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Diabetic Retinopathy among Self-Reported Diabetics; A Population Based Study.

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ABSTRACT

Background: DM is emerging as epidemic throughout the country in recent years. DM has been proved as potential threat for the visual impairment in India predominantly in rural population. Therefore, present study was designed to assess that prevalence of diabetic retinopathy among self reported DM patients in South India. **Methods:** The present study included 1990 randomly selected subjects of 50 years and above age group. Out of these subjects 100 participants gave a history of diabetes mellitus (DM). Assessment for diabetic retinopathy was independent of blood sugar levels in our study and based on a self reported history of diabetes. We elicited a history of current use of insulin to control diabetes. A modified classification of diabetic retinopathy based on the retinopathy levels used by Klein et al was used in our study. The presence of clinically significant macular oedema (CSMO) was assessed using indirect and direct ophthalmoscopy. **Results:** Results of the current study revealed that there was 27% prevalence of diabetic retinopathy among the self reported diabetic patients. Further, an increase prevalence of diabetic retinopathy with advance age was recorded in our study. However, this increase with age was statistically insignificant (p = >0.05). Similarly, there was an insignificant relation between sex and prevalence of diabetic retinopathy (p = >0.05). **Conclusion:** Findings of the present study suggest that there is remarkable prevalence of diabetes in population of South India. Further, prevalence of diabetic retinopathy was still more in self reported DM patients. This untreated diabetic retinopathy may leads to various degree of visual impairment in self reported DM patients. However, sustaining strict glycaemic control and regular ophthalmic examination help in preventing incidence of blindness in diabetic retinopathy patients.

Keywords: Self reported, Diabetes Mellitus, Diabetic Retinopathy, Elderly.

INTRODUCTION

Incidence of diabetes mellitus (DM) has been found increasing with the advancement of age.[1,2] DM is considered as potential risk for the loss of visual acuity due to retinopathies.[3,4] Gradually a large number of Indian populations is becoming over 60 years. It is estimated that over 60 populations was 76 million in 2000; which will become more than 137 million by 2021.[5] It has been estimated that this increase in number of elderly population will be 195% by 2025 compare to 1995.[6] A large number of blind subjects belong to India. This blind subject's population attribute to one fourth of the total world blind population. Increase in prevalence various chronic diseases like DM may further add to this numbers.[7]

DM is emerging as epidemic throughout the country in recent years. DM has been proved as potential threat for the visual impairment in India predominantly in rural population. 8 Most of the studies on diabetic retinopathy are based on hospital studies.[9–11] Therefore, present study was designed to assess that prevalence of diabetic retinopathy among self reported DM patients in South India.

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MATERIALS AND METHODS

The present study included 1990 randomly selected subjects of 50 years and above age group. Out of these subjects 100 participants gave a history of diabetes mellitus (DM). Among these 100 DM patients, 52 patients were males while 48 patients were female. Verbal informed consent was obtained from all participants at the examination site.

Those physically unable to attend the examination site and those failing to come after repeated follow up contacts were offered the ocular examination at home. Presenting distance visual acuity and visual acuity with best correction after refraction were measured using illiterate E log MAR charts, distance visual acuity was measured at 4metres and 1 metre. When necessary testing included the ability to count fingers, to detect hand movements, or to perceive light. "No light perception" was assigned to

absent/phthisical eyes. External eye and anterior segment examinations were performed using slit lamp biomicroscopy. Fundus examinations were performed using a direct ophthalmoscopy and indirect ophthalmoscopy using a 20D lens after dilatation of the pupils.For reporting of vision status, we placed subjects in one of five vision categories:[10]

(1) NN: normal or near normal vision,>6/18 in both eyes;
(2) VI: unilateral or bilateral visual impairment, <6/18 to >6/60 in the worse eye and > 6/60 in the better eye;
(3) UL: unilateral blindness, <6/60 in the worse eye and >6/60 in the better eye;
(4) MB: moderate bilateral blindness, visual acuity < 6/60 in the worse eye and <6/60 to >3/60 in the better eye;
(5) SB: severe bilateral blindness, visual acuity <3/60 in both eyes.

Assessment for diabetic retinopathy was independent of blood sugar levels in our study and based on a self reported history of diabetes. We elicited a history of current use of insulin to control diabetes. A modified classification of diabetic retinopathy based on the retinopathy levels used by Klein et al[12] was used in our study. The presence of clinically significant macular oedema (CSMO) was assessed using indirect and direct ophthalmoscopy.

Presence of retinal photocoagulation scars was assessed using indirect ophthalmoscopy. Fundus photography was not performed because of the high costs involved.

Before the examination, a trained nurse measured the blood pressure of each study participant with a mercury column sphygmomanometer using a standardised technique.[13]

Body mass index (BMI) measures were estimated from height and weight measurements of individual subjects; BMI was defined as weight (kg)/height (m^2). Body weight was measured with the subject standing erect and motionless on weighing scale. Subjects were classified as lean if the BMI was <20 for males and <19 for females; as normal if the BMI was between 20–25 for males and between 19–24 for females; as overweight if the BMI was between 25–30 for males and between 24–29 for females, and obese if the BMI was >30 for males and >29 for females. We used spss software manufactured by USA for statistical analysis. Odds ratios (OR) and 95% confidence intervals (95% CI) are presented. Confidence intervals of the prevalence estimates have been calculated using a binomial approximation of normal distribution. The p values less than 0.05 was considered as statistical significant.

RESULTS

Results of the present study showed that present study included 1990 randomly selected subjects of 50 years and above age group. Out of these subjects 100 participants gave a history of diabetes mellitus (DM). Among these 100 DM patients (5.02%), 52 patients were males while 48 patients were females. The mean age of all the self reported patients was 62.8 ± 9.6 years.

[Table 1] shows that was most of the self reported diabetic patients were suffering with type 2 diabetes (n = 103, 93.6%). Out of all diabetes patients 74 (67.2%) patients were suffering with DM since last 10 years.

Results of the current study revealed that there was 27% prevalence of diabetic retinopathy among the self reported diabetic patients. Further, an increase prevalence of diabetic retinopathy with advance age was recorded in our study. However, this increase with age was statistically insignificant (p = >0.05). Similarly, there was an insignificant relation between sex and prevalence of diabetic retinopathy (p = >0.05).

Table 1: Distribution of patients according to various characteristics.

Characteristics	With Retinopathy		Without Retinopathy		Total Patients	
	Number of patients	Percentage of patients (%)	Number of patients	Percentage of patients (%)	Number of patients	Percentage of patients (%)
Age (years) 50-59 60-69 ≤70	10 9 8	22.5% 25% 40%	34 27 12	77.5% 75% 60%	44 36 20	44% 36% 20%
Sex Male Female	15 12`	28.8% 25%	37 36	71.2% 75%	52 48	52% 48%
Place of Residence Urban Rural	9 18	37.5% 23.7%	15 58	62.5% 76.3%	24 76	24% 76%
Literacy Illiterate Literate	19 8	29.3% 22.9%	46 27	70.7% 77.1%	65 35	65% 35%
Duration of diabetes (years) < 5 5-10 >10	15 8 4	22% 22.9% 17.3%	37 27 19	88% 77.1% 82.6%	42 35 23	42% 35% 23%
Total	27	27%	73	73%	100	100%

It is evident from [Table 2] that most of the patients suffering with mild NPDR (13%) followed by moderate NPDR (6%), CSMO (5%), PDR (2%) and severe NPDR (1%).

Table 2: Distribution of patients according classification of diabetic ratinopathy.

	Number of patients	Percentage of patients (%)
Without Retinopathy Patients	73	73%
Mild NPDR	13	13%
Moderate NPDR	6	6%
Severe NPDR	1	1%
COSMO	5	5%
PDR	2	2%
Total	100	100%

Table 3: Blindness and low vision in patients in self-reported diabetes patients.

	With Retinopathy		Without Retinopathy	
	Number of patients	Percentage of patients (%)	Number of patients	Percentage of patients (%)
Vision 6/18 in both eyes				
PVA	17	62.9%	55	75.3%
BCVA	19	70.3%	60	82.1%
Vision <6/18 to >6/60 in the worse eye and >6/60 in better eye				
PVA	4	14.8%	10	13.6%
BCVA	3	11.1%	5	6.8%
Vision <6/60 in the worse eye and >6/60 in better eye				
PVA	4	14.8%	4	5.4%
BCVA	3	11.1%	5	6.5%
Vision <6/60 in the worse eye and <6/60 to >3/60 in better eye				
PVA	1	3.7%	2	2.7%
BCVA	1	3.7%	1	1.3%
Vision <3/60 in both eyes				
PVA	1	3.7%	1.3%	
BCVA	1	3.7%	1	1.3%

Table 4: Aetiology for blindness and low vision in patients in self reported diabetes patients.

Causes	Number of patients	Percentage of patients (%)
Refractive error	5	41.6%
Cataract	3	25%
Age related maculopathy	1	8.3%
Retinal detachment	1	8.3%
Posterior capsule opacification	1	8.3%
Clinically significant macular oedema	1	8.3%
Total	12	100%

No symptom of diabetic retinopathy was observed in patients without diabetes. Five patients out of all diabetic patients including two patients with diabetic retinopathy were bilaterally blind at the <6/60 visual acuity level [Table 3]. Blindness was attributed to diabetic retinopathy for one of these four eyes presenting bilaterally blind. After best correction with refraction, only one patient remained bilaterally blind. Further, results of our study showed that best corrected vision better than 6/18 was significantly higher in without diabetic retinopathy patients in comparison of patients with diabetic retinopathy (p= <0.05).

[Table 4] shows that refractive errors and cataract were the major causes of low vision and blindness among patients with diabetic retinopathy.

DISCUSSION

There will be a high prevalence of DM in India by the year of 2025. Diabetic retinopathy is one of the most common complications associated with DM. Moreover, diabetic retinopathy is one of the important ophthalmic disease which leads to loss of vision; however, preventive measure for diabetic retinopathy may help in decrease of progression of the disease.[6]

Limitation of present study is that we have included only DM patients with a self reported history of diabetes and we have not performed any test for measurement of blood sugar level. It has been reported that there is 5.1% prevalence of DM in Indian population.[5]

Results of the current study showed that 5.2% prevalence of DM among the study population. Further, there was 27% prevalence of diabetic retinopathy in our study population. These findings are in agreement with the earlier study of Dandona L et al[8] as they recorded incidence of diabetic retinopathy in 22.4% patients among self reported DM patients of Andhra Pradesh. Similarly, in another study Rema M et al,[9] observed 34.1% incidence of diabetic retinopathy among DM patients of South Indian population. On the other hand, Sparrow JM et al,[14] reported prevalence of diabetic retinopathy among DM patients as high as up to 52%. Alike various other studies reported very high prevalence of diabetic retinopathy among DM patients.[15-19] There are studies which found diabetic retinopathy as potential threat for visual acuity.[3, 4]

We have recorded that five patients out of all diabetic patients including two patients with diabetic retinopathy were bilaterally blind at the <6/60 visual acuity level. Further, present study showed that refractive errors and cataract were the major causes of low vision and blindness. Cataract can be removed by surgery which in turn improves the vision. However, diverse studies have suggested that increase risk of blindness increases even after cataract surgery in diabetic retinopathy patients. [20-25] Nevertheless, we have observed that best corrected vision better than 6/18 was significantly higher in DM patients without diabetic retinopathy in comparison of patients with diabetic retinopathy.

Further, present study did not observe any significant relation of age, sex and BMI with diabetic retinopathy. These findings are supported by previous studies as they recorded no significant relation age, sex and BMI with diabetic retinopathy. However, similar to our study they observed a

significant relation between duration of diabetes and diabetic retinopathy.[21,23,25]

In India 90% of the blindness is caused by cataracts and refractive errors; nonetheless diabetic retinopathy accounts for very few cases of blindness compare to other eye diseases. Similarly, present study founded diabetic retinopathy account for blindness in 1.3% population. Nonetheless, studies suggest there will be a significant increase in incidence of blindness in India due to higher incidence of DM by 2025.[12,22,24]

Further, studies suggest that early diagnosis and management of DM may lead to decrease the risk of visual impairment and burden of blindness. Regular examination of dilated fundus is an unavoidable for the early diagnosis of diabetic retinopathy.[16,19,23]

Lasers technique is considered as most successful method for correcting the visual acuity in comparison of spectacles and cataract surgeries.[15,18,19] However, cost of intervention for diabetic retinopathy is high in comparison of spectacles and cataract surgery. Studies suggest that there will be a huge increase of diabetic patients by 2025 which means there will more than 5 million patients suffering with diabetic retinopathy. This will require surgical or lesser treatment which will be additional to the frequently prevalent surgeries and lesser for diseases like cataract and refraction errors.[9,10]

Reports suggest that there will be a great burden of surgeries which be additional to cataract surgeries in developing countries like India where previous task of cataract surgeries are incomplete even after great efforts. Therefore, prevention of that diabetic retinopathy is essential in India instead of treating the condition. To prevent diabetic retinopathy, it is essential to control blood sugar level within normal limits and regular time to time examination of eyes for early detection of retinopathy.[3,8,10]

CONCLUSION

Findings of the present study suggest that there is remarkable prevalence of diabetes in population of South India. Further, prevalence of diabetic retinopathy was still more in self reported DM patients. This untreated diabetic retinopathy may leads to various degree of visual impairment in self reported DM patients. However, sustaining strict glycaemic control and regular ophthalmic examination help in preventing incidence of blindness in diabetic retinopathy patients. Therefore, we strongly suggest to make a nationalise policy for timely diagnosis and various programmes for screening of the diabetic retinopathy in DM patients; which might be helpful in decreasing incident of diabetic retinopathy in DM patients especially among the underserved populations.

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