

Effect of Agility Exercises on Knee Symptom Status Among Patients With Osteoarthritis

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Abstract

Osteoarthritis is one of the most common causes of disability due to limitations of joint movement and accounts for more hospitalisations which ultimately result in an increased health care costs. The present study was carried out to assess the effect of agility exercises on knee symptom status among patients with osteoarthritis. It was a quasi-experimental pre-test post-test control group design study conducted over a period of three months in 50 subjects who were diagnosed as having mild to moderate knee osteoarthritis attending outpatient department of physical medicine and rehabilitation, Medical College Hospital, Thiruvananthapuram. Basic socio-demographic and clinical data of subjects were assessed using a semi-structured interview schedule. Knee symptom status was assessed using WOMAC osteoarthritis index part-I. All the subjects meeting the inclusion criteria were assessed with both tools. Control group subjects were given range of motion and quadriceps setting exercises. Experimental group subjects were given demonstration of agility exercises along with range of motion and quadriceps setting exercises. All the subjects continued their prescribed medications also at home. Subjects were assessed after two weeks using WOMAC osteoarthritis index part-I. On statistical analysis it was understood that both groups were comparable on the basis of baseline sociodemographic and clinical data. There was significant improvement in knee symptoms among experimental group subjects ($p < 0.001$). The results suggest that agility exercises can be included along with conventional exercise programme in patients with knee osteoarthritis.

Osteoarthritis (OA), also known as degenerative joint disease (DJD), is a progressive disorder of the joints caused by gradual loss of cartilage resulting in the development of bony spurs and cysts at the margins of the joints. The prevalence of OA is dramatically increasing, and will continue to increase from previously reported numbers of 43 million to 60 million in the year 2020 in the world. Ten percent of men and 13 percent of women over the age of 60 have symptomatic knee OA and women have a 1.8 times greater likelihood of developing knee OA.

Review of Literature

Osteoarthritis (OA) is the most common joint disorder. There is evidence that a majority of individuals over the age of 65 have radiographic and clinical evidence of OA. The most common sites affected by the disease are the hands, knees, hips and spine. The symptoms are often associated with significant functional impairments, as well as signs and symptoms of inflammation, including pain, stiffness and loss of mobility.

Osteoarthritis is characterised primarily by stiff-

ness and pain in the joints which tend to be worse in the morning (particularly for about 30 minutes after waking up) and again in the evening, often called first movement pain with improvement during the day as the person carries on daily activities. Pain that awakens one during the night is often an indicator.

A survey conducted by arthritis foundation in United Kingdom found that major symptoms reported by the patients with osteoarthritis are: pain (particularly when moving the joint or at the end of the day), stiffness (especially after rest – this usually ceases after a minute or so as you get moving), crepitus, a creaking, crunching, grinding sensation when you move the joint hard swellings (caused by osteophytes), soft swellings (caused by extra fluid in the joint). Degenerative osteoarthritis patients go through great pain and the decrease in muscle mass of extremity especially in quadriceps, mobility, stiffness of joint, limited movement, and proprioception. In addition, they have a lot of functional limitation when sitting or standing or going up and down stairs. Weakness of muscles or asymmetric muscle activity leads to unstable joints and aggravates muscle wasting by lesser use. There will be decrease in balance and walking ability which is a factor for causing

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falls in elderly.

Some people with knee OA may complain of knee instability. Patients usually describe this knee instability as giving way or buckling of the knee during daily activities. The prevalence of self-reported instability among people with knee OA has ranged from 11 to 44 percent and has been shown to be correlated with reduced functional ability. There is evidence that complaints of knee instability contribute to reduced function in people with knee OA above and beyond what is explained by impairments such as knee pain, quadriceps muscle weakness, and limited joint motion.

The main problems of patients with knee osteoarthritis are joint pain that is exacerbated by exercise and relieved by rest. Rest and night pain can occur in advanced disease. Knee pain due to OA is usually bilateral and felt in and around the knee, joint stiffness in the morning or after rest and reduced function and participation restriction. In order to enhance functional status with exercise therapy, exercise programmes should include activities that address problems with knee instability. The present study was undertaken to find out the effect of agility exercises on knee symptom status.

Objectives

The study aimed to evaluate the knee symptom status of patients with knee osteoarthritis before intervention, and to evaluate the effect of agility exercises on knee symptom status among them.

Materials and Methods

This research paper is the second part of the study "Effect of agility exercises on knee health status among patients with knee osteoarthritis" (the first part was published in *NJI* Jan-Feb 2015). The research design adopted for the present study was quasi experimental – pre-test post-test control group design. The outcome variable is the knee symptom status. Scientific and ethical committee clearance was obtained. Informed written consent was obtained from all the participants.

The study period was January to March 2013; 50 subjects participated in this study. Basic sociodemographic and clinical data of subjects were assessed using a semi structured interview schedule. Knee symptom status was assessed using WOMAC osteoarthritis index part-I. Control group subjects were selected initially, and given demonstration of range of motion and quadriceps setting exercises. Experimental group subjects were selected in the second half of the study, and given demonstration of agility exercises along with range of motion and quadriceps setting exercises. All the subjects continued their prescribed medications at home. A close rela-

tive was entrusted to supervise the exercises at home and the researcher herself called all the subjects daily to get the feedback. A home work exercise diary was given to write the details of exercises done at home. Subjects were assessed after two weeks. The data thus collected were analysed using Z test, and chi-square test with the help of statistical product and service solution (SPSS-17.0 package).

Results & Discussion

The relevant sociodemographic data include residence, religion, age, gender, education, occupation, marital status and income. The relevant clinical data collected in the present study included duration of illness, severity of knee osteoarthritis, medications, presence of co-morbid conditions, knee joints affected, joints other than knee affected, body weight, height in centimetre, type of osteoarthritis, non-pharmacological measures followed at home, presence of knee symptoms and perceived knee-related health status. On statistical analysis it was understood that both groups are comparable on the basis of baseline sociodemographic and clinical data.

Knee symptom status of patients with knee osteoarthritis before intervention

Table 1 shows that majority of the subject with knee osteoarthritis had experienced knee swelling. There was no difference ($p=0.09$) between the experimental and control group in terms of knee joint swelling before the intervention. Both group subjects were almost equally ($p=0.0513$) experienced the symptom of grinding and clicking sound in knee joint (Table 2). Bucking of knee joint was the major problem experienced equally ($p=0.559$) by both group subjects as seen from Table 3.

Table 4 shows that 'not able to straighten knee fully' was rarely experienced by people with mild to moderate osteoarthritis. There was no difference ($p=0.131$) between both groups based on their knee symptom status of not able to straighten knee fully. Majority of subjects in both groups equally ($p=0.543$) experienced the symptom not able to bent knee fully (Table 5).

Effect of agility exercises on knee symptom status

It is evident from Table 6 that among control group 4 percent and among experimental group 84 percent of subjects had improvement in knee swelling. Chi-square value shows that this difference is statistically significant at p value <0.001 .

Table 7 demonstrates that 92 percent of experimental group and 4 percent of the control group subjects had improvement in the knee symptom of clicking or grinding sound in knee joint. This difference is statistically significant at p value <0.001 .

Table 1: Distribution of subjects according to knee symptom: Swelling

Knee symptom-swelling	Control		Experimental		Z=1.681 Df=2 p=0.09
	N	%	N	%	
Never	3	12	0	0	
Rarely	2	8	2	8	
Sometimes	9	36	6	24	
Often	7	28	1	44	
Always	4	16	6	24	

Table 2: Distribution of subjects according to knee symptom : Grinding or clicking sound in knee joint

Grinding or clicking sound in knee joint	Control		Experimental	
	N	%	N	%
Never	2	8	0	0
Rarely	4	16	2	8
Sometimes	7	28	11	44
Often	5	20	5	20
Always	7	28	7	28

$\chi^2 = 1.333$, $df=2$, $p=0.513$

Table 3: Distribution of patients according to knee symptom: Knee buckling

Knee buckling	Control		Experimental	
	N	%	N	%
Never	3	12	3	12
Rarely	3	12	2	8
Sometimes	10	40	8	32
Often	5	20	8	32
Always	4	16	4	16

$Z=0.584$, $p=0.559$

Table 4: Distribution of patients according to knee symptom: Not able to straighten knee fully

Not able to straighten knee	Control		Experimental	
	N	%	N	%
Never	13	52	7	28
Rarely	7	28	10	40
Sometimes	2	8	5	20
Often	2	8	2	8
Always	1	4	1	4

$Z=1.50$, $p=0.131$

Table 8 shows that 4 percent of subjects in control group and 80 percent of subjects in experimental group had improvement in knee buckling. This observed difference is statistically significant at p value <0.001.

Table 9 demonstrates that 8 percent of subjects among control group and 6 percent of subjects in the experimental group had improvement. But 23 percent

of control group and 76 percent of experimental group have no improvement in this symptom. The observed difference is not statistically significant ($p=0.123$). This may be due to inadequate sample size or less duration of exercise therapy.

Majority of the patients in the experimental group had significant improvement in knee symptom status after the intervention. Majority of patients in the control group had no improvement in knee symptom status. The observed difference in the knee symptom status is statistically significant at $p<0.001$ for knee symptoms like knee joint swelling, knee buckling,

Table 5: Distribution of patients according to knee symptom: Not able to bend knee fully

Not able to bend knee fully	Control		Experimental	
	N	%	N	%
Never	3	12	2	8
Rarely	1	4	1	4
Sometimes	6	24	4	16
Often	10	40	13	52
Always	5	20	5	20
Total	25	100	25	100

$Z=0.608$, $p=0.543$

Table 6: Effect of agility exercises on knee symptom status: Knee joint swelling

Knee swelling	Control		Experimental		Total	
	N	%	N	%	N	%
Improved	1	4.0	21	84.0	22	44.0
Not improved	24	96.0	4	16.0	28	56.0
Total	25	100.0	25	100.0	50	100.0

$\chi^2=32.466$, $df=1$, $p<0.001$

Table 7: Effect of agility exercise on knee symptom status: Clicking and grinding sound in knee joint

Clicking or grinding sound in knee joint	Control		Experimental		Total	
	N	%	N	%	N	%
Improved	1	4.0	23	92.0	24	48.0
Not improved	24	96.0	2	8.0	26	52.0
Total	25	100.0	25	100.0	50	100.0

$\chi^2=38.782$, $df=1$, $p<0.001$

Table 8: Effect of agility exercise on knee symptom status: Knee joint buckling

Knee buckling	Control		Experimental		Total	
	N	%	N	%	N	%
Improved	1	4.0	20	80.0	21	42.0
Not Improved	24	96.0	5	20.0	29	58.0
Total	25	100.0	25	100.0	50	100.0

$\chi^2=29.639$, $df=1$, $p<0.001$

**Table 9: Effect of agility exercise on knee symptom status:
Not able to straighten knee fully**

Not able to straighten knee	Control		Experimental		Total	
	N	%	N	%	N	%
Improved	2	8.0	6	24.0	8	16.0
Not improved	23	92.0	19	76.0	42	84.0
Total	25	100.0	25	100.0	50	100.0

$\chi^2=2.381$, $df=1$, $p=0.123$

**Table 10: Effect of agility exercise on knee symptom status:
Inability to bend knee fully**

Inability to bend knee fully	Control		Experimental		Total	
	N	%	N	%	N	%
Improved	11	44.0	20	80.0	31	62.0
Not Improved	14	56.0	5	20.0	19	38.0
Total	25	100.0	25	100.0	50	100.0

$\chi^2=6.876$, $df=1$, $p=0.009$

clicking or grinding sound in knee joint and unable to bend knee fully. The difference in knee symptom for not able to straighten knee fully not statistically significant, this may be due to inadequate sample size or less duration of exercise therapy.

The hypothesis of the study was found to be true and accepted. Objectives of the study were met. This shows that agility exercises have significant effect on improving knee symptom status in knee osteoarthritis patients.

Traditional exercise therapy for knee osteoarthritis has centred on quadriceps strengthening; but it appears that such an exercise strategy may not be the optimal choice for all patients. It has been identified that functional instability, the symptom of buckling, slipping, or giving away of the knee during functional activities is a problem in a significant proportion of individuals with knee osteoarthritis. It has been suggested that agility and perturbation training programme may be effective by exposing the individual to potentially destabilising loads in a controlled manner allowing the neuromuscular system to adapt to such conditions.

The findings of the present study are supported by the report of Dr Fitzgerald, who recommended adding agility and perturbation exercises to a traditional strengthening and stretching programme for patients with knee osteoarthritis. In his study to assess the effect of agility exercises on knee instability, it was demonstrated that agility exercises can improve knee stability, reduce pain, and improve physical function in people with knee osteoarthritis.

Recommendations

In the light of above study the following recommenda-

tions are put forward:

- More studies can be conducted to find out the effect of agility exercises alone in knee health status.
- Studies can be conducted in another setting to assess the effect of the intervention.
- Descriptive studies can be arranged to find out the problems of patients with knee osteoarthritis
- Follow-up studies can be conducted to assess the effect of agility exercises on knee health status among patients with knee osteoarthritis.
- Similar study can be conducted to compare the effect of supervised hospital and unsupervised home-based agility exercise program.

Conclusion

Majority of the patients in the experimental group reported significant improvement in knee symptom status after the intervention. Majority of patients in the control group had no improvement in knee symptom status. The observed difference in the knee symptom status was statistically significant at p value <0.01 for knee symptoms like knee joint swelling, knee buckling, clicking or grinding sound in knee joint and inability to bend knee fully. The difference in knee symptom for not able to straighten knee fully was not statistically significant, this may be due to inadequate sample size or less duration of exercise therapy.

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