Abstract

Objective: To assess the fundus changes and incidence of various peripheral retinal degeneration associated with Myopia and to correlate these changes with the age of the patient. Materials and Methods: Randomised Prospective observational study of 100 cases of myopia (less than or equal to -6D: 50 cases and more than-6D: 50 cases) all the patients detailed history was recorded and subjected to intensive examination of both Anterior segment and posterior segment of the eye. The various fundus features and pathological lesions in the different degrees of myopia were noted and analysed. Findings: Females were comparatively affected more. Majority of the patients did not have significant family history. Majority of the cases showed some fundus changes more common were tessellated fundus. Axial length is relatively increased in higher degrees of myopia. Peripheral retinal degeneration are more common in moderate to higher degrees of myopia. Applications: The degenerative changes of fundus is commonly seen in moderate to high degrees of myopia whereas in our study it is evident in lesser degree also. Hence thorough examination of peripheral fundus using indirect ophthalmoscope for all cases of myopia will help in early diagnosis and treatment.

Keywords: Better Prognosis, Early Intervention, Indirect Ophthalmoscopy, Meticulous Examination, Pick up Complications

1. Introduction

The refractive error is one of the common causes of defective vision and myopia accounts for the major percentage of it. Myopia causes impaired visual acuity among school children as well as in adults. Retina is the innermost nervous layer of the eye which communicates with the brain. Myopia is associated with several retinal degenerations that can cause irreversible blindness. Peripheral retina is prone for various degeneration secondary to its anatomical dehiscence like thinness, presence of poorly developed retinal cells and absence of large blood vessels etc. Its less resistance to traction in the presence of degeneration make it vulnerable to retinal detachment.

This study was undertaken to analyse the incidence of degenerative lesions occurring in the peripheral retina of an asymptomatic myopic eye and to correlate these changes with the age of the patient and the degree of myopia.

2. Material and Methods

The study includes 100 cases of myopia (≤-6D : 50 cases; ≥-6D: 50 cases), who attended the Outpatient in department of Ophthalmology, Melmaruvathur Adhiparasakthi institute of medical sciences from September 2013 to July 2015. Informed, written consent was obtained from all the patients.

2.1 Inclusion Criteria

- Patients with refractive error of ≤ -6D : 50 cases;
- ≥ -6D : 50 cases.
- Patients with normal Corneal curvature.

2.2 Exclusion Criteria

- Patients with index myopia.
- Patients with abnormal corneal curvature (Curvature Myopia).
• Other ocular pathologies like Micro Ophthalmos, Retinopathy of Maturity, ectopia lentis.
• History of any intrauterine infection of the mother.

3. Study Design
This a prospective, randomised, observational study of Myopic patients attending the OPD between the period of September 2013 to July 2015 were selected randomly criteria applied.

(i) History of refractive error includes.
• Duration.
• Age at which spectacles were worn for the first – time.
• Time of last change of spectacles.
• Any complaints with present spectacles.

History of other symptoms like progressive loss of vision, defective vision related to day or night, sudden loss of vision, flashes, floaters.

Anterior segment examination was followed by recording of Visual acuity and the best corrected visual acuity was noted. IOP was measured for all the cases using Applanation tonometer. Axial length was measured in all the cases. Full mydriasis was obtained using homatropin 2% in young patients and phenylephrine 10% in adults. Fundus was examined with direct ophthalmoscope, indirect ophthalmoscope, 90D and B-SCAN was done in few cases. The media, disc, vessels, macula and the surrounding retina were examined. The periphery was examined was examined with indentation method. The various fundus changes and pathological lesions in the different degrees of myopia were noted.

The study was reviewed by the appropriate ethics committee was been performed in accordance with the ethical standards of the most recent version of the 1964 Declaration of Helsinki.

4. Results and Observation
Table 1. The incidence of myopia was higher in the younger age group.
Table 2. The incidence of myopia was higher among females
Table 3. Reduced incidence may be due to lack of awareness mainly in low social economic group.
Table 4. Out of the hundred patients examined 93% showed bilateral myopia and 7% showed unilateral myopia.

| Table 5. Out of 100 patients examined 75% showed fundus changes. |
| Table 6, Table 7. All the 7 cases of RD out of 100 cases examined has got either one or more of the above lesions as predisposing entity. All the above changes found to be common in moderate to higher degrees of myopia. |
| Table 8. In 100 cases examined 5 cases found to have paving stone degeneration with one case in the range of less than -6D and 4 cases in the range of more than -6D indicating that it is more common in higher degrees of myopia. |
| Table 9. Out of 100 cases examined, 9 cases found to have chorio – retinal degenerative changes like atrophic |

Table 1. Analysis depending on age

| Age in Years | Number of Patients | Percentage (%) |
|-------------|--------------------|----------------|
| 0-10        | 7                  | 7              |
| 11-20       | 45                 | 45             |
| 21-30       | 21                 | 21             |
| 31-40       | 11                 | 11             |
| 41-50       | 9                  | 9              |
| 51-60       | 3                  | 3              |
| > 61        | 4                  | 4              |

Table 2. Analysis depending on sex

| Sex of the Patients | Number of Patients | Total | Percentage |
|---------------------|--------------------|-------|------------|
| Male                | 46                 | 46    | 46         |
| Female              | 54                 | 54    | 54         |

Table 3. Analysis depending on family history

| Total No of Cases | No of Cases with Family History | Percentage |
|-------------------|---------------------------------|------------|
| 100               | 7                               | 7          |

Table 4. Analysis depending on eyes involved

| Eyes Involved | Total | Percentage |
|---------------|-------|------------|
| Bilateral     | 93    | 93         |
| Unilateral    | 7     | 7          |

Table 5. Incidence of fundus changes in myopia

| Total number of cases | Number of Cases showing fundus changes | Percentage |
|-----------------------|--------------------------------------|------------|
| 100                   | 75                                   | 75         |
patches and scars with 5 cases in the range of >-6D. 7 Cases Found to have posterior staphyloma with 6 cases falling under >-6D range. These changes indicate that degeneration changes most commonly seen in higher degrees of myopia.

Table 10. Retinal detachment is most commonly seen in higher degrees of Myopia

Table 11. Out of 23 cases of lattice degeneration examined, supero-temporal quadrant is most commonly affected with 16 cases. This is probably due to excessive stretching and increased vascularity of this area.

Table 12. Out of 23 cases who had lattice degeneration 14 cases belonged to the age group 11–40 years.

Table 6. Incidence of various types of fundus changes

| S. No | Nature of fundus changes | Number of cases affected | Less than or equal to -6D | More than -6 D | Percentage |
|-------|--------------------------|-------------------------|--------------------------|---------------|------------|
|       |                          |                         | Less than or Equal -6D   | More than -6   | Total       |
| 1     | Lattice                  | 23                      | 3                        | 20            | 20         | 23         |
| 2     | Chorioretinal            | 9                       | 4                        | 5             | 5          | 9          |
| 3     | WWP & WWOP               | 21                      | 9                        | 12            | 12         | 21         |
| 4     | Retinal Tear             | 3                       | -                        | 3             | 3          | 3          |
| 5     | RD                       | 0                       | 0                        | 7             | 0          | 7          |
| 6     | Posterior Staphyloma     | 7                       | 1                        | 6             | 1          | 6          |
| 7     | Paving stone Degeneration| 5                       | 1                        | 4             | 1          | 4          |
| 8     | Post Vitreous Detachment | 3                       | -                        | 3             | -          | 3          |
| 9     | Snail Track Degeneration | 5                       | -                        | 5             | -          | 5          |
| 10    | Retinal Hole             | 4                       | 1                        | 3             | 1          | 3          |
| 11    | Retinitis Pigmentosa     | 3                       | -                        | 3             | -          | 3          |

Table 7. Lesions predisposing to retinal detachment

| S. No | Nature of Lesions | Number of Cases Affected | Less or equal to -6D | More than -6 D | Percentage |
|-------|-------------------|--------------------------|----------------------|---------------|------------|
|       |                   |                          | Less or Equal to -6D | More than -6   | Total       |
| 1     | Lattice Degeneration | 23                      | 3                    | 20            | 20         | 23         |
| 2     | Snail Track Degeneration | 5                       | -                    | 5             | -          | 5          |
| 3     | White without pressure | 14                      | 5                    | 9             | 9          | 14         |
| 4     | Retinal Tear       | 3                       | -                    | 3             | -          | 3          |

Table 8. Lesions not predisposing to retinal detachment

| S. No | Nature of Lesions | Number of Cases Affected | Less or equal to -6D | More than -6 D | Percentage |
|-------|-------------------|--------------------------|----------------------|---------------|------------|
|       |                   |                          | Less or Equal to -6D | More than -6   | Total       |
| 1     | Paving Stone Degeneration | 5                       | 1                    | 4             | 1          | 4          |

Table 9. Incidence of other degenerations

| S. No | Nature of Lesions | Number of Cases Affected | Less or equal to -6D | More than -6 D | Percentage |
|-------|-------------------|--------------------------|----------------------|---------------|------------|
|       |                   |                          | Less or Equal to -6D | More than -6   | Total       |
| 1     | Chorio retinal Degeneration | 9                       | 4                    | 5             | 4          | 5          |
| 2     | Posterior Staphyloma | 7                       | 1                    | 6             | 1          | 6          |
| 3     | Retinitis Pigmentosa | 3                       | -                    | 3             | -          | 3          |

Table 10. Incidence of retinal detachment with the myopic status

| Range of Myopia | Number of cases affected |
|-----------------|--------------------------|
| Less than or equal to -6D | 0          |
| More than -6D   | 7          |

Table 11. Incidence of lattice degeneration with quadrant wise

| S.No | Affected quadrant | Number of cases |
|------|-------------------|-----------------|
| 1    | Supero Temporal    | 16              |
| 2    | Supero Nasal       | 3               |
| 3    | Infero Temporal    | 3               |
| 4    | Infero Nasal       | 1               |

Table 12. Incidence of lattice degeneration with age

| Age in Years | Number of Patients |
|--------------|--------------------|
| 0–10         | 1                  |
| 11–20        | 7                  |
| 21–30        | 4                  |
| 31–40        | 3                  |
| 41–50        | 5                  |
| 51–60        | 1                  |
| > 61         | 2                  |
Table 13. Slight female preponderance is seen with 13 cases out of 23 cases were females.

Table 14. No age specificity is seen as far as snail track degeneration is concerned.

Table 15. Out of total 5 cases of snail track degeneration it is found males has slightly more preponderance.

Table 16. Out of 14 cases of white without pressure 11 cases were found to be in 2nd and 3rd decades.

Table 17. Out of 14, it is found that both the sexes are almost equally affected.

Table 18. No age specificity is seen in the 7 cases affected.

Table 19. No sexual preponderance is seen in the above study.

Table 20. In the study of 100 cases, it is found that all the cases with posterior staphyloma seen in the younger age group.

Table 21. Female dominance is clearly seen in this study.

Table 22. Though 41 cases out of 100 cases has tessalated fundus, 27 cases comes under the higher degrees of myopia. This indicates that, in moderate to higher degrees of myopia Tessalation is more common.

Table 13. Incidence of lattice degeneration with sex

| Sex   | Number of cases affected |
|-------|--------------------------|
| Male  | 10                       |
| Female| 13                       |

Table 14. Incidence of snail – track degeneration with age

| Age in Years | Number of Patients |
|--------------|-------------------|
| 0–10         | -                 |
| 11–20        | 1                 |
| 21–30        | 1                 |
| 31–40        | 1                 |
| 41–50        | 1                 |
| 51–60        | -                 |
| > 61         | 1                 |

Table 15. Incidence of snail – track degeneration with sex

| Sex   | Number of cases affected |
|-------|--------------------------|
| Male  | 3                        |
| Female| 2                        |

Table 16. Incidence of white without pressure with age

| Age in Years | Number of Patients |
|--------------|-------------------|
| 0–10         | -                 |
| 11–20        | 8                 |
| 21–30        | 3                 |
| 31–40        | 1                 |
| 41–50        | -                 |
| 51–60        | 1                 |
| > 61         | 1                 |

Table 17. Incidence of white without pressure with sex

| Sex   | Number of cases affected |
|-------|--------------------------|
| Male  | 6                        |
| Female| 8                        |

Table 18. Incidence of chorioretinal degeneration with age

| Age in Years | Number of Patients |
|--------------|-------------------|
| 0–10         | -                 |
| 11–20        | 1                 |
| 21–30        | 2                 |
| 31–40        | 2                 |
| 41–50        | 2                 |
| 51–60        | 1                 |
| > 61         | 1                 |

Table 19. Incidence Of Chorioretinal Degeneration With Sex

| Sex   | Number of cases affected |
|-------|--------------------------|
| Male  | 5                        |
| Female| 4                        |

Table 20. Incidence of posterior staphyloma with age

| Age in Years | Number of Patients |
|--------------|-------------------|
| 0–10         | -                 |
| 11–20        | 4                 |
| 21–30        | 2                 |
| 31–40        | 1                 |
| 41–50        | -                 |
| 51–60        | -                 |
| > 61         | -                 |
5. Discussion

100 cases of myopia were studied. Females were commonly affected 54%. The highest incidence was seen in the younger age group (0–30 years) 73%. It is of interest to note that majority of these cases falls under the students community. This may be because they were symptomatically aware of the refractive error. While only 7% of cases had a family history of myopia, majority of the cases did not have a significant family history. Reduced incidence may be due to lack of awareness mainly in low socio-economic group. 7% of cases had unilateral myopia. All these cases falls under more than -6D group. Four of these cases were associated with lattice degeneration. Interestingly 2 cases of unilateral myopia is associated with posterior polar cataract.

Axial length is found out to be increased in higher degrees of myopia. This is due to the elongation of the globe. Out of 100 cases examined, 75% showed various fundus changes. Retinal background showed a tessellated appearance in 41% of cases. This tessellation was not much in mild degrees of myopia. In higher degrees gross tessellation was noted. This is due to thinning of retinal pigment epithelium which exposed the underlying choroid secondary to elongation of the globe. Vitreous Floaters were seen in 36% of eyes this is due to vitreous degeneration in myopes. Commonly temporal crescents were seen. There was also shallow cupping of the disc. These changes were probably due to elongation of the globe. In few cases macula showed stippled appearance. This is due to thinning of the retina. The various studies done showed that onset of vitreous degeneration and degree of myopia had close association. In this study young patients with moderate to higher degree of myopia had vitreous degeneration.

Peripheral retinal degeneration changes are common in moderate to higher degrees of myopia. Common types seen were lattice degeneration (23%) white without and white the pressure (21%) chorio retinal degeneration 9%, retinal tear (3%), Snail track degeneration (5%). Majority of the above degenerative changes is associated with retinal detachment which is seen in 7% of cases. All the 7 cases of RD seen in higher degrees of myopia. Lattice degeneration is more commonly seen in Supero-temporal quadrant. This is probably due to excessive stretching and increased vascularity of this area. On the edge of lattice, vitreous adhesion is commonly seen and this accounts for the association of retinal detachment with lattice degeneration. White without pressure is significant since its indicates some amount of thinning and vireo-retinal adhesion in this area. Retinal degenerative changes were associated with retinal breaks in 7% of cases. In eyes with chorio retinal breaks or detachments, due to firm adhesion between retina and choroid in young patients with moderate to high degree of myopia showed high incidence of retinal detachment. This was due to vitreous degeneration, lattice degeneration and breaks could not be localized. The other eye showed degenerative changes associated with high degree of myopia. These patients belonged to illiterate low socio-economic group and probably were not aware of the seriousness of loss of vision. 2 patients had cataract the lens and the fundus details could not be made out. Hence B scan was done and it showed retinal detachment. The other eye showed refractive error of -24D and -7D and associated degenerative changes. 9% of patients had lenticular opacity. Common type seen was posterior polar cataract. 3 cases in the high degree of myopia had associated retinitis pigmentosa changes.

6. Conclusion

In our analysis of 100 myopic patients, 72% showed various fundus changes. Younger age group is most commonly affected. The peripheral degenerative though common in moderate to higher degrees of myopia, it was present in lesser degrees also. So all the cases of myopia must be examined meticulously with indirect opthalmoscope which can pick up complications at the earliest and can be treated effectively for better visual outcomes.

Awareness need to be created among myopic population regarding visual hygiene, safety precautions, risks and complication involved.

The periodical monitoring and properly structured patient education program will help them to be aware of the symptoms and warning signs. It helps in early recognition of symptoms to intervene immediately for better visual prognosis.

Table 21. Incidence of posterior staphyloma with sex

| Sex  | Number of cases affected |
|------|--------------------------|
| Male | 1                        |
| Female | 6                        |

Table 22. Incidence of tessalation with myopic status

| Myopic Status (in Dioptres) | Number of cases Affected |
|-----------------------------|--------------------------|
| Less than or equal to -6D   | 14                       |
| More than -6D               | 27                       |
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