



Assessment of Quadriceps Muscle Strength among Older adults with Knee Osteoarthritis

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ABSTRACT

Background: Osteoarthritis (OA) of the knee, generally referred to as degenerative joint disease of the knee, is frequently brought on by wear and tear as well as the gradual loss of articular cartilage. Most often, it affects the elderly. One of the main reasons of disability in older adults is knee osteoarthritis (OA), which is characterized by lessened knee flexion angles (KFA) and external knee flexion moments (KFM) during the stance phase.

Objective: The purpose of this cross sectional study was to determine assessment of Quadriceps muscles potency among patients with Knee Osteoarthritis.

Methodology: This cross sectional learning was held in Gujrat, Pakistan. Data of 267 patients was taken from Aziz Bhatti hospital, Allied hospital and from City hospital. Manual muscle testing was used to check the quadriceps power in knee osteoarthritis patients

Results: 267 participants were added in study. Both males and females were added with diagnosed knee osteoarthritis. Grade 3 commonly results in knee osteoarthritis patients with weak quadriceps strength. Grade 4 and 5 are less in common.

Conclusion: Quadriceps strength strikingly declines in older persons with knee osteoarthritis. Grade 3 is constantly noticed. Patients among grades 4 and 5 are also suffering but with a lesser amount of percentage

Keywords: knee osteoarthritis, quadriceps muscle strength, older adults.

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INTRODUCTION

The physiological and anatomical state of all organs, including muscle strength, is altered as we age due to a number of co-morbidities. As people age, their muscle mass and strength decline, this causes the skeletal muscles' mechanical characteristics to decline.¹ One of main source of impairment in aged adults is knee osteoarthritis (OA), which is characterized by compact knee flexion angles (KFA) and external knee flexion moments (KFM) during the stance phase.² Medial knee joint osteoarthritis (OA) is a long-term declinatory condition of knee joint that worsens by means of age. It can considerably limit daily activities like level walking and cause a loss in knee function. In the United States, 37 percent of persons aged 60 or older have X ray photograph support of knee OA, with 12% of these

adults exhibiting symptoms.³

Potential contributing causes to OA-related gait asymmetries include lower limb muscular weakening and asymmetry. Knee OA is characterized by weak quadriceps and hip abductor muscles, and contraction of these muscles contributes to three-dimensional control of centre of collection during typical walking. Gait asymmetry is accompanied by OA-related biomechanical abnormalities.⁴

Frailty refers to ideas about how the body deteriorates with age in relation to ageing. It includes the biological symptoms of diminished reserve and resistance to stresses, as well as the physiologic changes that cause poor health outcomes such a deterioration in physical and mental function.⁵



The most prevalent orthopedic condition affecting this proposed that balance impairment and increased falling joint is knee joint osteoarthritis (OA). Age is a feature in the risk in elderly due to age related alterations and disease-clinical care of Osteoarthritis joint; this condition has a related actions.⁹ Activities of daily living (ADL), such as significant effect on function and independence, including standing up, sitting down, ascending stairs, and walking, restrictions on mobility and household chores. Recent heavily rely on the quadriceps. In aged adults, quadriceps studies link muscular weakness, notably in the quadriceps weakness has been linked to worse ADL performance and and hamstrings, to the functional decrease in OA.⁶ A higher frequency of falls.¹⁰ Women's knees are especially number of earlier researches have documented distinct susceptible to the onset of OA. The feminine predilection hazard aspect linked with occurrence and sequence of in this condition explain by risk factors that are different knee OA joint, complex illness. These factors included for men and women. These include sex difference that power of quadriceps, alignment of knee joint, influence joint loading, such as pelvic size, morphology of osteoporosis, hormones, genes, age, gender, traditions, knee, angle of quadriceps muscle (Q angle), and strength obesity, smoking, profession, existence of knee traumas, of neuromuscular, as well as differences in strength of metabolism illnesses, and others. Frequency and quadriceps, mass of higher fat and minor strength succession of knee OA joint may be significantly influenced collection in women, and knee joint steadiness/inflexibility by mechanical element such weight of body, alignment of as effect of decreased neuromuscular strength and knee joint, firmness of joint, density of bone, lower limb increased ligamentous laxity.¹¹

muscular vigor, push during walking, and adduction Autumn episodes among community members, especially moment.⁷ Quadriceps muscle weak spot has recently been the elderly, were not infrequent. Additionally, an analysis connected to incidence symptomatic knee joint OA in based on the Cochrane database found that the addition to causing discomfort and disability in people with community's elderly residents fall every year at a rate of OA of knee. One vital factor in formative impairment is about 30%.¹²

weakening of quadriceps muscle, a major clinical It would be rational to use "knee joint pain" as first indication of OA. Strength of quadriceps muscles been presenting symptom when estimating population burden demonstrated to be able of increasing bodily purpose in of knee joint osteoarthritis in elder people. Age grouping is those suffering from condition. Adequate quadriceps helpful for diagnosis. Osteoarthritis is not most recurrent strength appears to be required in those with knee joint basis of knee joint discomfort in people under age of 55; OA to undertake actions of daily life.⁸ Falls and balance more frequent reasons include injury to the ligaments, issues are crucial functional status indicators for elderly cartilage, and soft tissue surrounding the joint. These adults. These problems restrict senior people's movement, injuries may be relevant to main prevention of knee joint which increases reliance, raises healthcare expenditures, osteoarthritis and risk factor for consequent and lowers quality of life in terms of health. It has been osteoarthritis.¹³

Osteoarthritis (OA) is a degenerative joint condition that (GJH), a disease characterized by an excessively high ROM in impairs movement, creates joint stiffness and is painful. Its joints, is biomechanical component that may contribute to association with getting old and more prone to happen in joint pain and OA even though OA is frequent in all joints that have worked over years. Lumbosacral spine and individuals.¹⁷

Cervical, knee, hip, and first metatarsal phalangeal joint are The rationale of this study was to evaluate link among the joints most frequently afflicted by it. OA is the most strength of quadriceps in persons with knee joint prevalent kind of arthritis.¹⁴

osteoarthritis. The course of knee OA and functional The knee joint is most repeatedly afflicted by OA, which deterioration are predicted by quadriceps muscle weakness; frequently leads to disability. Knee OA syndrome therefore, therapies to increase power of quadriceps muscle characterized by presence of discomfort, which frequently can help with knee OA symptoms as well as function. correlates with laboratory and radiographic results. A Endurance of quadriceps assessment is crucial constituent significant portion of the clinical symptoms that result in of managing knee joint OA. And can assist clinicians in disability are brought on by OA of the knee.¹⁵

identifying patients who might benefit from focused The significance of depressive symptoms in knee OA exercise programmers. Patients with knee OA frequently participants is now more understood. With 20 percent experience quadriceps muscle weakness, which can prevalence rate, progressive symptoms are significant co exacerbate joint instability and raise the risk of falls and morbidity in grown-up persons with knee joint OA.¹⁶

other problems. Additionally, weak quadriceps muscles A primary source of disability, osteoarthritis (OA) is disabling might result in unnatural biomechanics and gait patterns. and painful condition of joint. General joint hypermobility



Table 1: Frequencies of Variables

Variables		n (%)
Age of participants		267
	Mean value	63
	Standard deviation	8.17
Gender	Male	69 (25.8%)
	Female	198 (74.2%)
BMI	Under weight	9 (3.4%)
	Normal weight	102 (38.2%)
	Over weight	128 (47.9%)
	Obese	28 (10.5%)
Manual muscle testing Right Knee	Grade 3	160 (59.9%)
	Grade 4	82 (30.7%)
	Grade 5	25 (9.4%)
Manual Muscle Testing Left Knee	Grade 3	148 (55.4%)
	Grade 4	82 (30.7%)
	Grade 5	37 (13.9%)

MATERIAL AND METHODS

Selection and description of participants: A descriptive cross sectional study was carried out involving diagnosed knee osteoarthritis older adults. Data was collected from Aziz Bhatti hospital, city hospital of Gujrat. Total 267 male and female were evaluated by using non probability convenient sampling technique. Diagnosed knee osteoarthritis patients were taken from age 45 and above.

A Performa used to get demographic data including name, age, gender, weight and height. Their BMI was calculated. Tool MMT (Manual Muscle Testing) was used to check the quadriceps strength in knee osteoarthritis patients.

Technical Information: Body Mass Index (kg/m²) of the participants was calculated by measuring their

Weight in kilograms and height in meters. A measuring tape was used to measure their height by asking the patient to stand erect without shoes and a weight machine was used to measure their weight by asking the participants to stand bare footed on it.

Statistics: SPSS (Statistical Package for Social Sciences) software version 25 was used to entered and analyzed data. In this descriptive analysis, for quantitative variables mean and standard deviation were calculated while for



qualitative variables frequency and percentages were calculated. And an appropriate statistical test was applied for inferential statistics. All the results of this study were calculated at 95 percent confidence interval and P-value <0.05 was considered to be significant value.

RESULTS

The results have been obtained after analyzing the data to evaluate the assessment of quadriceps muscle strength in older knee osteoarthritis patients. Total 267 patients, males and females were added with diagnosed knee osteoarthritis. Grade 3 commonly results in knee osteoarthritis patients with weak quadriceps strength. Grade 4 and 5 are less in common.

DISCUSSION

The purpose of this study was to determine the assessment of quadriceps strength among older adults with knee osteoarthritis in city Gujrat of Pakistan. Individuals included in this study were 267 with an age group of 45 and above. Both male and female participants were added in this study. Diagnosed knee osteoarthritis males and females were included. Manual muscle testing was done to obtain the results.

In 2019, a study was conducted on the study of The Importance of Functional Hamstrings/Quadriceps Ratios in Knees Osteoarthritis. This study demonstrated that patients with knee OA have weak quadriceps and hamstrings(32). My research shows that quadriceps weakness is a hallmark impairment of knee osteoarthritis. Patients with weaker quadriceps strength largely suffer from Grade 3.

A study was conducted on reduced quadriceps strength relative to body weight a cross sectional study. In women but not in men, knee OA was linked to an increase in body weight(37). The significant findings of my research exhibit that 25.84% of the participants were male and 74.16% were female. This shows that females are more prevalent and more prone to this disease as compared to men.

A study was conducted on quadriceps muscle strength, radiographic knee osteoarthritis and knee pain. The strong correlation between quadriceps muscle strength and knee discomfort was found (38). My research shows that quadriceps strength drastically decreases in older adults with osteoarthritis. Half of the percentage of my result is linked with grade 3 because most

of the participants were suffering from grade 3 which is full range of motion against gravity.

A study was conducted on Body composition is more closely related to development of knee osteoarthritis in women than men: a cross sectional study. In women, knee OA was more closely connected with lower extremity muscle mass than fat(45). Knee osteoarthritis patients are more likely to bear muscular pains. Women are more addictive towards this disease because of early degenerative changes. Grade 3 is most commonly found in my study whereas grade 4 and 5 were less in amount as compared to grade 3.

A study was conducted on Relationships between pain, functions and radiograph findings in osteoarthritis of knee: a cross sectional study. The patients were 56.98 years old on average, and the disease had been present for an average of 4.14 years. The degree of disability experienced by people with knee OA may be influenced by knee pain, stiffness, and the severity of the disease(47). My research involves the age group of 45 and above older adults with diagnosed knee osteoarthritis. Pain during manual muscle testing helps in identifying the muscle grade.

The findings of my study shows that knee osteoarthritis patients have frequently reduced quadriceps strength. Mostly females are involved in this disease because of early degenerative changes as compared to men. The dramatically decreased quadriceps strength in older adults with knee osteoarthritis patients has a frequent percentage of Grade 3. Patients in grades 4 and 5 experience pain as well, though at lower percentage of 30 and 13 respectively.

Grade 3 of manual muscle testing is contemplated the mid range for muscle strength because in this case, participants complete their range of muscles against gravity. Most of the participants of my interest according to study included in this stage. Against reasonable resistance, persons perform a complete range against gravity but with full range of motion. Patients in this type of grade which is 4 were less in number than 3. They also experience pain and stiffness but can complete their range against resistance.

Women and men were involved but women with greater range were include in it because of the joints and cartilages. With increasing age, body transform itself and becomes lean. Stress and



pressure becomes unbearable for lean and weak body. Females with greater pelvic region and changes in their pregnancy periods affect the changes in body's osteoarthritic changes.

Last grade which is 5, consider patients who are able to go through their full range of motion as the practitioner exerts resistance. This stage was also less in my research. Grade 3 was comparatively higher than other grades.

Grade 0 is the no contraction of muscle but this is not felt in knee joint osteoarthritis. Muscle does not flicker. No palpation occurs in 0 grade. In grade 1 there is flickering contraction of muscle. In grade 2 full ROM with gravity counter balance that is gravity eliminated.

My work contains 267 patients of gender, males as well as females. Males were less in number than females but they both showing grade 3 with variably increase ratios. Strength of quadriceps muscles were drastically decreases in those patients. Lesser amount of grade 4 and 5 but higher amount of grade 3 was obtained. Those patients learn the procedure to check manual testing of muscle hardly but showed significant results of grade 3.

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