Factors Affecting Self Reported Physical Disability among Middle Aged Patients with Knee Osteoarthritis

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ABSTRACT

Introduction: Identifying potential factors influencing the disability in patients with knee osteoarthritis is paramount for rehabilitation.
Objectives: To determine the factors that contributes to the symptoms of knee osteoarthritis.
Methods: Knee Injury and Osteoarthritis Outcome Score questionnaire (KOOS) was used to assess the physical disability. one hundred and twenty four patients (age range 50–65 years) were randomized to therapeutic exercise (n =62) and conventional group(n = 62).
Results: The results of regression analysis revealed that age and BMI factors play a role in knee osteoarthritis.
Conclusion: The present study highlights the various factors that influence physical disability and thereby demonstrates to clinical researchers and practitioners that understanding and improving the quality of patient's well-being goes beyond simply treating the underlying clinical condition.

Keywords: *Osteoarthritis, Quality of life, Exercises, Obesity*

INTRODUCTION

Osteoarthritis (OA) causes disability affecting approximately 12% of those between 25-74 years of age.[1,2]. Knee OA is multifactorial and can be divided into endogenous and exogenous risk factors. Endogenous risk factors include age, sex, heredity, Ethnic origin and postmenopausal changes. Exogenous risk factors include macro-trauma, repetitive micro-trauma; overweight, respective joint Surgery and lifestyle factors[3]. Chronic aberrant and excessive knee joint loading is arguably the primary risk factor [4, 5].

The clinical manifestations of knee OA has a direct impact on physical, psychological, social, cognitive and general well-being of patient and can be evaluated in terms of knee related quality of life measures[6].The concept of Qol is critical due to the fact that patients vary greatly in their responses to identical stressors, such as pain. For the majority of patients, pain in OA is episodic in nature. The impact of depression on disability associated with OA is comparable to the effects of depression on cardiac ailments and other clinically important conditions[7]. Psychological well-being and anxiety have been found to be associated with pain and disability [8] Reducing depression seems to alter the levels of pain and disability in OA [9].

Articular degeneration is a key articular factor responsible for pain and disability in knee osteoarthritis [10, 11]. Muscle weakness is the kinesiological factor that results in unstable joints. Mechanical stress on unstable joints leads to strain in innervated tissues, which may cause pain and disability. With regards to psychological factor, pain and disability are found to be associated with coping style, self-efficacy, beliefs and negative emotions [11, 12]. However it is unclear as to what extent each of these factors separately contributes.

Methods

This is a part of research study conducted from April 2012 to December 2013 at Physical Medicine & Rehabilitation Centre.

Study design and study population

A total of 124 patients were recruited and due to 6 dropouts during the intervention period, final analysis was done with 118 participants. The study population was randomly divided into a conventional physiotherapy and therapeutic exercise group respectively comprising of 59 patients each. Patients of diagnosed unilateral knee OA in the age group 50-65 years with sufficient English/Tamil language skills to complete the assessment tools were included in the study.

Patients with neurological diseases, hypertensive patients, those with uncontrolled cardiopulmonary/respiratory diseases, patients unable to rise from and return to a chair without assistance, those with any additional muscular skeletal diseases/surgeries, psychiatric illness and liability to co-operate were excluded from the study.

Demographic data [age, gender, body mass index (BMI), duration of disease & educational status] was obtained. Physical Disability was measured using KOOS scale. KOOS scale measures pain, symptoms, physical function, sport and recreation function, and knee-related quality of life. Standard versions of the KOOS scale were available for free in both English and Tamil. (http://www.koos.nu). The internal consistency range in knee osteoarthritis patients for KOOS Pain was 0.65–0.94, for KOOS Symptoms was 0.56–0.83, for KOOS Activities for Daily Living (ADL) was 0.78–0.97, for KOOS Sport/Rec: 0.84– 0.98, and for KOOS Quality of Life (QOL) was 0.71–0.85[13].

Interventions: The treatment protocol for therapeutic exercise physiotherapy program was framed based on current published treatment recommendations of exercise programs for knee Osteoarthritis by American College of Rheumatology Subcommittee on Osteoarthritis Guidelines [14], American Geriatrics society [15], and evidence-based recommendations of an expert panel on delivering exercise therapy to knee OA patients [16].

Statistical analysis: For analysis of various factors affecting the parameters under study, logistic regression was used.

Ethical committee consideration

The study was approved by the Ethical committee. Letter of permission was taken from respective administration. Written informed participants were obtained. Privacy and confidentiality was maintained throughout the study period.

Results

The study included 118 participants after eliminating the dropouts. The age of the patients varied from 50-65 years of age with maximum number of patients were in the age group of 50-55 years. A high percentage (80.5%) of the participants was overweight with a BMI ≥ 25. The entire study group was educated and had received a minimum of high school education. Table 1 demonstrates the split up of the demographic data.

Table1: Demographic characteristics

Variables	Therapeutic Exercise		Conventional Physiotherapy	
Age (in Yrs)				
50-55	29		25	
56-60	23		18	
61-65	7		16	
Gender				
Male	28		19	
Female	31		40	
BMI				
18.6-24	12		11	

25-29	23		31	
≥30	24		17	
Duration (in Yrs)				
3-6	38		31	
7-12	21		28	
Education				
High School	39		44	
Secondary	9		2	
Graduate	11		13	

Logistic regression analysis showed age (p=0.043) to be a significant factor in predicting mean pain KOOS score in the therapeutic exercise group (table 2) while none of the factors seemed to influence the pain KOOS score in the conventional group.

Table 2: Logistic Regression table showing the factors affecting physical disability(KOOS)-Pain

	Factors	B	S.E.	Wald	p	OR	95% C.I.forEXP(B) Lower	Upper
Therapeutic Group	Age	1.311	.648	4.085	0.043	3.709	1.041	13.219
	Gender	-1.654	1.200	1.900	.168	.191	.018	2.010
	Occupation	-1.810	1.097	2.722	.099	.164	.019	1.405
	Education	-.755	.743	1.033	.309	.470	.110	2.015
	Pain	1.228	.668	3.381	.066	3.415	.922	12.648
	Site	.243	.377	.416	.519	1.275	.609	2.670
	Side	-.468	.676	.478	.489	.626	.166	2.358
	BMI	.290	.412	.496	.481	1.337	.596	3.000
	Constant	1.419	3.582	.157	.692	4.134		
	Duration	.906	.693	1.710	.191	2.474	.636	9.617
	Total	-.965	.781	1.525	.217	.381	.082	1.762

	Factors	B	S.E.	Wald	p	OR	Lower	Upper
Conventional Group	**Age**	**-.155**	**.445**	**.121**	**.728**	**.857**	**.358**	**2.049**
	Gender	**-20.1**	**14608**	**.000**	**.999**	**.000**	**.000**	
	Education	**.165**	**.838**	**.039**	**.844**	**1.179**	**.228**	**6.096**
	Occupation	-20.1	14608	.000	.999	.000	.000	
	Pain	-1.460	.969	2.269	.132	.232	.035	1.552
	Site	.555	.406	1.870	.172	1.742	.786	3.860
	Side	.246	.715	.118	.731	1.278	.315	5.189
	BMI	.654	.557	1.378	.240	1.923	.645	5.730
	Duration	.035	.709	.002	.960	1.036	.258	4.161

Regression analysis of the factors affecting KOOS symptom subscale showed that the duration of the pain

(p=0.004) was a significant predictor of KOOS symptom subscale in the therapeutic group. Age (p=0.049) was a significant factor influencing the KOOS- symptom subscale in the conventional group.(Table 3)

Table 3: Logistic regression table showing the factors affecting physical disability (KOOS) –Symptom

Group	Factors	B	S.E.	Wald	p	OR	95% C.I.forEXP(B) Lower Upper	
	Age	-.748	.576	1.682	.195	.474	.153	1.466
Therapeutic group	Gender	.225	.925	.059	.808	1.253	.204	7.678
	Occupation	1.636	.890	3.383	.066	5.136	.898	29.368
	Education	-.535	.807	.439	.508	.586	.120	2.850
	Pain	1.481	.785	3.555	.059	4.396	.943	20.491
	Site	.040	.393	.010	.920	1.040	.482	2.246
	Side	.022	.703	.001	.975	1.022	.258	4.052
	BMI	.532	.424	1.576	.209	1.703	.742	3.908
	Constant	-8.039	3.599	4.990	.025	.000		
	Duration	2.273	.782	8.441	0.004	9.709	2.095	44.996
	Total	-.988	.865	1.306	.253	.372	.068	2.027

Group	Factors	B	S.E.	Wald	p	OR	Lower	Upper
Conventional group	**Age**	**-1.397**	**.710**	**3.874**	**0.049**	**.247**	**.062**	**.994**
	Education	1.400	1.064	1.731	.188	4.056	.504	32.659
	Pain	-.921	1.151	.641	.424	1.647	.484	5.601
	Site	.653	.489	1.785	.182	1.921	.737	5.008
	Side	.618	.916	.455	.500	1.855	.308	11.169
	BMI	.499	.625	.638	.424	1.647	.484	5.601
	Duration	-.262	.943	.077	.781	.769	.121	4.886

As per the data documented in table 4 the physical disability scores (KOOS)-ADL subscale was not found to be statistically influenced by any of the factors in the therapeutic group, however the educational status (p=0.04) and duration of the illness (p=0.015) seemed to statistically influence ADL in conventional physiotherapy group.

Table4: Logistic regression table showing factors affecting physical disability(KOOS) –ADL subscale

Group		B	S.E.	Wald	p	OR	95% C.I.for EXP(B) Lower	Upper
Therapeutic group	Age	-.881	.565	2.436	.119	.414	.137	1.253
	Gender	1.445	1.660	.759	.384	4.244	.164	109.733
	Occupation	1.586	1.492	1.130	.288	4.884	.262	90.964
	Education	.792	.839	.890	.345	2.207	.426	11.432
	Pain	.242	.735	.109	.742	1.274	.302	5.375
	Site	-.163	.385	.180	.671	.849	.399	1.806

	B	S.E.	Wald	p	OR	Lower	Upper
Side	-.675	.742	.826	.364	.509	.119	2.183
BMI	-.174	.445	.154	.695	.840	.351	2.008
Constant	.411	4.698	.008	.930	1.508		
Duration	-.739	.715	1.070	.301	.478	.118	1.938
Total	-.801	.730	1.204	.272	.449	.107	1.877
Conventional group							
Age	-.423	.436	.942	.332	.655	.279	1.539
Gender	1.166	1.449	.647	.421	3.208	.187	54.888
Occupation	-.216	1.152	.035	.851	1.241	.130	11.861
Education	1.763	.859	4.208	0.04	5.828	1.082	31.396
Pain	-.069	.800	.007	.931	1.071	.223	5.139
Site	.565	.398	2.018	.155	1.760	.807	3.837
Side	1.103	.706	2.439	.118	3.013	.755	12.025
BMI	.929	.537	2.996	.083	2.531	.884	7.245
Duration	1.762	.725	5.903	0.015	5.823	1.406	24.123
Constant	12.345	4.882	6.393	.011	.000		

BMI (p=0.009) of the participants of the conventional group influenced the QOL subscale (table 5) of KOOS however none of the factors seemed to statistically influence the KOOS- QOL.

Table 5: Logistic regression table showing factors affecting physical disability(KOOS) –QOL subscale

Group		B	S.E.	Wald	p	OR	95% C.I. for EXP(B) Lower	Upper
Therapeutic Group	Age	-.424	.501	.714	.398	.655	.241	1.749
	Gender	1.388	1.003	2.916	.166	4.008	.561	28.611
	Occupation	.357	.854	.175	.676	1.429	.268	7.615
	Education	-.146	.672	.047	.828	1.157	310	4.323
	Pain	1.190	.671	3.147	.076	3.287	.883	12.238
	Site	-.182	.335	.295	.587	.833	.432	1.673
	Side	-.790	.634	1.553	.213	.454	.131	1.572
	BMI	.126	.376	.112	.738	1.134	.543	2.369
	Duration	-.772	676	1.306	.253	.462	.123	1.737
	Constant	-1.460	3.205	.208	.649	.232	.344	4.213
	Total	.185	.639	.084	.772	1.203		
Conventional group	Age	-.206	.413	.248	.619	.814	.362	1.830
	Gender	2.507	1.396	3.228	.072	12.272	.796	189.177
	Occupation	.914	1.031	.786	.375	2.495	.330	18.838
	Education	-.049	.799	.004	.951	.952	.199	4.558
	Pain	-.575	.778	.532	.466	.563	.120	2.637
	Site	.467	.387	1.460	.227	1.596	.748	3.406
	Side	.365	.670	.296	.586	1.440	.387	5.356
	BMI	1.532	.586	6.827	0.009	4.625	1.446	14.591
	Duration	.455	.664	.470	.493	1.577	.429	5.792

	Constant	-11.932	4.712	6.411	.011	.000		

Discussion

Osteoarthritis (OA) is a disease for which the prevalence, risk factors, clinical manifestations and prognosis vary according to the joints affected. The degradation of articular cartilage leads to joint pain and difficulty in movement such as in knee OA[17].

According to our study the condition was most prevalent in the age group of 50-55 years, suggesting the prevalence of OA in the late middle age group. CDC estimates 47.5% of adult population ≥ 60 years in the US suffer from OA[18].

In the present study majority of the affected population were females. A number of studies have proved that the prevalence of knee OA in men is lower compared with women[19,20] . BMI was ≥ 25 in 80.5% of the study population thereby indicating obesity to be an important factor to be associated with knee OA. Many studies results show a similar association between obesity and knee OA[21,22] .Obesity is associated with voluntary weakness of the quadriceps muscle[23] .Weight reduction along with exercises has shown to improve function in patients with knee OA[24].

Mental health factors have a multifold relation to pain in OA. Vast majority of studies have found a positive correlation between depression and disability. Studies by Summers et al [25] and Salaffi et al [26] have found positive association of depression and disability in knee osteoarthritis. The above-mentioned studies show a clear-cut association of anxiety with depression, which is the preliminary cause for the physical disability. Any acute injury to the knee triggers anxiety and avoidance of movement as a protective response to prevent further damage to the knee. However long term anxiety is associated with persistent avoidance of motion resulting in loss of muscle bulk. Education and emotional support can help the patient conquer helplessness and alleviate the symptoms[27] A study by Lin et al. [28] has shown a significant reduction in OA pain upon treatment of the co-existing depression.

Despite numerous studies, the etiology of OA remains elusive. Present study showed age and obesity to be the primary factors influencing the pain, symptomatology, physical disability and quality of life in patients with knee OA.

Symptoms associated with chronic conditions such as knee osteoarthritis typically fluctuate over time. Similarly the present study also proved that the duration of the disease significantly influenced the symptoms complex and physical disability associated with the disease.

Pharmacological and non-pharmacological measures are routinely utilized in the treatment of knee OA[29]. Oral and topical NSAIDs reduce pain in the short term compared with placebo, but can cause gastrointestinal, renal and cardiac adverse effects. Opioid analgesics reduce pain in knee osteoarthritis but they are associated with serious adverse effects so are not recommended for first-line treatment.. Exercise and physiotherapy modalities may reduce pain in people with knee osteoarthritis particularly in the initial stages. [30-36]

Conclusion

The study showed that knee osteoarthritis is primarily influenced by factors such as age, duration of the pain and BMI which, in turn showed a marked effect on the mean KOOS scores.

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