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NON-GLAUCOMATOUS OPTIC NEUROPATHY IN IBADAN: EXTRAPOLATIONS TO HEALTHCARE FUNDING IN NIGERIA.

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ABSTRACT

Background: **Optic neuropathy is not a diagnosis in itself, as potential aetiologies are myriad. A pilot study conducted in the Eye Clinic, University College Hospital, Ibadan, between September 2007 and November 2009, showed that 46.8% of new cases presenting to the neuroophthalmology unit, had non-glaucomatous optic neuropathy (NGON) in which, the precise aetiology of optic neuropathy was never diagnosed.**

Methods: **All cases of NGON, seen in the neuro-ophthalmology unit, between September 2007 and June 2014 were analyzed to determine common aetiologies and identify the difficulties encountered in their investigation or management.**

Results: **There were 159 cases of NGON. The age range was 6 months to 87 years (mean 39.0, SD 21.3). Male: Female ratio was 1.2: 1, and the commonest diagnosis was optic atrophy of unknown aetiology. Challenges identified included difficulty obtaining recommended radiological and serological investigations, as well as no access to genetic studies and high loss to follow-up.**

Conclusion: **There are major constraints in the investigation of patients presenting with optic nerve disease in Ibadan, despite the prevalence of NGON as a major cause of visual disability among neuro-ophthalmic patients in this setting. Diagnostic constraints must be addressed, to facilitate neuroophthalmology patient care, within our limited resources.**

Key words: Optic atrophy, Non-glaucomatous optic neuropathy, Neuroophthalmology, Aetiology, Healthcare funding, National health insurance

INTRODUCTION

With an estimated population of 5.58 million according to 2006 official Nigerian census, the landmass of Ibadan makes it the largest city in South-Western Nigeria but the third largest metropolitan city[1]. The University College Hospital, Ibadan, is the largest teaching hospital in Nigeria, a major referral Centre, and Federal Government designated Centre of Excellence in the Neurological sciences[2]. The Eye clinic, receives a large number of walk-in patients and secondary referrals. Subspecialty consultation clinics, like the Neuroophthalmology clinic, were established in September 2007.

An unpublished review of the first 27 months in the neuroophthalmology unit revealed optic neuropathy as the commonest presentation. Though, optic neuropathy is not a diagnosis in itself, as it results from various aetiologies[3], some cases of optic neuropathy are amenable to treatment with good visual outcome[4,5]. Optic neuropathy is a significant cause of visual impairment among Nigerians[6]. A study in the Low Vision Clinic in Ibadan showed that the third commonest condition among 193 patients attending over a 3-year period was optic atrophy[7]. Retinitis pigmentosa (16%) and albinism (13.2%) especially among children, were the commonest conditions associated with optic atrophy in these cases[7]. Compressive optic neuropathy is a preventable and treatable cause of visual loss and this was identified as the commonest cause of optic atrophy in a retrospective review of 100 randomly selected cases, by Oluleye *et al.*[8]. Aetiology of optic atrophy could not be identified in 62% of patients, in the review in question[8]. On the other hand, in Port Harcourt, in a review of 99 patients with NGON, 40% of patient had optic atrophy at presentation[9]. Majority of the patients in the Port Harcourt study were presumed to have nutritional amblyopia (31.3%) or demyelinating optic neuritis (27.3%) although 41.4% were

undiagnosed[9]. Likewise, in many patients, in the neuro-ophthalmology clinic in Ibadan, determining the cause of NGON is challenging. Nevertheless, good management of such patients must involve early diagnosis and targeted therapy, where possible.

The objective of this study therefore was to determine the pattern of non-glaucomatous optic neuropathies presenting to the neuroophthalmology unit at the Eye clinic, University College Hospital, Ibadan and to perform a needs analysis to identify and recommend potential strategies for improving diagnostic patient evaluation and outcome of care.

MATERIALS AND METHODS

The study was a retrospective analysis of all patients diagnosed with NGON in the neuroophthalmology unit of the eye clinic, University College Hospital, Ibadan between September 2007 and June 2014. During this period, a total of 17,707 patients were seen at the eye clinic, of which 2,900 received neuroophthalmology consultations. Diagnosis of optic neuropathy was based on evidence of visual impairment on Snellen visual acuity, which was not improved by refraction or pinhole testing, afferent pupillary defect on pupillary examination and ophthalmoscopic finding of diffuse or sectoral optic disc pallor, cupping or swelling following posterior pole examination, by means of binocular indirect ophthalmoscopy, using a 20D double aspheric, antireflective coated lens, with a fully dilated pupil, and stereoscopic disc examination using a 78D aspheric lens at the slit lamp. Optic neuropathy was further confirmed by demonstrating more than two faults (mistakes) during testing of either eye, using the Ishihara pseudochromatic plates. Cases of glaucoma were excluded using records of the intraocular pressure measurements and central visual field analyses in the case files.

Non-glaucomatous optic neuropathy (NGON) was defined as clinical evidence of impaired optic nerve function in the absence of field or disc changes of glaucoma. Aetiological groupings were determined based on documentary evidence from case notes that identified a clear aetiology of optic nerve dysfunction from clinical examination, ancillary investigations or neuroimaging[10]. For instance, optic neuropathy was categorized as compressive when there was evidence of optic nerve compression from an orbital or intracranial lesion. Papilloedema was defined as optic neuropathy associated with disc swelling and other evidence of raised intracranial pressure.

Four hundred and forty cases of NGON were identified from the clinical registers. Of these, 159 case notes were successfully retrieved from the Records Department. Information retrieved from these case notes included: biodata, source of referral, presenting history, presenting visual acuity, clinical assessment and suspected aetiology, investigations performed, including neuroimaging and perimetry. Patients' compliance with performance of requested investigations, reasons for defaulting, management/ treatment given, visual outcome and follow-up data were also retrieved. The information was entered and analyzed in a spreadsheet (MS-Excel 2007).

RESULTS

Approximately 2,900 patients received neuroophthalmology consultations during the study period, of which 440 cases were diagnosed with NGON constituting 15.2% of all neuroophthal-mology clinic patients. A total of 159 NGON case records were reviewed.

The age range was 6 months to 87 years. The mean age was 39.0 years (SD 12.3 years). The modal age group was 41 to 50 years. There were 85 (54.4%) males and 72 (45.6%) females (M:F ratio = 1.2:1). Majority (56%) had unilateral involvement while 44% of cases, were bilateral.

The commonest presenting complaint was progressive painless deterioration of vision. The average duration of symptoms at the time of presentation was 9 months. Headache was a presenting complaint in only 3.1% of cases.

Presenting visual acuity, in the better eye, was < 6/60 in 53.6% of cases. The cause of NGON was identified in only 40.9% (74/159) of cases. Aetiology remained undetermined in 59.1% (95/159) of the cases. Figure 1 summarizes the pattern of aetiological presentation among cases of NGON.

Only 35% of patients in whom static automated perimetry of the central 30° of the visual field (CVF 30-2) was ordered, actually performed the test. Majority (90.5%) of those who performed static automated perimetry (CVF 30-2) demonstrated field defects. Confrontation test was done in patients with severely depressed fields and defects were detected in all cases. Only 10% of cases in whom neuroimaging was requested, actually performed the test. The commonest neuroimaging performed was cranial CT scan. 62.5% of cases that had neuroimaging done had detectable abnormalities. Commonest barrier to obtaining neuroimaging was high cost and most patients could not afford to repeat the test even when requested. Longest duration before CT scan requested could be done was 6 months. Some cases never had

Table 1: Table comparing key findings in recent Nigerian studies on aetiology of optic neuropathy

Authors	**Oluleye *et al*[8].**	**Pedro-Egbe *et al*[9].**	**Ogun & Adediran** *(index study)*
Study location and year	Ibadan 2005	Port Harcourt 2011	Ibadan 2014
Sample size	100	99	159
Study period	6 years	5 years	7 years
M:F	2:1	1.1:1	1.2:1
Mean age	40.8 years	40 years	39.2 years
Proportion of cases with bilateral involvement	80%	22.2%	44%
Conclusion	Aetiology of optic atrophy could not be satisfactorily elicited in 62% of cases	Aetiology was reported, undetermined, in 40%. **Note:** However, all cases of temporal pallor (~ 31%) were defined as nutritional optic neuropathy and were not specifically investigated or confirmed as such. If this is taken into account, then 71% of optic neuropathies in this study were truly undiagnosed.	Aetiology of optic neuropathy was not found in 59% of cases

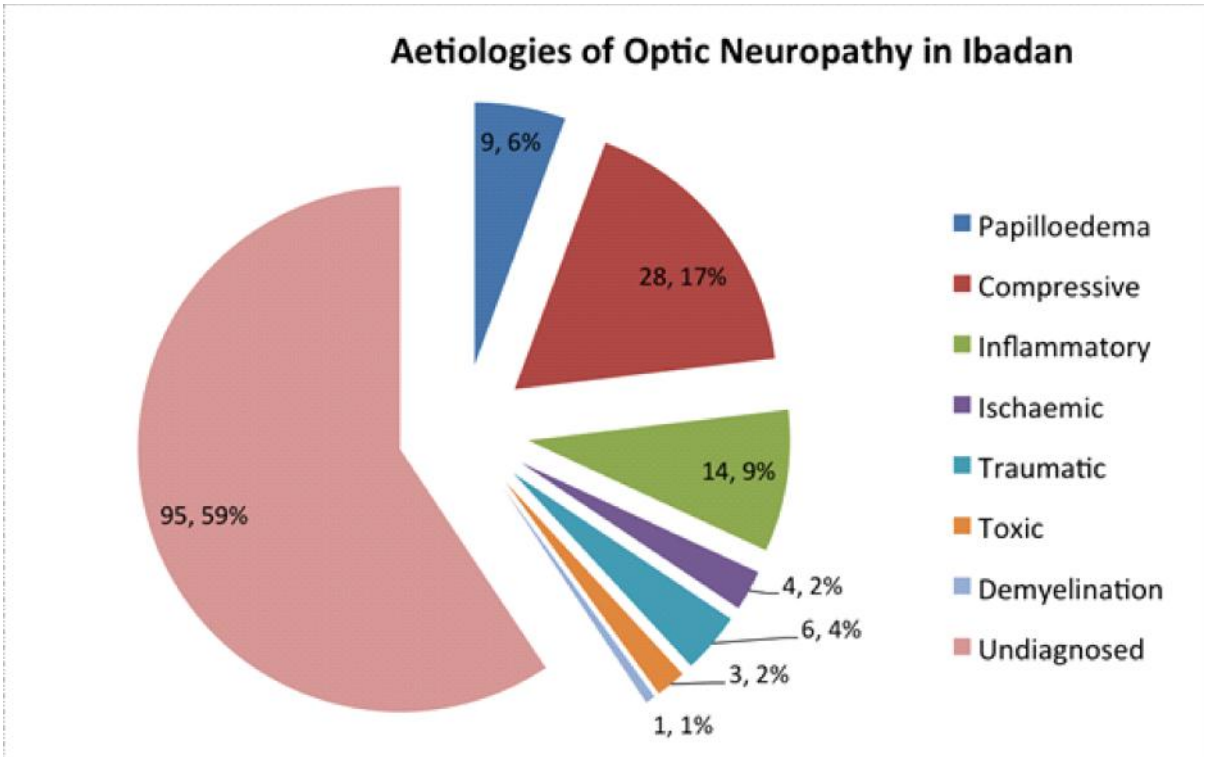

Figure 1: Pie chart showing proportions of different causes of non-glaucomatous optic neuropathy in Ibadan.

CT scan in spite of request. There was a high rate of defaulting, 92.5% were lost to follow-up; 60.4% of whom, defaulted after their second clinic visit follow-up periods ranged from 1 week to six months.

DISCUSSION

This review demonstrates that finding the cause of NGON presents a major challenge to the ophthalmologist in the Nigerian environment; aetiology in more than half of patients, remain undetermined. Of the known aetiologies, compressive optic neuropathy was the commonest cause of optic neuropathy seen. The commonest cause of compression was intracranial mass lesion in the sellar/parasellar region. Although, this may not have been truly representative of the commonest aetiology, considering the large proportion of cases with undertermined aetiology (59.1%). The burden of non-glaucomatous optic neuropathy in Nigeria is high, reaching a prevalence of 3.7% among patients with VA <3/60[6]. Furthermore, optic atrophy was found in almost 1 in 4 patients (11.9%) among children attending the Low vision clinic of UCH in a 3-year period.[7] Though the causes of optic atrophy were not stated in both studies, it is evident that infectious disorders like onchocerciasis, which was a major cause of optic neuropathy about 30 years ago, no longer feature prominently.[6, 11] Recent studies point to the increasing significance of neuroophthalmic disorders such as cranio-orbital tumours[8], optic neuritis[9], cerebral palsy[12] and hydrocephalus[13] as common aetiologies seen in the hospital setting. It is not certain, however, whether disorders like nutritional amblyopia still abound.[11, 14] Comparing the observations in this study to two similar studies done in recent times[8, 9], this study comprises the largest review to date, of cases of NGON in Nigeria as shown in Table 1. Furthermore, comparisons in table 1, highlight differences in the study date, duration, patient demographics and the conclusions drawn from each of the studies. The common challenges encountered in the management of patients include: late presentation with severe visual disability, unreliable patient history, high cost or lack of diagnostic/ancillary investigations (e.g. serology, electrophysiology, genetic) thereby forcing ophthalmologists to perform selective testing either based on ease of accessibility, patient's convenience or patient's willingness to pay for their tests. Patient's must pay out of pocket for all drugs and investigations and are often unwilling to pay for an expensive test that does not guarantee visual recovery, even if it adds to knowledge or the elucidation of their condition. In the absence of institutional support for costly testing such as waivers, rebates and other concessions, patient compliance is poor.

Occasionally, detailed explanation and counseling may encourage the patient to comply with recommended testing however, there is a subtle conflict of interest when one is aware of the opportunity cost to the patient, and their financial circumstances. Patient loss to follow-up remains high as a result of multiple factors, chief of which remains financial constraint. A constant feature in many of the case notes was a reference to financial incapacity as a cause of delay or non-compliance. This has been identified as a major constraint in the management of many ophthalmic conditions.[15,16] It is also possible that lack of appropriate rehabilitation facilities for specific visual needs, as well as, superstitious belief in alternative therapy are other factors that may complicate patient management in Ibadan. Patients in our environment, frequently report that they had sought spiritual or local traditional healing before, during or after seeking medical consultation.[17, 18] Some of these alternative therapies are costlier than orthodox medical care but are adhered to by the patients because of the superfluous promises of healing and the acknowledgement of the patient's religious or cultural ideals. A recent study in a tuberculosis (TB) control programme, in Enugu, showed that 217/221 patients, consulted between 1-6 alternative sources, before presenting to a designated TB treatment clinic[17]. The first alternative source of consultation was a chemist or herbalist. In that study, patients spent up to US$911 and a median of US$25 on alternative therapies[17] Persistence of symptoms was the main reason why patients abandoned alternative therapies[17]. In another study, patients with mental illness experienced a delay of up to 4.5 years before presenting to the specialist (psychiatrist) while seeking alternative therapy.[18]

In this study, it was found that patients delayed for an average of 9 months before presenting with symptoms to the neuroophthalmology clinic. In many cases, they had either ignored the symptoms until they became unbearable or attributed the visual symptoms to a "need for spectacles". Many patients changed spectacles several times before seeking medical consultation. Spectacles were often obtained from roadside opticians and occasionally from optometrists. However, the majority of patient referrals were from physicians. It is noteworthy that patients often sought non-medical consultation for their health problems. Most patients had exhausted their material resources before presenting to the hospital; thereby experiencing severe constraints with their management as they faced high cost of virtually all health services. Individual expenditure on healthcare in Nigeria is composed mainly of out-of pocket-spending (OOPS) which has been shown to be as high as 98.8% in many households.[19] The average cost of healthcare is

estimated at about ₦2219 per household per month[19] with the highest burden of health expenditure falling on the poorest individuals. Majority of impoverished Nigerians have traditionally relied on the government hospitals for subsidized healthcare but the removal of government subsidy on healthcare over the years has led to steadily rising cost of healthcare delivery to the individual. While it is impossible to expect healthcare to be provided free of charge in the face of current global practices in the healthcare system; there should be a system in place to provide short-term support for unexpected exponential demands that may result from the need to obtain costly investigations such as neuroimaging. The NHIS does not currently pay for neuroimaging. There is a need for the National Health Insurance Scheme to be restructured to accommodate this reality otherwise there will continue to be an increase in avoidable deaths and debility which will ultimately increase the burden on the healthcare system locking it in a vicious cycle. In addition, appropriate basic health education must be communicated to the populace to ensure prompt reporting of health complaints to appropriate and skilled health personnel and institutions to avoid unnecessary delays and out of pocket spending. Finally, the referral structure within the healthcare system must be established and strengthened to promote prompt and appropriate referrals.

CONCLUSION AND RECOMMENDATIONS

In conclusion, aetiology of NGON remains undetermined in >50% of patients in Ibadan. Most patients present late, with severe visual impairment, and face significant financial constraints hampering investigation, diagnosis, management and follow up. Adequate facilities for the investigation of NGON are needed, to facilitate the diagnosis of treatable causes such as nutritional optic neuropathy, and to preempt avoidable conditions such as ethambutol toxicity. In addition, a review of the National Health Insurance Scheme is recommended, to incorporate support for the investigation and diagnosis of major debilitating diseases with potentially treatable outcomes, such as diabetes and hypertension. This is because financial incapacity often introduces delays in diagnosis, intervention and treatment compliance, leading to an ultimately poor outcome and a vicious cycle of distrust, delay, disappointment, and disenfranchisement of the average Nigerian; who can not afford private insurance. Furthermore, NHIS should provide cover for neurological conditions, which are potentially curable but carry a heavy financial burden, too heavy for average individuals or families to bear; such as non-malignant brain tumours. With a cost-sharing mechanism in place, patients are enabled to present early and receive adequate care, with good outcome.

LIMITATIONS

The main limitation of this study was the difficulty encountered with retrieval of patient records, high attrition rate and failure of patients to complete recommended investigations (as described above). Complete records of only 36.1% of cases were found.

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