Association between qaudriceps strength, pain and functional disability among knee OA patients.

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ABSTRACT: *BACKGROUND: - Physical inactivity is common in patients with knee osteoarthritis (OA) and has been linked to serious comorbidities such as cardiovascular disease, obesity, and diabetes. The purpose of this study was to examine the association between quadriceps strength and self-reported physical activity in patients with radio-graphically confirmed knee OA. Secondarily, the authors' sought to determine if there were differences in quadriceps strength between knee OA patients with low physical activity (LPA) and knee OA patients with higher physical activity (HPA). A tertiary aim of this study was to examine the effect of gender on physical activity and quadriceps strength in patients with knee OA.*

AIMS: - Study to correlate quadriceps strength, pain and functional activities among osteoarthritis knee patients

OBJECTIVES:-

1) To determine whether the quadriceps weakness is a predisposing factor to osteoarthritis.

2) To correlate strength deficit and pain.

3) To correlate strength deficit and function.

METHOD :- From the sitting position, the participant stands up completely up so hips andknees are fully extended, then completely back down, so that the bottom fullytouches the seat. This is repeated for 60 seconds.Same chair should be used for re-testing within site.If the person cannot stand even once then allow the hands to be placed on theirlegs or use their regular mobility aid. This is then scored as an adapted test score.

Conclusion: In conclusion the result of this study indicates that Quadriceps strength is related with pain and disability in patients suffering with Osteoarthritis knee.Patients with more quadriceps strength are found to have less pain and disability.

Key Words:

INTRODUCTION

There is currently no cure for knee osteoarthritis (OA),[1,2]Patients with knee OA are at greater risk of developing cardiovascular disease, obesity, and diabetes, all of which can be linked to increased body mass index and physical inactivity.[3] Furthermore, disability, impaired ambulation, and decreased physical activity may lead to secondary health complications and increased risk of mortality in patients with knee OA.[3,4] Interventions that focus on increasing walking have been successful in improving physical activity,[5] reducing self-reported workplace limitations,[6] as well as decreasing pain and improving fatigue in patients with knee arthritis.[7] Identifying factors that may allow for increased physical activity and exercise in patients with knee OA is important for developing clinical methods to improve general health in patients with knee OA.

Improving lower extremity strength is a hallmark characteristic of non-surgical knee OA management.[8] Specific attention has been paid to the quadriceps musculature, which is important for ambulatory propulsion and energy attenuation at the knee during gait,[9] and, quadriceps dysfunction is common in patients with knee OA.[10] Quadriceps strength and voluntary muscle activation are associated with physical disability in people with knee osteoarthritis.[11] Physical inactivity is associated with quadriceps weakness in patients with chronic diseases[12,13,14,15] and even quadriceps muscle wasting in patients with chronic obstructive pulmonary disease.[16] Knee OA patients and people at risk of developing knee OA have demonstrated decreased physical activity,[17,18] yet the association between quadriceps muscle strength and physical activity remains uncertain.

Associations between quadriceps muscle strength, quadriceps activation, and disability have been evaluated in patients with knee OA,[19,20] while these associations provide information regarding the consequence of muscle weakness on movement patterns, pain, and physical function, the current literature has not evaluated if an association exists between strength and exercise habits or the amount of physical activity in

which people with knee OA engage. Establishing the association between quadriceps muscle strength and the amount of exercise in which knee OA patients participate is important for understanding the effects of physical inactivity on the quadriceps, a group of muscles known to predict disability in knee OA patients. Additionally, an association between the amount of exercise and quadriceps strength may provide evidence that increasing quadriceps strength may positively affect exercise tolerance in patients with knee OA.[21] Therefore, the overall goal of the current study was to evaluate the association between quadriceps strength to leisure-time exercise in people with knee OA. The primary purpose of this study was to examine the association between quadriceps strength and self-reported physical activity in patients with radiographically confirmed knee OA. Secondarily, the authors' sought to determine if there were differences in quadriceps strength between knee OA patients with low physical activity (LPA) and knee OA patients with higher physical activity (HPA). A tertiary aim of this study was to examine the effect of gender on physical activity and quadriceps strength in patients with knee OA.

REVIEW OF LITERATURE

N A Glass, at al (2013) the relationship between quadriceps muscleweakness and worsening of knee pain in the MOST cohort: a 5-yearlongitudinal studyto determine whether quadriceps weakness is associated with elevated risk ofworsening knee pain over 5 years. Quadriceps weakness was associatedan increased risk of worsening of knee pain over 5 years in women, but not inmen.[22]

Alex.N Bastick,at al (2015) What Are the Prognostic Factors forRadiographic progression of knee osteoarthritis? Meta analysisThe purpose of this study is to provide an updated systematic review ofavailable evidence regarding prognostic factors for radiographic knee OA.[23]

Marlene Farsen, at al(2011) The epidemiology of osteoarthritis in AsiaAn update of what is currently known about the prevalence of hip and kneeOA from population-based studies conducted in the Asian region is presentedin this review. Many of the recent studies have conducted comparisonsbetween urban and rural areas and poor and affluent communities. Theresults of Asian-based studies evaluating risk factors from population-basedcohorts or case–control studies, and the current evidence on OA morbidityburden in Asia is also outlined[24]

Stephanie c. Petterson, at al(2008) Mechanisms Underlying QuadricepsWeakness in Knee OsteoarthritisTo identify determinants of quadriceps weakness among persons with endstageknee osteoarthritis. Both reduced CAR and LMCSA contribute to muscleweakness in persons with knee OA. Similar to healthy elders, the best predictorof strength in the contra lateral, no diseased limb was largely determined byLMCSA, whereas CAR was found to be the primary determinant of strength inthe OA limb. Deficits in CAR may undermine the effectiveness of volitionalstrengthening programs in targeting quadriceps weakness in the OApopulation.[24]

Fiona Dobson, at al Recommended performance-based tests to assessphysical function in people diagnosed with hip or knee osteoarthritisAlthough the tests in the recommended set were selected based on globalexpert opinion and available clinimetric evidence, none of the tests fulfil alldesirable criteria, limiting the ability for a definitive core set of tests to bedefined.[25]

METHODOLOGY

- STUDY DESIGN:-Observational study
- STUDY SETTINGS: -Subjects will be taken from stuti physiotherapy clinic, ahmedabad.
- SAMPLING TECHNIQUE: -Purposive sampling technique will be used for osteoarthritis knee patients.
- SAMPLING POPULATION: -30 radiological confirmed knee osteoarthritis patients will be taken.
- SAMPLE SIZE:-30 patients

CRITERIA FOR SELECTION

INCLUSION CRITERIA:-

1. Diagnosed or radiological confirmed osteoarthritis knee patients.
2. Subjects from age 35-65yrs.

EXCLUSION CRITERIA:-

1. Treatment taken for 6 months.
2. Cases of rheumatoid arthritis and other arthritis taken as well as no post operative patients.
3. Cases of neurological disorder.

METHOD

The maximum number of chair stand repetitions possible in a 60 second period (2-4).The chair cannot slide backwards by placing the back of the chair against awall.Comfortable walking footwear (e.g. tennis

shoes/cross trainers) should be worn.The participant sits in the chair in a position that allows them to place their feet flaton the floor, shoulder width apart, with knees flexed slightly more than 90 degrees sothat their heels are somewhat closer to the chair than the back of their knees.The arms are crossed at the wrists and held close to the chest (across chest).The tester stands close to the side of the chair for safety and so as they canobserve the technique, ensure that the participant comes to a full stand and full sitposition during the test. A practice trial of one or two slow paced repetitions is recommended before testingto check technique and understanding.

Procedure

From the sitting position, the participant stands up completely up so hips andknees are fully extended, then completely back down, so that the bottom fullytouches the seat. This is repeatedfor 60 seconds. Same chair should be used for re-testing within site.Ifthe person cannot stand even once then allow the hands to be placed on theirlegs or use their regular mobility aid. This is then scored as an adapted test score. "For this test, do the best you can by going as fast as you can but don't push yourselfto a point of overexertion or beyond what you think is safe for you.

1. Place your hands on the opposite shoulder so that your arms are crossed at thewrists and held close across your chest. Keep your arms in this position for the test.
2. Keep your feet flat on the floor and at shoulder width apart.
3. On the signal to begin, stand up to a full stand position and then sit back downagain so as your bottom fully touches the seat.
4. Keep going for 60 seconds and until I say stop.
5. Get ready and START".

Scoring

On the signal to begin, start the stop watch. Count the total number of chair stands(up and down equal's one stand) completed in 60 seconds. If a full stand has beencompleted at 60 seconds (i.e. standing fully erect or on the way down to the sittingposition), then this final stand is counted in the total.

The participant can stop and rest if they become tired. The time keeps going.

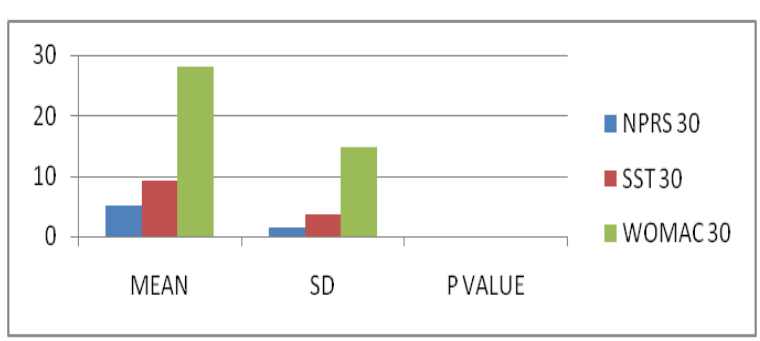
If a person cannot stand even once then the score for the test is zero.

Next, allow the hands to be placed on their legs or use their regular mobility aid. Ifthe person can stand with adaptions, then record the number of stands as anadapted test score (see score sheet). Indicate the adaptations made to the test.

RESULT

Here in this study we have involved 30 individuals to find out the correlation betweenpain, strength and functional disability. The mean of NPRS, SST and WOMAC wasfound to be 5.2,9.067,and 28.1 respectively.In this study we have taken Karl Persons Spearmen's test. We found correlationbetween NPRS AND WOMAC which has positive correlation. Second we have foundinverse correlation of NPRS and SST. Third we have found correlation of WOMACand SST which also has inverse correlation. So it says that as pain increasesfunctional ability decreases and second correlation says that ass pain increasesstrength decreases third correlation says that as strength deceases functional abilityof osteoarthritis knee decreases.

COMPONENTS	NPRS	SST	WOMAC
NO OF PARTICIPANTS	30	30	30
MEAN	5.1	9.1	28.1
SD	1.34	3.54	14.72
P VALUE	<0.0001	<0.0001	0.0001



DISCUSSION

This study correlates quadriceps strength, pain and functional disability amongosteoarthritis knee patients. It is observed that higher levels of quadriceps strengthcorrelate with higher physical activity in knee OA patients.We also found that quadriceps weakness was associated with worsening knee pain.Our evaluation also found out that quadriceps weakness predicts worsening kneepain because the quadriceps muscle is a primary dynamic contributor to knee jointstability.By definition, stability at the knee joint requires internal forces of sufficient magnitudeto counteract external forces acting at the knee. The quadriceps muscle absorbs loads and provides dynamic stability witness of the quadriceps may alter localcontact , stress in a manner detrimental to artricular cartilage. It may also lead toincreases impulse loading, which has been associated with knee pain and maycontribute to knee osteoarthritis.This suggests that if excess loading is predictive of osteoarthritis increasesquadriceps strength may protect the knee. Weakness could reduce shock absorptionand neuromuscular control and impair structural integrity of the knee joint. This maylead to abnormal loading and subsequent structural pathology associated with kneesymptoms, such as bone marrow lesions or bone attrition. Some articles alsomention that exact reason that quadriceps strength does not predict the majority ofvariance in physical activity is unknown but there are likely multiple other factors thatinfluence physical activity in patients with knee OA. Knee OA is a multifactorialcondition that includes injury and disease of multiple joint structures. Strength oractivation of multiple lowerExtremity muscles affect contact forces at the knee, many of which may uniquelycontribute to explaining a portion of the diminished physical activity seenin patients with knee OA. Additionally, the inability to tolerate pain during locomotionmay explain additional variance regarding physical activity, as fear of pain duringambulation may decrease physical activity. Non-physiological factors such associoeconomic status may be associated with lower leisure-time physical activity. Itis possible that severity of joint damage at the time of testing may have contributedto explain a proportion of variance among osteoarthritis knee patients. Although theassociation between OA progression and strength is not clear, quadricepsweakness remains a hallmark physical impairment. This is what are study containsalong with the contradictions we found in research done by others.

LIMITATIONS OF THE STUDY

- Only 35-65 age groups of people were selected in this study.
- Small sample size was taken for study i.e. 30
- As man oeuvres are to be performed by the subject, the result greatly depends
- On confidence level and skill of subjects.
- Excessive repetitions if performed by the subject can lead to exertion whichaffects the result.

FURTHER RECOMMENDATION

- The study can be carried out on more number of subjects
- Other tests like using dynamometer, sea bags isometric exercise can also beselected for this study.
- In sequence further interventional studies may be done on quadricepsendurance and neuromuscular control of the same.
- Longitudinal studies of this component can help to see their effect onprognosis of osteoarthritis knee.

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