

Prevalence and Types of Cataract Associated With Rheumatic Diseases

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ABSTRACT

Background—Cataract is one of the most common cause of blindness and most common treatable cause of visual loss. Cataract and glaucoma have long been regarded as a potential adverse effect of systemic glucocorticoid therapy and glucocorticoids remains widely prescribed in the treatment of Rheumatic and other inflammatory diseases for years.

Materials and Methods—A hospital based observational study was conducted in the Department of Ophthalmology, Assam Medical College; Dibrugarh for 6 months, between December 2021 to May 2022. It included, a study sample of 110 adult patients with Rheumatic diseases, attending Rheumatic clinic at Assam Medical College; Dibrugarh. The patients with Rheumatic diseases were examined and screened for evaluation of the prevalence and various morphological types of cataract associated due to systemic use of glucocorticoids.

Results—The study included 110 patients with common Rheumatic diseases, 88 cases were female and 22 cases were male (Male: Female=1:4). Involvement of cataract most commonly found was Posterior subcapsular cataract (6.3%) followed by Nuclear sclerosis (4.5%), Cortical (3.6%) and Mixed type (1.8%). Maximum number of Posterior subcapsular cataract were found in steroid use group (4.76%) of Rheumatic diseases than non-steroid group. P value is <0.01 which is statistically significant, for the distribution of types of cataract with steroid administration.

Conclusion—From the present study of 110 Rheumatic patients, we found that the prevalence of cataract developing is about 16.36% and includes mostly Posterior subcapsular type (6.31%). The Rheumatologist in coordination with Ophthalmologist can play a major role in detecting and managing cataract to save the most important sense organ.

KEY WORDS—Posterior subcapsular cataract; Rheumatic diseases, Glucocorticoids, Systemic.

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I. Introduction

Cataract is an opacity of the clear lens of the eye and is a prominent cause of socio-medical problem like blindness throughout the world. The risk factors identified in development of cataract was genetic, ageing, systemic disease, nutritional and metabolic and rheumatic diseases. Steroid use is the main key factor in the development of Posterior subcapsular cataract in various rheumatic diseases.¹

Rheumatic diseases commonly includes Rheumatic Arthritis, Systemic Lupus Erythematosus, Systemic sclerosis, Spondyloarthropathy, Ankylosing Spondylitis, Osteoarthritis, Multiple Connective Tissue Disorders, Polymyalgia Rheumatica etc.² More than 200 varieties of rheumatic diseases are identified and these primarily affects the joints, bones, serosa and virtually all systems of the body including tissues. Ocular manifestations of rheumatic diseases includes keratoconjunctivitis sicca, uveitis, episcleritis, scleritis, increased intra ocular pressure, cataract formation etc. One of the common eye complications of lens involvement is cataract formation.

Most cataracts develop when ageing or tissue injury to the lens. Some inherited genetic disorders that cause other health problems can increase the risk of cataracts. Cataracts can be caused by many eye conditions like previous eye surgery, Diabetes mellitus etc. Long term use of steroid group of drugs can cause cataract to develop.³ The risk factors promote oxidative stress and ion pump disruption causes aberrant lens epithelial cells to proliferate and migrate to posterior pole region then after a latent period, chronic inflammation and other premature ageing related mechanisms promote mature vacuolar or plaque Posterior subcapsular cataract.⁴

Black RL, Oglesby RB et.al found that Posterior subcapsular cataract were seen in 5 of 22 (23%) , rheumatic arthritis patients treated with 10-16mg prednisolone per day for one year and more and 12 in 16(75%) treated with 16 mg prednisolone or more. The patients age, duration and severity of Rheumatoid arthritis showed no significant link with the cataract development in patients not treated with corticosteroids; so corticosteroids were suggested as one of the chief etiological factor.⁵

Studies are ongoing in this field but lacking and need more elaborated study for diagnosis and treatment point of view.

II. Materials and Methods

A hospital based cross sectional study was conducted in the Department of Ophthalmology, Assam Medical College, Dibrugarh between December 2021 to May 2022 including all patients of rheumatic diseases attending Rheumatic clinic at Assam Medical College. Selection of cases includes all the common rheumatic disease cases of sample size 110.

Inclusion criteria---1)Cases with common rheumatic diseases,

2)Adults more than 18 years of age.

3)Both sexes.

Exclusion criteria----1)Paediatric and other causes of cataract cases.

2)Patients with pre existing ocular diseases.

Ethical consideration

The study proposal submitted in the Institutional Ethics Committee of Assam Medical College and Hospital , Dibrugarh for review and appraisal and the study was commenced after approval.

Consent

A written informed consent was taken from the participants for conducting the study.

Methodology

Patient diagnosed with common rheumatic diseases in the Rheumatology clinic at Assam Medical College and Hospital, Dibrugarh was taken for study. Patients overall health, family history, medications and previous diseases, eye surgery, last date of eye examination are thoroughly taken. They are then subjected to various tests like Visual Acuity test , Cover test, Pupillary Responses , Slit Lamp Examination of the Anterior segment including lens, Retinal examination ,Tonometry, Biometry. Diagnosis of cataract was best made with dilated pupil Slit lamp examination for detailed character, location and extent of lenticular opacity. Well-developed cataracts appeared as a gray, white or yellow brown opacities of the lens.

There are 3 primary types of cataracts. Cataract types are defined by where opacities exists within the lens and graded by how severe the opacities are at their location.

Nuclear sclerosis(NS)—The presence of cloudiness of the nucleus or the central portion of the lens was seen by making slit beam at 30 to 45 degree angle.

Cortical cataract (CC)---Presence of spoke or wedge like cloudiness on slit lamp retro illumination examination.

Posterior subcapsular cataract (PSC)—Opacity in the posterior capsule of lens seen as granular or plaque like appearance on oblique slit lamp examination and black and vacuolated in slit lamp retro illumination examination.

Grading of cataract is done as per Lens Opacities Classification System 3. Retinal examination done with Direct and Indirect Retinoscope , anterior chamber angle examined with Gonioscope and intra ocular pressure checking is done with Applanation tonometry method.

Investigation—Routine blood examination, ESR, Routine examination of urine, Fasting and postprandial blood sugar level, Kidney and Liver function test, Rheumatoid factor, Antinuclear antibody, Anti citrullinated peptide, C reactive protein, Anti double stranded DNA, Anti-Sm, Antiphospholipid antibody, Complement level, HLA B27, Chest X-ray, ECG, Ultrasound, MRI, A scan biometry with SRK2 Formula.

Statistical Analysis

Continuous data was expressed as mean +-standard deviation and catagorial variables as proportion and percentages. Statistical significance was tested using Chi-square test/Fisher Exact test. Ap-value of less than 0.05 will be considered as statistically significant.

Results and Observations

The present study included of 110 cases of common rheumatic diseases, out of which 88 cases were females and 22 cases were males (Male: Female= 1:4). Maximum patients were in the age group range 40-59 years (47.2%) , which is shown in the Table 1 below ;

TABLE 1: Age and sex distribution

Age Group (in years)	Sex Female(n)	Sex Female (%)	Sex Male(n)	Sex Male (%)	Total(n)	Total(%)
18-19	0	0.00	1	0.9	1	0.9
20-39	30	27.2	7	6.3	37	33.6
40-59	47	42.7	5	4.5	52	47.2
60-79	10	9.09	8	7.27	18	16.3
More than or equal to 80	1	0.9	1	0.9	2	1.8
TOTAL	88	80	22	20	110	100

The overall ocular involvement in these 110 patients of rheumatic diseases revealed Dry eye is a more common finding (19.09%) followed by Uveitis(10.0%), Retinopathy (7.27%) ,Episcleritis (0.9%), Scleritis(0.9%),Increased Intra ocular pressure(0.9%) and Posterior subcapsular cataract(6.36%) ;shown in the Table 2 below ;

TABLE2: Ocular involvement in rheumatic diseases

OCULAR INVOLVEMENT	Number of eyes (n=220)	Percentage(%)
Dry eye	42	19.09
Uveitis	22	10.0
Retinopathy	16	7.27
Episcleritis	2	0.9
Scleritis	2	0.9
Intra-ocular pressure more than 21 mm Hg	2	0.9
Posterior subcapsular cataract	14	6.36
Total	100	45.45

Steroid can cause development of Posterior subcapsular cataract. The mechanism of steroid cataract formation holds that glucocorticoids are covalently bound to lens proteins resulting in destabilization of the protein structure allowing further oxidation leading to cataract. In this present study there is more number of Posterior subcapsular cataract(4.76%) are associated with total steroid users (n=210), which is statistically significant(p value <0.01), shown in the Table 3 below,

TABLE3:Types of cataract and steroid administration relationship (n=210).

Types of Cataract	Eyes with steroid (Number)	Eyes with steroid (%)	Eyes without steroid (Number)	Eyes without steroid (%)
Posterior subcapsular cataract(PSC)	10	4.76	4	40%
Nuclear sclerosis (NS)	6	2.86	4	40%
Cortical cataract(CC)	6	2.86	2	20%
Mixed	2	0.95	2	20%

There are mainly 3 types of cataract ; Nuclear sclerosis, Cortical cataract and Posterior subcapsular cataract based on where and how they developed in the eye.Nuclear sclerosis and Cortical cataract are mainly age related and Posterior subcapsular cataract augmented by steroid uses and in Diabetes mellitus. The below Table 4 shows that,among the cataract types, total number of cataract found to be of 36 in number(16.36%).Posterior subcapsular cataract comprises of maximum(6.3%) followed by Nuclear sclerosis(4.5%),Cortical cataract(3.6%) and Mixed(1.8%).

TABLE 4—Distribution of types of cataract, among rheumatic diseases,

Types of cataract	Number of eyes(n=220)	Percentage(%)
Posterior subcapsular(PSC)	14	6.3%
Nuclear sclerosis (NS)	10	4.5%
Cortical cataract(CC)	8	3.6%
Mixed	4	1.8%
Total	36	16.36%

The widely used classification in grading of cataract in rheumatic diseases is Lens Opacities Classification System 1 to 3.In this study shows that Posterior subcapsular cataract is found maximum in 220

eyes are in Grade2 (3.63%),Nuclear sclerosis in Grade 4 (3.63%)followed by Cortical in Grade 4(1.81%). Total number of eyes with Mixed type of cataract is 4with Grade 4 (1.81%), shown in the Table 4 below,

TABLE 4: Proportion of gradings of cataract(number of eyes=220)

Types of cataract	Grade1 (Number)	Grade1 (%)	Grade2 (Number)	Grade2 (%)	Grade3 (Number)	Grade3 (%)	Grade4 (Number)	Grade4 (%)
Posterior subcapsular	0	0	8	3.63	4	1.81	2	0.9
Nuclear sclerosis	0	0	2	0.9	0	0	8	3.63
Cortical cataract	0	0	2	0.9	0	0	4	1.81
Mixed	0	0	0	0	0	0	4	1.81

Development of Posterior subcapsular cataract by prolonged systemic use of steroids is a significant risk factor.In this present study , we see that proportion of Posterior subcapsular cataract formation is more (10 %) in patients using steroids for more than 10 years followed by those who use steroids for 5-10 years(6.6%) and 1-5 years (2.6%), with no cataract seen within 0-1 years ,shown in the Table 5 below,



CATARACT (NUCLEAR SCLEROSIS) UNDER SLIT LAMP EXAMINATION



CORTICAL CATARACT



POSTERIOR SUB-CAPSULAR CATARACT UNDER SLIT LAMP EXAMINATION

TABLE 5:Posterior subcapsular cataract associated with duration of steroid use.

Duration of steroid(Years)	Number of eyes(Total eyes=220)	Cataract(Posterior subcapsular cataract)	Percentage(%)
0-1	4	-	0%
1-5	76	2	2.6%
5-10	60	4	6.6%
More than 10 years	80	8	10 %

In the present study, among the 14 cases of Posterior subcapsular cataract ; 9 cases(16.6%) are associated with Systemic Lupus Erythematosus (no. of eyes=54) and 5 cases(3.01%) are associated with Rheumatoid Arthritis(no. of eyes=166).More cases are seen in Systemic Lupus Erythematosus(16.6%), may be due to longer duration of steroid treatment.

III. Discussion

In this present study, among the 110 cases of rheumatic diseases, the systemic administration of steroid can result in Posterior subcapsular cataract in all age groups above 18 years, specifically after 4th or 5th decade.

In the present study, maximum number (47.2%) of rheumatic diseases occur between the age group range 40-59 years which is comparable to the study of S. Ausayakhun et.al (43.8%)⁶ and Tuba Erdem et.al. (48.9%)⁷ and Pooja Dhaon et al (Peak)⁸ Most patients of rheumatic diseases used to occur between 3rd, 4th, 5th decade of life with a mean age of 41.17+-39.70 years by Mohammadhasan Joker et.al 2018.

The present study also shows increased female ratio compared to males (M:F=1:4), which has similar values when compared with the study of Tore K. Kvein et.al (M:F=1:4-5)⁹, Maryam H. Abdullahi et.al (M:F=1:4.3)¹⁰, S. Laivoranta-Nyman et.al 2001 (M:F=1:3 RA)¹¹, Lai-Chu See et.al 2013 (M:F=1:3-4 times)¹². Differential immune regulation, X chromosome gene effect, sex hormones, sex specific exposure to environmental factors all are implicated to this sex difference by Angela Tincani et.al 2018.

Regarding ocular involvement in rheumatic diseases, most common manifestation we found in this present study is the Dry eye disease (19.09%) which is comparable with the studies of S. Ausayakhun et.al 2002 (19.9%) and Uribe-Reina P. et.al 2021 (15.93%)¹³. Hori, Maeda and Sakamoto proved that patients with dry eye associated with Sjogren syndrome are more likely to have fluoroquinolone-resistant conjunctival bacteria than controls due to an altered ocular environment or chronic topical medication use causing a disruption of natural flora with marked increase in antibiotic resistant organism.¹⁴ Sometimes disease modifying antirheumatic drugs and systemic immunosuppressive drugs may be necessary to improve tear production e.g. Cyclosporin A, Monoclonal antibody, Infliximab etc by Gordana Zlatanovic et.al¹⁵

Robert G. Cumming et al 1997¹⁶ studied the distribution of Posterior subcapsular cataract among 217 steroid users and found about 6.3%. Also J.H. TOOGOOD et al 1962¹⁷ found Posterior subcapsular cataract 5.4% among 26 steroid treated patients so as Andrew I. Jobling 2002¹⁸ found 4.7% in steroid users. The present study also shows the comparison between distribution of Posterior subcapsular cataract between steroid users. Black and colleague noted a definite dose dependent effect of steroid use 39%, where higher is the steroid use, greater is the prevalence of cataract. In the present study the development of Posterior subcapsular cataract among steroid users (6.3%); and p value is <0.01 indicating statistically significant.

There might be a relationship between duration of steroid and development of Posterior subcapsular cataract. In this present study we found no Posterior subcapsular cataract in the rheumatic patients using steroids for less than a year and 1 case (2.6%) of Posterior subcapsular cataract in 1-5 years and maximum numbers (10%) found in more than 10 years of steroid users. Tinkleman et.al¹⁹ found no posterior subcapsular cataract in steroid users up to 1 year and Nassif et.al²⁰ found 1 Posterior subcapsular cataract in steroid users for more than 1 year of steroid use, indicating that, there must be a relationship of development of Posterior subcapsular cataract with the duration of steroid use.

IV. Conclusions

From the present study of 110 numbers of patients with rheumatic diseases, it has been found that the prevalence of cataract developed is about 16.36% over the time. A large number of them developed Posterior subcapsular cataract (6.3%), probably related to the long term steroid therapy, statistically significant p value <0.01. Next in order was Nuclear sclerosis followed by Cortical cataract and Mixed type. Maximum number of cataract was found in more than 10 years of duration of steroid use and least within 1 year of steroid use duration followed by 1-5 years and 5-10 years of duration of steroid use. Posterior subcapsular cataract was maximum in Grade 2 grading and Nuclear sclerosis is maximum in Grade grading followed by Cortical and Mixed groups of cataracts in Grade 4 in this study. More number of Posterior subcapsular cataract found in Systemic Lupus Erythematosus among the rheumatic diseases, may be due to longer duration of steroid treatment in this present study group. The Rheumatologist in co-ordination with Ophthalmologist can play a major role in detecting and managing eye involvement in the rheumatic patients to save the most important sense organ.

Conflict of Interest

We are hereby declared that, the present study conducted on prospective basis. During the study period we have not been supported financial resource from private or government agency.

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