



A population-based, multiphasic, cross-sectional, prospective, observational study carried out in rural area of Sangli district of Maharashtra to determine prevalence of Diabetic retinopathy in rural Maharashtra

KEYWORDS

Diabetes Mellitus, Diabetic Retinopathy, funduscopy.

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ABSTRACT

The study aimed at increasing awareness regarding Diabetes Mellitus and its complications by evaluation of Diabetic Retinopathy using funduscopy as per age and sex distribution.

It was a cross-sectional study carried out in rural part of Sangli district of Maharashtra from January 2015 to June 2016 which included 1452 patients of age >40 years. Those with fasting blood sugar >126 mg% were further evaluated for presence of diabetic retinopathy. Patients were grouped into newly diagnosed and known diabetics. These patients underwent dilated ophthalmoscopic examination and Fundus photography.

Amongst 1452 subjects, 149 were diabetics which was 10.26% of the total participants.

Out of 149 diabetics, 5 were newly detected diabetics.

A prevalence of 5.3% of diabetic retinopathy was seen in the study group.

Introduction:

The prevalence of diabetes is rapidly rising all over the globe at an alarming rate¹. Based on a compilation of studies from different parts of the world, the World Health Organization (WHO) has projected that the maximum increase in diabetic population would occur in India².

Globally there are approximately 93 million persons living with DR, 17 million with the proliferative type and 21 million with the treatable form of macular edema. Approximately 38 million people with diabetes therefore have sight threatening diabetic retinopathy (ST-DR) and 1.85 million people are blind from diabetic retinopathy.

In India, the projected increase in the diabetic population by 2030 is a startling figure of 151% as compared to 54% in developed countries³.

Materials & methods:

Study design: population-based, multiphasic, cross-sectional, prospective, observational study. Required Ethical clearance from the College and the University was taken. Informed written consent was obtained separately from each study subject.

Inclusion criteria:

Subjects in the given population cluster >40 years of age

Exclusion criteria:

Patients non-compliant to follow-up

Patients <40 years of age

Sampling technique:

The three major components were:

I. Pre-camp: Preparation for screening camp, training and quality control;

All houses in the study area were numbered serially during listing and enumeration. A door-to-door survey of all households to distribute the household datasheet was conducted in study areas. The household datasheet contained details of demography, language, educational qualifications, occupation, residential

status, and history of ocular and systemic disease, if any. Eligible subjects were instructed to fast overnight for 8 hours and were informed about the ophthalmic screening camps organized at a convenient place in their locality a day prior. A standardized KAP adapted from the Sankara Nethralaya Diabetic Retinopathy Epidemiology and Molecular Genetic Study⁴ was administered in a suitable language to the health-care providers. Awareness camps were held in pre-selected areas a month prior to the screening camps targeting high risk populations. The awareness campaigns educate the community about DM in general and DR in particular through eye model demonstrations and pamphlets printed in local languages.

2. Camp: Screening for type 2 DM, medical history and questionnaire, anthropometric evaluation, ophthalmic examination and referrals;

On the day of the screening camp, the finger prick method of FBG estimation was performed by glucometer on eligible subjects. A trained CHW measured the BP of registered subjects. Hypertension was deemed to be present, if a subject had a history of high blood pressure diagnosed by a physician and/or current usage of anti hypertensive medications and/or a blood pressure reading of 140/90 mm Hg⁵ or more.

A questionnaire was administered; demographic information, and details regarding education, occupation and medical history were recorded. It recorded the duration and treatment of chronic diseases like diabetes and hypertension, family history of diabetes and degree of relatedness to the diabetic family member, symptoms related to complications of diabetes like nephropathy and neuropathy, tobacco intake and alcohol consumption. The ocular history included details of the last visit to an ophthalmologist, any existing ocular discomfort and prolonged medical or surgical interventions.

Body mass index (BMI): Height and weight of each subject was measured, and BMI calculated using the formula weight (kg) / height (m²). Based on their BMI values, subjects were assigned as underweight (<18.50 kg/m²), normal weight (18.50–24.99 kg/m²), overweight (25.00 kg/m²) or obese (30.00 kg/m²)⁶.

Waist circumference: Circumference of the abdomen was measured 2.5cm above the umbilicus and recorded as central obesity if 90 cm in males or 80 cm in females.

Ophthalmic Examination

Visual Acuity and Refraction:

VA was measured using Snellen's visual acuity chart.

Anterior Segment Examination:

Anterior segment evaluation including chamber depth and iris pattern to exclude Rubeosis irides was performed using a slit lamp

Intraocular Pressure:

A Perkins applanation tonometer was used to measure intraocular pressure in both eyes.

Dilated Fundus Examination:

A direct ophthalmoscope was used to examine the fundus of both eyes. While screening, documentation of the fundus was kept simplified as DR or no DR.

Referrals:

Those categorized as known diabetics (KD) or provisional diabetics (PD) were referred to the base hospital for further management and thus for all practical purposes, the post-camp was limited to subjects with type 2 DM.

3. Post-camp: Laboratory investigations and ophthalmic posterior segment assessment

Posterior Segment Assessment:

Classification of DR and Macular Edema: Subjects underwent direct ophthalmoscopic evaluation after pupillary dilatation. Modified classification of DR based on the degree of retinopathy was used for DR classification. The macular area was examined with a +78D lens to diagnose clinically significant macular edema as defined by the ETDRS⁷

Photographic Grading of DR: The grading of DR was based on photographs graded against the ETDRS⁷ standard photographs performed by a single experienced retinal specialist in an unmasked manner.

Results:

Mean age of the study subjects was 57.13 years. 40% were between the age of 41-50 years

The number of male participants in the study was more than female participants.

Both the genders showed maximum number in the age group of 41-50 years followed by 51-60 years (p-value = 2.05)

Highest number of study subjects were farmers and dairy owners by occupation.

In the study, total number of subjects with diabetes was 149. Of which, 144 were known diabetics and 5 were newly diagnosed diabetics.

Table no.1: Number of participants with Diabetes mellitus

	Number of patients	%
Total	1452	100%
Diabetics	149	10.26%

Amongst 149 diabetic subjects, 96 were male and 53 were female.

Out of 1452 study subjects, 422 had undergone eye check up in

the past 1 year

The study showed prevalence of 5.3% of diabetic retinopathy

Table no.2: prevalence of Diabetic Retinopathy

Total	1452	100%
DR	77	5.3%

The prevalence of diabetic retinopathy in males was 3.3% and females was 2.0% (p-value = 0.030)

Out of 149 diabetics, 48 males and 29 females showed DR changes.

An occurrence of 36.40% was found in the age group of 51-60 years which was the highest.

The prevalence of mild NPDR was highest (2.68%), followed by moderate NPDR (1.65%)

Of the 149 diabetics, 121 were on regular treatment while 28 were on and off medications.

Table no.3: Prevalence of diabetic retinopathy by grades

Grades NPDR	Diabetic retinopathy	% of DR
Mild	39	2.68%
Moderate	24	1.65%
Severe	6	0.41%
Very severe	5	0.34%
PDR	3	0.20%
PDR + HRC	0	0.00%
Total	77	5.3%

Diabetics who were irregular with their treatment of showed more severe degree of retinopathy

Amongst 77 subjects with diabetic retinopathy, 51.94% had co-existing hypertension while 3.89% had bronchial asthma.

Discussion:

The present study was a population-based, multiphasic, cross-sectional, prospective, observational study. The study was carried out from January 2015 to June 2016.

In this study, 1452 patients >40 years were examined for fasting blood sugar level. Those with fasting blood sugar >126 mg% were further evaluated for presence of diabetic retinopathy. Based on the past history patients were grouped as newly diagnosed (NDD) and known diabetics (KD). These patients underwent dilated ophthalmoscopic examination and Fundus photography. Based on the fundus findings and photographs presence / absence of diabetic retinopathy was determined and if present, grading of retinopathy was done.

Total 1452 subjects were examined for diabetic retinopathy changes.

Maximum number of subjects (67.35%) were in the age group of 41-60 years

Male preponderance was observed in the study with male participants being 51.45% of the total 1452 subjects.

Also the number of diabetics as well as those showing diabetic retinopathy changes was more in male participants (male 6.43%, female 4.11%)

Amongst 1452 subjects, 149 were diabetics which was 10.26% of the total participants.

Out of 149 diabetics, 5 were newly detected diabetics. They were unaware about their diabetic status because of absence of any symptoms or complaints, lazy attitude towards regular health check up.

History of previous eye examination was given by 422 (29.06%) of the participants.

In the present study, 38 (2.6%) such participants were diabetics, who have undergone previous eye check up mostly for refractive error, which emphasizes on the observation that there is a considerable magnitude of unawareness regarding ocular manifestations of diabetes.

A prevalence of 5.3% was seen when the total population studied i.e., 1452 was taken into account.

Study	Prevalence
SN-DREAMS III8	10.4%
AJ-DRUMSS9	14.5%
PRESENT STUDY	5.3%

Studies conducted in urban and slum areas showed prevalence of diabetic retinopathy of 10.4% and 14.5% respectively; the present study conducted in the rural area of Western Maharashtra showed a prevalence of 5.3%.

Around 63% of the participants belonged to the labourer class which included farmers and milkmen. 8.6% were in teaching profession and most of the female participants were housewives (28.6%). However, there was no significant correlation between the type of occupation and presence of diabetes / diabetic retinopathy (p-value = 2.62)

Out of 149 diabetics, 121 were taking anti-diabetic medications regularly. Remaining 28 were on and off treatment. Also the grade of DR in these 28 subjects was more severe than the rest. The primary reason for not following the treatment regime being the symptomatic / temporary relief from the treatment. Notably, the patients fail to understand that to maintain a state of health, the treatment needs to be continued for longer duration; in most cases, lifelong.

This again brings to the light the fact that, diminution of vision, which happens to be the most common presenting complaint can be caused by factors apart from refractive error and the gross lack of knowledge regarding diabetes and its ocular effects causes the negligence on the patient's part.

Conclusion:

There was a significant lack of knowledge amongst the study subjects regarding diabetes and its complications, especially related to the eye, which led to a neglect towards ocular as well as systemic health.

It was also observed that these subjects were unacquainted with the fact that vision loss has many other causes than just refractive error showing an absolute lack of awareness regarding diabetic retinopathy.

Diabetic retinopathy being the very notorious cause of blindness worldwide can be brought under control or at least its progression can be checked if detected and treated early.

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