

Original Research Article

Impact of COVID-19 lockdown on pain and physical function in patients with advanced hip and knee osteoarthritis

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ABSTRACT

Background: Osteoarthritis is the most common degenerative disease of joints that impairs quality of life and leads to disability. Hence, this study aims to assess the impact of lockdown on pain and physical function in patients with advanced knee and hip Osteoarthritis.

Methods: A total of 86 patients between the age of 35 to 80 years with advanced hip and knee osteoarthritis were considered for the study during the second wave of COVID 19 lockdown. The subjects were contacted over phone call and a questionnaire was put forward after obtaining their consent. Subsequently the interviews were repeated in the fourth week and at the end of lockdown. The observers were blinded for the previous results. Visual analogue scale (VAS), Tegner activity scale (TAS), McMaster Universities Osteoarthritis questionnaire (WOMAC) scores of the patients were obtained. Comparative analysis was made based on these parameters at pre, during and after lockdown period.

Results: Positive, strong to very strong and significant Pearson's correlation was seen between VAS and WOMAC scores at all the time intervals in both the groups (knee and hip) and overall. Negative, moderate to strong and significant correlation was seen between VAS and TAS scores. A weak, moderate and significant correlation was seen between WOMAC and TAS scores.

Conclusions: Our study depicts that the COVID-19 lockdown had a significant negative impact on patients with end-stage hip and knee osteoarthritis resulting in increased pain and deteriorating joint function with reduced quality of life. We suggest that virtual education in the form of web physiotherapy, online knee and hip schools and holistic self-management strategies are vital to improve pain and physical function.

Keywords: COVID-19, Knee, Osteoarthritis, Physical function, VAS score

INTRODUCTION

The most prevalent degenerative joint disease that significantly reduces quality of life and causes disability is osteoarthritis (OA).¹ Pathophysiology of OA is poorly understood and it is still under investigation. So, its origin is accepted as multifactorial. The immune response, biomechanical changes and inflammation play a significant role.² Sex, obesity, genetic as well as mechanical factors are all risk factors.³ In adults, OA is known to be the most prevalent form of arthritis and joint

disease.⁴ OA is endemic to every country in the world and approximately 300 million people are living with this condition.⁵ It leads to loss of function, pain, decreased quality of life and finally disability among older adults.⁶ Earlier, OA was considered to be just a "wear and tear" disease. The destruction of the articular cartilage in the joint and the subsequent inflammation were believed to be caused by chronic overload and poor biomechanics on the joint. This results in stiffness, swelling, as well as loss of mobility. It is now determined that the causes of OA include inflammatory as well as metabolic factors and

involves much more complicated process.⁷ Articular cartilage, which suffers substantial degradation throughout the course of OA, is what makes the disease most notable. Articular cartilage is the smooth cartilage at the end of long bones and within the intervertebral discs. It provides a low friction surface for articulation while being able to transmit heavy loads. Even with mild damage, cartilage heals very slowly despite of having long half-life of collagen. Even though the cartilage has the most notable changes, the entire joint is affected, including the synovium, joint ligaments and subchondral bone.⁷ Progressive pain is the most prominent OA symptom, although mechanical symptoms may also be present. Systemic symptoms should be absent and their presence should cause investigation into other pathologies.⁸

OA is primarily a clinical diagnosis. However, plain radiography can be helpful in confirming the diagnosis and ruling out other pathology.⁹ Magnetic resonance imaging (MRI) and computed tomography are rarely needed. Currently, there is no cure for OA. The available treatment can broadly be classified into a reduction of modifiable risk factors, intra-articular therapy, physical modalities, alternative therapies and surgical treatments. There is also emerging evidence for several novel treatments. Early course of OA, the focuses will be mainly treatment on reducing pain and stiffness. Later, treatment focuses on maintaining physical functioning.⁸

World Health Organization (WHO) declared COVID-19 as a pandemic on March 11th, 2020. To limit new infection rates and prevent health facilities from becoming overcrowded, the majority of European nations instituted a total national lockdown that included the closing of all non-essential activities.¹⁰ Coronavirus disease 2019 (COVID-19) has evolved as a pandemic around the globe. It imposed an unprecedented challenge to healthcare providers' personal as well as professional life and has significant socioeconomic effects on most nations.¹¹ Hospitals have been forced to halt the majority of non-COVID-related activity and postpone the majority of elective procedures, including knee arthroplasties, as part of these attempts to slow the spread of the virus and protect patients and employees.¹² Interestingly, the COVID-19 survey of members of the European Knee Associates (EKA) and European Hip Society (EHS) in April 2020 revealed that 92.6% of hospitals had stopped performing elective surgeries, whereas the American Association of Hip and Knee Surgeons (AAHKS) COVID-19 survey revealed a similar trend in the USA.^{13,14}

Similarly, Asian orthopaedic surgeons had delayed any operations requiring more than 23 hours in the hospitalisation.¹⁵ Additionally, due to their increased chance of developing severe COVID-19, older patients may experience more difficulties following knee surgery.¹¹ Meanwhile delaying elective arthroplasty in patients with severe OA, may result in worsened joint pain, decreased mobility, functional restrictions and an increase in the need for analgesics as well as opioids. Recently, most of the

countries started to think about resuming elective procedures including knee arthroplasties.¹⁶ However, the gradual reintroduction of elective joint replacements will be a difficult and time-consuming, as patient and medical staff safety must always come first in this pandemic.¹⁷

The patient induction into an orthopaedic or arthroplasty programme should be a systematic team approach with the inclusion of an established patient-specific home-based rehabilitation strategy. Plans that should be taken into account include preoperative identification of patient home caregivers, training them in the fundamental rehabilitation protocols and exercise programmes through trainings, pictorial and video study material for pre and post operative period; educating them about the red flags of orthopaedic or arthroplasty management for early and rapid response; required utility devices such as walker, toilet chair, heat sensor, oxygen saturation probe needed for home-based post-operative rehabilitation; at discharge, issuing an official identification card that is countersigned by an appropriate authority in order to enable an early home-based responses from a healthcare provider; facilitating a line of communication between the surgeon and the patient to enable a positive mental attitude that you are being taken care of and that need-based remedies are need to be provided.¹⁸ With this background, the current study was designed to assess the effect of pandemic (COVID 19) situations on patients suffering from end-stage hip and knee osteoarthritis.

METHODS

This is a prospective Cohort study conducted on 86 patients in our arthroplasty record between the age of 35 to 80 years with advanced hip and knee osteoarthritis during the second wave of COVID 19 lockdown at Bangalore Medical College and Research Institute from March 2021 to May 2021. Institutional Ethical Clearance was obtained before commencement of study.

Patients refusing to give consent and not available were excluded. Out of 86 patients, a total of 79 patients who met our inclusion criteria with informed consent were included. The subjects were contacted over phone call during the beginning of lockdown and a questionnaire was put forward. Subsequently the interviews were repeated in the fourth week and at the end of lockdown. Visual analogue scale (VAS), Tegner activity scale (TAS), Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) scores of the patients were obtained. The observers were blinded for the previous results. Comparative analysis was made based on these parameters pre, during and after lockdown.

Statistical analysis

SPSS (Statistical Package for Social Sciences) version 20. (IBM SPASS statistics (IBM corp. Released 2011) was used to perform the statistical analysis. Data was entered in the excel spreadsheet. Descriptive statistics of the

explanatory and outcome variables were calculated by the mean and standard deviation for quantitative variables, frequency and percentage with qualitative variables. Inferential statistics were applied for the comparison of scores. An Independent sample t-test was applied to compare the VAS, WOMAC and TAS scores between the groups (knee and hip) at different time intervals (pre, during and post). Pearson's correlation was applied to correlate the VAS, WOMAC and TAS scores at different time intervals (pre, during and post). Repeated measures ANOVA followed by Bonferroni post-hoc test was applied to compare the VAS, WOMAC and TAS scores at different time intervals for comparison between two-time intervals. The level of significance was set at 5%.

RESULTS

Results on demographic details of study subjects revealed that the mean age of the subjects was 56.16 ± 11.329 with a minimum age of 35 years and maximum age of 80 years. Out of the total 79 (100%) subjects, 31 (39.2%) subjects were aged between 50 to 60 years, followed by 29 (36.7%) subjects aged >60 years and 19 (24.1%) subjects were aged between 35 to 45 yrs. The male predominance was observed (54.4%) as compared to females (45.6%) (Table 1).

The VAS scores between the knee and hip groups were obtained at different time intervals. VAS scores were slightly higher in the hip group at pre-time intervals as

compared to the knee group with a mean difference of -0.66, whereas VAS scores were higher in the knee group at both during and post-time intervals as compared to the hip group. A statistically significant difference ($p=0.001$) was observed between the knee and hip groups at pre-time intervals (Table 2).

The WOMAC scores between the knee and hip groups at different time intervals revealed that the mean scores were higher in the hip group at all intervals (pre, during and post) compared to the knee group. A statistically significant difference ($p=0.001$) was observed between the knee and hip groups at pre-time intervals (Table 3).

The results of TAS scores delineated that the scores were slightly higher in the knee group at pre and post-time intervals as compared to the hip group. However, there was a statistically significant difference ($p=0.006$) observed between the knee and hip group at a pre-time interval ($p=0.006$) (Table 4).

Pearson's correlation was applied to correlate the VAS, WOMAC and TAS scores at pre, during and post-time intervals. Positive, strong to very strong and significant correlation was seen between VAS and WOMAC scores at all the time intervals in both the groups (knee and hip) and overall. Negative, moderate to strong correlation and significant correlation was seen between VAS and TAS scores. A weak, moderate and significant correlation was seen between WOMAC and TAS scores (Table 5).

Table 1: Demographics of study subjects.

	Frequency	%
Age groups (in years)		
35 to 45	19	24.1
50 to 60	31	39.2
>60	29	36.7
Total	79	100
Mean±S.D.	56.16±11.33	
Minimum	35 years	
Maximum	80 years	
Gender		
Females	36	45.6
Males	43	54.4
Total	79	100

Table 2: Effect of COVID-19 pandemic situation on VAS score of study subjects.

Time intervals	Groups	N	Minimum	Maximum	Mean	S.D	Mean diff	P value
Pre	Knee	53	4	7	5.34	0.939	-0.66	0.001*
	Hip	26	6	6	6.00	0.000		
During	Knee	53	5	8	6.72	0.928	0.063	0.746
	Hip	26	6	7	6.65	0.485		
Post	Knee	53	7	10	7.96	0.808	0.308	0.077
	Hip	26	7	8	7.65	0.485		

*Statistically significant.

Table 3: Effect of COVID-19 pandemic situation on WOMAC score of study subjects.

Time intervals	Groups	N	Minimum	Maximum	Mean	S.D	Mean diff	P value
Pre	Knee	53	32	41	35.83	3.142	-2.17	0.001*
	Hip	26	38	38	38.00	0.000		
During	Knee	53	36	51	43.49	5.254	-1.54	0.168
	Hip	26	41	48	45.04	3.013		
Post	Knee	53	39	61	51.06	8.789	-0.059	0.97
	Hip	26	42	58	51.12	6.683		

*Statistically significant.

Table 4: Effect of COVID-19 pandemic situation on TAS score of study subjects.

Time intervals	Groups	N	Minimum	Maximum	Mean	S.D	Mean diff	P value
Pre	Knee	53	4	5	4.74	0.445	0.313	0.006*
	Hip	26	4	5	4.42	0.504		
During	Knee	53	3	4	3.55	0.503	-0.145	0.222
	Hip	26	3	4	3.69	0.471		
Post	Knee	53	1	3	2.13	0.761	0.286	0.148
	Hip	26	1	3	1.85	0.925		

*Statistically significant.

Table 5: Pearson's correlation between VAS, WOMAC and TAS scores of study subjects.

Time intervals	Scores	Overall		Knee		Hip	
		r value	P value	r value	P value	r value	P value
Pre	VAS V/s WOMAC	0.919	0.001*	0.906	0.001*	-	-
	VAS V/s TAS	-0.602	0.001*	-0.701	0.001*	-	-
	WOMAC V/s TAS	-0.557	0.001*	-0.638	0.001*	-	-
During	VAS V/s WOMAC	0.725	0.001*	0.704	0.001*	0.995	0.001*
	VAS V/s TAS	-0.506	0.001*	-0.528	0.001*	-0.485	0.012*
	WOMAC V/s TAS	-0.378	0.001*	-0.388	0.004*	-0.527	0.006*
Post	VAS V/s WOMAC	0.862	0.001*	0.870	0.001*	0.95	0.001*
	VAS V/s TAS	-0.610	0.001*	-0.618	0.001*	-0.926	0.001*
	WOMAC V/s TAS	-0.676	0.001*	-0.648	0.001*	-0.648	0.001*

*Statistically significant.

DISCUSSION

The present study was conducted to assess the implications of the pandemic (COVID 19) in patients suffering from end-stage hip and knee osteoarthritis since COVID-19 lockdown affected many patients with end-stage hip or knee osteoarthritis as surgeries and therapies were delayed for a long time. In the present study, the mean age of the study subjects was 56.16±11.329 with a minimum age of 35 years and maximum age of 80 years.

This is comparable with a study conducted by Endstrasser et al, where the mean age of participants was 62.4±11.84, ranging from 26 years to 86 years.¹⁰ The present study findings showed that out of 79 (100%) subjects, 43 (54.4%) were males and 36 (45.6%) were females. Similarly, in the study reported by Endstrasser et al, it was found that out of 63 (100%) subjects, 28 (44%) were females and 35 males (56%).¹⁰ In our study, the VAS scores of subjects were slightly higher in the hip group at

the pre-time interval as compared to the knee group. Whereas VAS scores were higher in the knee group at both during and post time intervals as compared to the hip group. Comparable to this, Endstrasser et al, found that the mean VAS scores increased significantly between the first and second and between the second and final lockdown intervals.¹⁰

WOMAC scores in the current study were higher in the hip group at all the time intervals (pre, during and post) as compared to the knee group. The results of the study conducted by Clement et al, also revealed that the mean WOMAC scores increased constantly during the lockdown, which is consistent with our study findings. The WOMAC scores difference between the beginning and the end of lockdown exceeds the minimum score difference that has been reported as clinically important.¹⁹ This could indicate a loss of joint function that was clinically significant during the lockdown. Patients with hip OA generally had higher WOMAC scores than those with knee

OA.¹⁰ Furthermore, the present study findings reported that TAS scores were also marginally higher in the knee group than the hip group at pre- and post-time intervals with a mean difference of 0.313 and 0.286, respectively. In contrast to these results, Endstrasser et al, found that significantly decrease of TAS during lockdown.¹⁰

Pearson's correlation was applied in the present study for the comparison of parameters. It was observed that VAS and WOMAC scores had positive, strong to very strong and significant correlation at all the time intervals in both the groups (knee and hip) and overall. Meanwhile, VAS and TAS scores had negative, moderate to strong and significant correlations. In addition to it, a weak, moderate and significant correlation was observed between WOMAC and TAS scores. Relating to these results, Endstrasser et al, stated that VAS and WOMAC scores revealed an increasing correlation with the level of activity (TAS) during the lockdown.¹⁰

Increased pain and loss of joint function are linked to a persistent decline in physical activity. Results from earlier research showed how important home exercise sessions are for reducing symptoms during a possible lockdown.^{20,21} Endstrasser et al, found that during the lockdown, patients having knee OA demonstrated a faster deterioration in pain score compared to patients having hip OA, suggesting that the loss of activity has a greater impact on OA knees.¹⁰

Nearly eighty percent of patients in the Endstrasser et al, cohort study that was reviewed said they wanted to undergo surgery as soon as possible. Only twenty percent wanted further delay in their treatment, mostly because they wanted to wait until things could return back to normal. Subgroup analysis revealed that patients who preferred their surgery sooner suffered from significant pain as well as function decline during the lockdown, whereas patients who preferred a further delay did not deteriorate significantly. This implies that the patients' choices were largely influenced by how their symptoms manifested rather than by any reservations they may have had about receiving treatment at home.¹⁰

Limitations of our study include a small sample size and telephonic interview methodology. It may be difficult to elicit the exact patient related data without examination. However, the pandemic warranted social restrictions which prevented physical visits unless an emergency.

CONCLUSION

Our study depicts that the COVID-19 lockdown had a significant negative impact on patients with end-stage hip and knee osteoarthritis resulting in increased pain and deteriorating joint function with reduced quality of life. This also proves that lack of joint mobility can lead to joint dysfunction accentuating the symptoms of osteoarthritis. However, a certain subset of patients with advanced osteoarthritis experience debilitating pain which can be

attributed to non-availability of medical care and the negative psychological impact of pandemic. As a concern for the community and considering the circumstances and the consent of the patients, it is quite difficult to restore the original surgical schedules during a pandemic. We suggest that virtual education in the form of web physiotherapy, television-based exercise education programs, online knee and hip schools and holistic self-management strategies are vital to improve pain and physical function.

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