

Risk factors for diabetic retinopathy in rural India

Diabetes mellitus is a growing health problem in developing countries. According to the Diabetes Atlas, India with 40.9 million people with diabetes has already become the 'Diabetes Capital of the World' and this number is set to increase to 69.9 million by 2025.^[1] The prevalence of diabetes is growing rapidly in both urban and rural areas in India. In 1972, the prevalence of diabetes in urban areas was 2.1%^[2] and this has rapidly climbed to 12-16% representing a 600-800% increase in prevalence rates over a 30 year period.^[3,4] Till recently, the prevalence of diabetes was reported to be low in rural areas, but recent studies suggest that the prevalence rate is rapidly increasing even in rural areas,^[5,6] similar to the situation seen in developed countries of the world.

The explosion of diabetes in urban and rural India increases the propensity for developing complications of diabetes i.e. both small vessel (microvascular) and large vessel (macrovascular) disease.^[7] The complications of diabetes present a serious challenge to the health care system because people with diabetes have an increased mortality and morbidity compared with those without diabetes.^[8] Microvascular complications are more specific to diabetes and indeed, diabetic retinopathy (DR) is considered as the hallmark of diabetes. Recent epidemiological studies have provided valuable information on the prevalence of DR in the urban south Indian population.^[9-11] However, there is very few data on the prevalence of DR in rural population, where 72% of India's population lives. Although prevalence rates of diabetes are lower in rural areas, the absolute number of people with diabetes is actually higher (23.0 million) compared to urban areas (17.9 million). Screening for diabetes and its complications is hardly ever done in rural areas. This results in a large burden of undiagnosed diabetes and its associated complications due to delayed diagnosis and/or improper treatment.^[12]

In the light of these facts, the cross-sectional study by Rani *et al.*, in this issue^[13] is of interest. The authors studied a total of 26,519 rural self-reported subjects with diabetes (age \geq 30 years) who attended 198 DR screening camps conducted in three southern districts of Tamilnadu. The study reports on the prevalence and risk factors for the presence and severity of DR. The authors report that the prevalence of DR among the self-reported diabetic subjects, diagnosed using binocular indirect ophthalmoscope is 17.6% while that of sight threatening retinopathy was 5.3%. In the Aravind Comprehensive Eye Study conducted in a rural population in three districts of Tamilnadu [Madurai, Tirunelveli, and V.O. Chidambaranar], the prevalence of DR was 10.5% in type 2 diabetic subjects.^[14] Rani *et al.*,^[15] have earlier reported age and sex adjusted prevalence of DR to be 18% in rural areas (Kancheepuram and Vellore) and 17% in

the urban area (Chennai) in Tamil Nadu. It is of interest that the prevalence rate of DR reported in this rural study (17.6%) is similar to that reported among urban south Indian population based on retinal photography.^[9] The two earlier population based studies done in the neighboring states of Andhra Pradesh and Kerala in South India among urban self reported diabetic subjects have reported a 22.4% and 26.8% prevalence of DR, respectively. One would expect the prevalence of DR to be higher in a rural population. It is possible that if retinal photography were used, the prevalence of DR would have been higher in this study.

The prevalence of DR in persons with known diabetes was 17.8%, while in persons with newly detected diabetes (duration of diabetes <1 month) it was 10.2%. Persons with known diabetes had significantly higher prevalence of referable DR compared to newly detected diabetes [30.2% vs. 25.4%]. There is evidence that DR may be present even at the time of diagnosis of type 2 diabetes due to the insidious onset of this disease with estimates that on an average, the disease may set in up to 7 years before the initial diagnosis of diabetes.^[16] The prevalence of DR among newly diagnosed diabetic subjects in this study was 10.2%, which is higher than the figure of 7.3%, reported earlier in a clinic-based population^[17] as well as in an earlier population based study from the same region (5.1%).^[9]

Rani *et al.*,^[13] reported that duration of diabetes, lower BMI, systolic blood pressure, insulin intake, and male gender are risk factors associated with any DR. The risk factors associated with severity of DR were longer duration of diabetes, elevated systolic blood pressure, lower BMI, and those on insulin therapy. In another study of urban South Indian type 2 diabetic subjects, duration of diabetes, HbA1c, male gender, macroalbuminuria, and insulin therapy were identified as independent risk factors for the severity of DR.^[18] The risk factors identified in this study have been implicated as risk factors in the development of DR in many studies: duration of diabetes,^[18,19] hypertension,^[20] male preponderance,^[10,18] and insulin intake.^[18,21] However, the association of BMI and DR has not been consistently demonstrated in all studies. The current data shows that DR is related to lower BMI, as observed in the Cree population of James Bay^[22] and multiethnic population of Mauritius^[23] as well as the study by Rema *et al.*,^[9] in south India. However, in some studies conducted in developed countries, higher BMI is associated with DR subjects with type 2 diabetes.^[21,24]

With the prevalence of diabetes reaching epidemic proportions in India, DR is fast becoming significant cause of visual impairment. Scarcity of data on prevalence of DR is regarded as

one of the barriers to instituting and strengthening cost-effective prevention and control of visual impairment due to diabetes. In addition, identifying the risk factors for DR is imperative, given the association between the risk factors and increased morbidity. Regular screening for DR and more aggressive management of modifiable risk factors could reduce the numbers of people who develop sight-threatening retinopathy. Rural areas in developing countries like India have additional challenges such as the lack of awareness due to illiteracy and limited access to specialized health care facilities, which even if available, would be largely unaffordable due to the prevailing poverty. Therefore there is an urgent need to make diabetes care “Available, Accessible, and Affordable” to the rural population. Routine retinal screening in diabetic individuals is thus mandatory to detect DR in its early stages and thus reduce the burden due to DR in developing countries like India.

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