

Report

Epidemiology and clinical features of keloids in Black Africans: a nested case–control study from Yaoundé, Cameroon

Emmanuel A. Kouotou^{1,2,3}, MD, Jobert R. Nansseu⁴, MD  Edwige Omona Guissana^{1,3}, MD, Coralie Reine Mendouga Menye⁵, MD, Fabrice Akpadjan⁶, MD, Thiemo M. Tounkara⁷, MD, Anne-Cecile Zoung-Kanyi Bissek³, MD and Elie Claude Ndjitoyap Ndam³, MD

¹Yaoundé University Teaching Hospital, Yaoundé, Cameroon, ²Biyem-Assi District Hospital, Yaoundé, Cameroon, ³Department of Internal Medicine and Specialties, Faculty of Medicine and Biomedical Sciences of the University of Yaoundé I, Yaoundé, Cameroon, ⁴Department of Public Health, Faculty of Medicine and Biomedical Sciences of the University of Yaoundé I, Yaoundé, Cameroon, ⁵Department of Morphological Sciences and Pathological Anatomy, Faculty of Medicine and Biomedical Sciences of the University of Yaoundé I, Yaoundé, Cameroon, ⁶Department of Dermatology and Venerology Unit, Faculty of Health Sciences of Cotonou, University of Abomey Calavi, Cotonou, Benin, and ⁷Department of Dermatology and Venerology, Teaching Hospital of Conakry and Gamal Abdel Nasser University, Conakry, Republic of Guinea

Correspondence

Jobert R. Nansseu, MD
Department of Public Health
Faculty of Medicine and Biomedical Sciences of the University of Yaoundé I
PO Box 1364
Yaoundé, Cameroon
E-mail: joberttrichie_nansseu@yahoo.fr.

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Introduction

The skin plays a major role in interactions with others: it contributes to seduction, especially when well-maintained. It reveals and betrays our emotions but is sometimes constrained to bear indelible scars resulting from multiple attacks by both exogenous and endogenous agents throughout our lives. Sometimes

Abstract

Background Keloids are a common presenting complaint in Black Africans but remain poorly documented in these populations. The aim of our study was to describe the epidemiological and clinical profiles of patients with keloids seen at dermatology outpatient consultations in Yaoundé (Cameroon) and to determine driving factors of keloid occurrence.

Methods This was a 1 : 2 case–control study conducted from February to May 2016 at the dermatology unit of five health facilities in Yaoundé, Cameroon. Cases were patients with black skin and diagnosed with keloids while controls had no keloid scar, paired to cases according to age and sex. The diagnosis of keloid was based on clinical history and findings.

Results Of 2,940 patients seen during the study period, 102 (54.9% females) had keloids, hence a prevalence of 3.5% (95% confidence interval [CI]: 2.8–4.2). The most affected age group was ≥ 25 years (69.6%). Lesions at the origin of keloids were mostly traumatic (66.7%). In 68 patients (66.7%), keloid scars were associated with pruritus. The presternal region was the predominant localization (26.5%). Existence of a family history of keloids was significantly associated with presence of keloids (adjusted odds ratio: 4.2, 95% CI: 2.4–7.2; $P < 0.001$).

Conclusions Keloids commonly affect black skin as recorded during dermatology consultations in Yaoundé, Cameroon. More often, they are secondary to skin trauma and seem to occur among those with a family history of keloids. Therefore, these people should be closely monitored accordingly.

the healing process occurs abnormally, often leading to chronic wounds, retractile scars, and/or keloids.¹

Keloids are intradermal proliferations of the cutaneous connective tissue, secondary to an abnormal skin repair process with accumulation of collagen.² In sub-Saharan Africa, the frequency of ritual practices of scarification, tattooing, and piercing coupled with the predisposition of the black skin to develop this

anomaly make keloids a nightmare for sub-Saharan Africans, particularly when these lesions are located on uncovered areas.³ Keloids usually cause few complications, but depending on their size, localization, and associated symptoms, they can lead to functional, esthetic, and/or psychological harm.³ In Nigeria, Olaitan, in a study aiming at assessing the perception and psychological impact on patients with keloids, observed social integration problems in 35.8% of cases; 48.9% of patients were stigmatized in society because of the keloid scars.⁴ It is possible that keloids undergo cancerization; however, this remains rare.⁵ Similarly, keloids are rarely associated with poor prognosis. Nevertheless, they pose enormous therapeutic problems for practitioners (general practitioners, dermatologists, psychologists) and even to patients because of numerous therapeutic failures and recurrences recorded.⁴

In Cameroon, to the best of our knowledge, no study has yet been dedicated to keloids. Therefore, we conducted this study with the aim of describing the epidemiological and clinical aspects of keloids witnessed during dermatology consultations in Yaoundé, Cameroon; additionally, we sought to identify potential factors involved in their genesis.

Materials and methods

Study design and setting

We conducted a case-control study over a period of 3 months – from February to May 2016 – in five hospitals of the city of Yaoundé, Cameroon: the Yaoundé University Teaching Hospital, the Yaoundé Gynaeco-Obstetrics and Paediatrics Hospital, the Yaoundé Military Hospital, the Biyem-Assi District Hospital, and the Elig-Essono Medical Health Centre. These health facilities were selected on the basis that they dispose of a dermatology unit with well-experienced and trained dermatologists.

Study participants

Cases were patients aged 2 years or older, harboring the black skin, diagnosed with one or more keloid scars by a dermatologist during consultation in one of the study sites and who consented (or their parents/guardians for those under 18 years) to take part in the study. Controls were also expected to be at least 2 years old, harboring the black skin too, seen at the dermatology outpatient consultation with neither hypertrophic scars nor keloids; additionally, they must have agreed to participate in the study (or their parents/guardians for those under 18 years of age). One case was paired to two controls based on age, sex, and site of recruitment. The minimum sample size was estimated at 78 cases and 156 controls.

Data collection

The study began after obtaining an ethical clearance along with administrative authorizations from directories of the different study sites. Potential participants for this study (cases or controls) were approached, and the various aspects and

procedures were fully presented; those (or their parents/guardians) who agreed to participate signed an informed consent form, and data were collected subsequently. The diagnosis of keloid was based on history/description (chronic solid scar lesions, painful or not, and pruritic or not) and clinical findings (one or several tumoral lesions with a sessile base of hard/fibrous consistency, smooth surface, and edges).

A standardized and pre-tested questionnaire was used to collect data from each participant. Information was gathered on age, gender, profession (office employee [administrative officer, physician, pharmacist, teacher, stylist, computer scientist]; handler [mason, carpenter, house painter, laborer, shopkeeper, housewife, launderer, seamstress, farmer]; professional athlete; pupil/student; unemployed), family history of keloid, associated signs (pruritus, pain, burning, hyperesthesia, tingling, discomfort) and clinical data: onset (spontaneous, secondary); number of lesions (single or multiple); localization (pre-sternal, shoulder, ear lobe, upper limbs, cheeks, lower limbs, back, abdomen, others); size of lesions (classified in three groups: 0.5–5, 5–10, and >10 cm); appearance of the surface (smooth, rough, ulcerated); and existence of bacterial superinfection. Associated signs and clinical data were collected for cases only.

Operational definitions

We defined "spontaneous keloids" as keloids which developed without any known prior skin lesion. Professions "with high risk of skin trauma" were considered as professions in which the skin is more exposed to stretching and tensions: professional athletes and handlers. On the contrary, professions "with minimal risk of skin trauma" were those professions in which the skin is less exposed to stretching and tensions: office employees, pupils, students, and unemployed.

Statistical analysis

Data were coded, entered, and double checked using Microsoft Excel 2007. Data processing and analysis used SPSS v. 20.0 (IBM SPSS Inc., Chicago, Illinois, USA). Qualitative data were described using numbers and frequencies while quantitative data were summarized using means $\pm$ standard deviations (SD). The Chi square test or Fisher exact test served for the comparison of proportions, where applicable. Odds ratios (ORs) with their 95% confidence intervals (CIs) were used through univariable and multivariable logistic regression analyses to identify those factors susceptible of driving keloid occurrence. We introduced in the multivariable model all variables with a $P < 0.25$ in univariable analysis, added to age and sex. Results were considered statistically significant for a $P < 0.05$.

Ethical considerations

We were granted an ethical clearance by the Institutional Ethical Review Board of the Faculty of Medicine and Biomedical Sciences of the University of Yaoundé I, Cameroon. In addition, we obtained research authorizations issued by the directors of

the various study sites. We conducted our study in strict compliance with the fundamental principles of medical research. All aspects and procedures of the study were clearly presented and explained to each potential participant (or parent/guardian for the under 18 years). We included only those who voluntarily agreed to participate; an informed consent form was duly signed in this regard. All patients were free to withdraw at any time from the study at their convenience without fear of any retribution. Data were collected and processed by persons subject to professional secrecy.

Results

During the study period, we received a total of 2,940 patients at these outpatient dermatology consultations in the five selected health facilities. Of these, 2,544 were ≥ 2 years old among whom 106 had an excessive scar, including four cases of hypertrophic scars and 102 patients with keloids. Thus, the prevalence of keloids in our study equaled 3.5% (95% CI: 2.8–4.2). We definitively included 102 cases and 210 controls who met our inclusion criteria (Fig. 1).

Sociodemographic characteristics of the study population

Ages of patients varied from 2 to 65 years; the most affected age group was 25 years and over (69.9%; Table 1). Women represented 53.5% of the study population. There was no

significant difference between cases and controls in terms of age ($P = 0.944$) and sex ($P = 0.734$). Office employees were the most represented (56.9%). Cases and controls were different in terms of their professions ($P = 0.014$). However, these differences became irrelevant after categorization of professions according to the risk of trauma (professions with high risk of skin trauma: 24/102 [23.6%] vs. 55/210 [26.2%]; $P = 0.612$; Table 1).

Medical history

Keloids were the main presenting complaints. The discovery of keloids was made by the dermatologist in 18 patients (17%). We recorded 16 cases (15.7%) of spontaneous onset against 86 (84.3%) cases of keloids secondary to a clearly identified process. Lesions at the origin of the keloid were predominantly traumatic (66.7%), followed by inflammatory dermatoses (17.7%; Table 2).

Keloids were associated with pruritus in most patients (66.7%), in isolation or combined to other symptoms (pain and/or tingle); 17 patients (16.7%) were found asymptomatic. The time elapsed between onset of lesions and diagnosis varied between 0 and 5 years for a predominant number of patients (55.9%; Table 2).

Clinical aspects

On average, 1.6 ± 1.1 keloid scars per patient were present on the entire skin. Sixty-five patients (63.7%) had only one

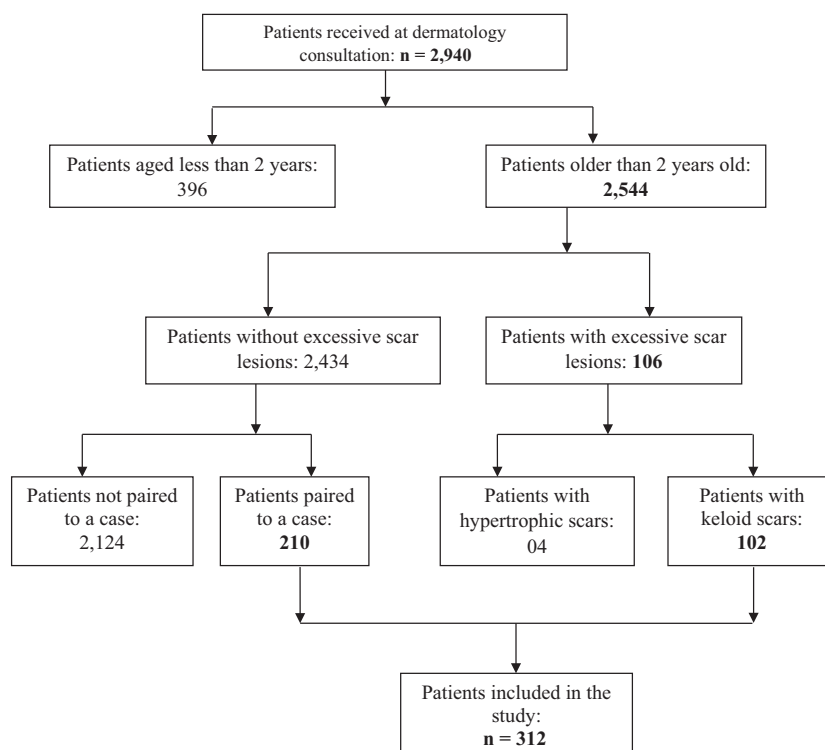


Figure 1 Flow diagram showing the process of participants' inclusion

Table 1 Characteristics of the study population

Parameter	Cases (N = 102)	Controls (N = 210)	P value
Females	56 (54.9)	111 (52.9)	0.734
Age range (years)			0.944
2–9	7 (6.9)	18 (8.6)	
10–17	6 (5.9)	13 (6.2)	
18–24	18 (17.6)	39 (18.6)	
≥25	71 (69.6)	140 (66.7)	
Profession			0.014
Office employee	28 (27.4)	62 (29.5)	
Student	21 (20.6)	48 (22.9)	
Pupil	14 (13.7)	35 (16.7)	
Unemployed	15 (14.7)	10 (4.8)	
Handler	22 (21.6)	55 (26.2)	
Professional athlete	2 (2.0)	0 (0.0)	

Data are presented as frequency (percentage)

keloid scar, and 22 (21.6%) had two keloid scars; there was one patient (1.0%) with six keloid scars (Table 2). The majority of lesions measured between 0.5 and 5 cm (58.8%; Table 2).

The presternal region, back, and earlobes were favorite areas for isolated lesions, while the presternal region, cheeks, and limbs (upper and lower) were areas mostly affected by multiple keloid lesions (Table 3).

Determinants of keloid scar occurrence

After univariable and multivariable logistic regression analysis, we found that existence of a family history of keloid was the only factor significantly prompting keloid occurrence in our patients (adjusted OR: 4.20, 95% CI: 2.4–7.2; $P < 0.001$) (Table 4).

Discussion

The aim of this hospital-based study was to describe the epidemiological and clinical aspects of keloids and to investigate their driving factors among patients consulting dermatologists in Yaoundé, Cameroon. The prevalence of keloids was 3.5%. Lesions at the origin of keloid scars were mostly traumatic (66.7%). In 66.7% of patients, keloid was associated with pruritus. The presternal region was the most affected site (26.5%). Moreover, patients with a family history of keloid had a 4.2-fold increased risk of developing keloids than their counterparts.

The prevalence of keloids in this study (3.5%) is lower than the 5.7% reported in Nigeria by Omo-Dare.⁶ This difference could be explained by the smaller sample size in the Nigerian study (75/1,317). The majority of people affected were aged 25 years and above, which may be explained by the fact that at this age, physical activity is significantly greater and exposes the individual to more trauma of all kinds, especially on young skins which experience maximal skin tensions.⁷

Table 2 Medical history and clinical aspects of lesions

Parameter	Number (N = 102)	(%)
Circumstances of appearance		
Trauma		
Wounds	38	37.3
Shaving	15	14.7
Surgery	11	10.8
Vaccination	4	3.9
Inflammatory dermatoses		
Acne	12	11.8
Varicella	6	5.9
Spontaneous	16	15.7
Associated symptoms		
Pruritus	37	36.3
Pruritus + tingle	20	19.6
Tingle	11	10.8
Pruritus + tingle + pain	8	7.8
Pruritus + pain	3	2.9
Pain	2	2.0
Tingle + pain	2	2.0
Gene sensation	2	2.0
Asymptomatic	17	16.7
Duration (years)		
[0–5]	57	55.9
[5–10]	16	15.7
≥10	29	28.4
Number of keloids		
1	65	63.7
2	22	21.6
3	5	4.9
4	6	5.9
5	3	2.9
6	1	1.0
Size of keloids (cm)		
[0.5–5]	60	58.8
[5–10]	24	23.5
≥10	18	17.7

Table 3 Localization of lesions

Site	Number per site		Total	(%)
	Isolated	Multiple		
Presternum	15	12	27	26.5
Ear lobes	13	7	20	19.6
Back	14	5	19	18.6
Upper limbs	11	8	19	18.6
Lower limbs	9	8	17	16.7
Shoulder	7	6	13	12.7
Cheeks	7	11	18	17.6
Abdomen	3	4	7	6.9

Bold values were indicative of statistically significant results

This study population was predominantly female with a male/female sex ratio of 0.8. This feminine predominance could be explained by the fact that women, concerned about their physical appearance, are more often preoccupied with the possible

Table 4 Factors driving keloid occurrence

Variable	Cases	Controls	Odds ratio (95% CI)	P value	Adjusted odds ratio (95% CI)	P value
Age (years)						
2–9	7 (6.9)	18 (8.6)	0.77 (0.31–1.92)	0.571	0.88 (0.34–2.29)	0.795
10–17	6 (5.9)	13 (6.2)	0.91 (0.33–2.50)	0.855	0.89 (0.31–2.57)	0.825
18–24	18 (17.6)	39 (18.6)	0.91 (0.49–1.70)	0.768	0.94 (0.48–1.83)	0.854
≥25	71 (69.6)	140 (66.7)	1	/	1	/
Sex						
Female	56 (54.9)	111 (52.9)	1.09 (0.68–1.75)	0.734	1.03 (0.62–1.70)	0.918
Male	46 (45.1)	99 (47.1)	1	/	1	/
Profession						
High risk for trauma	24 (23.5)	55 (26.2)	0.87 (0.50–1.51)	0.612		
Low risk for trauma	78 (76.5)	155 (73.8)	1	/		
Family history of keloids						
Yes	44 (43.1)	32 (15.2)	4.22 (2.45–7.27)	<0.001 ^a	4.20 (2.43–7.24)	<0.001 ^a
No	58 (56.9)	178 (84.8)	1	/	1	/
Personal history of acne						
Yes	44 (43.1)	95 (45.2)	0.92 (0.57–1.48)	0.726		
No	58 (56.9)	115 (54.8)	1	/		
Personal history of seborrhea						
Yes	59 (57.8)	121 (57.6)	1.01 (0.63–1.63)	0.970		
No	43 (42.2)	89 (42.4)	1	/		

CI, confidence interval.

^aData are presented as number (percentage)^b* $P < 0.05$.

negative esthetic impact that keloids may cause; hence they are more prone to consult.¹ On the other hand, it has been observed that in general, women are more inclined to consult and take part in studies than men in sub-Saharan Africa.

The present study showed that 15.7% of keloid scars appeared “spontaneously,” while they appeared after an initial lesion either traumatic (66.7%) or inflammatory (17.6%). In Benin, Yedomon *et al.*⁸ found 75% of keloids secondary to trauma, a proportion slightly lower than what was observed in this study. It has been demonstrated that even minimal trauma is likely to cause loss of substance and, during skin repair, excessive healing. Thus, the “spontaneous” nature of certain keloids remains controversial.^{2,9}

The presternal region was a predominant localization of keloids in this study (26.5%). These results are lower than the 34.5% of keloids located in the anterior trunk region found in Benin by Yedomon *et al.*⁸ Most patients (55.9%) had a keloid that had evolved for less than 5 years at the time of recruitment. It has been claimed that the duration of evolution of a keloid must be taken into account for management, as the choice of the therapeutic regimen will depend on this duration. The probability of treatment success is higher when the keloid is young rather than when it has existed for long.² In addition, keloids over 10 years of age should be monitored because of the potential risk of cancer.⁵

Forty-three percent of patients with keloids had at least one first-degree relative who also suffered from keloids. The

existence of a family history of keloids increased by four times the risk of developing a keloid scar. This result confirms the existence of a genetic predisposition in the occurrence of keloids.⁶

These results should, however, be interpreted in the context of some limitations. First, the study sites and participants were not chosen randomly, and the study was limited to the city of Yaoundé; this could hinder the translatability of these results to the entire Cameroonian population. Second, the study was hospital-based and participants were recruited from dermatology units only, which could perhaps lead to underestimating the real prevalence of keloids in the general population. Notwithstanding and to the best of our knowledge, this study is the first of its kind carried out in Central Africa and one of the rare conducted among Black Africans. We used rigorous methodological and statistical procedures to recruit participants and address the research questions.

In the end, this hospital-based study revealed a 3.5% prevalence of keloids during outpatient dermatology consultations in Yaoundé, Cameroon. Keloids seem mostly secondary to well-identified skin trauma. Moreover, a person with a family history of keloids would be four times more likely to develop a keloid scar than a person without such a history, thus confirming a genetic predisposition to keloid occurrence. Therefore, populations and health professionals should be well informed in order to reinforce monitoring of people at risk. Future studies on a larger scale are necessary to identify all other factors that would be involved in the occurrence of keloids on the black skin.

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