.15 ± 23.29	0.8 ± 0.2279	0.1049
Right Ankle Plantar Flexor	87.59 ± 20.018	0.8 ± 0.2279	0.2509
Right Ankle dorsiflexor	80 ± 16.583	0.8 ± 0.2279	0.09415

DISCUSSION

The term contact sport is used to refer to sports such as basketball and handball, and the term limited-contact sport to sports like baseball, volleyball, and squash.¹

Sports participation has a positive impact on the health, education, and behaviour of children and adolescents.³ Athletes in contact sports like basketball and soccer make touch with one other or inert objects on a regular basis, although with less force than in collision sports.¹ According to one idea, professional athletes who participate in sports that require a consistent preference for one leg during training or competition (i.e. single-leg-dominant players) may acquire considerable asymmetry between their dominant and nondominant legs.³ The visit was arranged in sports club in and around Pune. The aim objective and method of study was explained to the participants. The participants were selected according to the inclusion and exclusion criteria. The W FQ-R questionnaire, which is a self-reported leg dominance, was delivered to the subjects and clearly explained. The WFQ-R was utilised to determine the participant's own leg dominance experience. Eight questions were added to this 12-item questionnaire based on other leg dominance tests previously described. The participants were instructed to complete the questionnaire first, before proceeding to the activities, and they were unaware that some of the questionnaire tasks would have to be completed afterwards.

The following approach was used to determine the strength of the lower limb muscles. (a) the valve was securely closed, then the system was inflated to 100mm Hg to remove creases in the bladder, (b) the pressure was decreased to a baseline of 20 mm Hg, providing a measuring interval of 20-300 mm Hg, and the valve was tightly closed again to avoid leaking. (c) the cuff or bag was placed longitudinally above the ankle, immediately proximal to the line traced, (d) the scale was put within full view of the observer, and (e) the observer lifted the leg to a position of 30° flexion at the knee, the patient was then requested to keep that position while gradually applying pressure along the length of the cuff with the flat of the hand; the force recorded on the scale in mm Hg pressure was the greatest the patient could endure without moving. The observer's pressure was steadily increased, matched at each stage by the patient, reaching a peak at the count of 5 set, then held there for 2 more set at which time the scale was read. In this way the data was collected and analysed.

From the total of 30 participants 56.67% of population was male and 43.33% population was female i.e., 17 participants were male and 13 were female. Out of 30 participants 10 subjects were under the age group of 18-20 years, 12 subjects were under the age of 20-23 and 8 subjects under were under the age of 23-25. Sport wise distribution of subjects in the study. Out of 30 participants 14 play football, 6 play handball, 5 play basketball and 5 play kabaddi. Subjects playing the sport since how long. Out of 30 participants 15 were playing between 0-5 years and 15 were playing between 5-10 years. Only one previous study found a link between self-reported leg dominance and observed limb dominance. According to Hart and Gabbard, in unilateral mobilizing (seated) tasks, 98 percent of right-footers and 84 percent of left-footers agreed on the favored leg.⁶

With $r = -0.2196$, the result reveals that there was no link between right-sided dominance and right hip flexor strength. With a $r=0.4360$, the result reveals that there was no link between left-handed dominance and right hip flexor strength. With $r=-0.3805$, the result reveals that there was no link between right-sided dominance and left hip flexor strength. With a $r= 0.4079$, the result reveals that there was no link between left-handed dominance and left hip flexor strength. With a $r= -0.1337$, the result reveals that there was no link between right-sided dominance and right hip extensor strength. There was no link between left-sided dominance and right hip extensor strength with r in the result. The result was such that there was no correlation between right sided dominance and strength of left hip extensor with $r= 0.03300$. With a $r= 0.7971$, result reveals that there was no link between left sided dominance and left hip extensor strength. Muscle strength is believed to be the most important predictor of function and plays an important part in a variety of daily tasks. Muscle weakness has also been linked to impairment. As a result, muscle strength is a significant outcome that is of great relevance in terms of overall health.⁷

With a $r=0.1640$, result reveals that there was no link between right-sided dominance and right knee flexor strength. With a $r=-0.3133$, the result reveals that there was no link between left-handed dominance and right knee flexor strength. With a $r=0.3189$, the result reveals that there was no link between right-sided dominance and left knee flexor strength. With a $r=-0.5322$ there was no correlation between left sided dominance and strength of the left knee flexor, with $r=0.05978$ there was no link between right-sided

dominance and right knee extensor strength. With a $r= 0.9207$ correlation, there was no link between left-sided dominance and right-side knee extensor strength. No correlation was seen between right sided dominance and strength of left knee extensor with $r= 0.1380$. There was no correlation between left sided dominance and strength of left knee extensor with $r= -0.9791$. To determine the most accurate question to ask for leg dominance based on the agreement between the self-reported leg dominance using the Waterloo Footedness Questionnaire-Revised (WFQ-R) questionnaire and the strength of lower limb can be assessed using the modified sphygmomanometer test (MST).⁸

No correlation was noted between right sided dominance and strength of right ankle plantar flexor with $r= 0.2509$. The result shows that there was no correlation between left sided dominance and strength of right ankle plantar flexor with $r= -0.3735$. There was no correlation between right sided dominance and strength of left ankle plantar flexor with $r= 0.2333$. According to the result it shows that there was no correlation between left sided dominance and strength of left ankle plantar flexor with $r= -0.3133$. The result shows that there was no correlation between right sided dominance and strength of right ankle dorsiflexor with $r= 0.09415$. There was no correlation between left sided dominance and strength of right ankle dorsiflexor with $r= 0.7462$. The result shows that there was no correlation between right sided dominance and strength of left ankle dorsiflexor with $r= 0.2770$. In one result it shows that there was no correlation between left sided dominance and strength of left ankle dorsiflexor with $r= -0.4671$.

In this study we concluded that there was no correlation of lower limb strength and dominance.

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