

The study of correlation between advancing age, foveal sensitivity and visual acuity

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Abstract

Aim: To study correlation between ageing and corresponding foveal sensitivity and visual acuity in subjects and to study the rate of decrease of foveal sensitivity with age. **Materials and Methods:** Two hundred and fifty eyes of 125 normal subjects from age group 5 to 64 years were examined for visual acuity by Snellen's chart. After detail eye examination, foveal sensitivity of each subject was recorded in dB on Humphrey's automated perimeter. All the results obtained were averaged and 'p' value was determined. **Results:** The mean foveal sensitivity in males of all age groups was 36.92dB and that in females was 35.5 dB. Male eyes were more sensitive than females by 1.42 dB. The mean foveal sensitivity was found to be decreased by 2.88dB throughout in advancing age at the rate of 0.48 dB/decade; however there was no effect on visual acuity of the group, average being 6/6 in all age groups. **Conclusion:** There is decrease in mean foveal sensitivity in advancing age group. The decrease in mean foveal sensitivity was 0.48 dB/decade. Visual acuity has not suffered loss with advancing age.

Keywords: Foveal sensitivity, Visual acuity, advancing age.

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INTRODUCTION

Failing body function is commonly attributed to advancing age. As age advances there are characteristic progressive changes in the anatomy and physiology of the visual system which has effect on a number of visual functions as in presbyopia.¹ The influence of ageing on visual acuity and its correlation with more specific effect on foveal sensitivity is important to understand for predictability.² To date, there are only a few published studies that assess the influence of aging on visual acuity and foveal sensitivity. In most of these studies, a limited no. of subjects were included, particularly the older age groups. The purpose of this study is to evaluate correlation between advancing age, foveal sensitivity and

visual acuity in age groups from 5 years to 65 years, arranging them in chronology of paediatric, adolescent, young adult, middle age and old age group and also to study the rate of decrease of foveal sensitivity with age.

MATERIAL AND METHODS

In this cross-sectional, prospective, observational study, subjects were selected from patients attending eye OPD of MGM Medical College, Aurangabad. Written consent was obtained from all the participants in accordance with the World Medical Associations Declaration of Helsinki. 250 eyes of 125 normal subjects of age group of 5 to 65 years were studied. The participants were grouped according to age 5 to 16 (Paediatric) 17 to 28 years (Adolescent), 29 to 40 (up to 40/ younger), 41 to 52 years (middle aged) and 53 to 64 years (old). In each group 25 subjects that is 50 eyes were examined. Systemic diseases like diabetes mellitus and hypertension that can cause ocular pathology were excluded. Gross refractive errors were also excluded. The subjects having foveal sensitivity ranging outside 21-41 dB^[10] were excluded. Visual acuity was measured and recorded by standard snellen's chart at 6 metre distance using pinhole, separately for two eyes of each subject and converted to decimal table. After detail anterior and posterior segment evaluation, foveal

sensitivity of each eye was measured using Humphrey’s automated perimeter.

Statistical Analysis

The database was collected on a Microsoft Excel spreadsheet age wise, foveal sensitivity as well as corresponding visual acuity wise. All the results obtained for each group were averaged for age, foveal sensitivity and visual acuity, which were required for significance determination. The ‘p’ value was determined. A ‘p’ value <0.05 was considered significant.

RESULTS

A total of 250 eyes of 125 subjects were identified as eligible for inclusion for the analysis. Out of 125 subjects, 78 were males and 47 were females. Average foveal sensitivity was calculated in males and females. Foveal sensitivity in males, average of all age groups is 36.92dB and in females, it is 35.5dB. Male eyes were more sensitive than females by 1.42 dB.

Graph 1 shows sex distribution and Table 1 shows average foveal sensitivity in males and females

Table 1

Sex	No. of Subjects	Average Sensitivity for both eyes
Male	78	36.92dB
Female	47	35.5 dB

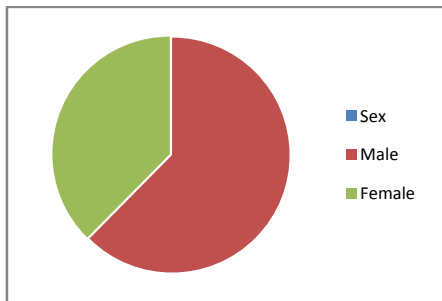


Figure 1:

Table 2: Summarizes distribution of age group, average age, Average foveal sensitivity and average visual acuity

Sr. No	GROUPS	AVG. AGE	AVG. SENSITIVITY	VISUAL ACUITY
1	5-16 YRS	9.84	37.66	6/6
2	17-28 YRS	21.08	36.66	6/6
3	29-40 YRS	36.44	36.62	6/6
4	41-52 YRS	45.44	36.24	6/6
5	53-64 YRS	55.76	34.78	6/6

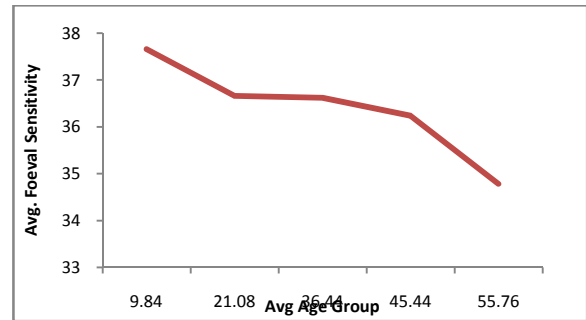


Figure 2: Clearly indicates dimensions of foveal sensitivity with advancing age

The average foveal sensitivity decreases by 2.88 dB being 0.48 dB/ decade with advancing age. Statistically the ‘p’ value is 0.074 which is not significant. Average visual acuity of 6/6 in all groups has no change with advancing age.

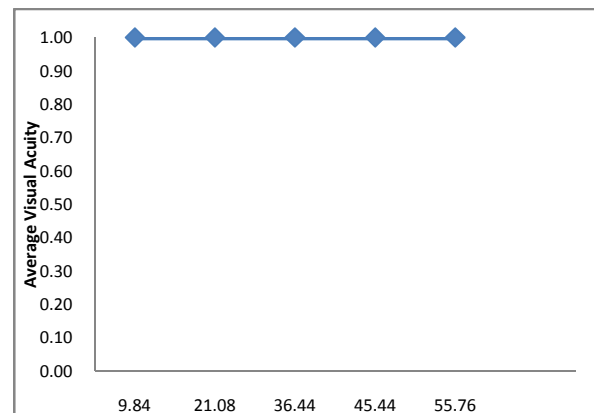


Figure 3: Shows visual acuity in advancing age

Rt eye and Lt eye are almost equal in foveal sensitivity. Males are slightly more sensitive than females. Average foveal sensitivity in males is 36.92 dB and that in females 35.5 dB.

DISCUSSION

In this study, there was a total loss of mean foveal sensitivity from first group (5 – 14 years) to last group (52-64 years) by 2.88 dB less. This average comes out to be 0.48 dB/decade. The study undertaken by⁶ Paul G Spry and Johnson *et al* has shown a small age related sensitivity reduction during first six decades of life approximately 0.43dB/decade which increases to around -1.02dB/decade onwards. So the findings in this study correlate with mean retinal sensitivity change with age. However the difference being 2.88 dB less i.e. p =0.074 showing no statistical significance. Similarly, pinhole visual acuity tested in all age groups irrespective of foveal sensitivity decrease has not shown any decrease with ageing, thereby concluding that there is no correlation between decrease in foveal sensitivity and visual acuity with increasing age. The study by⁷ Laxmi *et al* indicated

slight decrease in visual acuity but no appreciable decrease in mean retinal sensitivity with age which is roughly 0.40 dB/decade. In the study⁸ Zhou J *et al* has studied and concluded that with ageing, there is no correlation of mean retinal sensitivity with age. This conclusion coincides with our study. However both these studies have considered macular retina for study of sensitivity. Our study has only considered visual acuity and foveal sensitivity. Further, no significant difference is seen between male and female foveal sensitivities but slight male preponderance is present. Also there is no significant difference in foveal sensitivity of both eyes that is in laterality and visual acuity.

CONCLUSION

There is no significant correlation between the age and the foveal sensitivities in advancing age groups. Pinhole visual acuity of 6/6 has not been affected by increasing age. There is no correlation found in this study between mean foveal sensitivity and visual acuity in advancing age groups. The decrease in foveal sensitivity with advancing age was 0.48 dB/decade which is similar to other studies. No significant difference in sensitivity of either right or left eye was found. Though not very significant, males have slightly more sensitivity than females by 1.42dB.

- There is average decrease of foveal sensitivity by 2.88 dB in advancing age being 0.48/decade decrease.

- Visual acuity was not affected by decrease in foveal sensitivity in advancing age.

REFERENCES

1. Parsons' textbook of Ophthalmology 21st Ed. Ocular examination Pg 102
2. Johnson CA, Spry PG Normal age related sensitivity loss for a variety of visual functions throughout the visual field *Optom Vis Sci* 2006;83:438-443.
3. Automated perimetry – Diagnostic modalities in Ophthalmology. Chapter 109 Andrew M. Prince And Drane P. Pomsuitony
4. Stephen Ryan retina 4th Ed Chap 10 Pg 210 Joel Pokorny Viviant C Singh
5. Paolo Brusini Ageing and Visual field data *British Journal of Ophthalmology* Oct 2007, Ed. 10, 1257 -1258.
6. Paul. G.D. Spry, Chris Johnson senescent changes at the Normal Visual field June 2001, Vol. 78 Issue 6. *Optometry and Visual Sciences* Pg. 436 – 431
7. Retinal sensitivity in healthy Indians using microperimeter. Laxmi Gella, Muneersuar Gupta et al. *Indian Journal of Ophthalmology* Vol 62 No. 3 Page 284-84.
8. Macular retinal function detected by MP – 1 microperimetry in normal subjects of middle and old age. Zhou J, Liu W, et al *Chinese Journal of Ophthalmology* 2011, 47(1), 35 – 38.
9. Joel Pokorny Viviant C Singh Jaffe GJ, Alvarado JA, Jures RP Age related changes of the normal Visual field. *Arch. Ophthalmology* 1986; 104: 1021-25
10. Anders Heijl, Vincent Pateua, Boel Bengtsson, “The Field Analyser Primer – Effective Perimetry” Pg. 25, 4th Edⁿ

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