



EFFECT OF STRETCHING EXERCISE ON GASTROCNEMIUS MUSCLES IN LOW BACK PAIN

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ABSTRACT

Background: The gastrocnemius muscle is essential for walking and maintaining a straight posture. The gastrocnemius is a large muscle that covers the bulk of the lower thigh's posterior region. Symptoms of low back pain may be described in several ways, depending on the underlying condition. An official definition of a low back injury is "pain and discomfort below the lumbar spine's costal margin and above the gluteal folds, with or without leg pain." The study's primary goal is to determine if stretching exercises for low back pain affect the gastrocnemius muscles.

Materials & Methods: The sample size was 102 individuals, however 16 are excluded due to exclusion rules, leaving 86 individuals in the final sample. The research recruited 86 people who meet the inclusion and exclusion criteria. Two groups are designated as GROUP A and GROUP B. The participant gives consent to participate in the research. For all groups, baseline data on the lower back will be gathered using the Oswestry low back pain disability questionnaire with VAS. GROUP A was to stretch the gastrocnemius muscles passively for 5- 8 minutes five days a week for four weeks. GROUP B was stretched normally with Gastrocnemius stretching for 5-8 minutes five days a week for four weeks. Both groups will use the Oswestry Low Back Pain Disability Questionnaire to obtain post-test data. SPSS 27 will be used to compare pre-and post-test data from both groups and to compare the effect differences between Group A and Group B.

Results: The results are very clear and show that there are significant differences between the scores of Pre and Post data of Gastrocnemius Muscles Passive Stretching as well as of Gastrocnemius Muscles Normal Active Stretching. For Gastrocnemius Muscles Passive Stretching Pre scores of Oswestry Low Back Pain, Disability Questionnaire was $41.10 \pm 4.199 > 18.40 \pm 8.506$ post scores. For Gastrocnemius Muscles Normal Active Stretching Pre scores was $43.02 \pm 5.298 > 21.40 \pm 8.506$ post score. Vas score of Group A was pre $(8.38 \pm 0.868) > post (4.95 \pm 1.616)$. Vas score of Group B was pre $(6.87 \pm 1.865) > post (4.87 \pm 1.987)$. As the data shows there were significant effects in both of the Groups for Lower back pain and there was a higher effect in Group A (Gastrocnemius Muscles Passive Stretching)

Conclusion: From the study, we can conclude that there is a significant effect of Gastrocnemius stretching on the lower back pain and the passive Gastrocnemius stretching has a higher effect on lower back pain as compared with the active Gastrocnemius stretching.

DOI: 10.31838/ecb/2023.12.5.4202023.06/06/2023

INTRODUCTION

The gastrocnemius muscle, which helps us walk and keep an upright posture, is a vital part of our bodies(1). The gastrocnemius is a large muscle that forms the majority of the lower thigh's rear. There are two heads to this muscle that goes from the back of the knee to the heel. (2) The gastrocnemius' medial and lateral heads, located at the back of the lower leg's upper half, are one of the calve's most distinctive characteristics. The soleus and plantaris muscles are combined to form the triceps surae muscle. The popliteal muscle's two heads define the popliteal fossa's lower margins. The gastrocnemius muscle is located on the underside of your thigh and may be seen and felt. The Femur adductor tubercle is located behind the medial supracondylar ridge, which houses the medial head, on the popliteal surface. As the most distal section of the femur's head, it is located above the lateral epicondyle and posterior to it on the outside side of the lateral condyle. The fabella is most often seen near the lateral head of the gastrocnemius. At both ends of its head, the oblique popliteal ligament joins to the joint capsule of the knee. To form a single long membranous tendon, the heads of the gastrocnemius muscle unite with the rest of the muscle. The supra tendon consists of the soleus tendon and the tendon calcaneus, which constitute the top portion of the tendon. This long tendon shrinks dramatically in diameter as it approaches the calcaneus. The tibial nerve supplies both heads of the gastrocnemius S1 and S2. There are three major nerves supplying the skin: L4, 5, and S2.(3).

As it reaches the posterior surface of the calcaneus, it expands in size once again. The soleus and gastrocnemius are the major plantar flexors of the ankle joint, and they are responsible for a variety of functions. Another benefit of this muscle is its strength as a knee flexor. When the knee is bent, the gastrocnemius, for example, is unable to create as much force at the ankle as it would normally be able to do. There's no evidence that ankle flexion has any effect on this. To go forward, you need the gastrocnemius muscle to push yourself. The triceps surae may create a substantial amount of force when compared to the amount of force needed to push the body into the air(4). As the gastrocnemius muscle contracts, tension is transferred to the foot, knee, hip, and lower back via the fascia of the leg. If the physiological movements of the gastrocnemius muscle are hampered by a shortened gastrocnemius muscle, the hip's anteversion may be diminished (inward rotation of the femur)(5). The transmission of force produced by the contractile component of the muscle is facilitated by the presence of fascia in the muscle. Back

discomfort is the sixth most common reason for a visit to the doctor in the United States. Chronic low back pain affects up to 23% of the world's population at any one moment, according to some research. This group's recurrence rates range from 24% to 80% over a year. A lifetime frequency of up to 84% in adults has been suggested by various studies. The prevalence of back discomfort in adolescents varied from 11.8 per cent to 33 per cent annually, according to considerable studies. The prevalence of lower back pain is estimated to be between 11 and 13 per cent of the population.(6).

Lower back pain may be classified in several ways, depending on the underlying reason. The European Guidelines for Prevention of Low Back Pain characterise pain and discomfort as occurring "below coastal, above inferior gluteal folds, with or without leg pain."(7). To put it another way, "pain that develops posteriorly, between the lower boundary of the rib and the proximal thighs" is one way that low back discomfort might present. The term "non-specific low back pain" is used to characterise persistent back pain that is not connected to a specific medical condition.(8)

Low back pain can be classified as acute, subacute, or chronic. The most common condition is acute low back pain, particularly in the lower back. It is dependent on the length of time a person has had to deal with back pain before being assigned to this category. Chronic back pain lasts for more than 12 weeks, while subacute back pain lasts for six weeks or less. on the basis of how long it has been going on(9). It is considered chronic pain if it lasts for more than three months and does not go away. Persistent low back pain accounts for as much as 80 per cent of all US healthcare spending (LBP)(10). Back pain that is severe and persistent affects about one-third of the population. It is estimated by the National Institutes of Health that seven million Americans suffer from chronic low back pain every day.(11).

The use of antibiotics in the treatment of low back pain was studied in a recent study by a group of experts. Type 1 Modic alterations around the site of a prior herniation were necessary for the MRI scans for inclusion in the analysis. Some of the other prerequisites were a six-month history of back discomfort and a history of herniated discs. Oedema in the vertebral body is a frequent symptom of a condition known as "Modic alterations.". After receiving 100 days of antibiotics,

those who were reassessed and had a one-year follow-up showed a statistically significant reduction in pain(12).

STATEMENT QUESTION

In the case of low back pain, may stretching the gastrocnemius muscles help?

AIMS AND OBJECTIVES OF THE STUDY

It is the primary goal of the study to determine the effect of stretching exercise on the gastrocnemius muscles in patients with low back pain.

Researchers are trying to find out if stretching exercises can help alleviate low back discomfort by affecting the gastrocnemius muscles.

HYPOTHESIS

HYPOTHESES – Stretching the gastrocnemius muscles has a substantial influence on the muscles of the lower back.

NULL HYPOTHESES - Stretching exercises had no effect on the gastrocnemius muscles of those with low back discomfort.

TOOLS USED:

OSWESTRY LOW BACK PAIN DISABILITY QUESTIONNAIRE

Description: As an academic and professional resource, the Oswestry Low Back Pain Disability Index is invaluable. The test is often referred to as "the gold standard" in the area of evaluating

low back functional outcomes. Patients with low back pain must complete a questionnaire to determine their functional ability (or lack thereof) in everyday life as part of their therapy.

VAS

Description: In 1921, Hayes and Patterson introduced the Visual Analogue Scale (VAS) as one of the earliest pain rating measures. Epidemiological and clinical research often use this technique to gauge the severity or frequency of certain symptoms. A patient's perception of pain, for example, might vary from no discomfort at all to a very high level of agony. According to the patient's point of view, this continuum looks unbroken; their pain isn't divided into distinct peaks as a classification of none, mild, moderate, and severe would imply. The VAS was developed to encapsulate this underlying continuous concept.

METHODOLOGY

Type of study: Experimental study

Sampling: Simple Random Sampling

Area of Project: Delhi NCR

Sampling Method:

- No of Sample:102
- Groups: Two groups (51 subjects in each group)
- Sample place: Multicentric Grounds

Inclusion Criteria:

1. 18-35 YEARS OF AGE
2. MALE AND FEMALE GENDER
3. COMPLAIN OF LOWER BACK PAIN
4. DO NOT PERFORM ANY PHYSICAL WORKOUT
5. NO INJURIES IN SAPINE

Exclusion Criteria:

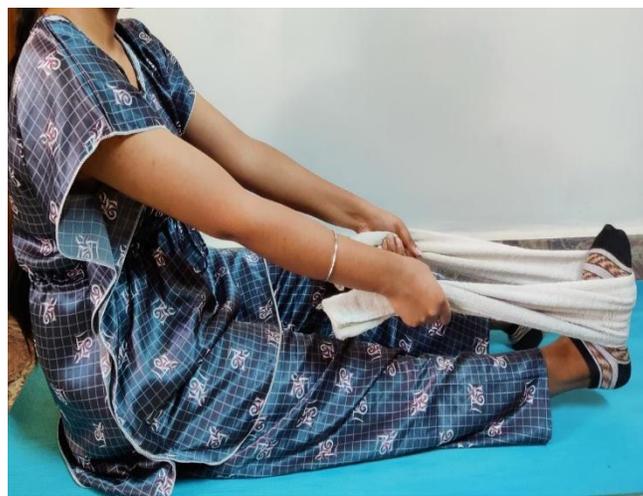
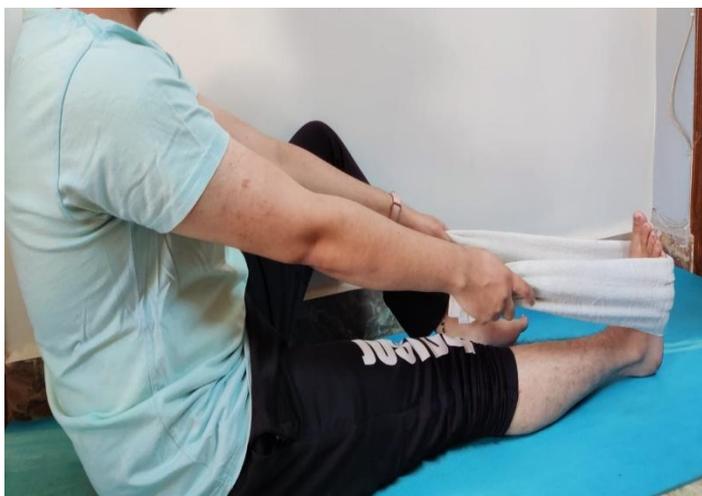
1. INJURE/ TRAUMA IN THE SPINE
2. ACCIDENT HISTORY
3. PERFORMING PHYSICAL WORKOUTS DAILY
4. OTHER HEALTH CONDUCTION

PROCEDURE

The sample size was 102 individuals, however 16 are excluded due to exclusion rules, leaving 86 individuals in the final sample. 86 subjects were enrolled in the study according to the inclusion and exclusion criteria. Two groups are divided as GROUP A and GROUP B accordingly. Consent is taken from the subject for being a part of the study. Pre-data on the lower back was collected using Oswestry low back pain disability questionnaire with VAS for both groups. All participants completed the permission form and provided their agreement to participate in the research, after which they filled out demographic information such as their name, age, height, weight, gender, and profession. Following this, the following steps were implemented:

- GROUP A - TO PERFORM GASTROCNEMIUS MUSCLES PASSIVE STRETCHING
- GROUP B- TO PERFORM GASTROCNEMIUS MUSCLES NORMAL ACTIVE STRETCHING
- Gastrocnemius muscles were passively stretched for 5- 8 minutes five days a week for four weeks during GROUP A.
- It was GROUP B's turn Gastrocnemius stretch for 5-8 minutes on five days per week for four weeks.

- Using the Oswestry Low Back Pain Disability Questionnaire, data was obtained from both groups.
- Comparison of Pre and post-data of both groups and Comparing of Group A and Group B effect differences will be made using SPSS 27.



RESULTS

The results are very clear and show that there are significant differences between the scores of Pre and Post data of Gastrocnemius Muscles Passive Stretching as well as of Gastrocnemius Muscles Normal Active Stretching. For Gastrocnemius Muscles Passive Stretching Pre scores of Oswestry Low Back Pain, Disability Questionnaire was $41.10 \pm 4.199 > 18.40 \pm 8.506$ post scores. For Gastrocnemius Muscles Normal Active Stretching Pre scores was $43.02 \pm 5.298 > 21.40 \pm 8.506$ post score. Vas score of Group A was pre $(8.38 \pm 0.868) > \text{post } (4.95 \pm 1.616)$. Vas score of Group B was pre $(6.87 \pm 1.865) > \text{post } (4.87 \pm 1.987)$. As the data shows there were significant effects in both of the Groups for Lower back pain and there was a higher effect in Group A (Gastrocnemius Muscles Passive Stretching)

LIST OF TABLES:

TABLE NO 5.1: DEMOGRAPHIC DESCRIPTIVE STATISTICS.

	AGE	HEIGHT	WEIGHT
Mean	28.35	5.665	79.98
N	86	86	86
Std. Deviation	11.942	.3701	12.752

TABLE NO 5.2: GENDER RATIO

GENDER					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	43	50.0	50.0	50.0
	Male	43	50.0	50.0	100.0
	Total	86	100.0	100.0	

TABLE 5.3: SHOWS THE WORK FIELD DISTRIBUTION OF THE SUBJECTS.

WORK					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	House Wife	32	31.37	31.37	31.37
	Teacher	12	11.76	11.76	11.76
	Office Staff	34	49.02	49.02	49.02
	Factory Worker	8	7.48	7.48	100.0
	Total	86	100.0	100.0	

PAIRED T-TEST RESULTS

TABLE NO 5.4. GROUP A Oswestry Low Back Pain Disability Questionnaire score (PRE-POST)

VARIABLE	SCORE	T-TEST	P-VALUE
PRE-DATA	41.10±4.199	61.906	P<0.05
POST DATA	18.40±8.506		

TABLE NO 5.5. GROUP B Oswestry Low Back Pain Disability Questionnaire score (PRE-POST)

VARIABLE	SCORE	T-TEST	P-VALUE
PRE-DATA	43.02±5.298	62.820	P<0.05
POST DATA	21.40±8.506		

TABLE NO 5.6 GROUP A VAS score (PRE-POST)

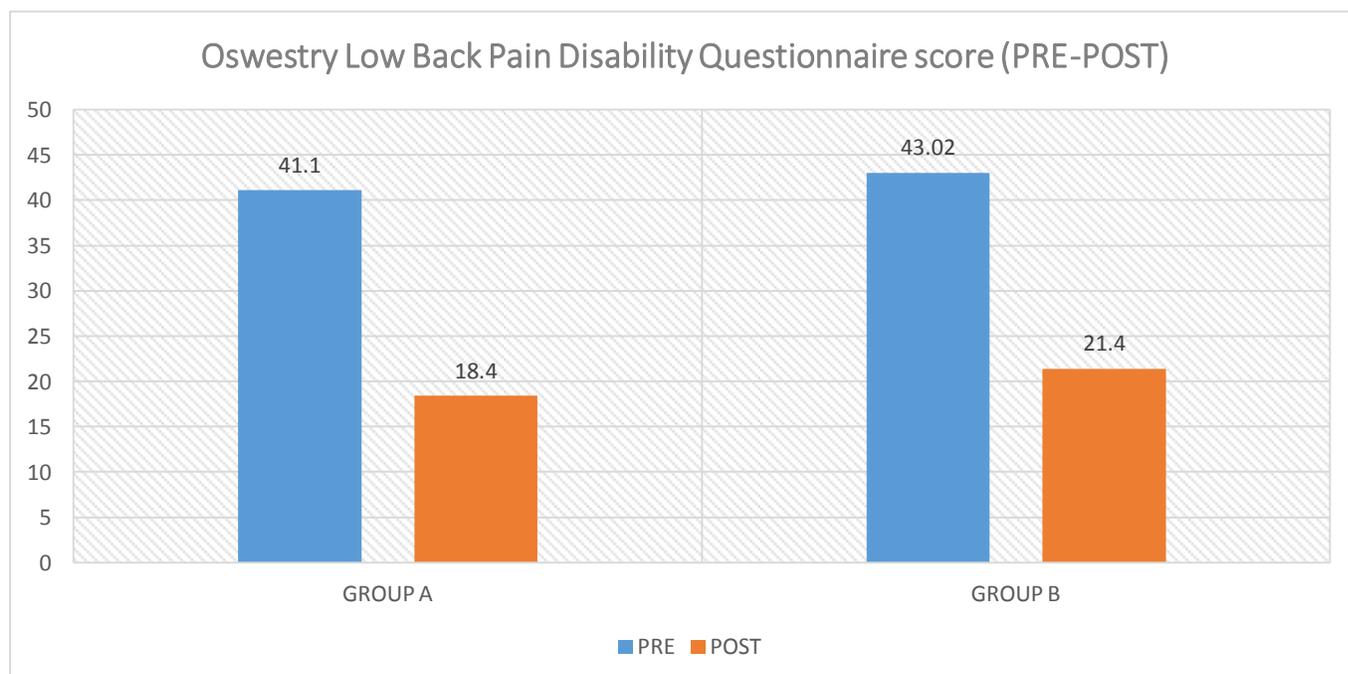
VARIABLE	MEAN±SD	T-TEST	P-VALUE
VAS PRE-DATA	8.38±0.868	61.032	P<0.05
VAS POST DATA	4.95±1.616		

TABLE NO 5.7 GROUP B VAS score (PRE-POST)

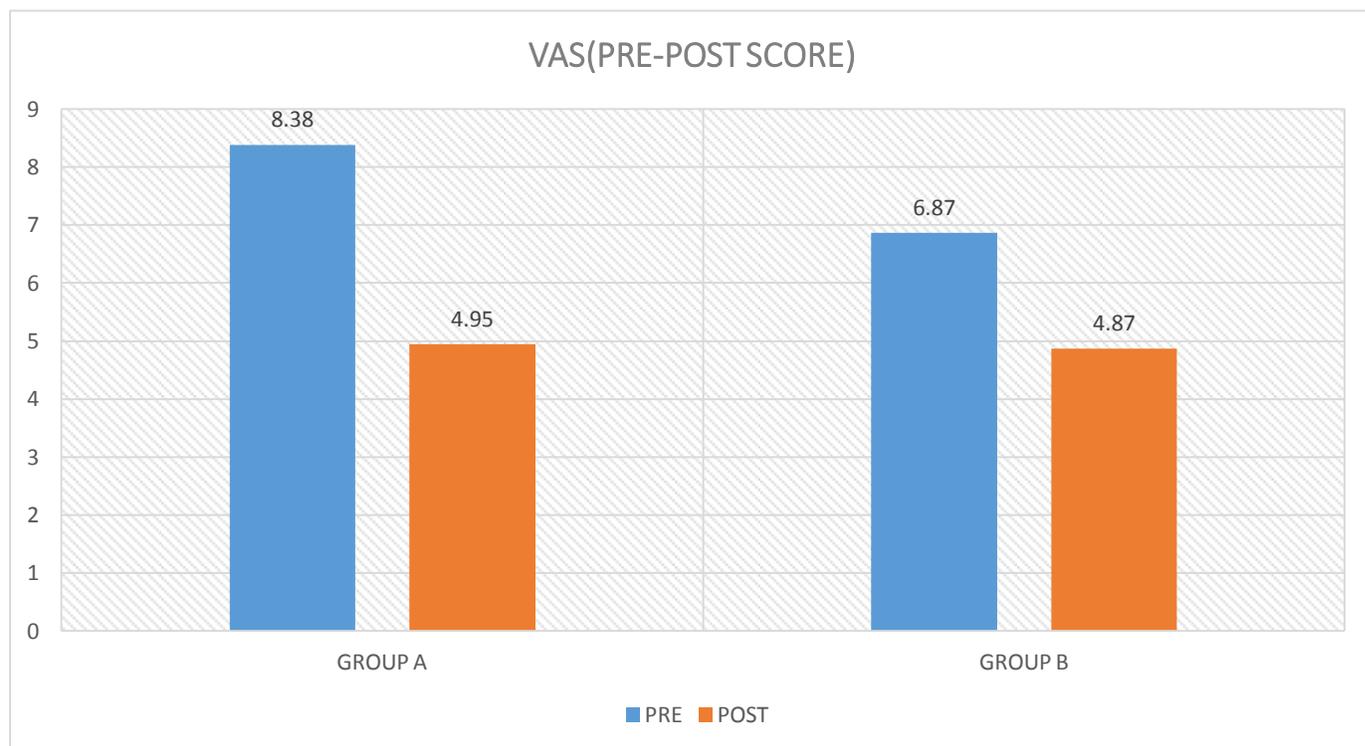
VARIABLE	MEAN±SD	T-TEST	P-VALUE
VAS PRE-DATA	6.87±1.865	41.032	P<0.05
VAS POST DATA	4.87±1.987		

LIST OF GRAPHS:

GRAPH NO 5.1- Oswestry Low Back Pain Disability Questionnaire score (PRE-POST)



GRAPH NO 5.2- VAS (PRE-POST)



DISCUSSION

From the study, we can conclude that there is a significant effect of Gastrocnemius stretching on the lower back pain and the passive Gastrocnemius stretching has a higher effect on lower back pain as compared with the active Gastrocnemius stretching which is similar to the study done by Kamalakannan. M et al 2020(13) a study Ankle mobilization and active stretching were used in this study to see whether they may help those with pronated feet alleviate back discomfort. The purpose of this study was to discover whether ankle mobilization and active stretching may reduce low back discomfort. Those who are pronated have a worse quality of life. participants with a pronated foot and a pronated foot and a foot with a pronated foot and a pronated foot with 30 participants in total Individuals with low back pain were screened using inclusion and exclusion criteria. This scale shows statistically significant differences between severe disability

(41 per cent-60 per cent) and moderate and light impairments. (10 percent -25 percent). Peemongkon Wattana et al 2020(42) in a study found that lumbopelvic stabilization operations during hamstring muscle stretching increased lumbar stiffness when performed on persons who had previously had low back pain and were believed to have clinical lumbar instability. There is, however, a lack of evidence to support this claim. In this study, the researchers aimed to 1) measure changes in lumbar, lumbar, and hip movements, and 2) compare those changes following lumbopelvic stiffening or relaxing workouts. Hamstring muscle stretching may extend both hamstring muscles and minimize excessive lumbar motion by increasing the lumbar spine's relative stiffness, according to the results. By keeping the lumbar spine from moving too much, this stiffening method may help avoid repeated low back discomfort.

LIMITATIONS OF THE STUDY:

- 1}The sample size included in the study could have been more.
- 2}The physical activity performed could be more vigorous.

FUTURE RESEARCH:

- 1}The study can be used for identifying the effect of physical activity on lower back pain.
- 2}Further research can be done with a properly structured exercise program.

CONCLUSION

From the study, we can conclude that there is a significant effect of Gastrocnemius stretching on the lower back pain and the passive Gastrocnemius stretching has a higher effect on lower back pain as compared with the active Gastrocnemius stretching. The study's primary goal is to

examine the effects of stretching exercise on the gastrocnemius muscles in patients with low back pain.

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