



ISSN Print: 2394-7500
 ISSN Online: 2394-5869
 Impact Factor: 5.2
 IJAR 2019; 5(4): 209-212
 www.allresearchjournal.com
 Received: 07-02-2019
 Accepted: 09-03-2019

Dr. Abhijeet Manohare
 MPT Community
 Physiotherapy, Dr. A. P. J.
 Abdul Kalam College of
 Physiotherapy, PIMS (DU),
 Loni BK, Maharashtra, India

Dr. Deepali Hande
 Associate Professor,
 Community Physiotherapy,
 Dr. A. P. J. Abdul Kalam
 College of Physiotherapy,
 PIMS (DU), Loni BK,
 Maharashtra, India

Hamstring and quadriceps muscles strength in knee osteoarthritis patients among older adults

Dr. Abhijeet Manohare and Dr. Deepali Hande

Abstract

Background: Osteoarthritis (OA) is degenerative joint disease. It is a common chronic and most common musculoskeletal condition worldwide and most common leading cause of disability among older adults resulting in pain, fatigue, functional limitations Increased healthcare utilization and high economic costs to society and impact on quality of life Worldwide estimates reported 9.6% of men and 18.0% of women aged ≥ 60 years have symptomatic osteoarthritis and US and European's Radiographic studies reported populations aged >45 years show higher rates for OA knee in that 14.1% for men and 22.8% for women have OA knee. Indian Council of Medical Research sponsored multi-centre study on, 'epidemiology of musculoskeletal conditions in India' in 2012 reported that percentage of OA patients are in the category of moderate severity and they varied from 40.5% to 66.5%.

Materials and method: This observational study was conducted in older adults and the data was collected from Dr. A.P.J. Abdul Kalam College of physiotherapy Tal. Rahata dist. Ahmednagar district. The objective of this study was to check strength in hamstring and quadriceps muscles in patients of OA knee in older adults by using quadriceps chair.

Result: In present study (comprised of mainly patients from out of state) there was 75% of male and 25% of female in case group. The patients who were recruited with knee OA the BMI mean was $25.35 \text{ kg/m}^2 \pm 6.38$ and in normal group it was $22.65 \text{ kg/m}^2 \pm 4.72$ which was high in case group compare to normal group but statistically there was no significant difference in BMI between two group ($p = 0.135$). This is because of the fact that the effect of obesity on OA has increased the mechanical loading of the knee and hip which lead in cartilage damage in this weight bearing joints.

Conclusion: Patients with OA knee have reduced strength of quadriceps and hamstrings muscles compare to normal individual. The overall deficits in quadriceps strength are 62 % (range - 0% to 88%) and in hamstrings are 55 % (range - 0% to 75%). Study also concluded there is no significant difference in Q/H ratio probably because both quadriceps and hamstrings muscles strength is reducing similarly.

Keywords: Quadriceps, hamstring, OA knee, older adults

Introduction

Osteoarthritis (OA) is degenerative joint disease ^[1, 2, 3]. It is a common chronic and most common musculoskeletal condition worldwide ^[2] and most common leading cause of disability among older adults ^[4] resulting in pain, fatigue, functional limitations ^[4, 5, 6, 7], increased healthcare utilization and high economic costs to society and impact on quality of life ^[2, 5, 6]. Worldwide estimates reported 9.6% of men and 18.0% of women aged ≥ 60 years have symptomatic osteoarthritis and US and European's Radiographic studies reported populations aged >45 years show higher rates for OA knee in that 14.1% for men and 22.8% for women have OA knee ^[8]. Indian Council of Medical Research sponsored multi-centre study on, 'epidemiology of musculoskeletal conditions in India' in 2012 reported that percentage of OA patients are in the category of moderate severity and they varied from 40.5% to 66.5% ^[9]. The cause of OA remains unknown ^[5]. The major risk factors are age, obesity, joint trauma, and heavy work load ^[10]. The risk factors can be divided into systemic (for e.g. age, gender, genetics, and overweight) and local biomechanical factors such as joint injury, malalignment, overweight, muscle weakness, abnormal mechanical loading during various sport activities or during heavy work ^[1, 5, 10, 11]. Risk of OA is increasing with age ^[5, 8]. Worldwide estimates are that 9.6% of men and 18.0% of women aged >60 years have symptomatic osteoarthritis ^[8, 11]. According to the author Behzad Heidari *et al.* the prevalence of OA is increased significantly with age,

Correspondence

Dr. Abhijeet Manohare
 MPT Community
 Physiotherapy, Dr. A. P. J.
 Abdul Kalam College of
 Physiotherapy, PIMS (DU),
 Loni BK, Maharashtra, India

risk of OA knee increases in woman mostly after menopause [11]. Occupational activities that physically load the joint like squatting and kneeling, regular heavy weight lifting, climbing and high physical workload contribute in occurrence and or progress the disease [11, 12]. Occupation involving squatting or kneeling more than two hours daily were associated with two-fold significantly increased risk of moderate to severe radiographic knee OA [11]. Obesity is also a major risk factor for the incidence of bilateral knee OA. The effect of obesity on OA has been thought to be mediated through the increased mechanical loading of the knee and hip. This would lead in cartilage damage in these weight-bearing joints [5]. Joint injury increases the risk for developing of knee OA, compared to healthy controls, it is 5 to 6 fold risk as per Ashraf Ramadan Hafez [5] *et al*, according to Behzad Heidari [11] *et al* the risk increases by 2.6 times after meniscal injury & surgery. Pain is the predominant symptom of knee OA [4, 5]. Pain generally related to joint use and relief with rest. As OA progresses, pain may become more persistent and can appear also at rest and during the night. There is tenderness around knee joint line, crepitus, morning stiffness and restricted ROM due to osteophyte formation, reduced muscle strength and wasting, swelling. As OA progresses deformities also seen, Patients find difficulties in squatting, waking, stair climbing, cross leg sitting and slowness of movement seen [1, 4, 5, 6, 7, 11]. Two major muscle of thigh inserted around knee joint are hamstrings and quadriceps which play important role in knee flexion and extension [6]. These muscles also provide dynamic stability to the knee joint [5, 6, 13]. A numbers of studies supported that individual with OA knee markedly appears with weaker quadriceps [1, 4, 6, 7, 13, 14, 15, 16]. Quadriceps and hamstring weakness is clinically important because in individuals with OA quadriceps and hamstring weakness is associated with impaired dynamic knee stability and physical function, as both hamstring and quadriceps muscle works concentrically and eccentrically in walking, standing, stair climbing squatting, getting up from the chair, toileting [4, 17]. Weaker quadriceps and have been associated with an increased rate of loading, higher loading rates may initiate knee OA or cause progression of existing disease [4, 16].

Muscle weakness in knee OA is not limited to the quadriceps. Other lower limb muscles including the hip abductors and adductors are also weaker and these muscles may play a role in disease pathogenesis and people with a lower external hip adduction moment (possibly from weaker hip abductor muscles) demonstrated more rapid knee OA progression [18, 19]. The exact mechanism by which hip abductor and adductor muscles may influence medial knee loading is unclear [18]. Many studies find quadriceps strength reduced 25% to 60% [16, 17, 20, 21] and Hamstring strength is reduced 20 % to 30% in cases with OA [17].

Materials and method

Total forty one participants both male and female who were included in the study. Participants were screened

according to the inclusion and exclusion criteria. Participants with age group in older adults, who have OA knee and willing to participate were selected for the study. Participants with physical and cognitive limitation and surgery around knee were excluded from the study.

The study received approval from Institutional Ethical Committee of Dr. APJ Abdul Kalam College of Physiotherapy, Pravara Institute of Medical Sciences (DU), Loni. Written informed consent was taken from all the participants selected for the study.

Procedure

The study received approval from Institutional Ethical Committee of Dr. A. P. J. Abdul Kalam College of Physiotherapy, Pravara Institute of Medical Sciences, Loni. Total twenty participants (n=41) were selected and screened according to inclusion and exclusion criteria. Informed written consent form was obtained from the patient.

Outcome measure

The specific assessment was computed by using 1 RM for Isotonic hamstring strength and isotonic quadriceps strength in older adults.

Data analysis and result

Age	30-40	40-50	50-60	>60
Percentage	21.95%	31.71%	24.39%	21.95%

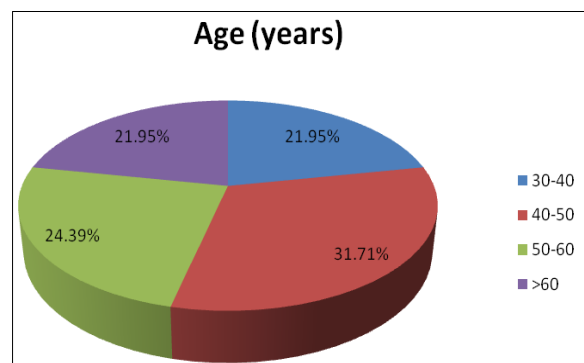


Fig 1: Percentage wise distribution of Subject Age

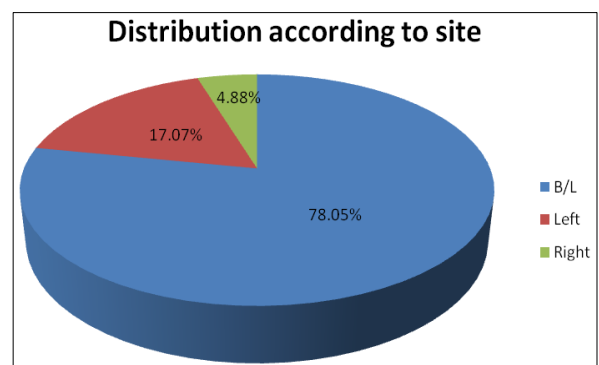


Fig 2: Percentage wise distribution of subject according to site of knee OA

Table 1: Baseline characteristics

	No	Minimum	Maximum	Mean	Std. Deviation
Age	41	30	70	50.49	10.861
BMI	41	19.0000	43.0000	27.05	4.3910440
NPRS on rt side	35	2	8	4.83	1.524
NPRS on lt side	38	0	8	4.26	1.688

Table 2: Correlation of Age and duration of OA

N	Age		Duration of OA		Pearson Correlation (r)	P-value
	Mean	SD	Mean	SD		
41	50.49	10.861	2.1159	2.09734	.573	.000

Table 3: Pain (component of WOMAC) and Total score (Modified WOMAC)

N	Component of pain		Total WOMAC		Pearson Correlation (r)	P-value
	Mean	SD	Mean	SD		
41	9.76	3.55	50.37	15.274	.884	.000

Table 4: Stiffness (component of WOMAC) and Total score (Modified WOMAC)

N	Component of stiffness		Total WOMAC		Pearson Correlation (r)	P-Value
	Mean	SD	Mean	SD		
41	3.78	1.837	50.37	15.274	.767	.000

Table 5: Physical Function (component of WOMAC) and Total score (Modified WOMAC)

N	Component of Physical Function		Total WOMAC		Pearson Correlation (r)	P-Value
	Mean	SD	Mean	SD		
41	36.78	10.946	50.37	15.274	.986	.000

Table 6: Correlation of NPRS and Modified WOMAC Score

NPRS		Total score (Modified WOMAC)
Right side on movement	Pearson Correlation	0.789
	P-value	<0.001
	N	35
Left side on movement	Pearson Correlation	0.557
	P-value	<0.001
	N	38

Table 7: Correlation of BMI and modified WOMAC Score

N	BMI		Total WOMAC		Pearson Correlation (r)	P-value
	Mean	SD	Mean	SD		
41	27.05	4.39	50.37	15.274	.126	.432

Discussion

A number of studies have reported significant reduction in strength of muscles surrounding the knee joints of patients with OA [7, 4, 19]. The present study was planned also to check the strength of hamstring and quadriceps muscles in OA knee patients to compare it with normal individual especially because squatting is common activity amongst Indians. In the present study there were 20 OA knee patients and 21 normal individual and both group were homogenous. (Table 1) In present study strength of quadriceps and hamstrings muscles were measured by 1 RM method, and we found reduction in strength of quadriceps and hamstrings muscle compare to normal individual.

The prevalence of OA increases with age [5, 11]. Recent US data demonstrated that half of people with symptomatic knee OA are diagnosed by age 55 years [5, 11]. There is growing recognition that OA affects people at younger ages [5]. In the present study the age range of the patients with OA was 30 to 70 years (mean 50.25±10.76), number of patients <45 were 9.

In present study (comprised of mainly patients from out of state) there was 75% of male and 25% of female in case group. The prevalence rate has been seen to be significantly higher among women than in men [11]. Worldwide estimates are that 9.6% of men and 18.0% of women aged >60 years have symptomatic osteoarthritis. Radiographic studies of US and European populations aged >45 years show higher rates for osteoarthritis of the knee: 14.1% for men and 22.8% for women [8].

In this study the patients who were recruited with knee OA the BMI mean was 25.35 kg/m² ±6.38 and in normal group it was 22.65 kg /m²±4.72. In present study BMI is high in case group compare to normal group but statistically there was no significant difference in BMI between two group (p =0.135). Many authors [5, 13, 14, 11] have reported that Knee OA is more common in obese subject than in subjects of normal weight. The effect of obesity on OA has been thought to be mediated through the increased mechanical loading of the knee and hip. This would lead in cartilage damage in this weight bearing joints [5].

Conclusion

- Patients with OA knee have reduced strength of quadriceps and hamstrings muscles compare to normal individual. Overall deficits in quadriceps strength are 62 % (range - 0% to 88%) and in hamstrings are 55 % (range - 0% to 75%). There is no significant difference in Q/H ratio probably because both quadriceps and hamstrings muscles strength is reducing similarly.

Limitations

In the present study, the duration of the intervention was short term, small sample size and unequal number of males and females were taken. Participants were included Individuals who having OA Knee.

Suggestions for future research

Further study with addition of intervention to improve the

balance in older adults and community access is suggested. Also this study only includes the people who having OA knee.

References

1. Maheshwari J. Essential orthopaedic 3rd edition, 35, 252-253.
2. Serrao PR, Gramani-Say K, Lessi GK *et al.* Knee extensor torque of men with early degree of osteoarthritis is associated with pain, stiffness and function. *Rev Bras Fisioter.* 2012; 16(4):289-94.
3. Valderrabano V, Steiger C. Treatment and Prevention of Osteoarthritis through Exercise and Sports. *Journal of Aging Research.* 2011, 6, Article ID 374653
4. Alnahdi AH, Zeni JA, Snyder-Mackler L. Muscle Impairments in Patients with Knee Osteoarthritis. *Sports Health.* 2012; 4(4):284-292.
5. Hafez AR, Alenazi AH, Kachanathu SJ *et al.* Knee Osteoarthritis: A Review of Literature. *Phys Med Rehabil Int.* 2014; 1(5):1-8.
6. Johani AH, Kachanathu SJ, Hafez AR *et al.* Comparative Study of Hamstring and Quadriceps Strengthening Treatments in the Management of Knee Osteoarthritis. *J Phys. Ther. Sci.* 2014; 26(6):817-820.
7. Emrani A, Bagheri H, Hadian MR *et al.* Isokinetic Strength and functional Status in Knee Osteoarthritis. *J Phys. Ther. Sci.* 2006; 18(2):107-114.
8. Woolf AD, Fleger BP *et al.* Burden of major musculoskeletal conditions. *Bulletin of the World Health Organization.* 2003; 81(9):646-656.
9. Epidemiology of musculoskeletal conditions in India, Indian council of medical research, 2012.
10. O'Reilly SC, Adrian J, Muir KN *et al.* Quadriceps weakness in knee osteoarthritis: the effect on pain and disability. *Ann Rheum Dis.* 1998; 57:588-594.
11. Heidari B. Knee osteoarthritis prevalence, risk factors, pathogenesis and features: Part I. *Caspian J Intern Med.* 2011; 2(2):205-212.
12. Palmer KT. Occupational activities and osteoarthritis of the knee. *British Medical Bulletin.* 2012; 102:147-170.
13. Segal NA, Zimmerman MB, Brubaker M *et al.* Obesity and Knee Osteoarthritis Are Not Associated with Impaired Quadriceps Specific Strength. *PM R.* 2011; 3(4):314-323.
14. Segal NA, Natalie A, James Torner *et al.* Quadriceps weakness predicts risk for knee joint space narrowing in women in the MOST cohort. *Osteoarthritis Cartilage.* 2010; 18(6):769-775.
15. Adegoke BOA, Mordi EL, Akinpelu OA *et al.* Isotonic Quadriceps-Hamstring Strength Ratios of Patients with Knee Osteoarthritis and Apparently Healthy Controls. *African Journal of Biomedical Research.* 2007; 10:211-216.