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Prevalence of self-reported knee instability to physical functions in patients of knee osteoarthritis

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Abstract
knee instability is associated with activity limitations in patients with knee osteoarthritis (OA), in addition to knee pain and muscle strength.
Aims & Objective: "To study the prevalence of self-reported knee Instability to physical-function in patients with knee Osteoarthritis.
Method: 50 subjects diagnosed with osteoarthritis knee were included in the study. Functional status of patient was evaluated using WOMAC index scale. The data was collected by questionnaire form and was analyzed using SPSS 14.0 and graph pad 6.7 version. Correlation of Physical Function, Stiffness, Pain and Get up and Go test was done using Pearson correlation coefficient.
Result: 28% of cases were in the age group between 40-50 years and 20% were more than 50-60 years. 30% was between 60-70 and 22% were above 70 years. The correlation between the Principal component score for physical function & age is non-significant with P value 0.226. The correlation between the Principal component score for physical function & sex is significant with P value <0.001, The correlation between the Principal component score for physical function & pain is significant with P value 0.025,The correlation between the Principal component score for physical function & no. of years diagnosed as knee OA is significant with P value <0.00). The correlation between the principal component score for physical function & knee range of motion is significant with P value 0.0003 for flexion and 0.0137 for extension. The correlation between the Principal component function & Quadriceps torque is significant. o score for physical with a P value <0.001 The correlation between the Principal component score for physical function & ADL score is significant with P value <0.00°1
Conclusion: From the present study it is concluded that the result indicates that individuals with knee osteoarthritis report, episodes of knee instability during activities of daily living. Instability affects physical function which can be explained by contributions from other impairments such as knee pain, range of motion and quadriceps strength.

Keywords: ADL, visual analogue scale (VAS) WOMAC, knee instability

Introduction
Osteoarthritis, the word is derived from the greek word "osteo", meaning "of the bone", "arthro", meaning "a joint", and "itis", "inflammation" [1].
Given the central role of the knee in activity, instability may influence what an individual perceives she/he can do and chooses to do. Such choices may in turn influence which skills are maintained, aerobic capacity and conditioning, and ultimately the risk of disability. Via such paths, knee instability may impact quality of life in knee OA[2]. Because lack of confidence may cause people with knee OA to alter activity to avoid buckling, evaluation of knee confidence provides an additional approach to capture buckling impact. Notably, self-reported knee instability and greater varus-valgus joint motion during gait were both associated with worse knee confidence in a recent study [3]. In the instability spectrum, confidence and the memory of a buckling experience may particularly influence nature and intensity of activity. It is not known whether these variables are more important to outcome than instability measured during gait [4].
Clinical osteoarthritis consists of joint symptoms plus evidence of structural change usually demonstrated in Radiograph. In pathologic studies, osteoarthritis might be characterized as severe, localized cartilage erosion extending to the bone. In most epidemiologic studies, although not all, osteoarthritis is assessed through radiologic evaluation [2-4].
Knee osteoarthritis is a prevalent condition that contributes significantly to functional limitation and disability in elderly population [3, 4]. Physical impairment such as knee pain, loss

of knee motion and decreased quadriceps torque have been associated with knee osteoarthritis and are believed to contribute to physical disability and progression of disease [4, 5]

Framingham study suggest that symptomatic knee osteoarthritis occurs in 6.1% of adult age 30 and over. Before age of 50years, men have higher prevalence and incidence of this disease than women, but after age of 50, women have higher prevalence and incidence [6]. These sex and age related prevalence patterns are consistent with the role of postmenopausal oestrogen deficiency in increasing risk of osteoarthritis [2, 3, 7].

Increase in life expectancy and ageing population are expected to make osteoarthritis 4th leading disability by 2020 [2]

Aims & Objectives

"To study the prevalence of self-reported knee Instability to physical-function in patients with knee Osteoarthritis"

Material & Methodology

Study Design: Observational Study

Study Setting: Datta Meghe College of Physiotherapy, Wanadongari, Nagpur.

Study Period: 4 months

Sample Population: 50 symptomatic patients of osteoarthritis of knee reporting to OPD of Datta Meghe College of Physiotherapy, Nagpur.

Materials Used

Goniometer, Hand Odd dynamometer, Measuring tape, Weighing machine, Stopwatch.

Inclusion Criteria:

- Age >= 40 years
- Diagnosed as OA knee by physician
- Morning stiffness > 30minutes
- Crepitus with active motion of knee

Exclusion Criteria:

- Patients with limitation in knee motion Total knee arthroplasty
- Patellar tendon auto graft ACL reconstruction Patellar fracture
- Prolonged corticosteroids injections in patellar and quadriceps tendon

Procedure

Before participation all the subjects had given a consent letter for a participating in the study. Data for each subject were collected during one testing session. During this session, subjects first completed a demographic questionnaire.

A self-reported measure of function by ADL scale of knee outcome survey was taken. Then severity of knee pain rated on visual analogue scale (VAS) was recorded as pain at present moment, maximum pain within 24hours and minimum pain within 24 hours. Then the mean was taken. Knee instability rated by WOMAC score was taken.

Following completion of questionnaire physical performance measurement were taken as knee motion, quadriceps strength and get up and go test.

Knee range of motion - First passive then active range of motion was taken. Subject in prone lying at the edge of the table. Axis of goniometer on lateral condyle of femur, stationary arm parallel to lateral midline of thigh and reference as greater trochanter and movable arm parallel to lateral midline of leg and reference as lateral malleolus. Then subjects were asked to flex the knee and flexion range as measured.

Quadriceps strength - Subjects were seated on quadriceps chair. Thigh was stabilized by stabilising belt. A soft pad was tied at the lower one-third of the kg. A hand held dynamometer (4) was placed and the subjects were asked to exert as much force as possible while extending the knee against the resistance and deflection was noted. This procedure w. repeated for four times and mean quadriceps strength was taken. Now, quadriceps torque was measured by following formula:

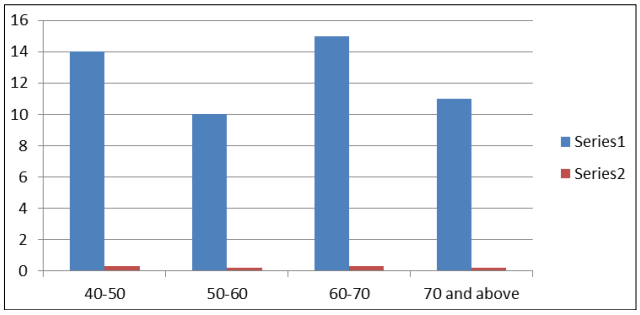
Quadriceps torque mean of quadriceps strength BMI

Get up and go test - Subjects were seated on standard height chair with arm rest. On the command "go" subjects stood up and walked along a level, unobstructed corridor as fast as possible. A stop watch was used to measure the time it took for the subject to stand and walk for 15 meters (7).

Data Analysis

Table 1: Table showing age wise Distribution

Age group	No. of subjects	%
40-50	14	28%
50-60	10	20%
60-70	15	30%
70 and above	11	22%



Graph showing age wise Distribution

Statistical Analysis

There is modest relationship between performance based and self-reported measure of function, these measures may be measuring different aspects of the constructs of physical function. We decided to combine the self-reported and physical performance measures of function to provide a more comprehensive measure of function. The get up and go test score and three components of WOMAC (pain, stiffness and physical function) scores where entered into the principal component analysis.

Principal component analysis allowed on to combine four original variable into a single principle component score of physical function (PCPF) for each subject. This was accomplished by transforming each subjects score on each of the four measures of physical function to a Z score. The Z score for each variable was then multiplied by the principle component score coefficient for that variable. The resulting products were summed to create a principle component score for each subject.

Calculation of the principle component score for physical function

Variable	Component score coefficient	Z score	Component score coefficient Z score
WOMAC Pain	0.177	-0.54117	-0.095
WOMAC Stiffness	0.3868	-0.86164	-0.333
WOMAC Physical Function	0.1556	0.32055	0.0498
WOMAC Get & Go Test	0.1394	0.7542	0.1051

Correlation between the Principal Component

1. The correlation between the Principal component score for physical function & age is non-significant with P value 0.226.
2. The correlation between the Principal component score for physical function & sex is significant with P value <0.001.
3. The correlation between the Principal component score for physical function & pain is significant with P value 0.025
4. The correlation between the Principal component score for physical function & no. of years diagnosed as knee OA is significant with P value <0.00).
5. The correlation between the principal component score for physical function & knee range of motion is significant with P value 0.0003 for flexion and 0.0137 for extension.
6. The correlation between the Principal component function & Quadriceps torque is significant. o score for physical with a P value <0.001.
7. The correlation between the Principal component score for physical function & ADL score is significant with P value <0.00°1

Discussion

This study provides evidence of prevalence of self-reported knee instability to physical function.

This suggests that the knee instability experienced by individuals with knee osteoarthritis is most likely a multifactorial problem. Factors contributing to knee instability are increased capsuloligamentous laxity, structural damage to the knee and altered lower extremity muscular strength and neuromuscular control. Joint laxity results from reduced tension in joint capsule and ligaments, secondary to progressive degenerative changes in the joint and increased joint space narrowing.

Our data indicated that reports of knee instability correlate with limitations in physical function. Functional instability is a symptom that refers to sensation of buckling, slippage or giving may of the knee during functional activities.

Fitzgerald *et al* originally described self-reported instability including giving way, buckling, or shifting of the knee during functional activity as potentially having an effect in OA that could not be accounted for by knee pain or strength. Three previous studies used the same question as we did to ascertain buckling: two of these had a lower frequency [11.8% in the Framingham Osteoarthritis Study and 18.0% in MOST than we found (35.8%), most likely because our cohort all had knee OA while the two previous studies included individuals without OA; the third study described a higher frequency (67%, Amsterdam OA cohort), perhaps due to differences in distribution of disease severity. Previous studies have described a cross-sectional association between buckling and self-reported function, in persons: with knee OA; with and without knee OA; and with knee OA and without knee OA but at higher risk to develop it

G. Kelley Fitzgerald, Sara R. Piva, James J. lrrgang, Sawzi Bouzubar, Terence W. Stutz reported that physical function may be severely affected by weakness of quadriceps muscles in individuals with knee osteoarthritis and our study also reported reduced quadriceps torque.

Hurley M V; Scott D L; Rees J; Newham D J reported that reduced quadriceps motor-neuron excitability contributes to quadriceps weakness and diminishes proprioceptive acuity and our data also reported decreased quadriceps torque.

Conclusion

The result indicates that individuals with knee osteoarthritis report, episodes of knee instability during activities of daily living. Instability affects physical function which can be explained by contributions from other impairments such as knee pain, range of motion and quadriceps strength.

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