Reliability of Sit to Stand Test in fall Identification in Knee Osteoarthritis- A Literature Review

Abstract:

Osteoarthritis is the second most prevalent degenerative illness as well as the most frequent joint condition in India. It is one of the most common degenerative disorder of the articular cartilage and surface of weightbearing joints causing disability in elderly patients. Gait, stair-climbing, unipedal stance, and the sitting-to-standing (STS) task have all been shown to be altered in research.Most of the research article had proved that sit to stand test, we can use to physiotherapy department to identify the risk of fall in knee OA patients. Most of the patients had severe knee pain and reduced lower limb muscle strength so, during the test patient may take a long time to complete the test and there is a loss of balance. Due to pain and reduced endurance and loss of balance, the patient may not be capable of completing the test. So, the test is reliable to determine the risk of a fall in knee OA patient.

Keywords: Reliability, Sit to Stand Test,Fall, Knee Osteoarthritis, Literature Review

Introduction

Osteoarthritis is the second most prevalent degenerative illness as well as the most frequent joint condition in India, with a frequency of 22% to 39% [1]. Knee arthritis is anticipated to become India's fourth leading cause of physical impairment. The incidence of knee arthritis in Indians is considered to be up to 15 times greater than in Western countries. This is due to the Indians' inherent susceptibility to knee arthritis and a lifestyles that causes overuse of the knee joints. It is an increasing problem for aging populations. This is predicted to be a 40% lifetime risk for males and a 47% lifetime risk for women [2].

However, although the average age of beginning of knee difficulties in Indian females is 50 years, it is 60 years in Indian males. Obesity and poor diet are two factors that contribute to early symptoms in females. Vitamin D deficiency affects as many as 90% of Indian women, and it is essential for bone metabolism. The knee is affected directly or indirectly by a lack of vitamin D in the body [3]. The traditional Indian way of living has an impact on the knee. Excessive usage and straining of the knee joint occurs as a result of movements such as squatting, sitting cross-legged, using Indian restrooms, and not wearing correct footwear when walking [4].

Knee OA leads to restriction of all movements, decreased range of motion and stiffness of the joint and painful knee movements, and reduced lower limb muscle strength so the patient will lead to the risk of fall while doing the movement [5]. The risk of falling can be evaluated by different physical performance tests such as one leg standing test, five-time sitting to standing test, six meter walk test, timed up and go test, functional reach test, tandem stance test, etc. During each test, consistent verbal encouragement can provide to the subjects. The time took

for each test should be noted [6]. Because STS motion is a component of so many Activities of Daily Living (ADL), so when capability to arise is impeded significant functional limitations might occur.

It is one of the most common degenerative disorder of the articular cartilage and surface of weightbearing joints causing disability in elderly patients. The widely held belief is whether an imbalance in the joint loads causes the initial damage that slowly progresses. The articular cartilage is the part of the body that is most affected. The extracellular matrix of cartilage, which is primarily made of type II collagen and proteoglycans, provides viscoelastic and compressive characteristics to the structure. The initial alteration was a rise in water concentration and a reduction of proteoglycans in the cartilage matrix, and repetitive weight-bearing upon these cartilage causes it to fibrillate. The grinding process at work at the points of interaction between the opposing articular surfaces abrades the cartilage till an inherent bone is exposed with repeated rubbing, the subchondral bone becomes hard and glossy, as well as the bone at the joint margins hypertrophies to constitute a rim of protective spurs termed osteophytes. The loose cartilage fragments cause synovial inflammation and capsule thickening, leading in joint deformity and rigidity. The joint space is lost over time [7].

The causes of OA are ageing and repeated mechanical load on articular cartilage and the surface of weight-bearing joints. Newer research has divided etiological elements in to the 3 categories: gender, anatomy, and body mass [8]. The American College of Rheumatology (ACR) recommends that knee osteoarthritis be diagnosed considering the following criteria: persistent knee discomfort that lasts longer than 6 weeks with at least three of the following symptoms: Over the age of 50, Tenderness on bone palpation, morning knee stiffness enduring up to 30 minutes, crepitus with dynamic motion, Bone thickening or growing. On examination, there is no local heat [2].

Limitations in everyday movements, such as walking, climbing stairs, and getting out of or sitting in a chair, in people with knee osteoarthritis (OA). The majority of knee OA patients experience knee instability, according to studies. A sense of buckling or shifting has been classified as self-reported knee instability [4]. Reduced power in the muscle groups that surround the joints is crucial as it leads to a gradual loss of function. Such symptoms make it difficult for a person to get out of a chair, walk, or climb stairs. Individuals with OA may also have limping, poor limb alignment, and instability. Crepitation can be heard during movement due to the uneven joint surfaces caused by arthritis [9].

The 1-year fall incidence in people with knee osteoarthritis has been observed to be nearly 30% higher than in healthy elderly people of the same age. Proprioception loss is common in people with knee osteoarthritis, perhaps owing to articular cartilage degradation and decreased mechanoreceptors. These impairments lead to a loss of motor control, that could impair aperson's capability to execute functional tasks securely and raise the chance of falling [10]. Individuals with knee osteoarthritis commonly experience reduced muscle strength, discomfort, stiffness, and physical function limitations.The majority of falls occurred while walking, ascending stairs, reaching for something, or shifting from one chair or bed to another. In older persons, falls are the greatest cause of head injuries, fractured bones, activity limits, and mortality. It may also cause the patient to become bedridden, affecting everyday activities [11].

The functionality alternations in people of knee OA are well known. Gait, stair-climbing, unipedal stance, and the sitting-to-standing (STS) task have all been shown to be altered in research. STS necessitates more joint forces and moments as opposed to gait and stair climbing. Furthermore, attaining STS is regarded as one of the most vital actions of everyday living. Sitting and standing are two of the most common actions in everyday life. To perform these activities, as well as other daily activities, minimum levels of muscular power,

coordination, balance, and flexibility appear to be required.Falls frequently result in functional disability. Due to the length of time, it would take to finish the test, those who have knee OA are much more prone to collapse. Furthermore, if joint discomfort and muscular weakness are present, the future risk is increased [12].The primary goal assesses the resilience of the sitting-to-standing test in predicting the risk of falling in knee OA patients.

Review

A cross-sectional study was conducted on tibiofemoral osteoarthritis impact on standard of living as well as functioning in elderly Koreans, with women suffering more than men. The objective was to look at the effect of osteoarthritis of the knee on standard of living, functioning, and lower limb physical ability in older Korean community members, as well as the gender differences.The individuals were all from the population-based Hallym ageing study (HAS), with anaverage age of 70.4 years with 274 (54 percent) of them being female. Several lower limb physical performance tests were performed, including standing balance, a 6-meter typical walk, and 5 repetitive chair stands. The individuals were instructed to try to maintain their legs in side-by-side, semi-tandem, as well as tandem positions for 10 secs each to assess their standing balance.Across all 3 trials, female OA participants had considerably lower functional groupings than female non-OA responses, whereas males exhibited no substantial variation between OA and non-OA individuals.They concluded that knee OA has a detrimental impact on QoL and physical performance in both men and women, although women being more severely impacted than males. The sitting-to-standing test was used in this study to assess the risk of falling and balance difficulties in knee OA individuals [13].

A study on Five Times Sit-to-Stand Test Performance in Parkinson’s Disease aimed to establish the intrarater and test-retest reliability of the Five Times Sitting-to-Standing Test (FTSTS) in Parkinson's disease (PD), as well as the FTSTS's usefulness in distinguishing among fallers and nonfallers with PD.The primary outcome measure was FTSTS time

(seconds) concluding it as a simple, rapid test that can be used to assess the risk of falling in people with Parkinson's disease [14].

An observational study on sitting-to-standing alternations in severe knee OA was done using the whole-body techniques used in an STS task in individuals with knee OA, as well as the relationship among STS modifications and clinical evaluations.WOMAC was used to determine pain and functional capacity. The period from the starting of the STS task to the seat off was not distinctive among the individual and control group but there is a significantly longer time from the seat off towards the peak value of the floor response was found for individuals with knee OA and the individuals with knee OA put 10% additional weight on the contralateral side in comparison with the symmetric method of the controlled group and the individuals with knee OA shows a significantly lower knee flexion moment, increased maximum trunk flexion and aincreased lateral trunk lean on the opposite side in comparison with a control group. The primary associations they discovered were between discomfort and the average time required to complete the STS job [15].

A study was reported on whether theindividuals with knee osteoarthritis complete sitting-to-standing motion efficiently with an objective to see if individuals with knee OA can do STS effectively using mechanical energy transfer evaluations.The results demonstrated that the STS and Phase 2 times in the knee OA group were substantially greater than those from the control group, while the Phase 1 timinghad no differencescomparing both the two groups. DCH at buttocks-off was substantially shorter in the knee OA group than in the control group, and the variance in thorax forward lean angle was substantially larger in the knee OA group than the control group. The pelvic and shank forward lean angles were not substantially different among the two groups.STS in individuals with knee OA showed lower force intake in the knee extensors from the shank forward leaning movement following buttocks-off had worse knee extensor efficacy and consumed more physiological effort.

These results imply that individuals with knee OA do not complete STS effectively in terms of mechanical energy transfer [16].

A study on varyingadaptation throughout the sitting-to-standing task inpeople with severe knee osteoarthritis had an objective to see if individuals with knee OA had different strategies for doing the sit-to-stand activity and concluded that in a broad sample of people with severe knee OA, they discovered three basic STS trunk methods. One of the groups was able to compensate for the STS task by using trunk flexion and obliquity to finish it in the same amount of time as the controls. Only trunk flexion was used to compensate in the second group; however, this compensation was insufficient, and participants were unable to finish the STS at the same time as the control group.The STS took a long time for the last group to complete. This group employed more trunk flexion and obliquity, indicating that the task was more difficult for them to complete. The characteristics and subgroups discovered might be utilised to alter the characterisation of the STS task for patients with knee OA, as well as to aid in follow-up [17].

A cross-sectional study on the Five Times Sitting-to-Standing Test: safety and reliability with elderlycritical care unit individuals at discharge was conducted to identify the safety and clinometric features of the five-time sitting-to-standing test in elderly patients who are hospitalised in a critical care unit.Authors concluded that the five-times sitting-to-standing test has been proved to be both secure and reliable. Its practical application, on the other hand, might be limited to high-functioning elderly people in hospital environments [18].

A cross-sectional study on the Automatic Assessment of Strength and Mobility in Older Adults: A Test-Retest Reliability Study was undertaken to give TUG and 30 s Chair Stand test reliability metrics. It concluded that, in elderly people, the TUG and the 30 s Chair Stand testing are both valid. Using an automated clock in the TUG is strongly advised since it improved the test's dependability. The 30s Chair Stand test may be used to gather meaningful

and dependable data, such as the period of the sitting-to-standing-to-sitting cycles and stages, using this equipment [19].

A reliability analysis was done to find the most optimal number of sitting-to-standing testing repetitions in elderly people with an aim to see how reliable STST was at various time periods and with varying numbers of repetitions and concludedthat the STST's dependability was established in this study at various time periods and repetition frequencies. There are strong indications that stopping the test after 4 repeats may be a reliable substitute for terminating the testing after 5 repetitions or 30 seconds.Given the ease and possible safety of a shortened assessment in a geriatric adult, future studies should focus on the creation and verification of a four-time STST in this target group. Its acceptance by potential investigators might contribute to further study and implementation in the other high-risk clinical population that can profit from a faster testing [20].

The 5-time sitting-to-standing testing is regarded as a valid, dependable, and low-cost method of determining sit-to-stand competence. The FTSST calculates how long it takes to rise up from a sitting posture5 times as quickly as feasible. The FTSST seems to have the ability to be a useful bedside technique for therapist assessing sit-to-stand abilities in elderly hospitalized patients. For this test we only need armless chair and a stopwatch.Lower extremity power, postural control, risk of falls, and exercising capacity are all usually evaluated using this testing. In community in general elderly adults, slower sitting-to-standing times have been associated to a higher risk of persistent falls, low gait velocity, and difficulties in other ADL. The five-time sit-to-stand testing has been demonstrated to have excellently reliable and safe.

Conclusion

In this review titled “Reliabilityofsit to stand test in fall identification in knee osteoarthritis” most of the research article had proved that sit to stand test, we can use to physiotherapy

department to identify the risk of fall in knee OA patients. most of the patients had severe knee pain and reduced lower limb muscle strength so, during the test patient may take a long time to complete the test and there is a loss of balance. Due to pain and reduced endurance and loss of balance, the patient may not be capable of completing the test. So, the test is reliable to determine the risk of a fall in knee OA patient.

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