



A CLINICAL STUDY OF OCULOMOTOR NERVE PALSY IN DIABETES MELLITUS

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(ABSTRACT) **Background:** Oculomotor nerve palsy is a frequent complication in diabetic patients with variable clinical presentations and evolutions. **Aim:** To study the demographic and the clinical characteristics, to assess the risk factors, duration of diabetes, its evolution and recovery pattern of oculomotor nerve palsies in diabetic patients. **Materials & Methods:** We report a series of 12 diabetic patients with oculomotor palsy presented to Ophthalmology OPD and General medicine OPD of Government General Hospital of Kadapa between December 2022 to December 2023. In our study all the patients were of the age group between 45-60 years with history of diabetes mellitus. The following data were collected from patients: age, gender, year of onset, and type of cranial nerve palsy, presenting features, type and duration of DM, presence or absence of diabetes retinopathy in fundus examination, neuroimaging. **Results:** In our study, all the 12 patients were 45-60 years age group. The mean duration of diabetes was 10 ± 5 years (5 – 15 years). **Conclusion:** It has been found that the involvement of oculomotor cranial nerves in diabetic patients has been associated with the duration of diabetes and glycemic status.

KEYWORDS: Diabetes mellitus, Oculomotor nerve palsy, Pupil sparing, Diabetic retinopathy.

INTRODUCTION:

Oculomotor nerve palsy is one of the most frequent neuro-ophthalmologic complications of diabetes mellitus, and its clinical presentations are variable. Its incidence increases with the duration and severity of diabetes, poor glycemic control and age of the patient. Studies show that oculomotor nerve palsy is 7-8 times more common in diabetics than non-diabetics. Approximately 50% of patients with diabetes mellitus will eventually develop diabetic neuropathy.

Although a number of different cranial nerve palsies in diabetic patients have been reported, such abnormalities are seen rarely in the general population. As regards to cranial nerve palsy caused by diabetes, it is generally accepted that the extraocular muscles are the most frequently involved, indicating that muscles supplied by oculomotor nerve is more commonly affected in diabetics.

Most patients with oculomotor nerve palsies were found to belong between 45 to 65 years age group with a history of diabetes mellitus. It can be either a partial or complete nerve palsy.

The etiology of oculomotor nerve palsy in diabetics is hyperglycemia-induced ischemic damage to nerve cells. The inflammation and immune reaction may also be the cause of diabetic neuropathy. The classical presentation of oculomotor nerve palsy in diabetes is that of an acute onset of ptosis, restriction of extraocular movements, diplopia and with normal pupil reaction [pupillary sparing], this is due to the anatomical arrangement of the pupillary nerve fibers in the oculomotor nerve, since fibers controlling the pupillary reflex are superficial, thus spared from diabetic ischemia induced injury.

Neuroimaging helps in localization of the lesion in oculomotor nerve pathway and rules out other causes of oculomotor nerve palsy. Patients with Complete Control of blood sugar levels and regular follow up shown partial or complete recovery.

AIM:

To study the demographic and the clinical characteristics, to assess the risk factors, duration of diabetes, its evolution and recovery pattern of oculomotor nerve palsies in diabetic patients.

MATERIALS AND METHODS:

We report a series of 12 diabetic patients with oculomotor palsy presented to Ophthalmology OPD and General medicine OPD of Government General Hospital of Kadapa between December 2022 to December 2023.

Inclusion criteria includes all infranuclear ocular motor nerve palsies with Diabetes mellitus. Exclusion criteria includes supranuclear, nuclear nerve palsies, myogenic and restrictive neuropathies, all other causes of oculomotor nerve palsy.

In our study all the patients were of the age group between 45-60 years

with history of diabetes mellitus. The following data were collected from patients: age, gender, year of onset, and type of cranial nerve palsy, presenting features, type and duration of DM, presence or absence of diabetes retinopathy in fundus examination, and other associated vascular risk factors (hypertension, hyperlipidemia, and coronary artery disease). The results of cerebral neuroimaging (brain CT scan and MRI) were also recorded.

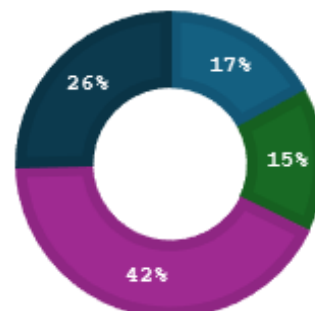
Patient information data and informed consent was obtained from the patients before initiating the study. Patients who required medical attention during the period of the study were given appropriate medical care.

RESULTS:

In our study, age distribution of oculomotor nerve palsy in diabetics was studied and observed that were in 45-60 years age group.

AGE DISTRIBUTION

■ 45-50 ■ 51-55 ■ 56-60 ■ 61-65



Out of 12 patients 8 males and 4 females were presented with oculomotor nerve palsy.

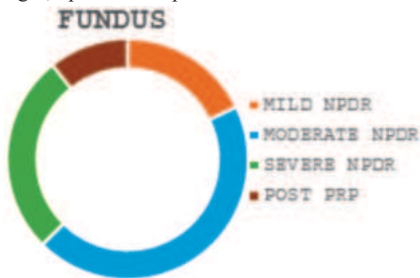
SEX DISTRIBUTION

In our study, the mean duration of diabetes was 10 ± 5 years (5 – 15 years).

In our study, most of the patients presented with the complaints of drooping of upper eyelid. The pupils examination was normal in all patients. The direct and the consensual pupillary light reflex were also normal in all patients. Diplopia was noted in few patients. Third nerve palsy was partial in all patients. On examination we noted deviation of eyeball in primary position and limitation of eye movements in the territory of the third nerve.



Fundus examination revealed that each patient had at least one diabetic microangiopathy at the time of diagnosis. Diabetic retinopathy was present in 12 patients, out of which 3 patients had severe NPDR changes, 5 patients had moderate NPDR changes, 2 patients had mild NPDR changes, 2 patients had post PRP.



In our study the FBS, PPBS and HbA_{1c} were estimated and their correlation with the changes in the retina has been assessed. It has been found that the patients with uncontrolled blood sugar levels had more severe diabetic retinopathic changes. In addition to diabetes, the study of cardiovascular risk factors like hypertension, hyperlipidemia seen in few patients. Neuroimaging studies in 3 patients has shown ischemic changes. All the patients were in primary prevention and regular follow up. They have shown either partial or complete recovery within few days to months.

DISCUSSION:

Diabetic neuropathy of oculomotor nerve has been reported to affect about 7-10% of diabetic patients, it is generally thought to arise most frequently in the extra ocular muscles. Third nerve palsy typically manifests as ptosis and limitation of extraocular movements, the pupil is unaffected. Symptoms are reversible after few days to months with control of blood sugar levels.

Age of the patients varied from 45-60 years. The duration of diabetes seems to be a more important risk factor than the age of onset of oculomotor nerve palsy, indeed the average duration of diabetes evolution in our patients was 5-15 years.

A microvascular infarction of the blood supply to the oculomotor cranial nerve may cause diabetic third nerve palsy. In addition, the association with high blood pressure, dyslipidemia, or vascular disease suggests the vascular origin of the pathogenesis of diabetic neuropathy. These factors have also been observed as a risk factor for the occurrence of diabetic neuropathy.

The microvascular ground is also a predictor of the diabetic ischemic origin of oculomotor nerve palsy. In our study all the patients had diabetic retinopathy changes in fundus. Neuroimaging was performed in all patients. In addition, it eliminates other neurological causes of oculomotor nerve palsy.

Patient management in our study was gradual but optimal control of blood sugar levels with control of other cardiovascular risk factors. Oculomotor nerve findings persist for several weeks and then begin gradually to improve. Full resolution generally takes place within 3 – 5

months. Diabetic third nerve palsies usually occur in isolation and recover completely.



Case 1: Figure 1

Figure 2



Case 2: Figure 3

Figure 4



Case 3: Figure 5

Figure 6



Case 4: Figure 7

Figure 8

Table 1 : Data Of Patients

Patient	Age [years]	Gender	Past medical history	Duration of diabetes	Diabetic retinopathy	Type of CN 3 palsy	Brain CT / MRI
1	57	Male	DM, HTN	7 years	Moderate NPDR	Left Partial [pupil sparing]	Normal
2	62	Male	DM	12 years	Post PRP	Left partial	Cerebral lacunar infarcts
3	46	Male	DM	5 years	Mild NPDR	Left partial	Normal
4	54	Female	DM	10 years	Moderate NPDR	Right partial	Normal
5	49	Male	DM, HTN	8 years	Moderate NPDR	Left partial	Normal
6	53	Female	DM	6 years	Mild NPDR	Right partial	Normal
7	65	Male	DM, HTN	13 years	Severe NPDR	Left partial	Ischemic changes

8	53	Male	DM	9 years	Moderate NPDR	Right partial	Normal
9	64	Female	DM, HTN, H.lipidemia	13 years	Post PRP	Left partial	Ischemic changes
10	59	Male	DM	11 years	Severe NPDR	Left partial	Normal
11	57	Female	DM, HTN	10 years	Moderate NPDR	Right partial	Normal
12	60	male	DM	10 years	Severe NPDR	Right partial	Brainstem infarct

CONCLUSION:

Oculomotor nerve palsy is the most frequent neuro-ophthalmologic complication in diabetes mellitus. It has been found that the involvement of oculomotor cranial nerves in diabetic patients has been associated with the duration of diabetes and glycemic status. There was a positive correlation between duration of diabetes and degree of retinopathic changes in diabetes mellitus. The diabetic oculomotor nerve palsies occur in a wide range of age but are more common in the age group of 45 to 60 years. The males were more affected than females in our study. Most of the patients presented with Ptosis, limitation of extraocular movements in our study. Neuroimaging was done in all patients and found ischemic changes in few. Patients with diabetic retinopathy were treated with utmost care and regular monitoring. Ninety percent of patients in our group had either a complete or partial recovery from the ocular motor nerve palsies due to diabetes mellitus.

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