

Incidence of Primary Open-Angle Glaucoma at the Flamboyants Communal Medical Center of Conakry, Guinea

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Abstract

Background: Primary Open-Angle Glaucoma (POAG) is a chronic, progressive optic neuropathy of multifactorial origin defined by alterations in the visual field, progressive loss of optic nerve fibers and ganglion cells, and an open iridocorneal angle in gonioscopy. It is the world's leading cause of irreversible blindness. There is no epidemiological study in Guinea that allows us to locate the real level of the problem. The objective of this study is to determine the hospital incidence of POAG at the Centre Médical Communal (CMC) in the Flamboyants. **Patients and Method:** This was a descriptive cross-sectional study with a prospective collection for one year, from April 1, 2020 to March 31, 2021, in patients aged at least 40 years, received in consultation at the CMC in the Flamboyants. The diagnostic criterion for a new case of glaucoma was the presence in a patient of the following two signs: (excavation of the optical disc $C/D \geq 0.5$ and alteration of the visual field) with an open angle at least stage 4 of the Shaffer and Etienne classification associated or not with ocular hypertension and having never received anti glaucoma treatment. We described variables related to sociodemographic characteristics, visual acuity, intraocular pressures, papillary excavations, and visual field surveys. Informed consent from patients was sought and obtained. The confidentiality of the files was guaranteed. **Results:** 68 new cases of POAG were diagnosed out of 3220 consultations, an incidence rate of 2.11%. The average age was 58.2 years (10.64 with a male predominance of 63.23%. A family history of glaucoma was present in 11.36% of cases. Visual acuity was poor $< 1/10$ in 79 eyes/136, average between $1/10$ and $3/10$ in 11 eyes/136, and good $\geq 3/10$ in 46 eyes/136. The

mean intraocular pressure (IOP) was 26.5 mm Hg in the right eye and 25.9 mm Hg in the left eye with extremes of 18 and 38 mm Hg. The cup/disk ratio was above 0.5 in 97.1% at OD and 95.58% at OG. The visual field was impaired in all patients. **Conclusion:** This study has shown us that POAG in our environment is relatively common, early onset, and rapidly evolving. The implementation of a rapid and reliable screening strategy by the Eye Health Program will make it possible to manage glaucoma from the earliest stages.

Keywords

Primary Glaucoma, Open-Angle, Incidence, Conakry, Guinea

1. Background

Primary Open-Angle Glaucoma (POAG) is a chronic, progressive, multifactorial optic neuropathy [1]. It is characterized by an acquired degeneration on optical fibers. Such a loss develops while the iridocorneal angle is wide, with abnormalities characteristic of the visual field and generally high intraocular pressure. This neuropathy is manifested by excavation and atrophy of the head of the optic nerve [1]. It is the 2nd leading cause of blindness worldwide after cataracts and the leading cause of irreversible blindness whose main risk factor is ocular hypertension [2]. The POAG is the most common glaucoma since it represents 50 to 70% of all glaucoma depending on the region and diagnostic criteria and is believed to be the cause of 6.4 million cases of blindness worldwide [2]. The prevalence of POAG varies by race. It is relatively low in a European-type population of the order of 1% of people over 40 years of age, and is higher in blacks where glaucoma is earlier, more severe, and also more difficult to treat [3] [4]. In Africa, some studies have been carried out on the epidemiology of POAG, including the one carried out in Benin by Yehouessi L *et al.* [5] in 2009, and in Mali by Sidibé M *et al.* [6] in 2017, which found a prevalence of 5.5% and 5.68% respectively. In Cameroon, studies conducted by Ellong A *et al.* [7] and Moukouri E and Moli M C [8] found a prevalence of POAG of 4.3% and 1.67% respectively. There are very little data on the incidence of blindness due to glaucoma. The study by Leske M C *et al.* [9] of the incidence of open-angle glaucoma in Black populations in Barbados found variable incidence rates ranging from 1.2% among those aged 40 to 49 to 4.2% among those aged 70 and older, tending to be higher in males than females (2.7% versus 1.9%). The increasing number of new cases of glaucoma detected in recent years at the communal medical center motivated the present study. The purpose of this work was to determine the hospital incidence of POAG at the communal medical center (CMC) the Flamboyants and to describe sociodemographic and clinical characteristics.

2. Patients and Method

This was a prospective study over a period of one year, from April 1, 2020 to

March 31, 2021, carried out at the communal medical center (CMC) Les Flamboyants in the commune of Ratoma in Conakry. We included in this study all patients aged at least 40 years, whose discovery of POAG was made for the first time. We conducted an interview specifying sociodemographic characteristics, and personal and family history before determining visual acuity in all patients using the Monoyer and Snellen optotype scale, placed at 5 m. The patients were installed with the slit lamp for the examination of the anterior segment, the measurement of the IOP of each eye at the Goldman's applanation tonometer after instillation of fluorescein, and oxybuprocaine (Novesine®) and the fundus. Pachymetry was not performed due to a lack of apparatus. Gonioscopy and examination of the optical disc were performed with Goldmann's three-mirror glass. We used Shaffer and Etienne's classification to assess the degree of openness of the iridocorneal angle (see **Table 1**).

Stages 4 and 5 were retained as the open angles. To measure the vertical C/D ratio, we used Goldmann's three-mirror glass to identify the edge of the papilla, the edge of the excavation, and the neuroretinal ring after tropicamide pupillary dilation. We appreciated the thickness of the neuroretinal ring if it obeyed the Lower > Upper > Nasal rule > Temporal (the ISNT rule). Other abnormalities of the posterior pole were noted. Visual field readings were recorded by the Humphrey Monitor. The diagnostic criterion for a new case of glaucoma was the presence in a patient of the following two signs: (excavation of the optical disc C/D \geq 0.5 and alteration of the visual field) with an open angle at least stage 4 of the Shaffer and Etienne classification associated or not with ocular hypertonia and having never received anti glaucoma treatment. We excluded all patients under 40 years of age and patients who had previously received anti-glaucoma therapy. The sample was large, including all patients meeting the inclusion criteria and seen during our study period. We described the variables by sociodemographic characteristics, visual acuity at reception, intraocular pressures, papillae examination and visual field readings. Informed consent from patients was sought and obtained. The confidentiality of the files was guaranteed. The data entry was done on EPI-Info version 7 and the analysis using the Stata software. The tables were made on Excel 2010. Pearson's Chi² test or Fisher's test was used for the comparison of proportions.

Table 1. Classification of Shaffer and Etienne according to the degree of opening of the iridocorneal angle.

Stage 1	Closed angle	0°	No visible structure
Stage 2	Probable closure	0° - 10°	Visible Schwalbe ring
Stage 3	Possible closure	10° - 20°	Scleral spur not visible
Stage 4	Unable to close	20° - 35°	Clearly visible spur
Stage 5	Open	35° - 45°	All structures are clearly visible up to the ciliary band

3. Results

Among the 3220 patients aged 40 and over who came to the CMC the Flamboyants during our study period, 68 new cases of POAG were diagnosed, an incidence rate of 2.11%. The majority of patients were male (63.24%) with a sex ratio of 1.71 (Figure 1). The average age was 58.2 years (10.64 with extremes ranging from 40 to 86 years. The 50 - 69 age groups were the most represented (Table 2). A family history of glaucoma was found in 11.36% of patients (Figure 2). Visual acuity during screening was poor < 1/10 in 39 right eyes (OD) and 40 left eyes (OG), average between 1/10 and 3/10 in 5 eyes (OD) and 6 eyes (OG) and good \geq 3/10 in 24 OD eyes and 22 OG eyes (Table 3). The mean intraocular pressure (IOP) was 26.5 mm Hg in the right eye and 25.9 mm Hg in the left eye with extremes of 18 and 38 mm Hg (Table 4). The cup/disk ratio was above 0.5 in 97.1% at OD and 95.58% at OG (Table 5). The visual field was impaired in all patients (Table 6). All patients diagnosed with POAG, received drug treatment

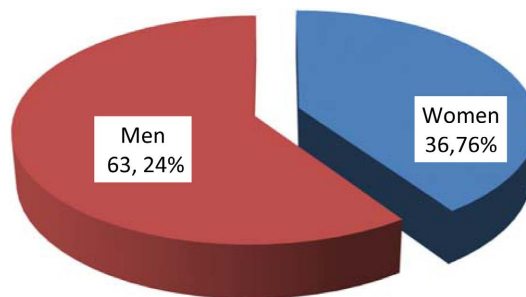


Figure 1. Distribution of patients by sex.

Table 2. Distribution of patients by age group.

Age range (year)	Effectif	Pourcentage (%)
40 - 49	14	20.6
50 - 59	21	30.9
60 - 69	21	30.9
70 - 79	9	13.2
80 - 89	3	4.4
In all	68	100

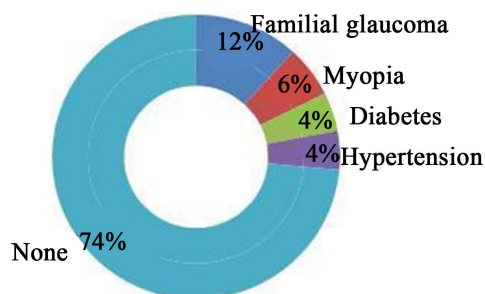


Figure 2. Distribution of patients by history.

Table 3. Distribution of the eyes according to visual acuity (VA) at reception.

VA	Right Eye (RE)		Left Eye (LE)	
	Number	%	Number	%
<1/10	39	57.35	40	58.80
1/10 < AV < 3/10	5	7.35	6	8.80
≥3/10	24	35.30	22	32.40
In all	68	100	68	100

Table 4. Distribution of eyes by intraocular pressure (IOP) at reception.

IOP	Right Eye (RE)		Left Eye (LE)	
	Number	%	Number	%
≤21	16	23.53	14	20.59
≥22	52	76.47	54	79.41
In all	68	100.00	68	100.00

Table 5. Distribution of eyes by degree of papillae excavation during screening.

Degree of excavation of the papillae (C/D)	Right Eye (RE)		Left Eye (LE)	
	Number	%	Number	%
<0.5	2	2.9	3	4.4
0.5 ≤ C/D < 0.8	34	50.0	28	41.2
≥0.8	32	47.1	37	54.4
In all	68	100.0	68	100.0

Table 6. Visual field results of the 136 eyes (68 patients).

	Number	Percentage (%)
Arciform scotoma	18	13.2
Deficit in sectors or nasal march	27	19.9
Central or temporal island	54	39.7
Field of vision impossible to achieve	37	27.2
In all	136	100.0

based on prostaglandin analogue (Travoprost) and an interview to explain their disease and the need for lifelong treatment. Surgery (deep sclerosing) was proposed and refused by all cases. At the end of the study we lost sight of more than half of the patients.

4. Discussion

Among the 3220 consultants aged 40 and over, 68 new cases of POAG were di-

agnosed, an incidence rate of 2.11%. This was essentially a hospitable population and therefore the results cannot be extrapolated to the entire Guinean population. However, the geographical location of the CMC the Flamboyants, which covers one of the major municipalities of the capital, gives our sample a representative hospital character. The organization of a survey at the level of all ophthalmology departments in the country could determine the national hospital incidence rate. Our rate is comparable to that found by Leske M C *et al.* [9] in melanoderms in Barbados, which report incidence rates from 1.2% in those aged 40 to 49 to 4.2% in those aged 70 and older. On the other hand, our incidence rate is higher than those reported by Leske M C *et al.* [10] in Barbados Eye Study including 3222 subjects with a nine-year follow-up who estimated the incidence of POAG at 4.4%, or 0.49% per year who have in addition to papilla examination and automated visual field readings, had taken photographs of the papillae. For Latinos, the incidence found in the Los Angeles Latino Eye Study of Jiang X *et al.* [11] was equal to 2.3% for a 4-year follow-up, which corresponds to an incidence of 0.5% per year. The number of new cases in our study could be higher if cases of ocular hypertonia with media disorder could have benefited from fundus biomicroscopy and visual field readings. Our results therefore only partially reflect the importance of POAG at the CMC the Flamboyants where there are almost no patients who come to the systematic glaucoma screening consultation as is the case in developed countries. With regard to sociodemographic characteristics, most epidemiological studies on POAG confirm the increase in the incidence of glaucoma with age [4] [5] [6] [7] [8] [9]. Quigley H A and Vitale S [12] proposed an incidence of primary open-angle glaucoma for blacks from 263 per 100,000 at age 55 to 541 per 100,000 at age 75. Our study confirms this data, in fact, it increases in our series from 20.6% to 30.9% for the respective age groups from 40 to 49 years, 50 to 59 years and 60 to 69 years with an average age of 58.2 years. Data from the literature are contradictory on the frequency of glaucoma by sex. Some studies have found a higher frequency of male sex [13] [14] [15] as was our case (63.24% with a sex ratio of 1.66) and other publications have found an increase in the prevalence of CAPG for the female sex [6] [16] [17]. The meta-analysis published by Rudnicka *et al.* [18] shows that the prevalence of POAG is higher for males (OR: 1.37; 95% CI: 1.22 - 1.53). According to Hulsman C A *et al.* [19], the existence of protective hormonal factors in women, the involvement of different environmental factors between the two sexes and the role of cardiovascular risk factors would explain this difference. Family history of glaucoma was found in 8 patients, or 11.76% and 4 patients (5.88%) were nearsighted. The majority of patients (82.36%) had no known family history of glaucoma or a personal history of myopia. However, a number of patients had reported a notion of blindness in the family without specifying the cause. Our difficulty in finding a family history of glaucoma can be explained by the population's lack of knowledge of glaucomatous disease. The assessment of visual acuity found blindness in 39 right eyes, or 57.35%, and 40 left eyes, or 58.82%.

This high frequency of blindness shows the severity of this disease. The blindness found in more than half of the patients' eyes during screening can be explained by the fact that glaucoma occurred early, asymptomatic at the onset stage and rapidly evolving in melanoderma. This late screening trait has been reported by most African authors [5] [6] [7] [8] [17]. The delay in diagnosis could be related to the asymptomatic nature of the disease in its early stage and its insidious course where the decrease in vision occurs only at the ultimate stage. Added to this is the lack of access to eye care in our country. It is established in the literature that melanoderma patients have a higher incidence of POAG and a higher rate of blindness compared to Caucasian patients [4] [15]. Ocular hypertonia (IOP > 21 mm Hg) was found in 76.47% of the right eyes and 79.42% of the left eyes. Normotonia (IOP between 10 and 21 mm Hg) was present in 23.53% of the right eyes and 20.58% of the left eyes. Ocular hypertonia predominated slightly in the left eye with average IOP of 25.9 mmHg in the right eye and 26.5 mmHg in the left eye. More than 3/4 of the patients had high-pressure glaucoma joining the Sidibé M *et al.* studies in Mali [6] and Ellong A *et al.* in Cameroon [7]. Among the 68 cases of POAG, the average frequency of ocular hypertonia was 77.94% in our study. This same finding is reported by the majority of studies on blacks [5] [6] [7] [8] [9] [13] [14] [15]. It is important to remember that we did not perform pachymetry to determine the central thickness of the cornea in our patients which could be a bias in the assessment of intraocular pressure. Examination of the optic papilla had found a bilateral papillary excavation often asymmetrical with a vertical c/d ratio ≥ 0.8 in 32 right eyes (47.1%) and in 37 left eyes (54.41%). We did not take a picture of the papillae or analyze the papillary optical fibers, which is one of the limitations of the study. Sidibé M *et al.* [6] and Daboué A. [14] found a total papillary excavation in 63.89% and 45.5% of the eyes respectively. This confirms the late nature of the diagnosis of glaucoma. In our series, most patients were seen in the advanced stage of the disease in one or both eyes as confirmed by the results of the visual field. This is due to the lack of systematic consultations and early detection strategies in our country.

5. Conclusion

Our study, although limited by its strict hospital recruitment, showed us that POAG in our environment is relatively frequent, early onset, and rapidly evolving. Screening for this disease is essential because its progression is extremely serious toward irreversible blindness. The implementation of a rapid and reliable screening strategy by the National Eye Health Program to detect glaucoma in the early stages will promote better management of this disease. This work is only a preliminary study. It deserves to be prosecuted on the basis of a population survey.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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