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Epidemiological, Clinical and Paraclinical Profile of Osteoarthritis of the Lower Limbs in Obese Patients at the Cocody University Teaching Hospital

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Abstract

Objective: To describe the epidemiological, clinical and paraclinical characteristics of osteoarthritis of the lower limbs in obese patients at the Cocody University Teaching Hospital. **Methodology:** This was an analytical cross-sectional study carried out in the rheumatology department of the Cocody UTH in Abidjan (Ivory Coast) from March 1 to April 30 2023. Patients who came for rheumatology consultation presenting with mechanical arthralgia of the lower limbs, who were obese, had radiographic images were included. All patients without radiographic images were excluded. Obesity was defined as a body mass index (BMI) greater than or equal to 30 kg/m. The Chi^2 test was used to compare proportions and determine the existence of associations between osteoarthristis and obesity, obesity severity and radiographic stage of osteoarthritis as well as the functional impact. A p-value below a predefined threshold (p = 0,05) indicates a significant relationship between the variables. **Result:** Out of 185 patients received for osteoarthritis of the lower limbs during the study period, 136 were obese (74%). There were 115 women (84.6%) with an average age of 56.03 with a standard deviation of 12.72 years (extremes: 22 and 84 years). The main socio-professional category was the informal sector (30%). The majority of patients had a low socio-economic level (80.2%) and lived in urban areas (92.6%). The most common past medical history was hypertension (33.08%) followed by peptic ulcer disease (16.91%). Patients had a body mass index class 1 (81.6%), class 2 (15.40%) and class 3 (2.90%). The average duration of symptom progression until diagnosis was 11

months. Genu varum was the main static disorder (56.10%) and the knee joint was the dominant topography (90.4%) with a bilateral localization (80%). The average Lequesne index was greater than 8 (59.5%). The Kellgren and Lawrence radiographic stages were stage 1 (9.20%), stage 2 (46.90%), stage 3 (29.20%) and stage 4 (6.90%). The Obesity severity was significantly associated with osteoarthritis of the knee ($p = 0.042$). There was no statistically significant association between obesity severity and radiographic stage of osteoarthritis ($p = 0.163$) or functional impact ($p = 0.180$). **Conclusion:** Osteoarthritis of the lower limbs affected obese women and was dominated by stage 2 osteoarthritis of the knee (Kellgren and Lawrence). There is an association between the severity of obesity and osteoarthritis of the knee.

Keywords

Osteoarthritis, Lower Limbs, Obesity, Abidjan

1. Introduction

Osteoarthritis is the most common degenerative disease encountered in rheumatology [1] [2] [3]. It is linked to dysfunctions involving all the components of the joint including the destruction of the cartilage, inflammation of the synovial membrane and remodelling of the subchondral bone [4]. Its etiology is multifactorial including obesity, which has a steadily rising frequency that has almost tripled since 1975 [5] [6]. According to the World Obesity Federation, in 2020, obesity affected 14% of the world's population, and respectively 18% and 7% of women and men in Africa [7]. In recent years, there has been a great deal of interest in the relationship between osteoarthritis and obesity, and the concept of metabolic osteoarthritis has even been individualised. Apart from a direct effect of excess weight on chondrocyte, mechanoreceptors, the involvement of fat cells via cytokines in the initiation of osteoarthritis has been reported [5] [8]. Body mass index (BMI) was positively associated with hip and knee OA, causing functional disability with major socio-economic repercussions [3] [4] [9] [10] [11] [12]. We felt it important to describe the epidemiological, clinical and paraclinical characteristics of osteoarthritis of the lower limbs in obese patients in a rheumatology department in Abidjan.

2. Patients and Methods

- **Characteristics of the study**

This was an analytical cross-sectional study carried out from March 1 to April 30 2023 in the rheumatology Department of Cocody UTH in Abidjan (Ivory Coast).

- **Study population**

This study involved patients who came for rheumatology consultation presenting with mechanical arthralgia of the lower limbs, who were obese and had

radiographic images. All patients without radiographic images were excluded.

- **The procedure**

We were interested in sociodemographic data (age, sex, profession, monthly income, origin), clinical data (past medical history, grade of obesity according to body mass index, static disorder, site of osteoarthritis, duration of symptoms, Lequesne algo-functional index), paraclinical data (imaging, Kellgren and Lawrence radiographic stages). The ratio of weight (kg) to squared height (m^2) was used to calculate the body mass index. Obesity was defined as a body mass index (BMI) greater than or equal to 30 kg/m^2 and classified into 3 class: class 1 ($30 \leq BMI < 35$), class 2 ($35 \leq BMI < 40$) and class 3 ($BMI \geq 40$) [13]. Lequesne algo-functional index is a clinical tool made up of a questionnaire used to assess a patient's functional disability [14]. The Kellgren and Lawrence criteria were used to classify the radiological stages of osteoarthritis of the limbs [15].

- **Statistical analysis**

For the analytical component, we formed two groups: a group of grade I obese patients with lower limb osteoarthritis and a group of grade II and III obese osteoarthritis patients. We compared these two groups with respect to socio-demographic, clinical and paraclinical factors to investigate the influence of the severity of obesity. The Chi^2 test was used to compare proportions and determine the existence of associations between socio-demographic, clinical and paraclinical factors and severity of obesity. The Fisher test was used where appropriate. The student's T test was used to compare the means of quantitative variables in the obese and non-obese osteoarthritis patient groups. The risk of error was set at 5%. Ethically, the confidentiality and anonymity of respondents were respected. Data were computed and analysed using SPSS version 25 software.

- **Operational definition of terms**

The informal sector is a group of unstructured activities producing goods and services (workers, shopkeepers, farmers, surface technicians, hoteliers, cashiers, salespeople). The level of schooling refers to the highest level of education achieved by the patient when they left school. It is considered higher for patients who have continued their studies beyond the Baccalaureate, secondary for those who schooled between from one to upper sixth and primary for those who schooled between CP1 and CM2. The socio-economic level (SEL) was defined arbitrarily on the basis of the guaranteed interprofessional minimum wage (75,000 F CFA = 115.38 euros). It was considered low if the patient earned less than 250,000 CFA francs (382 euros) per month, medium if the patient earned between 250,000 CFA francs and 500,000 CFA francs (763 euros) per month, and high if the patient earned more than 500,000 CFA francs per month.

3. Results

- **Sociodemographic characteristics**

Out of 185 patients received for osteoarthritis of the lower limbs during the

study period, 136 were obese (74%). There were 115 women (84.6%) and 21 men (15.4%) with an average of 56.03 with a standard deviation of 12.72 years (extremes: 22 and 84 years). Workers in the informal sector (30.90%) and pensioners (20.06%) were the socio-professional categories most affected, followed by housewives (16.20%), administrative staff (14.70%), pupils and students (5.94%), the unemployed (5.90%) and other occupations (5.90%). Their socio-economic level was low (80.2%), medium (14.70%) and high (5.20%). They lived in urban (92.06%) and rural (7.40%) areas.

- **Clinical characteristics**

Patients had class 1 (81.6%), class 2 (15.40%) and class 3 (2.90%) obesity. The average duration of symptoms progression until diagnosis was 11 months. Genu varum (56.10%), genu valgum (40%), genu recurvatum (3.90%) constituted the different static disorders. Table 1 represents the different topographies of osteoarthritis. The average Lequesne index was greater than 8 (62.30%).

- **Paraclinical characteristics**

The Kellgren and Lawrence radiographic stages were stage 1 (9.20%), stage 2 (46.90%), stage 3 (29.20%) and stage 4 (6.90%).

- **Analytical data**

The influence of the severity of obesity on OA topography is shown in Table 2. Obesity was significantly associated with gonarthrosis ($p = 0.042$). Table 3 shows that there was no statistically significant association between obesity severity and the radiographic stage of osteoarthritis ($p = 0.163$) or the functional impact ($p = 0.180$).

4. Discussion

- **Sociodemographic characteristics**

Out of 185 patients received for osteoarthritis of the lower limbs during the study period, 136 were obese (74%). It was in line with several African studies [16] [17] [18]. In our patients, it could be explained by several factors: dietary and socio-cultural. In our countries, the diet is mainly based on cereals (rice, millet, maize) and starchy foods, which are very rich in calories. Obesity is considered as a factor of psycho-social wellbeing. It is a risk factor for osteoarthritis

Table 1. Topographies distribution of osteoarthritis in lower limbs.

	Number	Percentage
Bilateral	110	80.9
Unilateral	26	19.1
Multiple	11	8.1
Unique	125	91.9
Ankle	5	3.7
Knees	123	90.4
Hips	7	5.1
Midfoot	1	0.7

Table 2. Association between severity of obesity and topographies of osteoarthritis.

	BMI		P-valeur
	[30 - 35[	35 et plus	
Osteoarthritis of knee			**0.042**
No	13	98	
Yes	0	25	
Osteoarthritis of hip			
Yes	7	0	
No	104	25	0.197

Table 3. Association between severity of obesity and radiographic stage of osteoarthritis and functional impact.

	BMI		P-valeur
	[30 - 35[	35 et plus	
Stage of osteoarthritis (Kellgren)			
1	21	1	
2	49	12	0.163
3	29	9	
4	6	3	
Lequesne index			
[0 - 8[	63	11	0.180
8 et plus	42	14	

of weight-bearing joints. For every 5 kg of weight gain, there is a proportional 36% increased risk of developing osteoarthritis [19]. A systemic and metabolic link between obesity and osteoarthritis involves a number of molecular elements, including adipokines, pro-inflammatory cytokines, fatty acids and lipids involved in cartilage degradation [12] [20] [21]. Our series was dominated by women (84.60%) with an average age of 56 years, which is comparable to other African series [16] [18] [22] [23]. This could be explained by the fact that women have a higher risk of developing osteoarthritis after the reproductive age (menopause). At that moment, the protective effects of female sex hormones, which appear to reduce the risk of osteoarthritis, begin to decrease, but also because of the absence of hormone replacement therapy [5] [24]. It is well known in the literature that advanced age is a risk factor for osteoarthritis [5] [25]. Elements of the local joint environment, such as protective joint muscle activity, muscle strength in relation to body weight, proprioception, varus-valgus laxity, and menisci, may be damaged or impaired in some elderly people and contribute to the development of osteoarthritis [26]. The predominant socio-professional category was that of the informal sector (35.80%). In developing countries, the economy is dominated by the informal sector, in which workers perform tasks

that place heavy demands on the joints (going up and down stairs, kneeling on hard surfaces) or involve handling heavy loads, sitting or standing for long periods [27].

- **Clinical characteristics**

The average duration of symptoms progression until diagnosis was 11 months. This is lower than in the African literature [5] [16] [18]. This could be explained by the fact that the majority of our patients lived in urban areas, where there are more and more rheumatologists, awareness-raising campaigns, and specialist consultations are more affordable.

In our study, the osteoarthritis was located in the knee (90.4%) and was bilateral (80.90%). This is in line with other African studies [5] [16] [17] [18]. This frequency of bilateral forms could be explained by the static disorders and also by the fact that patients were recruited exclusively in hospital, where advanced and disabling forms predominate.

The extra weight caused by obesity increases pressure on the articular cartilage of the knee. It has been shown that each extra kilogram per metre square above a BMI of 27 increases the risk of gonarthrosis by 15% [8]. This could explain the greater frequency of gonarthrosis in obese patients. Our study demonstrated a link between severity of obesity and gonarthrosis ($p = 0.042$). As found in the literature [22] [28] [29] [30], genu varum was the architectural defect most frequently observed in 56.10% of cases. The functional impact of gonarthrosis and coxarthrosis according to the Lequesne index was at least significant in our study in 62.30% of cases. This was also found by Ouédraogo *et al.* in Burkina Faso (87.3%) [18]. To the best of our knowledge, this was the only previous series in black Africa that has assessed the functional impact of gonarthrosis.

- **Paraclinical characteristics**

In our study, radiographic structural damage was dominated by that of Kellgren and Lawrence stage 2 (46.90%). In contrast to our series, Lukusa *et al.* in the DRC found damage predominantly in stage IV (36%) [23]. In our study, this difference could be explained by the shorter delay between the onset of symptoms and the 1st specialist consultation.

5. Conclusion

Osteoarthritis of the lower limbs affected obese women and was dominated by stage 2 gonarthrosis (Kellgren and Lawrence). There is an association between the severity of obesity and osteoarthritis of the knee. It is important to step up community health campaigns on osteoarthritis and obesity. These campaigns could consist of raising public awareness, combined with ongoing training for healthcare professionals. The aim would be to prevent the onset of obesity and reduce the time taken to diagnose osteoarthritis in order to prevent the onset of disabling symptoms and the progression of structural lesions, thereby improving patients' quality of life.

Limit of the Study

This work was carried out in the only rheumatology department in Abidjan. Despite the confidential and anonymous nature of the study, it was difficult for us to verify the veracity of the answers provided by the respondents. The sample does not reflect reality in Ivory Coast.

Conflicts of Interest

The authors declare that they have no ties of interest.

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