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Epidemiological and ophthalmological findings in diabetic patients examined in a general hospital

Achados epidemiológicos e alterações oftalmológicas em diabéticos atendidos em hospital geral secundário

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ABSTRACT

Objective: *To evaluate the association between epidemiological and ophtalmological findings in diabetic patients.* ***Methods:*** *Cross-sectional study. We selected consecutively diabetic patients examined during 2011 which responded to a questionnaire and examination.* ***Results:*** *The sample comprised 103 patients, of whom 72 (69.9%) were female, 66 (64%) were Caucasian, average age 59 (+/- 9,21) years, 64% reported minimum wages, 58.2% did not finish elementary school, 75.7% reported family history of diabetes, 45.6% reported regularly perform metabolic control, 54.3% did not receive special nutritional care. On examination, 72.8% had visual acuity of 20/40. There was a significant association between retinal complications and insulin usage (OR=8,3; p=0,003), and between low visual acuity and age (OR=11,8; p=0,003) and insulin (OR=5,48, p=0,021), as well with lower education and income.* ***Conclusion:*** *In this low-income and low-education population, glycemic control was poor, and related to the development of diabetic retinopathy and the consequent low vision. These findings emphasize the need to adopt broader strategies to improve control and prevention of diabetes mellitus.*

Keywords: *Diabetes mellitus; Diabetic retinopathy; Blindness*

RESUMO

Objetivo: Avaliar a associação entre alterações no exame oftalmológico, características epidemiológicas e controle metabólico em pacientes diabéticos. **Métodos:** Estudo transversal. Foram selecionados consecutivamante os diabéticos atendidos durante 2011 em um hospital secundário. Todos os pacientes responderam questionário e foram submetidos a exame oftalmológico. **Resultados:** Foram estudados 103 pacientes, dos quais 72 (69,9%) eram do sexo feminino e 66 (64%) da cor branca. A média de idade foi de 59 (+/- 9,21) anos. Sessenta e quatro por cento dos participantes referiram renda aproximada de até 1 salário mínimo, 58,2% tinham ensino fundamental incompleto, 75,7% com história de diabetes familiar, 45,6% informaram realizar controle metabólico regular, 54,3% não observavam cuidados nutricionais, 28% usavam insulina, 99% eram diabéticos do tipo-2. Ao exame, 72,8% apresentaram acuidade visual corrigida de 20/40. Foram estatisticamente significativas as relações entre complicações retinianas e o uso de insulina (OR=8,3; p=0,003) e da baixa acuidade visual com o uso de insulina (OR=5,48, p=0,021) e a idade (OR=11,8; p=0,003). Também foi observada relação entre a baixa de visão com escolaridade, idade e baixa renda **Conclusão:** Na população analisada, predominantemente de baixa renda e escolaridade, a condução inadequada da doença foi expressiva, o que se associou com a presença de complicações retinianas, reforçando a necessidade de adoção de medidas mais amplas para melhorar as estratégias de controle e prevenção do diabete mellitus.

Descritores: Diabetes mellitus; Retinopatia diabética; Cegueira

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Introduction

According to the World Health Organization, diabetes mellitus (DM) currently affects approximately 171 million people worldwide[1]. Of these, probably 10 to 20% have some form of retinopathy and about 1.78 million are blind. An estimated 7.7% of the population aged 20-70 years (439 million) will have the disease by 2030, of which 70% or more will be concentrated in developing countries[2]. This difference is based on factors such as population growth, ageing, inadequate diet, obesity, and sedentary lifestyle, in addition to reductions in the fasting glucose thresholds currently used for diagnosing DM[1-5].

In Brazil, according to the Brazilian Diabetes Society[3], the prevalence of DM in persons aged 30-69 years is 7.6%; São Paulo, Porto Alegre and João Pessoa are the capitals with the highest prevalences.

Most diabetic patients, with rare exceptions[4], do not undergo preventive ophthalmic examination with the recommended frequency and they ignore the consequences of the disease and the importance of prevention[5-13]. The most efficient method for evaluating the population utilises non-mydriatic cameras and specialised image-processing centres[14-33].

The present study aimed to investigate the ophthalmic status of diabetic patients in the Brazilian public health system (SUS) in the city of Viamão, a municipality adjacent to Porto Alegre in the state of Rio Grande do Sul.

Methods

This study had an observational, cross-sectional design and it was approved by the Research Ethics Committee of the Institute of Cardiology of Viamão Hospital. Inclusion criteria were: diabetic patients covered by the SUS seen in 2011 at the ophthalmology outpatient clinic of the Institute of Cardiology of Viamão Hospital.

All diabetic patients seen at the clinic were invited to participate in the study. After providing their informed consent, they answered a questionnaire and underwent a complete ophthalmic examination.

The questionnaire included questions on sex, age, race, income, education, family history of diabetes, presence of other systemic diseases, a self-assessment of diabetes control (good, when following all the routine guidelines; moderate, in cases of partial adhesion; and bad, when the guidelines were not followed), diet (adhesion, supervision by a nutritionist), frequency of medical evaluations, knowledge of the potential consequences of diabetes, and frequency of fasting glucose testing (including tests with personal glucometers). Medical records were reviewed for information on glycosylated haemoglobin (last available result) and other non-ocular complications associated with diabetes.

All patients underwent an assessment of best corrected visual acuity (on a logMAR chart), intrinsic and extrinsic eye movements, applanation tonometry (Perkins), anterior slit lamp biomicroscopy, and binocular indirect ophthalmoscopy under mydriasis. Patients who did not fully provide their informed consent, answer the entire questionnaire, or undergo eye examination were excluded from the study.

Patients who had been fasting for more than 2 hours underwent capillary glucose testing (Accu-Chek Performa glucometer, Roche, Germany).

All the collected information was stored in a database using Microsoft Office Excel 2003 and analysed using Stata 12.1 software.

Table 1

Epidemiological characteristics of the study population

Variable		(%)
Sex	Female	(69,9)
Race	White	(64)
	Black	(26)
	Mixed-race	(10)
Monthly family income	Up to the minimum wage	(64)
	>1 and < 3 times the minimum wage	(30)
	> 3 times the minimum wage	(6)
Education	Iliterate	(18,5)
	Incomplete elemantary school	(58)
	Elemantary school education	(18,5)
	High school education or higher	(5)
Familiar kistory of DM	Yes	(76)
Type of diabetes	Type 2	(99)
Concomitant diseases	Systematic arterial hypertension	(51)
	Ischemicheart disease	(7)
	Acute myocardial infarction	(9)
	Stroke	(7)
	Renal failure	(2)
Metabolic control	Good	(39)
	Moderate	(46)
	Poor	(15)
Diet	Incomplete adhesion	(72)
Supervision by a nutricionist	No	(72)
Frequency of medical visit	Every 6 months	(48)
	Every 3 months	(35)
	Yearly	(17)
Frequency of capillary glucose testing	Once a week	(25,5)
	Once a month	(36,5)
	Quarterly	(31,5)
	Never	(6,5)
Glycosylated heamoglobin	Average	(8,3)
Treatment	Oral hypoglycaemic agent	(71)
	Oral hypoglycaemic agent + insulin	(28)
	Insulin	(1)

Table 2

Results of logistic regression for correlations between low visual acuity and other variables.

Low visual acuity	Odds ratio	Standard error	P Value	[95% CI]
Sex	0,71	0,52	0,65	0,17-3,01
Race	2,03	1,06	0,17	0,72-5,67
Income	0,62	0,49	0,55	0,13-2,96
Education	0,51	0,30	0,25	0,16-1,62
Family history	0,40	0,30	0,23	0,92-1,77
Metabolic control	0,74	0,32	0,5	0,31-1,75
General complications	0,63	0,20	0,16	0,32-1,20
Blood glucose	1,84	0,62	0,07	0,94-3,58
Insulin use	5,48	4,03	0,02	1,3-23,2
Age	11,8	9,94	0,003	2,26-61,5
Glycosylated haemoglobin	1,23	1,01	0,8	0,24-6,16
Diet	1,3	1,22	0,79	0,20-8,3

[95% CI = 95% Confidence interval]

Statistical analysis included a description through means and standard deviations or proportions, bivariate Pearson or Spearman correlations, and multivariate analysis (logistic regression). Results with $p<0.05$ were considered statistically significant.

Results

The sample included 103 patients examined between March and December 2011. The mean age of respondents was 59.6 (41-85) years. Most patients were white (64%), followed by black (26%) and mixed-race (10%) patients. Table 1 shows the complete data.

On examination, visual acuity was equal to or better than 20/40 in 73% of patients, and between 20/50 and no light perception in 27%. Fundus examination was normal in 53% of patients, non-proliferative diabetic retinopathy (DR) without macular oedema was found in 32%, non-proliferative DR with macular oedema in 8%, and high-risk proliferative DR in 6%.

The glucometer test was performed on 60% of patients, with the following results: d”200 mg/dl in 31%; 201-300 mg/dl in 18%; 301-400 mg/dl in 9%; 401-500 mg/dl in 1%; and e”501 mg/dl in 1% (59% had been fasting for more than 6 hours).

Logistic regression controlling for other variables found statistically-significant correlations between retinal complications and insulin use (OR=8.3, p=0.003); low visual acuity and insulin use (OR=5.48, p=0.021); and low visual acuity and age (OR=11.8, p=0.003) (Table 2).

Discussion

In this study, the typical participant was a low-income, low-education adult patient with type 2 diabetes using oral hypoglycaemic agents. Almost half of patients had retinopathy. Most patients underwent medical follow-up every three to six months but were unaware of the systemic diseases associated with diabetes and did not adhere adequately to medical recommendations.

Most patients had high capillary glucose levels, which were considered reliable as they were in agreement with glycosylated haemoglobin[34-36]. These results show that metabolic control was poor even though patients had access to specialist care.

Statistically-significant correlations were found between insulin use and retinopathy, low visual acuity and age, and low visual acuity and the need for insulin therapy. These findings reproduce the conditions of SUS patients in our region[6,7] and are in agreement with most studies conducted in different locations[5-13,24-29], which show that longer disease duration and greater difficulty controlling the disease (requiring insulin use) are associated with more severe ocular manifestations.

On average, 50-90% of diabetic patients are not evaluated under optimal conditions[1,2]. An exception to this is found in Peto and Tadros[4], where 78% of diabetic patients over 15 years of age in the UK underwent retinal assessment with non-mydriatic cameras. Greater access to health care does not imply that all forms of treatment are available[37], which can affect outcomes related to disease control[30-33]. In our environment, Guedes et al.[38] studied a Family Health Programme and stressed the need to provide better treatment and education to diabetic patients, even though the authors used a small sample and had a high number of study drop-outs.

Reducing the incidence of blindness and its associated costs requires early detection and rigorous, universal, multidisciplinary, preventive specialist care.[30-33] The main risk factors for RD are related to disease duration, metabolic control, the type of diabetes, and treatment (with a lower risk in patients treated with diet and a higher risk in insulin users), as well as other factors (genetic factors, systemic arterial hypertension, smoking, pregnancy, and nephropathy)[24-29]. Considering that disease duration and the type of diabetes are related to DR[26-29] and that a predominance of high-risk patients are found in our public health system, implementing targeted educational programmes and using non-mydriatic digital systems to acquire fundus images processed through telemedicine methods is required to reduce the incidence of blindness.

Conclusion

This study showed that essential elements in the management of RD in our health system, such as knowledge of the disease, periodic controls, nutritional support, and adherence to medical treatment, are still largely lacking. Patients with longer disease duration or requiring a greater number of drugs are very likely to suffer functional vision loss and severe retinal damage.

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