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PREVALENCE AND CLASSIFICATION OF DIABETIC RETINOPATHY IN DIABETIC PATIENTS AT THE KING ABDULAZIZ MEDICAL CITY, RIYADH, SAUDI ARABIA

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ABSTRACT

Diabetes Mellitus (DM) is a common metabolic disorder in Saudi Arabia. One of its chronic complications is diabetic retinopathy that has been estimated to affect nearly 100% of DM Type I as well as 50-80% of DM Type II after 20 years of the onset of DM. Early detection of retinopathy may be a critical factor in the management of diabetic retinopathy. We designed this study with the primary objective of obtaining the prevalence and classification of diabetic retinopathy among diabetic patients attending Al-Yarmuk Family Medicine Center in Iskan area. Furthermore, our secondary objective is to evaluate physician's practice in the management of diabetic patients particularly, evaluating diabetic retinopathy by prompt referral to ophthalmology clinic.A cross sectional, retrospective study was carried out at Diabetic clinic (Al-Yarmuk Family Medicine Center) at Iskan area, King Abdul-Aziz Medical City, Riyadh, Saudi Arabia.Data were collected for medical records of all patients attending the diabetic clinic over one year period from February 2004 to February 2005. The data were obtained using a pre-specified format to provide information regarding demographic details of each patient, history of DM, blood pressure, fasting plasma, glucose, HbA1c, body mass index (BMI), and ophthalmology evaluation by fundoscopy according to standard guidelines.

Data from of 151 diabetic patients were obtained. 84 were males and 67 were females. Their mean age was 51.56 ± 9.74 (range 32-80 years). The majority of patients were having Type 2 DM (94.04%) compared to 3.97% who have Type I DM. Out of 151 patients with DM only 74 were referred to ophthalmologist for retinal examination. Among patients who were referred to retinal examination, 71 attended the ophthalmology clinic with 4.1% not attended. The prevalence of diabetic retinopathy among patients who attended the ophthalmology clinic is 47.3%. Proliferative diabetic retinopathy was less prevalent than non-proliferative retinopathy with a percentage of 25.7% and 74.3% respectively ($p<0.004$). The mean HbA1c was 10.64% and the mean FBS was 10.8 mmol/l, indicating poor control of their DM, despite 79.6% attending dietchen education classes.The overall prevalence of diabetic retinopathy obtained from this study is 00%. More awareness is needed from physician in referring diabetic patients for ophthalmology clinic. We recommended enhancing compliance for diabetic control by diabetic educators. A longitudinal study is needed to show the importance of early referral of diabetic patients in management of diabetic retinopathy and prevention of progression to blindness.

KEYWORDS: Diabetic Retinopathy- Diabetes Mellitus- Prevalence.

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INTRODUCTION

Diabetes Mellitus (DM) is a prevalent metabolic disorder in Saudi Arabia that carries a significant morbidity and mortality. Its prevalence has been evaluated by studies and it was found to involve nearly 4.3% to 19.4% (based on age and gender) of the Saudi population [1, 2] Recent data reported by Al-Nozha and his group revealed a rather higher prevalence among Saudi adult population reaching 24.6% and this figure is expected to increase in the near future due to increasing prevalence of obesity [3] Clearly, the magnitude of DM as a health problem in Saudi Arabia is an overwhelming one, particularly, when considering its inevitable complications.

Almost every system in the human body is affected in a way or another by the metabolic abnormalities associated with DM. The consequences are translated into increased morbidity as well as mortality with significant

burden on the healthcare system in terms of cost and availability. It is well known that acutely, diabetic patients may suffer from diabetic ketoacidosis or hyperosmolar non-ketotic coma as a result of hyperglycemia. Alternatively, patients with DM may be the victims of hypoglycemia, as a result of anti-diabetic therapy, with all the different manifestations and outcome of hypoglycemia.

Furthermore, long term complications of DM are well established affecting the nervous system, the kidneys, the vascular system, the feet, as well as the eyes. In addition to macrovascular (atherosclerosis) disease, microvascular complications such as retinopathy, nephropathy and neuropathy are an important cause of morbidity in diabetics.

In Type 2 diabetics, disease onset is insidious, occurring over many years, and many patients are not aware of having the disease [4,5] As a result, diabetic microvascular complications may be present when the diagnosis is made, and their frequency then increases over time.

Diabetic retinopathy is a major cause of morbidity in patients with DM, both in those with Type 1 diabetes and those with Type 2 diabetes [6]. By 20 years, evidence of retinopathy is present in almost all patients with Type 1 diabetes and 50 to 80 percent of those with Type 2 diabetes.Many diabetic patients who develop retinopathy are asymptomatic until it may be too late for effective treatment. The vision is affected in several ways with either gradual or abrupt reduction in visual acuity. However, it is the most common cause of blindness in middle-aged subjects. Moreover, the presence of severe retinopathy may be a risk factor for death due to ischemic heart disease [7]. This interesting finding has many implications that generated researchers to try to understand the association between retinopathy and the development of coronary artery disease.

Thickening of the retinal basement membrane is another early change in diabetic retinopathy, a finding similar to that seen in glomeruli. Death of retinal pericytes and microvascular cells and impairment of basement membrane function are associated with the formation of retinal capillary microaneurysms, excessive vascular permeability, and increased activity of vasoproliferative substances. Microaneurysms and the leakage of lipid and proteinaceous material are called non-proliferative diabetic retinopathy. Capillary leakage often spreads in a circinate pattern and is associated with retinal thickening and edema. Macular edema typically presents with the gradual onset of blurring of near and distant vision in patients who have other evidence of microvascular disease, such as microaneurysms. Proliferation of the endothelial cells of retinal veins results in marked changes in the caliber of the veins, with formation of tortuous loops. More severe ischemia results is vasoproliferation, resulting in the formation of new vessels (neovascularization) which is called proliferative diabetic retinopathy that is more threatening to vision than non-proliferative type.

The prevalence of retinopathy increased progressively in patients with both Type 1 and Type 2 diabetes with increasing duration of disease. However, patients with Type 1 diabetes should have a complete ophthalmologic examination beginning five years after the onset of diabetes, whereas patients with Type 2 diabetes should have a complete ophthalmologic examination beginning at the time of diagnosis [8].

Treatment of diabetic retinopathy is directed both at prevention and treatment of established disease. Because the rate of progression may be rapid and therapy is at least partially effective, it is important to screen patients with diabetes regularly for the development of retinal disease. Annual screening using ophthalmoscopy with dilated pupils for those without retinopathy and every six months screening for those with retinopathy followed by appropriate treatment has been shown to reduce blindness in diabetic patients [9, 10].

Photocoagulation is the primary treatment for advanced retinopathy. Its efficacy was demonstrated in the Diabetic Retinopathy Study, in which 1758 diabetic patients with advanced retinopathy were randomly assigned to panretinal photocoagulation in one eye. The cumulative risk of developing several visual loss at six years was reduced by more than 50% in the treated eyes. [11]Furthermore, timely photocoagulation is well known to reduce visual loss and blindness caused by diabetic retinopathy [12-14].

Needless to say that optimal glycemic control is an important independent factor in reducing the development and progression of retinopathy and other diabetic complications. [15-16]

Therefore, this study is designed with the primary objective of obtaining the prevalence and classification of diabetic retinopathy among diabetic patients attending Al-Yarmuk FMC in Iskan area. Furthermore, our secondary objective is to evaluate physician's practice in the management of diabetic patients particularly, evaluating diabetic retinopathy by prompt referral to ophthalmology clinic.

METHODS

Setting: Saudi patients with diabetes mellitus who are attending primary care clinics of King Abdulaziz Medical City.

Design: Retrospective hospital chart based study, conducted over one year period from 2/2004 to 2/2005, using a questionnaire to collect data from the included patients sample charts. The questionnaire included demographic data collection concerning patients who are included in the study as well as data regarding the duration and type of DM as well as attendance to dietchen education class. Additionally, we collected data regarding the time of referral to ophthalmologyclinic and the type of retinopathy present.

Patients were included if they were adults with DM and were eligible for treatment at King Abdulaziz

Medical City with complete and available medical records. Patients who were known to have bilateral blindness were excluded from the study. Examination of the retina was conducted by ophthalmologist after full dilatation of the pupils. Biochemical data were obtained from the patients charts regarding fasting plasma glucose, random plasma glucose, and hemoglobin A 1c (HbA1c) obtained during one year from data collection. Data were obtained by reviewing the medical charts by R4 (fourth year in the family medicine training program) resident under the supervision of the consultant. All data were entered in a computer and statistical analysis was performed.

Statistical Analysis

Data were analyzed using SPSS 20 (Statistical Package for Social Science), Chi-square test was used for measuring the difference between groups. P value was considered significant when < 0.05.

RESULTS

Data from 151 diabetic patients were obtained. 84 (55.6%) were male and 67 (44.4%) were female. The demographic data and baseline characteristics of the patients included in the study are shown in table 1. Their mean age and standard deviation was 51.56 ± 9.74 (range 32-80 years). The majority of patients included in this study representing 142 (94.04%) were having Type 2 DM, based on the World Health Organization new classification, compared to 6 patients (3.97%) who have Type 1 DM.

Out of 151 patients with DM nearly half of them [74 patients (49%)] were referred to ophthalmologist for retinal examination. Those who were not referred had mean duration of DM of 6.2 years (Table 2). Among patients who were referred to retinal examination, 71 patients (95.9%) attended the ophthalmology clinic and had full ophthalmologic examination, while 3 patients (4.1%) did not attend the clinic.

The prevalence of diabetic retinopathy among patients who attended the ophthalmology clinic was 47.3% (Table 3). Non-Proliferative diabetic retinopathy was more prevalent than proliferative retinopathy with a percentage of 74.3% (n=26) and 25.7% (n=9) respectively (p<0.004). The mean and standard deviation of HbA1c was 10.64±1.107, and the mean and standard deviation of FBS in mmol/l was 10.84 ±3.446. The number of patients who were regularly attending dietician education classes was 117 (79.6%).

Fig 1. Study results showing the number of patients who were referred to ophthalmology clinic and their outcome

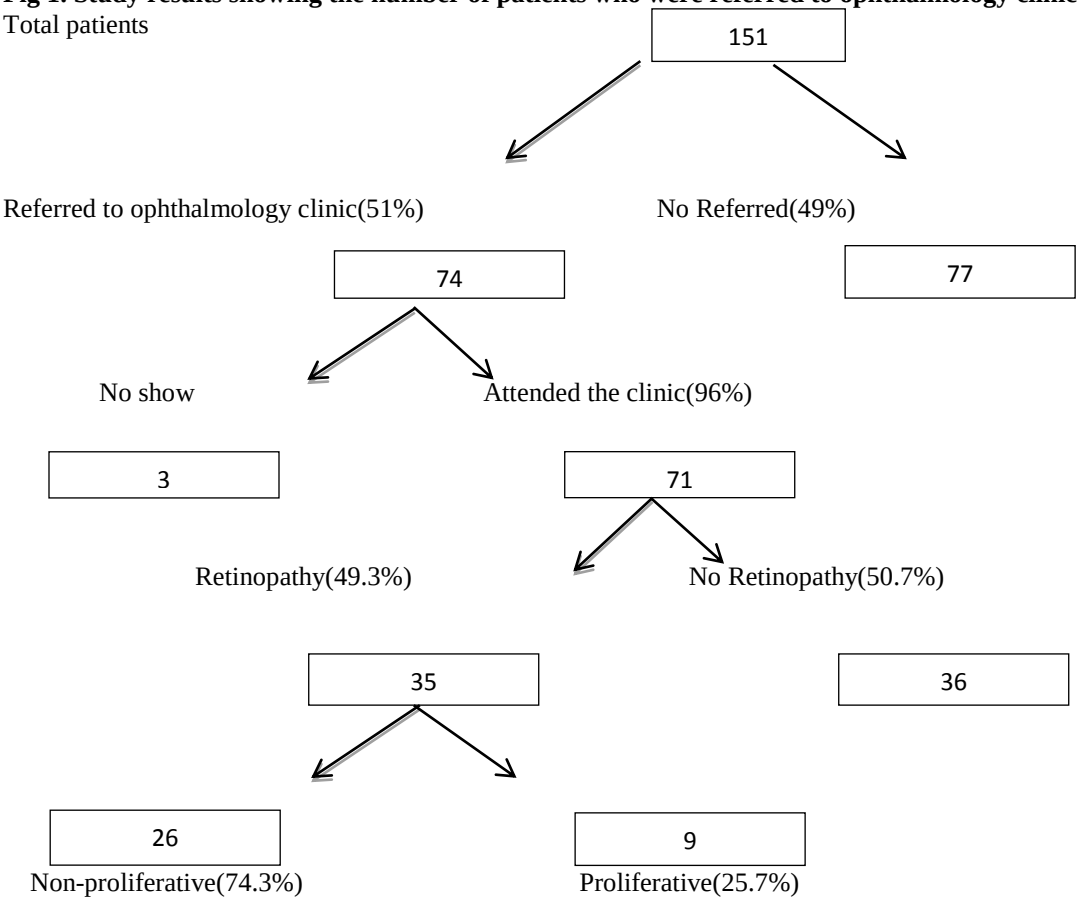

Table 1. Baseline Characteristics of Patients included in the study

Total Number	151 Patients
Age	51±9.74 (32-80 years)
Males	84 (55.6%)
DM Type 2	142 (94.04%)
DM Type 1	6 (3.97%)

Table 2. Patients with DM and referral to ophthalmology clinic

Referral made	74 (49%)
Ophthalmology clinic attended:	71 (95.9%)
Duration of DM for not referred	6.2 years

Table 3. Features of Diabetic Retinopathy

Diabetic Retinopathy	47.3%
Non proliferative:	74.3%*
Proliferative:	25.7%*

*:P< 0.004

Table 4. Duration of DM and Retinopathy

Duration of DM	<5 Years	5-10 Years	10-15 Years	15-20 Years	>20 Years	P Value
Retinopathy	2	12	8	6	7	<0.0001
No retinopathy	27	12	2	8	4	
Non-proliferative	2	9	7	4	4	
Proliferative	0	3	1	2	3	0.612

DISCUSSION AND CONCLUSION

Our study showed important results and demonstrated the importance of management strategies in the primary care setting provided to patients with diabetes mellitus. The management of diabetic retinopathy is primarily focused on halting the progression of the disease which can be achieved either by medical therapy or ophthalmic interventions. Evidence has emerged stressing the fact of tight glycemic control in reducing and delaying the complications of DM [15]. Strict glycemic control is highly effective in primary prevention in patients without retinopathy, with new retinopathy at nine years occurring in one study in 54% of conventionally treated patients versus only 12% of those receiving intensive insulin therapy. Furthermore, the degree of protection is directly related to the degree of glycemic control; progressive retinopathy is uncommon in patients with glycosylated hemoglobin (HbA1c) values below 7 percent. It has been also shown that good glycemic control is highly effective in slowing the rate of progression of retinopathy in patients with very mild to moderate nonproliferative retinopathy. However, it is of little or no benefit in patients with advanced retinopathy as shown from studies with two-year follow-up in which normoglycemia was attained with pancreas transplantation [16-18].

However, other specific management strategies were evaluated for diabetic retinopathy. Angiotensin-converting enzyme (ACE) inhibitors may have the same benefit in diabetic retinopathy as they do in nephropathy [13, 19]. One study assessed the efficacy of lisinopril in normotensive patients with Type 1 diabetes and retinopathy. Retinopathy, assessed on a five-level scale (none to proliferative), progressed by one level in 21 of 159 patients (13%) receiving lisinopril, versus 39 of 166 patients (23%) receiving placebo [19]. The mechanism by which ACE inhibitors might inhibit the progression of retinopathy is unclear. In the case of captopril, the benefit may be related to its sulfhydryl group rather than to ACE inhibition [20].

Despite clear guidelines for early referrals of diabetic patients to ophthalmology clinic for retinal examination, [21] only 49% of patients with DM in our study were referred to ophthalmic evaluation. Most of our patients were of Type 2 DM and their mean age was 51 years. Although the majority of our patients were of Type 2 DM (94%), that may be considered one of the limitations of our study, nonetheless, only half of them were referred for proper ophthalmic evaluation. Clearly, this contradict the current guidelines, particularly, for patients with Type 2 DM. The implication of this finding is important in terms of implementing more awareness of practicing physicians to adhere to guidelines, particularly in the era of evidence based medical practice. In patients with Type 2 DM the current guidelines states that these patients should have an initial comprehensive examination by an ophthalmologist or optometrist shortly after the diagnosis of diabetes is made [21, 22].

In contrast, it is unusual for patients under the age of 30 years with Type 1 diabetes to develop retinopathy that requires specific ophthalmologic therapy earlier than five years after the onset of diabetes.

The data obtained from this study revealed good adherence of patients to referrals, as 96% of patients who were referred to the ophthalmology clinic actually showed up in their corresponding appointments and had the benefit of eye examination. This obviously demonstrates that physicians' instructions are literally followed up by their patients, and again stressing the fact of guidelines applied in practice. The other half of patients who were not referred to ophthalmic examination were having a mean duration of DM of 6.2 years and the majority of them are Type 2 DM, indicating the need for ophthalmic evaluation.

Among patients who attended the ophthalmic examination in this study, approximately, half of them (47.3%) had findings consistent with diabetic retinopathy. That is properly true and applicable for those who did not have ophthalmic examination, and by simple calculation, probably, were are missing 50% of diabetic retinopathy. Most of our patient with diabetic retinopathy (74.3%) had non-proliferative retinopathy that was statistically significant compared to proliferative diabetic retinopathy ($P < 0.004$).

Our study also reveals another significant finding of paramount importance that is the glycemic control in our patients was less than optimal despite an adherence to diabetic education class. Apparently, our patients require more motivation towards maintaining a near glycemic control. The mean HbA1c was 10.64% reflecting inadequate glycemic control, a finding that may explain the high prevalence of diabetic retinopathy in our patients. Our suggestion for diabetic education to be part of the treatment team.

In summary, this study has demonstrated several important findings, the importance of adherence to current guidelines in the management of diabetic patients need no more emphasis. Additionally, keeping diabetic patients with adequate glycemic control is equally as important. Finally, early referral to ophthalmic clinic for full and proper ophthalmic examination needs to be implemented in order to provide our patients with the best available standards of medical care. Therefore, we recommend that all diabetic patients seen in the primary care clinic should be referred to ophthalmology clinic and actually attended the ophthalmology clinic as well as proper ophthalmic examination is carried out. Moreover, it may be necessary to increase the available ophthalmology clinic sessions in order to meet the demand of examining all diabetic patients.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

STATEMENT OF HUMAN AND ANIMAL RIGHTS

All procedures performed in human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This article does not contain any studies with animals performed by any of the authors.

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