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Research Article

Prevalence and associated factors for Development of Diabetic Retinopathy in Clinic Followed up Cohort of Diabetic Patients in a Hospital Set up in Sri Lanka

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Abstract: This study was carried out to describe the prevalence of diabetic retinopathy and associated factors for development of DR in a cohort of patients routinely followed up in a hospital setting in Sri Lanka. An analytical cross sectional study was carried out using past patient medical records coupled with detailed clinical examination of eyes of Diabetic patients attending to Vijaya Kumaratunga Hospital, Seeduwa, Sri Lanka. Diabetic retinopathy was graded as Non proliferative diabetic retinopathy (NPDR), proliferative retinopathy (PDR) and macula oedema. Multiple logistic regressions was carryout to determine associated factors. In results there were 176 type 2 diabetic patients and 59 (33.5%) were males. Median age of the participants was 58 (25th and 75th percentiles 53 and 64) years. The overall prevalence of DR was 38.6% (35.6% among males and 40.2% among females). Commonest type of retinopathy among females was NPDR (22.2%) and among males it was both NPDR and (CSMO) Macular oedema (13.6%). Duration of diabetes was the only identified associated factor. ($p = 0.024$). In discussion the Prevalence of DR found from this study was higher than the reported value for Sri Lanka in 1993 and among the other Asian studies. Time duration was only identified as an associated factor for DR. Selection bias can be a limitation in this study since we evaluated a clinic attending compliant diabetics.

Keywords: diabetic retinopathy, prevalence, Sri Lanka

INTRODUCTION

Diabetes mellitus is fast becoming a major cause for morbidity and mortality in Sri Lanka, as well as the rest of the world[1-2]. Diabetic retinopathy (DR) is one of the non lethal, yet dangerous complications of diabetes. Diabetic retinopathy is responsible for 4.8% of the 37 million cases of blindness due to eye diseases in the world[3]. World Health Organization estimated that in 2002 diabetic retinopathy accounted for about 5% of worlds' blindness, which represents almost 5 million individuals. Since the incidence of diabetes gradually increases, there is the possibility that more individuals will suffer from eye complications which, if not properly managed, may lead to permanent eye damage[3].

The priority blinding diseases identified by the Sri Lankan College of Ophthalmologists' in 2012 are cataract, blindness in children, glaucoma, diabetic retinopathy and refractive errors[4]. Diabetic retinopathy ranges from mild non-proliferative abnormalities, characterized by increased vascular permeability; to moderate and severe non-proliferative diabetic retinopathy (NPDR), characterized by vascular occlusion; to proliferative diabetic retinopathy (PDR), characterized by the growth of new blood vessels on the retina and posterior surface of the vitreous. Macular edema is characterized by retinal thickening from leaky blood vessels, which can develop at any stage of retinopathy[5].

Diabetic retinopathy is considered to be the result of vascular changes in the retinal circulation. In the early stages, vascular occlusion and dilations occur in the retina and it progresses into a proliferative retinopathy with the growth of new blood vessels. Macular oedema (the thickening of the central part of the retina) significantly decreases the visual acuity[6].

The duration of diabetes is probably the strongest predictor for development and progression of retinopathy. Among younger-onset patients with diabetes in the WESDR (Wisconian epidemilogic study of diabetic retinopathy), the prevalence of any degree of retinopathy was 8% at 3 years, 25% at 5 years, 60% at 10 years, and 80% at 15 years. The prevalence of PDR was 0% at 3 years and increased to 25% at 15 years[7]. The incidence of retinopathy also increased with increasing duration.

There are only few documented studies carried out on diabetic retinopathy in Sri Lanka. One of which, in 1993 reported that the prevalence of diabetic retinopathy to be 31.3% (95% confidence interval

28.0% to 31.6%) among patients attending a diabetic clinic[8].

Once vision has been lost due to diabetic retinopathy, it usually cannot be restored, although some forms of retinopathy can be treated by complex vitreo-retinal surgery. Health education programmes and screening programmes for detecting diabetic retinopathy at a stage at which treatment can prevent visual loss are the mainstay of prevention of irreversible blindness among these patients. Treatment and care for diabetic retinopathy is relatively expensive and requires properly trained eye-care professionals[9].

Considering the differences in management of diabetic patients in clinics as well as their level of compliance, it is important to assess the prevalence of different types of diabetic retinopathies and factors associated with development of DR.

Objectives

To determine the prevalence of diabetic retinopathy and its sub types among patients with diabetes mellitus and to determine the factors associated with development of diabetic retinopathy.

MATERIALS AND METHODS

This was an analytical cross sectional study designed to determine the prevalence of DR, to determine the factors for development of DR of patients attending the diabetic clinic in Seeduwa Vijaya Kunmaratunga hospital in Sri Lanka. The hospital is situated 20 kilometres north the capital, Colombo. The target population was persons who have been diagnosed with diabetes mellitus and being followed up in the hospitals' diabetic clinic. All consecutive patients attending the diabetic clinic during the study time were enrolled in the study after informed written consent.

An interviewer administered questionnaire coupled with slit lamp examination of the fundus and past medical records were used for collection of data. Data on first date of diagnosis of diabetes mellitus, the first date of diagnosis of retinopathy were collected using records of the patients (Eye examinations are being carried out in every six months at this clinic). Past medical records and cross-checking with other records were carried out to ensure the accuracy of data on dates. A trained medical graduate carried out the interviews and an ophthalmologist with more than 5 years of experience carried out the clinical examinations of the eyes.

Diabetic retinopathy was graded as Non proliferative diabetic retinopathy (Background and pre proliferative retinopathy), proliferative retinopathy and macula oedema (diabetic maculopathy) according to the Diabetic retinopathy guidelines by Royal College of ophthalmologists[10]. Patients who stated that they were following diabetic diet sheets were considered as being on diet control, and patients involved in exercises for more than 150 minutes per week were defined as those on exercise control (whether or not they were on drugs for controlling diabetes). Patients who have taken anti diabetic drugs for more than the half of time they had diabetes were considered as taking that drug. Presence of written evidence or clinical features was considered as having chronic co-morbidities.

Descriptive data were presented as frequencies and percentages. Continuous data were summarized using mean with standard deviations and range. Categorical data were summarized using the percentages with 95% confidence intervals. Box and Whisker plots were drawn for comparison of duration for development of DR. Multiple logistic regression was carried out and significances were also calculated.

RESULTS

Sample consisted of 176 individuals, of which 59 (33.5%) were males. Median age of the participants was 58 years, where the 25th and 75th percentiles were 53 and 64 years respectively. All had type 2 Diabetes Mellitus. Seventy nine (44.9%) had family history of diabetes mellitus. Ninety three (52.8 %) had co-morbidities. Forty three (24.4%) were on diet control and 14 (8%) were on exercise control in addition to drug control. Mean duration of diabetes mellitus was 8.37 (SD - 6.8) for males and 9.02 (SD - 7.1) for females (p=0.6).

Twenty one (35.6%) males and 47 (40.2%) of the females had at lease some degree of diabetic retinopathy on examination. The different types of retinopathies are shown in table 1.

Table 1: Prevalence of different types of retinopathies by gender among diabetic patients in Seeduwa Vijaya Kumaratunge hospital

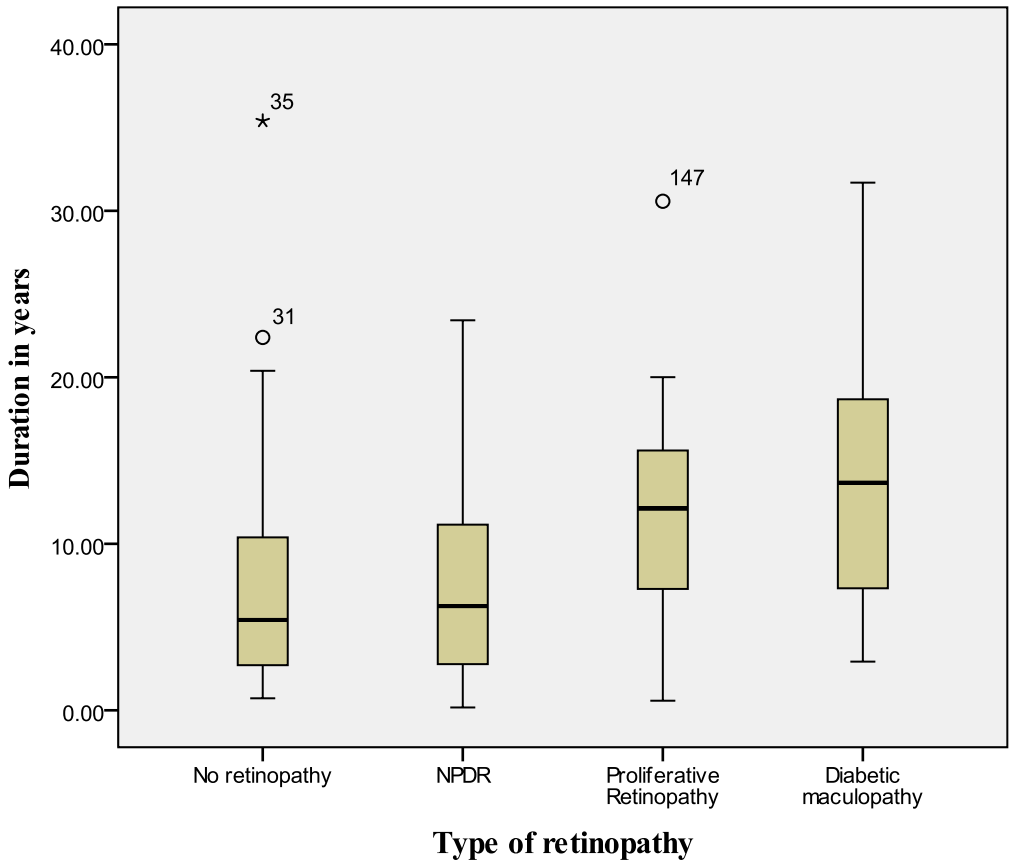
Gender	No retinopathy N (%) 95% C.I.	NPDR N (%) 95% C.I	Proliferative N (%) 95% C.I	Macular oedema N (%) 95% C.I
Male	38(64.4%) (51.7-75.4)	8(13.6%) (7-24.6)	5(8.5%) (3.7-18.3)	8(13.6%) (7-24.6)
Female	70(59.8%) (50.8-68.2)	26(22.2%) (15.6-30.5)	10(8.6%) (4.7-15)	11(9.4%) (5.3-16)
Total	108(61.4%) (54-68.2)	32(18.2%) (13.2-24.5)	15(8.5%) (5.2-13.5)	19(10.8%) (7-16.2)

Commonest type of retinopathy among females according to the table 1 is NPDR (22.2%) and among males it was both NPDR and Macular oedema (13.6%). Mean age of patients without diabetic Retinopathy was 57.6 (SD - 8.4) years and 59.4 (SD - 8.9) years among patients with DR (p=0.16).

Table-2: Significances of factors associated with diabetic retinopathy

Model	Unstandardized Coefficients		Standardized Coefficients	t	Significance	95% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	-0.346	0.366		-0.943	0.347	-1.069	0.378
Age in years	0.007	0.004	0.119	1.516	0.131	-0.002	0.015
Sex	0.023	0.077	0.023	0.301	0.764	-0.129	0.176
Presence of family history	-0.056	0.076	-0.057	-0.728	0.468	-0.207	0.095
Presence of co-morbidities	-0.034	0.074	-0.035	-0.464	0.644	-0.181	0.112
Taking Metformin	0.373	0.193	0.150	1.932	0.055	-0.008	0.755
Duration of diabetes in years	0.013	0.006	0.182	2.285	0.024	0.002	0.024
Taking Glibenclamide	-0.019	0.077	-0.019	-0.245	0.807	-0.171	0.134
Taking Tolubutamide	-0.257	0.131	-0.148	-1.960	0.052	-0.517	0.002

Mean duration of diabetes among patients with DR was 10.7 (SD - 7.7), which was 7.6 (SD - 6.2) for those without DR (p=0.004). Table 2 shows how the average duration taken for development of different types of DRs. The duration for development of was in ascending order according to the severity of retinopathy. Following box and whisker plot shows the median and its percentile duration for development of any kind of DR in graph 1.



Graph 1: Box and whisker plot of duration for development of different types of DRs.

DISCUSSION

Prevalence of DR found from this study was 38.6% which is more than the reported value for Sri Lanka in 1993 at Sri Jayewardenepura Hospital, Colombo. Females had a higher prevalence than males. There are no other local studies to compare the prevalence in Sri Lanka but this can be compared with the values that of South Asians residing in UK (45%) [11], a Korean study had the prevalence of 18%[12] and 28% in Beijing eye study[13] and 31.4% reported in Thailand. The reported value for global prevalence in 2012 by a meta-analysis was 34.6%. In India it was 18% among the diabetics which is also lower than our reported value.

This study reported the NPDR of 18%, Proliferative 8.5% and Macular oedema of 11%. The global value for proliferative DR was 7% and macular oedema 6.8%. The Korean study showed a prevalence of NPDR of 16.7% and PDR of 1.3%. Thailand reported NPDR of 22% and PDR of 9.4%. Therefore our findings are relatively comparable with Thai study in 2006.

The median durations for development of retinopathies differ in a wide range but the severe forms took a long duration of time than milder forms. Studies aiming to find the duration for development of retinopathy after diagnosing of diabetes are not found in literature may be due to two reasons. First, the assumption that all diabetics are not developing retinopathy. Secondly those demarcations are hard to find accurately both the dates of occurrence of diabetes and the date of development of retinopathy. Therefore this can be the main limitation of our study. But we wanted to measure the average duration that will taken to develop retinopathy. The two measurements we have taken were the first date of diagnosis of diabetes mellitus and the first date labelling the condition in 6 monthly visits to ophthalmologist.

Another main limitation of this study may be that this may not be the true picture for diabetics in population as these people coming to clinic may have a different course of illness. Mean time we would like to recommend survival form of analysis for further studies and our team is planning for it in near future. It is worth to carry out such kind of analysis because many studies have found the longer duration of diabetes is a risk factor for development of retinopathy although further elaborations are not been done.

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