

**A pilot study of facial skin ageing in patients with senile cataract**

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**Abstract**

**Introduction:** Aging of the skin is due to intrinsic factors and extrinsic processes. The intrinsic changes are governed by genes. Among the extrinsic factors it has been stated that on exposed skin more than 90% of age-associated cosmetic problems are caused by ultraviolet radiation. The most characteristic signs of aging skin are atrophy, laxity, wrinkling, sagging, dryness, pigmentary changes, sparse and gray hair. Cataracts as a complication of dermatologic disorders probably occur more commonly than has been reported. This association should not be surprising, since the lens and the skin and

appendages share a common embryonal origin, the surface ectoderm.

**Objective:** To study the association of facial skin ageing in patients with senile cataract

**Methods And Materials:** This is hospital based cross-sectional study of 104 cataract patients at outpatient department of Ophthalmology and Dermatology at A.J Institute of Medical Sciences, Mangalore.

**Results:** In this hospital based cross-sectional study of patients with senile cataract, nearly 45.2% of the study subjects were from 61 to 70 years of age, 52.9% were female and 47.15% males. On comparing the duration of cataract with respect to the characteristics of the study

subjects - gender and IGH were found to be statistically significant.

**Conclusion:** The etiology of cataracts in association with skin disease is poorly understood. Cataracts may be a part of the developmental defect along with other multiple abnormalities. Although cataracts are a relatively uncommon consequence of dermatoses, this relationship is quite significant.

**Keywords:** Idiopathic Guttate Hypomelanosis (IGH), Senile Cataract, Surface Ectoderm

### Introduction

Cataracts as a complication of dermatologic disorders probably occur more commonly than has been reported. An increased awareness on the part of dermatologists and ophthalmologists should give a truer index of the occurrence and frequency of this association than now exists. in diseases of interest to the dermatologist. This association should not be surprising, since the lens and the skin and appendages share a common embryonal origin, the surface ectoderm. <sup>1</sup>

Although cataracts occur rather infrequently as a complication in the course of dermatoses, this association has great importance from both medical and legal standpoints. Most of the reports are found in the ophthalmologic literature and have been given little attention by dermatologists. The purposes of this project are to review the dermatoses associated with the development of cataracts and to discuss the more important facets in their relationship. <sup>2,3</sup>

The literature on the various dermatologic disorders which are known to be associated with the formation of cataracts showed a number of syndromes or entities in which cutaneous manifestations play a major or minor role. Such cataracts may be congenital or acquired; they may result from developmental, toxic, allergic, or

metabolic factors, although the exact mechanism of their formation is unknown. <sup>4</sup>

Cataract, a vision-impairing opacification of the ocular lens, is the leading cause of blindness worldwide. Age-related cataract, the most common form, occurs after the age of 50 years. Paediatric cataracts can occur in babies, infants, and children and are rare. The prevalence of age-related cataract increases with age from around 4% in those aged 55 to 64 years to >90% in those aged  $\geq 80$  years. In Australia, approximately 30% of individuals aged  $\geq 50$  years have age-related cataract, and the prevalence increases to approximately 80% in those aged  $\geq 80$  years. The prevalence is higher in Indigenous, with a rate that is 5 to 6 times higher in those aged  $\leq 60$  years, than non-Indigenous Australians. <sup>5,6,7</sup>

The goals of this research are to evaluate the dermatoses connected to cataract formation and to talk about the main significant aspects of that connection.

### Aims and Objectives

To study the association of facial skin ageing in patients with senile cataract.

### Materials and Methods

The present cross sectional study was conducted by the Department of Dermatology and Ophthalmology at A J Institute of Medical Sciences, Mangalore from March 2022 to August 2022. Based on the Sample Size estimated using the formula  $n=4(pq)/l^2$  assuming the Prevalence to be 7% based on the pilot study done in the same study setting at 95 % Confidence Interval and 5% allowable error the sample size was estimated to be 104. A total of 104 study subjects who met the inclusion criteria were selected randomly from the study subjects and included in the study.

The data was collected in the pretested semi structured questionnaire and the information was collected by the

interview method by the investigator. A brief history of the complaints and relevant questions were asked pertaining to the complaint. Detailed examination of the face under good illumination was conducted to assess the lesions.

**Sample size:** 104 PATIENTS.

**Study duration:** March 2022 TO AUGUST2022.

**Sample design:** Cross-sectional study.

**Inclusion criteria**

Patients with Senile Cataract presenting in the Department of Dermatology and Venereal Disease and Department of ophthalmology of A.J Institute of Medical Science, Mangalore.

**Exclusion criteria**

1. Patients with Chronic illness / Premature ageing syndromes.
2. Active bacterial and viral infections of the skin.
3. Active inflammatory dermatosis.
4. Non-compliant patients

**Statistical Analysis:** Data was entered into Microsoft excel data sheet and was analyzed using SPSS 22 version software. Categorical data was represented in the form of Frequencies and proportions. Continuous data was represented as mean and standard deviation. Normality of the continuous data, was tested by Kolmogorov–Smirnov test and the Shapiro–Wilk test. Independent t test was used as test of significance to identify the mean difference between two quantitative variables.

**ANOVA (Analysis of Variance)** was the test of significance to identify the mean difference between more than two groups for quantitative data.

**Graphical representation of data:** MS Excel and MS word were used to obtain various types of graphs such as bar diagram, Pie diagram, line diagram and Scatter plots.

**p value** (Probability that the result is true) of <0.05 was considered as statistically significant after assuming all the rules of statistical tests.

**Statistical software:** MS Excel, SPSS version 22 (IBM SPSS Statistics, Somers NY, USA) was used to analyze data.

**Results:** A total of 104 study subjects were evaluated and analyzed in the present study.

Table 1: Characteristics of the study subjects

		Frequency (N)	Percentage (%)
Age group	<50 years	4	3.8%
	51 to 60 years	31	29.8%
	61 to 70 years	47	45.2%
	>70 years	22	21.2%
Gender	Male	49	47.1%
	Female	55	52.9%

In the present study nearly 45.2% of the study subjects were from 61 to 70 years of age , 29.8% of them were between 51 to 60 years of age , 21.2% of them were aged more than 70 years of age and 3.8% of them were aged less than 50 years . Among the gender distribution 52.9% of them were female and 47.15 of them were males.

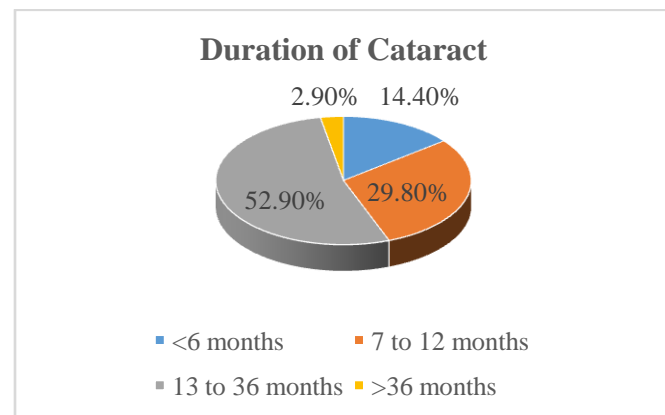


Figure 1: Distribution of the study subjects based on duration of cataract

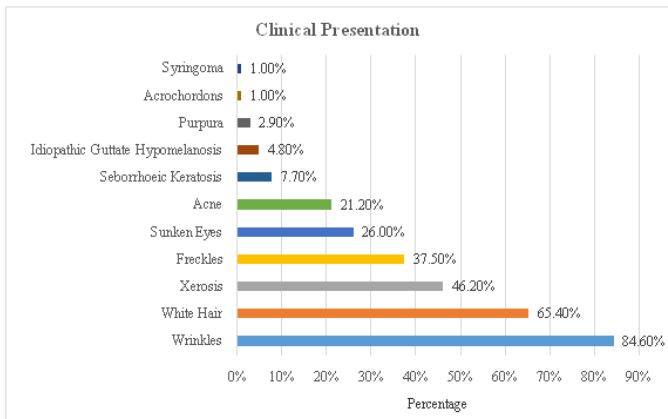


Figure 2: Clinical presentation of the study subjects

Table 2: Comparison of duration of cataract with respect to characteristics of subjects

		Duration of Cataract (in months)			p-value #
		Mean	SD	Median	
Age group	<50 years	8.25	6.55	5.50	0.116
	51 to 60 years	15.68	6.35	18.00	
	61 to 70 years	17.23	10.83	18.00	
	>70 years	20.32	12.42	18.00	
Gender	Male	14.84	9.43	12.00	0.033*
	Female	19.07	10.40	18.00	
Wrinkles	Present	17.74	10.63	18.00	0.119
	Absent	13.44	5.73	12.00	
Freckles	Present	16.23	8.30	18.00	0.512
	Absent	17.58	11.12	18.00	
Acne	Present	14.50	6.49	18.00	0.180
	Absent	17.77	10.83	18.00	
Xerosis	Present	17.96	10.74	18.00	0.414
	Absent	16.32	9.61	18.00	
White Hair	Present	17.57	10.48	18.00	0.495
	Absent	16.14	9.51	12.00	
Seborrhoeic Keratosis	Present	15.00	9.62	12.00	0.549
	Absent	17.25	10.20	18.00	
IGH	Present	8.20	5.22	12.00	0.044*
	Absent	17.53	10.13	18.00	
Sunken Eyes	Present	17.26	8.87	18.00	0.914
	Absent	17.01	10.59	18.00	
Purpura	Present	16.00	6.93	12.00	0.853

	Absent	17.11	10.23	18.00	
Acrochordons	Present	18.00	-	18.00	0.928
	Absent	17.07	10.18	18.00	
Syringoma	Present	18.00	-	18.00	0.928
	Absent	17.07	10.18	18.00	

# Independent t-test

\* Statistically significant

On comparing the duration of cataract with respect to the characteristics of the study subjects it was found that gender and IGH were statistically significant and the remaining characteristics were found to be statistically insignificant on comparing with the duration of the cataract.



57 year old male with Syringoma



59 year old female with senile comedones



60 year old female with wrinkles over face

Figure 3: Clinical picture of the study subjects

## Discussion

Aging of the skin is due to intrinsic factors and extrinsic processes. The intrinsic changes are governed by genes. Among the extrinsic factors it has been stated that on exposed skin more than 90% of age-associated cosmetic problems are caused by ultraviolet radiation.<sup>2</sup> The most characteristic signs of aging skin are atrophy, laxity, wrinkling, sagging, dryness, pigmentary changes, sparse and gray hair.<sup>2</sup>

In the study done by Vashist P et al <sup>8</sup> prevalence of unoperated cataract in people aged  $\geq 60$  was 58% in north India (95% CI, 56–60) and 53% (95% CI, 51–55) in south India ( $P = 0.01$ ). In other studies done by Pagar T et al <sup>9</sup> in Singapore , Meiktila Eye Study <sup>10</sup> in Myanmar the prevalence of Cataract among those aged more than 60 years of age ranged from 72% to 87% which is slightly higher than our study findings .

In the present study the gender was found to be statistically significant with the duration of cataract and 52.9% of the females were affected when compared to 47.1% of Males. In the study done by Pant H B et al<sup>11</sup> Prevalence of cataract blindness was higher in females compared to males and Adjusted odds ratio from logistic regression analysis revealed that females continued to be at a higher risk of cataract blindness. Data from surveys in Africa and Asia have consistently shown that cataract surgical coverage among females is significantly lower compared to males.<sup>12,13</sup> Nirmalan Et al <sup>14</sup> found that the prevalence of the cataract was 47.5% among males and 52.5% in females among the rural population in southern India which is similar and comparable to our study findings.

Nail changes in the elderly are due to impaired circulation, susceptibility to infections, neoplasms, concurrent skin or systemic diseases and related

treatments. In many areas of the skin, the epidermis becomes thinner with age and the cell turnover is halved between the third and seventh decades of life. The dermo-epidermal junction becomes flattened with age. Lack of dermo-epidermal cohesion may lead to a tendency for bulla formation at the extremes of age. The main structural changes are observed in the dermis of aged skin. The solubility and the turnover rate of collagen decrease with aging and the tissue becomes more fixed, increasingly cross-linked and fibrous. Degenerative changes in the elastic tissue may lead to fragmentation of elastic fibers. The ground substance solidifies, thus interfering with the exchange of materials with the capillaries. With increasing age, there is a decrease in the hyaluronic acid content of the dermis and an increase in the sulfonated glycosaminoglycans especially the chondroitin sulfates.<sup>4,5</sup>

Hyaluronic acid is able to bind a considerable amount of water and it is thought that this water binding capacity is responsible for the gel state of the young dermis. Facial wrinkles, accentuation of forehead lines and nasolabial folds, drooping eyelids, and fan shaped radiating lines around the mouth accompany loss of elasticity, thickening, and low water content of the skin. The pliability and resiliency of the skin is reduced.<sup>5,6</sup>

The permeability of the skin also changes with age. Though substances enter aged skin more easily than young skin, they are removed slowly into the circulation because of the changes in the dermal matrix and reduction in the vasculature. Free radicals, also known as reactive oxygen species (ROS), play an important role in skin aging.<sup>6</sup> Free radicals are created by UV exposure, normal metabolic process, smoking, and stress. They are composed of oxygen with an unpaired electron. These free radicals activate matrix degrading

metalloproteinases (MMPs) that are regulated by transcription factors such as activator protein 1 (AP-1) and nuclear factor kappa beta (NF- $\kappa$ B). This leads to collagen degradation and increased wrinkling. Sebum production reaches the maximum in early adulthood but lessens with aging. In spite of the decreased output, the size of the sebaceous glands increases because of the reduced turnover of cells in senility.

The axillary apocrine glands regress with age and the apocrine odor also becomes less. Spontaneous sweating on the fingertips decreases with old age due to a reduction in the number of eccrine sweat glands and the decreased output per gland. Aging affects cholinergic sweating indirectly through the hormonal balance in the blood. The maximum rate of cholinergic sweating is much greater in men than in women or in juveniles and this is probably androgen dependent. Sensory perception decreases and the threshold for pain increases with aging.<sup>15,16</sup>

The density of Meissner's corpuscles is decreased in old age. Aging decreases the number of Langerhans cells. T cells are reduced in number and lose their responsiveness to specific antigens. Though the number of B cells is not affected by aging, their dysfunction is reflected by increased autoantibody formation and serum levels of IgA and IgG.<sup>11-14</sup> The intensity of delayed hypersensitivity reactions is decreased with old age. The increased risk of photocarcinogenesis and the greater susceptibility to chronic skin infections are some of the consequences of aging of the immune system.<sup>3</sup> Clinical signs of photoaging include dryness, rhytids, irregular pigmentation, loss of elasticity, telangiectasias, and areas of purpura. Histologically, photoaged skin is characterized by accumulation of elastin material just below the dermal-epidermal junction, known as

elastosis. Epidermal atrophy and fragmentation of collagen and elastic fibers are also associated with photoaged skin.<sup>17,18</sup>

Elderly people feel cold easily owing to the reduction of subcutaneous fat. Loss of fat and insufficiency of elastic fibers and collagen fibers may lead to hernia in old age. It is difficult to draw a line between the physiological and the true pathological changes of old age. It is better to refer to skin problems rather than skin diseases in this age group. The most obvious senile change is irregularity of pigmentation. Senile lentigines appear over the dorsa of the hands and exposed parts of the face. Very rarely, they may turn into lentigo maligna, which is a slowly progressive precancerous condition.<sup>18</sup>

Dry skin, menopausal flushing, and keratoderma climactericum are the main skin disorders of menopause. Hormone replacement therapy (HRT), which is used to treat menopausal symptoms, can cause urticarial or eczematous reactions. It can also exacerbate melasma, spider angioma, and acanthosis nigricans. Transdermal patches of HRT can cause eczema at the site of application.<sup>18</sup> In women, hirsutism can occur due to endocrine changes associated with menopause. Photoaging changes are superimposed on the usual intrinsic and chronologic aging process of the skin. The following changes are produced in photoaged skin: coarsening, deep wrinkling, furrowing, dryness, roughness, laxity and sagging, solar lentigines, seborrheic keratosis and freckles, telangiectasia (mainly over the cheeks), purpura, stellate pseudoscars (mainly over the forearms and back of the hands), and finally, a tendency to develop pre-malignant and malignant neoplasms. Sun induced wrinkling on the back of the neck as a typical rhomboidal furrowed pattern is called cutis rhomboidalis nuchae. Elastic degenerative changes,

senile comedones and infundibular follicular cysts may form in the periorbital region. This is called Favre-Racouchot disease.<sup>6,16</sup>

In the study done by Phillips C I et al<sup>19</sup> the study group involving the cataract population (15.7%) showed significantly higher prevalence of Dermatological condition than the control non-contrast group .

Similarly, in the study done by Katosh et al<sup>20</sup> in the male and female age related cataract the prevalence of Dermatological manifestation was 12.5% and 13.7% respectively and there was no significant association between cataract and dermatological conditions similar to our study findings .

The relationship between cataract and dermatological manifestations were mentioned as early as 1868 by Rothmund<sup>21</sup> and in 1904 by Werner . Later Andogsky made the report on cataract patients presenting with neurodermatitis. In 1934 Kugelberg also termed the term called syndromatotic cataract which indicated lenticular and cutaneous changes associated together.<sup>19</sup>

Rosen stated that in patients with atopic dermatitis who were closely observed and in whom changes were alertly anticipated, the lenticular disturbance followed shortly after the cutaneous flare-up. Ectodermotoxic as well as allergic factors have been postulated. It should be noted that the lens continues to grow throughout life by the laying down of new fibers around the pre-existing ones. Thus, it can be readily appreciated that conditions affecting the systemic and ocular milieu would affect the development and the optical state of the outermost layers at that point

The aetiology of cataracts in association with skin disease is unknown. Cataracts may be a part of the developmental defect when multiple abnormalities are evident. In other instances, metabolic, endocrine, toxic,

or allergic factors may be active. Immunochemically, the lens contains many antigens and is capable of producing allergic reaction in the uveal tissue, for example, after extracapsular extraction. Maisel found antigens immunologically identical to those of the lens in iris, cornea, and pigment retina of the chick eye. It would not be too farfetched to expect similar antigens in skin. However, it has never been demonstrated that the lens itself can be the seat of an allergic reaction.

### Conclusion

The etiology of cataracts in association with skin disease is poorly understood. Cataracts may be a part of the developmental defect along with other multiple abnormalities. Although cataracts are a relatively uncommon consequence of dermatoses, this relationship is quite significant from a medical point of view. Proper evaluation of facial skin for age related manifestations among cataract patients is important so that it can be managed at the earliest.

### References

1. Leyden JJ. Clinical features of ageing skin. *Br J Dermatol.* 1990;122 (Suppl 35):1–3
2. Cerimele D, Celleno L, Serri F. Physiological changes in ageing skin. *Br J Dermatol.* 1990; 122(Suppl 35):13–20.
3. Grove GL, Kligman AM. Age associated changes in human epidermal cell renewal. *J Gerontol.* 1983;38:137–42.
4. Yaar M, Gilchrest BA. Aging of skin. In: Freedberg IM, Eisen AZ, Wolff K, et al, editors. *Fitzpatrick's dermatology in general medicine.* New York: McGraw-Hill; 2003. p. 1386–97.
5. Montagna W. Morphology of ageing skin: the cutaneous appendages. In: Montagna W, editor. *Advances in biology of skin.* Vol. VI. Ageing. Oxford: Pergamon Press; 1965. p. 1–16.
6. Oberste–Lehn H. Effects of ageing on the papillary body of the hair follicles and on the sweat glands. In: Montagna W, editor. *Advances in biology of skin.* Vol. VI. Ageing. Oxford: Pergamon Press: 1965. p. 17–34.
7. Hogan, M. H., and Zimmerman, L. E. : *Ophthalmic Pathology,* ed 2, Philadelphia: W. B. Saunders Company, 1962.
8. Vashist P, Talwar B, Gogoi M, Maraini G, Camparini M, Ravindran RD, Murthy GV, Fitzpatrick KE, John N, Chakravarthy U, Ravilla TD, Fletcher AE. Prevalence of cataract in an older population in India: the India study of age-related eye disease. *Ophthalmology.* 2011 Feb;118(2):272–8.
9. Seah S.K., Wong T.Y., Foster P.J. Prevalence of lens opacity in Chinese residents of Singapore: the Tanjong Pagar survey. *Ophthalmology.* 2002;109:2058–2064.
10. Athanasiov P.A., Casson R.J., Sullivan T. Cataract in rural Myanmar: prevalence and risk factors from the Meiktila Eye Study. *Br J Ophthalmol.* 2008;92:1169–1174.
11. Pant HB, Bandyopadhyay S, John N, Chandran A, Gudlavalleti MV. Differential cataract blindness by sex in India: Evidence from two large national surveys. *Indian J Ophthalmol.* 2017 Feb;65(2):160–164.
12. Woldeyes A, Adamu Y. Gender differences in adult blindness and low vision, Central Ethiopia. *Ethiopian Med J.* 2008;46:211–8.
13. Nkmozana O. Disparity in access to cataract surgical services leads to a higher prevalence of blindness in



- women compared with men: Results of a national survey of visual impairment. *Health Care Women Int.* 2009;30:228–9.
14. Nkmozana O. Disparity in access to cataract surgical services leads to a higher prevalence of blindness in women compared with men: Results of a national survey of visual impairment. *Health Care Women Int.* 2009;30:228–9.
  15. Silver AF, Montagna W, Karacan I. The effect of age on human eccrine sweating. In: Montagna W, editor. *Advances in biology of skin. Vol. VI. Ageing.* Oxford: Pergamon Press; 1965. p. 129–50..
  16. Rees J, Shuster S. Pubertal induction of sweat gland activity. *Clin Sci.* 1980;60:689–92.
  17. Walford DS, Willkens RF, Decker JL. Impaired delayed hypersensitivity in an ageing population: association with antinuclear reactivity and rheumatoid factor. *J Am Med Assoc.* 1968;203:831–5.
  18. Khavkin J, Ellis DA. Aging skin: histology, physiology, and pathology. *Facial Plast Surg Clin North Am.* 2011 May;19(2):229-34.
  19. Phillips C I, Donnelly C A , Clayton R M , Cuthbert J. Skin Disease and Age related Cataract. *Acta Derm Venereol.* 1996;76:314-318.
  20. Katoh, N & Sasaki, Kensuke & Shibata, T & Obazawa, H & Fujiwara, T & Kogure, F & Obara, Y & Itoi, M & Kato, K & Akiyama, K. . Case-control study of senile cataract in Japan: A preliminary report. *Japanese journal of ophthalmology.* 1993;37. 467-77.
  21. Rothmund A. Uber Cataracten in verbindung Mit einer eignthumlichen Hautdegeneration. *Arch Ophthalmol.* 1868;14:159-182.