

PREVALENCE OF KNEE BUCKLING AMONG GRADE 3 OSTEOARTHRITIS PATIENTS OF KNEE: A SELF-REPORTED STUDY

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ABSTRACT

Objective: The present study aims to find out the sensation and frequency of episodes of knee buckling in Grade 3 osteoarthritis (OA) and its physiotherapy treatment.

Methods: Experimental study design is used to determine the knee buckling in Grade 3 OA of the knee joint. Subjects are classified into two groups. Subjects with Grade 3 OA knee are examined for knee buckling. The investigator used a questionnaire to collect data from filed documents. Data were numerically coded and captured in excel, using SPSS 20 version software. Descriptive statistics were applied to analyze the data.

Results: The study has provided baseline information about knee buckling among Grade 3 OA knee. In Group A, out of 32 study projects, 25 reported a sensation of knee buckling and reported no history of knee buckling in previous 3 months. Among 25 subjects reported knee buckling, the frequency of episodes of knee buckling reported >5 in 15 subjects while 3–5 in 6 and 1–2 in 4 subjects were reported in previous 3 months. In Group B, after completion of 3 weeks of knee stabilizing exercise, 10 subjects reported no sensation of buckling out of 25 subjects in past 3 weeks, while remaining 9 subjects were reported 1–2 and 6 subjects were reported only 3–5 number of episodes of buckling.

Conclusion: The study shows that knee stabilizing and balancing exercises are helpful in reducing or preventing knee buckling.

Keywords: Knee buckling, Osteoarthritis of knee, Quadriceps and hamstring muscles.

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INTRODUCTION

Knee buckling is associated with patients suffering from osteoarthritis (OA) of the knee. It is characterized by the loss of postural support across the knee at the time of weight bearing while standing or walking. This self-supported knee instability is often associated with shifting, the sensation of buckling or even giving away of the knee [1]. This has been reported in nearly 60–80% of patients struggling with knee OA [2-6]. There is more severe activity limitation among patients with knee OA plus knee instability as compared to those without this sensation. In addition, there are higher rates of falling, higher pain levels, and alteration in walking patterns [3,5-13] in persons with knee instability and also the reason behind the onset of knee OA and progression [7-14] although the exact cause of the knee instability is to be identified. In fact, knee-buckling is a multi-factorial problem characterized by biomechanical impairments, for instance, muscle weakness, high laxity, impaired proprioceptive accuracy. These symptoms are commonly found in the patients with knee OA, and they have been hypothesized in many instances from time to time as an important causal factor in self-supported knee instability [1,2,4-6,13-18]. The quadriceps and hamstring muscles are vital for providing stability to the knee joint by acting as shock absorbers and distributing the knee-joint load. Nevertheless, the proprioceptive receptors are also said to be imperative for preventing excessive and possible injurious movements of the knee as they act as the precursors of alterations in position, movements of the knee joint and posture [10,17]. Laxity or the inadequate passive restraint of the knee has also been hypothesized to be the cause of knee instability during functional and dynamic activities [15,17].

Robust lower extremity muscles are suggested to be the structures aiding in the stabilization of the knee, even under circumstances

when there is impairment of the proprioceptive accuracy or high rate of laxity [4,5,11,12,15,16]. In patients with impaired or debilitated proprioceptive accuracy or high laxity, the muscle strength is more strongly related to activity limitations as compared to patients with adequate proprioceptive accuracy or low laxity was shown in a study conducted by Van der Esh *et al.* [17]. The authors also suggested that strong muscles around the knee can compensate for the impaired proprioceptive accuracy or high laxity to maintain knee stability and eventually accounting for less severe activity limitations.

METHODS

The experimental study design was used to determine the knee buckling in Grade 3 OA of the knee joint. Patients were classified into two groups, subjects with Grade 3 OA knee to examine fine knee buckling based on the questionnaire was controlled group and those given physiotherapy as the experimental group. The physiotherapy treatment was given for 3 weeks. Data were collected from Uni Hospital and Physiotherapy Outpatient Department (OPD), Lovely Professional University. A questionnaire to collect data from filed documents was used. Data were numerically coded and captured in excel, using SPSS 20 version software. Descriptive statistics were used to analyze the data.

Risk factors of OA

Growing age is one of the primary OA risk factors. OA is the most common joint disease prevalent worldwide. It is also one of the most common causes of pain and disability in older people. Statistics suggest that one-third of people over 65 years of age suffer from knee arthritis. 70% of people have evidence of OA. OA is more prevalent among men before the age of 50 years than women. Women are more likely to suffer from OA than men after the age of 50 years.

Some of the other factors known OA risk factors are obesity or excessive weight, injury, hormones, congenital or developmental deformities, certain deformities, weak thigh muscles, genetic factors, race, certain occupations, and other diseases which change cartilage structure, low intake of Vitamin C and D. It has been found that obese people are 4–5 times more likely to suffer from OA compared to people of normal weight.

Sampling

Samples collected by convenience sampling procedure.

CRITERIA FOR SELECTION

Subject for the study was selected based on the inclusion and exclusion criteria. The inclusion criteria include age between 40 and 80 years, both male and females, medically diagnosed Grade 3 knee OA patient by an orthopedic surgeon, years of knee OA to 53. The exclusion criteria included prior knee injury or surgery, Grades 1 and 2 OA, and other orthopedic conditions such as ankylosing spondylitis and septic arthritis (Fig. 1).

Table 1: Age distribution of participants

Participants	Frequency (%)
40–49	7 (17.50)
50–59	19 (47.50)
60–69	12 (30.00)
70–79	2 (5.00)
Grand total	40 (100.00)

Table 2: Gender distribution

Participants	Count of sex (%)
F	29 (72.50)
M	11 (27.50)
Grand total	40 (100.00)

Table 3: Sensation of buckling in the past 3 months (Group A)

Sensation of years of buckling in past 3 months	Count of sensation of episodes of buckling in past 3 months (Group A)	Percentage of sensation of episodes of buckling in past 3 months (%)
No	10	25.00
Yes	30	75.00
Grand total	40	100.00

RESULTS

Data analysis and results

Self-reported knee buckling in Grade 3 OA patients.

DISCUSSION

The study has provided a baseline of information about the knee-buckling among Grade 3 OA knee patients. The age group distribution of participants as depicted (Table 1), 7 participants fall in the age group of 40–49, 19 in the age group of 50–59, 12 in the age group of 60–69, and 2 subjects in 70–80 age group. 29 females and 11 males participated in the study (Table 2). In Group A, out of 40 study projects, 30 reported the sensation of knee buckling and reported no history of knee buckling in the previous 3 months (Table 3). Among 40 subjects who reported knee buckling, the frequency of episodes of knee buckling in previous 3 months between 0 and 4 was reported in 5 subjects, while 5–9 in 27 subjects and 10–15 in 8 subjects (Table 4). In Group B, after completion of 3 weeks of knee stabilizing exercise, 10 subjects reported no sensation of buckling out of 40 subjects in past 3 weeks, while out of the remaining 30 subjects, 17 reported 0–1 episodes of buckling, 11 subjects showed 2–3 episodes, and 2 showed 4–5 episodes of buckling in the past 3 weeks (Table 5). Out of 40 participants, 10 showed no involvement of knee buckling, 13 showed bilateral involvement, 8 subjects showed left knee involvement, and 9 showed right knee involvement (Table 6). Mean, median, mode, and standard deviation and p-value for age, height, weight, body mass index, years of OA knee, and number of episodes of buckling after 3 weeks of exercise can be correlated (Tables 7 and 8).

In this community-based study, we found that knee-buckling is commonly found in people with Grade 3 knee OA and they complained of limitations in walking, climbing stairs, and physical function. With the progression of OA with age, the symptoms knee buckling would aggravate with time if timely intervention not provided [10].

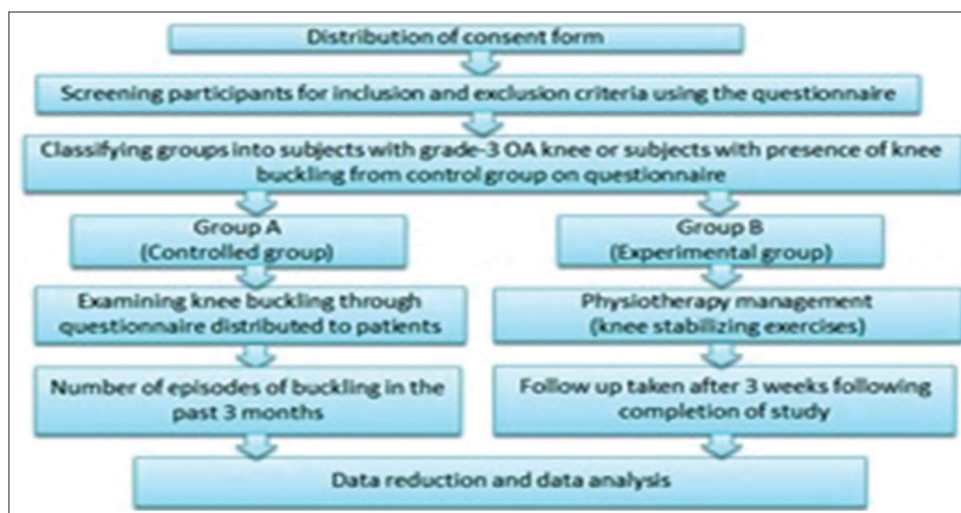


Fig. 1: Methodology

People are benefitted from the advancement of the medical sciences with the improvements in medications, imaging, and surgical techniques and equipment as doctors can more effectively diagnose and treat the illnesses. Despite, all these advancements in the medical field, OA is the most common form of arthritis, and the pain associated with it is the prime cause of functional disability, inactivity or activity limitation, and reduced health-related quality of life. OA is a multi-factorial disease involving systemic factors (age, sex, genetics, hormones, and nutritional factors), intrinsic joint vulnerability (bridging muscle weakness, previous damage, laxity, and mal-alignment), and extrinsic factors acting on joints (obesity and specific injurious activities). OA (Grade 3 OA) of the knee is a major cause of knee buckling among the aging population of the industrialized world. The study dealt with the frequency of knee buckling in the previous 3 months among patients visiting with the knee instability to find out whether new buckling was associated with particular characteristics such as muscular weakness or knee or other joint pain. Finally, the sensation and the number of the sensation of knee buckling in Grade 3 OA of knee and its related physiotherapy treatment was examined [18-21].

Table 4: Years of OA knee

Count of No. of years of OA	Participants (%)
0-4	5 (12.50)
5-9	27 (67.50)
10-15	8 (20.00)
Grand total	40 (100.00)

OA: Osteoarthritis

CONCLUSION

The study demonstrated that sensation and frequency of episodes of knee buckling are very common in Grade 3 OA knee patients. However, knee stabilizing exercise is highly significantly effective in preventing or reducing the number of episodes of knee buckling. It is important to develop research-based evidence of physiotherapy practice. Physiotherapist's practice is evidence based in all aspects of health care. There are a few studies on knee buckling in OA of the knee. This study could not cover all the aspects of the vast area. Hence, it is recommended that the next generation of physiotherapy members should continue study regarding this area; this may involve the use of large-scale sample size and participants from different states of the country.

ETHICAL APPROVAL

Ethical approval was taken from the Department of Physiotherapy, Lovely Professional University.

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CONFLICTS OF INTEREST

There are no conflicts of interest of any sort.

Table 5: Number of episodes of buckling after completion of 3 weeks of exercise

No. of episode of buckling	Count of No. of episode of buckling after 3 weeks of exercise (Group B)	Percentage of episode of buckling after 3 weeks of exercise (Group B) (%)
0	10	25.00
0-1	17	42.50
2-3	11	27.50
4-5	2	5.00
Grand total	40	100.00

Table 6: Extremity involvement of lower limb

Involvement of knee buckling	Count of EPISODE of knee side	Count of episode of knee side (%)
None	10	25.00
B/L	13	32.50
Lt	8	20.00
Rt	9	22.50
Grand total	40	100.00

Table 7: Statistics

Parameters	Age	Height	Weight	BMI	Years of OA knee	No. of episodes of buckling	No. of episodes of buckling after 3 weeks of exercise
N							
Valid	40	40	40	40	40	30	30
Missing	0	0	0	0	0	10	10
Mean	56.65	5.397	72.963	28.205	7.30	7.60	1.40
Median	57.00	5.350	72.600	27.600	7.00	7.00	1.00
Mode	59	5.4	68.6 ^a	25.0	6	8 ^a	0
SD	7.322	0.2904	7.8242	3.9365	2.719	5.223	1.354
Minimum	43	5.0	60.2	21.0	3	1	0
Maximum	74	6.0	89.2	40.0	14	25	5

^aMultiple modes exist. The smallest value is shown. BMI: Body mass index, OA: Osteoarthritis, SD: Standard deviation

Table 8: Correlations

Parameters	Age	Height	Weight	BMI	Year	Buckling A	After 3 weeks B
Age							
Pearson correlation	1	0.022	0.264	-0.026	0.002	-0.134	-0.090
Significant (2-tailed)		0.890	0.099	0.873	0.992	0.482	0.636
N	40	40	40	40	40	30	30
Height							
Pearson correlation	0.022	1	0.528**	-0.144	-0.057	-0.402*	-0.307
Significant (2-tailed)	0.890		0.000	0.377	0.725	0.028	0.098
N	40	40	40	40	40	30	30
Weight							
Pearson correlation	0.264	0.528**	1	-0.051	-0.146	-0.246	-0.057
Significant (2-tailed)	0.099	0.000		0.757	0.369	0.190	0.764
N	40	40	40	40	40	30	30
BMI							
Pearson Correlation	-0.026	-0.144	-0.051	1	-0.160	0.071	0.114
Significant (2-tailed)	0.873	0.377	0.757		0.324	0.708	0.550
N	40	40	40	40	40	30	30
Year							
Pearson correlation	0.002	-0.057	-0.146	-0.160	1	-0.103	-0.208
Significant (2-tailed)	0.992	0.725	0.369	0.324		0.587	0.270
N	40	40	40	40	40	30	30
Buckling A							
Pearson correlation	-0.134	-0.402*	-0.246	0.071	-0.103	1	0.940**
Significant (2-tailed)	0.482	0.028	0.190	0.708	0.587		0.000
N	30	30	30	30	30	30	30
After 3 weeks B							
Pearson correlation	-0.090	-0.307	-0.057	0.114	-0.208	0.940**	1
Significant (2-tailed)	0.636	0.098	0.764	0.550	0.270	0.000	
N	30	30	30	30	30	30	30

**Correlation is significant at the 0.01 level (2-tailed). *Correlation is significant at the 0.05 level (2-tailed). BMI: Body mass index

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