PREVALENCE OF DIABETIC RETINOPATHY AMONG INDIVIDUALS SCREENED POSITIVE FOR DIABETES IN FIVE COMMUNITY-BASED EYE CAMPS IN NORTHERN KARACHI, PAKISTAN

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Background: Population-based data on the prevalence of diabetic retinopathy in Pakistan are lacking. We determined the prevalence of diabetic retinopathy among individuals screened positive for diabetes in five community-based eye camps in northern Karachi, Pakistan. **Methods:** In summer 2002, five community-based eye camps were set up in Karachi, Pakistan's largest city. All individuals aged 30 years or older who visited the camps were requested to participate in the study. Those who agreed were screened for diabetes and those found to have the disease were referred to an eye hospital for diabetic retinopathy screening. Verbal informed consent was obtained from all participants at the examination site. Our main outcome measure was diabetic retinopathy, which was classified as non-proliferative diabetic retinopathy (NPDR), severe NPDR, and proliferative diabetic retinopathy (PDR). Our grading was based on clinical examination. **Results:** A total of 912 subjects were screened for diabetes mellitus. Of these, 160(17.5%) had diabetes- 1.8% had type I diabetes and 15.9% had type II diabetes. One hundred and eight individuals visited the hospital for ophthalmic examination. Of them, 15.7% had diabetic retinopathy. The prevalence of diabetic retinopathy was higher among individuals with type I diabetes, with greater duration of diabetes, and among women. The commonest form of diabetic retinopathy was non-proliferative (76.5% [mild: 35.3 %, moderate: 29.4 %, and severe: 11.8 %]), followed by maculopathy (17.6 %) and proliferative diabetic retinopathy (5.9 %). **Conclusion:** More systematic and population-based research is needed to estimate the prevalence of and identify risk factors for diabetic retinopathy in Pakistan.

Key words: diabetic retinopathy, prevalence, Karachi, Pakistan

INTRODUCTION

Individuals with diabetes are 25 times more likely to become blind than individuals without this disease. In many developed countries, diabetic retinopathy is the leading cause of new cases of visual impairment and blindness among adults aged 20-74 years. Among people with type 1 diabetes; about 25% have diabetic retinopathy during the first 5 years and about 100% in two decades. Among people who have type 2 diabetes, around 21% have retinopathy at diagnosis, [1] and more than 60% have diabetic retinopathy during the first two decades of the disease.[2] Diabetes occurs at a much younger age in South Asian countries than it does in developed countries.

Pakistan has a population of 154 million. More than 10% of its adult population has diabetes.[3-5] Although the country ranks 6th among countries with the highest burden of diabetes,[6] population-based data on the prevalence of diabetic retinopathy in Pakistan and on the visual impairment due to diabetic retinopathy are lacking. Data that are available are hospital-based.[7-12]

We determined the prevalence of diabetic retinopathy among individuals screened positive for diabetes in five community-based eye camps in northern Karachi, Pakistan.

MATERIAL AND METHODS

During July and August 2002, we set up five community-based eye camps in northern Karachi, Pakistan largest city. A multi-ethnic metroplolis, Karachi's diverse population of 15 million includes all major ethnic groups in Pakistan: Sindhi, Muhajir, Pakhtoons, Baloch and Punjabis. All individuals aged 30 years and above who visited the eye camps were requested to participate in the study. All of them (n=912) agreed to participate. They were screened for diabetes and those found to have the disease were referred to an eye hospital for diabetic retinopathy screening. Verbal informed consent was obtained from all participants. An ophthalmologist examined the anterior segment of the subject using slit lamp and measured the intraocular pressure with applanation tonometer, and performed dilated funduscopy with a 90-dioptre hand held fundus viewing lens using a Topcon slit lamp. This was supplemented by indirect ophthalmoscopy if peripheral abnormalities were detected or suspected. The presence or absence of any diabetic retinopathy was recorded. Diabetic retinopathy was classified as non-proliferative diabetic retinopathy (NPDR), severe NPDR, and proliferative diabetic retinopathy

(PDR). The presence of clinically significant macular oedema (CSMO) was assessed using indirect and direct ophthalmoscopy. Stereoscopic photographs of the macula and optic disc were obtained with a Topcon fundus camera in subjects having any evidence of diabetic retinopathy. Photographs of all the standard photographic fields of the fundus were not taken. However, the major findings used to classify diabetic retinopathy were photographed. Grading was based on clinical examination, with photographs serving as documentation.

The data was entered and analyzed using Epi Info 6.0. Simple frequencies of the dependent variable and their proportions were calculated and compared according to groups, sex and type of diabetes.

RESULTS

We screened a total 912 subjects in the eye camps. Of them, 160(17.5%) had diabetes,1.8% had type I diabetes and 15.9% had type II diabetes (table-1). Around two-thirds of the diabetics (108/160) visited the hospital as requested and were examined. Their age-sex distribution and other characteristics are shown in table 2. Of individuals we examined, 17(15.7%) had diabetic retinopathy (table 3). Eight of them(47.1%) were aged 30-49 years. The prevalence of diabetic retinopathy was higher among individuals with type I diabetes (44.4%) compared with type II diabetes (13.1%). But the difference was not statistically significant (p = 0.43). Women compared with men were slightingly more likely to have diabetic retinopathy (16.4 % vs. 14.9%) but the difference was also not statistically significant (P = 0.83). The prevalence of diabetic retinopathy was associated with the duration of diabetes mellitus: 0 %, 12.1%, 17.6%, 36.4% and 42.9% among the newly diagnosed, those diagnosed < 5 years ago, 5-9 years ago, 10-14 years ago, and = 15 years ago, respectively. The commonest form of diabetic retinopathy was non-proliferative (76.5% [mild: 35.3 %, moderate: 29.4 %, and severe: 11.8 %]), followed by maculopathy (17.6 %) and proliferative diabetic retinopathy (5.9 %) (table 4).

Out of 17 individuals with diabetic retinopathy, one needed pan-retinal photocoagulation with follow up and tight control of diabetes whereas 3 needed focal laser + grid to macula + follow up and tight diabetic control.

DISCUSSION

In our study, the prevalence of diabetic retinopathy among diabetics was 15.7% (17/108) which is lower than that (21-60 %) reported in other studies conducted in Karachi and other cities in Pakistan.[7 11 13-16]. The reason behind these differences could be that all the other studies were hospital-based and were not conducted under similar circumstances. Because of the small sample size and non-representative nature of the sample, the observed prevalence cannot be generalizable to the general population: First, people who were screened for diabetes were those who had eye diseases. It may have caused an overrepresentation of diabetics in the sample because several eye diseases are more prevalent among diabetics than their non-diabetic counterparts. Second, a third of diabetics did not participate in the screening for diabetic retinopathy which may have either overestimated or underestimated the prevalence of diabetic retinopathy, depending on the rates of diabetic retinopathy among non-respondents.

In our study, women had a slightingly greater prevalence of diabetic retinopathy than men (16.4 % vs. 14.9%)-although the difference was not statistically significant (p: 0.83).

Table 1 Prevalence of diabetes mellitus by type among selected subject (n=912) in a study in Karachi, Pakistan

Type of DM	Frequency (n = 912)	%
IDDM	16	1.7
NIDDM	144	15.8
Non-diabetics	752	82.5

Table 2 Characteristics of the selected individuals with diabetes (n=108) in a study in Karachi, Pakistan

Characteristics	**No**	**%**
Age group (in years)		
30-39	12	11.1
40-49	35	32.4
50-59	35	32.4
60-69	20	18.5
= 70	6	5.6
Sex		
Male	47	43.5
Female	61	56.5
Occupation		
Housewife	61	56.5
Employed	24	22.2
Unemployed	23	21.3
Type of diabetes		
IDDM	9	8.3
NIDDM	99	91.7
Duration of Diabetes		
Newly diagnosed	23	21.3
< 5 years	33	30.6
5-9 years	34	31.5
10-14 years	11	10.2
= 15	7	6.5

Table 3 Prevalence of diabetic retinopathy by age-groups, sex, and type of diabetes among diabetics (n=108) in a study in Karachi, Pakistan

	Diabetics	Number of subjects with diabetic retinopathy	% of diabetic retinopathy
Diabetic retinopathy	108	17	15.7
Age group (in years)			
30-39	12	4	33.3
40-49	35	4	11.4
50-59	35	7	20.0
60-69	20	2	10.0
= 70	6	--	--
Sex			
Male	47	7	14.9
Female	61	10	16.4
Occupation			
Housewife	61	10	16.4
Employed	24	5	20.8
Unemployed	23	2	8.7
Type of diabetes			
IDDM	9	4	44.4
NIDDM	99	13	13.1
Duration of Diabetes			
Newly diagnosed	23	--	--
< 5 years	33	4	12.1
5-9 years	34	6	17.6
10-14 years	11	4	36.4
= 15	7	3	42.9
Occupation			
ousewife	61	10	16.4
Employed	24	5	20.8
Unemployed	23	2	8.7

Table 4 Types of diabetic retinopathy observed in among diabetics (n=108)in Karachi, Pakistan.

Type of diabetic retinopathy	No.	%
Mild non-proliferative diabetic retinopathy	6	35.3
Moderate non-proliferative diabetic retinopathy	5	29.4
Severe non-proliferative diabetic retinopathy	2	11.8
Proliferative diabetic retinopathy	1	5.9
Maculopathy*	3	17.6

Table 5 Action needed in a study of diabetics (n=108) in Karachi, Pakistan.

Action needed	Frequency (%)
12 month follow up	89 (82.4)
6 month follow up	11 (10.2)
3 month follow up	2 (1.8)
Pan-retinal photocoagulation + follow up	1 (0.9)
Focal laser + grid to macula + follow up	3 (2.8)
Others	2 (1.8)

The most prevalent type of diabetic retinopathy is our study was NPDR which accounted for 76.4% of the cases. In a study by Khan in Karachi[13], NPDR accounted for 79.1% of the cases compared with 92%, 89.3-94.0% and 69.8% in studies conducted in Australia, India and Oman, respectively. We found a low prevalence of PDR out of all retinopathies (5.8%). This is lower than those reported in hospital based studies in Pakistan and elsewhere. The severity of retinopathy is primarily related to the duration of diabetes, and exposure to various internal and external ocular factors. This lower prevalence of maculopathy can be explained by the fact that majority of our participants were young.

Many studies have found duration of diabetes to be an important predictor of diabetic retinopathy. After 20 years, nearly 60 % people with type 1 diabetes, and around 40% with type 2 diabetes have proliferative diabetic retinopathy. Consistent with previous studies, the prevalence of diabetic retinopathy was higher among individuals with greater self-reported duration of diabetes than those with shorter duration of disease.

More systematic and population-based research is needed to estimate the prevalence of and identify risk factors for diabetic retinopathy in Pakistan.

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