

Effectiveness of Nordic Exercises in Subjects with Hamstring Strain

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Abstract

Background: Hamstring strains are the most prevalent muscle injuries reported in sport with a prevalence rate between 6% and 29% of all injuries reported. The symptoms of hamstring strains include pain, swelling, tenderness, bruising in the back of the thigh. There is an inadequacy of studies to support the efficacy of Nordic Exercise for hamstring strain.

Purpose: To determine the effectiveness of Nordic exercise among subjects with hamstring strain.

Materials and Methods: A Convenient sample of 80 subjects with hamstring strain were sorted out by the selection criteria and were randomly assigned into Nordic group and control group. The Nordic group was treated with Nordic exercises, while the Control group was treated with stretching and strengthening exercises on an odd-even randomization. The pre-test and post-test were obtained through "Functional assessment scale for acute hamstring injuries" (FASH).The entire study process was conducted from November 2022 to March 2023.

Result: The study revealed that the Nordic exercise group showed reduction in hamstring strain and FASH score than the conventional group. The mean pre-test value for Nordic group was 57.00 and post-test value was 11.73, while the mean pre-test value for Control group was 52.61 and post-test value was 7.40. As a result, both groups have a significant increase in FASH.

Conclusion: The study concluded that the Nordic exercises are more effective when compared to stretching and strengthening exercises for reduction of hamstring strain and increased functional activities.

Key Words: Hamstring strain, muscle injury, eccentric training and FASH.

Introduction

The most habitual muscle pathology in sports is the hamstring strains. According to epidemiology studies, around 6% to 29% among injuries disclosed were found to be hamstring-related.^{1,2}The prevalence of hamstring strains and re-injuries has not seen to be reduced over the past three decades. Within a few

weeks of the injury, most of the athletic population are able to return to sport. Rehabilitation professionals must be knowledgeable with the causative factor and processes of hamstring injuries in order to execute a complete functional assessment and proceed weight bearing to the injured area in a safe and efficient manner. According to recent research, there are two types of hamstring strains; as first occurs during

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high-intensity activities while the other occurs during stretching exercises performed at their maximum range of motion.³ In addition to the higher frequency of injuries, the protracted length of clinical features, inadequate relieving outcomes, and a significant risk of recurrent injury prevalence of 12-31% all contribute to aggravation with hamstring strains.³⁻⁴ The main functions of the hamstrings are knee flexion and lengthen the hip. It is frequently assumed that the factor contributing to hamstring's propensity for strain is that it is biarticular in development, crossing over two joints and being stretched at many points.⁵⁻¹⁰ Breakdown of the muscle-tendon junction, which typically takes place at the anterior musculotendinous junction, characterizes a muscular strain injury typically, when the muscle is stretched or passively lengthened.¹¹⁻¹⁴ Schache et al. in his research studied the bio-mechanical measures for the pre- and post-sprinting-related hamstring injury utilizing movement and ground reaction force data which revealed that, asymmetries exist prior injury and the biomechanical changes that occur due to the injury leg, when the damage most likely occur prior to the foot strike during a sprinting movement that results in an eccentric muscle action where the "biceps femoris" stretched over the hip and knee.¹⁵ It has been demonstrated that the Nordic hamstring exercises (NHE), also known as Nordic curl, is a useful tool for increasing eccentric hamstring strength. Adopting the NHE in routine training decreased the incidence rates of hamstring injuries by 65% to 70%, with a notably preventative effect on minimizing recurrent injuries, according to previous research on male professional soccer players. The exercise attempts to stop falling forward while kneeling which indirectly causes rise in the eccentric torque output of hamstring muscle during the eccentric phase, according to a preliminary finding by a team of researchers from the Oslo Sports Trauma Research Centre (OSTRC).¹⁷ Most of the time, the hamstrings are engaged throughout its late swing phase or the beginning of stance phase. The risk of hamstring strain is highest throughout the late swing or late stance stages of a sprint because those times are when the hamstring muscles flex eccentrically to limit knee and hip extension. Risk of future strain injuries might be due to hamstring weakness, hence strengthening exercises, particularly eccentric knee movements, should be used.¹⁶⁻²⁰ According to Yu et

al., the musculo-tendinous junction throughout the terminal stance phase and the muscle's belly through the late swing phase maybe they are the most prone locations for hamstring strain.²¹⁻²³ Having enough flexibility is a crucial component of physical fitness. Many athletic teams focus on improving or maintaining flexibility, primarily via the use of different stretching. Numerous investigations, notably all of those examined in this work, have demonstrated at least a brief improvement in range of motion and increasing flexibility when hamstrings are stretched.^{24,25} Thus, an attempt is made in this study to determine the effect of Nordic exercises on hamstring strain.

Aim

To evaluate the effect of Nordic exercise among subjects with hamstring strain.

Material and Method

A Convenient sample of 80 subjects with hamstring strain were selected from Prism Health Care and were sorted-out by the selection criteria and were randomly assigned into the Nordic group and control group. The Nordic group treated with Nordic exercises, while the Control group treated with stretching and strengthening exercises on an odd-even randomization. The study conducted for eight weeks, the pre-test and post-test values were obtained through "Functional assessment for acute hamstring injuries" (FASH). Study period : November 2022 to March 2023.

Inclusion Criteria

- Male and Female players.
- Age between 21 and 35 years.
- Being an active player of any sport.
- No Previous injury of the hamstring at least for 6 months.

Exclusion Criteria

- Recurrent episodes of strain.
- Recent H/O hamstring strain or last 6 months.
- H/O knee injuries, surgeries, hip and back pain.
- Musculoskeletal, respiratory or cardiovascular conditions.

- Uses of nutritional supplements steroids.
- Physical therapy treatment for strain.

Outcome Measures

Assessment was performed at before and after the treatment.

- Functional assessment for acute hamstring injuries (FASH).

Procedure

Subjects who were willing to take part in the study were sort-out based on the selection criteria and informed consent was obtained after explaining about the process of study and the safety of the procedure. A total of 80 subjects were recruited and using the odd even ratio were divided into Nordic Hamstring Exercise (NHE) group (n=40) treated with Nordic exercises and Control group (n=40) treated with Strengthening and Stretching exercises for the Hamstring. The pre-test value was measured using the FASH and the same was recorded as post-test after eight weeks of intervention.

Nordic Hamstring Exercises Group:

Subjects in this group were instructed to follow the Nordic Exercises along with Stretching exercises. The session started with 5 mins of warm-up and 5 mins of cool down phase.

Procedure: The subject was asked to kneel on both knees with pad below and secure the ankles with Nord stick and instruct them to tighten the hamstrings, glutes and abs to hold up the position. Keep your back straight and slowly lean forward till you reach the floor at the same time squeeze your hamstrings and glutes hard to maximize contraction per repetition.

Treatment Protocol:

No of Sets: 3

No of Repetitions: 10

Rest period: 10 seconds

Sessions: 3 sessions per week for 8 weeks.

Stretching and Strengthening Exercises Group:

Subjects in this group were instructed to follow the Strengthening and Stretching exercises for the

Hamstring. The session started with 5 mins of warm-up and 5 mins of cool down phase.

Stretching Exercises:

1. Sitting Hamstring Stretch:

Procedure: Subjects instructed to sit on the floor in long sitting with one leg bent at knee and foot facing inward and extend the stretchable leg and bent forward at the waist. Instruct the subjects to bend forward and touch the toe to feel a stretch.

2. Standing Hamstring Stretch:

Procedure: The subjects received instructions in accordance. They were instructed to stand straight with their backs straight, put one leg in front of them with the foot flexed and the heel pushed into the ground, then ask them to lean forward and lay their hands on the straight leg.

Treatment Protocol:

No of Sets:3

No of Repetitions:10

Hold period:30 seconds

Rest period:10 seconds

Sessions:5 sessions per week for 8 weeks.

Strengthening Exercises:

1. Romanian Deadlift:

Procedure: The subjects were instructed to stand with their feet hip-width apart, knees slightly bent, and arms at their sides while maintaining a flat back and holding the barbell in both the hand. They were then instructed to slightly drop the weight along their shins, squeeze their butt while keeping the weight near to your shin.

2. Weighted Glute Bridge:

Procedure: The subjects were instructed to lie on their back with their knees bent, holding a dumbbell in each hand, rest it under their hip, and contract their glutes and abs while naturally pushing through their heels and lifting their hip.

3. Sumo Squat:

Procedure: The subject was instructed to stand with their feet wider and their toes pointed slightly outward. They were then instructed to grip a weight with both hands, and instruct them to perform squatting.

Treatment Protocol:

No of Sets:3.

No of Repetitions:10.

Hold period:30 seconds.

Rest period:10 seconds.

Sessions:5 sessions per week for 8 weeks.

Data Analysis

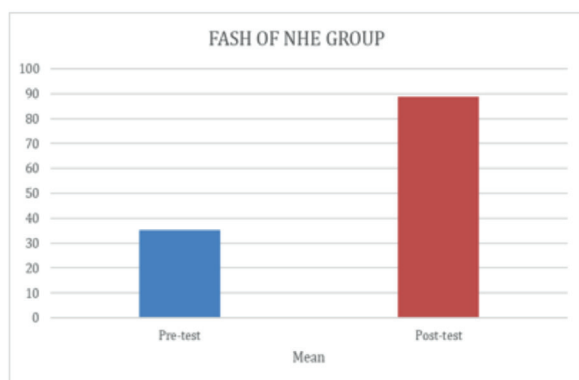


Fig-1 Pre and Post-test values of NHE for FASH

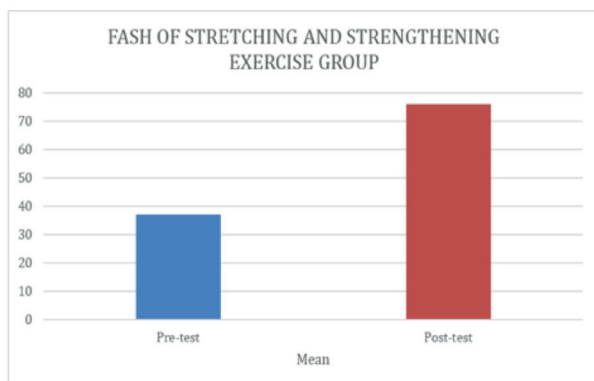


Fig-2 Pre and Post-test values of Stretching and Strengthening exercise group for FASH

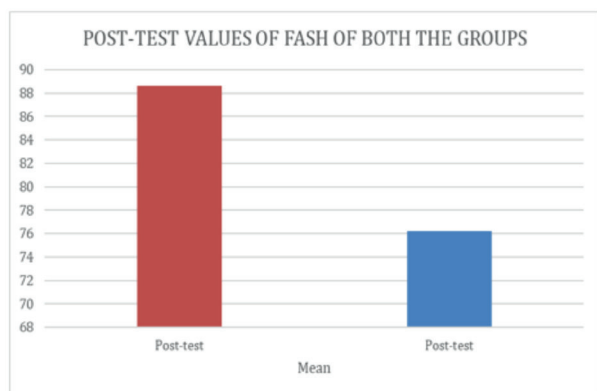


Fig-3 Comparison between the post-test values of both the groups for FASH

Result

Statistical analysis made with quantitative data indicated statistically significant differences in the values of NHE and Control group. The statistical analysis of both the groups, post-test values (mean \pm SD) for FASH 88.60 ± 8.76 and 76.18 ± 11.84 respectively with t-value of 12.42 and the p-value was less than 0.0001 were considered statistically significant.

Discussion

By describing the incidence of acute hamstring injuries in various sports and the general population, as well as the challenges associated with returning to sports without suffering performance-related setbacks and a high risk of recurrence of injuries, this study aims to highlight the scale and extent of the problem. Because hamstring injuries are most common among athletes and the general public.²⁵ Male athletes are more likely than female athletes to experience hamstring strain, according to several studies.²⁶ Acute hamstring strains have been discovered to occur more frequently in field sports than in court sports, during competitions as opposed to practices, and during the preseason as opposed to the regular season and post season.²⁷ Exercise improves various factors of our body like cardiorespiratory fitness, mental health and helps in maintaining the level of various diseases like type-2 diabetes and many more. Exercise plays a major role in our daily living.²⁸ This study mainly focuses on the effectiveness of Nordic exercises versus stretching and strengthening exercises. According to Decoster LC et al (2005), only 21.4% (6/28) of the studies had a methodological quality score between 6 and 8, indicating a generally poor level of quality. Therefore, it was challenging to definitively name the top hamstring stretching technique. Instead, it appears there is support evidence in a variety of stretching methods, positions, and durations that increase range of motion in the hamstrings.²³ According to Guex K et al (2013), preventing hamstring strain injuries requires more than just strength and contractions, or a combination of both the activity.²² This study shows more effectiveness with Nordic exercises based on statistical values than strengthening and stretching exercises. Although both the groups show almost the same result and values.

Conclusion

According to the findings, the Nordic exercises were more effective than stretching and strengthening exercises. It was concluded that Nordic exercise had a substantial clinical and statistical effect rather than using electrical modalities on treating Hamstring strain. As a result, it is suggested that this procedure be used in clinical practice to reduce hamstring strain.

Ethical Clearance: The ISRB committee of a private hospital and institution in Chennai has provided its clearance for the conduct of human research that complies with all applicable national laws, institutional regulations. (Application Number- 03/067/ 2022/ ISRB/ SR/ SCPT).

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Conflict of Interest: Nil.

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