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Research Article

Macular Alterations in Patients with Chronic Diseases in Queretaro

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Abstract

Background: Visual health problems and chronic-degenerative diseases have a significant impact on the Mexican population. Macular alterations are the third worldwide cause of moderate to severe visual disability. The timely detection of macular alterations and the control of chronic-degenerative diseases allow stopping or prolonging their progress, giving better visual health and quality of life.

Objective: To determine the association between the main chronic degenerative diseases and macular alterations.

Methods: A comparative cross-sectional observational study was carried out in patients over 60 years of age assigned to UMF 16. The selection of participants was carried out in a non-probabilistic manner. The Amsler grid test was applied as a screening to detect macular alterations, and clinical, metabolic and sociodemographic variables were also measured. For the statistical analysis we used descriptive statistics with measures of central tendency and dispersion; in the inferential analysis, Chi-Square Test, odds ratio and ANOVA were used.

Results: A total of 112 patients were analyzed. The frequency of macular alterations in the right eye was 25%; and the same for the left eye. The total frequency of macular alterations was 36%. When analyzing the four groups we found the following results for qualitative variables: sex, p 0.58; education, p 0.27; CKD stage, p 0.22; smoking, p 0.22; dyslipidemia, p 0.64; obesity, p 0.72; and macular alterations, p 0.11. In the quantitative variables we find: age, p 0.1; creatinine, p 0.4; GFR, p 0.055; glucose, p 0.001; systolic pressure, p 0.04; and diastolic pressure, p 0.6.

Conclusions: No association was found between the presence of type 2 diabetes, arterial hypertension or both with the macular alteration. Obesity represents a risk factor for developing macular alteration.

Keywords: Macular disease; Diabetes mellitus; Arterial Hypertension; Chronic Diseases

Introduction

The medical contributions that have arisen thanks to the advances in science and technology, have allowed increasing the life expectancy of the adult population, and this has increased the disorders and complications related to chronic-degenerative diseases. According to data provided by the World Health Organization, macular alterations, mainly represented by age-related macular degeneration, represent the first cause of blindness in patients over 60 years in industrialized countries and the third cause of preventable blindness worldwide, only behind cataract and glaucoma [1,2].

At primary care, the detection and follow-up of chronic-degenerative diseases are the first causes of medical attention, and with this, possible complications must be prevented, detected, treated and rehabilitated. Visual health problems, including blindness, are considered not only a state of disability and individual tragedy, but also a significant emotional and economic burden for both the family and the health systems. Currently, there are no resources at primary care to carry out timely detection of macular alterations, which have a high prevalence in the adult population, and have an impact on patients with chronic-degenerative diseases [3,4].

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Table 1: Differences between the qualitative variables according to the group.

Variable	Group					p
	Healthy (n=28)	DM (n=28)	HBP (n=28)	DM + HBP (n=28)	*n (%) (n=112)*	
Sex						
Female	17(61)	15(54)	20(71)	17(61)	69(62)	0.58
Male	11(39)	13(46)	8(29)	11(39)	43(38)	
Education						
None	2(7)	1(4)	0(0)	5(18)	8(7)	0.27
Elementary	8(29)	6(21)	8(29)	11(39)	33(29)	
Middle	5(18)	8(29)	5(18)	4(14)	22(20)	
High	4(14)	7(25)	6(21)	0(0)	17(15)	
University	9(32)	6(21)	9(32)	8(29)	32(29)	
CKD grade						
Grade 1	6(21)	17(61)	11(39)	11(39)	45(40)	0.22
Grade 2	20(71)	9(32)	14(50)	13(46)	56(50)	
Grade 3a	2(7)	1(4)	2(7)	3(11)	8(7)	
Grade 3b	0(0)	1(4)	1(4)	1(4)	3(3)	
Macular alterations	7(25)	12(43)	14(50)	7(25)	40(36)	0.11
Smoking	14(50)	11(39)	8(29)	15(54)	48(43)	0.22
Dyslipid-emia	9(32)	13(46)	9(32)	11(39)	42(38)	0.64
Obesity	8(29)	5(18)	6(21)	8(29)	27(24)	0.72

DM= Diabetes Mellitus; HBP= High Blood Pressure; CKD= Chronic Kidney Disease; p= Chi-Square

Table 2: Differences between the quantitative variables according to the group.

Characteristic	Group				p
	healthy (n=28)	DM (n=28)	HBP (n=28)	DM+HBP (n=28)	
Age	69.7	67.3	70.7	71.8	0.12
Creatinine	0.87	0.78	0.83	0.85	0.43
Glomerular Filter Rate	77.3	87.3	78.7	76.5	0.055
Glucose	99.7	122.7	101.1	126.7	0.001
Systolic pressure	120.5	122.3	125.5	128.2	0.04
Díastolic pressure	75.8	75.2	78.0	77.2	0.63

DM= Diabetes Mellitus; HBP= High Blood Pressure; p= ANOVA

Timely detection of these pathologies and correct control of chronic diseases make it possible to stop or prolong their progress, allowing a better quality of individual life and intra-family relationship due to the degree of dependency and psycho-emotional affectation. Advanced stages of the disease allow less invasive treatments to be carried out with lower cost-benefit for both patients and institutions [5], for these reasons, the present study aims to determine the association between the main chronic degenerative diseases and macular alterations.

Material and Methods

Study Design and Population

An analytic cross-sectional study was carried out in Queretaro, Mexico between January to June 2023. The research was developed at the Family Medicine Unit 16 of the Instituto Mexicano del Seguro Social (IMSS). The inclusion criteria were: patients who agreed to participate in the study with informed consent, aged 60 years or older of both sexes, with a chronic degenerative disease such as high blood pressure, type 2 diabetes or type 2 diabetes plus high blood pressure. Patients with total blindness, with a previous diagnosis of any macular alteration

Table 3: Findings of the Amsler grid exploration.

Characteristic (n=112)	n(%)
Right eye	
Central black spot	109(97)
Four corners	108(96)
Four sides	109(97)
Intact frames	100(89)
Blurred	85(76)
Parallel lines	109(97)
Same size	110(98)
Vibrations	96(86)
Left eye	
Central black spot	110(98)
Four corners	108(96)
Four sides	108(96)
Intact frames	99(88)
Blurred	86(77)
Parallel lines	106(95)
Same size	109(97)
Vibrations	97(87)
Macular alterations	
Right eye	28(25)
Left eye	28(25)
Macular alterations	
Yes	40(36)
No	72(64)

n=frequency; %=percentage

or patients with refraction problems who will not have a visual aid at the interview to read the Amsler grid were excluded. Patients who did not complete the test or questionnaire were eliminated. A control group was added with a healthy population.

Variables

The following variables were measured in patients who met the inclusion criteria: age, sex, education, chronic diseases, smoking, glomerular filtration rate, dyslipidemia, glucose, blood pressure, obesity, and macular alterations. The collection of variables was as following: age in years; sex, according to phenotypical characteristics; education, asking about the level of education; chronic diseases and smoking, with direct question; GFR, applying the MDRD equation; dyslipidemia and glucose, with the last laboratory results; blood pressure through measurement with a digital baumanometer; obesity, with the body mass index; and macular alterations with the Amsler grid. The information obtained was attached to the standardized data collection form.

Statistical Analysis

Once the information was collected, the analysis was carried out using the SPSS version 25. Descriptive statistics were used, the qualitative variables were expressed as frequencies and percentages, and the quantitative variables as measures of central tendency and dispersion. For the bivariate analysis we used the odds ratio, chi-Square test and ANOVA.

Ethics

The study was approved by the Local Committee for Ethics and Health Research number 2201, with registration number R-2022-2201-034. The research was conducted under the General Health Law on Health Research, the Declaration of Helsinki and bioethical principles.

Table 4: Characteristics associated with macular alterations.

Macular alterations				
Characteristic	**Yes (n=40)**	**No (n=72)**	**OR (CI 95%)**	***p***
Age[a]	71.1(8.1)	69.2(6.7)	--	0.1[b]
Creatinine[a]	0.8(0.2)	0.8(0.2)	--	0.056[b]
Glomerular Filter rate[a]	78.4(17.1)	80.8(16.4)	--	0.5[b]
Glucose[a]	119.9(45.1)	108.5(22.2)	--	0.001[b]
Systolic pressure[a]	124.3(12)	124(10.2)	--	0.2[b]
Diastolic pressure[a]	75.2(8.5)	77.3(8.9)	--	0.8[b]
Gender[c]				
Female	27(68)	42(58)	1.4(0.6-3.3)	0.33[d]
Male	13(32)	30(42)		
Education[c]				
Basic	31(78)	32(44)	4.3(1.7-10.2)	0.001[d]
Middle -Higher	9(22)	40(56)		
Smoking[c]				
Yes	14(35)	34(47)	0.6(0.2-1.3)	0.21[d]
No	26(65)	38(53)		
Diabetes[c]				
Yes	19(48)	37(51)	0.8(0.3-1.8)	0.69[d]
No	21(52)	35(49)		
Arterial hypertension[c]				
Yes	21(53)	35(49)	1.1(0.5-2.5)	0.69[d]
No	19(47)	37(51)		
Dyslipidemia[c]				
Yes	16(40)	26(36)	1.1(0.5-2.6)	0.68[d]
No	24(60)	46(64)		
Obesity[c]				
Yes	14(35)	13(18)	2.4(1.1-5.9)	0.04[d]
No	26(65)	59(82)		
Chronic disease[c]				
Yes	33(83)	51(71)	1.9(0.7-5.0)	0.17[d]
No	7(17)	21(29)		
CKD Stadium				
Stadium 1	17(43)	28(39)		
Stadium 2	19(48)	37(51)	--	0.98[d]
Stadium 3a	3(7)	5(7)		
Stadium 3b	1(2)	2(3)		

OR=Odds Ratio; a=mean (Standard Deviation); b=Student's t test; c=frequency (percentage); d=X2, 95% CI=Confidence Interval

Results

A total of 112 patients were analyzed, of which 62% (n=69) were women and 38% (n=43) men. The mean age was 69.9±7.3 years. The most common age range was 60–70 years (54%), followed by 71 – 80 years (37%) and 81 – 90 years (10%). The main education was primary education with 30% (n=33), bachelor's degree 29% (n=32), secondary education 20% (n= 22), high school/technical education 15% (n=17), and no education 7% (n=8). Within the clinical variables, 57% (n=64) of patients do not smoke, 27% (n=30) are ex-smokers, 12% (n=13) smoke and 5% (n=4) are passive smokers. In the presence of chronic diseases, 50% (n=56) have diabetes mellitus, 50% (n=56) have arterial hypertension and 25% (n=28) DM + HBP. The frequency of dyslipidemia was 63% (n=70) and obesity 76% (n=85).

The mean creatinine was 0.6 mg/dl, with a range of 0.5 – 2.0 mg/dl. The average glomerular filtration rate was 80 ml/min, with a range of 29 – 107 ml/min. According to the filtration rate, the majority of patients were in stage 2 with 50% (n=56), followed by stage 1 with 40% (n=45), stage 3a with 7% (n=8) and stage 3b with 3% (n=3). The average glucose in the participants was 112.5 mg/dl with a range of 76 – 316 mg/dl. Within the group of patients with DM, 38% (n=21) were in poor glycemic control and 62% (n=35) were in control. Of the patients with HBP, five cases (18%) were detected with glucose in the DM ranges (equal to or greater than 126 mg); and within the group without chronic disease, 2 cases were detected (7%).

When examining each eye with the Amsler grid, we found the following results: right eye, central black dot detection in 97% (n=109) of the cases; four corners, 96% (n=108); four sides, 97% (n=109); intact frames, 89% (n=100); blurry, 76% (n=85); parallel lines, 97% (n=109); same size, 98% (n=110); vibrations, 86% (n=96). In the left eye: detection of central black dot in 98% (n=110) of cases; four corners, 96% (n=108); four sides, 96% (n=108); intact frames, 88% (n=99); blurry, 76% (n=86); parallel lines, 95% (n=106); same size, 97% (n=109); vibrations, 87% (n=97). The frequency of macular alterations in the right eye was 25% (n=28); and the same for the left eye, 25% (n=28). The total frequency of macular alterations was 36% (n=40).

When analyzing the four groups of our study (healthy, DM, HBP and DM + HBP) with the qualitative variables, through the chi-square test, we found the following results: sex, p 0.58; education, p 0.27; CKD stage, p 0.22; smoking, p 0.22; dyslipidemia, p 0.64; obesity, p 0.72; and macular alterations, p 0.11. As can be seen, no associated variables or significant differences were found according to the chronic disease suffered by the participants.

An Analysis of Variance (ANOVA) was also carried out to assess the differences between the quantitative variables and the four groups studied, finding the following: age, p 0.1; creatinine, p 0.4; GFR, p 0.055; glucose, p 0.001; systolic pressure, p 0.04; and diastolic pressure, p 0.6. Differences were only found between glucose and systolic pressure between the groups studied, which is expected, since they are the variables that distinguish each of the groups.

In addition to the above, we carried out an analysis to find the risk factors associated with the presence of macular alterations, we used the chi-square test where we found the following: sex (woman), RM 1.4 (0.6-3.3), p 0.33; education (basic), RM 4.3 (1.7-10.3), p 0.001; smoking, OR 0.6 (0.2-1.3), p 0.21; diabetes mellitus, OR 0.8 (0.3-1.8), p 0.69; arterial hypertension, RM 1.1 (0.5-2.5), p 0.69; dyslipidemia, OR 1.1 (0.5-2.6), p 0.68; obesity, OR 2.4 (1.1-5.9), p 0.04; chronic disease, OR 1.9 (0.7-5.0), p 0.17; and stage of kidney disease, p 0.98. The only variables with significant differences associated with macular alterations were education and obesity.

Discussion

Macular alterations are the most common cause of irreversible loss of central vision in older adults. With the increase in life expectancy, age-related disorders have increased the numbers of people with visual impairments. In this study, it was detected that the average age in general was 69.9 years, a figure very close to that reported by Gama-Ortiz (2021) which was 66.4 years and by Hernández-Narváez et al. (2015), 70.4 years old [6,7].

In relation to sex, a higher frequency of female sex was found with 62%, observing the same pattern reported by Gama-Ortiz (2021) with 60% and Hernández-Narváez et al. (2015) with 70.1%. Regarding the schooling of the studied population, the highest percentage corresponds to primary schooling with 29%,

similar to what was reported by Gama-Ortiz (2021), with 36.4% [6,7].

In relation to smoking, we found a higher frequency of non-smoking patients with 57%, similar to what was reported by Gama-Ortiz (2021) with 50.7%, but different from what was reported by Faes et al., (2014) where there was a higher frequency of smoking patients with 82.7%, which can be explained due to the different geographical areas analyzed. The average creatinine was 0.6 mg/dl, while the average glomerular filtration rate was 80 ml/min. According to the KDIGO classification (2022), 50% of the patients are in stage 2, followed by stage 1 with 40 %, stage 3a with 7% and stage 3b with 3%, no studies were found with which these results can be compared [6-9].

The prevalence of macular alterations in the present study was 36%, similar to what was reported by the IMSS in 2015 with a prevalence of 30%. On the other hand, Gama-Ortiz (2021), who performed screening with the Amsler grid in the Family Medicine Unit, reported a prevalence of 17.5%. The frequency of macular alteration in the right eye was 25%, as well as for the left eye with 25%, this figure was different from what was found by Gama-Ortiz (2021) in which the right eye predominated with macular alterations with 8.2%. and the left eye 10.4% [6,10].

The prevalence of arterial hypertension was 50%, similar to what Hernández-Narváez et al., (2015) reported with 57.3%, while Gama-Ortiz (2021) reported 56.8%. The group with BPH had the highest number of cases with macular alteration 50% (n=14), followed by the group with DM with 43% (n=12), similar to what was reported by Chakravarthy (2020). 25% (n=7) were found in patients with DM+BPH, equal to the 25% reported by Gama-Ortiz (2021) [6-7,11]. In relation to type 2 diabetes, the prevalence was 50% similar to that reported by Hernández-Narváez et al., (2015) with 45.6%. It stands out that of these patients, 38% were in metabolic uncontrol, which damages the ocular microvasculature causing damage to the retina, similar to what was reported by Chakravarthy (2020) [6,11].

In comorbidities, it was found that of 38% (n=42) of patients with dyslipidemia, 40% (n=16) presented macular alteration. Of 24% (n=27) of patients with obesity, 35% (n=14) presented macular alteration, so obesity, especially abdominal obesity, is a risk factor for macular alteration. According to Verdaguer (2010), high values of abdominal circumference would have a twice greater risk of developing age-related macular degeneration, and García et al. 2015 indicate that a diet rich in carotenoids, antioxidants and omega-3 acids reduce the risk of developing age-related macular degeneration [12].

Macular degeneration is considered a prevalent neuroinflammatory condition, in addition to being one of the main causes of blindness caused by genetic and environmental factors such as obesity, which is why it is important to know the modifiable risk factors in our population and perform detections. Timely in order to prevent visual loss and maintain functionality in older adults [13].

Conclusions

Female sex and basic education were the most representative characteristics in the sample studied. No association was found between the presences of type 2 diabetes, high blood pressure or dyslipidemia with the presence of macular alteration, therefore the null hypothesis is accepted. Regarding obesity, a positive association was found with the presence of macular alteration, due to damage to ocular microvasculature and metabolic imbalance. This is why it is important to control this chronic disease in order to prevent visual loss. Timely assessments for the care of the elderly will contribute to maintaining, as far as possible, the functional independence of this age group, which is a main goal of both public and private health services.

References

1. Arévalo F, Agüero C, Arzabe C, Lavaque A, Ramón N. Retina PAAO. 2019.
2. Negredo Bravo LJ, Arribas García RA. Cribado de patología oftalmológica. FMC - Formación Médica Continuada en Atención Primaria. 2019; 26: 3-12.
3. Mehta S. Age-related macular degeneration. Prim Care. 2015; 42: 377-91.
4. Iroku-Malize T, Kirsch S. Eye conditions in older adults: age-related macular degeneration. FP Essent. 2016; 445: 24-8.
5. Seluarize G, Khairudin MN, Ismail F. Early detection and prevention of age-related macular degeneration. Cureus. 2023; 15: e41169.
6. Gama-Ortiz GA. Prevalencia de alteraciones maculares en pacientes mayores de 50 años de edad en una unidad de primer nivel de atención (tesis de maestría). México: Universidad Autónoma de Querétaro. 2021.
7. Hernández-Narváez MG, Olivares-Luna AM, Carillo-Hernández A, Tovar-Méndez GM, González-Pedraza A. Prevalence of visual disorders and their relationship with functionality of the older adults. Rev Cuba Oftalmol. 2015; 28: 190-7.
8. Faes L, Bodmer NS, Bachmann LM, Thiel MA, Schmid MK. Diagnostic accuracy of the Amsler grid and the preferential hyperacuity perimetry in the screening of patients with age-related macular degeneration: systematic review and meta-analysis. Eye (Lond). 2014; 28: 788-96.
9. de Boer IH, Khunti K, Sadusky T, Tuttle KR, Neumiller JJ, Rhee CM, et al. Diabetes management in chronic kidney disease: A consensus report by the American Diabetes Association (ADA) and kidney disease: improving global outcomes (KDIGO). Diabetes Care. 2022; 45: 3075-90.
10. Instituto Mexicano del seguro social. IMSS 2010. Guía de práctica clínica: diagnóstico y tratamiento de la degeneración macular relacionada con la edad. México: IMSS. 2015.
11. Chakravarthy U, Peto T. Current perspective on age-related macular degeneration. JAMA. 2020; 324: 794-5.
12. Juan Verdaguer T. Degeneración macular relacionada a la edad. Revista Médica Clínica Las Condes. 2010; 21: 949-55.
13. Thomas CJ, Mirza RG, Gill MK. Age-related macular degeneration. Med Clin North Am. 2021; 105: 473-91.