

A Study on Etiological Pattern of 3rd, 4th, and 6th Ocular Motor Nerve Palsies – Hospital Based Study

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Abstract:

Background: It is crucial to conduct a thorough clinical examination together with supportive supplementary studies in order to determine the cause of ocular motor nerve palsies. With this background, the present study was carried out on the etiological pattern of 3rd, 4th, and 6th ocular motor nerve palsies.

Methods: This was a hospital-based, prospective, observational study conducted with 40 patients over a period of 18 months. Data regarding the disease and sociodemographic characteristics was gathered. The history of the mode of onset, time and course of the symptoms of the disease, history of fever, comorbidities like DM, HTN, tuberculosis, stroke, hypercholesterolaemia, coronary artery disease and personal habits like tobacco consumption and alcoholism was noted. Routine ophthalmological examinations and blood investigations were carried out. Data collected was entered in Microsoft Excel 2010 and analysed using Epi Info software.

Results: The mean age of the patients studied was 50.22 ± 11.76 years, with 72.5% of cases being males. There was a slight right-eye preponderance. The most common nerve to be affected was the abducent nerve, followed by the oculomotor nerve and multiple nerve palsies. The trochlear nerve was the least frequently involved. The most common aetiology identified was microvascular in origin, followed by trauma, inflammation and idiopathic. While trauma was more common in the younger age group (less than 40 years old), microvascular aetiology was more prevalent in the fifth and sixth decades. At least one vasculopathic risk factor was present in 67.5% of the participants in this study, and 17.5% had several risk factors. 71% of the patients with oculomotor nerve palsy had pupillary involvement. The most common fundus changes were NPDR (15%) followed by no DR changes (17.5%), hypertensive changes (5%) and PDR changes (2.5%).

Conclusion: According to numerous earlier research studies, abducens nerve palsy was the most prevalent type of nerve palsy seen, and the most common aetiology was discovered to be microvascular in nature. Cranial nerve palsies and associated effects can be avoided with early detection and efficient treatment of these systemic disorders.

Keywords: Ocular Motor Nerve Palsies, Aetiology.

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Introduction

There are not many studies which have dealt with the incidence, prevalence, and etiology of OMNP (Ocular Motor Nerve Palsies) among patients presenting with symptoms suggestive of nerve involvement. The prevalence of third, fourth and sixth nerve palsies has been documented in large population studies which were conducted on a regular basis around the world, where they observed that the sixth nerve was the commonest to be involved in around 42-51%, followed by the third nerve in around 27-32%, the sixth nerve in 8-

13%, and the least being multiple nerve involvement in around less than 4%. [1-4] Some Indian studies have also confirmed a similar prevalence. [5-9]

Although the disease pattern varies globally, the etiological patterns of OMNP have stayed rather stable over the decades. In order to diagnose and treat the various pathologic processes-such as ischaemia, inflammation, and compression-that might harm these nerves, scientific literature has helped us comprehend the anatomy and vascular

interactions of the OMN. Because they result in ischaemic alterations in the cerebral nerve, diabetes mellitus and hypertension are two of the most commonly described systemic causes of acquired paralytic strabismus. [10–12]

Delays in identifying the pathophysiology causing OMNP can occasionally be lethal. Therefore, it is advised to take a cooperative, multidisciplinary strategy to improve OMNP's diagnostic precision.[13] It's critical to conduct a thorough clinical examination together with supplementary, supportive studies to determine the aetiology. In light of this, the etiological pattern of third, fourth, and sixth ocular motor nerve palsies was the subject of the current investigation.

Material and Methods

This was a hospital-based, prospective, observational study conducted with 40 patients over a period of 18 months involving patients with complaints of acute ocular motor nerve palsies presenting to OPD, of all age groups, with the onset of symptoms within 1 month. Chronic cases of ocular motor nerve palsies, congenital nerve palsies and myopathies were excluded from the study.

Data related to sociodemographic characteristics and details regarding the disease were collected using a questionnaire format after obtaining the written informed consent. Patient particulars like age, sex, laterality of the eye, and detailed history are noted. The history of the mode of onset, time and course of the symptoms of the disease, history of fever, comorbidities like DM, HTN,

tuberculosis, stroke, hypercholesterolaemia, coronary artery disease and personal habits like tobacco consumption and alcoholism was noted.

Routine ophthalmological examination, head posture, facial symmetry, visual acuity, extraocular movements, pupillary reflex, slit lamp examination, IOP recording, fundus examination and squints tests for motor and sensory status like the cover test, uncover test, alternate cover test, prism bar cover test, head tilt test, double Maddox rod test and diplopia charting were done, and the test for sensory adaptation like the Worth four-dot test was done, and all findings were documented. Routine blood investigations like CBC, blood sugar levels, VDRL, ESR, CRP, urine analysis, the Mantoux test, radiological investigations, CT brain, MRI brain, X-ray chest, CTA, and MRA are conducted.

Data collected was entered in Microsoft Excel 2010 and analysed using Epi Info software. Descriptive statistics such as proportion, mean and standard deviation were calculated. The connection was measured using the chi-square test. Statistical significance was defined as a "p" value of less than 0.05. Where appropriate, the results were displayed graphically.

Results

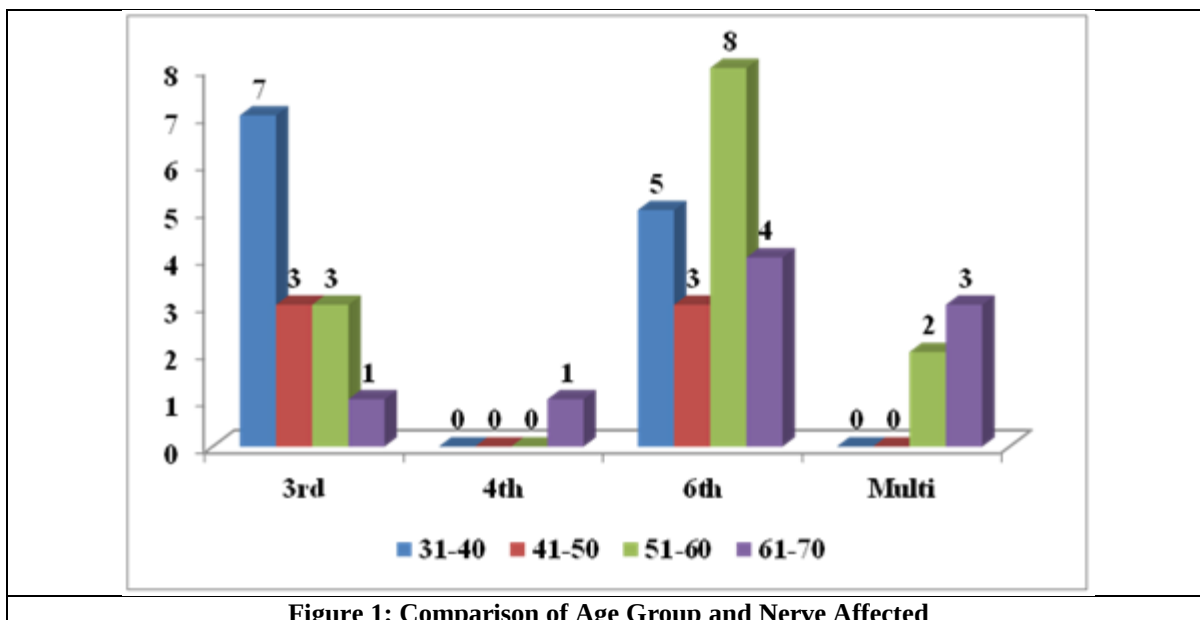
13 (32.5%) were between the ages of 51 and 60, 9 (22.5%) were between the ages of 61 and 70, 6 (15%) were between the ages of 41 and 50, and 12 (30%) were between the ages of 31 and 40.

Table 1: Distribution of Patients According to Age

Age Group	Frequency	Percentage
31-40	12	30.00
41-50	6	15.00
51-60	13	32.50
61-70	9	22.50
Total	40	100.00

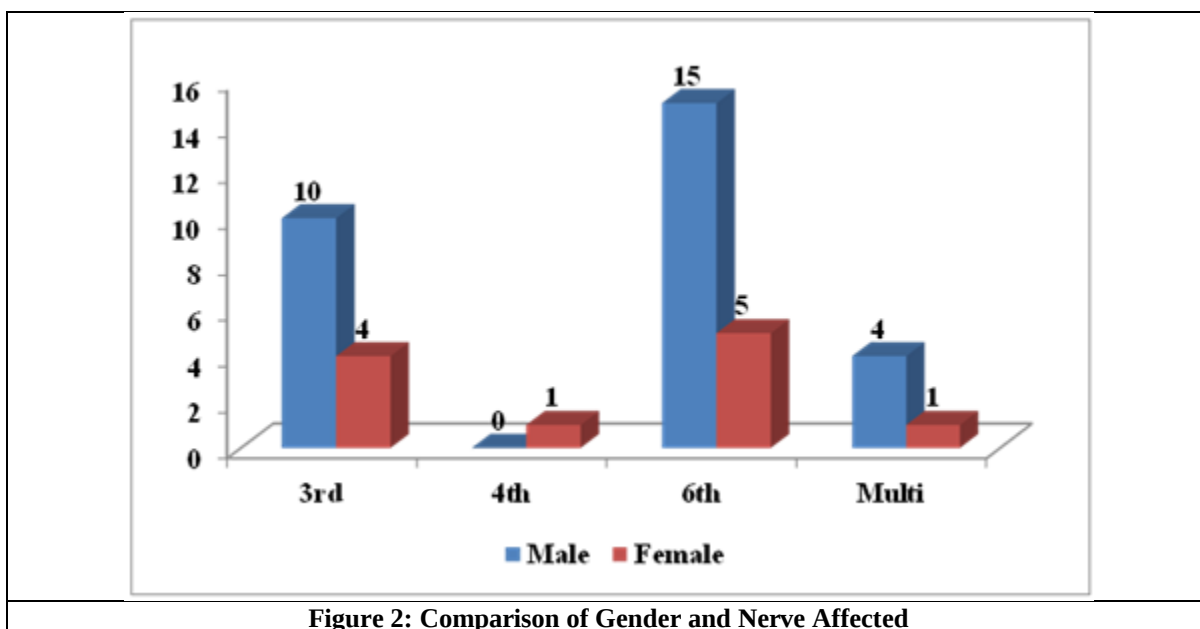
Among the 31 to 40 years age group patients, 7 were affected with 3rd nerve palsy and 5 with 6th nerve palsy. Among the 41 to 50 years age group, 3 were affected with 3rd nerve and 3 with 6th nerve palsy. Among the 51 to 60 years age group, 3 were

affected with 3rd nerve, 8 with 6th nerve palsy and 2 with multiple nerve involvement. Among the 61 to 70 years age group, 1 was affected with 3rd nerve, 1 with 4th nerve, 4 with 6th nerve palsy and 3 with multiple nerve involvement.



29 (72.5%) were male and 11 (27.5%) were female. Among male patients, 10 were affected with 3rd nerve palsy, 15 with 6th nerve and 4 with multiple nerve involvement. Among female patients, 4 were

affected with 3rd nerve palsy, 1 with 4th nerve palsy, 5 with 6th nerve and 1 with multiple nerve involvement. The association was not statistically significant.



Among our study group, 14 (35%) were affected with 3rd cranial nerve palsy, 1 (2.5%) with 4th nerve palsy, 20 (50%) with 6th nerve palsy and the

remaining 5 (12.5%) were affected with multiple cranial nerve palsies.

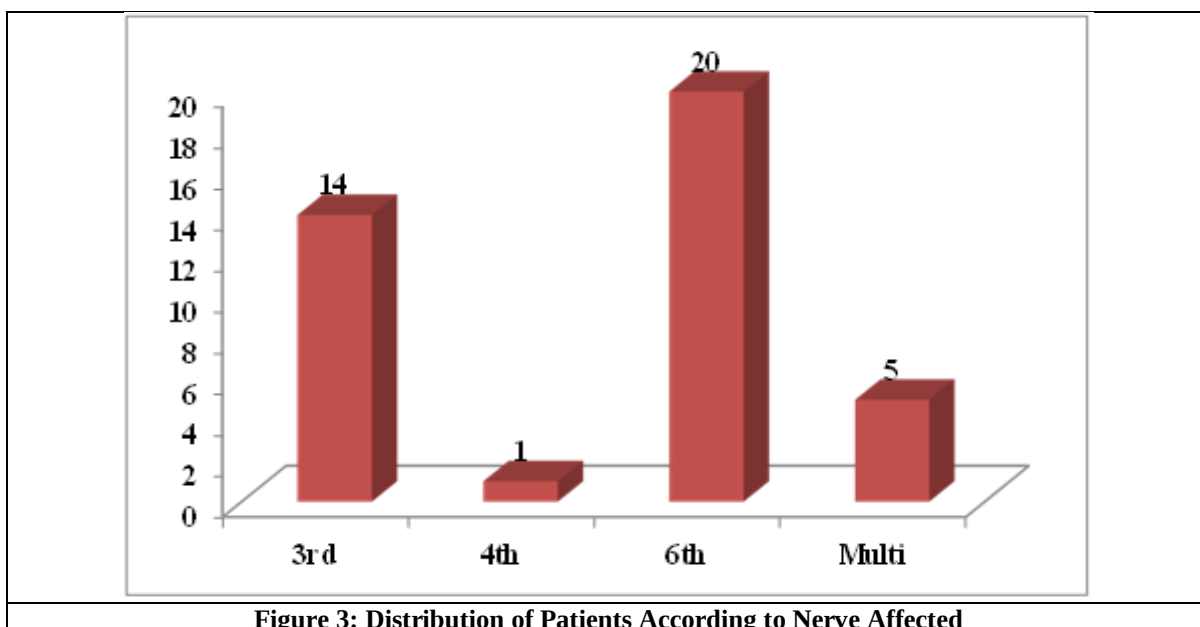


Figure 3: Distribution of Patients According to Nerve Affected

5 (12.5%) had infective aetiology, 13 (32.5%) had trauma, 21 (52.5%) had vascular aetiology and 1 (2.5%) had idiopathic aetiology. Among 3rd nerve palsy cases, 1 had an infective aetiology, 5 had a traumatic history and 8 had vascular pathology. 1

patient with 4th nerve involvement had idiopathic aetiology. Among 6th nerve palsy patients, 7 had a traumatic history and 13 had vascular pathology. Among multiple nerve involvement, 4 had infective aetiology, and 1 had a traumatic history.

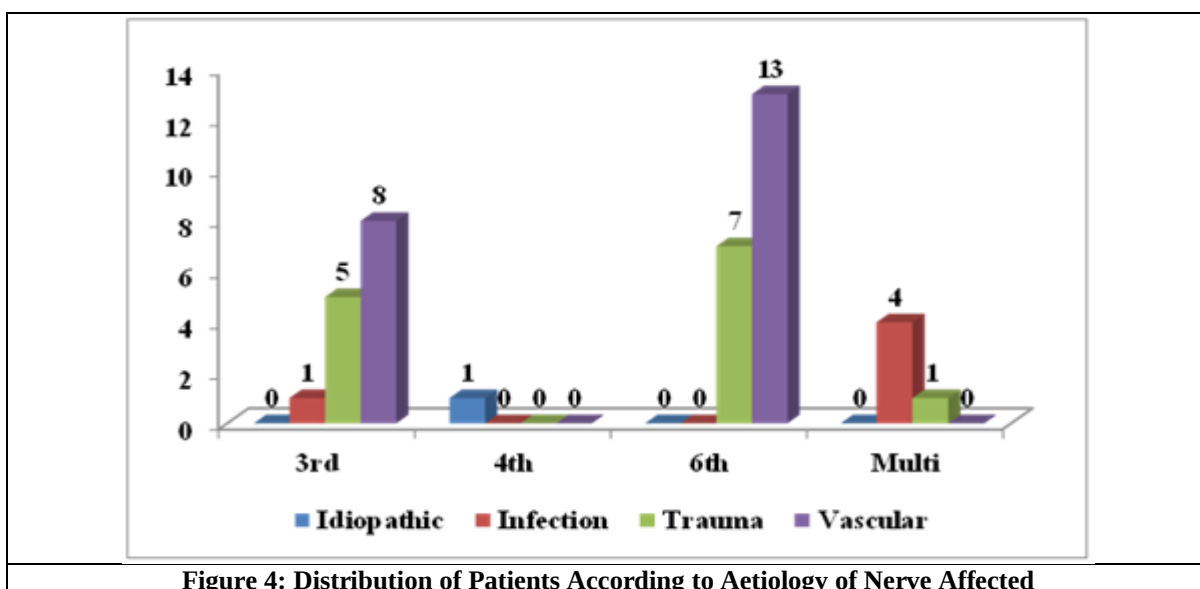


Figure 4: Distribution of Patients According to Aetiology of Nerve Affected

A majority of the patients, 45% suffered from diabetes mellitus, followed by hypertension among

37.5%. The distribution of risk factors is as shown in the table below.

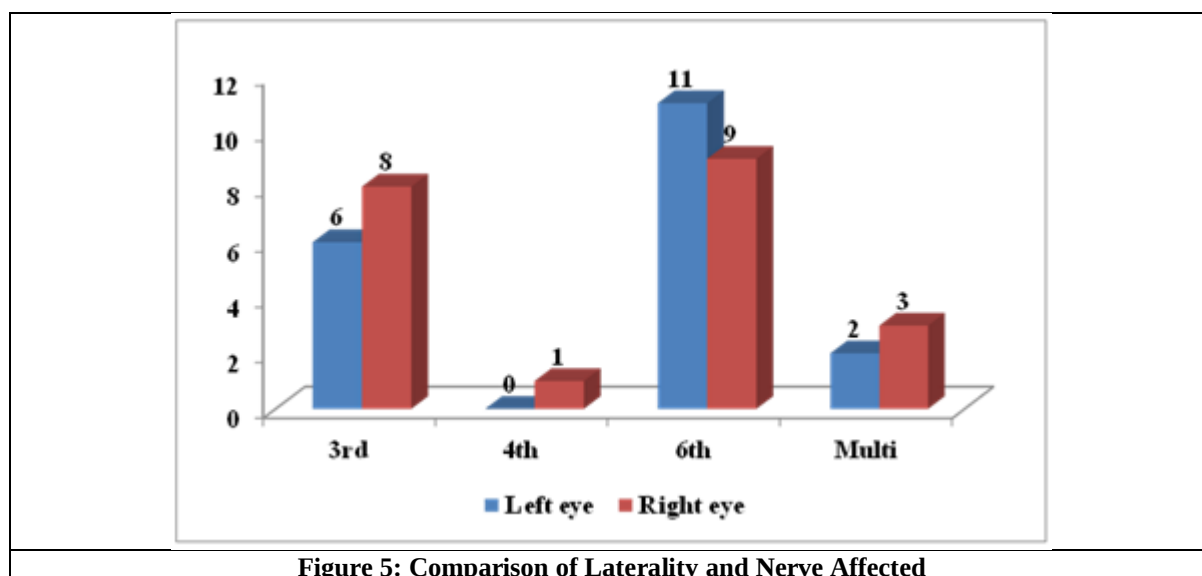
Table 2: Distribution of Patients According to Risk Factors

Risk Factors	Frequency	Percentage
Diabetes mellitus (DM)	18	45
Hypertension (HTN)	15	37.5
DM + HTN	7	17.5
Hyperhomocystenemia	1	2.5

Among 3rd nerve palsy patients, 86 were affected with the left eye and 8 with the right eye. 1 patient with 4th nerve involvement had right eye

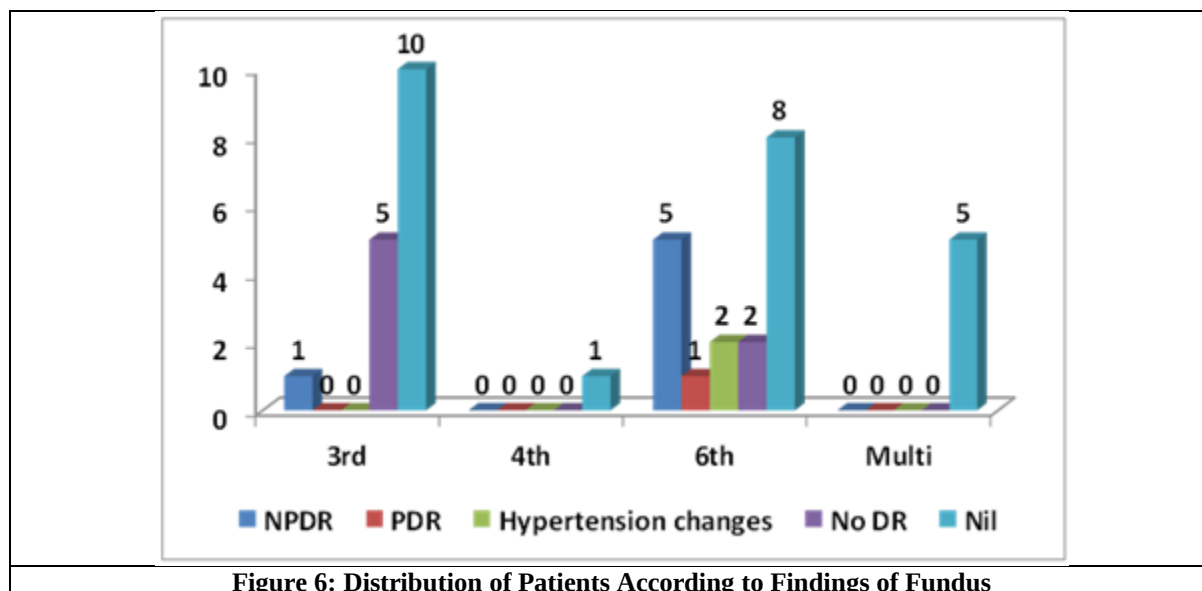
involvement. Among 6th nerve palsy patients, 11 were affected with the left eye and 9 with the right eye. Among multiple nerve involvement, 3 patients

were affected with the right eye and 2 patients with the left eye.



21 (52.5%) were affected with the right eye and 19 (47.5%) with the left eye. 6 (15) patients showed NPDR changes in the fundus, 1 (2.5%) showed PDR changes, 2 (5) showed hypertensive changes, 7 (17.5) showed no DR changes, and the remaining 24 (60%) showed no changes in the fundus. Among

3rd nerve palsy, 1 patient had NPDR and 5 patients showed no DR changes in the fundus, and among 6th nerve palsy, 5 patients showed NPDR, 1 patient showed PDR changes, 2 patients showed hypertension changes and 2 patients showed no DR changes in the fundus.



18 (45%) patients showed esotropia in the cover test, 14 (35%) showed exotropia, and 8 (20%) showed no changes.

Among 16 patients with 3rd nerve palsy, the pupil was involved in 10 (71.43%) patients and was spared in 4 (28.57%) patients.

Discussion

A hospital-based, prospective, observational study was conducted with 40 patients to determine the aetiology of 3rd, 4th, and 6th oculomotor nerve

palsies in different age groups. Among our study group, 12 (30%) were in the age group of 31 to 40 years, 6 (15%) were in 41 to 50 years, 13 (32.5%) were in 51 to 60 years and 9 (22.5%) were in the age group of 61 to 70 years. Our study found that the majority of ocular motor nerve palsies afflicted people in the 51–60 age range, with a mean age of 50.22 ± 11.76 years, which is lower than those found in other studies but comparable to that described by Stephen et al.[8,9] However, Sitaula et al. have observed a mean age of 39.4 years.[5] K

Haridev Kumar et al.,[1] observed that the mean age of presentation was 55.8 years, whereas Park UC et al.,[8] observed that >60% of cases were >50 years of age. Khadka et al.,[14] the mean age of the total patients was 45 ± 15.33 years.

As seen in earlier research, [8,9] males were more likely to be involved in our study (72.5%) than females, but Neelam Pawar et al.,[15] and Dinesh P et al.,[16] found that females were impacted more often. Given that ischaemia and trauma are the most common causes of ocular motor nerve palsies, the prevalent affection of males may be explained by the fact that they are more likely to experience atherosclerotic alterations and are frequently involved in RTAs. In our study group, 21 (52.5%) were affected with the right eye and 19 (47.5%) with the left eye, which is comparable with the Rush and Younge study.[17]

According to other research, [5,8] microvascular aetiology was the most common cause of ocular nerve palsy in this study (52.5%), followed by trauma (32.5%). Stephen et al. [9] observed that trauma was the most common cause of ocular nerve palsy in their centre. 2.5% of the cases had no aetiology, whereas 12.5% of the cases had an infectious aetiology. An unidentified aetiology can occur somewhere between 12 and 35% of the time. [17,18] The large variation in frequency is most likely due to the different standards used by different centres to classify the aetiology as microvascular or unknown. Rush and Young's study [18] observed that the most common etiological factor was idiopathic. P.S.Reedy et al [19] noticed that TB was the most common cause. Trauma (blunt injury) was identified as another important cause by Menon V et al. [4] and Richard BW et al. [3] According to Khadka et al.,[14] the majority of OMNP cases had an aetiology that was unidentified (68/167, 40.7%), had no known underlying cause, and were unrelated to any systemic disorders.

According to several comparable studies, the abducens nerve was the most commonly implicated nerve in this study (20 instances, or 50%), followed by the oculomotor nerve in 14 cases, or 35%. [5-8] The trochlear nerve was involved in one case, and multiple nerves were involved in 5 (12.5%) cases. Microvascular aetiology was the most common among isolated 6th and 3rd nerve palsies. Multiple nerve palsies were frequently inflammatory in origin. Our analysis found no instances of multifocal nerve palsy or cerebral aneurysms caused by microvascular aetiology.

The traumatic cause was more common in the younger age group (<40 years), while microvascular aetiology was more common in the 6th decade. Our data confirmed the nerve distribution reported in previous studies, which

found sixth nerve involvement to be most common and fourth nerve involvement to be least.[20,21] However, a study by Sujatha P. N. found that the oculomotor nerve was the commonest nerve involved (40%), followed by the 6th nerve (28%), the 4th nerve (5.23%), and 26.67% had multiple cranial nerve involvement.[22]

In our study, 6 (15%) patients had NPDR changes, 1 (2.5%) patient had PDR changes, 2 (5%) patients had hypertensive changes and 7 (17.5%) patients had no DR changes in the fundus. NPDR changes were more common among 6th nerve palsy, while no DR changes were common among 3rd nerve palsy. This could be because of vascular pathology in the 6th decade and microvascular aetiology being the most common cause for 6th nerve involvement.

Of the patients in this study, about 27 (67.5%) had at least one vasculopathic risk factor, and 7 (17.5%) had several risk factors. In one study, 71% of oculomotor nerve palsies included the pupil; in other investigations, pupillary involvement ranged from 41% to 80%. According to Neelam Pawar et al.,[15] there is a strong correlation between the aetiology and pupillary involvement. According to research by Dinesh P et al.,[16] of the isolated oculomotor nerve palsy cases, 23.07% showed pupil involvement and 76.92% showed pupil sparing.

Conclusion

In this study, the most frequent nerve palsy observed was abducens nerve palsy, and the commonest aetiology was found to be microvascular in nature, as reported in many previous studies. Early diagnosis and effective management of these systemic diseases can prevent cranial nerve palsies and their consequences.

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