

**Effect of Gluteus Maximus Strengthening on Back Pain, Range of Motion,
and Endurance in Desk-Job Workers with Chronic Low Back Pain**

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Introduction

Low back pain is one of the most common musculoskeletal disorder. Two-thirds of the population complain of chronic low back pain at least once during their life span (**Cheng M et al., 2025**). Recent studies support that the population whose age ranged between 35 and 55 years is more likely to complain of low back pain than other age groups (**Wong C et al., 2021**). Low back pain can be defined as pain that is felt from the lower thoracic cage and extends to the gluteal margin (**Krismer et al., 2007**). Low back pain is classified into two main categories: Mechanical pain is abnormal stress on your back without any pathological reason, while Chemical pain is pain in your back because of a pathological reason, such as a fracture or infection (**Nasreen et al., 2022**). Most patients with low back pain have mechanical pain without pathological causes (**Hong et al., 2021**). Mechanical low back pain caused by prolonged sitting at the desk, bad posture, muscles weakness (**Mahdavi et al., 2021**).

Due to prolonged sitting and bad posture, desk-job workers complain of musculoskeletal disorders and pain in different areas of the spine, lumbar, cervical, and thoracic (**Guduru et al., 2022**). Most desk-job workers sit for a long time in a slouched posture, leading to loss of the normal lordosis curve that increases mechanical stress on spinal structures (**Cho IY et al., 2015**). Prolonged sitting

which occurs in desk-job workers causing weakness and atrophy of Gluteus Maximum (GM) (**Buckthorpe et al., 2019**). GM is large muscle response of primary hip extension and dynamic stabilization of lumbar spine so it consider as one of core muscles stability (**Amabile et al., 2017**). Although, the electromyogram (EMG) results show strong correlation between weakness of GM and low back pain, but the relation between them isn't clear. Which one is secondary to the other is a question without an answer (**Amabile et al., 2017**). GM plays an important role during the first degrees of lumbar extension, as its weakness causes alertness in normal lumbar loads and leads to pain during extension, also affecting the range of motion of extension (**Leinonen et al., 2000**). During normal gait GM activate to control abnormal movement in late of swing to mid- stance, in low back pain patients, this pattern is alerted. However, the relations between changes of pattern and low back pain is unclear.

There is two types of treatment of Low back pain, Concretive treatment: non-steroidal anti-inflammatory drugs, physical therapy modalities such as (Ultra-sound, manual therapy, High powered laser therapy, McKenzie methods and Gluteus maximum strengthening exercises) or operative treatment (**Fukuda et al., 2021**).

Statement of the problem:

Does the strengthening training of GM decrease low back pain and increase lumbar range of motion in desk-job workers?

Purpose of the study:

This study will be performed to detect the effect of strengthening exercises of GM on low back pain in desk-job workers.

Null Hypothesis:

It will be hypothesized that there will be no effect of strengthening exercise of GM on low back pain and spine mobility in desk-job workers with low back pain.

Methods

Design

The study will be an RCT designed to assess the effect of GM strengthening on back pain, mobility and endurance in desk-job workers with low back pain.

Subjects:

40 patients will be selected from Pharos University in Alexandria outpatient clinic,

Inclusion criteria: desk-job workers with chronic low back pain for at least 3 months ago, and their ages ranged from 30 to 40 years old.

Exclusion criteria: Scoliosis, lumbar stenosis, lower limb deformities, pregnancy, previous surgery, lumbar instability, fracture or trauma, taking analgesic drug, malignant patients, gynecological disorder like pre-menstrual pain, Deep vein thrombosis, Lumbar spondylolysis and spondylitis, Malignancy and Rheumatoid arthritis.

Design of study:

The research is designed as a randomized controlled study pre and post experimental design.

They will be divided randomly into two equal groups A and B:

Group A (Control group):

20 patients (10 male and 10 females) will be selected randomly by computer and Will be treated by traditional methods including electrotherapy (TENS and Interferential Therapy) and postural education, active range of motion exercise for back muscles 3 times per week for 4 weeks.

Group B (experiment group):

20 patients (10 male and 10 females) will be selected randomly by computer and Will be treated by traditional methods including electrotherapy (TENS and Interferential Therapy) and postural education, active range of motion exercise in addition to performed a specific GM strengthening program consisting of step-ups, resisted isolated hip extension and lateral rotation, squats, single-leg squats, and lunges for back muscles 3 times per week for 4 weeks.

Procedures:

All workers in both groups will be given a full explanation of the protocol of the study and consent form (Appendix I) will be signed by each patient before participation.

History:

Every patient in both groups will be subjected to history taking which include:

1. Personal history: (name, age, previous disease, drug used and problem list).
2. Past history.

Outcome measurements

- 1- Visual analogue scale: will be used to assess the severity of pain pre and post treatment.
- 2- Goniometer: will be used to assess the flexion and extension range of motion of lumbar spine pre and post treatment.
- 3- Biering-sorensen test: will be used to test the endurance of back muscles pre and post treatment.
- 4- Modified Schober's test: will be used to assess distance between vertebrae in lumbar flexion pre and post treatment.

Appendix I

Informed consent form

I am Mr-s\ decided to be volunteer freely to participate in research study under the direction of researcher \ Moataz Abdelaal Mohamed. After description of procedure has been explained with reserve my right to withdraw my consent and discontinue participation in this research at any time without prejudice to me.

Participant:

Date:

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اقرار

اقر انا السيدة\ الموقعه أدناه بأرادتي الكاملة الموافقة بحرية التطوع على المشاركة في البرنامج البحثي تحت اشراف و توجيه من الباحث / معتز عبدالعال محمد وذلك بعد وصفه وشرحه الاختبارات مع الاحتفاظ بكامل حقي في الانسحاب في أى وقت بدون أى ضرر لى.

التوقيع

التاريخ

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Appendix II

Recording data sheet

Patient ID:

Group:

Name:

Age:

Address:

Occupation:

Onset of low back pain:

Type of pain:

Location:

Duration:

	Pre treatment	Post treatment
Age		
Weight		
BMI		
VAS		
Flexion and extension ROM		
Biering-sorensen test		
Modified Schober's test		

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