ORIGINAL ARTICLE

Frequency of Lattice Retinal Degeneration in Emmetropes and Myopes

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Purpose: To determine the frequency of lattice retinal degeneration in emmetropes and myopes. To assess the relationship between the frequency of lattice degeneration and the axial myopia.
Material and Methods: Two hundred patients attending the outpatient were selected. One hundred and four (52%) patients were females and 96 (48%) were males. The mean age was 26.50 years ± 8.63 (range= 12 to 60 years).These were then grouped according to their refractive status into, 100 cases of emmetropes (group I), 50 cases of myopia less than -6.00 dioptre (D) (group II) and 50 cases of myopia of -6.00 (D) or more (group III).. A complete ocular examination included indirect ophthalmoscope, slit lamp biomicroscopy with Goldman's 3 mirror and 90D lens. Selected cases were photographed with the pan fundus camera. The axial length was evaluated by A-Scan ultrasound. The data thus obtained were analyzed on SPPS 13.
Results: Twenty patients (10%) out of 200 patients studied showed the evidence of lattice retinal degeneration. Eight (40%) were male and 12 (60%) were female. Six (30%) were less than 20 years of age, 10(50%) between 20-40 years and 4(20%) were more than 40 years. Four (20%) cases out of 20 patients showed unilateral lattice degeneration. Right eye was involved in 3 (15%) while left eye in 1 (5%). In remaining 16(80%) cases the lattice was bilateral. Atrophic holes within lattice were seen in 3(15%) patients. The lattice retinal degeneration was found in 3 patients (3%) in one hundred emmetropes (group I) and 17 patients (17%) in one hundred myopes (group II and III). The difference in frequency of lattice degeneration in emmetropes and myopes was statistically significant (p=0.001). Group II with low myopia showed lattice degeneration in 7(14%) patients while group III with high myopia showed lattice degeneration in 10(20%) patients. Five patients (62.6%) in Group III with myopia between -12.1 D and -15 D had the highest evidence of lattice degeneration, which was interestingly also seen on higher side in 5(18.6%) patients in Group II with myopia between of -0.1 D to -3.00 D. Mean axial length in 400 eyes of 200 patients was noted to be 24.4860 milimeter (mm) ± 2.1426 SD (range= 22.11–31.10 mm). The mean axial length in emmetropes (Group I) was 22.9736 mm ± 0.4739 SD (range= 22.11 to 24.64 mm) while mean axial length in myopes (Group II and Group III) was 25.9984 mm ± 2.0934 SD (range= 22.12–31.10 mm). The highest frequency 6(46.1%) was noted in myopic eyes with axial length between 28.01–30.00 mm (-11.00 D to -14.00 D). A high frequency 6(21.4%) of lattice degeneration was also seen in low myopic eyes of axial length between 24.01–26.00 mm (-2.00 D to -5.25 D).
Conclusions: Ten percent of the patients in this study showed the evidence of lattice degeneration. It was noted in both emmetropes as well as in low and high myopic groups but more common in high myopia. There was strong relationship between incidence of lattice and the axial length of the eye and high myopia.

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INTRODUCTION

Myopia is a common optical aberration. Physiological myopia is by far the most prevalent and is considered a normal biological variation.[1] Many patients have a relatively low degree of myopia, with no deleterious ocular changes; there is perhaps a tendency to regard myopia as a simple refractive condition without considering the serious visual problems.[2] High or pathological myopia also known as degenerative myopia is rare, occurring in roughly 2.1% of population.[1] High myopia or pathological myopia is associated with globe elongation and a refractive error of at least 6 diopters (D) and/or axial length of greater than 25.5 mm.[3-5] Excessive axial elongation of the globe in high myopia can cause mechanical stretching and thinning of the choroid and retinal pigment epithelium (RPE) layers, resulting in various retinal degenerative changes.[6] Individuals with high myopia have increased risks of retinal complications such as peripheral retinal degenerations, retinal tears, reghmatogenous retinal detachment (RRD), posterior staphyloma, chorioretinal atrophy, retinal pigment epithelial atrophy, lacquer

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cracks, choroidal neovascularisation (CNV) and macular haemorrhage.[7,8] The presences of peripheral retinal lesions are associated with younger age and high degree of refractive error.[9] One of the most-frequent peripheral retinal lesion is lattice retinal degeneration.[10] Lattice retinal degeneration is present in approximately 6-8% of the general population and 16.5% in pathological myopia.[11] There is also strong positive relationship between lattice degeneration and axial length of the eye in different grades of myopia.[12] Atrophic hole with lattice degeneration in young myopes is one of the major risk factor for primary rhegmatogenous retinal detachment.[13] In Pakistan myopia is found to be three times more common than hypermetropia and is noticeably increasing in younger people.[14] Therefore peripheral retinal examination is very important for early detection and treatment of possible pathological ocular conditions like retinal detachment. The first goal of this study is to determine the frequency of lattice retinal degeneration in emmetropes and myope. The second goal of this study is to access the relationship between the frequency of lattice degeneration and the axial myopia.

MATERIAL AND METHODS

From 10th October 2007 - 9th April 2008, for a duration of six months, this cross sectional study was conducted at Department of Ophthalmology, Dow University of Health Sciences, Civil Hospital Karachi. Two hundred patients attending the outpatient were selected. One hundred and four (52%) patients were females and 96 (48%) were males. The mean age was 26.50 years ± 8.63 standard deviation(SD). Youngest patient was 12 years while the oldest being 60 years of aged. These were then grouped according to their refractive status into, 100 cases of emmetropes (group I), 50 cases of myopia less than -6.00 dioptre (D) (group II) with a mean refraction -3.0827 ± 1.3395 SD (range= –0.50 to -5.50 D) and 50 cases of myopia of -6.00 (D) or more (group III) with a mean refractive error of -10.1525 ± 3.3227 SD (range= -6.00 to -20.00 D). Ophthalmic and general medical histories were obtained. Ophthalmic examinations consisted of indirect ophthalmoscopy. Slit-lamp biomicroscopy with 90 D lens and the Goldmann three-mirror lens was also performed when patient co-operation permitted. Selected cases were photographed with the pan fundus camera. The axial length was evaluated by A-Scan ultrasound. Refractive errors were converted to spherical equivalent. The data thus obtained were analyzed on SPPS.

RESULTS

The 200 cases (400 eyes) were grouped according to their refractive state into, 100 cases (200 eyes) of emmetropes (group I), fifty cases (100 eyes) of myopia less than 6 dioptre (group II) with a mean refraction -3.0827 ± 1.3395 SD (range= –0.5 to -5.50 D) and fifty cases (100 eyes) of myopia of 6 or more dioptre (group III) with a mean refraction -10.1525 ± 3.3227 SD (range= -6.00 to -20.00 D). Four hundreds eyes of 200 cases with mean axial length 24.4860 mm ± 2.1426 SD (range= 22.11–31.10 mm) were evaluated by using A-scan axial length measurements. The mean age of 200 cases was 26.50 years ± 8.63 SD; the two extremes begin at 12 and 60 years, with 104(52%) females and 96(48%) males.

3(3%) of Lattice retinal degeneration found in emmeropes (group I) and 17(17%) in myopes (group II and group III). There is significant difference in the association of lattice degeneration between myopes and emmetropes (p=0.001). Overall twenty patients (10%) showed the evidence of lattice retinal degeneration in our study (Table 1).

Table 1: Frequency of Lattice Retinal Degeneration in Emmetropes and Myopes

Refractive state	No of cases	No of cases with lattice degeneration	% of total cases
Emmetropes	100	3	3.0%
Myopes	100	17	17.0%
Total	200	20	10.0%

p=0.001

Out of 100 myopes 7(14%) lattice found in myopia less than 6 D (group II) and 10(20%) in myopia of 6 or more dioptre (group III) (Table 2).

Table 2: Frequency of Lattice Retinal Degeneration in Myopes

Refractive state	No of cases	No of cases with lattice degeneration
Myopia less than 6 D (group II)	50	7
Myopia of 6 D or more (group III)	50	10
Total	100	17

While consider the relationship between axial myopia and lattice, 1(4.3%) found between 22.01–24.00 mm, 6(21.4%) between 24.01–26.00 mm, 3(9.6%) between 26.01–28.00 mm, and 6(46.1%) between 28.01–30.00 mm and 1(20%) more than 30.00 mm which correspond ,respectively to -2.25 D, -2.00 to -5.25 D, -8.25 to -9.00 D, -11.00 to -14.00 D and -14.25 D (Table 3).

The age distribution among 20 cases of lattice retinal degeneration was 6(30%) in less than 20 years, 10(50%) between 20-years to 40 years and 4(20%) in more than 40 years (Table-4).

Table 3: Distribution of Lattice Retinal Degeneration in 2 Milimeter Intervals for Axial Length and their Corresponding Refractive Error in Myopes (N=100)

Axial length in milimeters	Total no of cases	No of case with lattice	refractive error in dioptre (D)
22.01 - 24.00	23	1(4.3%)	-2.25
24.01 – 26.00	28	6(21.4%)	-2.00 to -5.25
26.01 – 28.00	31	3(9.6%)	-8.25 to -9.00
28.01 – 30.00	13	6(46.1%)	-11.00 to -14.00
More than 30.00	5	1(20%)	-14.25

Table 4: Age Distribution in Cases of Lattice Retinal Degeneration

Age in years	No of cases with lattice	% of cases
Less than 20	6	30%
20-40	10	50%
More than 40	4	20%
Total	20	100%

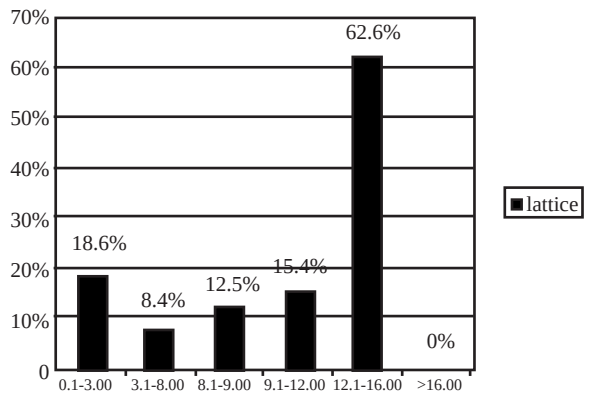
3(15%) of lattice retinal degeneration out of 20 cases were associated with atrophic holes, no case of retinal tears associated with lattice found in our study and remaining 17(85%) cases were without breaks (Table 5)

Table 5: Distribution of Retinal Breaks in the Cases of Lattice Retinal Degeneratio

Retinal breaks	No of cases	% of cases
Without break	17	85%
Tears	0	0%
Holes	3	15%
Total	20	100%

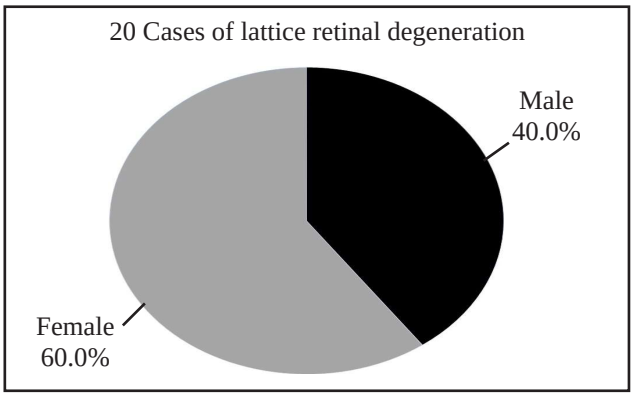
The highest frequency 5(62.6%) of lattice retinal degeneration was found between mean refractive error of -12.1 to -15.00 D and also 5(18.6%) of mean refractive error between -0.1 to -3.00 D (Figure-1).

Figure 1: Distribution of Lattice Retinal Degeneration in 3D Intervals for Myopia (N=100)



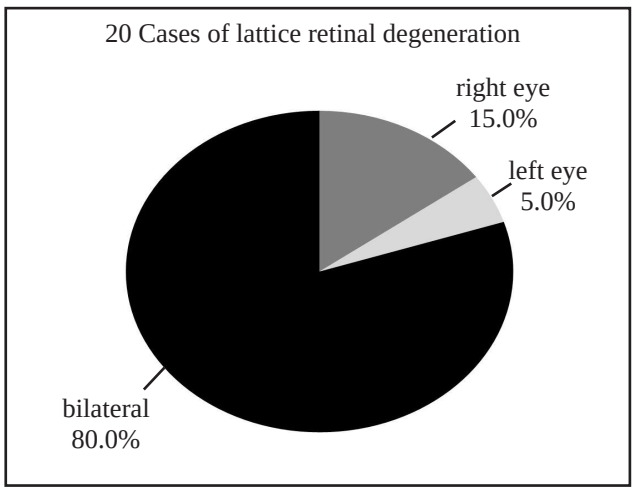
The evidence of lattice retinal degeneration in sex distribution included 8(40%) males and 12(60%) females (Figure-2).

Figure 2: Gender Distribution in Cases of Lattice Retinal Degeneration (N=20)



Right eye was involved in 3(15%), left eye was involved in 1(5%) and in remaining 16(80%) cases there was bilateral involvement (Figure 3).

Figure 3: Laterality in Cases of Lattice Retinal Degeneration



DISSCUSION

Lattice degeneration of the retina is perhaps the most important specific degeneration associated with retinal detachment. Therefore peripheral retinal examination is very important for early detection and treatment of possible pathological ocular conditions causing retinal detachment.

This has been a purposive sampling in which we have tried to find out the overall frequency of lattice retinal degeneration in emmetropes and myopies at the Ophthalmology Department of Civil Hospital Karachi.

A total number of 200 cases (400 eyes) were studied during a period of 6 months. Among them the overall frequency of lattice retinal degeneration was 10%. A study conducted by Everett[15] who reported 9.5 per

cent of 200 pairs of eyes in his study. In United States Lattice degeneration affects approximately 10% of the population[16] and in Japan was reported to be 9.5% in 1980.[17] In our study 3% of lattice retinal degeneration found in emmetropes, 14% in myopia less than 6 dioptre and 20% in myopia of 6 or more in dioptre. Reconstruction of Byer's[18] data reveals an increasing incidence of lattice degeneration with increasing myopia, ranging from about 4.3% in Emmetropia and hypermetropia to 8% in myopia of -0.1 D to -3.0 D and to 14% in myopia of -3.1 D or more. Cambiaggi[19] found lattice degeneration in 19% of myopic eyes and in 4.5% of emmetropic cases. In another study conducted in Chinese adults with high myopia reported lattice retinal degeneration 12.2%.[20] However, lattice degeneration is not restricted to eyes with myopia but more commonly found in myopes.

In our study the highest frequency of lattice degeneration found in high myopia between -12.1 to -15 D and also in the group of myopia between -0.1 to -3.00 D. The study conducted in the Spain reported highest frequency of lattice degeneration in myopia more than -15 D and also myopia between -3 and -6 D.[12] In a study of 218 patients with myopia of six dioptres or more in both eyes, Celorio and Pruett[7] found that greatest prevalence being in eyes having -6 to -9 dioptres of myopia. There is slightly significant variation in the distribution of lattice degeneration for myopia in different parts of the world as compared with our study.

As considering the relationship of lattice degeneration and axial length in our study highest frequency of lattice also found when the axial length was between 28.01–30.00 mm in group III and 24.01–26.00 mm in group II, which correspond, respectively, to myopia between -11.00 to -14.00 D and -2.00 to -5.25 D. Sanchez and Rodan[12] found highest frequency of lattice for myopia with axial length between 25-27 mm (-3 to -10 D) and 29-30 mm (more than -15 D). This suggests that there is a positive correlation between lattice retinal degeneration and axial elongation in highly myopic eyes. In another study, Celorio and Pruett[7] found an inverse relationship between axial length and the prevalence of lattice retinal degeneration in severly myopic eyes. They found greatest frequency of lattice in eyes with axial length of 26.0 to 26.9 mm (-6.00 to -8.70 D) and least prevalence of lattice degeneration in eyes with an axial length of 32.00 mm (-24.00 D) or greater.

Our study shows that in 20(10%) cases of lattice 4(20%) were unilateral while 16(80%) were bilateral. Celorio and Pruett[7] found lattice lesions 54.2% uniocular and 45.8% binocular. In different series of studies found that bilateral involvement in 34% to 48% of patient. This shows that the frequencies of bilateral involvement are higher in our study than the studies conducted previous in different countries.

As considering the age distribution for lattice degeneration the highest frequency of lattice in our study found between the ages of 20 to 40 years. In Byer's study of 1300 consecutive routine cases, he noted the highest incidence of lattice degeneration in the 20-to-29 years age group and an actual decreased incidence in older age groups.[18]

In our study out of 20 cases 8(40%) males had lattice degeneration 12(60%) females had lattice degeneration. as compared to Celorio and Pruett[7] who found lattice in 45.8% of males and 54.2% of females. It shows that there is no sex predisposition but slightly more common in female.

In our study out of 20 cases of lattice retinal degeneration, atrophic holes found in 3(15%) but no case of retinal tear associated with lattice found. Byer[18] in his clinical series found 16% to 24% of atrophic holes with lattice retinal degeneration and the risk of Retinal detachment with atrophic holes is 0.27%, which are infrequent, and show an increased risk in young myopic eye. Atrophic retinal holes within degenerative area in young myopes occurred mostly without giving rise to symptom so peripheral fundus examination is necessary in patient with lattice degeneration for early detection and management. In another clinical series of Byer[18] found 1.5% of retinal tears in eyes with lattice lesion followed for 3 to 10 years. Because lattice degeneration is present in 40% of phakic rhegmatogenous retinal detachment, theses lesion have been frequently consider for prophylactic therapy.[7,21] In eyes without other predisposing factors, however, lattice degeneration rarely cause a retinal detachment.[18,22]

CONCLUSIONS

Ten percent of the patients in this study showed the evidence of lattice degeneration, which was more common in both low and high myopia. It was seen more often in middle-aged females. The condition was bilateral in 80% cases and was associated with atrophic holes in 15% cases. It was noted in both emmetropes as well as in low and high myopic groups. There was strong relationship between incidence of lattice and the axial length of the eye and high myopia.

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