VIMS Journal of Physical Therapy

[ORIGINAL ARTICLE]

Correlation Between Hamstring Tightness and Time Duration of Disease in Knee Osteoarthritis: An Observational Cross-sectional Study.

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ABSTRACT :

Background: Osteoarthritis (OA) is gradually developing articular diseases that originate in the cartilage and affects the underlying bone, soft tissues as well as synovial fluid. OA usually occurs late in life and mainly it affects the hand and large weight-bearing joints such as the knee and hip. The knee joint is largely affected due to its weight-bearing nature. In many studies, this functional loss is related to muscular weakness caused by OA in particular the quadriceps and hamstring muscles. Flexibility is the ability of a muscle to lengthen and allow one joint [or more than one joint in a series] to move through a range of motion. The hamstring muscle group have tendency to shorten and the tightening results in increased patello-femoral compressive force, which may eventually lead to patello-femoral syndrome often associated with osteoarthritis.

Method: Seventeen patients with knee osteoarthritis matched with the inclusion criteria were included in the study. Sit and Reach test was used to evaluate the hamstring tightness. Goniometer was used to evaluate knee active range of motion Spearman's correlation was used to determine the relationship between hamstring tightness and duration of disease in knee osteoarthritis.

Result: The present study found significant inverse correlation (r = -0.07) between hamstring tightness and duration of disease such that the hamstring flexibility decreases with increase in the duration of knee osteoarthritis. However, the correlation between duration of disease and knee active range of motion was negligible (r = 0.25).

Conclusion: The results states that hamstring tightness and duration of the disease in knee osteoarthritis are correlated. Further research is indicated with a larger sample size.

Keywords: Knee osteoarthritis, Hamstring tightness, Osteoarthritis.

Introduction

Osteoarthritis (OA) is gradually developing articular diseases that originate in the cartilage and affects the underlying bone, soft tissues as well as synovial fluid. OA usually occurs late in life and mainly it affects the hand and large weight-bearing joints such as the knee and hip. It is associated with pain, joint stiffness, and progressive loss of function and thereby affects daily activities. There are many factors that affect the disease progression of OA. The knee joint is largely affected due to its weight-bearing nature.[1] The prevalence of osteoarthritis of the knee increases with age among persons over age 65.[6] In many studies, this functional loss is related to muscular weakness caused by OA in particular the quadriceps and hamstring muscles.[1] In the intact knee joint, activation of the agonist quadriceps muscle generates an anterior shear force on the tibia relative to the femur and activation of the antagonistic hamstring muscle group counteracts this force, producing joint stability. When the quadriceps is activated to generate power in activities of daily living (ADLs), central command concurrently also activates the hamstrings and spinal reflexes, including reciprocal inhibition, modulate the amount of coactivity.[7] Flexibility is the ability of a muscle to lengthen and allow one joint [or more than one joint in a series] to move through a range of

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motion. The degree of flexibility of the quadriceps and hamstring group of muscle contributes to the smooth and precise ambulatory pattern in the knee joint. Inadequate flexibility predisposes individual to injuries and musculoskeletal dysfunction and it can greatly limit mobility. The hamstring muscle group have tendency to shorten and the tightening results in increased patello-femoral compressive force, which may eventually lead to patello-femoral syndrome often associated with osteoarthritis[2]. As hamstring tightness in patients with OA knee causes functional limitation and pain. Hence, the need of the study is to find if there is correlation between hamstring tightness and time duration of disease in individuals with knee osteoarthritis.[1]

Methodology

Individuals were diagnosed according to the national institute for health and care excellence (NICE) criteria [4]. Eligibility criteria for the participants diagnosed with osteoarthritis knee included their willingness to participate; both male and female having bilateral osteoarthritis of knee joint and coming under 45-65years age group. Patients with any orthopaedic, surgical or neurological disorder in the lower limbs were excluded. After that informed consent was taken from the eligible participants. The data analysis was done on the following outcome measures.

Sit and Reach Test Box (r=0.74)[3].

Active range of motion of knee.

The hamstring tightness was measured by sit and reach test using sit and reach test box (figure 2). Simultaneously, the range of motion of knee joint was also taken with goniometer. The patients were asked to describe the symptoms and its duration. The time duration of the knee osteoarthritis was divided into acute, sub-acute and chronic. The total study duration of the present study was 10 days and total 17 participants were enrolled in the study from the orthopaedic OPD of the physiotherapy department. The sample size was calculated by non-probability sampling method.

Statistical Analysis

Data were analysed using Microsoft excel version 2019 as the data were not normally distributed, Spearman's correlations were used. The duration of the disease was counted in months and the data collected by goniometer and sit and reach box were counted in degrees and centimetres respectively. The correlation was found out between the duration of the disease and active range of motion of the knee

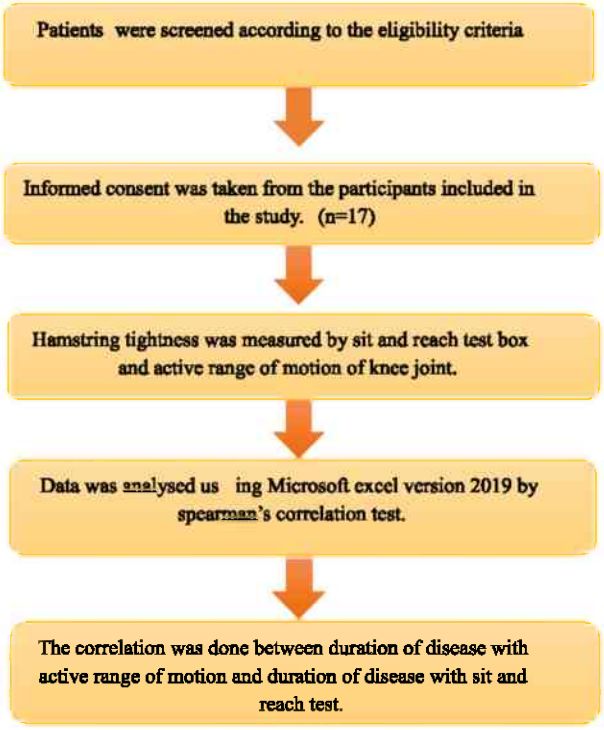

Figure 1. Flowchart of Methodology



Figure 2. Sit and reach test box

Result

Total 17 participants were included in this study from which 11 were female and 6 were male (figure 3).

The mean and standard deviation of the age and outcome measures is given in table 1.

The correlation coefficient of duration of disease with sit and reach test data was found to be r = -0.07 (figure 4). The result showed significant inverse correlation between the hamstring tightness and the duration of the disease such that the hamstring flexibility decreases with the increase in the duration of the knee osteoarthritis. However, the correlation coefficient of duration with the active range of motion of knee joint was found to be r = 0.25 suggesting negligible correlation (figure 5).

Table 1. Baseline Characteristics

	Mean and SD
Age	58.29 ± 10.40
SRB	21.61 ± 8.85
AROM	121.47 ± 15.14

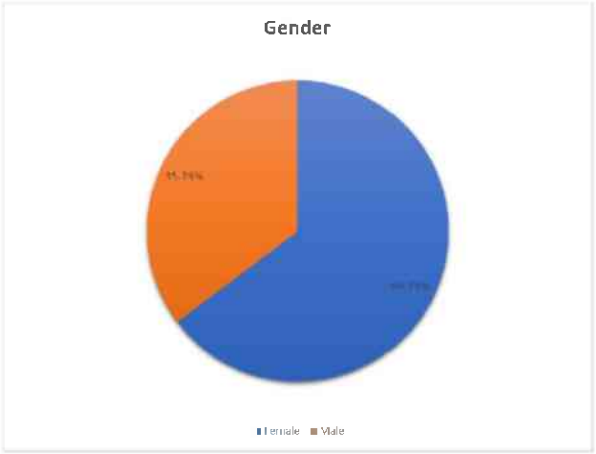

Figure 3. Gender Distribution

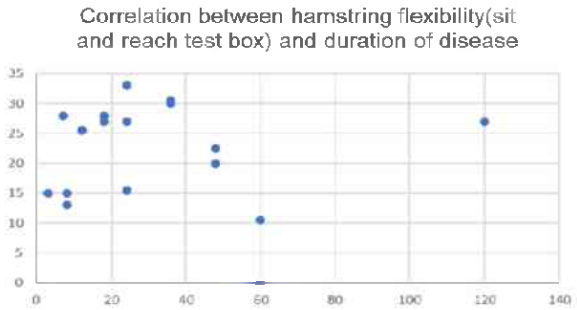

Figure 4. Correlation between duration of knee osteoarthritis and hamstring flexibility

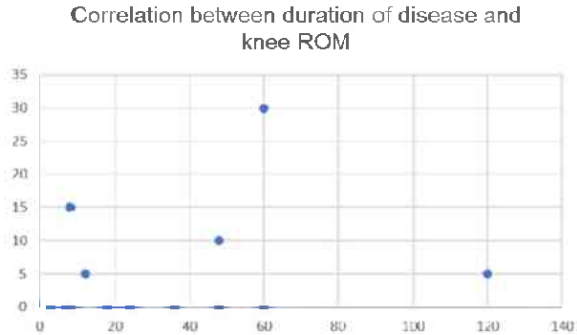

Figure 5. Correlation between duration of knee osteoarthritis and knee ROM

Discussion

The present study focused on finding the correlation between the hamstring tightness and time duration of the disease in the knee osteoarthritis. Total seventeen subjects were included in this study with acute to chronic knee osteoarthritis diagnosed according to the NICE criteria. Participants were checked for hamstring tightness by using sit and reach test box and active range of motion of the knee joint.

The correlation was found between the duration of the disease and active knee range of motion and between duration of the disease with sit and reach test box. The results showed that there is correlation between the hamstring tightness and duration of the disease as such that the hamstring flexibility decreases leading to hamstring tightness along with the increase in the duration of knee osteoarthritis.

Similar results were found in the study conducted by AT Onigbinde et al. showed a positive association between obesity and knee osteoarthritis in some population-based studies while body weight and BMI had also been documented to be consistent predictors of incident of knee osteoarthritis and concluded that the mean hamstring flexibility of subjects with knee osteoarthritis was significantly lower than that of apparently healthy individual [2].

Ozcan et al. reported that hamstring tightness significantly correlated with grade of arthritis in proximal tibio-fibular joint at the knee with severe tibio-femoral primary osteoarthritis [5].

Another study conducted by Sailor S et al. found decrease in hamstring flexibility leads to functional limitations in everyday life. Thus, decrease in hamstring flexibility in patient with osteoarthritis causes functional limitation [1].

However, the present study suggested correlation between the duration of knee osteoarthritis and hamstring tightness.

Conclusion

The present study concluded that the duration of knee osteoarthritis is correlated with the hamstring tightness. However, further research is indicated with a larger sample size.

Clinical Implications

Tightness of hamstring muscle is likely to develop flexion contracture in later stages of OA. Hence, stretching of hamstring should be considered early in the intervention protocol.

Conflict of Interest: There is no conflict of interest.

Abbrevations

NICE - National institute for health and care excellence.

OA – Osteoarthritis

BMI – Basal metabolic rate

ROM – Range of motion

SRB – Sit and reach test box

Acknowledgement: None

Source of Funding: None

Ethical Approval: As the present study is observational, ethical approval was not needed.

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