THE EFFECT OF SPINAL MANIPULATIVE THERAPY ON HOCKEY PLAYERS WITH LUMBO-SACRAL FACET JOINT DYSFUNCTION ON THE SPEED OF A HOCKEY BALL

ABSTRACT

Purpose: The aim of this study was to determine whether chiropractic spinal manipulation delivered to the lumbar spine (L/S) and/or sacroiliac joint (SIJ), would have an effect on the speed of a hockey ball when hit by a field hockey player. It is postulated that by increasing the lumbar spine and SIJ range of motion in hockey players experiencing dysfunction in either of these areas and therefore decreasing any pain, will allow field hockey players to increase the ball speed during a hockey hit. This would strongly suggest that by restoring the L/S and SIJ dysfunction through a chiropractic manipulation, chiropractic treatment could be a beneficial requirement to the game of field hockey.

Method: The participants for this study were recruited mainly from the University of Johannesburg (UJ) Hockey Club. The players at this institute are currently playing at club, provincial and national levels.

Thirty national, provincial or club participants, that met the selection criteria, were randomly allocated into two equal groups. Group 1: treatment group and Group 2: control group. Group 1 participants were motion palpated and the lumbar and/or sacroiliac restrictions were manipulated, while the Group 2 participants received no chiropractic treatment or manipulation. Consultations for both groups occurred over a two week period with the treatment group receiving two manipulations per week.

Procedure: The data was captured during all four consultations over the two week period. Readings were recorded before each consultation followed by motion palpation and manipulation or no treatment, depending on their respective groups. Data capturing consisted of two objective measurements: digital inclinometer measurements (degrees) of the lumbar spine range of motion and radar gun speed (km/h) readings taken once the hockey ball was hit.

Results: A majority of the data obtained in this study showed it was not statistically significant for either of the groups. From a clinical perspective there was a definite effect on the lumbar spine range of motion and unfortunately little effect was showed regarding the ball speed.

Conclusion: The final results obtained after the completion of the study indicated that chiropractic manipulation applied to a dysfunctional joint/s in the L/S or the SIJ did not have any effect on the speed of the hockey ball when hit by male or female hockey players. Thus, there was no correlation between the biomechanics of the L/S and SIJ alone and the speed at which a hockey ball gets hit.

Key Words:
Chiropractic manipulation
Field hockey players
Lumbar spine
Sacroiliac joint
Digital inclinometer
Radar speed gun

INTRODUCTION

Field hockey is becoming an increasingly popular sport amongst men, women and children worldwide. A two-handed swinging motion is used during a field hockey hit to produce high ball velocity making it an effective selection for long distance passing or for shooting at goal (Willmott and Dapena, 2012). The maximum possible speed needs to be produced, at the end of the distal kinematic chain, during a field hockey hit. The effectiveness of the latter is dependent on the movement of each involved body segment in relation to the next proximal segment (Zatsiorsky, 2000).

Little research, if at all, has been done on the effects of increased lumbar spine (L/S) and sacroiliac joint (SIJ) range of motion (ROM) on the speed of a hockey ball. Gorman (2012), suggested that the momentum is transferred from the front foot to the back foot and then back to the front foot again while accompanied by the rotation of the hips and shoulders at the end of the backswing phase. According to Willmott and Dapena (2012), the planar stick face motion of a field hockey hit, consisting of a curved backwards then downwards motion followed by a forward swing in a single oblique plane, appears to be similar to that of the planar club head motion in golf and therefore the biomechanics involved will be similar. During the downswing most of the speed is added to the stick face (Willmott and Dapena, 2012).

Earlier rotation of the hips in a backwards direction towards the target line promotes the stretch-shortening cycle (SSC) activity of the muscles involved and therefore allows the ball to be hit over greater distances (Gorman, 2012). Most of the power produced in a hockey hit is derived from the lower limb,

trunk and upper limb rotations respectively (Zatsiorsky, 2000), but according to Tsai (2005), any rotation or bending movement in the trunk will lead to rotation and bending in the L/S.

In the study completed by Rebelo, Pyper and Hollinshead (2010), it stated that biomechanical stresses can be transferred among a kinematic chain and are linked in function and dysfunction. The L/S and SIJ are subjected to large forces due to their location in the body and are therefore more prone to injury and dysfunction. The SIJ, lumbo-sacral joint, pubic symphysis and hip joints are all linked and connected (Moore, Dalley and Agur, 2010) and therefore any abnormality or dysfunction in one unit will lead to a compensatory reaction in another unit, sometimes in a painful manner (Rebelo, Pyper and Hollinshead, 2010).

MATERIALS AND METHODS

Selection Criteria: The thirty participants were randomly allocated into two equal group. Group 1: treatment group and Group 2: control group.

Methodology: The researcher measured the L/S ROM in degrees using a digital inclinometer. The individuals in both groups were then asked to hit a hockey ball in order to determine an average ball speed (km/h) using a radar speed gun. Group 1 participants were then motion palpated and the lumbar and/or sacroiliac restrictions were manipulated, while the Group 2 participants received no chiropractic treatment or manipulation.

RESULTS

Thirty participants, fifteen in the treatment group (Group 1) and fifteen in the control group (Group 2), took part in the study.

Intra-group analysis of the ball speed

The non-parametric, Friedmann test, was used. The comparison revealed p-values above the level of significance for both the study group and the control group. The non-parametric, Wilcoxon signed rank test, was not conducted as both the study and control groups had high p-values.

Inter-group analysis of the ball speed

The non-parametric, Mann-Whitney U test, was conducted in order to compare the study group treatments with the treatments in the control group. Both the study and control group showed a decrease over the course of the four consultations.

Intra-group analysis of the L/S ROM

Flexion

The non-parametric, Friedmann test, was used. The comparison revealed a p-value above the level of significance for the study group and a significant p-value for the control group. The Wilcoxon signed rank test was conducted to the control group to determine whether the p-value readings obtained from the Friedmann test was precise enough.

Extension

The non-parametric, Friedmann test, was used. The comparison revealed an insignificant p-value for the control group and a significant p-value for the study group. The Wilcoxon signed rank test was conducted to the study group to determine whether the p-value readings obtained from the Friedmann test was precise enough.

Right rotation

The non-parametric, Friedmann test, was used. The comparison revealed a p-value above the level of significance for the control group and a significant p-value for the study group. The Wilcoxon signed rank test was conducted to the study group to determine whether the p-value readings obtained from the Friedmann test was precise enough.

Left rotation

The non-parametric, Friedmann test, was used. The comparison revealed insignificant p-values for both the study group and the control group. The Wilcoxon signed rank test was not conducted to neither the study nor the control group.

Right lateral flexion

The non-parametric, Friedmann test, was used. The comparison revealed a p-value above the level of significance for the study group and a significant p-value for the control group. The Wilcoxon signed rank test was conducted to the control group to determine whether the p-value readings obtained from the Friedmann test was precise enough.

Left lateral flexion

The non-parametric, Friedmann test, was used. The comparison revealed an insignificant p-value for the study group and a significant p-value for the control group. The Wilcoxon signed rank test was conducted to the control group to determine whether the p-value readings obtained from the Friedmann test was precise enough.

Inter-group analysis of the L/S ROM

L/S Flexion

The non-parametric, Mann-Whitney U test, was conducted in order to compare the study group treatments with the treatments in the control group. Both the study and control group showed an increase over the course of the four consultations.

L/S Extension

The non-parametric, Mann-Whitney U test, was conducted in order to compare the study group treatments with the treatments in the control group. Both the study and control group showed an increase over the course of the four consultations.

L/S right rotation

The non-parametric, Mann-Whitney U test, was conducted in order to compare the study group treatments with the treatments in the control group. Both the study and control group showed an increase over the course of the four consultations.

L/S left rotation

The non-parametric, Mann-Whitney U test, was conducted in order to compare the study group treatments with the treatments in the control group. Both the study and control group showed an increase over the course of the four consultations.

L/S right lateral flexion

The non-parametric, Mann-Whitney U test, was conducted in order to compare the study group treatments with the treatments in the control group. The study group showed a decrease while the control group showed an increase over the course of the four consultations.

L/S left lateral flexion

The non-parametric, Mann-Whitney U test, was conducted in order to compare the study group treatments with the treatments in the control group. The study group showed a decrease while the control group showed an increase over the course of the four consultations.

DISCUSSION

Clinical Analysis

Ball speed

The mean values of ball speed showed that the study group had a decrease over the course of the four consultations. It can be assumed that there had to be a different reason for the drop in ball speed, as the dysfunctional joints were corrected using chiropractic manipulations. The control group had only minor changes with an overall decrease over the four consultations. This showed that the control group, not receiving any chiropractic manipulation implying that the affected joints had become slightly worse over time.

Lumbar range of motion

The study group had mostly increased values (percentages), except for both left and right lateral flexion which decreased over time. The control group also mostly had an increase in the L/S ROM values with the exception of L/S extension.

Statistical Analysis

Ball speed

The Friedmann test used to analyse the ball speed mean values, produced no statistical changes for neither the study nor the control group. As a result of no significance (high p-values), the Wilcoxon signed by ranks test was not conducted for either of the groups. According to the Mann-Whitney U test, there was no statistical significant difference between the compared study and control groups.

Lumbar range of motion

The Mann-Whitney U test applied for group comparisons to the L/S ROM mean values only produced five statistical significant p-values. Through the application of the Friedmann analysis test it revealed that only three control group L/S ROM and two study group L/S ROM showed statistical significant improvement over the course of the study. The Wilcoxon signed ranks test was used for a more strict analysis on these statistical significant findings.

CONCLUSION

The aim of the study was to determine whether restoring or increasing the ROM of a dysfunctional joint/s in the L/S and/or pelvis (SIJ) would have a resultant effect on the ball speed when hit by a field hockey player.

The final results obtained after the completion of the study indicated that chiropractic manipulation applied to a dysfunctional joint/s in the L/S and/or the SIJ did not have any effect on the speed of the hockey ball when hit by male or female hockey players. Thus, there is no correlation between the biomechanics of the L/S and SIJ alone and the speed at which a hockey ball gets hit.

This study does not completely support that chiropractic manipulative therapy of dysfunctional joints in the L/S and pelvis (SIJ) would have an influence in the ball speed when hit by a field hockey player.

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