

Prevalence and causes of blindness at a tertiary hospital in Douala, Cameroon

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Purpose: The aim of this study was to determine the prevalence and causes of bilateral and unilateral blindness in the town of Douala and its environs based on data from the ophthalmic unit of a tertiary hospital in Douala.

Methods: We conducted a retrospective epidemiological survey of consultations at the eye unit of the Douala General Hospital over the last 20 years (from January 1, 1990 to December 31, 2009).

Results: Out of the 1927 cases of blindness, 1000 were unilateral, corresponding to a hospital prevalence of 1.84% and 927 cases were bilateral, corresponding to a hospital prevalence of 1.71%. No statistically significant difference was noted between the two ($P = 0.14$). The leading causes of bilateral blindness were cataract (50.1%), glaucoma (19.7%), and diabetic retinopathy (7.8%) while the leading causes of unilateral blindness were cataract (40.4%), glaucoma (14.1%), and retinal detachment (9.1%). Cataract (51.2%), cortical blindness (16.3%), and congenital glaucoma (10%) were the leading causes of bilateral blindness in children aged less than 10 years.

Conclusion: Blindness remains a public health problem in the Douala region with a hospital prevalence which is relatively higher than the national estimate given by the National Blindness Control Program.

Keywords: bilateral blindness, unilateral blindness, prevalence, Douala, Cameroon

Introduction

According to the World Health Organization (WHO),¹ about 284 million people in the world suffer from visual impairment, of whom 39 million are estimated to be blind. It appears there is unequal distribution of blindness prevalence in the world. This prevalence stands at 0.2% in France, 0.7% in Eastern Europe, and between 0.2 and 0.4% in the United States; in sub-Saharan Africa it is estimated at 1.4%.² In Cameroon, a Central African country with a population of over 19 million, following the 2005 general population census,³ no general population survey on blindness and its causes has been carried out. The prevalence of blindness in Cameroon is estimated by WHO at 1%.⁴ Studies carried out in the South West region of Cameroon reported a prevalence of 1% in the Limbe urban area and 1.6% in the Muyuka rural area.^{5,6} The most frequent causes of blindness in these areas included cataracts, onchocerciasis, and posterior segment pathologies. The “VISION 2020 initiative: The Right to Sight” launched by WHO⁷ was adopted in Cameroon in 2002. This initiative comprises three components, namely the elimination of preventable blinding diseases as a public health problem by the year 2020, human resource development, and infrastructure development.

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The adoption of this initiative in Cameroon was realized by the setting up of the National Blindness Control Program by the Ministry of Public Health. Numerous strategies on medical training and infrastructure development have been implemented as well as the surgical management of cataract at low cost (US\$10).

Douala, the economic capital of Cameroon and political capital of the Littoral region, has a population estimated at more than 2.5 million inhabitants with two tertiary hospitals: the General Hospital and the Laquintinie Hospital. We carried out a retrospective epidemiological survey on all medical records of patients consulted over the last 20 years in the ophthalmology unit of the Douala General Hospital. The objective of this survey was to determine the prevalence and causes of bilateral and unilateral blindness. Findings will serve as a baseline in formulating intervention strategies to control blindness in the Littoral region of Cameroon in collaboration with the central administration and various national and international partners.

Materials and method

We carried out a descriptive and retrospective documentary survey in the eye unit of the Douala General Hospital which lasted 4 months starting from March 1 to June 30, 2009. All the medical records of patients who consulted during the period between January 1, 1990 and December 31, 2009 were reviewed.

Target population and data collection

The definition of blindness by WHO was used;⁸ bilateral blindness was defined as best-corrected distant visual acuity in the better eye $< 3/60$, unilateral blindness was defined as best-corrected distant visual acuity $< 3/60$ in one eye and $\geq 18/60$ for the other eye. Patients with low vision and those with incomplete medical records were excluded. The following variables were collected: age, sex, medical history, best-corrected distant visual acuity, and cause(s) of blindness.

Data analysis

Microsoft Excel 2007 (Microsoft, Redmond, WA) and SPSS (v 15.0; SPSS Inc, Chicago, IL) software were used. Quantitative data are reported as means, standard deviation, median, and range while qualitative data are reported as proportions. Student's *t*-test was used to compare means between two groups, and the ANOVA variation test to compare means in more than two groups. The Chi-square test was used to compare proportions. Difference was significant if $P < 0.05$.

Ethical considerations

Patient privacy was respected by the use of identification numbers on questionnaires. Administrative approval to carry out research was obtained from the Director General of the Hospital and the Chief of the eye unit. Ethical clearance was also obtained from the National Ethics Committee.

Results

Prevalence of blindness

A total of 1927 cases of blindness (bilateral and unilateral) were recorded amongst 54,244 consulted patients (27,549 males and 26,695 females) corresponding to a prevalence of 3.55%. One thousand cases were bilateral, corresponding to a prevalence of 1.71% and 927 cases were unilateral, corresponding to a prevalence of 1.84%. No statistically significant difference was found ($P = 0.14$).

Medical history

Table 1 reveals that diabetes was associated more with bilateral blindness than unilateral blindness ($P = 0.000$), while ocular trauma was associated more with unilateral blindness than bilateral blindness ($P = 0.000$). In males, 23.4% had a history of ocular trauma compared to 11.5% of females ($P = 0.000$). The average age for ocular trauma was 36.4 ± 20.7 years and the most affected age groups were 10- to 29-year-olds ($n = 77$). The ocular complications of human immunodeficiency virus (HIV) was associated with both bilateral and unilateral blindness ($P = 0.271$).

Causes of blindness

The following were leading causes of bilateral blindness: cataract (50.1%), glaucoma (19.7%), diabetic retinopathy (7.8%), age-related macular degeneration (ARMD; 5.5%), and retinitis pigmentosa (4%) (Table 2). The leading causes of unilateral blindness were cataract (40.4%), glaucoma (14.1%),

Table 1 Type of blindness with respect to past history

Past history		Types of blindness				P value
		Unilateral blindness		Bilateral blindness		
		n	%	n	%	
Diabetes	Yes	58	31.0	129	69.0	0.000
	No	942	54.1	798	45.9	
Ocular trauma	Yes	306	86.7	47	13.3	0.000
	No	694	44.1	880	55.9	
HIV	Yes	21	58.3	15	41.7	0.271
	No	979	51.8	912	48.2	

Abbreviations: HIV, human immunodeficiency virus; n, number of cases; %, percentage.

Table 2 Causes of unilateral and bilateral blindness

Etiologies	Unilateral blindness		Bilateral blindness	
	n	%	n	%
Cataract	404	40.4	464	50.1
Primary open angle glaucoma	141	14.1	182	19.7
Proliferative diabetic retinopathy	16	1.6	71	7.8
ARMD	18	1.8	51	5.5
Retinitis pigmentosa	15	1.5	37	4
Posterior uveitis	90	9	16	1.8
Neovascular glaucoma	12	1.2	16	1.8
Corneal opacities	43	4.3	15	1.6
Cortical blindness	—	—	15	1.6
Cytomegalovirus retinitis	6	0.6	10	1.1
Hereditary macular dystrophies	—	—	7	0.7
Onchocerciasis	—	—	7	0.7
Retinoblastoma	14	1.4	6	0.6
Optic neuropathy	1	0.1	6	0.6
Globe injury	43	4.3	4	0.4
Pituitary tumors	—	—	3	0.3
Oculoorbital tumors	21	2.1	2	0.2
Keratoconus	1	0.1	2	0.2
Albinism	—	—	2	0.2
Macular hole	2	0.2	2	0.2
CRAO	9	0.9	2	0.2
Eclampsia	—	—	1	0.1
CRVO	19	1.9	1	0.1
Panophthalmitis	6	0.6	1	0.1
Leprosy	—	—	1	0.1
Diffuse retinal epitheliopathy	—	—	1	0.1
Orbital cellulitis	1	0.1	1	0.1
Cretinism	—	—	1	0.1
Retinal detachment	91	9.1	—	—
Ophthalmic herpes zoster	4	0.4	—	—
Optic nerve section	1	0.1	—	—
Disc coloboma	2	0.2	—	—
Anisometropia	3	0.3	—	—
Vitreous hemorrhage	6	0.6	—	—
Hematoconia	30	3	—	—
Ptosis	1	0.1	—	—
Total	1,000	100%	927	100%

Abbreviations: ARMD, age-related macular degeneration; CRVO, central retinal vein occlusion; CRAO, central retinal artery occlusion; n, number of cases; %, percentage.

retinal detachment (9.1%), posterior uveitis (9%), corneal opacities, and wounds of the eyeball (4.3% each).

Blindness and gender

In general, in terms of blindness, males and females were affected in equal proportions (Table 3). Males (59.9%, $n = 599$) were more frequently affected with unilateral blindness than females (40.1%, $n = 401$; $P = 0.016$).

Blindness and age

The mean age of cases with blindness was 49.39 ± 23.02 years; (range of 0.02 to 93 years). The mean age of patients suffering

Table 3 Prevalence of blindness with respect to sex

Type of blindness	Prevalence						P value
	Male		Female		Total		
	n	%	n	%	n	%	
Unilateral blindness	599	2.17	401	1.50	1000	1.84	0.224
Bilateral blindness	505	1.83	422	1.58	927	1.71	0.386
Total	1104	4.01	823	3.08	1927	3.55	0.140

Abbreviations: n, number of cases; %, prevalence.

from unilateral blindness was significantly lower (43.2 ± 21.5 years) than that of patients suffering from bilateral blindness (56.1 ± 22.8 years; $P = 0.000$; Table 4). Figure 1 shows a higher frequency of unilateral blindness between 10 and 39 years of age and a predominance of bilateral blindness after 60 years.

In children aged 0 to 10 years, the major causes of bilateral blindness were: cataract (51.2%), cortical blindness (16.3%), congenital glaucoma (10%), retinoblastoma (7.5%), and posterior uveitis (2.6%); meanwhile the major causes of unilateral blindness included cataract (32.2%), retinoblastoma (15.7%), complicated hyphemas (12.3%), wounds of the eyeball, and unspecified oculoorbital tumors (8.9% each).

Discussion

Prevalence of blindness

Hospital prevalence for bilateral blindness in this study is 1.71%. This is similar to those reported by Oye et al in other Cameroonian localities,^{5,6} who found a bilateral blindness prevalence of 1.6% in the Muyuka rural population in 2006 and 1.1% in the Limbe urban area in 2007. At the national level, the National Blindness Control Program in Cameroon⁹ estimates a population-based prevalence at about 1%, from WHO reports.⁴ A prevalence of 5.8% was reported from a hospital-based study carried out amongst young adults in Bamako, Mali.¹⁰ Climatic differences between Bamako and Douala could be responsible for this difference. Some blinding diseases such as trachoma occur more frequently in Sahel regions than in humid equatorial regions. This difference could also be due to disparities in culture, medical access, and social issues of these two populations. The hospital prevalence of unilateral blindness was 1.84% in our series.

Table 4 Mean ages

Type of blindness	n	Mean age at the time of diagnosis of blindness \pm SD (years)	P value
Unilateral blindness	1000	43.2 ± 21.5	0.000
Bilateral blindness	927	56.1 ± 22.8	
Total	1927	49.4 ± 23	

Abbreviations: n, number of cases; SD, standard deviation.

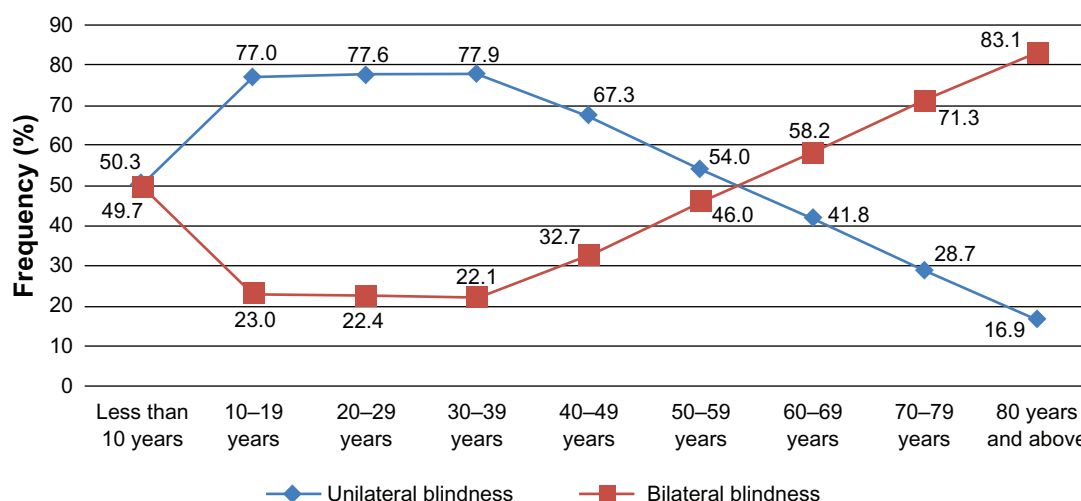


Figure 1 Evolution of blindness according to age group.

In the literature, this prevalence varies from place to place. Oye and Kuper in 2007 reported 3.3% in Limbé in the South West region of Cameroon,⁶ Moussala et al in 1996 reported a prevalence of unilateral blindness of 1.35% in the West region of Cameroon,¹¹ and Balo et al in Togo reported a prevalence of 2.65%;¹² all these were in a population-based study.

Causes of blindness

Bilateral blindness

Cataract was the leading cause of bilateral blindness in our series; it represented 50.1% of cases. This is in accordance with national data which attributes half of the causes of bilateral blindness to cataract.⁹ Similarly, Moussala et al in the West region of Cameroon reported 50% and Negrel et al in Benin reported 54% bilateral blindness due to cataract.^{13,14} Saw et al reported 58.8% of cataract-related bilateral blindness in a study conducted in Singapore on a Chinese population aged from 40 to 79 years.¹⁵

Glaucoma was the second leading cause of bilateral blindness with a frequency of 19.7%. This is similar to the results obtained in a study carried out by Eballé et al in Bamako (22.9%)¹⁰ and those obtained by Balo et al in a rural region of Togo (15%).¹²

In contrast with cataract-related blindness which is reversible by surgery in most cases, glaucoma is a real problem owing to late diagnosis and the irreversibility of lesions. In Cameroon, a hospital-based study on glaucoma reported a bilateral blindness prevalence of 34.2% in a glaucomatous population seen at first consultation.¹⁶ This is evidence that glaucomatous patients consult late and often at a stage when visual field defects are advanced.

Diabetic retinopathy was the third leading cause of bilateral blindness in our series with a frequency of 7.8%.

This may be attributed to the rising incidence of type 2 diabetes whose occurrence is influenced by urbanization in which there is sedentary life style and consumption of fatty foods favoring obesity, a major risk factor for metabolic diseases. The prevalence of diabetes is estimated at 3.7% to 9.7% in Cameroon;¹⁷ Moukouri et al, in a hospital-based study, reported a diabetic retinopathy-related blindness of 5%.¹⁸ Mvitu Muaka et al in Congo reported 47% of blindness in a diabetic population in 2006.¹⁹ If nothing is done, diabetic retinopathy will soon play a leading role in the causes of blindness in our setting, as is the case for many developed countries, which together with ARMD represents the leading cause of bilateral blindness.⁴

Other causes of bilateral blindness were ARMD (5.6%). It is the fourth leading cause of blindness in our series and according to Chainé et al,²⁰ it is the leading cause of bilateral blindness and low vision in industrialized countries. In our series, retinitis pigmentosa (4%) was the fifth ranking cause of bilateral blindness. In a hospital study on retinitis pigmentosa in Cameroon, Eballé et al reported 30% of bilateral blindness in a population of patients with retinitis pigmentosa;²¹ while Balo et al in Togo reported 0.29% retinitis pigmentosa-related blindness;¹² however, Moussala et al in 1992 reported that 1.96% of bilateral blindness resulted from retinitis pigmentosa.¹³ Retinitis pigmentosa is a silent cause of irreversible bilateral blindness, but is not given the necessary attention in our setting. Genetic testing is required in order to determine the exact mode of transmission of the disease in our setting.

HIV/autoimmune deficiency syndrome (AIDS)-related ocular manifestations represented 1.1% of the causes of bilateral blindness representing the tenth ranking cause of

bilateral blindness in our series. This rate is low compared to the 8.3% prevalence reported by Eballé et al in a study conducted in Bamako in 2003 which ranked this as the fourth leading cause of bilateral blindness in young patients (18 to 50 years).¹⁰ Some authors hold the view that HIV/AIDS-related ocular complications are rare in African patients, notably because they die early owing to the lack of or inaccessibility to antiretroviral drugs.^{22,23} National policies and international cooperation against HIV make antiretroviral treatments increasingly affordable in many African states. As a result, there is an improvement in the management and survival of patients and the rarity of ocular complications.

In our series, onchocerciasis (0.7%, $n = 7$) ranked as the twelfth cause of bilateral blindness. On the contrary, the studies conducted by Oye et al in Muyuka reported onchocerciasis (13.8%) as the second leading cause of bilateral blindness,⁵ while in Limbe in 2007 they found 17% ($n = 4$) representing the fourth leading cause of bilateral blindness.⁶ This twelfth position might be due to the fact that the town of Douala might not be an onchocerciasis hyper endemic focus. Cases observed, though minimal, might originate more from the Mounjo or Edea basins which are meso or hyper endemic areas owing to the existence of rapid water currents which are breeding sites for the black fly. At the national level, onchocerciasis represents the second leading cause of blindness after cataract.⁹

No case of trachoma was reported in our series just as in the series of Oye et al in 2006 in Muyuka and in 2007 in Limbe;^{5,6} Balo et al¹² also found no case of trachoma in South Togo. Its absence in the various causes of blindness listed in this study is explained by the fact that said study was conducted in a town located in South Cameroon. This pathology is confined to rural and urban areas with no potable water and to communities with poor collective and individual hygiene. It is predominant in hot climate regions such as Northern Cameroon where a survey on the prevalence of the disease is currently being carried out by the National Blindness Control Program.

Unilateral blindness

Cataract and glaucoma (40.4% and 14.1%, respectively) were the leading causes of blindness in our series. Moussala et al also ranked cataract (34.8%) as the first cause of unilateral blindness and glaucoma came third with 14.2%.¹¹ Similarly, Balo et al in Togo reported cataract as the leading cause of unilateral blindness.¹² Retinal detachment was also a major cause of unilateral blindness in our setting accounting for 9.1% of cases ($n = 91$). The management of this pathology by

retinopexy is not commonly done because no ophthalmology unit of a public hospital in Cameroon is adequately equipped for posterior segment surgery. Consequently, a majority of the cases lose vision. There is need to train vitreoretinal surgeons.

Type of blindness and gender

Oye and Kuper reported that males and females were equally affected by unilateral blindness.⁶ This is not the case in this study where unilateral blindness was more frequent in males than females ($P = 0.016$). Other sub-Saharan African studies have reported similar findings.^{2,10} The male predominance of unilateral blindness may be accounted for by the higher prevalence of ocular trauma in males than females. Ocular trauma occurs more frequently in males.²⁴

In our series, bilateral blindness occurred in 1.83% of males and in 1.58% of females. Amongst those with bilateral blindness, 54.4% were males and 45.6% were females. Similar results have been reported by other African authors.^{10,25}

Type of blindness and age

Unilateral blindness was more frequent in young adults. This might be related to ocular trauma which caused more unilateral blindness than bilateral blindness ($P = 0.000$). This ties in with the results of two previous studies carried out in Cameroon on unilateral blindness. These studies report ocular trauma as the major cause of unilateral blindness in young adults and in children.^{11,13}

The frequency of bilateral blindness increases with age. These results are similar to those reported in various studies conducted in sub-Saharan Africa.^{10,26} This phenomenon might be related to the increased frequency of blinding pathologies with ageing such as cataract, glaucoma, and ARMD. It is also known that cataract and glaucoma occur earlier in the tropics from the age of 40 years.^{2,9}

Childhood blindness

Lens disease was the leading cause of bilateral blindness in children. This corroborates the results of many studies such as that of Akinsola and Ajaiyeoba in Lagos, Nigeria where cataract and congenital glaucoma were the major causes of bilateral blindness;²⁷ Bulgan and Gilbert in Mongolia and Ezegwui et al in South West Nigeria also reported that lens diseases were the leading causes of bilateral blindness.^{28,29} In our series, the high frequency of cortical blindness might be due to meningoencephalitis (neonatal infection, meningitis, severe malaria, rubella) where ocular complications are often irreversible. Consequently,

particular emphasis should be laid on the early management of meningeal and brain diseases of the child and also on the management of pediatric cataract and glaucoma. This may be achieved by facilitating training in subspecialties such as pediatric ophthalmology.

The low rate of corneal diseases at 3.5% (four cases) in our series, yet a major cause of blindness in some developing countries,³⁰ might be due to the intense activity of the Expanded Program on Immunization which has a vast geographic coverage in Cameroon, and whose activities in the field are often associated with the distribution of vitamin A. In addition, cases of measles and vitamin A deficiency which cause corneal blindness are rarely observed in South Cameroon where the consumption of palm oil (rich in vitamin A) is very common.

Retinopathy of prematurity, a major cause of blindness in middle income regions like Latin America and former socialist countries of Western Europe,³⁰ was not found in our series just as in the series of Ezegwui et al²⁹ in 2003 in Nigeria and that of Kello and Gilbert³¹ in 2003 in Ethiopia. This might be due to the acquired mastery of oxygenation in premature babies in neonatology centers of the African Southern countries.

Unilateral blindness in children was caused mainly by cataract (32.9%). These cataracts were posttraumatic and congenital. Eballé et al in 2009 in Yaoundé reported lens diseases (20%) as the second leading cause of unilateral blindness after uveal tract pathologies.²⁴ Complications resulting from posttraumatic hyphema and wounds of the eye-ball were the second leading cause of unilateral blindness. All complications of ocular trauma put together, ocular trauma represented the leading cause of unilateral blindness.

Tumors were represented by retinoblastoma in 7.2% and unspecified oculoorbital tumors in 5.6% of cases. The two diseases put together represented the second leading cause of unilateral blindness in our series; difficulties in management exist in our setting where there are no orbital and oculoplastic surgeons.

Conclusion

Blindness remains a public health problem in the Douala region. Diseases that cause bilateral blindness in Douala include: cataract, glaucoma, diabetic retinopathy, ARMD, and retinitis pigmentosa. Ocular trauma is the leading cause of unilateral blindness, this calls for the implementation of more preventive strategies. Limitations of this study include the design (retrospective) and the site (hospital-based). Therefore, a population-based prevalence study in this area would provide a more reliable prevalence of blindness.

Disclosure

The authors report no conflicts of interest in this work.

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