

Frequency if Quadratus Lumborum Muscle Weakness in Obese Subjects-Observational Study

Minal Pawar¹, Poonam Patil²

¹Intern, Faculty of Physiotherapy, Krishna Institute of Medical Sciences Deemed University, Karad

²Lecturer, Faculty of Physiotherapy, Krishna Institute of Medical Sciences Deemed University, Karad

Abstract: ***Objectives:** To find out the frequency of quadratus Lumborum muscle weakness in obese subjects. To screen out the individual weakness of quadratus lumborum muscle in obese subjects. To find out the relationship between quadratus lumborum muscle and obesity. **Study Design:** Observational study conducted at Krishna Gym, KIMSUDU, Karad. 100 subjects were selected by convenient sampling method. **Questionnaire** was the main outcome measure for the study. **Result:** Out of 100 subjects 53 subjects were having quadratus lumborum weakness and 47 subjects were not having quadratus lumborum weakness. **Conclusion:** Study results concluded that there is significant weakness of Quadratus Lumborum Muscle in obese subjects.*

Keywords: Obesity, Quadratus lumborum muscle, quality of life, 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 tear¹. 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 obesity⁴. 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 females⁶. 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

- BN Birabi, PO Dienne, GU Ndukwu 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.
- Franziska GroBschadl, Wolfgang Freidl, Eva Rasky, Nathalie Burkert, Johanna Muckenhuber, Willibald J. Stronegger¹ 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 confirm 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.
- Zhang TT, 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.
- C.J. Onyemkpa, G.C. Oguzie, D.C. Chukwumam 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 identified as risk for developing LBP.
- Winfried Hauser, MD Gabriele Schmutzer, PhD Elmar Braehler, 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 indicators for chronic disabling LBP.
- Ingrid Heuch, Ivar Heuch, Knut Hagen, John – Anker Zwart 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 an observational study conducted in KIMS Gym, of Krishna Institute of Medical Sciences. 100 subjects participated in the study. Questionnaire was provided to the participated subjects and was the main outcome measure for the study. Subjects were selected according to inclusion and exclusion criteria. Written informed consent was taken and

the whole study was explained to them. Detailed evaluation was done to screen the subjects.

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.

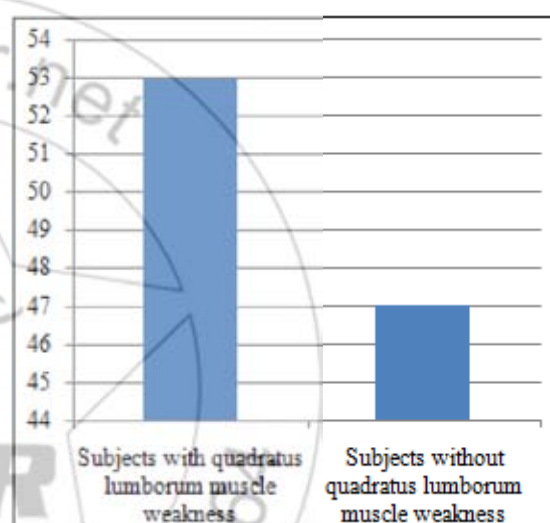
Exclusion criteria were as follows; Subject with systemic illness, Any neurological problem, Age more than 40 years, Subject are not willing to participate in study.

4. Statistical Analysis

Gender distribution in the study

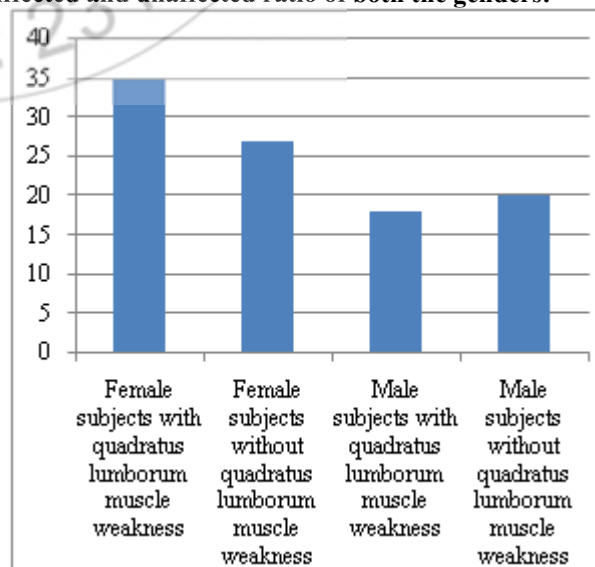
Male	Female	Total
38	62	100

Affected ratio



The graph shows that out of 100 subjects 53 subjects were having quadratus lumborum weakness and 47 subjects were not having quadratus lumborum weakness.

Affected and unaffected ratio of both the genders:



5. Results

The study was used to analyze the frequency of QL muscle weakness in obese subjects. Out of 62 females 35 females were having quadratus lumborum muscle weakness and 27 subjects were not having quadratus lumborum muscle weakness. Out of 38 males 18 males were having quadratus lumborum muscle weakness and 20 were not having quadratus lumborum muscle weakness. Out of 100 subjects 53 subjects were having quadratus lumborum weakness and 47 subjects were not having quadratus lumborum weakness. Hence based on the results of the present study it can be concluded that there is significant weakness of quadratus lumborum muscle in obese subjects. Thus, Null Hypothesis is proved.

6. Discussion

This project was done in three months of duration with sample size 100 and age group 30-40 years. The subjects were taken randomly from KIMS Gym. 100 subjects having any grade of obesity were taken for the study. BMI of the subject was calculated. Waist-hip ratio of the subject was checked by inch tape method. MMT for quadratus lumborum muscle was checked and questionnaire was given. The following questionnaire was used.

Questionnaire

Personal details (Name, Age, Gender, Weight, Height, BMI):

1. Do you have low back pain? (Yes/No)
2. Are you able to perform hip hiking activity? (Yes/No)
3. Do you have any difficulty while walking? (Yes/No)
4. Do you have any difficulty in climbing up and downstairs? (Yes/No)
5. Do you feel breathlessness/respiratory problems? (Yes/No)
6. Do you have pain on sides of the back? (Yes/No)

If yes then unilateral/bilateral?

7. Do you have difficulty in bending forward? (Yes/No)
8. Do you have difficulty in performing daily activities? (Yes/No)
9. Does your pain get worse when trans positioning from sitting to standing? (Yes/No)
10. Are you able to perform planks without any difficulty while doing it? (Yes/No)
11. Do you have pain the back that worsens with prolonged sitting? (Yes/No)

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.
- 4- 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.

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.

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 have 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 position for both men and women in 1975 to ranking 5th and 3rd respectively in 2014. There was high prevalence in higher socio economic adults.

General obesity, is associated with a greater risk of disability or premature death due to type 2 diabetes mellitus [T2DM] and cardiovascular disease [CVD] such as hypertension, stroke and coronary heart disease as well as gall bladder disease, certain cancer [endometrial, breast, colon, prostate] and non-fatal condition including gout respiratory condition gastro-esophageal reflux disease, osteoarthritis and infertility.

So the present clinical trial was conducted to find out the frequency of quadratus lumborum muscle weakness in obese subjects. Out of 100 subjects 62 females and 38 males participated in the study. Most of the subjects were co-operative and wanted to have a keen look on the results of the survey. All the subjects were interested to know about the cause of the quadratus lumborum muscle weakness and prevention needed, so as to avoid further consequences.

7. Conclusion

Study results concluded that there is significant frequency of quadratus lumborum weakness in obese subjects

8. Further Scope

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

References

- [1] Derek Tobin, Tom Shaw, Ellen Daly. Obesity and Low back pain. A review of the literature (March 2009).
- [2] Lisa Johnson Wright, Ellen Schur, Carolyn Noonan, Sandra Ahumada, Dedra Buchwald, Niloofar Afari. Chronic Pain, Overweight, and Obesity: Findings from a community-based Twin Registry.
- [3] Karina S. S. Vasconcelos¹, Joao M.D. Dias¹, Marilia C. Araujo¹, Ana C. Pinheiro¹, Bruno S. Moreira¹, Rosangela C. Dias¹. Effects of a progressive resistance exercise program with high-speed component on the physical function of older women with sarcopenic obesity: a randomized controlled trial.

- [4] Yves Rolland, Valerie Lauwers-Cances,Marco Pahor,Judith Fillaux,Helene Grandjean,and Bruno Vellas.Muscle strength in obese elderly women:effect of recreational physical activity in a cross-sectional study^{1,2,3}
- [5] Kelly T, Yang W, Chen CS, Reynolds K, He J. Global burden of obesity in 2005 and projections to 2030. *Int J Obes (Lond)* 2008;32:1431-7.
- [6] Chhatwal J, Verma M, Riar SK. Obesity among pre-adolescent and adolescents of a developing country (India). *Asia Pac J Clin Nutr* 2004;13:231-5.
- [7] Kemper HC,Post GB, Twisk JW, van Mechelen W. Lifestyle and obesity in adolescence and young adulthood: Results from the Amsterdam Growth And Health Longitudinal Study (AGAHLS). *Int J Obes Relat Metab Disord* 1999;23 Suppl 3:S34-40
- [8] Annina Ropponen , Michele C. Battié The reliability of paraspinal muscles composition measurements using routine spine MRI and their association with back function.
- [9] Andrew J. Teichtahl, FRACP, Donna M. Urquhart, Yuan Yuan Wang, Anita E. Wluka,Pushpika Wijethilake,Richard O'Sullivan,FRANZCR, Flavia M. Cicuttini Fat infiltration of paraspinal muscles is associated with low back pain,disability, and structural abnormalities in community-based adults.

Author Profile

Dr. Minal C. Pawar: has done BPT, from Krishna College of Physiotherapy, Krishna Institute of Medical Sciences Deemed University, Karad- 415110. District: Satara, State: Maharashtra. Have done research during graduation course in year 2016-17 under the guidance of Dr. Poonam H. Patil from Krishna college of Physiotherapy, KIMSU, Karad, and Maharashtra, India.

Dr. Poonam H. Patil is physiotherapist Mastered in the field of Cardiopulmonary Sciences. Presently working as a Lecturer in Krishna College of Physiotherapy, Krishna Institute of Medical Sciences Deemed University, Karad.