Epidemiology of slipped capital femoral epiphysis in Nigeria: a 3-year review of a regional orthopedic center

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Background
Slipped capital femoral epiphysis (SCFE) is a disorder of the proximal femur in adolescents. Very few studies have been carried out on SCFE in Nigeria, and the epidemiology of SCFE is poorly understood. Investigating the epidemiology of SCFE in Nigeria is an important step towards developing a comprehensive understanding of its burden and distribution within this population.
Patients and methods
This was a retrospective cohort study using data obtained from electronic medical records in the National Orthopaedic Hospital, Igbobi, Lagos. The inclusion criteria were all patients diagnosed with SCFE between May 1, 2021, and May 31, 2024.
Results
Sixty-seven case notes obtained from electronic medical records met the criteria for this study, with an age range of 9–16 years and a mean age of 11.88 years (SD 1.62). Twenty-nine (43.28%) children had a history of trauma at the onset of symptoms, and six (8.95%) children had an incident of trauma after the onset of symptoms. There was no significant variability in the month of the onset of pain.
Conclusion
The findings reveal a male predominance, with an average age of onset around 12 years and a higher incidence in the left hip compared to the right. A significant proportion of patients had a history of preceding trauma, underscoring the potential role of mechanical factors in the pathogenesis of SCFE. Furthermore, the study highlights the challenges of timely diagnosis, with many patients presenting months after the onset of symptoms and receiving prior over-the-counter medications.

Keywords:
epidemiology, Nigeria, slipped capital femoral epiphysis

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Introduction

Slipped capital femoral epiphysis (SCFE) is a disorder of the proximal femur in adolescents. It is defined as the displacement of the femoral head relative to the femoral neck and shaft at the level of the physis [1,2]. The proximal femoral metaphysis translates anteriorly, superiorly, and externally rotates relative to the epiphysis, leaving the femoral head in the acetabulum [1,3]. It is the most common hip disorder in children 9–16 years old, with a prevalence of 0.71–10.8 cases per 100 000 [3–5]. It is reported to affect boys more often than girls, with a male-to-female ratio of ~1.5 [2,3,5]. There is variation in the disease prevalence depending on ethnicity, sex, season, and geographical location [6].

SCFE results from mechanical insufficiency of the proximal femoral physis, either from an abnormally high load across a normal physis, a physiological load across an abnormally weak physis, or a combination of these two [1]. Mechanical factors leading to unusually high load across the physis include obesity, femoral retroversion, and increased physeal obliquity [7].

Clinical features include hips, thighs, knee pain, limping, or inability to walk. Limb shortening, externally rotated attitude, and limitation in flexion, adduction, and internal rotation are some findings that are usually present [8]. Diagnosis is often delayed due to the subtle primary clinical presentation of pain in the hip, thigh, or knee that goes on for weeks or months [6].

The gold standard for diagnosing SCFE is the biplanar radiographic examination. The supine anteroposterior pelvis and Lauenstein or frog lateral view often demonstrate the anterior displacement of the anterior femoral neck, with simultaneous relative posterior displacement of the capital femoral epiphysis [6,9,10].

Various classification and grading systems exist to help diagnose and guide treatment. Loder and Skopelja [2] classified SCFE into stable and unstable based on the patient's ability to bear weight on the affected limb with or without support [9]. This classification correlates with the risk of avascular necrosis [2,8]. Early detection and treatment are associated with a better outcome.

Very few studies have been carried out on SCFE in Nigeria, and the epidemiology of SCFE is poorly understood. This study aimed to identify the demographic characteristics of SCFE in Nigeria, using data obtained from electronic medical records (EMRs) of a regional orthopedic hospital in Nigeria. Such insights can guide the development of appropriate prevention, screening, and management strategies tailored to the local context.

Patients and methods

Study design

(1) This was a retrospective cohort study using data obtained from EMR of a regional orthopedic hospital.

Inclusion criteria

(1) All patients were diagnosed with SCFE between May 1, 2021 and May 31, 2024.

Exclusion criteria

(1) Patients with incomplete data.

Data collection

(1) Demographic information (age, sex).
(2) Clinical presentation (symptoms, duration).

Statistical analysis

(1) Descriptive statistics (mean, median, proportions).

Ethical considerations

(1) Patient confidentiality and data anonymization were ensured.

Consent

(1) All the data for the study were obtained from electronic medical records, hence there was no need to obtain consent from the patients. However, consent and ethical clearance was obtained from the institution.

Table 1 General information

Sex	**Male: 35**	**Female: 32**	
Male: female	1.1: 1		
Age range	9–16 years	SD 1.62	
Mean age	Male: 12.68 years	Female: 11 years	
Side	Left: 31 (46.3)	Right: 21 (31.3)	Bilateral: 15 (22.4)
Classification			
Stability	Unstable: 17 (25.4%)	Stable: 50 (74.6%)	
Duration of symptoms	Acute: 8 (12%)	Acute-on-chronic: 12 (18%)	Chronic: 47 (70%)
Average symptom duration	5.4 months	Range: 24 h–3 years	
Point of first contact:	Traditional bone setters: 15%	Primary health facility: 30%	Specialist centers: 55%

Results

Sixty-seven case notes obtained from the EMR met the criteria for this study and were reviewed.

Thirty-five (52.2%) were males, while 32 (47.8%) were females, giving a male to female ratio of 1.1: 1.

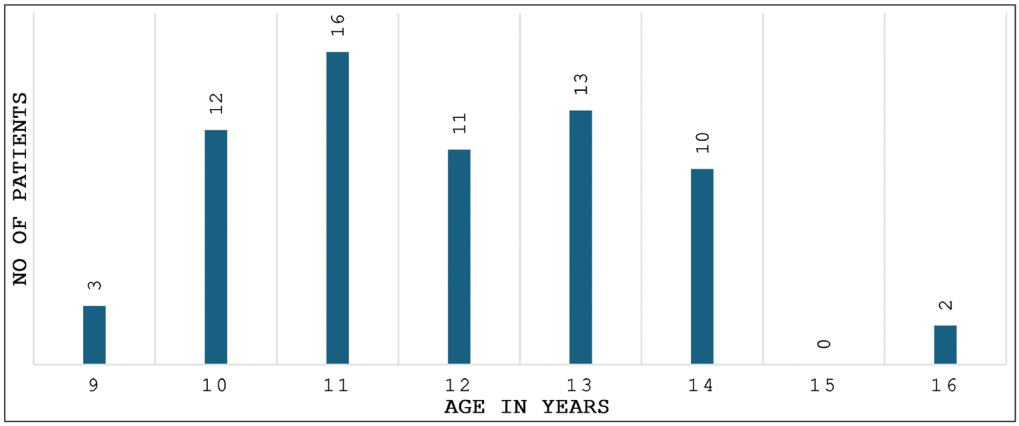
The age range was 9–16 years, with a mean age of 11.88 years (SD 1.62). The mean age for males was 12.68 years (1.43) and for females 11 years (1.32). Three cases presenting at 9 years were all females, while two males presented at 16. The majority presented between 9 and 14 years, with a median age distribution of 12 years. Females presented at an earlier age than males, with 87.5% of females presenting at or below the age of 12 years while 62.86% of males presented with an age of onset greater than 12 years (Table 1).

Twenty-nine (43.28%) children had a history of trauma at the onset of symptoms, and six (8.95%) children had an incident of trauma after the onset of symptoms.

The time between the onset of symptoms and presentation was 24 h to 3 years. Twenty-seven percent presented within 1 month of onset of symptoms, while 10% presented after 1 year. The average symptom duration was 5.4 months, while the median month of presentation was 4 months. At 4 months, about 52% of patients had presented in a health facility.

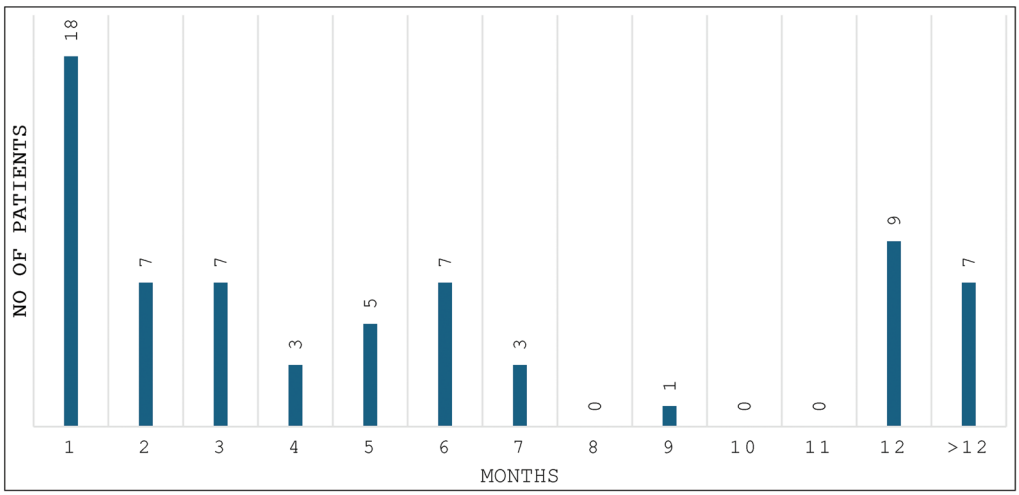
Forty-eight percent of patients had received over-the-counter medications before seeking any form of care. When a decision to seek treatment was made, over half (55%) first presented to a specialist hospital, and

Figure 1



Distribution of age of onset of symptoms.

Figure 2



Duration of symptoms before presentation.

others presented at different facilities such as primary healthcare centers (30%) and traditional bone setters (15%).

The first contact point was traditional bone setters at 15%, primary healthcare facilities at 30%, and specialist centers at 55%.

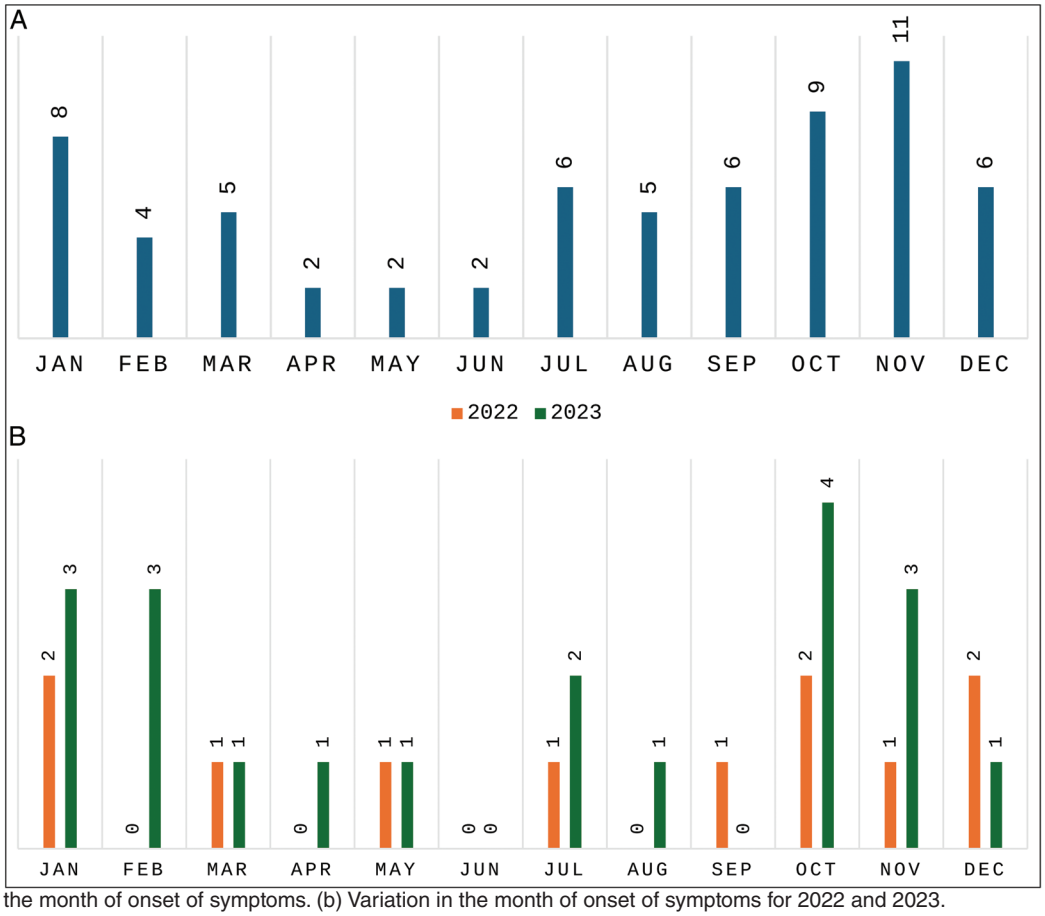
The onset of SCFE was noted to be highest in November (16%), followed by October (13%) and January (12%). A comparison of the frequency for years 2022 and 2023 did not show any significant variation. 2021 and 2024 were excluded since the study did not cover the full year (Figs 1–3).

Discussion

Several studies have documented that SCFE is commoner in Africans [5,6,11,12]. However, there is little research related to SCFE in Nigeria and Africa. Data from 67 patients were interrogated for this study. Thirty-five (52.2%) were male while females were 32 (47.8%), giving a ratio male:female of 1.1: 1. This was similar to the sex distribution of patients with SCFE reported in a review by Loder and colleagues of 4343 children and other studies [2,3,5,10]. This was different from findings by Yinusa *et al.* [13] and Katchy [14], who had a higher female distribution with male: female of 1: 2.1 and 1: 1.3, respectively. The smaller population sizes of these studies may have contributed to this disparity.

The age range was between 9 and 16 years, with a mean age of 11.88 (SD 1.62). Yinusa *et al.* [13] and Katchy [14] reported an age range comparable to this study. The mean age of onset for males was 12.7 (1.43) years, which was higher than the mean age for females at 11 (1.32) years. This was similar to findings in other studies [2,5,15,16]. There seems to be a gradual reduction in the age of onset of SCFE, as noted in this

Figure 3



(a) Variation in the month of onset of symptoms. (b) Variation in the month of onset of symptoms for 2022 and 2023.

study compared to previous studies. This downward trend has been reported in other studies [2,5,17,18]. This may be due to the decreasing age of the onset of puberty in both males and females [19]. The earlier age at onset in females can also be explained by the earlier onset of puberty compared to males.

The preponderance of SCFE in the left hip noted in this study is similar to other studies [13,14,16,20]. There is currently no physiological or anatomical explanation for the predisposition to the left. The prevalence of bilateral SCFE has been reported in the literature to be between 20 and 80%, with a higher prevalence rate in blacks [21]. Bilateral slips were seen in 22.4% of patients at the initial presentation, comparable to studies by Katchy [14] (20%) and Yinusa *et al.* [13] (13%).

Twenty-nine (43.28%) children had a history of trauma at the onset of symptoms. These usually included falls at the playground or home, which were significant enough to require medications or necessitate hospital visitation. Six (9%) children reported traumatic incidents after the onset of symptoms, leading to the worsening of symptoms and necessitating hospital presentation. Katchy [14], in their study of 40 children, reported a history of trauma in 57.5% of children. Yinusa *et al.* [13], in a study, reported that 35% with a history of trauma. SCFE may be a form of Salter-Harris type 1 fracture of the proximal femur with displacement, occurring in adolescents and resulting from either an abnormally high load across a normal physis or a physiological load across an abnormally weak physis, or a combination of these two factors.

Loder's classification of SCFE is based on physeal stability. SCFE is divided into stable or unstable SCFE based on the ability to ambulate with or without support, and unstable SCFE is associated with a higher rate of AVN of the femoral head [20]. Loder *et al.* [20], in their study of 55 patients with SCFE, reported unstable SCFE in 54.54% of patients. In this study, however, stable SCFE accounted for 74.6%, while 25.4% presented with unstable SCFE. Seventy percent presented with chronic SCFE, while 12% and 18% presented with acute and acute-on-chronic SCFE, respectively. Other studies reported a similar result, with Yinusa *et al.* [13] at 61.2% and Haider *et al.* at 85% for chronic SCFE [10]. SCFE usually presents with subtle symptoms, often ignored by both children and parents, which will account for a significant number of cases presenting after 3 weeks. Most of the time,

the presentation is caused by the sudden worsening of symptoms or the inability to walk. Fifty percent of the patients visited a specialist center when they sought treatment. This may be due to worsening symptoms or complications that may have developed, necessitating the presentation.

Twenty-seven percent presented within 1 month of onset of symptoms. The average duration of symptoms was 5.4 months, comparable to findings reported by other studies. Loder and colleagues, in their review of 2482 patients, reported an average duration for stable SCFE as 4–5 months [14]. Katchy [14], in their study, found the mean number of days before presentation as 134.2 days (4 months) with a range of 3–365 days. About 48% received over-the-counter medications before presentation at any health facility. This, in addition to the dull aching nature of SCFE, may account for the delay in the presentation reported in this study.

Several studies have reported seasonal variation in incidents of SCFE globally [6,16,18,22]. This study did not show any seasonal or monthly variation in the time of onset of SCFE. Data from 2022 and 2023 did not show any variation in the month of onset of symptoms. Loder [23], in the study of 1630 children from 6 continents, reported significant variation in the month of onset of symptoms for children in North America and Europe but no variation in Africa, Asia, Australia, or South America. Firth *et al.* [22], in their study of 69 children from Africa and 188 from Europe, noted that the phenomenon of slips occurring more often in summer was only present with children living north of the 40-degree latitude.

One of the major limitations of this study was that it had to rely on information obtained from EMRs. Information on weight and height was not routinely entered in the records, so the effect of obesity on this study could not be assessed. Limited research in Africa made it challenging to compare these results with other studies in Africa. The small size of this study was also a limitation. A larger multicenter study is recommended.

Conclusion

This retrospective study provides insights into the epidemiology of SCFE in Nigeria. The findings reveal a male predominance, with an average age of onset around 12 years and a higher incidence in the left hip compared to the right. A significant proportion of patients had a history of preceding trauma, underscoring the potential role of mechanical factors in the pathogenesis of SCFE. Furthermore, the study highlights the challenges of timely diagnosis and management, with many patients presenting months after the onset of symptoms and having received prior over-the-counter medications. This study lays the groundwork for further research to establish the burden and determinants of SCFE in the Nigerian context.

Author's contributions

U.E.E. conceptualized and designed the research. Was involved in the interpretation of data and was a major contributor to the writing of the manuscript. E.I. contributed to the research conception and interpretation of data and revised the manuscript. A.U. was involved in the design of the work, analysis of the data, and writing of the manuscript.

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Conflicts of interest

There are no conflicts of interest.

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