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Clinical Presentation and Severity of Knee Osteoarthritis Among Patients at Primary Health Centers, Omdurman Localities, Khartoum State, 2020 -2021

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Abstract

Background: Osteoarthritis, especially the knee joint, is one of the most common diseases in advanced ages and at the same time greatly affects activities of patients in various parts of the world.

Objective: To study the impact of knee osteoarthritis among patients at primary health centers

Methods: Across sectional study was conducted in five primary healthcare centers in Omdurman locality in Khartoum state from October 2020 to March 2021. Data collected, prepared, entered and analyzed using SPSS version 25.0.

Results: This study involved 288 participants, predominantly female (59%), with a male-to-female ratio of 1:1.4. Over half (57%) were over 60 years old, with an average age of 60.7 years. Regarding daily activity impact, 37.5% were self-dependent, 40.6% were self-dependent with minimal assistance, 19.8% were partially dependent, and 2.1% were totally dependent. Over a third (38.9%) reported knee injuries, 64.6% said their disease affected their jobs, and 80.6% experienced reduced walking distances in the past six months. Most (88.9%) had moved normally before developing knee osteoarthritis.

Chi-square tests showed that females had a longer knee pain duration per minute than males ($p = 0.011$). Those aged 60-79 experienced significantly more knee pain duration than other age groups ($p = 0.001$). Overweight patients had longer pain durations, but this difference was not statistically significant ($p = 0.628$). There was no significant difference between occupation and knee pain duration ($p = 0.101$).

Conclusion: We concluded that patients with OA suffer limitations in their life. These findings can provide feedback for clinicians regarding patients' performance during everyday. So that they can take the necessary treatment and counselling measures to improve and facilitate their quality of life.

Abbreviations

ACL	Anterior Cruciate Ligaments
ADL	Activity Of Daily Living
LCL	Lateral Collateral Ligament
MCL	Medial Collateral Ligament
OA	Osteoarthritis
PCL	Posterior Cruciate Ligament
PHC	Primary Health Care
SPSS	Statistical Package For Social Sciences

Introduction

In old age physical function such as leg strength, balance and mobility of the leg joints decrease markedly with age. prevention of reduction in these physical functions is crucial to allow the elderly to continue a healthy and independent daily life (1 ,2). Demura and Sato (3) reported that the ability to live independently should be assessed in the elderly.

In addition, Sato et al. (4) reported that the ability to achieve activities of daily living (ADLS), rather than the ability to perform physical function at maximum exertion, should be assessed for elderly. it is important for elderly to retain the ability to achieve ADLs at above a certain level to maintain an independent daily life (4 ,5) among different leg joint, knee joint have the greatest load – bearing capacity, and double the usual load of body weight is imposed on each knee joint when standing on one leg or when walking (6).

Knee joint is important for achieving independence in ADLs (7). Recently the number of elderly who suffer from mild or sever knee pain has increase (8) O, Reilly et al. (9) and McAlindon et al. have reported that approximately 25% of the elderly with knee osteoarthritis, which is the main cause of mild and sever knee pain, do not feel subjective pain. however,they are more likely to suffer mild or sever knee pain in the future. ADLs survey was used to assess the physical ability which the elderly is necessary to pass independent daily life.

In knee osteoarthritis, there is degeneration of the joint targeting the articular cartilage and the surrounding tissues. The main affected tissues

are synovium,bone, hyaline cartilage. Also, it may lead to Synovitis (7) (8).

Knee osteoarthritis is considered one of the musculoskeletal conditions that causes pain, stiffness, fatigue, which may impair the ability to undergo daily living (29).Osteoarthritis, in general, have many risk factors, includingage,trauma,gender,overuse, and genetics (27)

Risk Factor for Knee Osteoarthritis

Age: age is the one of the strongest risk factors (16 18). The national Health survey found the prevalence of this disease to be less than 0.1 %in those age 25 to 34 years old and 80% in people over age 55. (16)

Female sex: study have found that women are more likely to develop osteoarthritis. (17)

Obesity: the strongest modifiable risk factor for the development osteoarthritis, multiple studies was done demonstrated a relationship between obesity and osteoarthritis. (17)

Sex hormones: gender related hormones have been considered to be possible risk factor in the development of osteoarthritis, particularly in women, studies assessing serum sex hormone in women with OA and the effect of estrogen replacement therapy on the disorder are inconclusive. (24)

Occupation: certain occupation activities, related to repetitive knee bending appear to be a risk factor for the development of knee OA.

Previous knee injuries: injuries such as those that occur when playing sport or from an accident can increase the risk of OA. even injuries that occur many year ago and seemly healed can increase your risk of osteoarthritis.

Repeated stress on the joint: if your job or a sport you play places repetitive stress on a joint, that joint might eventually develop osteoarthritis (20, 21, 22, 23)

Genetics: some people inherit a tendency to develop osteoarthritis.

Bone deformities: some people are born with malforemated joint or defective cartilage. (20, 21, 22, 23)

Certain metabolic diseases: these include diabetes and a condition in which your body too much iron (hemochromatosis (20, 21, 22, 23).

The general objective of this study is to examine the clinical presentation and severity of knee osteoarthritis among patients at primary health centers. Specifically, the study aims to describe the sociodemographic characteristics of patients with knee osteoarthritis, assess the severity of the condition, and explore the relationship between sociodemographic variables and the degree of the disease.

Materials and Methods

Study design and setting:

This observational cross-sectional study was conducted across five primary health centers in the Omdurman locality, Khartoum State, Sudan, from October 2020 to March 2021.

Study Population:

The study included all patients with knee osteoarthritis (OA) attending these centers during the study period. We focused on non-traumatic patients who complained of knee pain, excluding those with other knee pathologies causing knee pain.

Sampling Size and Technique:

Out of seven primary health centers, two were closed during the study period, so the research covered the five remaining centers. The sample size was calculated using Slovin's formula (19):

Slovin's formula

n=N/1+N(e)2

n=sample size

N = population size = 764

e= desired margin of error = (0.05)

764/1+764 X0.0025

764/1+1.91 =764 /2.91 = 262

262 +10% = 288

N=288 (study participants)

Proportional allocation was carried out for the sample of 288 patients with knee O.T. Stratified random Sampling technique was used, in each center patient were Numbered and in the first center only odd number were taken , in second center even number were taken in third center odd number in four center even number and in five center odd number were taken , data collected in that miner until the sample size was completed.

Method of Data Collection

Data were collected through structured interviews using a comprehensive questionnaire. This tool captured a range of variables related to demographic information and osteoarthritis characteristics for all participants enrolled in the study.

For Body Mass Index (BMI) assessment, participants' weights and heights were measured and recorded. BMI was calculated using the formula:

BMI = weigh (kg) /height (m)2 and categorized as follow:

BMI categories were defined as follows:

- 18-24.9: Normal

- 25-29.9: Overweight

- 30-39.9: Obese (Class 1)

- 40 and above: Obese (Class 2)

Study Variables

Dependent Variables:

- Knee Pain: Classified as Mild, Moderate, or Severe

- Duration of Knee Pain: Categorized as >15 minutes or ≤15 minutes

- Diagnosis of Knee Osteoarthritis (K.O.A): Duration categorized as <1 year, 1-5 years, or >5 years

Independent Variables

- Age: Grouped into <40 years, 40-59 years, 60-79 years, and >80 years

- Sex: Male or Female

- History of Trauma: Present or Not Present

- Obesity: Classified as Underweight, Normal, Overweight, or Obese

- Occupation: Manual, Non-manual, Employed, or Other

Data Analysis

Data were entered, edited, and analyzed using the Statistical Package for the Social Sciences (SPSS, version 26). Descriptive statistics were presented in frequency tables and figures. Statistical significance was assessed using the chi-square test, with a p-value of less than 0.05 considered significant. Significant relationships identified by the chi-square test were further analyzed using a Multiple Logistic Regression model.

Ethical Considerations

Ethical clearance and approval were obtained from the Sudan Medical Specialization Board. Written permission was secured from the administrative authority of the primary health centers in Omdurman locality. Informed consent was obtained from all participants, with assurances that the information would be used solely for research purposes and that confidentiality would be maintained. Both written and verbal consent were provided by participants.

Results

The study included 288 participants, with a predominance of females (59%) and a male-to-female ratio of 1:1.4. More than half of the participants (57%) were over 60 years old, with a mean age of 60.7 ± 10.1 years. The majority were non-manual workers (64.6%), with 16.7% unemployed and 8% manual workers (Table 1 and Table 2). Most participants (81.3%) had a body mass index (BMI) higher than normal, with a mean of 29.1 ± 5.5 kg/m² (Table 3).

Variable	Number (%)
Age:	
< 40	5 (1.7%)
40-59	119 (41.3%)
60-79	154 (53.5%)
≥ 80	10 (3.5%)
Gender:	
Male	118 (41%)
Female	170 (59%)
Total	**288 (100%)**

Table 1 the distribution of the study participants according to their age and gender (n = 288)

Occupation	Number (%)
Manual	23 (8%)
Non-manual	186 (64.6%)
Unemployed	48 (16.7%)
Other	31 (10.8%)
Total	**288 (100%)**

Table 2: the distribution of the study participants according to their occupation (n = 288)

Body mass index (kg/m²)	Number (%)
Underweight (< 18.5)	5 (1.7%)
Normal (18.5 - 24.9)	49 (17%)
Overweight (25 - 29.9)	133 (46.2%)
Obese (≥ 30)	101 (35.1%)
Total	**288 (100%)**

Table 3: the distribution of the study participants according to their BMI (n = 288)

Regarding knee pain, 58.7% reported experiencing pain for 1-5 years, and 25.4% had pain lasting more than 15 minutes (Table 4 and Table 5). Functional ability was limited: only 33.3% could drive a car. In terms of daily activities, 37.5% of patients were self-dependent, 40.6% were self-dependent with minimal assistance, 19.8% were partially dependent, and 2.1% were totally dependent. Additionally, 38.9% reported knee injuries, 80.6% experienced reduced walking distances in the past six months, and 88.9% had moved normally before the onset of knee osteoarthritis. Furthermore, 64.6% stated that the disease had affected their jobs (Table 6).

Duration of knee pain – years	Number (%)
Less than 1 yr.	55 (19.1%)
1 – 5 yrs.	169 (58.7%)
> 5 years yrs.	64 (22.2%)
Total	**288 (100%)**

Table 4: the distribution of the study participants according to the duration of knee pain - years (n = 288)

How does the pain last	Number (%)
< 15 mins	276 (95.8%)
≥ 15 mins	12 (4.2%)
Total	**276 (100%)**

Table 5: the distribution of the study participants according to knee pain duration - minutes (n = 288)

Variable	Number (%)
Driving a car:	
Yes	96 (33.3%)
No	192 (66.7%)
Effect of daily activities:	
All self-dependent	108 (37.5%)
Self-dependent with minimal assist	117 (40.6%)
Partially dependent	57 (19.8%)
Totally dependent	6 (2.1%)
Knee injury:	
Yes	112 (38.9%)
No	176 (61.1%)
Walking distances decreased in the last six months:	
Yes	232 (80.6%)
No	56 (19.4%)
Move normally before the appearance of your knee osteoarthritis:	
Yes	256 (88.9%)
No	32 (11.1%)
The disease affects the job:	
Yes	186 (64.6%)
No	102 (35.4%)
Total	**288 (100%)**

Table 6: the distribution of the study participants according to the functional ability of patients with O.A (n = 288)

Chi-square analysis showed several significant associations. Females had a longer duration of knee pain compared to males (p = 0.029). Participants aged 60-79 years experienced a longer duration of knee pain than other age groups (p = 0.001). Overweight patients reported a longer pain duration than other groups (p = 0.018). Non-manual workers also had a longer duration of knee pain compared to other occupations (p = 0.033) (Table 7).

When analyzing the duration of knee pain in minutes, females again had a longer duration than males (p = 0.011). The age group 60-79 years experienced more pain duration than other age groups (p = 0.001). Although overweight patients had more pain duration per minute, this difference was not statistically significant (p = 0.628). There was no significant difference between occupation and the duration of knee pain in minutes (p = 0.101) (Table 8).

Demographical characteristics Number (%)		**Total (n = 288)**	**Duration/Years Less than 1 yr. (n = 55)**	**1 – 5 years (n = 169)**	**> 5 years (n = 64)**	**P value**
		Number (%)	**Number (%)**	**Number (%)**		
Gender	Male	118 (41%)	25 (45.5%)	76 (45%)	17 (26.6%)	**0.029**
	Female	170 (59%)	30 (54.5%)	93 (55%)	47 (73.4%)	
Age – years	< 40	5 (1.7%)	2 (3.6%)	1 (0.6%)	2 (3.1%)	**0.001**
	40 – 59	119 (41.3%)	34 (61.8%)	71 (42%)	14 (21.9%)	
	60 – 79	154 (53.5%)	19 (34.5%)	96 (56.8%)	39 (60.9%)	
	≥ 80	10 (3.5%)	0 (0.0%)	1 (0.6%)	9 (14.1%)	
BMI	< 18.5	5 (1.7%)	1 (1.8%)	3 (1.8%)	1 (1.6%)	**0.018**
	18.5 - 24.9	49 (17%)	10 (18.2%)	31 (18.3%)	8 (12.5%)	
	25 - 29.9	133 (46.2%)	34 (61.8%)	77 (45.6%)	22 (34.4%)	
	≥ 30	101 (35.1%)	10 (18.2%)	58 (34.3%)	33 (51.6%)	
Occupation	Manual	23 (8%)	5 (9.1%)	17 (10.1%)	1 (1.6%)	**0.033**
	Non-manual	186 (64.6%)	43 (78.2%)	101 (59.8%)	42 (65.6%)	
	Unemployed	48 (16.7%)	3 (5.5%)	30 (17.8%)	15 (23.4%)	
	Other	31 (10.8%)	4 (7.3%)	21 (12.4%)	6 (9.4%)	

Table 7: the relation between the demographical characteristics with the duration of the knee pain - years among the participants (p < 0.05.) (n = 288)

Demographical characteristics Number (%)		**Total (n = 276)**	**Duration/Min < 15 mins (n = 196)**	**> 15 mins (n = 80)**	**P value**
		Number (%)	**Number (%)**		
Gender	Male	111 (40.2%)	88 (44.9%)	23 (28.8%)	0.011
	Female	165 (59.8%)	108 (55.1%)	57 (71.3%)	
Age - years	< 40	5 (1.8%)	3 (1.5%)	2 (2.5%)	0.001
	40 – 59	114 (41.3%)	96 (49%)	18 (22.5%)	
	60 – 79	147 (53.3%)	93 (47.4%)	54 (67.5%)	
	≥ 80	10 (3.6%)	4 (2%)	6 (7.5%)	
BMI	< 18.5	5 (1.8%)	3 (1.5%)	2 (2.5%)	0.628
	18.5 - 24.9	44 (15.9%)	33 (16.8%)	11 (13.8%)	
	25 - 29.9	127 (46%)	91 (46.4%)	36 (45%)	
	≥ 30	100 (36.2%)	69 (35.2%)	31 (38.8%)	
Occupation	Manual	21 (7.6%)	14 (7.1%)	7 (8.8%)	0.101
	Non-manual	180 (65.2%)	125 (63.8%)	55 (68.8%)	
	Unemployed	44 (15.9%)	29 (14.8%)	15 (18.8%)	
	Other	31 (11.2%)	28 (14.3%)	3 (3.8%)	

Table 8: the relation between the demographical characteristics with the duration of the knee pain - minutes among the participants (n = 276)

Demographical Characteristics

Table (1) the distribution of the study participants according to their age and gender (n = 288)

Table (2) the distribution of the study participants according to their occupation (n = 288)

Clinical Characteristics

Table (3) the distribution of the study participants according to their BMI (n = 288)

Table (4) the distribution of the study participants according to the duration of knee pain - years (n = 288)

Table (5) the distribution of the study participants according to knee pain duration - minutes (n = 288)

Table (6) the distribution of the study participants according to the functional ability of patients with O.A (n = 288)

Table (7) the relation between the demographical characteristics with the duration of the knee pain - years among the participants ($p < 0.05$.) (n = 288)

Table (8) the relation between the demographical characteristics with the duration of the knee pain - minutes among the participants (n = 276)

Discussion

This study aimed to explore the impact of knee osteoarthritis (OA) among patients attending primary health centers in Omdurman locality, covering 288 participants. Notably, there is a scarcity of similar studies in Sudan, which, while limiting direct comparisons, positions this research as a pioneering effort in this region. This absence underscores the need for further research to corroborate and expand upon these findings.

Cultural and lifestyle differences between Africa and the developed world likely influence the experiences of individuals with knee OA. This study represents a first attempt to assess knee OA and its health impacts in Sudan, highlighting a significant gap in knowledge. Limited awareness of knee OA among participants can be partly attributed to inadequate healthcare services, poor communication with healthcare professionals, and insufficient educational outreach. Additionally, cultural factors may also contribute to the misperception of knee OA as merely "dryness" or increased friction within the joint, rather than understanding it as a complex condition involving both structural and functional changes.

The study found a predominance of female participants (59%) with a male-to-female ratio of 1:1.4, which aligns with findings from other regions, such as Bangladesh, where the female-to-male ratio was 1.14:1. This trend is consistent with the broader literature indicating a higher prevalence of OA in women, potentially influenced by hormonal factors and the impact of menopause on joint health. Despite varying results regarding the role of estrogen and other hormones, the increased prevalence among women is well-documented.

Participants in this study had a mean age of 60.7 years, reflecting the global pattern where knee OA is more common in older age groups. Similar age distributions have been observed in studies from Bangladesh, Japan, and Brazil, reinforcing the notion that age is a major risk factor for knee OA. The prevalence of knee OA rises with age, and the condition becomes more pronounced with longer life expectancy and higher body weight.

The study also revealed a high prevalence of obesity among participants, with a mean BMI of 29.1 kg/m². This finding corroborates existing research indicating that obesity is a major modifiable risk factor for knee OA. Studies from various regions have shown that higher BMI is associated with increased risk and severity of knee OA. This association underscores the need for interventions targeting weight management as a preventive measure.

Regarding functional limitations, the study found that a significant portion of participants were either self-dependent or required minimal assistance. This limitation in daily activities, including driving and mobility, reflects the substantial impact of knee OA on quality of life. Previous research has similarly documented difficulties in performing daily tasks and the significant burden of knee OA on personal and professional life.

The study also identified that over a third of participants had a history of knee injuries, which aligns with evidence linking past knee trauma to a higher risk of developing OA. Injuries, even those occurring years earlier, can predispose individuals to accelerated joint degeneration and OA. This highlights the importance of addressing and managing knee injuries to prevent long-term complications.

Finally, the study found that more than half of the participants reported that knee OA affected their job performance, reflecting the broader economic burden of the disease. Studies from various countries have highlighted the significant productivity losses and economic impacts associated with knee OA, emphasizing the need for targeted policies to support affected individuals and mitigate the disease's economic burden.

This study has several limitations. As a cross-sectional study, it cannot determine causal relationships between knee OA and its impacts. Additionally, the research was confined to five health centers in Omdurman, potentially excluding patients with lower pain severity who might seek care at the community level. Despite these limitations, the study provides valuable insights into the prevalence, impact, and challenges of knee OA in Khartoum State and serves as a foundation for future research and intervention efforts.

Conclusion

This study, which included 288 participants predominantly female with a mean age of 60.7 years, revealed significant limitations in daily life due to knee osteoarthritis (OA). A third of the participants were self-dependent, while 40.6% required minimal assistance, 19.8% were partially dependent, and only 2.1% were totally dependent. Over a third reported previous knee injuries, and nearly two-thirds indicated that the disease impacted their employment. Most participants had normal mobility before developing knee OA. The analysis identified several factors with a significant negative impact on daily life, including female gender, age over 60, long-duration pain (more than five years), inability to drive, job impact, knee injury, and reduced walking distance. These findings highlight the substantial limitations OA imposes on patients' lives and underscore the need for clinicians to address these issues to improve quality of life.

Recommendations from our findings include raising clinical Awareness, and focusing on High-Risk Groups; Special attention should be given to women, older adults, housewives or unemployed individuals, those with a history of knee injuries, prolonged pain duration, reduced walking distance, and those unable to drive. These groups experience significant knee problems and pain intensity, necessitating targeted interventions. Additional studies with larger sample sizes and diverse methods for managing knee OA are recommended to deepen understanding and improve treatment approaches.

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