



A STUDY ON EFFECTIVENESS OF CONVENTIONAL FOOT EXERCISES AND GLUTEAL STRENGTHENING EXERCISES ON FLEXIBLE FLAT FOOT IN REDUCING PAIN AND NAVICULAR DROP IN STUDENTS OF AGE GROUP 18 TO 25 YEARS- COMPARATIVE STUDY

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ABSTRACT **Objective-** To compare the effectiveness of conventional flat foot exercises and gluteal muscle strengthening exercises on flat foot in reducing navicular drop and pain **Method-** A total of 60 participants were taken and divided into two groups of 30 participants , group A was given Conventional flat foot exercises and Group B was given Gluteal muscle strengthening exercises for 4 week . Outcome measures- Navicular drop test and Numerical pain rating scale. Result- Statistical analysis were done using paired t-test and unpaired t-test. The post intervention value obtained by performing unpaired t-test showed that pain and navicular drop was comparatively more reduced in Group A than in Group B. **Conclusion-** From the study it was concluded that, Foot intrinsic muscle strengthening technique is more effective in reducing pain and navicular drop in individuals with flexible flat foot as compared to Gluteal muscle strengthening techniques.

KEYWORDS : flat foot, conventional flat foot exercises, gluteal muscle strengthening, navicular drop, pain

INTRODUCTION

The foot has mainly two major arches a) Longitudinal arch b) Transverse arch, there are two longitudinal arch a) Medial longitudinal arch b) Lateral longitudinal arch. In flat foot the medial longitudinal arch becomes low. Flat foot is one of the common concerns as it can alter the biomechanics of the foot.^[1]

Flat foot are mainly of two types a) Spastic flat foot b) Flexible flat foot. In spastic flat foot the MLA is low even on non weight bearing , whereas, in flexible flat foot the MLA is only flattened during weight bearing.

Conventional Foot Exercises:

It consists of intrinsic muscle strengthening, these muscles are present at the bottom of the foot and are very crucial to stabilize the foot joints , thus weak intrinsic muscle can lead to lower arch. Intrinsic muscle strengthening includes toe curls , heel raises and short foot exercises.^[7]

Gluteal Muscle Strengthening:

The gluteal muscles includes; a) Gluteus maximus b) Gluteus Minimus c) Gluteus Medius, these muscles helps to stabilize the hip joint and prevents the excess adduction and internal rotation of the thigh and maintaining the leg alignment which impacts the kinetic chain and prevents flat foot.^{[9][10]}

MATERIALS AND METHODOLOGY

The study included 60 participants (male and female both) with flexible flat foot of age group 18-25 years.

Study Design- Comparative study
Study Duration- 6 Months
Treatment Duration- 4 Weeks
Sampling Technique- Convenient

Inclusion Criteria

- 1) Students between the age of 18-25 with flexible flat foot.
- 2) Both male and females
- 3) BMI from 18.5-29..
- 4) Unilateral flat foot
- 5) Navicular drop > 10mm

Exclusion Criteria

- 1) Rigid flat foot
- 2) Any ankle ligament injury
- 3) Any congenital foot condition
- 4) Recent foot fracture
- 5) Recent foot and ankle surgery.

Exercise Protocol

Group A consists of students of age 18-25 were given Gluteal strengthening protocol included Clamshell 10 secs hold , 10 reps , 2 sets Side lying hip abduction 10 sec hold , 10 reps 2sets Single limb

squats no hold , 5 reps , 2 sets Quadrupe exercise no holds, 10 reps , 2 sets Group B consists of students of age 18 to 25 with flexible flat foot were given foot intrinsic muscle protocol which included Short foot exercise 10 sec hold, 10 reps, 2 sets Heel raise 10 sec hold, 15reps , 2 sets Toe curl no hold , 10 reps , 2 sets.

Outcome Measures

1) Navicular drop test

In navicular drop test the height of the navicular tuberosity is measured in sitting and stance position and the difference of excursion i.e the distance between the floor and the navicular tuberosity between the two readings

2) Numerical pain rating scale

NPRS is used for pain assessment. The subject is asked to rate his pain from 0 -10, where 0 is no pain and 10 is severe pain.

Data Analysis;

Paired t test was used to analysis pre- post difference within the group and Unpaired t test was used to analysis post- post difference between the 2 group.

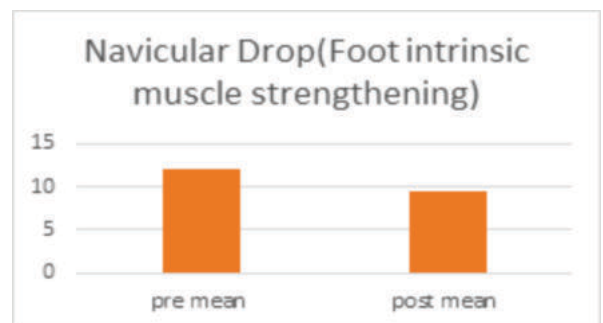


Fig1. Pre and post mean navicular drop for foot intrinsic muscle strengthening

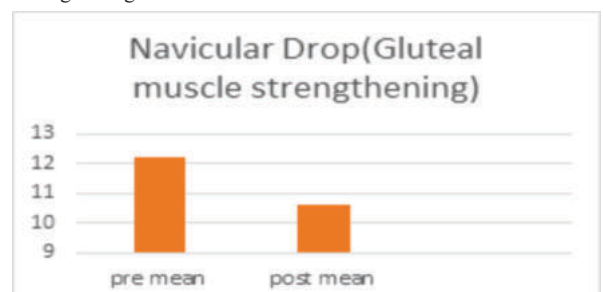


Fig2. Pre and post mean navicular drop for gluteal muscle strengthening

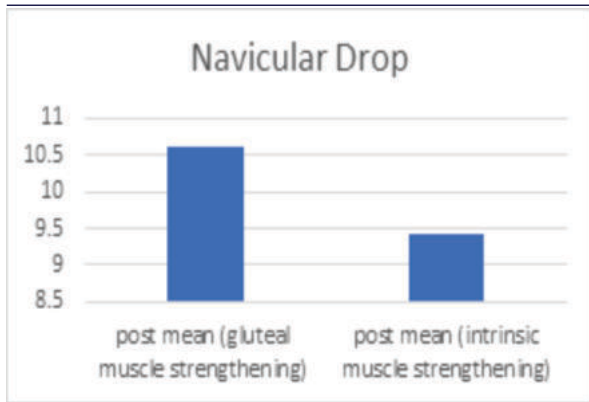


Fig3. Post and post mean navicular drop after gluteal muscle strengthening and foot intrinsic muscle strengthening respectively

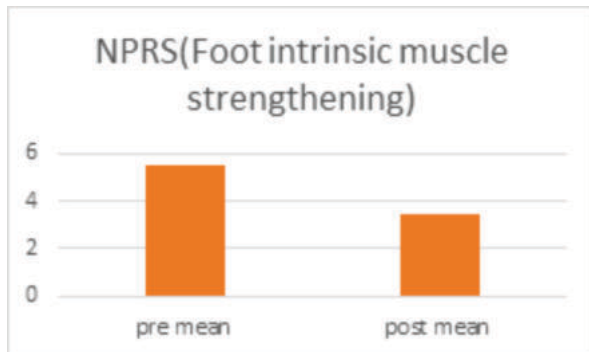


Fig4. Pre and post mean NPRS for foot intrinsic muscle strengthening

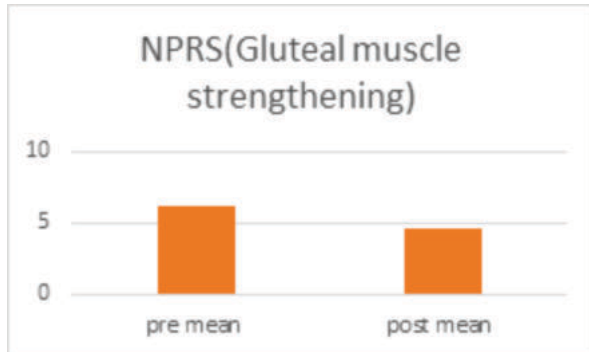


Fig5. Pre and post mean NPRS for gluteal muscle strengthening

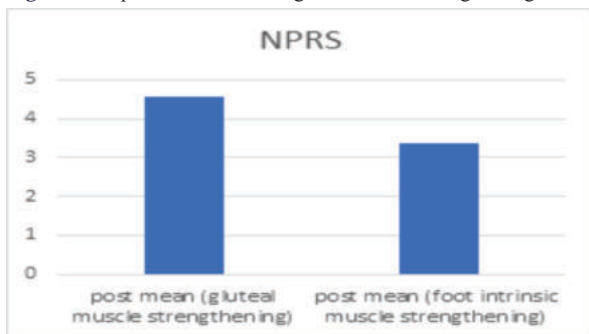


Fig6. Post and post mean NPRS after gluteal muscle strengthening and foot intrinsic muscle strengthening respectively.

RESULTS

The result for navicular drop obtained by gluteal strengthening technique were, 'p' value obtained was less than 0.0001 and the t value obtained was 9.1750 this suggests that there is extremely statistical significant effect of Gluteal Strengthening Protocol.

The result for navicular drop obtained Foot Intrinsic Strengthening technique were, 'p' value obtained was less than 0.0001 and the t value obtained was 13.52 this suggests that there is extremely statistical

significant effect of Foot Intrinsic Strengthening Protocol.

The result for Numerical Pain Rating Scale obtained by gluteal strengthening technique were, 'p' value obtained was less than 0.0001 and the t value obtained was 10.82 this suggests that there is extremely statistical significant effect of Gluteal Strengthening Protocol.

The result for Numerical Pain Rating Scale obtained Foot Intrinsic Strengthening technique were, 'p' value obtained was less than 0.0001 and the t value obtained was 10.47 this suggests that there is extremely statistical significant effect of Foot Intrinsic Strengthening Protocol.

DISCUSSION

The major purpose of this study was to compare the effectiveness of gluteal strengthening exercises and foot intrinsic muscle strengthening in flexible flat foot.

Flat foot is one of the most common musculoskeletal condition of the foot, it is a condition in which the medial longitudinal arch becomes chronically and abnormally low which results in pain and navicular drop. This study focused on checking the effects of gluteal muscle strengthening technique and foot intrinsic muscle strengthening technique in decreasing pain and navicular drop of subjects with flexible flat feet.

It was a study where 60 samples were chosen according to the inclusion and exclusion criteria. The collected data was analysed as there were 2 groups, with the group paired t test was done and pre and post values were compared. To compare post values of both groups unpaired t test was done.

In the present study it has been proven that gluteal muscle strengthening has a significant effect in reducing pain and navicular drop, which is well supported by a previous study of pooja mulchandani, trupti warude, amrutkuvar pawar, effectiveness of gluteal muscle strengthening on flat foot concludes that there is a significant effect of gluteal muscle strengthening on the flat foot.

In the present study it has also been proven that foot intrinsic strengthening has a significant effect in reducing navicular drop and pain this result is well supported by a study carried out by Unver B, Erdem EU, Akbas E. Effects of Short-Foot Exercises on Foot Posture, Pain, Disability, and Plantar Pressure in Pes Planus. J Sport Rehabil. This study concluded that Six-week short-foot exercises provided a reduction in navicular drop, foot pronation, foot pain, and disability and increment in plantar force of medial midfoot in pes planus.

Headlee DL, Leonard JL, Hart JM, Ingersoll CD, Hertel J. Fatigue of the plantar intrinsic foot muscles increases navicular drop has stated that The intrinsic foot muscles play a role in support of the medial longitudinal arch in static stance. Disrupting the function of these muscles through fatigue resulted in an increase in pronation as assessed by navicular drop.

McKeon PO, Hertel J, Bramble D, Davis I. The foot core system: a new paradigm for understanding intrinsic foot muscle function stated that The foot is 'shortened' by using the intrinsic muscles to pull the first metatarsophalangeal joint towards the calcaneus as the medial longitudinal arch is elevated. As the arch raises during this exercise.

CONCLUSION

This study concludes that Foot intrinsic strengthening exercises will be more effective than gluteal muscle strengthening exercises in reducing pain and navicular drop in individual with flexible flat foot.

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