

# Effect of Strength Training on Quadratus Lumborum Muscle in Obese Subjects - Experimental Study

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**Abstract:** *Background: The quadratus lumborum is the muscle of posterior abdominal wall. It is deepest abdominal muscle and commonly referred as block muscle. In case of obesity due to accumulation of fat around waist and hip area; there is a weakness of spinal and abdominal muscle and specially affects quadratus lumborum muscle. Objectives: To determine the effect of strength training exercise on quadratus Lumborum muscle in obese subject. To find out the significant changes in strength of Quadratus Lumborum muscle by Pre and Post MMT. Study design: Experimental study conducted at KIMS DU Karad. 40 Subjects were selected by convenient sampling method. Pre and Post MMT was the main outcome major for the study. Result: For the 40 subjects average pre treatment MMT was 2.25 and average post MMT was 4.25. Conclusion: Study results concluded that there is significant Effectiveness of strength training exercise on quadratus lumborum muscle on obese subjects.*

**Keywords:** Obesity, quadratus lumborum muscle strength training exercise, waist hip ratio, MMT

## 1. Introduction

Obesity is a medical condition with excess body fat accumulation to an extent that has negative effect on health. In 2005, it was estimated that 33% of the world's adult population were overweight or obese. Further, it is projected that there will be up to 57% overweight or obesity levels by 2030. Obesity prevalence is observed in developed as well as developing countries such as India. In India, it is projected that there will be an increase of the prevalence of overweight or obesity from 16.9% (as in 2005) to 32.8% by 2030[5]. India has a major significant rise in obesity from 19th position for both men and women in 1975 to ranking 5th in 2011 and 3rd in 2014. There was high prevalence in higher socio economic adults. It has been postulated that excessive body weight could have mechanical ill effects on the back caused by excessive weight bearing [1]. The increased mechanical demands from obesity have been suspected of causing low back pain through excessive wear and tear. The combination of excess body fat and reduced muscle mass or strength is called sarcopenic obesity[3]. Various factors, in addition to muscle mass, contribute to the components of strength and may play a role in functional disability. Among these factors, obesity and low physical fitness are frequently associated, and both may impair muscle strength [4]. Several arguments suggest that muscle strength is affected in obesity. In obesity, muscle impairment may be involved independently of lack of physical activity[4]. Physical activity improves muscle strength and muscle mass and has a key role in the management strategy for obesity[4]. In India, obesity was observed even in school aged preadolescents and adolescent in both males and females. There was higher prevalence in high socioeconomic children and females[6]. Due to increased abdominal obesity (waist circumference >90cm for men and >80cm for women) is one of the health hazard caused to the lower segments of the spine, there is kypho-lordotic postural mal-alignment seen in many people due to

excessive work load on the spinal musculature the muscle undergoes weakness. People try different methods of weight reduction but the end result is not up to the mark. Every obese individual is suffering from various consequences like health related issues and cosmetic issues. A central distribution of body fat is associated with a higher risk of morbidity and mortality than a more peripheral distribution. It has been reported that physical problems in obese individual affects HRQL.

## The quadratus lumborum muscle

The quadratus lumborum is a muscle of the posterior abdominal wall. It is the deepest abdominal muscle and commonly referred to as a block muscle. It is irregular and quadrilateral in shape and broader below than above.

**Correlation Between Obesity and Quadratus Lumborum Muscle Weakness:** The lack of consistency in the relationship between CSA (cross sectional area) and back function may be because of failure to take into account paraspinal muscle composition, such as the degree of fatty infiltration, in addition to CSA[8]. Isokinetic trunk extension performed with maximal force at constant speed has been found to be moderately associated with paraspinal muscle composition[8]. Fat infiltration is a sign of muscle atrophy. There is growing interest in the role of fat infiltration of paraspinal muscles and the pathogenesis of low back pain[9]. Reduced CSA and higher fat presence in paraspinal muscles will be associated with low back pain and disability, as well as reduced intervertebral disc height and modic change[9]. Studies that have investigated the size of paraspinal muscles have tended to recruit people with chronic low back pain. Such an approach may be problematic because fear of movement is common among people with chronic low back pain, and high levels of inactivity may select people with more pronounced muscle atrophy[9]. Studies have demonstrated that paraspinal fat rather than muscle CSA is associated with high-intensity low back pain/disability and structural

abnormalities in the lumbar spine[9]. Paraspinal muscle CSA and fat infiltration were determined at the level of the L3–L4 intervertebral disc [9]. The amount of fat within paraspinal muscles as indicated by qualitative muscle composition ratings had weak to moderate associations with isokinetic lifting performance, similar to those of muscle CSA [9].

## 2. Review of Literature

**1. BN Birabi<sup>1</sup>, PO Dienne<sup>2</sup>, GU Ndukwu<sup>2</sup>** conducted the study on prevalence of low back pain among peasant farmers in a rural community in south Nigeria and concluded that severe LBP was linked to aging (41-60 yrs age group), high BMI and those with above average (1.60m) height. The association between these factors and LBP was statistically significant.

**2. Franziska GroBschadl<sup>1</sup>, Wolfgang Freidl<sup>1</sup>, Eva Rasky, Nathalie Burkert<sup>1</sup>, Johanna Muckenhuber<sup>2</sup>, Willibald J. Stronegger<sup>1</sup>** conducted the study on A 35-year trend analysis for back pain in Austria: The role of obesity and concluded that there was an increase in the prevalence of back pain among all investigated subgroup, with the highest prevalence among obese women. The finding confirms the effect of high BMI as a risk factor for back pain in the general adult population. The link between obesity and back pain underlies the importance of promoting preventive measures to reduce the incidence of obesity.

**3. Zhang TT<sup>1</sup>, Liu Z, Liu YL, Zhao JJ, Tian QB** conducted the study on obesity as a risk factor for low back pain: a meta- analysis and concluded that maintaining healthy body weight may be one of the factors preventing the occurrence of LBP.

**4. C.J. Onyemkpa<sup>1</sup>, G.C. Oguzie<sup>2</sup>, D.C. Chukwumam<sup>3</sup>** conducted the study on obesity as a risk factor for low back pain in a Nigerian population and concluded that higher classes of obesity (BMI>35) were also identify as risk for developing LBP.

**5. Winfried Hauser, MD, Gabriele Schmutzer, PhD, Elmar Brahler, PhD, Marcus Schiltenswolf, MD, and Anja Hilbert, PhD** conducted the study on the impact of body weight and depression on low back pain in a representative population sample and concluded that BMI and depression are modifiable risk indicator for chronic disabling LBP.

**6. Ingrid Heuch<sup>1</sup>, Ivar Heuch<sup>2</sup>, Knut Hagen<sup>3, 4</sup>, John – Anker Zwart<sup>1, 5</sup>** conducted the study on A comparison of anthropometric measures for assessing the association between body size and risk of chronic low back pain: The HUNT study and concluded that positive association with LBP at and of follow – up were all significant for body weight, BMI, waist circumference and hip circumference.

## 3. Material and Methodology

It was experimental study conducted at Krishna hospital Karad. 40 subjects were participated in the study data

collection sheet and consent form was provided to the participated subjects and pre and post MMT was the main outcome major for the study. Subjects were selected according to inclusion and exclusion criteria detailed evaluation and treatment protocol was done on the subject.

**Inclusion Criteria Were as follows:** Obese subject (All grades of obesity); Age group 30-40; Gender both male and female; Participants willing to participate in study; Psychologically stable subject; Medically stable subject.  
**Exclusion criteria were as follows:** Subject with systemic illness; any neurological problem; Age more than 40 years; Subject are not willing to participate in study.

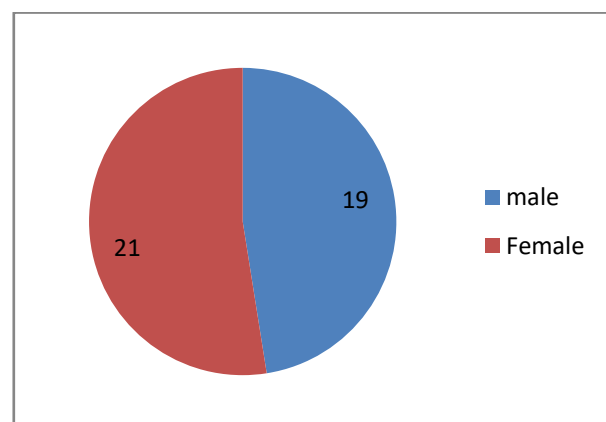
## 4. Statistical Analysis

### Procedure:

- A subject who was fulfilling the inclusive and exclusive criteria will be included.
- Informed consent form was taken from each of the subjects.
- An instruction was given to the subjects about techniques performed.
- BMI of the subject was calculated.
- Waist hip ratio was checked by inch tape method.
- MMT for quadratus lumborum muscle was checked.
- In this study strengthening exercise protocol was prescribed to the subjects. A set protocol exercise for quadratus lumborum muscle was demonstrated and taught to the subject. Quadratus lumborum stretch. Side plank; Side Bridge; lunges; squats.
- 5 set of each exercise was given to the subject for 5 times per week for 20 repetitions.
- The effect of strength training exercise for quadratus lumborum muscle was noticed.
- MMT was checked.

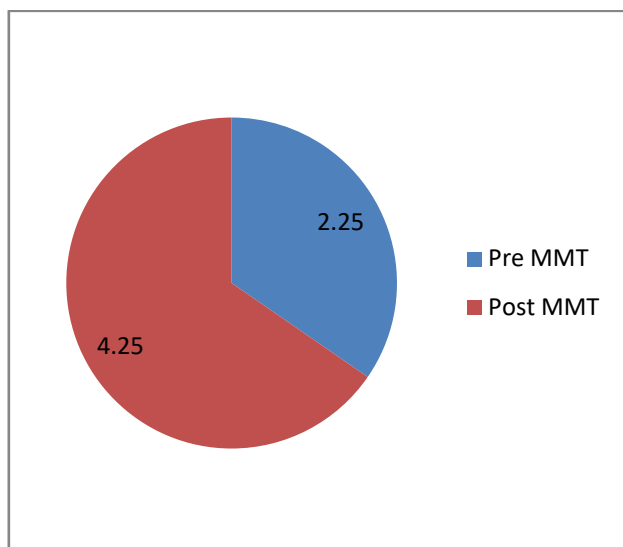
Findings: Statistical analysis was done manually average pre and post MMT was done by statistical measures ' mean ' and paired 't' test.

### 1. Gender distribution in study



The graph shows that 21 females and 19 males participated in the study.

## 2. pre and post MMT ratio



The graph shows that average pre MMT is 2.25 & average post MMT 4.25

## 5. Results

The study was used to analyze the significant effectiveness of strength training on quadratus lumborum muscle in obese subjects for the 40 subjects average pre treatment MMT is 2.25 & average post MMT is 4.25. Hence based on results of present study it can conclude that there is significant effectiveness of strength training on quadratus lumborum muscle in obese subjects. Thus, alternative hypothesis is proved.

## 6. Discussion

The project was done in 3 months of duration with sample size 40 and age group 30 to 40 years the subjects were taken conveniently from KIMS gym. 40 subjects having any grade of obesity were taken for the study. BMI of the subjects was calculated. Waist hip ratio of subject was checked by inch tape method. pre MMT was checked and treatment was done after 3 months of duration post MMT was checked. Data collection sheet and consent form were provided.

personal details (name, age, gender, weight, height, BMI) MMT was checked (grades of MMT)

5- Muscle can move the joint it crosses through a full range of motion, against gravity and against full resistance applied by the examiner.

4- The muscle can move the joint it crosses through a full range of motion against moderate resistance.

3- The muscle can move the joint it crosses through a full range of motion against gravity but without any resistance.

2- The muscle can move the joint it crosses through a full range of motion only if the part is properly positioned so that the force of gravity is eliminated. The muscle can move the joint it crosses through a full range of motion only if the part is properly positioned so that the force of gravity is eliminated.

1- Muscle contraction is seen or identified with palpation, but it is insufficient to produce joint motion even with elimination of gravity.

0- No muscle contraction is seen or identified with palpation paralysis.

Obesity is one cause of many chronic conditions the impact of obesity on general health or HRQL among person who has not been diagnosed with any of the condition remains unclear. Obesity is a medical condition with excess body fat accumulation to a extent that has negative effect on health.

India has a major significant rise in obesity from 19 positions for both men and women in 1975 to ranking 5th and 3rd respectively in 2014. There was high prevalence in higher socio-economic adults.

## 7. Conclusion

Study result concluded that there is significant effectiveness of strength training exercise on quadratus lumborum muscle in obese subjects.

## 8. Further Scope

The sample size used in the study was relatively small. This makes it difficult to extrapolate the result on general population. This study can be done on larger population.

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### Author Profile

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