

## Urban-rural divide in the distribution of diabetic retinopathy

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### Abstract

**Purpose:** To find an association between prevalence of diabetic retinopathy (DR) and region, in patients reporting to a tertiary care Diabetic and Endocrinology Center, of western Uttar Pradesh.

**Materials and Methods:** A hospital-based, cross-sectional study was conducted on 240 eyes of 120 diabetic patients presenting at our Institute of Ophthalmology. The demographic profile of each patient was procured and the ETDRS system was used to grade the severity of retinopathy. The data analysis was done with the help of SPSS version 16.0 using unpaired t-test and binary logistic regression analysis.

**Result:** The prevalence of DR was higher among rural patients (70.6%) compared to urban (39.1%). It was observed to be 3.73 times significantly higher among rural than urban patients (OR=3.73, 95%CI=1.72-8.08, p=0.001).

**Conclusion:** The prevalence of DR was found to be 3.73 times significantly higher among rural patients when compared to the urban counterparts.

**Keywords:** Diabetic retinopathy, Rural, Urban.

### Introduction

India is set to emerge as the diabetic capital of the world. According to the WHO, 31.7 million people were affected by diabetes mellitus (DM) in India in the year 2000. This figure is estimated to rise to 79.4 million by 2030, the largest number in any nation in the world. Approximately, two-thirds of all Type 2 and almost all Type 1 diabetics are expected to develop diabetic retinopathy (DR) over a span of time.<sup>1-3</sup> Earlier, a study reported a nearly threefold prevalence of diabetes and twofold prevalence of DR in the urban population in South India.<sup>4</sup> Diamond<sup>5</sup> had also described a similar trend of the prevalence of diabetes being higher among the affluent, educated, urban Indians than among the poor, uneducated, rural people.

The sedentary lifestyle and unhealthy food preferences could be the possible reasons for this urban-rural divide.<sup>6-9</sup> A paucity of previous reports on the regional divide of the prevalence of DR, made the present study immensely important.

### Materials and Methods

This hospital based cross-sectional study was conducted after getting an approval from the Ethical Committee, Jawaharlal Nehru Medical College and Hospital, A.M.U., Aligarh, and was according to the Declaration of Helsinki. An informed written consent was taken from each patient before their participation in the study.

### Inclusion Criteria:

All 240 eyes of 120 patients with age greater than 20 years, and having a reasonably clear media which were referred to the Retina Clinic, Institute of

Ophthalmology, Jawaharlal Nehru Medical College and Hospital, A.M.U., Aligarh from January 2016 to October 2017, after being referred from Rajiv Gandhi Center for Diabetes and Endocrinology, of the same hospital.

### Exclusion Criteria:

1. The patients with media not clear.
2. The patients with gestational diabetes mellitus.
3. The patients where fundus photography was not possible (in any particular eye or field) due to inadequate dilatation or an inability to co-operate, properly.

A clinical history was taken with the help of a structured questionnaire including- demographic data (which included a clear mention of the urban-rural divide), duration of diabetes, treatment taken, addiction, dietary habits, family history of diabetes, and blood pressure. A thorough clinical examination was done to grade the severity of DR using the modified Airlie House classification of diabetic retinopathy.

The data collected was analysed for statistical significance using SPSS version 16.0 (Chicago, Inc., USA) using appropriate statistical tests. The binary logistic regression analysis was carried out to find the strength of association between prevalence of DR with region. The odds ratio (OR) with its 95 per cent confidence interval was calculated. Unpaired t-test was used to compare the continuous variables between two strata. The p-value<0.05 was considered significant.

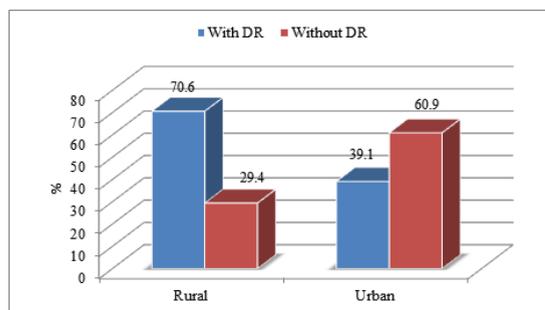
### Observation and Results

The data was analysed using SPSS version 16.0 version (Chicago, Inc., USA).

**Table 1: Association of prevalence of Diabetic retinopathy (DR) with region**

Region	No. of patients	With DR		Without DR		OR (95% CI)	p-value <sup>1</sup>
		No.	%	No.	%		
Rural	51	36	70.6	15	29.4	3.73 (1.72-8.08)	0.001*
Urban	69	27	39.1	42	60.9	1.00 (Ref.)	

OR-odds ratio, CI-Confidence interval, <sup>1</sup>Binary logistic regression, \*Significant



**Fig. 1: Association of prevalence of Diabetic retinopathy (DR) with region**

The prevalence of DR was higher among rural patients (70.6%) compared to urban (39.1%). The prevalence of DR was 3.73 times significantly higher among rural than urban patients (OR=3.73, 95% CI=1.72-8.08, p=0.001) (Table 1, Fig. 1).

## Discussion

Diabetes mellitus is a major clinical and public health problem leading to 4.6 million deaths annually, worldwide.<sup>10</sup> According to the International Diabetes Federation, around 366 million people globally are currently estimated to have diabetes, of which 80% live in low and middle income countries.<sup>10</sup> The more worrisome fact is that about 50% of those with diabetes remain undiagnosed.<sup>11,12</sup> The Indian Council of Medical Research India Diabetes Study (ICMR-INDIAB study) revealed that India had 62.4 million people with diabetes in 2011,<sup>13</sup> which are projected to increase to 101.2 million by 2030.<sup>10</sup>

Education is of utmost importance in ensuring better treatment and control of diabetes. An increasing knowledge regarding diabetes and its complications among diabetic patients has led to significant benefits including increase in compliance to treatment, thereby decreasing the complications associated with diabetes.<sup>14,15</sup>

The regional differences in level of awareness of diabetes could be attributed to differences in education levels, thereby leading to a higher prevalence of DR among rural diabetics. This study indirectly emphasizes on the need for improvement in knowledge and awareness both among the general population as well as diabetic subjects (especially rural population) in order to achieve prevention and better control of diabetes and its complications.

Our study, which included 120 patients, demonstrated a poor metabolic control in rural

diabetics, perhaps, owing to the low socio-economic status and infrequent follow up visits to diabetes center leading to a prevalence of DR which was 3.73 times significantly higher among rural patients (70.6%) compared to the urban diabetic patients (39.1%). The tertiary health care center being easily approachable to the urban patients was one of the many confounding factors, leading to a better diabetic control and decreased prevalence of DR among them. Moreover, the overall population reporting to our tertiary care center was found to be rural rather than urban (which prefer a consultation with private sector endocrinologists and ophthalmologists). This again amounts to a higher prevalence of DR being observed in the rural population. This prevents us to establish the actual prevalence of DR in a diabetic population. Quantitative accuracy can be improved by scientific sampling techniques, evaluating heterogeneous subgroups in the population and ensuring quality control of reported finding.

In contrast, Alemu et al., demonstrated that urban dwellers had a significantly higher prevalence of retinopathy compared to rural patients, 16.1% and 5.0%, respectively.<sup>16</sup>

Along with the rise in Diabetes prevalence, there is also an alarming rise in the prevalence of Diabetic retinopathy (DR) in both urban and rural India. Epidemiological data from India suggests the prevalence of DR is 18% in the urban and 10.4% in the rural India.<sup>17</sup>

A population-based cross-sectional study was conducted to estimate the prevalence of type 2 diabetes mellitus and diabetic retinopathy in a rural population of South India. They found that the prevalence of diabetes in the rural Indian population was 10.4% (95% CI 10.39% to 10.42%), and that the prevalence of diabetic retinopathy, among patients with diabetes mellitus, was 10.3% (95% CI 8.53% to 11.97%).<sup>17</sup>

The spread of diabetes to economically disadvantaged sections of society is a matter of great concern, warranting urgent preventive measures. A lack of awareness to get screened for retinopathy is a major barrier in this section of the diabetic population. Therefore, a good knowledge about the disease would eventually help develop a positive attitude and good practice patterns. Srinivasan et al. revealed that there was a poor knowledge about diabetic retinopathy among the diabetic patients. Consequently, there occurs an urgent need to educate diabetic patients about this potentially blinding complication of diabetes.<sup>18</sup>

The cost-effective measures of diabetes care at various steps of screening, diagnosis, monitoring, and management, are necessary to be implemented. Both, a good patient education, along with updating the medical fraternity on various developments in the management of diabetes, are required to combat the current diabetes epidemic in India.

Public health initiatives in the form of affordable DR screening programmes and awareness programmes will be needed to improve patient compliance with ophthalmic examinations and facilitate follow ups. A particular emphasis should be laid to strengthen the capacity of existing national and local institutions to provide screening services, to train eye-care personnel, and to develop low-cost interventions to improve compliance.<sup>19</sup>

Successful DR management programmes will be needed to maximize efficiency of healthcare resources. The development of lower-cost retinal cameras and lasers will make it more accessible for patients to receive treatment. A major consideration should be given to post graduate training programmes (retina fellowships etc.) with special emphasis on the diagnosis and management of diabetic retinopathy. Educating and empowering primary eye care workers with basic skills has been demonstrated as a feasible intervention in low-resource environments and will ensure that timely diagnosis and highest quality of care is instituted to the greatest number and at all levels of society.

The greatest challenge to the sustainability of DR management programs will be to ensure that patients are adequately followed-up and are compliant with treatment.

## Conclusion

The prevalence of DR was found to be 3.73 times significantly higher among rural patients when compared to the urban counterparts in patients reporting to a tertiary care diabetic center of western Uttar Pradesh. This means that we have to actively reach out to the neglected population and help them get diagnosed and managed effectively, in time, in order to reduce burden of this blinding disease from our country.

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