1 **Original Research Article**

2 **DEMOGRAPHIC CHARACTERISTICS AND COMORBIDITY PROFILES IN**

3 **PATIENTS WITH SENILE CATARACT**

4

5 **ABSTRACT**

6 **Aims:** In this study, it was aimed to review demographic characteristics and comorbid

7 systemic and ocular disorders in patients underwent cataract surgery in our clinic.

8 **Study Design**: Retrospective cross-sectional

9 **Place and Duration of Study:** The study conducted in Department Of Ophthalmology, Ahi

10 Evran University Faculty Of Medicine, Kırsehir , Turkey. The patients who underwent

11 cataract surgery between November 2014 and December 2017 were evaluated

12 retrospectively.

13 **Methodology:** We retrospectively reviewed 1197 patients diagnosed as cataract and

14 underwent surgery. Age, gender, type of cataract, comorbid ocular disease, previous ocular

15 surgeries and systemic diseases were recorded. By slit lamp examination with dilated pupils,

16 cataract was classified as nuclear, cortical, posterior subcapsular, mixed and mature.

17 **Results:** Mean age was 67.87 ± 9.71 years (range: 45-95 years). Of the patients, 597 (49.9%)

18 were female while 600 (50.1%) were male. The most common cataract type was nuclear

19 cataract (27.2%); followed by posterior subcapsular cataract (24.7%), mixed cataract

20 (23.1%), cortical cataract (14.9%) and mature cataract (10.0%). Hypertension was the most

21 common systemic comorbidity (636 cases-46.9%), followed by diabetes mellitus (390 cases-

22 32.6%). The most common ocular comorbidity was pseudo-exfoliation syndrome (12 cases-

23 10.1%); followed by diabetic retinopathy of any stage (84 cases-7.0%).

24 **Conclusion**: Systemic and ocular comorbidities are commonly seen in the patients with

25 senile cataract due to advanced age in these patients in general. All ocular and systemic

26   comorbidities should be identified before surgery. These procedures will improve surgical

27   success and prevents potential medico-legal issues after surgery.

28   **Keywords:** Cataract, surgery, ocular comorbidity, systemic comorbidity

29   **INTRODUCTION**

30   At present time, the most common cause of treatable blindness is still cataract. WHO (World

31   Health Organization) data indicates that 48% percent of blindness in the world is caused by

32   cataracts, and it affects 18 million people. According to WHO estimates, by 2020, 54 million

33   people over 60 years old will suffer decreased vision because of cataracts [1]. Due to the

34   aging population cataract will remain to be an important health issue in the future.

35   Even race, high altitude, malnutrition, diabetes, corticosteroid use, long exposure to sunlight

36   play role in the cataract progression, age is known to be the most important risk factor [2,3].

37   As systemic diseases and medication, other ocular diseases and previous ocular/extra-ocular

38   surgeries accompanies to cataract in elderly population, pre-operative, peri-operative and

39   post-operative treatment plan and rehabilitation is important.

40   In this study, we aimed to evaluate demographical features, comorbid systemic and ocular

41   diseases and their relationship to cataract types in patients who underwent cataract surgery in

42   our clinic.

43   **MATERIAL AND METHOD**

44   1197 patients who had cataract diagnosis and underwent cataract surgery in ophthalmology

45   department of Ahi Evran University Medical Faculty between November 2014 and December

46   2017 were evaluated retrospectively. The age, gender, cataract type, other ocular diseases,

47   previous ocular/extra-ocular surgeries and systemic diseases of the patients were recorded.

48   All the patients underwent full ophtalmologic examination. Cataract surgery was performed

49   for the patients who had the best corrected visual acuity of 20/63 and less according to

50   Snellen chart. After the pupillary dilatation with mydriatic drops, cataract type was evaluated

51   by slit lamp. The cataract classification was made by evaluating the anatomical location of

52   opacification in the lens according to Brown and Hill [4] and Lens Opacities Classification

53   System III [5] as nuclear, cortical, posterior subcapsular (PSC). Mixed and mature cataracts

54   were also included in the study. The mixed cataracts were accepted as those have features of

55   at least 2 of nuclear, cortical and PSC cataract types. Optical coherence tomography and

56   fundus fluorescein angiography were utilized for the cases when needed.

57   Congenital and secondary cataracts were excluded from the study. Before the surgery

58   complete blood count, routine biochemistry parameters, prothrombin time (PTT) and

59   activated partial thromboplastin time (aPTT) , anti-HIV, anti-HCV, HbsAg tests were

60   performed. Should the systemic diseases existed, patients were consulted internal medicine,

61   cardiology and pulmonology departments and patients were prepared pre-operatively

62   according to their recommendations.

63   **Statistical Analysis**

64   For statistical analysis SPSS 20 (IBM Corp., Armonk, NY, USA) package software were

65   used and $p<0.05$ was accepted as statistical significance. Descriptive statistics were used for

66   demographical data. Normal distribution of the data was tested with Kolmogorov Smirnow

67   test. The analysis of parametric data was performed by Kruskal-Wallis analysis and ANOVA

68   test for the parametric data.

69   The approval of ethical committee in our faculty was obtained for the study.

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71   **RESULTS**

72   The mean age of totally 1197 participants was 67.87 ± 9.71 (45-95) and there were 597

73   (49.9%) females and 600 (50.1%) males. The cataracts were in the right eye for 56.5% of

74   cases and in the left eye for 43.4% of the cases. The most common cataract type was nuclear

75   cataract (27.2%) followed by PSC (24.7%), mixed cataract (23.1%), cortical cataract (23.1%)

76   and mature cataract (10%) respectively (Table 1).

77   **Table 1. Distribution of the patients according to cataract type**

Cataract type	Number of patients (n)	Percent(%)	Age mean (years)
Nuclear	326	%27.2	68.88 ± 8.86
Cortical	178	%14.9	70.01 ± 9.5
PSC*	296	%24.7	63.22 ± 9.73
Mature	120	%10	69.41 ± 11.02
Mixed	277	%23.1	69.65 ± 8.86

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79   *PSC: posterior subcapsuler cataract

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81   The most common systemic disease accompanying cataract was arterial hypertension (AH),

82   (636 patients - 46.9%) followed by diabetes mellitus (DM) (390 patients - 32.6%). The rate

83   of at least one accompanying disease to cataracts in study population was 74.6% (Table 2).

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89 **Table 2. Number the diseases accompanying cataract.**

Number of accompaniments	Number of patients (n)	Percent (%)
0	304	25.4
1	393	32.8
2	323	27
3	113	9.4
4	52	4.3
5	11	0.9
6	1	0.1

90 268 (22%) patients had both DM and AH. The other accompanying systemic diseases were

91 cardiovascular diseases (14.6%), hyperlipidemia (10.4%), respiratory diseases (10.4%),

92 prostatic diseases (6.1%), gastrointestinal system diseases (3.3%), thyroid diseases (1.8%),

93 cerebrovascular diseases (1.4%), chronic renal failure (1.3%), extra-ocular malignancies

94 (1.3%), psychiatric diseases (1.2%) and carotico-vertebral and cerebral artery occlusions

95 (0.3%) .

96 As contagious diseases Hepatitis B was found 3.2% of patients and hepatitis C was found as

97 0.1% . Some of these viral hepatitis patients (4 hepatitis B and 1 hepatitis C patient) were

98 diagnosed firstly in these routine laboratory testings (Table 3).

99 **Table 3. Systemic diseases accompanying cataract**

Concomitant systemic disease	Nuclear n(%)	Cortical n (%)	PSC n(%)	Mature n(%)	Mixed n(%)
DM	75(23)	54(30.3)	118(39.9)	41(34)	102(36.8)
AH	156(47.9)	96(53.9)	143(48.3)	70(58.3)	171(61.7)
Cardiovascular Diseases	37(11.3)	23(12.9)	43(14.5)	17(14.2)	55(19.9)
Hyperlipidemia	29(8.9)	15(8.4)	41(13.9)	7(5.8)	32(11.6)
Rheumatologic Disease	4(1.2)	2(1.1)	3(1.0)	1(0.8)	6(2.2)
Gastrointestinal System Diseases	13(4)	4(2.2)	7(2.4)	6(5)	10(3.6)
Respiratory Diseases	15(4.6)	14(7.9)	26(8.8)	8(6.7)	30(10.8)
Carotico-Vertebral and Cerebral Artery	3(0.9)	-	1(0.3)	-	-

Occlusions					
Prostatic Diseases	16(4.9)	5(2.8)	19(6.4)	5(4.2)	28(10.1)
Psychiatric Diseases	3(0.9)	2(1.1)	3(1)	3(2.5)	3(1.1)
Cerebrovascular Diseases	5(1.5)	1(0.6)	3(1)	4(3.3)	4(1.4)
Thyroid Diseases	6(1.8)	2(1.1)	6(2)	-	8(2.9)
Chronic Renal Failure	1(0.3)	6(3.4)	3(1)	-	5(1.8)
Extra-Ocular Malignancies	5(1.5)	1(0.6)	4(1.4)	2(1.7)	3(1.1)
Alzheimer	2(0.6)	2(1.1)	-	1(0.8)	1(0.4)
Parkinson's	-	-	-	1(0.8)	1(0.4)
Esansiyel Trombositopeni	-	-	1(0.3)	-	-
Hepatititis B/C	10(3.1)	5(2.8)	12(4.1)	4(3.3)	8(2.9)

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101 PSC: posterior subcapsuler cataract, DM: Diabetes mellitus, AH:arterial hypertension

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103 The most common ocular disease accompanying cataract was pseudo-exfoliation syndrome

104 (PES) (121 patients-10.1%), followed by diabetic retinopathy of any stage (84 patients-7

105 %). The other accompanying ocular diseases were pterygium (4.6%), glaucoma (4.4%), dry

106 type age related macular degeneration (ARMD, 4.2%), dry eye (moderate, severe dry eye

107 (3%, under cyclosporine treatment), wet-type ARMD (2.3%), idiopathic epiretinal membrane

108 (2.3%), corneal opacities (1.7%), dacryocystitis (1%, previous DCR surgery), eyelid

109 disorders like entropion and ectropion (0.8%), retinal artery and/or retinal vein occlusions

110 (0.7%), high myopia (0.4%), retinitis pigmentosa (0.3%), optic atrophy 0.1% (Table 4).

111 **Table 4. Ocular diseases accompanying cataract**

Ocular accompanying diseases	Nuclear n(%)	Cortical n(%)	PSC n(%)	Mature n(%)	Mixed n (%)
Dacryocystitis	2(0.6)	3(1.7)	2(0.7)	1(0.8)	4(1.4)
Corneal Opacities	7(2.1)	4(2.2)	3(1)	3(2.5)	3(1.1)
Pterygium	19 (5.8)	14(7.9)	9 (3)	2(1.7)	11(4)
Eyelid Disorders	1(0.3)	2(1.1)	1(0.3)	2(1.7)	3(1.1)
Dry Eye	13(4)	9(5.1)	3(1)	1(0.8)	10(3.6)
Glaucoma	23(7.1)	8(4.5)	7(2.4)	2(1.7)	13(4.7)
PES	29(8.9)	16(9)	19(6.4)	23(19.2)	34(12.3)
Dry Type ARMD	14(4.3)	14(7.3)	8(2.7)	1(0.8)	13(4.7)
Wet Type ARMD	12(3.7)	11(6.2)	2(0.7)		3(1.1)
Retinitis Pigmentosa			1(0.3)	1(0.8)	2(0.7)

Diabetic Retinopathy of any stage	10(3.1)	25(14)	18(6.1)	5(4.2)	26(9.4)
Retinal Artery And/Or Retinal Vein Occlusions	2(0.6)	1(0.6)		2(1.7)	3(1.1)
High Myopia			2(0.7)		3(1.1)
Idiopathic Epiretinal Membrane	6(1.8)	6(3.4)	5(1.7)		10(3.6)

112 PSC: posterior subcapsuler cataract, PES: pseudo-exfoliation syndrome, ARMD: age related

113 macular degeneration

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115 **DISCUSSION**

116 The number of aging populating is increasing with increased average life-span. The rate of

117 ophthalmic diseases seen in elderly is increasing, thus, life quality is affected by decreased

118 vision. The surgical treatment of cataracts ,which is the most common cause of decreased

119 vision, improves life quality in elderly population and prevents possible morbidities [6,7].

120 The average age of senile cataract patients differ among the variable genetic, racial,

121 geographic factors, sociocultural state, dietary habits and estimated life span. The average age

122 of these patients was found as 64.5 years in Malesia [8], 74.9 years in Switzerland [9], 76.3

123 years in UK [10], 74.6 years in New Zeland [11] 65.9 years in China [12]. In central Turkey,

124 Atas and et all [13] reported that mean age of cataract patients was 66.4 years. In our study,

125 mean age was 67.8 years.

126 In our study, when patient systemic disease profiles revised, AH and DM were the most

127 common diseases accompanying cataracts. Followed by the AH and DM, other common

128 accompanying systemic conditions were cardiovascular disease (14.6%), hyperlipidemia

129 (10.4%), respiratory system diseases (10.4%) ,prostate diseases (6.1%), respectively.

130 We found that the AH (49.6%) was the most common systemic disease accompanying

131 cataracts. Previous studies reported that AH rates in cataract patients were 56.3% in Australia

132 [14], %29 in a study including 18.545 patients in UK [11], 46.5% in the central region of

133 Turkey. It's not clear whether AH or antihypertensive drugs causes cataracts. After

134   modifying the results with factors like age and rate, it's shown that risk rate was lowered

135   [15]. The high rate of AH in the study also indicates that it is an important public health issue

136   in elderly population.

137   We found that DM (32.6%) was the second most common systemic disease accompanying

138   cataracts. The increased risk of cataract and age related cataract in younger ages in diabetic

139   patient could be resulted from accumulation of sorbitol in the lens, accompanying hydration,

140   non-enzymatic glycosylation of the lens proteins, increased oxidative stress in lens

141   metabolism [16]. In addition to cataractous effect of diabetes, diabetes accelerates cataract

142   formation. Diabetes mellitus was blamed to be an important and independent risk factor

143   especially for the posterior subcapsular cataracts [17]. The rate of DM in cataract patients

144   was found as 40.6% in USA [18] and as 29.9% in Turkey [13].

145   With increasing rate, DM is an economical burden worldwide and one of the important public

146   health issues. Thus, DM is defined as a pandemic condition. Obesity, sedentary life style and

147   stress are blamed as the most important life-style factors in DM epidemia [19-21]. The

148   progression rate of retinopathy after cataract surgery is more prompt in diabetic patients than

149   natural course. Therefore, if the retina of the patients can be visualized, cataracts surgery

150   should be postponed after the treatment of the retinopathy [22].

151   In a study including 45.082 patients in USA, the rate of respiratory system diseases was

152   21.2%, malignancies was 12.5% and congestive heart disease was 9.5%. Riley and et al. [11]

153   reported that following DM and AH, the most systemic conditions were cardiovascular,

154   respiratory system, cerebrovascular and thyroid diseases respectively in New Zelland. We

155   think that these diseases accompanying cataract are diseases of elderly population and there

156   can be geographical differences according to genetic, racial and environmental factors.

157   In our study the most common ocular condition accompanying cataract was PES (10.1%).

158   There are some challenges in cataract surgery for the eyes with PES. These cases has

159   insufficient pupillary dilatation, increased capsular and zonular fragility in addition to higher

160   glaucoma incidence and complication rates -including zonular dialysis, vitreous loss and

161   intraocular lens decentralisation- are higher [23-24]. Previous studies from Turkey reported

162   PES prevalence as 7-12% and these results coincide with our findings [25-27].

163   In our study, the second most common ocular disease accompanying cataract was diabetic

164   retinopathy (7%). Besides, glaucoma rate was 4.4%, dry type ARMD rate was 4.2% and wet

165   type ARMD rate was 2.3% in cataract patients. In UK [10] it was reported as 16.9% for

166   ARMD, 11.2% for glaucoma and 3.4% for diabetic retinopathy. In New Zeland [11], ocular

167   comorbidity was reported as 9.2% glaucoma, 7.6% diabetic retinopathy and 5.1% ARMD in

168   cataract patients. In Australia [11]. ARMD rate was 12.6%, glaucoma rate was 10.6% and

169   diabetic retinopathy rate was 9%.

170   Comparing to these studies, the lower rate of glaucoma and ARMD might be resulted from

171   younger age in cataract patients in our study.

172   Pre-operative ocular comorbid diseases accompanying cataracts may influence postoperative

173   visual outcome of the cataract surgery. Thus, with informing the patients about the prognosis

174   of cataract surgery with informed consent, rational expectations of the patients can be

175   ensured.

176   In the study, Hepatitis B rate was 3.2% and Hepatitis C rate was 0.1%. Some of these patients

177   were firstly diagnosed with pre-operative routine testing. This indicates that preoperative

178   serologic testing should be performed to prevent medico legal issues after the cataract surgery

179   and to prevent transmission of the disease.

180   The cataract patients should be evaluated for accompanying ocular and systemic diseases and

181   not only for cataracts. To operate the patients in the appropriate time and condition, full

182   ophthalmologic examination should be performed and patients should be consulted for

183   systemic diseases. In conclusion we think that all the cataract patients should undergo full

184   ophthalmologic examination and systemic evaluation before the surgery to get the best visual

185   outcome and prevent systemic morbidity and mortalities.

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