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Relationship of gluteus maximus insufficiency, tightness/weakness in the patients with chronic mechanical LBP in king khalid military city Saudi Arabia

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ABSTRACT

Introduction: Chronic mechanical low back pain (CLBP) is the commonest musculoskeletal condition in the clinical practice. Pain and inactivity in CLBP patients can lead to tightness and weakness of gluteus maxmimus muscle fibres. Limited data from the studies are available on Saudi military population, hence we intend to know the relationship of gluteus maxmimus insufficiency in relation to CLBP as it contributes larger burden of disability, loss of work days, diminished quality of life and considerable health care cost in military personnel. The objective was to study the relationship of gluteus maximus insufficiency in the patients with chronic mechanical LBP in king Khalid military city Saudi Arabia.
Materials and Methods: A prospective observational study was done on 100 patients with CLBP in king khalid military city hospital. The intensity of pain was measured by visual analog scores, Strength of Gluteus maximus muscle was measured by manual muscle testing, and the length of the muscle was measured by hip extension range of motion (ROM) using goniometer. Patients were also given rolland morris disability questionnaire for self scoring, recorded and duly signed by all patients and then results were analysed.
Results: This study showed significant association between LBP and strength of gluteus maximus with p-value <0.05, also between LBP and ROM of hip extension with p-value <0.05.
Conclusion: There is a significant relationship of gluteus maximus insufficiency with Chronic mechanical LBP.

1. Introduction

Chronic mechanical low back pain is the commonest musculoskeletal condition in the clinical practice. Pain and inactivity in chronic low back patients can lead to tightness and weakness of muscle fibres. As Military personnel have to do the daily drills with weights on and routinely carrying military equipments. So usually they come with mechanical back pain due to over use and fatigue. As in review of literature limited studies are available for the Saudi military population so we wanted to know the role of gluteus maxmimus insufficiency in relation to low back pain as it contributes larger burden of disability, loss of work days, diminished quality of life and considerable health care cost in military personnel.(CLBP) is the most common cause for frequent absenteeism at work in the less than 45-year-old.[1] Several studies mention that LBP is the main reason for physiotherapy consultations.[2] The gluteus maximus muscle is a strong extensor of the hip joint; it helps to straighten the lower limb at the hip joint when a person walks, runs, or climbs. The gluteus maximus is usually active simultaneously with the paraspinal muscles during back extension. This hip-spine interaction is disturbed in low back pain patients during sagittal trunk flexion.[3] Poor endurance and delayed firing of the hip extensor (gluteus maximus) and abductor (gluteus medius) muscles have previously been noted in individuals with lower extremity instability or LBP.[4] LBP-related conditions are

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also responsible for the highest five-year cumulative risk of disability among active duty US Army personnel.[5] Our study aimed to study the relationship of gluteus maximus insufficiency in relation with mechanical Low back pain as it contributes a larger burden of disability, loss of work days, diminished quality of life and considerable health care cost for saudi military personnel also at king khalid military city saudi arabia.

2. Materials and Methods

A prospective observation study was done on 100 subjects with chronic mechanical LBP in king Khalid military city hospital. Consent forms were signed by all patients who were part of the study after explaining the whole procedure and rights of patients reserved and privacy maintained . Assesment of pain,strength of Gluteus maximus and the range of motion of hip extension were calculated and data was taken. The intensity of pain was measured by Visual Analogue scale scores which ranges from 0 to 10 where 0 is no pain and 10 is maximum intolerable pain.Strength of gluteus maximus muscle was measured by manual muscle testing with patients in the prone position using isometric contraction of gluteus maximus by hip extension, and the length of the muscle was measured by hip extension range of motion (ROM) using goniometer.

3. Result

Demographic data is shown in Table 1. This study showed significant association between LBP and strength of gluteus maximus with p-value <0.05, also between LBP and range of motion of hip extension with p-value <0.05.Also we found significant p-value <0.05 between range of motion of hip extension and Rolland morris disability score (Table 2).

Table 1: Mean and standard deviation of variables

Variables	Mean ±sd	Minimum	Maximum
Age	36.9 ± (6.64)	25	53
BMI	25.9±(5.7)	18	39.5
Muscle Power	3.6±(0.75)	3	5
Hip extension ROM	3.1±(3.7)	0.1	15
NPS	4.7±(1.9)	2	9

o1 shows means+ standard deviation (SD).We recruited 100 patients. All of them were military male patients with mean age 36.9±6.64, their mean BMI was 26.9±5.7, Means Muscle power3.6±0.75, hip extension ROM mean was 3.1±3.7 and NPS mean was 4.7±1.9.

Table 2 shows significant co relation between pain levels and manual muscle testing with p-value 0.01 and also there is a significant co-oreleation between the length of gluteus maximus muscle with pain levels with –value 0.002.

Table 2: Shows co-relation between variables

S. No	Variables	R^2 -value	p-value
1	VAS vs RMDQ	0.0093	0.904637
2	VAS vs MMT	-0.2014	0.010797
3	VAS vs ROM	-0.2413	0.002153

4. Discussion

Our work studied relationship of gluteus maximus insufficieny with chronic mechanical LBP at the baseline for the patients coming to OPD. For Military personnel who often have high workloads, carrying heavy training equipement during routine drills and exercises. We conclude by saying that there is a significant relationship of gluteus maximus muscle strength with chronic mechanical low back pain which is the largest hip extensor of the hip. Our study is the first study in the military population of Saudi Arabia as no other similar study has been reported in the literature. Several studies support hip extensor involvement in individuals with LBP. Kankaanpaa et al. demonstrated increased fatigability of the gluteus maximus in individuals with chronic LBP.[6] Another study by Leinonen et al. also demonstrated the gluteus maximus to be more easily fatigued in those with nonspecific chronic LBP, but noted improvement in the latency of firing in the gluteus maximus after rehabilitation.[7] Another study done by congcong ca et al reported that Weakness of the right hip extensors in female athletes was previously noted in those with a history of LBP and in those who ultimately developed LBP.[8] Another study done by scott f et al demonstrated a significant increase in right hip extensor strength after incorporation of the strengthening program. This strength increase of the right hip extensors the dominant side for 90% (192 of 213) of athletes in our study.[9] Another study done by Nadler et al assessed right/left symmetry in gluteus maximus strength in over 200 collegiate athletes, and correlated this with reported history of LBP and lower extremity pain. They found significant alterations in GM strength symmetry in females with a history of LBP.[10] Another study done by Mohammad Reza et, al, stated that that decreased back extensor muscle en- durance is an important factor in chronic LBP.[11] Lutz. Vogt et al also stated also concluded that that low-back disorders are related to changes of the hip extensor recruitment pattern.[12] Another study done by Mati Pa et al also concluded in their study that during the Sørensen back isometric en- durance test the CNLBP patients fatigued faster than healthy controls.[13] Another study done by marco aurélio n et al concluded that the inclusion of gluteus maximus strengthening exercises in those with persistent lumbopelvic pain.[14]

5. Limitations

Sample size is smaller and confined to particular gender and particular geographical area in king Khalid military city saudi arabia.We recommend multi central trials in all the military centres in saudi arabia to put forward relative hypothesis.

6. Conclusion

For Military personnel who often have high workloads,we conclude by saying that there is a relationship of gluteus maximus muscle with chronic mechanical low back pain which is the largest hip extensor of the hip. Our study is a pioneer study in the military population of Saudi Arabia as no other similar study has been reported in the literature.

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8. Abbreviations

CLBP(Chronic Low back pain), GM(Glueteus maximus), ROM(Range of motion), MMT(Manual muscle testing), Rolland Morris Disability questionnaire(RMDQ)

9. Source of Funding

None.

10. Conflict of Interest

None.

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