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Research Paper

Medical Science

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Association Between Axial Length and Senile Cataract

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ABSTRACT

Purpose: To study the association between axial length and senile cataract. Materials & Methods: It is a prospective cross sectional study carried out on 420 eyes of 210 patients with senile cataract was included in the study. The age and sex of the patient, grade and axial length of the cataract of the eyes were recorded. The grade of the cataract was recorded by the LOCS III (Lens Opacities Classification System, version III) and Axial length recording using A biomode ultrasound device (A-scan) .Results: The age variation in the study was between 60-85 years. The maximum number of patients was in the age group of 60-65 years. The total no of the patients which are having Axial length less than 22 was 17 (4.04%) ,between 22 to 23 was 97 (23.10%) and more than 23 was 306 (72.86%). No patients with a score of nuclear opalescence and colour between 1.0-2.0 was 176, between 2.1-3.0 was 112 and above 3.0 was 132. No of patients with a score of cortical cataract between 0.1-1.0 was 293 and with a grade between 2.1-3.0 was 113. No of patients with a score of posterior subcapsular cataract between 0.1-1.0 was 225 and with a grade between 2.1-3.0 was 164. Conclusion: Longer eyes were found to have nuclear, cortical and posterior subcapsular cataract and the study was statistically significant in all types of cataract.

INTRODUCTION

Axial length has also been recognized as a risk factor for development of cataract[1] Studies have shown that eyes with longer axial length have greater prevalence of cataract. Patients with axial myopia are more likely to develop cataract at an earlier age than those with shorter axial lengths.[8]

Cataract is defined as opacity within the clear lens inside the eye that reduces the amount of incoming light and results in deterioration of vision. Natural lens is a crystalline substance and a precise structure of water and protein to create a clear passage for light.

Cataract is one amongst the major cause blindness in India' accounting for nearly 50-80% of blindness in both eyes in the country [2]. There are several known risk factors for cataract formation. These include individual factors like age, smoking, systemic factors like diabetes mellitus, environmental factors like ultraviolet light exposure, trauma, dehydration and drugs like steroids [3]. An additional hurdle arises from the fact that different types of cataracts may have different etiologies and risk factors which are difficult to measure. Cataract is often described as being similar to looking through a waterfall or waxed paper[4].

The present study evaluates the association between axial length and senile cataract.

MATERIAL AND METHODS

Study was conducted at Department of Ophthalmology, in a tertiary care teaching hospital located in rural area of western Maharashtra. The study was carried out over a period of two years, from September 2012 to August 2014. Total 210 patients with 420 eyes fulfilling the inclusion and exclusion criteria were enrolled in the study.

Inclusion criteria: Patients above the age of 60 years with diminished vision. Patients of either sex. Patients ready to give informed consent.

Exclusion criteria: History of intraocular surgery, ocular trauma, Corneal scar or opacity, Known case of dry eye syndrome, Lens induced glaucoma .Patients with the following risk factors for cataract: uveitis, glaucoma and steroid medications. Patients with the following conditions which are likely to affect the axial length of the eye: keratoconus, trauma, orbital mass, pterygium and eyelid mass such as chalazion. Patients with the chronic systemic illness.

Each patient documenting as per proforma:

Sociodemographic information.

Clinical findings like Vision, anterior segment examination, fundus examination.

Age, sex, grade of the cataract, the axial length of the eye was recorded. The grade of the cataract was then be recorded by the LOCS III (Lens Opacities Classification System, version III) [5] (Fig-1)and categorized as nuclear(Fig-2) and cortical(Fig-3) and posterior subcapsular type(fig-4). Axial length recording using A biomode ultrasound device (A-scan) [6]

Axial length is the antero-posterior distance of the eyeball. Average values for the axial length is between 22 and 23 mm for emmetropic eyes.[7]

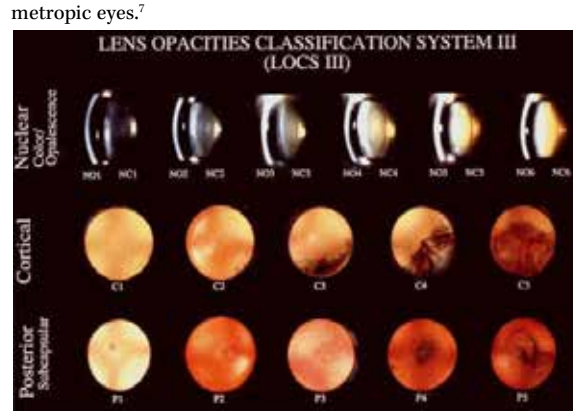


Fig 1: LOCS III Classification

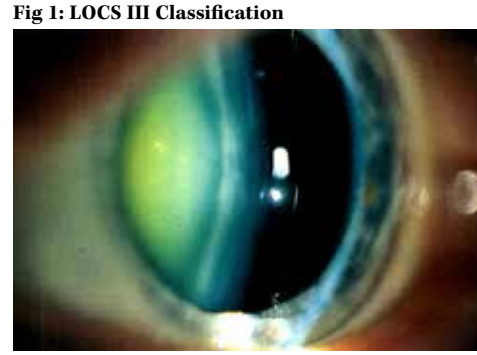


Fig 2: Nuclear Cataract

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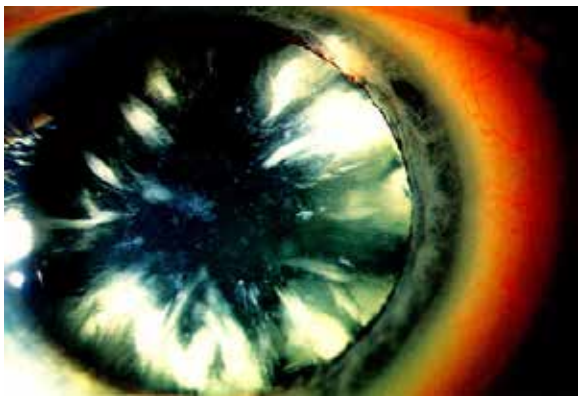


Fig3: Cortical Cataract

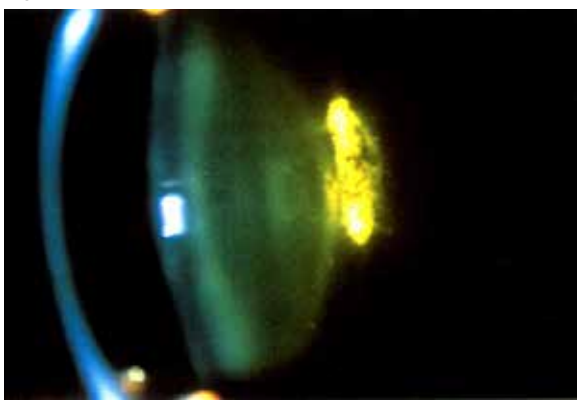


Fig 4: Posterior subcapsular Cataract

RESULTS

Table 1: Age and sex wise distribution of cases studied

Age in years	Males	Females	Total
	No. (%)	No. (%)	No. (%)
60-65	59(63.44%)	83(70.94%)	142(67.62%)
66-70	19(20.43%)	26(22.22%)	45(21.43%)
71-75	13(13.98%)	2(1.71%)	15(7.14%)
76-80	0	6(5.13%)	6(2.86%)
81-85	2(2.15%)	0	2(0.95%)
Total	93(44.29%)	117(55.71%)	210(100%)

In the present study the age variation was from 60 to 85 years. Highest number of 142 patients were found in the age group of 60-65 years. (Table no.1)

There were 93 male and 117 female patients in the study group comprising of 44.29% and 55.71 % of the study population respectively.

Table 2: Nuclear Colour & Opalescence of cases studied

Nuclear Colour &Opalescence	Total no eyes	Percentage
	No.	(%)
1—2	176	41.90%
2.1—3.0	112	26.67%
> 3.0	132	31.43%
Total	420	100%
Mean ± SD	1.74 ± 0.47	

Out of the 420 eyes of 210 patients studied 176 patients (41.90%) had nuclear colour (NC) & (NO) between 1.0-2.0, 112 patients (26.67%) had NC& (NO) between 2.1-3.0 and 132 patients (31.43%) had (NC) & (NO) above 3.0. (Table -2)

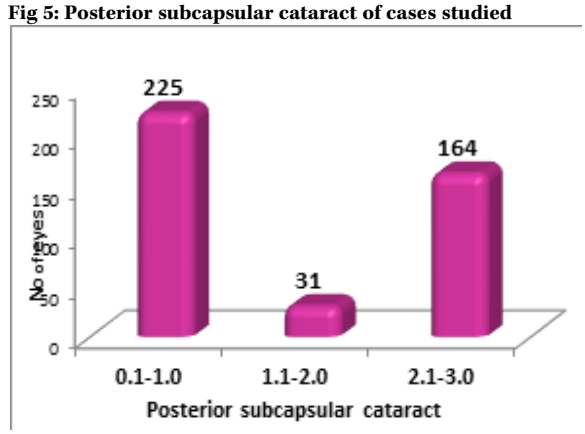
Out of the 420 eyes of 210 patients studied 293 patients (69.76%) had cortical cataract between 0.1-1.0, 14 patients (3.33%) had cataract between 1.1-2.0 and 113 patients (29.91%) had cortical cataract above 2.1. (Table 3)

Table 3: Cortical Cataract of cases studied

Cortical cataract	Total eyes	Percentage
	No.	(%)
0.1-1.0	293	69.76%
1.1-2.0	14	3.33%
2.1-3.0	113	26.91%
Total	420	100
Mean ± SD	0.94±0.03	

Out of the 420 eyes of 210 patients studied 225 patients (53.57%) had Posterior subcapsular cataract between 0.1-1.0, 31 patients (7.38%)between 1.1-2.0 and 164 patients (39.05%) had PSC above 2.1.(Fig no-5)

Fig 5: Posterior subcapsular cataract of cases studied



Out of the total 420 eyes studied, 306 eyes (72.86%) had axial length above 23mm, 97 eyes (23.10%) had an axial length between 22-23mm and 17 eyes (4.04%) had an axial length less than 22 mm. (Table 4)

Table 4: Axial length

Axial length	Total eyes	Percentage
	No.	(%)
<22	17	4.04%
22-23	97	23.10%
>23	306	72.86%
Total	420	100%
Mean ± SD	23.13±8.01	

Table 5: Association of Grading LOCS and Axial length of patients studied

Statistically significant association was found for nuclear, cortical and posterior subcapsular cataract

LOCS	No. of patients	Mean ± SD, Spherical equivalence	P value
Nuclear opalescence			
1.0 – 2.0	176	1.42±0.47	χ^2 = 19.87, **p<0.05**
2.1 – 3.0	112	2.64±1.06	
> 3.0	132	3.47±1.14	
Nuclear colour			

LOCS	No. of patients	Mean ± SD, Spherical equivalence	P value
1.0 – 2.0	176	1.42±0.47	χ^2 = 19.87, **p<0.05**
2.1 – 3.0	112	2.64±1.06	
> 3.0	132	3.47±1.14	
Cortical cataract			
0.1 – 1.0	293	1.11±0.14	χ^2 = 15.77, **p<0.05**
1.1 – 2.0	14	2.69±0.98	
2.1 - 3.0	113	3.78±1.11	
Posterior subcapsular cataract			
0.1 – 1.0	225	1.47±0.47	χ^2 =14.63, **p<0.05**
1.1 – 2.0	31	2.71±1.11	
2.1 - 3.0	164	3.56±1.14	

DISCUSSION

ASSOCIATION BETWEEN CATARACT AND AXIAL LENGTH:

For nuclear cataract In my study, 306 eyes had axial length more than 23 and 17 eyes having axial length less than 22. 41.90% axial length had nuclear cataract between1 to 2. The lowest mean standard deviation 1.42±0.47 was found in the group with score 1.0-2.0. The highest mean standard deviation 3.47±1.14D was found in the group with score of >3.0. Longer eyes were found to have higher grade of nuclear cataract in this study. However this correlation was statistically significant.

In the study by Kubo et a[8], the lowest mean axial length of 23.09 ± 1.5mm was found in the group of 1.0-2.0 and the highest mean axial length of 23.96 ± 2.42 mm was found in the group with a score of 4.0-5.0. Thus higher grade of nuclear cataract was found in eyes with a longer axial length in this study.

In Singapore Malay study[9], per millimeter increase in axial length was not associated with nuclear cataract.

For cortical cataract In my study, 306 eyes had axial length more than 23 and 17 eyes had axial length less than 22. In study 293 eyes had cortical cataract between 0.1 to 1.0. The lowest mean standard deviation 1.11±0.14 was found in the group with score 0.1-1.0. The highest mean standard deviation 3.78±1.11D was found in the group with score of 2.1 to 3.0.. Thus longer eyes were found to have grade of cortical cataract in this study. However this correlation was statistically significant.

In the study by Kubo et a[8], the lowest mean axial length of 23.16 ± 1.67mm was found in the group with score 1.0-2.0 and the higher mean axial length of 23.37 ± 1.87mm was found in the group with score 3.0-5.0.

In Singapore Malay study[9] , per millimeter increase in axial length was not associated with cortical cataract.

For posterior subcapsular cataract In my study, 306 eyes had axial length more than 23 and 17 eyes had axial length less than 22. 225 eyes had posterior subcapsular cataract between 0.1 to 1.0 and 164 eyes had posterior subcapsular cataract between 2.1 to 3.0. The lowest mean standard deviation 1.47±0.47 was found in the group with score 0.1 – 1.0. The highest mean standard deviation 3.56±1.14D was found in the group with score of 2.1- 3.0. This correlation was found to be statistically significant.

In the study by Kubo et al[8], the lowest mean axial length of 23.22 ± 1.65 mm was found in the group with score of 1.0-2.0 and the highest mean axial length of 23.41 ± 2.02 mm was found in the group with score 3.0-5.0.

In Singapore Malay study[9], per millimeter increase in axial length was not associated with posterior subcapsular cataract.

Limitations of the study:

Sample size is very small as compared to similar other population based studies.

Prior axial length of the patient could not be studied as many patients were presenting for the first time with the cataract.

Patients with early cataract could not be followed up to study the axial length as the cataract develops.

CONCLUSION

The longer axial length was associated with nuclear, cortical and posterior subcapsular cataract and this longer axial length was statistically significant with nuclear, cortical and posterior subcapsular cataract.

Conflict of Interest: Nil

REFERENCE

1. Wu Z, Lim JI, Sadda SR. Axial length: a risk factor for cataractogenesis. Ann Acad Med Singapore. 2006;35(6):416-9. | 2. Murthy G, Gupta SK, John N, Vashist P. Current status of cataract blindness and Vision 2020: the right to sight initiative in India. Indian J Ophthalmol.-Dec 2008; 56(6):489-94. | 3. Taylor HR. Epidemiology of age-related cataract. Eye (Lond). 1999; 13(3): 445-8. | 4. Robert S, Randall LK, editors. Cataracts Overview (Internet). Life Extension, Available from:http://www.garynullforum.com/articles/pdf/foundarticles1/lef/CATARACTS | 5. Chylack LT Jr, Wolfe JK, Singer DM, Leske MC, Bullimore MA, Bailey IL et al. The Lens Opacities Classification System III. The Longitudinal Study of Cataract Study Group. Arch Ophthalmol. 1993;111(6):831-6 | 6. Byrne SF. A-Scan Axial Eye Length Measurements: A Handbook for IOL Calculations. Mars Hill, NC: Grove Park Publishers; 1995. | 7. Abrams D. Duke-Elder's Practice of Refraction. Tenth edition.Edinburgh: Churchill Livingstone; 1993 | 8. Kubo E, Kumamoto Y, Tsuzuki S, Akagi Y. Axial Length, Myopia, and the Severity of Lens Opacity at the Time of Cataract Surgery. Arch Ophthalmol. 2006;124: 1586-90 | 9. Pan CW, Boey PY, Cheng CY. Myopia, axial length, and age Related cataract: the Singapore Malay Eye Study. Invest Ophthalmol Vis Sci. 2013;54:4498–02. |