

Prevalence of retinopathy in diabetic patients with and without distal sensory peripheral neuropathy

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Abstract

Introduction: Diabetic Retinopathy is the most common cause of preventable blindness among working-aged group. Diabetic neuropathy is also a common complication of diabetes. As the prevalence of diabetes increases the complications are also increasing. Early detection of DR will significantly reduce the chances of vision loss.

Aim of the Study: This study was done to assess the prevalence of diabetic retinopathy in patients with diabetic neuropathy and in patients without neuropathy.

Materials and Methods: This is an analytical cross sectional study conducted at the patients attending OPD from January 2016 to November 2016. Total 200 patients who include 100 patients with neuropathy and 100 patients without neuropathy were screened for the presence of DR. presence of distal sensory peripheral neuropathy was diagnosed by using biothesiometry. Ocular examination included best corrected visual acuity, anterior segment examination using slit lamp examination, intra ocular pressure measurement using non contact tonometer. A dilated fundus examination was done with indirect ophthalmoscopy and slit lamp biomicroscopy.

Results & Discussion: In this study, among the patients without neuropathy 30 percent of the patients had diabetic retinopathy of various stages and among the patients without neuropathy 44 percent of the patients had retinopathy. More advanced forms of the disease were seen in the DSPN group.

Conclusion: This study clearly shows the increased prevalence of DR in patients with DSPN. Patients with DSPN have more severe disease compared with the non neuropathy group. It is also found that CSME is more common in the DSPN group.

Keywords: CSME, Diabetic Retinopathy, Distal Sensory Peripheral Neuropathy, Diabetic retinopathy, Microvascular Complications.

Introduction

The incidence of Diabetes mellitus is drastically increasing in India. At present India is next to China with 72.9 million patients with diabetes and in 2045 it is expected that India will lead the world with 134.3 million people with diabetes.¹ Diabetic retinopathy (DR) is the most common cause of preventable blindness among working-aged adults.² The prevalence of DR in India varies from 28.9% to 34.7% of diabetic persons.^{3,4} Similarly various Indian studies revealed prevalence of neuropathy ranges from 29% to 33% which includes both large and small fibre neuropathy.^{5,6} Though traditionally DR was classified as microvascular complication, current researches recognize this as neurovascular complication or sensory neuropathy secondary to neurovascular unit disruption.⁷

Aim of the Study

This study was done to assess the prevalence of diabetic retinopathy in patients with diabetic neuropathy and in patients without neuropathy.

Materials and Methods

This is an analytical cross sectional study conducted at the patients attending OPD from January 2016 to November 2016. Total 200 patients who include 100 patients with neuropathy and 100 patients

without neuropathy were screened for the presence of DR.

Inclusion Criteria:

1. Diabetic patients with duration of 5-15 yrs,
2. Age group between 40 and 60 yrs.
3. FBS <130, PPBS <200 and/or HbA1c <7.2

Exclusion Criteria

1. co-morbid conditions like hypothyroidism.
2. Other causes of neuropathy.
3. Alcoholics / Smoker
4. Treated cases of DR
5. Type 1 Diabetes Mellitus

Patients were screened for presence of neuropathy based on history, clinical examination and vibration perception threshold (VPT). VPT was done using biothesiometry. VPT was measured in both lower limbs. The gold standard test for diabetic neuropathy is the nerve conduction velocity (NCV) testing. But many studies have compared the VPT against the NCV values and concluded that VPT is a reliable, painless and simple tool that can be used for screening of diabetic sensory neuropathy.⁸⁻¹⁰ Value of less than 15 was taken as normal and more than 15 was taken as presence of neuropathy.¹¹

Ocular examination included best corrected visual acuity, anterior segment examination using slit lamp

examination, intra ocular pressure measurement using non contact tonometer. A dilated fundus examination was done with indirect ophthalmoscopy and slit lamp biomicroscopy.^{12,13} The severity of diabetic retinopathy was graded as per the ETDRS (Early Treatment Diabetic Retinopathy Study) classification.

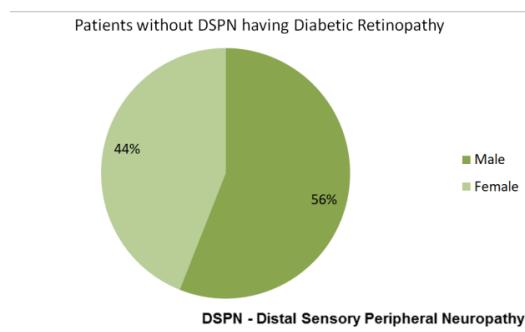


Fig 1a:

Among 100 patients in the group without neuropathy 17 patients had mild NPDR, 10 had moderate NPDR and 1 had severe NPDR. Two patients had proliferative diabetic retinopathy (PDR) out of which one patient had early PDR and the other had high risk PDR. On the whole 28 patients had NPDR and 2 patients had PDR.

In the neuropathy group 19 patients had mild NPDR, 15 had moderate NPDR, 3 had severe NPDR and 1 had very severe NPDR. Five patients had

Results

100 patients with DSPN and 100 patients without DSPN were studied. In the DSPN group 58 patients were males and 42 patients were females, in the control group 56 patients were males and 44 patients were females.

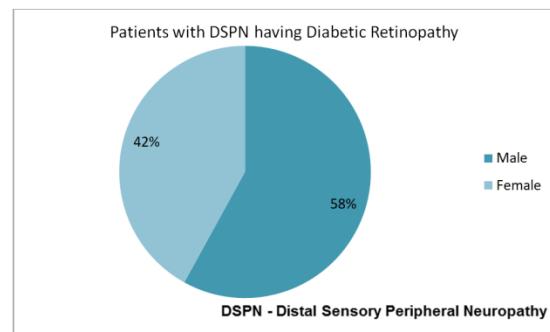


Fig 1b:

proliferative diabetic retinopathy (PDR) out of which 2 patients had early PDR, 3 had high risk PDR and the remaining one patient had advanced diabetic eye disease. On the whole 38 patients had NPDR, 5 patients had PDR and one patient had advanced diabetic eye disease.

Clinically Significant Macular Edema was noticed in 20 patients in non neuropathy group and 28 patients in the neuropathy group.

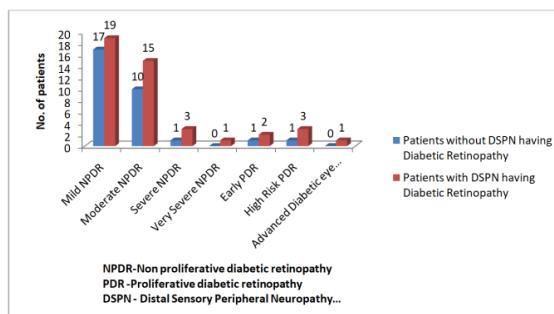


Fig 2a:

Clinically Significant Macular Edema

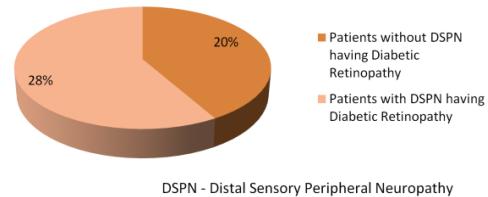


Fig 2b:

Discussion

In this study, among the patients without neuropathy 30 percent of the patients had diabetic retinopathy of various stages and among the patients without neuropathy 44 percent of the patients had retinopathy. More advanced forms of the disease were seen in the DSPN group in comparison with the non neuropathy group. These results confirm the association between the neuropathy and retinopathy in diabetic patients. And it is also observed that patients with DSPN are at increased risk of developing CSME as it was 28 percent of patients with DSPN and only in 20 percent of patients without neuropathy.

The study done by Vijayashree Shrirang Gokhale, Neha Chaggan et al showed very high incidence of DR (76%) in patients with Nerve conduction Velocity proven neuropathy patients.¹⁴ This increased incidence was supported by the study done by Abdollahi and Moghimi in which 79.1 percent of diabetic patients had DR. They have also noticed that more severe form of DR was present in patients with neuropathy.¹⁵ Sharma VK and his team observed that there was 2.75 times increased incidence of DR in patients with neuropathy in comparison with patients without neuropathy.

Conclusion

This study clearly shows the increased prevalence of DR in patients with DSPN. Patients with DSPN have more severe disease compared with the non neuropathy group. It is also found that CSME is more common in the DSPN group.¹⁶

References

1. IDF Diabetes Atlas - 8th Edition, page no:46.
2. Klein BE. Overview of epidemiologic studies of diabetic retinopathy. *Ophthalmic Epidemiol* 2007;14:179–183pmid:17896294.
3. Agrawal RP, Ranka M, Beniwal R, Gothwal SR, Jain GC, Kochar DK, et al. Prevalence of diabetic retinopathy in type 2 diabetes in relation to risk factors: Hospital Based Study. *Int J Diabetes Dev Ctries.* 2003;23:16–19.
4. Rema M, Pradeepa R, Diabetic retinopathy: an Indian perspective. *Indian J Med Res.* 2007 Mar; 125(3):297-310.
5. Anjana RM, Ali MK, Pradeepa R, Deepa M, Datta M, Unnikrishnan R,et al. The need for obtaining accurate nationwide estimates of diabetes prevalence in India — Rationale for a national study on diabetes. *Indian J Med Res* 2011;133:369-80.
6. Ashok S, Ramu M, Deepa R, Mohan V. Prevalence of neuropathy in type 2 diabetic patients attending a diabetes centre in South India. *J Assoc Physicians India* 2002;50:546-50.
7. Stem MS, Gardner TW. Neurodegeneration in the Pathogenesis of Diabetic Retinopathy: Molecular Mechanisms and Therapeutic Implications. Current medicinal chemistry. 2013;20(26):3241-3250.
8. J Cent South Univ (Med Sci) Vibration perception threshold in diagnosing diabetic peripheral neuropathy by receiver operating characteristic curve HOU Yu1 , LIU Sha1 et al.. 2012 Sep;37(9):951-6.
9. Martin CL, Waberski BH, Pop-Busui R, et al., Vibration Perception Threshold as a Measure of Distal Symmetrical Peripheral Neuropathy in Type 1 Diabetes. *Diabetes Care.* 2010 Dec; 33(12): 2635-2641.
10. Vera Bril, Jasna Kojic, Mylan Ngo, Kelly Clark , Comparison of a Neurothesiometer and Vibration in Measuring Vibration Perception Thresholds and Relationship to Nerve Conduction Studies Diabetes Care. Sep 1997, 20 (9) 1360-1362.
11. Ramakrishna Mr, Trupti Rr, Antin Ss, Raghukanth Reddy And Anandkumar H. An Evaluation of Vibration Perception Threshold (Vpt) Testing as an Early Predictive Diagnostic Marker of Neuropathy in Patients with Type 2 Diabetes Mellitus. *Int J Pharm Bio Sci.* 2015;6(4):26-31.
12. S.S. KHALAF, M.D. AL-BDOUR, M.I. AL-TILL. Clinical biomicroscopy versus fluorescein angiography: Effectiveness and sensitivity in detecting diabetic retinopathy. *European Journal of Ophthalmology.* 2017;17(1) 2007: pp.84-88.
13. Debajyoti Nanda et al., Comparison between slit-lamp biomicroscopy and fluorescein angiography in diagnosing diabetic retinopathy Sch. *J. App. Med. Sci.*, Jan 2017; 5(1B):108-111.
14. Gokhale VS, Chaudhari NC, Kakrani AL, Shah BP. High incidence of retinopathy in neuropathy proven diabetic patients: A cohort study. *Int J Med Public Health* 2015;5:289-92.
15. Abdollahi A, Moghimi S, Tabasi A, Rajabi MT, Sabet B. Neuropathy and retinopathy in diabetes: Is there any association? *Int J Ophthalmol* 2009;2(1):57-60.
16. Sharma VK, Joshi MV, Vishnoi AA. Interrelation of retinopathy with peripheral neuropathy in diabetes mellitus. *J Clin Ophthalmol Res* 2016;4:83-7.