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Original Article

Frequency of Isolated Optic Neuritis in Cases of Visual Impairment

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ABSTRACT

Visual impairment can result from various conditions of eye as well as neural pathways that are responsible to transmit visual inputs to the brain. One of the most common of these diseases is termed as optic neuritis which is basically an inflammatory disorder and effects the optic nerve. **Objective:** To find the frequency of the isolated optic neuritis among subjects with visual impairment. **Method:** We conducted an analytical cross-sectional study in the Department of Neurology at the Mayo Hospital. Total 93 subjects fulfilling the inclusion criteria were taken into the study for data collection. All cases underwent visual acuity assessment using Snellen's and near vision charts. Ishihara chart was used to assess color vision along with a fundoscopic examination. Isolated optic neuritis was defined as the presence of one or more of three defects on assessment, i.e., relative afferent pupillary, visual field, and the color vision defect. **Results:** The mean age of patients was 45.45 ± 14.42 years. There were 53.8% male and 46.2% female cases, with a higher male-to-female ratio. Isolated optic neuritis was diagnosed in 24.7% of cases of vision impairment. **Conclusions:** Isolated optic neuritis was diagnosed in almost one-quarter of the patients (24.7%). So, patients presenting with visual impairment must be screened for isolated optic neuritis as optic neuritis is easily distinguished from other diseases affecting the optic nerve by using Snellen's chart and near vision chart and fundoscopic examination and eventually can prevent permanent blindness.

INTRODUCTION

Visual impairment is a frequently encountered issue in the neurology outpatient department [1]. Visual impairment, eventually leading to permanent blindness, is a serious global public health problem and its prevalence is escalated due to shifting demographics and ageing populations [2, 3]. Globally, the prevalence of moderate to severe near as well as far vision loss was reported as approximately 295 million, and among 258 million mild visual loss was found [4]. In at least half of these cases, vision impairment is preventable, and most visually impaired people belong to developing countries [2]. Visual impairment can occur due to either local eye conditions or disorders of neural pathways carrying signals from the eye to the brain [5]. These conditions include cataract, occlusion of retinal artery and retinal vein, glaucoma, macular degeneration in relation to age factor, nutritional deficiencies, diabetic retinopathy, optic neuropathy, and optic neuritis [4]. The site of involvement and the underlying cause is mainly responsible for various clinical presentations (like mild or moderate impairment and complete blindness) and visual impairment [5]. Symptoms of vision impairment can include blurred vision, decreased color perception, loss of visual fields, and pain that is worsened by eye movement in almost all cases [6]. One

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such inflammatory condition directly related to optic nerve is acute optic neuritis that further poses worse health consequences and complications [7-9]. Most typically, this disorder further aggravates the risk of neurological conditions including the multiple sclerosis (MS) [8, 10]. Optic neuritis presents in approximately 15-20% of cases of MS and manifests in 50% of the cases at some point during their disease [11]. Atypical optic neuritis can be associated with complications due to its inflammatory nature and makes diagnosis a bit tricky as all factors have to be considered well [8, 12]. Dramatic advancements in technology and immunology made it possible to understand the pathology and progress of the disease better especially in the last decade. Doctors can now efficiently examine the structure and function of the optic nerve in the course of inflammatory injury, promptly recognize autoimmune foci relevant to disease, and provide appropriate treatment to ameliorate vision outcomes. In its clinical presentation, Optic neuritis usually is seen in single eye merely. But in around 10% subjects, it can occur in both eyes [13]. Vision loss usually occurs over hours to days, rising to peak within one to two weeks [11]. In Optic Neuritis Treatment Trial (ONTT), more than 90% of cases reported a remarkable decline in central visual acuity [14]. A study reported that the frequency of isolated optic neuritis was found in 19% of cases of neurogenic vision loss in neighboring countries [5]. Functional vision is restored within one year in most optic neuritis patients. However, most patients present deficits in color vision, contrast sensitivity, stereo acuity, and light brightness on testing for up to two years [11]. Aim of this study was to see the frequency of the isolated optic neuritis in cases of visual impairment in the Pakistani population, as no local study has been done so far. Also, there is either lack of awareness or under-diagnosis of optic neuritis, resulting in delayed diagnosis and management, often leading to permanent disability. Global data is also not widely published, and an amiable study reported a high percentage of isolated optic neuritis in vision impairment [5]. Epidemiology of vision loss is constantly increasing, and most of these cases remain undiagnosed for isolated optic neuritis. Evaluating patients with neuro-ophthalmic symptoms can help design appropriate diagnostic and therapeutic strategies in the future.

METHODS

We conducted an analytical cross-sectional study in Neurology department of Mayo Hospital. The sampling technique used to collect data was non-probability consecutive from 93 cases estimated using a percentage of isolated optic neuritis as 19% in cases of vision loss. [5] 8% margin of error (absolute precision) and 95% confidence level were used. Patients aged 15-70 years of either gender who had acute (develop over several minutes to hours), sub-acute, or chronic (few days to weeks or months) visual impairments were included in the study. Patients with all other local ophthalmological causes as well as neurological causes, such as glaucoma, cataract, occlusion of retinal artery or vein occlusion, optic neuropathic, neuromyelitis optical spectrum, malnutrition and multiple sclerosis contributing to visual impairment, were all put in exclusion. After taking informed consent, all cases underwent visual acuity assessment using Snellen's and Near vision charts. Fundoscopy was used for examination and Ishihara chart was used for checking the color vision by a consultant ophthalmologist conducted a reassessment to confirm the diagnosis. Isolated optic neuritis was defined as the presence of one or more of three defects on assessment, i.e., afferent pupillary, color vision and visual field defect. For quantitative data, mean ± standard deviation was used, whereas for qualitative variables, frequency (percentages) was used. Data were stratified for age, gender, visual acuity and duration of visual loss (Acute, sub-acute, chronic). Post-stratification Chi-square test was applied by considering p-value<0.05 as significant.

RESULTS

The average age of 93 patients was 45.45 ± 14.42 years (Range= 55 years). Overall, there were 50(53.8%) male and 43(46.2%) female cases, with higher male-to-female ratio. The average disease duration was 9.04 ± 5.33 weeks, with minimum and maximum duration of 1 and 20 weeks. The baseline characteristics of study respondents are given in table 1.

Table 1: Baseline characteristics of study respondents (N=93)

Parameters		N (%)
Age* (years)		45.45 ± 14.42
Gender	Male	50(53.8)
	Female	43(46.2)
Duration of disease* (weeks)		9.04 ± 5.33

n=Number of Participants; %=Percentage of Participants; *=Continuous data reported as mean ± standard deviation

Isolated optic neuritis was found in 23(24.7%) cases of visual impairment (Figure I).

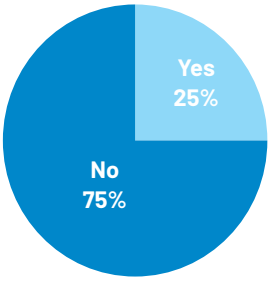

Figure 1: Distribution of Isolated Optic Neuritis

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When data were stratified for age, gender, and visual acuity, the frequency of isolated optic neuritis was statistically the same in each stratum (p>0.05). upon stratification of data with respect to the severity as well as disease duration, the frequency of isolated optic neuritis was statistically significant in cases with duration ≥ 4 weeks (p = 0.032) and in cases having sub-acute and chronic visual loss (p = 0.032) (Table 2).

Table 2: Comparison of isolated optic neuritis for age groups, gender, duration of disease, visual loss, and visual acuity

Parameters		Isolated Optic Neuritis		p-Value*
		Yes	No	
Age Groups (Years)	15-40	5(16.1%)	26(83.9%)	0.174
	41-70	18(29.0%)	44(71.0%)	
Gender	Male	15(30.0%)	35(70.0%)	0.204
	Female	8(18.6%)	35(81.4%)	
Duration of disease (weeks)	≤ 1	5(35.7%)	9(64.3%)	0.032
	4-8	10(40.0%)	15(60.0%)	
	>8	8(14.8%)	46(85.2%)	
Visual loss	Acute	5(35.7%)	9(64.3%)	0.032
	Sub-acute	10(40.0%)	15(60.0%)	
	Chronic	8(14.8%)	46(85.2%)	
Visual Acuity a	6/18	11(21.6%)	40(78.4%)	0.436
	Worse	12(28.6%)	30(71.4%)	

*Chi-square test was used to calculate the result, and a p-value <0.05 was taken as significant

DISCUSSION

Vision is a natural blessing, imperative for proper functioning of human being. Hence, its loss impairs normal daily activities and put a drastic effect on quality of life of patients, overall socio-demographic dynamics, and health burden. As stated in a Global Burden of Disease (GBD) study in 2015, among all-ages risk factors of Years Lived with Disability (YLDs), sensory organ loss, which inevitably includes vision loss/ blindness came just after neck and back pain holding second position and even before the depressive symptom [15]. Whereas, among patients above the age of 65 years, it topped the list [16]. All recent studies conducted globally, including up to date systematic reviews and meta- analysis have reported that a significant number of patient is affected with visual impairment that includes up to 32.4 million persons who are reported in 2010 as complete blind (< 3/ 60), as well as 191million persons having moderate-severe vision loss [17]. The incidence of acute optic neuritis has been reported as almost 1 – 5 in 100,000 persons per annum among otherwise healthy population [18]. When studied for risk factors, under correction of the refractive errors and cataracts topped the list while other reasons such as macular degeneration, glaucoma, isolated optic neuritis, and diabetic retinopathy constituted in 25% of all risk factors [19]. Typical optic neuritis has a very severe prognosis, is acute in nature and has difficulty in making diagnosis because of its complicated properties. Most of the times, it happens due to a reaction against the optic nerve and may aggravate into other issues such as multiple sclerosis [20]. Optic neuritis is more prevalent at the young age group (15-45 years) [20, 21]. The average age in this study was found as 45.45 ± 14.42 years, as correlated with the previous literature. Optic neuritis is found to be more prevalent in females than males by a ratio of 3:1 to 4:1 [11, 18]. But in the present study, there were 50(53.8%) male and 43(46.2%) female cases, with a higher male-to-female ratio. This could be due to the small sample size and can be overcome by increasing the sample size. Central visual loss has been reported in almost 90% patients having optic neuritis [21]. A prospective cohort study was conducted that focused on properties and outcomes among a number of visual disorders on 64 persons having optic neurogenic issues. These patients were followed up for 6 months. Study reported that 40 and 10 persons showed problem due to the anterior visual pathways and cortical loss. Out of 64 patients, 12(19%) had isolated optic neuritis as a cause of vision impairment; this frequency is lower than the reported frequency in the current study. Many of them had severe intensity of visual problems [5]. While another study showed that among all patients with neurological diseases, the optic neuritis constituted for 43% [22]. The current study diagnosed isolated optic neuritis in 23(24.7%) and 70(75.3%) cases. Isolated optic neuritis was not found.

CONCLUSIONS

Isolated optic neuritis was diagnosed in almost one-quarter of the patients (24.7%). So, patients presenting with visual impairment must be screened for isolated optic neuritis as optic neuritis is easily distinguished from other diseases affecting the optic nerve by using Snellen's chart and near vision chart and fundoscopic examination and eventually can prevent permanent blindness.

Conflicts of Interest

The authors declare no conflict of interest.

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