

ASSESSMENT OF PAIN SEVERITY AND FUNCTIONAL STATUS IN PATIENTS WITH KNEE OSTEOARTHRITIS AT THE KENYATTA NATIONAL HOSPITAL, NAIROBI, KENYA

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ABSTRACT

Background: Chronic pain in knee osteoarthritis influences the quality of life and functional status of these patients. Despite numerous treatment modalities, pain may be inadequately controlled and affect a patient's functional status. This may be more evident in our local setup as patients tend to present later in the disease. This study was designed to understand the burden of pain in knee osteoarthritis.

Objective: To assess pain severity and the level of function in patients with knee osteoarthritis at the Orthopedic and Rheumatology clinics at the Kenyatta National Hospital (KNH).

Methods: A cross-sectional descriptive study that assessed patients above the age of 18 years with a diagnosis of knee osteoarthritis on follow-up who fit the inclusion criteria. The pain was assessed by the Brief Pain Inventory-Short Form (BPI-SF) and the functional status was assessed by the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC). Pain severity was analyzed and presented as a proportion of patients having either mild, moderate, or severe pain. Any patient reporting a pain score >4 in question 5 of BPI-SF indicating moderate (4-7) or severe pain (>8) was classified as having inadequate pain control. Functional impairment was assessed using the WOMAC score (0-96). A higher score indicated poorer function. Pain severity was associated with functional status using the ANOVA test. The chi-squared test was used to associate patient-related factors with pain control. A 5% level of significance was used to interpret all the statistical tests (p-value less or equal to 0.05).

Results: A total of 270 patients were recruited into the study of whom 139 (51.5%) were females and 131 (48.5%) were males, The mean age of the study population was 55.1 years. The majority of the patients were overweight (n= 134, 49.6%) with a smaller number (n=27, 10%) being obese. The median duration of osteoarthritis diagnosis was 48 months. Bilateral knee osteoarthritis (n= 172, 63.7%) was more prevalent than unilateral disease (n= 98, 36.3%). Knee pain was inadequately controlled in 265 (98.1%) participants with these patients scoring >4 (moderate to severe pain) in Question no 5 (pain on average) of the BPI-SF. The majority of participants (n=259, 95.9%) also had functional impairment/disability. Participants with inadequate pain control (moderate pain or higher) had a worse functional status p=0.026 (<0.05). Older patients had higher pain severity p=0.029 (<0.05).

Conclusion: Pain severity is mostly moderate or severe indicating poor pain control in patients with knee osteoarthritis. Higher pain severity is more common in older patients and is associated with worse functional status. This limits their daily activities and enjoyment of life.

Key words: Pain severity, Knee osteoarthritis

INTRODUCTION

Osteoarthritis is the most prevalent joint disorder and form of arthritis worldwide. It is an important cause of disability and is a source of significant health burdens having wide implications on patients' health, health systems and socioeconomic cost. The burden has risen by almost 50% over the past three decades and is expected to rise higher

owing to an aging population and increased rates of obesity (1,2).

According to the Global Burden of Disease Study in 2019, 7% of the global population is affected by osteoarthritis, with women accounting for 60% of cases. Osteoarthritis was the 15th highest cause of Years Lived with Disability (YLDs) worldwide and was responsible for 2% of the total global YLDs (2).

In Africa, epidemiological data for rheumatic diseases is limited, despite the burden possibly being heavier due to later presentation by patients (3,4). Usenbo *et al.* (3) in 2015 attempted to demystify this by conducting a systematic review and meta-analysis of the prevalence of arthritis in Africa. The review noted that prevalence data was lacking suggesting that more needs to be done to understand the true burden of rheumatic diseases and osteoarthritis in this part of the world.

The knee is the most affected joint in patients with osteoarthritis accounting for 60.9% of cases globally followed by hand and hip osteoarthritis accounting for a combined 29% of cases (2,4). In Kenya, Nour *et al.* (4) noted that knee osteoarthritis was the most common form of OA at the Rheumatology and Orthopaedic clinics at The Kenyatta National Hospital, accounting for 77% of cases. In 2016, at Moi Teaching and Referral Hospital in Eldoret, Kenya, Onsare *et al.* (5) found that among 177 patients with OA, 93.84% presented with worsening pain, and 92.66% presented with functional limitation concluding that severe pain and functional limitation were among the most salient clinical characteristics seen in patients with OA.

Pain is the characteristic symptom of Osteoarthritis (OA) that pushes patients to seek medical attention. Pain limits mobility and affects one's quality of life and functional status. The chief cause of disability in the elderly in the US is lower extremity OA (6). Such data is missing for the African population. The knowledge of pain control and functional status in patients with knee osteoarthritis within Kenya is not known and without this, we are unable to fully appreciate the burden of pain in this patient population.

MATERIALS AND METHODS

This was a cross-sectional descriptive study that was conducted at the Rheumatology and Orthopaedic clinics at the Kenyatta National Hospital in Nairobi, Kenya after the appropriate ethical approvals. This is the largest tertiary referral hospital in Kenya with a busy rheumatology and orthopaedic clinic. The main outcome measures of this study were pain severity and functional status. Pain severity was assessed using the BPI-SF. A score of >4 in item number 5 of BPI which asks "What is your pain on average?" defined inadequate pain control as this score is indicative of moderate-severe pain. Functional status was assessed using the WOMAC index. A higher total score (WOMAC Index) defined poorer physical function and increased disability.

Two hundred and seventy seven patients with a file diagnosis of knee osteoarthritis who fit the inclusion criteria were consecutively sampled. Seven patients did not give informed consent and were excluded. The study population was summarized into percentages and means or medians for categorical and continuous data respectively. Pain severity was analyzed and presented as a proportion of patients having either mild, moderate, or severe pain. Any patient reporting a pain score >4 indicating moderate (4-7) or severe pain (>8) was classified as having inadequate pain control.

Similarly, the functional status of the patients was analyzed and presented using percentages. Functional impairment was reported as mild (0-32), moderate (32-64), or severe (64-96) depending on the WOMAC score (0-96). Pain severity was associated with functional status using the ANOVA (Analysis of Variance) test as more than 2 groups of means were being associated. The ANOVA test was also used to associate age with pain severity. The chi-squared test was used to associate the other patient-related factors (categorical variables) with pain severity. The median duration of knee OA was associated with pain severity using the Kruskal-Wallis test. A 5% level of significance was used to interpret all the statistical tests ($p < 0.05$).

RESULTS

The study was carried out at the Orthopaedic and Rheumatology clinics at the Kenyatta National Hospital between May and June of 2022. A total of 277 patient files with a documented diagnosis of knee osteoarthritis were consecutively sampled to participate in the study. Seven patients did not give consent and were excluded therefore 270 participants were recruited into the study.

Sociodemographic and clinical characteristics: Among the 270 patients recruited into the study, 139 (51.5%) were females and 131 (48.5%) were males, The mean age of the study population was 55.1 years with a standard deviation of 13.7. Sixty-five (24.1%) participants were cigarette smokers (Table 1).

The majority of the patients were overweight ($n = 134, 49.6%$) with a smaller number ($n = 27, 10%$) being obese. The median duration of osteoarthritis diagnosis was 48 months. Furthermore, a larger number of patients had osteoarthritis of both knees ($n = 172, 63.7%$) (Table 1).

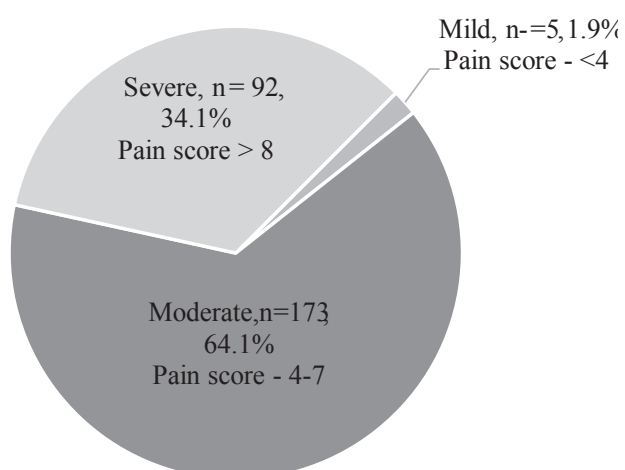
Pain severity: The majority of patients ($n = 173, 64.1%$) experienced moderate pain on average

Table 1
Sociodemographic and clinical characteristics

Variable	n=270
Age in years	
Mean (SD)	55.1 (13.7)
Min-max	18.0-83.0
Gender, n (%)	
Male	131 (48.5)
Female	139 (51.5)
Height (cm)	
Mean (SD)	162.5 (9.1)
Min-max	141-182
Weight (kg)	
Mean (SD)	67.9 (6.5)
Min-max	48.0-90.0
Body Mass Index (BMI), n (%)	
Underweight (<18)	2 (0.7)
Normal (18-24)	107 (39.6)
Overweight (>24)	134 (49.6)
Obese (>30)	27 (10.0)
Cigarette smoking, n (%)	
Yes	65 (24.1)
No	205 (75.9)
Duration of OA (in months)	
Median (IQR)	48.0 (12.0-72.0)
Min-max	1.0-360.0
Osteoarthritis of both knees, n (%)	
Yes	172 (63.7)
No	98 (36.3)

(pain score 4-7) with a lesser number (n=92, 34.1%) experiencing severe pain (pain score >8). This meant that most of the patient population had inadequate pain control as their average pain score was >4 (n=265, 98.1%) (Figure 1).

Figure 1
Average pain score



Functional status: The mean WOMAC score was 46.8 with a standard deviation of 12.6 (Table 2).

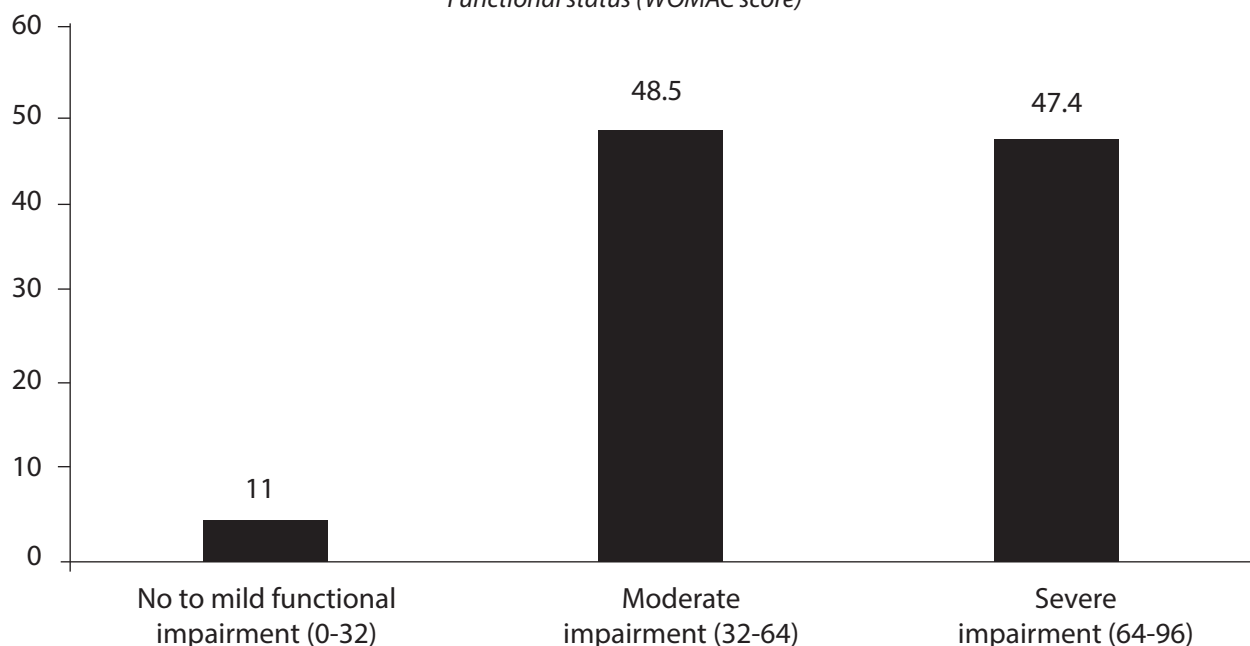
Only 11 (4.1%) patients reported no to mild functional impairment (Womac score 0-32) while the remainder of the patients were classified as having either a moderate or severe functional impairment. One hundred and thirty one (48.5%) patients scored between 32-64 on the WOMAC score signifying moderate functional impairment and 128 (47.4%) patients scored between 64 and 96 on the WOMAC score indicating severe functional impairment (Figure 2).

Association between pain severity and functional status: Severe pain was associated with a higher WOMAC score indicating poorer functional status in these patients. The mean WOMAC score increased with increasing pain severity (mild – 38.6, moderate – 45.5, severe - 49.2). Therefore those with inadequate pain control (moderate pain or higher) had a worse functional status. This was statistically significant with a p-value of 0.026 ($p < 0.05$) (Table 3).

Table 2
Functional status

Variable	Frequency
Functional status	
Mean (SD)	46.6 (12.6)
Category, (WOMAC score)	n-270 (%)
No to mild functional impairment (0-32)	11 (4.1)
Moderate impairment (32-64)	131 (48.5)
Severe impairment (64-96)	128 (47.4)

Figure 2
Functional status (WOMAC score)



Additionally, the degree of functional impairment decreased with decreasing pain severity. The proportion of patients with severe

functional impairment (63%) was much higher in those with severe pain compared to those with moderate pain (39.9%) (p-value – 0.003) (Table 3).

Table 3
Association between pain severity and functional status

Variable	Pain severity			P-value
	Severe	Moderate	Mild	
Mean WOMAC score (SD)	49.2 (12.3)	45.5 (12.6)	38.6 (11.0)	0.026
Functional impairment (WOMAC score)	n (%)	n (%)	n (%)	
No to mild (0-32)	2 (2.2)	9 (5.2)	0	0.003
Moderate (32-64)	32 (34.8)	95 (54.9)	4 (80.0)	
Severe (64-96)	58 (63.0)	69 (39.9)	1 (20.0)	

Factors associated with pain severity: Older patients had higher pain severity. The mean age increased with increasing pain severity with those with moderate pain having a mean age of 53.9 years while those with severe pain had a higher mean age of 57.9 years. A younger population (mean age - 46.8 years) experienced milder pain. This association was significant with a p-value of 0.029 ($p < 0.05$) (Table 4).

A higher proportion of patients with severe pain were female (58.7%) and overweight (52.2%) compared to those with moderate pain though this association was insignificant. Patients with bilateral knee osteoarthritis had higher pain scores with 59.5% of these patients having moderate pain and 71.7% having severe pain (Table 4). This association was also statistically insignificant.

Table 4
Factors associated with pain control

Variable	Pain severity			P-value
	Severe	Moderate	Mild	
Age - years				
Mean (SD)	57.9 (13.3)	53.9 (13.7)	46.8 (15.8)	0.029
Gender, n (%)				
Male	38 (41.3)	91 (52.6)	2 (40.0)	0.174
Female	54 (58.7)	82 (47.4)	3 (60.0)	
Body Mass Index (BMI)				
Underweight	1 (1.1)	1 (0.6)	0	0.722
Normal	37 (40.2)	68 (39.3)	2 (40.0)	
Overweight	48 (52.2)	83 (48.0)	3 (60.0)	
Obese	6 (6.5)	21 (12.1)	0	
Cigarette smoking, n (%)				
Yes	16 (17.4)	48 (27.7)	1 (20.0)	0.142
No	76 (82.6)	125 (72.3)	4 (80.0)	
Duration of OA in months				
Median (IQR)	48 (12-78)	48 (16-72)	24 (18-36)	0.582
OA of both knees, n (%)				
Yes	66 (71.7)	103 (59.5)	3 (60.0)	0.121
No	26 (28.3)	70 (40.5)	2 (40.0)	

DISCUSSION

Pain is a disabling symptom and chronic pain affects the majority of patients with knee OA, affecting their ability to move, work and enjoy life. Pain severity is an important factor in the level of functional limitation and this study assessed this in the patient population at Kenyatta National Hospital in Nairobi, Kenya.

There was a slight female preponderance among participants at 51.5%. Onsare *et al.* (5) noted a similar finding in gender distribution in his study in Eldoret, Kenya at Moi Teaching and Referral Hospital. Worldwide, the female sex is a strong risk factor for developing osteoarthritis (1). The mean age of the patient population was 55.1 years and the majority of the patients were overweight or obese making up 59.6% of the total study population. This is an expected finding as

osteoarthritis is more common in patients who are older and overweight or obese (1).

Overweight or obese patients are more likely to develop bilateral knee osteoarthritis (4). Therefore, it is unsurprising that bilateral knee osteoarthritis (63.7%) was more common than unilateral disease (36.3%). The median duration of disease in our patient population was 48 months indicating that these patients had a longer duration of disease. This is expected as the Kenyatta National Hospital is the largest referral hospital in Kenya and the majority of patients who are seen at the clinics have been referred from lower-level hospitals or clinics.

The study revealed that the burden of pain in these patients is overwhelmingly high with 98.1% of patients reporting inadequate pain control rating their pain at 4 or more on average. A larger number of these patients reported moderate pain

(64.1%) than severe pain (34.1%). It is difficult to ascertain why higher pain scores were largely ubiquitous in the study population. Treatment in knee OA is multi-modal including non-pharmacological, pharmacological, and surgical approaches therefore it was beyond the scope of this study to evaluate the treatment of these patients given the descriptive nature of the study.

Having said this, the findings are comparable with previous studies done locally on pain control in ambulatory cancer patients and patients with rheumatoid arthritis where pain control was found to be largely inadequate (7,8). Notwithstanding the different cohorts of patients, Mukopi *et al.* (8) also assessed the therapy of the patients with rheumatoid arthritis and their treatment adherence. A low level of medication adherence was a significant contributor to inadequate pain control noted in this study (8).

In Europe, a large study on the Survey of Osteoarthritis Real-World Therapies (SORT) across six European countries also noted that more than half of their patients (54%, n =1260) had inadequate pain control (9). The SORT study had a larger number of patients with different sociodemographic backgrounds, so the results of our studies might not be comparable.

General activity, work, and walking ability were all affected by pain. Ninety-seven percent of patients reported interference in their general activity with more than 85% reporting pain interference in their work and walking ability. Expectedly this was reflected in the general enjoyment of life, with 79.3% of patients reporting that they do not enjoy life because of pain. Though remarkably high, these results are an expected finding based on NHANES III data, which noted that 80% of individuals with OA have some limitation in movement (10). Further scrutiny into why this is the case is required, to improve patients' quality of life. This can be done by conducting further studies into the treatment patterns of knee osteoarthritis and adherence to these treatments and also by enhancing and streamlining access to arthroplasty clinics.

Functional impairment was equally as high at 95.9%. The mean WOMAC score was 46.6 (SD-12.6) with the majority of patients being classified as having moderate (48.5%) or severe (47.4%) functional impairment. This high level of functional disability is not dissimilar to osteoarthritis patients at Moi Teaching and Referral Hospital in Eldoret, Kenya. A study including 177 patients conducted there in 2016 by Onsare *et al.* (5) noted that most (92.66%) of the patients had a functional limitation

with many patients presenting to the clinics because of worsening pain (93.84%). The patients' sociodemographics were similar to our study with females representing slightly more than half of the study population at 51.16%. However, their patient population was less overweight or obese (39.43%). Furthermore, their patients' main occupation was peasant farming or casual labor, a factor that wasn't assessed in our study (5).

Patients with higher pain scores (moderate pain or higher) had a worse functional status. This association was significant with a p-value of 0.026 ($p < 0.05$). This finding is expected as there is a known association between the level of pain and functional impairment. Creamer *et al.* (11) noted that the main factors associated with functional impairment in patients with knee osteoarthritis are pain severity and obesity. Furthermore, Conaghan *et al.* (9) noted that patients with inadequate pain relief were more likely to have worse quality of life, greater function loss, and greater pain interference.

Age was the most important factor associated with increased pain severity in our study population. Older patients had a higher pain score and therefore had worse pain control ($p = 0.029$). This was the only significant factor contributing to poorer pain control. Despite a higher proportion of patients with bilateral knee osteoarthritis having higher pain scores, this was not a significant factor in pain control. Body mass index, gender, and duration of disease were also not contributing factors to the high pain scores in our study population. This was entirely different from the SORT study which showed a significant association between BMI, duration of disease, and the proportion of OA of both knees, with inadequate pain control (9).

Overall, the burden of pain and disability in the study population was very high and steps need to be taken to improve the quality of lives of patients suffering from knee osteoarthritis. Both non-pharmacological and pharmacological approaches need to be optimized while considering early stratification of patients for surgical intervention as joint replacement is a clinically relevant and cost-effective treatment for end-stage osteoarthritis.

CONCLUSION

Pain in knee osteoarthritis is inadequately controlled with the majority of our patients having moderate to high pain scores on average. There is also a high level of functional impairment in this patient population which limits their daily activities and affects their general enjoyment of

life. Higher pain scores are associated with poorer functional status and older age.

REFERENCES

- Hunter, D.J. and Bierma-Zeinstra, S. Osteoarthritis. *The Lancet*. *Lancet Publishing Group*. 2019; **393**: 1745–59.
- Vos, T., Lim, S.S., Abbafati, C., Abbas, K.M., Abbasi, M., Abbasifard, M., *et al.* Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. *The Lancet* [Internet]. 2020; **396**(10258):1204–22. Available from: [https://doi.org/10.1016/S0140-6736\(20\)30925-9](https://doi.org/10.1016/S0140-6736(20)30925-9)
- Usenbo, A., Kramer, V., Young, T. and Musekiwa, A. Prevalence of arthritis in Africa: a systematic review and meta-analysis. *PLoS One* [Internet]. 2015; **10**(8):e0133858–e0133858. Available from: <https://pubmed.ncbi.nlm.nih.gov/26241756>
- Nour, H., Oyoo, G. and Joshi, M. Patterns of knee, hip, and hand osteoarthritis in Kenyatta National Hospital. *East Afr Orthop J*. 2013; **7**:53–56.
- Onsare, J.N., Kibor, L. and Ayumba, B. Characterization of osteoarthritis in patients seen at Moi Teaching and Referral Hospital, Eldoret, Kenya. a thesis submitted in partial fulfillment of the requirements for the award of the degree of Master of Medicine-Orthopedic Surgery, Moi University. 2016.
- Neogi, T. The epidemiology and impact of pain in osteoarthritis. *Osteoarthritis Cartilage*. 2013; **21**(9):1145–53.
- Wanjuki, J., Abinya, N., Amayo, E. and Munyoro, E. Prevalence and management of cancer pain in ambulatory patients at Kenyatta National Hospital Dr. Wanjuki John Ndegwa MBChB. A dissertation submitted as part of fulfillment of the requirements for the Degree of Master of Medicine in Internal Medicine, University of Nairobi. 2013.
- Mukopi, L., Karimi, P. and Gitau, S. Evaluation of pain management among patients with rheumatoid arthritis at Kenyatta National Hospital Laurine Muyuka Mukopi (Bpharm). A research dissertation submitted in partial fulfillment of the requirements for the award of the Degree of Master of Pharmacy in Clinical Pharmacy, The School of Pharmacy, University of Nairobi. 2018.
- Conaghan, P.G., Peloso, P.M., Everett, S.V., Rajagopalan, S., Black, C.M., Mavros, P., *et al.* Inadequate pain relief and large functional loss among patients with knee osteoarthritis: evidence from a prospective multinational longitudinal study of osteoarthritis real-world therapies. *Rheumatology* [Internet]. 2015; **54**(2):270–277. Available from: <https://doi.org/10.1093/rheumatology/keu332>
- Osteoarthritis CDC Basics [Internet]. 2020 [cited 2021 Jun 30]. Available from: <https://www.cdc.gov/arthritis/basics/osteoarthritis.htm>
- Creamer, P., Lethbridge-Cejku, M. and Hochberg, M.C. Factors associated with functional impairment in symptomatic knee osteoarthritis. *Rheumatology* [Internet]. 2000; **39**(5):490–496. Available from: <https://doi.org/10.1093/rheumatology/39.5.490>