

Risk Factors in the Development of Knee Osteoarthritis in Sokoto, North West, Nigeria

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ABSTRACT

AIM: We aim to determine risks factors associated with degenerative knee osteoarthritis in our environment.

METHODS: An audit of patients with clinical and radiological features of Osteoarthritis of the knee was carried at an Orthopaedic clinic in sub-urban region in North west Nigeria between January 2016 and December 2016. Patients with prior history of trauma to the knee were excluded.

RESULTS: There were fifty-nine patients and the age range was between 36 and 83 years with a mean 55.5 ± 11.09 and males were 34% and females were 66% giving a M: F ratio of 1 : 1.9. Bilateral knee affectionation was seen in 50.8% and unilateral affectionation in

49.2%. Fifty-six percent of patients were housewives while 30.5% were civil servant. Eight-one percent of patients were overweight and obese. Pain was the predominant clinical symptoms with 79.7% and pain and swelling was present in 18.6%. Sixty-four percent of patients have had symptoms with duration of more than 12 months. The relationship between the Body mass index (BMI) with the duration of symptoms, unilateral or bilateral affectionation of the knee was not statistically significant $p > 0.05$. Overweight and obese patients have more severe forms of the disease. Non steroidal anti-inflammatory drug (NSAIDS) was used in 47.5% of cases while in 40.4% of cases intra articular steroid administration was administered in addition to NSAIDS.

CONCLUSION: Increasing age, the female gender and increased BMI are risk factors associated with the development of degenerative knee osteoarthritis.

Key words: Osteoarthritis; Knees; Body mass index

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INTRODUCTION

Osteoarthritis (OA) of the knee remains a debilitating condition affecting millions of people worldwide. The prevalence of the disease varies among populations and from region to region. Many hospital-based studies have shown that OA is common in Nigeria, more in females than males and that it affects the knee more than any other joint accounting for 65%-78%^[1]. It has also been reported that multiple joint affectionations and involvement of joints of the extremities are uncommon among Nigerian patients^[1,2]. Knee OA represents a heterogeneous group of conditions resulting in common histopathologic and radiologic changes. Primary Knee OA is a degenerative disorder arising from biochemical breakdown of articular (hyaline) cartilage in the synovial joints. Current view has it that osteoarthritis involves

not only the articular cartilage but also the entire joint structure, including the subchondral bone and Synovium^[3,4]. Various risks factors including age, genetics, lifestyle and obesity have been implicated in the development of degenerative Knee Osteoarthritis. Hyaline cartilage is avascular, aneural, and alymphatic. It is 95% water and extracellular cartilage matrix and only 5% chondrocytes. Chondrocytes have the longest cell cycle in the body (similar to CNS). We therefore aim to determine risks factors associated with degenerative knee osteoarthritis in our environment.

MATERIALS AND METHODS

An audit of patients with clinical and radiological features of Osteoarthritis of the knee was carried out at an Orthopaedic clinic in North west Nigeria between January 2016 and December 2016. Patients with radiographic evidence of OA but with history of trauma were excluded. The diagnosis of primary knee OA was made from history and physical examination and confirmed with plain film radiographs. Radiographic findings on X-ray needed for diagnosis include joint space narrowing, osteophytes formation, Subchondral sclerosis and subchondral cyst formation. Joint space narrowing as defined by the Ahlback classification and the Kellgren and Lawrence system was used to make a radiographic diagnosis and classification. Patients whose radiographs showed peri-articular osteoporosis and erosion were excluded.

RESULTS

There were fifty-nine patients seen with age range of between 36 and 83 years and a mean 55.56 ± 11.09 (Figure 1). Males were 34% and females were 66% giving a M: F ratio of 1 : 1.9 (Figure 2). Bilateral knee affection was present in 50.8% and unilateral affection in 49.2% (Figure 3). Fifty-six percent of patients were housewives while 30.5% were civil servants. Others include businessmen (10.2%), Farmers (3.4%) (Figure 4). Pain was the predominant clinical symptoms with 79.7% and pain and swelling was present in 18.6%. The Body mass index (BMI) showed that 55.9% of the study population were obese, 25.4% were overweight and 16.9% having normal weight (Figure 5). Sixty-four percent of patients have had symptoms with duration of more than 12 months with 52.5% of this patients being overweight and obese. Fifty-six percent of obese patients had bilateral knee affection while unilateral knee affection was present in 55.1%. Housewives and civil servant were the most obese with 49.1% (Table 1). Overweight and obese patients have more severe forms of the disease (Table 2). The relationship between the Body mass index (BMI) with the duration of symptoms, unilateral or bilateral affection of the knee and occupation were not statistically significant $p > 0.05$ (Table 3). Non steroidal anti-inflammatory drug (NSAIDS) was used in all cases while in 50.9% of cases had intra articular steroid and hyaluronic acid administration in addition to NSAIDS. Corrective osteotomy was done in 2% of cases (Figure 6).

DISCUSSION

Primary knee osteoarthritis is thought to be idiopathic and it occurs in a previously intact joint and with no initiating factor. The precise etiology of primary knee OA is unknown, but biochemical and biomechanical factors are likely to be important in the etiology and pathogenesis. The mean age of those that were diagnosed with primary OA in our study was 55.5 years which is higher than the average age in other studies. Prevalence rates for both radiographic OA and, to a lesser extent, symptomatic OA rise steeply after age 50

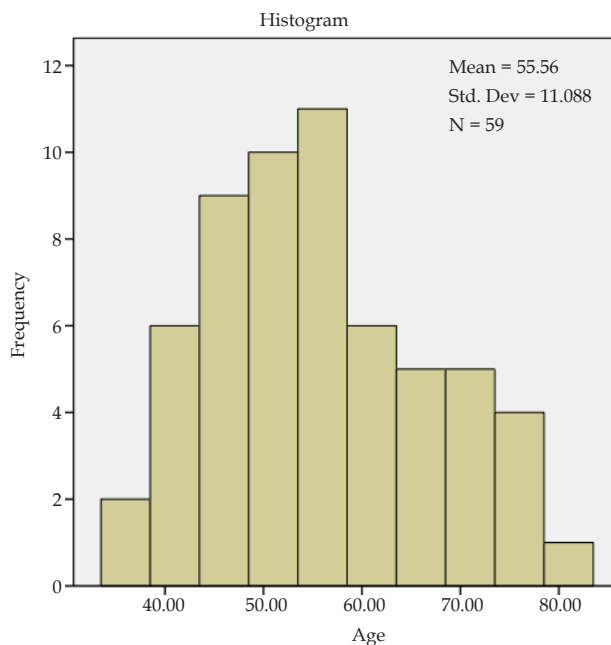


Figure 1 Age distribution of patients.

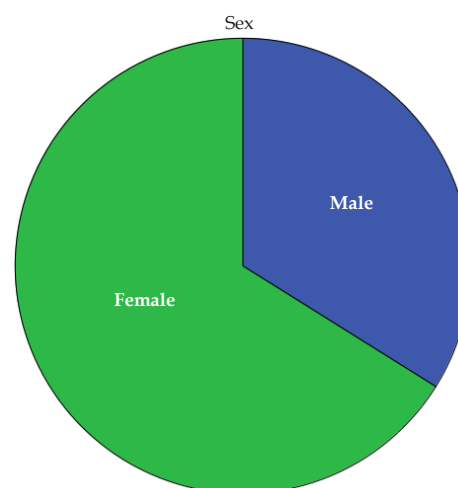


Figure 2 Sex distribution of patients.

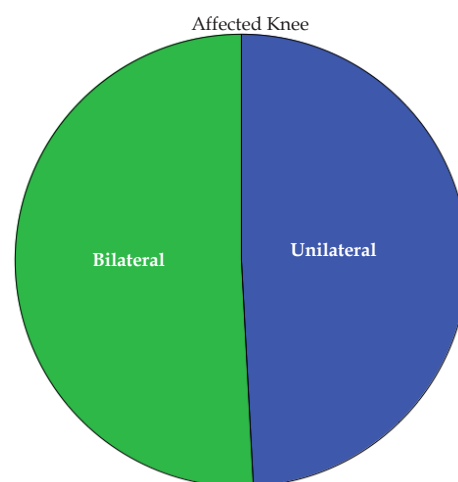


Figure 3 Knee affectionation.

in men and age 40 in women and this probably is a result of cumulative exposure to various risk factors and biologic changes that occur

over the years with aging^[5]. A cohort of adults (age 56-84) in Malmo, Sweden, shows that the prevalence of radiographic and symptomatic knee osteoarthritis were 25.4% (95% CI = 24.1, 26.1) and 15.4% (95% CI = 14.2, 16.7), respectively^[3,6].

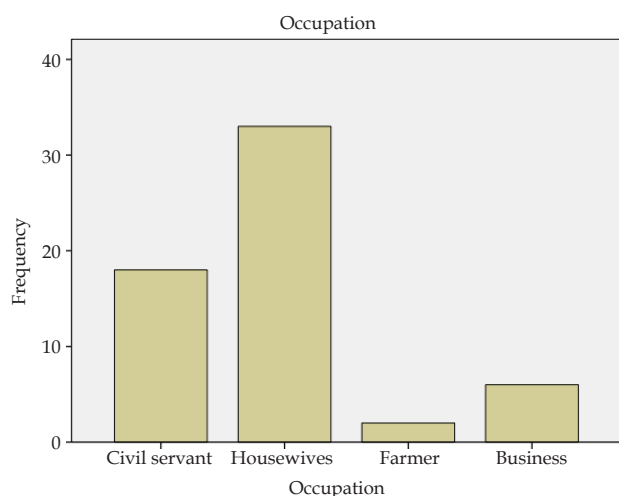


Figure 4 Occupation of patients.

Table 1 Crosstabulation of BMI with Occupation.

		Occupation				Total
		Civil servant	Housewives	Farmer	Business	
BMI	Underweight	1	0	0	0	1
	Normal weight	1	8	0	1	10
	Overweight	3	9	0	3	15
	Obese	13	16	2	2	33
Total		18	33	2	6	59

Chi square df = 1, $p = 0.402$.

Table 2 Crosstabulation of BMI with Kellgren and Lawrence.

		KL			Total
		grade 1	grade 2	grade 3	
BMI	Underweight	0	1	0	1
	Normal weight	3	6	1	10
	Overweight	4	6	5	15
	Obese	6	14	13	33
Total		13	27	19	59

Many studies have documented that osteoarthritis risk is greater among females and with increasing age^[7,8], and some studies have shown an increased risk with lower socioeconomic status^[9] and African American race^[10,11]. Our study showed a higher female preponderance as is the case in most studies worldwide. Female are not only at higher risk of OA than men, but they are also prone to have severe OA. Age, sex, hormones have been categorized as constitutional risk factors.

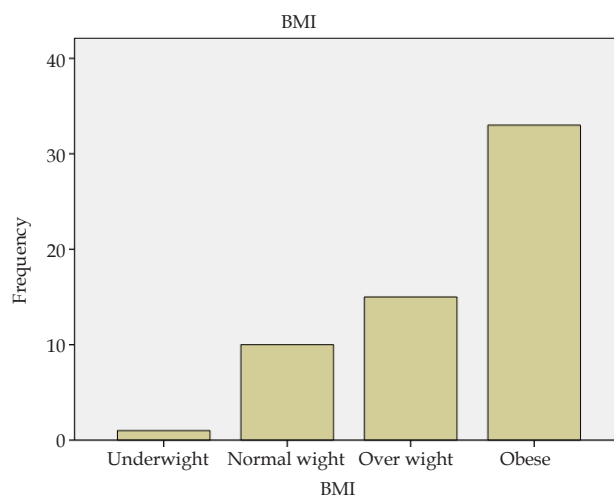


Figure 5 Weight distribution of patients.

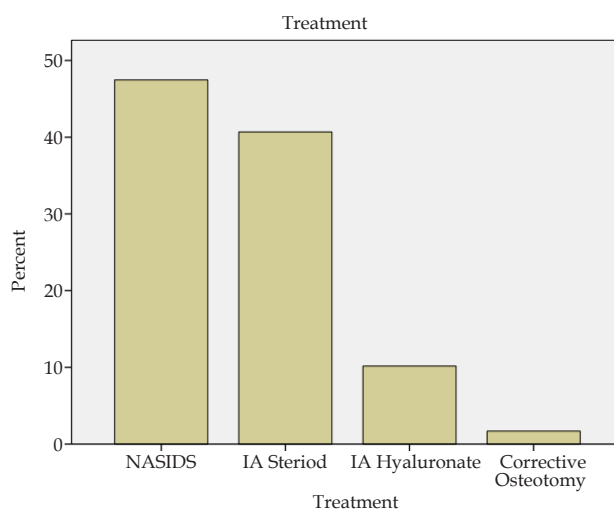


Figure 6 Treatment offered to patients.

Table 3 Cross tabulation of BMI with Symptoms, Duration of symptoms, Affected knee, Occupation

		BMI					Chi Square	P- value
		Underweight	Normal	Overweight	Obese	Total		
Symptoms	Pain	1	9	12	25	47	1.38	0.241
	Swelling	0	0	1	0	1		
	Pain & swelling	0	1	2	8	11		
Duration	< 6 months	0	4	4	8	16	0.01	0.976
	6-12 months	0	0	0	5	5		
	>12 months	1	6	11	20	38		
Affected Knee	Unilateral	1	2	10	16	29	0.28	0.597
	Bilateral	0	8	5	17	30		
Occupation	Civil servant	1	1	3	13	18	0.703	0.403
	Housewife	0	8	9	16	33		
	Farmer	0	0	0	2	2		
	Business	0	1	3	2	6		

Chi-square test showed no significant relationship ($p > 0.05$) between BMI with duration of symptoms, affected knee and occupation.

The study also showed that more than half of the patients were full time housewives and civil servants. The culture amongst the people in this part of Nigeria is that outdoor activities of women are restricted hence the sedentary life style. The civil service is another area where workers are inactive. Physical inactivity leads to weight gain and poor nourishment of the joint. Studies from the Johnston County Osteoarthritis Project however did not show an increase prevalence in those who were less active^[12]. Professional Farmers were the list affected in our study. Improve physical activities help to improve muscle strength and tone with recent reviews concluding that muscle weakness may confer risk for knee osteoarthritis onset and progression. The specific role of muscle strength and mass in osteoarthritis structural development and progression is still somewhat unclear, however muscle strength appears to play a role in knee symptoms^[13,14].

Obesity is a key person-level risk factor for knee osteoarthritis, increasing the risk three-fold, and evidence suggests that obesity accelerates progression of knee osteoarthritis^[3,4,15-17]. Multiple studies have suggested a strong relationship between OA with both overweight and obesity. Obesity is associated with increase incidence of major diseases such as cardiovascular diseases and diabetes mellitus. Elevated BMI is both a systemic and local risk factor for development and progression of knee OA. Increased body weight is believed to increase joint reaction force, which in turn increases wear on cartilage, the so-called intuitive biomechanical theory^[17,18]. Forces across the joint increases while walking or physical activities. BMI is known to have a direct effect on severity of OA in varus knees. Overweight women have nearly 4 times the risk of knee OA; for overweight men the risk is 5 times greater and it is estimated that persons in the highest quintile of body weight have up to 10 times the risk of knee OA than those in the lowest quintile. Obesity also causes changes in the density and stiffness of subchondral bone relative to the overlying cartilage and this has been implicated in the development of knee OA^[18].

Studies have illustrated evidence for a metabolic/inflammatory pathway between obesity and osteoarthritis. In a cohort study of US women, higher baseline serum leptin was associated with greater odds of severe knee joint damage and in another study of older adults, it was found that almost half of the association between BMI and knee osteoarthritis was explained by leptin levels^[19,20]. Studies have supported the beneficial effect of weight loss or maintenance to improve osteoarthritis symptoms, percentage change in weight was significantly associated with changes in Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) scores^[18].

Pain was the predominant complaints amongst the patients and duration of more than twelve months was present in most of the patients in our study. Pain of osteoarthritis is insidious in onset with occasional remission with or without medications. The pain experience in knee osteoarthritis in particular is well-recognized as typically transitioning from intermittent weight-bearing pain to a more persistent, chronic pain. The etiology of pain in osteoarthritis is recognized to be multifactorial, with both intra-articular and extra-articular risk factors^[21]. Pain results in a vicious cycle of inactivity as it reduces joint mobilisation with resultant stiffness thus worsening the clinical condition. Pain reduces the activities of daily living and for housewives and civil servant, sitting for prolonged period of time with inactivity can lead to obesity. Obesity has been found by several workers to be a modifiable risk factor not only for OA but also for pain. It is believed that mechanical loading on the joint and elaboration of adipokines potentially contributes to pain^[22,23].

Other person-level risk factors for primary osteoarthritis that have

been documented in literature include social economic status and family history. These factors were however not assessed in our study.

Joint-level risk factors with strong evidence for secondary osteoarthritis risk include injury and occupational joint loading, knee deformities; the associations of injury and joint alignment with osteoarthritis progression are compelling. While it may be true that patients with angular deformities like genu varum and valgum may predispose patients to unusual loading with unicompartmental osteoarthritis, patients with OA can be complicated with angular deformities^[24,25]. Very few patients had angular deformities in our study which were a complication of the disease.

This single center cohort study is limited in scope and study population as some other patients may have been seen in other hospitals.

CONCLUSION

Increasing age, the female gender and increased BMI are risk factors associated with the development of degenerative knee osteoarthritis. Obesity being a modifiable risk factor can be attenuated and housewives in this region need to be engaged in in-door sporting activities to help them keep fit and reduce obesity.

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