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Activity Limitations in Degenerating Knee Joint

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Abstract: *Osteoarthritis is a most common reason of joint disability over 45 years of age. It is the main cause of dysfunction in most countries around the world. Depending on functional activity limitations, an effective comprehensive rehabilitation program can be planned for the management of OA knee. Therefore, this study was conducted to know functional activity limitations in an Indian lifestyle. This cross- sectional study included 499 individuals who met inclusion criteria. It was conducted for 4 months in outpatient department of tertiary care hospital. The level of difficulty in sixteen chosen activities suitable mainly for Indian lifestyle was assessed. Analysis of data showed that sit to stand, getting in and out of the bed, sitting on the floor and getting up, cross sitting, climbing down stairs and sitting for a long time are the activities which are severely affected. Household chores and travelling via public transport are activities which are less affected mainly in people who follow Indian lifestyle.*

Key words: *Activity limitations, level of difficulty, degenerating knee, Indian lifestyle*

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I. Introduction

Musculoskeletal diseases are one of the major causes of disability around the world[1]. According to the WHO Fact Sheet Feb 2018, musculoskeletal conditions are the second largest contributor to disability worldwide and significantly impact functional ability. The Global Burden of Disease (GBD) study provides evidence of the impact of musculoskeletal conditions leading to significant disability burden[1].

Musculoskeletal disorders are commonly due to poor ergonomics and chronic rheumatic disorders. Osteoarthritis, rheumatoid arthritis and back pain are important causes of disability-adjusted-life years in both the developed and developing world[1]. World Health Organization/International League of Associations for Rheumatology community-oriented programme for control of rheumatic diseases (WHO-ILAR COPCORD) studies in over 17 countries around the world have identified back and knee pain as common in the community and are likely to increase with the ageing population[1].

Knee being the most commonly affected in osteoarthritis, leads to physical disability and decreased quality of life (QOL). Patients in order to relieve pain minimise their physical activity and lead sedentary lifestyle [2]. Pain caused in osteoarthritic conditions leads to reduced quality of life, decreased psychosocial health, lower self-efficacy and depression[2]. There are different therapeutic management techniques to reduce the pain level in knee conditions. The outcomes following injury of ligaments or menisci and osteoarthritis of the knee have been assessed in clinical examinations or special tests. Patients are more concerned about their pain and the functional capacity[3]. Therefore, patient's perspective of his/her own level of activity is necessary[4].

Most of the outcome measure tools used for assessing the pain and functional level in patients with knee pain were constructed in the developed western countries. Their cultural compatibility with the developing countries like India is not demonstrated in the available tools. Thus their utility is uncertain[5, 6].

There is a paucity of epidemiological data which gives clarity on particular activities of daily living (ADL) affected in Indian scenario. Therefore this study was undertaken to bridge the gap of knowledge regarding the functional activities affected in degenerative conditions of knee. Data collected in this study will be helpful in designing self-administered questionnaire mainly in Indian population according to their life- style. With the help of this information a rehabilitation program can be designed specifically following Indian lifestyle.

II. Material And Methods

This cross sectional study was conducted for 4 months in outpatient department of tertiary care hospital. 499 patients following inclusion criteria were included in this study.

Study Design: Cross sectional study
Study location: Outpatient department of Physiotherapy in tertiary care hospital
Study Duration: 4 months
Sample size: Convenient sampling, 499 patients were included

Inclusion criteria:

1. Patients with knee pain with underlying cause of degenerative changes on one or both knees
2. Kellgren and Lawrence system for classification of osteoarthritis grade 2 and above
3. Both males and females

Exclusion criteria:

1. Neurological conditions
2. Cognitively inefficient to understand or any psychiatric illness
3. Trauma, fracture related of the lower- limb

Patients graded the level of difficulty in the following list of activities:

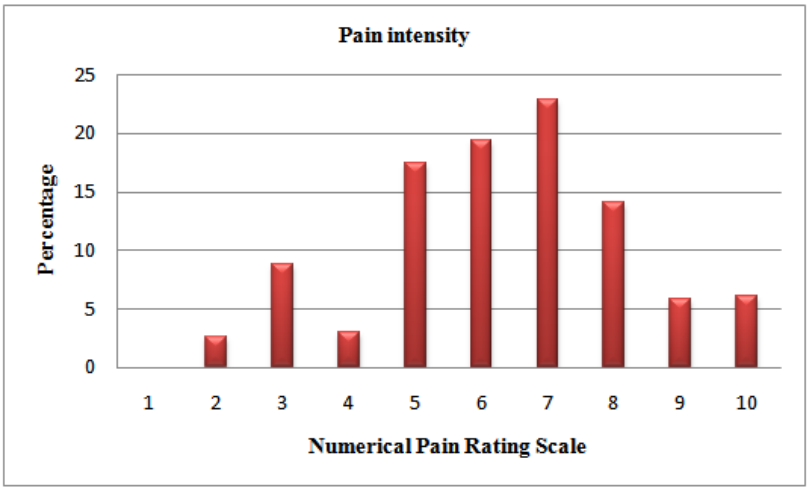
Table no 1: Level of difficulty

Sr. No.	Activities	Not difficult (%)	Difficulty due to pain (%)	Does not perform that activity (%)
1.	Sit to stand (chair)	19	74	7
2	Getting in and out of the bed	28	67	5
3	Straightening knee from bending position	40	51	9
4	Full kneeling/ Vajrasana/ Namaz position	12	58	30
5	Sitting on the floor and getting up	7	71	22
6	Cross sitting	11	64	25
7	Deep squatting when using Indian toilet	7	59	34
8	Dressing lower extremity	45	44	11
9	Climbing stairs down	14	73	13
10	Sitting for long period	19	69	12
11	Workout/ Exercises	18	45	37
12	Picking up items from the floor	23	54	23
13	Household chores	18	38	44
14	Walking on uneven roads/ surfaces	10	55	35
15	Ramps/Down slope	16	49	35
16	Public transport/ Travelling	13	30	57

Procedure methodology:

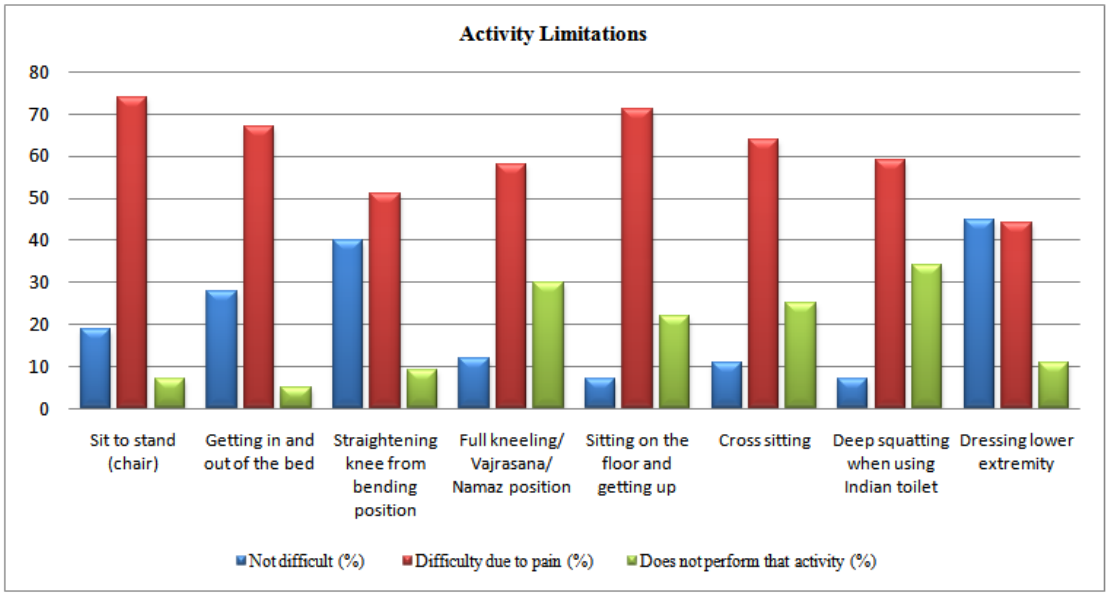
The data collection was done by asking patients to mark intensity of pain using Numerical Pain Rating Scale (NPRS) and to mark 1, 2, and 3 respectively to grade their difficulty level, where
1) Not difficult, 2) Had difficulty due to pain and 3) Does not perform that activity

III. Results

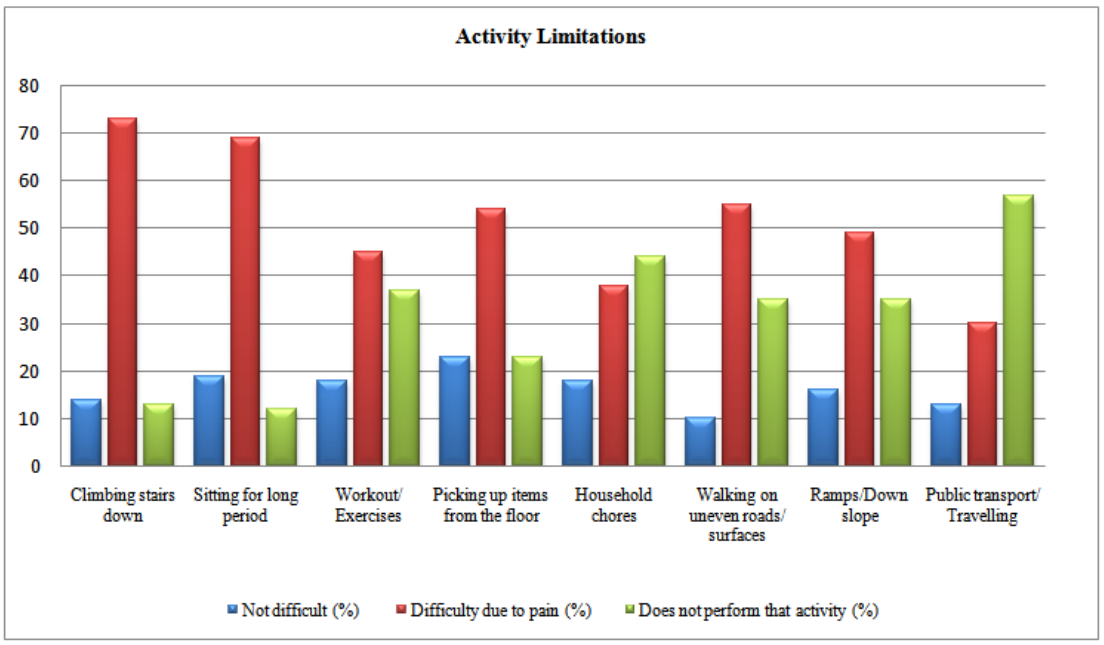


Graph 1

Graph 1 shows that 6.01% people had intensity of pain 10 on Numerical pain rating scale (NPRS). 5.81% had intensity of pain 9. It was 14.04% for intensity of pain 8. 22.85% and 19.44% were for intensity of pain 7 and 6 respectively. Intensity of pain 5 and 4 were present in 17.43% and 3.01% respectively. It was 2.61% for intensity of pain 2.



Graph 2



Graph 3

Graph 2 shows that 74% people had difficulty to perform sit to stand, 67% people had difficulty to perform getting in and out of bed, 51% people had difficulty while straightening knee from bending position, 58% people had difficulty while kneeling, 71% people had difficulty to sit on the floor and getting up, 64% people had difficulty while going in and attending cross- sitting position, 59% people had difficulty to perform deep squatting when using Indian toilet, 44% people had difficulty while dressing lower extremity due to pain. Graph 3 shows 73% people had difficulty while climbing stairs down, 69% people had difficulty to sit for a long period in static position, 45% people had difficulty while doing exercises or workout, 54% people had difficulty to pick up items from the floor, 38% people had difficulty while doing household chores, 55% people had difficulty to walk on uneven surface, 49% people had difficulty while getting down the ramp, 30% people had difficulty while using public transport due to pain.

IV. Discussion

Symptomatic osteoarthritis (OA) causes substantial physical and psychosocial disability[7]. The predominant symptom in most patients is pain. This descriptive study on 499 individuals with mean age 59.02 shows that activities like sitting on the floor and getting up, getting in and out of the bed, straightening knee from bending position, full kneeling/ vajrasana/ namaz position, sitting on the floor and getting up, attaining cross sitting position , deep squatting specifically when using Indian toilet, dressing lower extremity, climbing stairs down, sitting constantly for long period, while doing workout/ exercises, picking up items from the floor with bending knee , while performing household chores, walking on uneven roads/ surfaces, getting down on the ramps/down slope, while using public transport like trains, buses, rickshaws and cabs / travelling and sit to stand from chair, give pain.

OA constitutes structural and functional failure of synovial joints[8]. It occurs when the equilibrium between breakdown and repair of joint tissues is not maintained[9]. This may cause pain, physical disability, and psychological distress[7]. Changes in bony structures may remain asymptomatic[10]. The reason of disconnect between the level of reported pain and disability and disease severity is unknown. Similar finding were seen in this study.

Neuronal activity in the pain pathway is responsible for the joint pain generation and its exacerbation. Chemical mediators are released in the joint during inflammation. They sensitize primary afferent nerves because of which normally innocuous joint movements such as increased physical activity elicit a painful response. This is the neurophysiological basis of the sensation of pain in response to a normally non-painful stimulus such as walking[11].

Biological, psychological and social factors all play a significant role in pain in OA[12]. The perception of pain gets modified by the patient's affective status like level of depression, anxiety, or anger and cognitive state like pain beliefs, expectations and memories of pain. Age, gender, socioeconomic status, racial and cultural background, pain communication skills, and previous pain experiences can contribute to the way a patient perceives pain. Constitutional factors like self- efficacy, pain catastrophizing also play an important role in this. Along with that social support, communication is also important in understanding the pain experience. Thus, along with an effective exercise regimen, patient education involving the disease process of OA and its clinical characteristics, techniques of joint protection, OA related self-management techniques, diet control and psychologist consult on coping with pain and the disability plays an important role in management of knee osteoarthritis[13]. To lead an effective patient education program, it is essential to understand the painful activities depending on the culture and daily activities of the patient.

Movement is kinematics and therefore, it must be considered a mechanical phenomenon. Abnormal movement are responsible for the dysfunction. They may be caused by internal, biologically produced forces. They may also result from forces external to the body. Biomechanics should be considered as an inherent part of physical therapy, as it helps in prevention, evaluation and treatment of dysfunction[14]. Muscle strength is a major part of both performance- based and self-reported physical function in patients with knee OA[15, 16]. The quadriceps femoris muscle is significantly impaired in subjects with knee OA[17, 18, 19]. Activation deficit and atrophy contribute to quadriceps weakness[20, 21]. Hamstring and hip muscles also get involved[22, 23]. Patients adopt compensatory strategies to avoid pain and overcome movement dysfunction. Alterations in movement patterns have already been described during activities of daily life, including gait [22, 23], stair climbing [24, 25] and sit-to-stand tasks [26] in patients with knee OA. Previous studies have shown increased weight-bearing asymmetry [27, 28, 29], increased trunk lean towards the unaffected side [27], less flexion of the affected knee [26, 28] and more flexion of the trunk [26, 27, 30] during sit to stand movement. Affection of contra-lateral joint may be seen as a result of asymmetric loading[31]. Most of the Indians have traditional practices of squatting and sitting cross- legged on the floor for day-to-day activities. These activities involve high knee flexion. Wallace et al have shown that patello- femoral joint stress increases with knee joint flexion in squatting[32]. Studies have shown that as the knee flexion angle increases, patello- femoral joint reaction force increases[33].

Kito et al [34] reported that the double knee action was almost completely gone during level walking in knee OA. This action is observed in level walking. It decreases energy cost and has role in impact absorption and weight bearing. It moves the center of gravity (COG) downward during stair descent [35, 36]. Tatsuya Igawa et al [37] in their study have shown that knee joint flexion angle, extension moment and negative power during the early stance phase in knee OA were smaller as compare to healthy subjects. As they could not use the knee joint to absorb the impact during the early stance phase of stair descent, they might compensate by using ipsilateral ankle kinematics and kinetics.

Physical therapists need to make scholarly contributions in the field of biomechanics. They need to effectively apply biomechanical principles in their clinical practice to correct the movement dysfunctions.

V. **Conclusion**

This study shows that, sit to stand, getting in and out of the bed, sitting on the floor and getting up, cross sitting, climbing down stairs and sitting for a long time are the activities which are severely affected. Straightening knee, full kneeling, dressing lower extremity, doing workout / exercises, walking on uneven surface and ramps/ down slope are the activities the activities which are moderately affected. Household chores and travelling via public transport are activities which are less affected in Indian population.

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