



Salimatou Monteiro^{1,2*}, Amadou Alfa Bio^{1,2}, Abel Rodrigue Assavedo^{1,2}, Rose Wami^{1,2} and Soulé Alamou³

¹Unit of Teaching and Research in Ophthalmology

²Faculty of medicine, University of Parakou, Benin

³Faculty of Health Sciences of Cotonou, Benin

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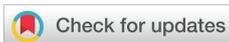
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***Corresponding author:** Salimatou Monteiro, Assistant head of clinic of Ophthalmology, Unit of Teaching and Research in Ophthalmology, Faculty of medicine, University of Parakou (Benin), BP: 123 – FM/UP- Parakou, Benin, E-mail: mont3sali@yahoo.fr

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Case Report

Causes of avoidable blindness in Parakou

Abstract

Introduction: Blindness and severe visual impairments have huge consequences on the socioeconomic development of individuals and human communities.

Objective: This research work aims to determine the causes of avoidable blindness in the city of Parakou (BENIN).

Method: This is a descriptive and prospective study. It was carried out during a time period of one (01) month. All the subjects with vision impairment who were blind and present during the study period were included. The main variable investigated was the causes of blindness.

Findings: Blindness prevalence was estimated at 78.72%. Subjects' mean age was equal to 16.54 ± 3.75 years with extremes from 9 to 25 years. 11 to 16 years age group accounted for 51.35%. The male subjects accounted for 76%. The main anatomical localizations observed were cornea (24.32%), all the eyeball (18.92%) and crystalline lens (16.22%). The main causes of blindness were bilateral congenital cataract (13.51%), bilateral bulbar phthisis (13.51%) and total bilateral microphthalmia (10.81%). 15 (40.54 %) out of the 37 patients had blindness with preventable/avoidable causes. Among those avoidable causes, bilateral phthisis bulb accounted for 33.33% of cases.

Conclusion: The prevalence of avoidable causes of blindness is high. Efforts still need to be made in order to improve the prevention and diagnosis of avoidable ophthalmic disorders, that may lead to blindness, through better access to and high quality of eye care.

Introduction

Blindness and severe vision impairments have significant consequences on the socioeconomic development of individuals and human communities. According to the estimates released by the World Health Organization (WHO) in 2009, approximately 80% of the causes of blindness and severely reduced visual acuity are preventable and avoidable [1]. A recent systematic study and a meta-analysis conducted by the experts' groups on this topic, have estimated that globally 36 million people were blind and 216.6 million people were with moderate or severe visual impairment [2].

In the southern region of Benin, a study conducted in 2013 on the causes of blindness and severe visual impairment in the *Social Promotion Center for the Blind and amblyopic people of Segbeyaya* (city of Cotonou), noted a prevalence of 87.3% [3]. However, no similar study has been carried out to date in the Northern region of Benin, where there is also a social promotion center for the Blind and partially sighted people. This justifies our decision to carry out this study; the general objective is to identify the causes of avoidable blindness in Parakou.

Patients and Method

The present research work was carried out in the *Social Promotion Center for the Blind and amblyopic people of Parakou*. It was a cross-sectional and descriptive study based on prospective gathering of data; it was carried out over a time period of one (01) month, running from March 28th to April 28th, 2017. The study included all the subjects with blindness, whatever their age, who were present in the center during the time period of research.

The primary outcome analyzed is the causes of blindness. The secondary outcomes are named as follows:

- Sociodemographic features (age, sex and educational status)
- Clinical features (complaints, past medical history, visual acuity, type of eye disorders, laterality of eye disorder and anatomical localization).

The subjects considered as with blindness were all those

who met the criteria of categories 3, 4 and 5 of the classification of visual impairments from WHO.

- Category 3: Corrected binocular visual acuity less than 1/20 and higher or equal to 1/50. In practice, the subject counts fingers at one meter distance but cannot do it at three meters.
- Category 4: Corrected binocular visual acuity less than 1/50 but with light perception protected. In practice, the subject does not count fingers at one meter or in a visual field less than 5°.
- Category 5: Absolute blindness; this corresponds to absence of light perception. A fortiori, it is characterized by an absence of the eye.

We used a survey form to collect data. All the subjects complied with:

- An interview (anamnesis)
- A comprehensive and bilateral eye examination which consist of:
 - measurement of visual acuity
 - examination of ocular adnexa and anterior chamber with slit lamp
 - measurement of intraocular pressure (IOP) with a Goldmann applanation tonometer (GAT), after performing a topical anesthesia (Oxybuprocaine 0.4%) as appropriate
 - Direct and/or indirect fundus examination with ophthalmoscope after pupil dilation by means of 0.5% tropicamide, as appropriate.

Data analysis was carried out with Software EPI INFO 7.

Findings

Frequency: Among 47 persons with visual impairment registered in the *Social Promotion Center for the Blind and partially sighted people of Parakou*, 37 were blind i.e. a prevalence of 78.72%.

Sociodemographic features: Age

Subjects' mean age was 16.54 ± 3.75 years, with extremes at 9 and 25 years. 11-16 years age group accounted for 51.35% of cases.

Sex: Male subjects accounted for 76% and female ones 24%. Male-to-female sex ratio was 3.1.

Educational status: Secondary/high school students represented the predominant group of our cohort, with a population size of 19 people i.e. 51.35%.

Clinical features

Complaints: Lacrimation and ocular pain were the main complaints made by the subjects, with 45.95% in each case. Sometimes, the subjects made simultaneously several

complaints. table 1 shows the distribution of subjects according to complaints.

Laterality of eye injury: Eye injury was bilateral in all the subjects involved in our study; there were 74 eyes affected.

Visual acuity : Among the 74 eyes affected, 68 i.e. 91.89% had no light perception. The 6 remaining eyes had unclear light perception.

Anatomical location of eye injury: As shown in table 2, the main anatomical locations observed during this study were cornea (24.32%), the entire eyeball (18.92%) and crystalline lens (16.22%) on right eye.

Etiology of blindness: The causes of blindness are indicated in table 3. The leading causes identified were bilateral congenital cataract (13.51%), bilateral bulbar phthisis (13.51%), total bilateral microphthalmia (10.81%) and congenital bilateral anophthalmia (8.11%).

Avoidable causes of blindness: Subjects suffering from blindness due to avoidable causes accounted for 40.54 % of the whole target population of the study.

As indicated in table 4, bilateral phthisis bulb accounted for 33.33% of those avoidable causes.

Discussion

Sociodemographic features

Frequency: In our study, blindness frequency was estimated at 78.72%.

Table 1: Distribution of subjects according to complaints.

	n	%
Lacrimation	17	45.95
Ocular pain	17	45.95
Headache	4	10.81
Dizziness	3	8.11
Visual impairment	2	5.41
Blurred vision up close	2	5.41
Tingling sensation	2	5.41
Photophobia	2	5.41

Table 2: Distribution of subjects according to anatomical location of eye injuries.

	Right eye		Left eye	
	n	%	n	%
Cornea	9	24.32	9	24.32
Crystalline lens	6	16.22	8	21.62
Entire eyeball	7	18.92	6	16.22
Conjunctiva	4	10.81	4	10.81
Pupil	3	8.11	3	8.11
Retina	3	8.11	3	8.11
Optic nerve	3	8.11	2	5.41
Iris	1	2.70	1	2.70
Other	1	2.70	1	2.70
Total	37	100.00	37	100.00

Table 3: Distribution of causes of blindness.

	n	%
<i>Hereditary and congenital causes</i>		
Bilateral congenital cataract	5	13.51
Extreme bilateral microphthalmia	4	10.81
Bilateral congenital anophthalmia	3	8.11
Bilateral congenital aphakia	2	5.40
Bilateral congenital sclerocornea	2	5.41
Hereditary maculopathy	2	5.41
Bilateral pigmentary retinopathy	2	5.41
Bilateral congenital glaucoma	1	2.70
Severe juvenile glaucoma	1	2.70
<i>Acquired causes</i>		
Bilateral phthisis bulb	5	13.51
Total corneal opacity	2	5.41
Total bilateral optic atrophy	2	5.41
Post uveitis cataract	2	5.41
Seclusion of the pupil	2	5.41
Anterior staphyloma	1	2.70
Total retinal detachment	1	2.70
Total	37	100

Table 4: Distribution of avoidable causes of blindness.

	n	%
Bilateral phthisis bulbi	5	33.33
Post uveitis cataract	2	13.33
Total corneal opacity	2	13.33
Total bilateral optic atrophy	2	13.33
Seclusion of the pupil	2	13.33
Anterior staphyloma	1	6.68
Total retinal detachment	1	6.67
Total	15	100.00

Tchabi and et al. [3], in 2013 in Cotonou (Benin) as well as Domngang and et al. [4], in Cameroon in 2010 had noted results higher than ours i.e. respectively 87.3% and 87.5%.

By contrast, other authors had found significantly lower frequencies. For instance, Guruprasad and et al. [5], in India in 2013, Jian-Yan and et al. [6], in China in 2017, Suman and et al. [7], in Nepal in 2011, Omgbwa and et al. [8], in Cameroon in 2009, Adeoti and et al. [9], in Nigeria in 2004 had respectively noted 3.9%, 1.1%, 0.43%, 0.9% and 1.18%.

This high frequency of blindness noted in our research work may be due to the fact that the study was carried out in a rehabilitation center established for visually impaired persons. This reflects delay in early screening of eye diseases in our urban and rural areas.

Age: The subjects' mean age was estimated at 16.54± 3.75 years. This result is lower than those found by Tchabi and et al. [3] in Benin in 2013 and Domngang and et al. [4], in Cameroon in 2010; they respectively got 22.2 ± 3 years and 21.6±10.5 years as mean age.

By contrast, in 2007 in Lebanon, Waked and et al. [10], got a mean age estimated at 77.74 year; this is due to the fact that their study had been carried in nursing homes on elderly people.

Sex: Male subjects were predominant with 76%. The same observation has been made by Tchabi and et al. [3], who found 74.5% in Benin in 2013.

By contrast, Saw and et al. [11], in Indonesia in 2003 and Omgbwa and et al. [12], in Mali in 2005 have reported female predominance with sex ratios estimated respectively at 0.87 and 1.15. The discrepancy existing between those findings may be explained by the sociodemographic disparities between the different target populations involved in these studies.

Clinical features

Complaints: In our cohort, lacrimation and ocular pain were the main complaints reported by the subjects, with 45.95% for each case.

Indeed, vision loss may be followed by other symptoms affecting eye such as ocular pain, lacrimation, photophobia and ocular pruritus. Concerning the reduced visual acuity, it is a logical complaint in a person with visual impairment. For instance, in Cameroon in 2009, Omgbwa and et al. [8], had reported a decreased visual acuity as main complaint in 34.8% of cases. All the same, in 2013 in Benin, Tchabi and et al. [3], found 81.8% in the case of blindness. The low rate of reduced visual acuity found out in our study is probably related to the fact that subjects do not complain about it anymore; but it is an integral part of their pathology.

Laterality of eye injury: All the subjects involved in this study had a bilateral injury.

This rate is comparable with the one of Tchabi and et al. [3], who had also found out 100% of bilateral injury in 2014 in Benin.

By contrast, significantly lower rates of bilaterality were reported by some authors. For example, Balo and et al. [13], in Togo in 2000, Traoré and et al. [14], in Mali in 2006 and Eballé and et al. [15], in Cameroon in 2008, respectively found out 2.47%, 5.8% and 34%. The 100% of bilaterality observed in our study are due to the fact that this research work was conducted in a center specially established for the blind and partially sighted people in Benin.

Visual acuity: In our cohort, 91.89% of eyes suffered from absence of light perception. Therefore, they were predominant. In 2013, in Benin Tchabi and et al. [3], had reported a rate less than 69.8%. This difference between results would be associated with the fact that our study was limited to subjects with blindness, whereas Tchabi and et al. [3], also took into account severely reduced visual acuity. This high rate of absence of light perception reflects the severity of visual impairment in facilities established for visual impairment care services.

Anatomical location of eye injury: The anatomical location most affected was cornea, with 24.32% for each eye.

In 2010 in Cameroon, Domngang and et al. [4], had also reported cornea (32.1% for each eye) as the main anatomical location affected.

Concerning Bella and et al. [16], they found in 2010 in Cameroon a predominance of crystalline lens impairment estimated at 27.3 %.

Etiology of blindness: The main causes of blindness were bilateral congenital cataract, bilateral phthisis bulb and total bilateral microphthalmia with respective rates estimated at 13.51%, 13.51% and 10.81%. Tchabi and et al. [3], had found out in 2013 in Cotonou 16.4% of congenital cataract among the causes of blindness; this rate is relatively similar to 13.51% found out in our study. This means that in Benin as well, congenital cataract would be the main cause of visual impairment.

Zaouali and et al. [17], had reported a higher rate at 26% in 2009 in Tunisia. This would probably be due to the fact that the research work had been carried out specifically in a pediatric unit whereas ours was centered on all age groups.

Anyway, according to the WHO, congenital cataract is still the leading cause of vision impairments in all the areas of the world [18].

Concerning total bilateral microphthalmia, the 10.81% rate registered is close to 13% found out by Bulgan and et al. [19]. Absence of effective prevention of infections in newborns and lack of antenatal care among pregnant women may explain the high frequency of eyeball malformation injuries which is most often due to rubella.

Avoidable causes of blindness: In our cohort, avoidable causes of blindness accounted for 40.54 % of all the causes. Some authors found broadly similar results, especially Tchabi and et al. [3], in Benin in 2013 and Sounouvou and et al. [20], in Benin in 2006; they respectively found 47.6% and 46%

By contrast, other researchers such as Dineen and et al. [21], in Pakistan in 2007, Muhit and et al. [22], in Bangladesh in 2007 and Nallassamy and et al. [23], in Botswana in 2011, found out higher rates respectively estimated at 85.5%, 69.2% and 63%. Our results are lower than those of the WHO which, according to 2010 data, indicate that 80% of the causes of vision impairments are avoidable and are dominated by refractive errors and cataract [1]. The lower rate of our results compared with those of the WHO may be due to the fact that this study was carried out in a center for visual impaired persons.

Conclusion

The prevalence of avoidable causes of blindness found in our study was estimated at 40.54%. The implementation of the "Right to Sight" global initiative of the WHO vision 2020 strategic plan has helped fight against avoidable causes of blindness. Although valuable advances have been made by health organizations and facilities, efforts still need to be made with a view to improve prevention and diagnosis of avoidable eye diseases and disorders leading to blindness through better access and quality of eye health care.

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