

## Cataract surgical reach: Falling short to catch white cataracts!

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**Purpose:** The aim of this study was to know proportion of white cataracts from among patients coming for cataract surgery, and to find causes delaying uptake of cataract surgery. **Methods:** A hospital-based, prospective study enrolled patients of senile cataract between April 2018 and March 2019. The proportion of white cataract was calculated and underlying causes delaying uptake of cataract surgery studied. **Results:** White cataracts constituted 13.5% of total 3634 senile cataract patients, with gender disparity disfavoring women. Bilateral white cataract was presentation in 39 (8%) patients and lens-related glaucoma in 24 (5%) patients. Pseudophakia in the other eye was single most common cause of delay. **Conclusion:** A large proportion of white cataracts suggest that penetration of cataract surgical services is not reaching to the most eligible individual.

**Key words:** Bilateral white cataract, delayed cataract surgery uptake, lens-related cataract, white cataract

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Cataract is the principal cause of blindness; and moderate-severe visual impairment in India.<sup>[1]</sup> Although surgical intervention can restore the vision, cataract continues to be a leading cause of blindness in India due to lack of awareness, access and affordability issues.<sup>[2]</sup> In the past decades, the cataract surgery rate (CSR) has increased substantially, reaching to 6,000 cataract operations per million population in 2012.<sup>[2]</sup> But CSR is a proxy indicator of access to cataract surgery.<sup>[3]</sup> It is not only affected by number of factors but also varies widely among Indian states.<sup>[4]</sup> Another quantifiable measure for measuring the impact of cataract intervention program is cataract surgical coverage (CSC), which is proportion of persons receiving cataract surgery of the eligible visually impaired individuals. Along with CSC, the population age dynamics and visual acuity threshold influences the uptake of cataract surgery.<sup>[5]</sup> The visual acuity threshold as an indicator to uptake cataract surgery varies among countries and influenced by several socio-demographic and economic factors.<sup>[6-8]</sup> However, delayed uptake of cataract surgery as late as when it leads to extreme of visual impairment or blindness, might not be acceptable for any modern society. Mature or total white cataracts lie at the extreme of visual impairment or blindness. Hence, prevalence of white cataract is not only associated with severe visual impairment or blindness but also an indicator of non-submission of cataract surgical services to the most eligible person. The study intended to know the proportion of white cataracts of all cataract patients in hospital-based set up and to find causes that lead to delayed uptake of cataract surgery.

## Methods

The prospective study was done in the ophthalmology department of a tertiary care teaching institute situated in Western Haryana. The study was approved by the institutional ethical board and adhered to the declaration of Helsinki.

We included all patients presenting with white (also called mature or total) senile cataract. The senile cataract was defined as age-related cataract in a person aged  $\geq 50$  years. White cataract was defined as presence of white pupillary reflex and vision not better than hand movement in affected eye [Fig. 1]. Enrolment was done after taking consent for participation in study and furnish personnel and socioeconomic information. All enrolled subjects were formally asked to share cause(s) that led to delay in uptake of cataract surgery. The naive responses were recorded in patient's vernacular and later categorized in one of four categories, using a pre-validated response sheet [Table 1]. The categories were based on individual characteristics of health-care utilization model developed by Anderson.<sup>[9]</sup> This was validated on thirty patients of cataract before enrolment of subjects for the current study. Information about demographic details and previous surgical advice for same eye was also sought. The reason compelling to uptake surgery was recorded. All patients underwent comprehensive pre-operative ocular and laboratory examination. Cataract surgery was carried out by extra-capsular cataract surgery technique either by phacoemulsification or manual small incision cataract surgery with intraocular lens implantation.

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**Table 1: Category-wise vernacular responses which delayed uptake of cataract surgery**

Category	Vernacular responses
Psycho-physiological	"could see till recently", "not yet mature", "can see with other eye", "other eye was operated", "fear for surgery", "other eye surgery had poor outcome",
Socio-cultural	"no one to accompany", "did not get time", "busy with agriculture activities/fields", "busy with care of domestic animals", "family dependent on me", "no one to take care after surgery", "occupied with care of new born in family", "climate was hot", "waiting for winter season", "was ignorant", "could not afford to rest after surgery", "have to work in dusty and warm climate"
Economic	"money constrain", "no one to earn", "dependent on pension", "could not afford"
Health related	"uncontrolled blood sugar," "recent surgery ( <i>non-ocular</i> )", "typhoid" "other illnesses", "was told eyes cannot be operated"

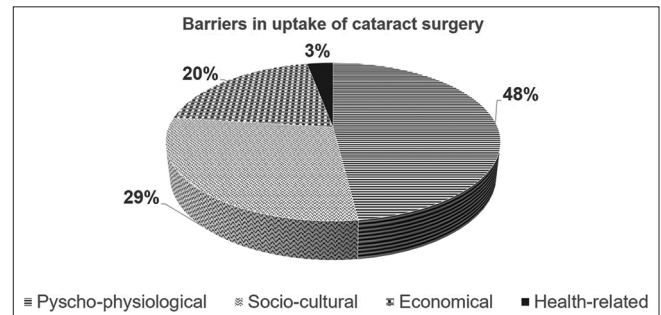
**Figure 1:** Representative picture of 69-year old man with bilateral white cataracts

The data was analyzed using SPSS 20.0 (IBM, Chicago, Illinois). The descriptive statistics were presented as mean and standard deviation (SD). The means were compared using Mann–Whitney test. All proportions were expressed with 95% confidence limits (CI). The test of proportion (Z-test) was applied for gender proportion. Association between delayed presentation and gender was studied using the Chi-square test, with a significance level < 0.5.

## Results

A total of 3634 senile cataract patients were operated between April 2018 and March 2019, including 1996 men and 1638 women. Of these 487 (13.5%; 95% Confidence Incidence (CI): 12.5–14.6) had white cataract. It included 204 (42%; 95%CI: 38–46) men and 283 (58%; 95% CI: 54–62) women. The mean  $\pm$  SD age was  $73 \pm 8$  (Range: 50–89) years. The difference in average age at presentation for women ( $72 \pm 8$ ) and men ( $74 \pm 8$ ) was significant ( $P = 0.009$ ). The proportion of white cataract was higher among women (17%) than men (10%). A Chi-square test of independence showed that there was a significant association between female gender and delayed presentation,  $X^2 (1, N = 487) = 38.6, P < 0.00001$ . The odds ratio was 1.69 (95%CI: 1.39–2.04). Nearly half of the study participants were illiterate, and most had rural, agriculturist background [Table 2].

At presentation, 39 (8%; 95% 6–11) participants had bilateral white cataracts. In 56 (11%; 95%CI: 9–15) cases cataract was at hyper mature stage. In 463 (95%; 95%CI: 92–97) cases, decreased vision was cause for uptake of cataract surgery. In 24 (5%; 95%CI: 3–7) cases pain in eye from lens-related glaucoma forced to seek treatment. All these 24 patients had preceding history of progressive diminution of vision. There was no history of

**Figure 2:** Pie diagram depicting proportion of causes delaying the uptake of cataract surgery (All figures in percentage)

the previous consultation or advise for cataract surgery for same eye in 346 (71%; 95%CI: 66–75) cases. The fellow eye was phakic in 229 (47%; 95% CI: 43–51) cases, with visually significant cataract in 167 (34%; 95%CI: 30–39) eyes [Table 3].

The most common cause for delay in uptake of cataract surgery falls in category of psycho-physiological [Fig. 2]. The single most common reason for delay in uptake of cataract surgery was pseudophakia in the fellow eye, reported by 156 (32%; 95%CI: 28–36) participants. In cases with bilateral white cataracts, socio-cultural factors were main barrier, noted in 28 (72%) cases. The barriers were different in relation to gender, socio-cultural for women and pscho-physiological for men were the main causes [Table 4].

## Discussion

There are three principal outcomes of this study. One, white cataract constitutes a noticeable proportion of senile cataracts. Second, in 5% of them lens-related complications compelled to seek cataract surgical services. And lastly, nearly 1% came for surgery when became bilateral blind. Did we actually lag behind in providing basic care to the underprivileged populations while delivery delight to others through high-end technology in cataract surgery?<sup>[5]</sup>

Pscho-physiological causes were the most common barrier in this study. This category includes attitudinal issues reported in previous studies.<sup>[10,11]</sup> Vaidaynathan *et al.* reported shift in barriers to cataract surgery, with decline of attitudinal issues.<sup>[10]</sup> Contrarily a study by Brilliant *et al.* had reported attitudinal causes a most common barrier.<sup>[11]</sup> Working vision in fellow phakic or pseudophakic eye was associated with delayed uptake of cataract surgery in a large proportion of our study subjects. Good vision in fellow eye might have allowed managing daily chores of life, despite being aware of falling vision in second eye.

**Table 2: Socio-demographic characteristics of study group**

Variable	Value (%)	95% CI
Age (in years)		
Mean	73±8	71-74
Range	50-89	
Median	74	
Gender		
Male	204 (42)	38-46
Female	283 (58)	54-62
Literacy		
Illiterate	221 (45)	41-50
Below secondary	152 (31)	27-35
Above secondary	114 (23)	20-27
Residential Background		
Rural	419 (86)	83-89
Semi urban/Urban	68 (14)	11-17
Vocational background		
Agriculturist	306 (63)	58-67
Labourer	111 (23)	20-27
Others	70 (14)	12-18

**Table 3: Clinical characteristics of study group**

Variable	Value (%)	95% CI
Laterality		
Unilateral	448 (92)	89-94
Bilateral	39 (8)	6-11
Cataract grade		
Total cataract surgeries	3610	
Total White cataracts	487 (13)	12-14
Mature	431 (89)	80-87
Hyper mature	56 (16)	4-8
Clinical presentation		
Decreased Vision	463 (95)	92-97
Pain full eye	24 (5)	3-7
Previous surgery advises		
Yes	141 (29)	25-33
No consultation	346 (71)	66-75
Fellow eye status		
Phakic	229 (47)	43-51
Pseudophakic	248 (51)	46-55
Aphakia	03 (0.6)	0.2-1.8

**Table 4: Gender wise comparison of proportion of cases and causes of delay**

	Men (n=204)	Women (283)	Validation
Proportion (%)*	10.2	17.2	$\chi^2=38.6$ $P<0.00001$ (Z-statistics)
Age (years)			
Mean±SD	72±8	74±8	$P$ 0.009
Median	73	75	
Bilateral cases (%)	17 (8)	22 (8)	$\chi^2=0.05$ , $P$ 0.8
Cases of delay			
Psycho-physiological	122	111	$\chi^2$ (3, $n=487$ ) = 25.2, $P$ 0.00001
Socio-cultural	39	102	
Economic	35	64	
Health related	8	6	

But it is interesting to note why did fellow eye pseudophakia motivate for surgery? Studies did not provide evidence that second-eye surgery significantly improved health related quality of life.<sup>[12]</sup> The review also reported cost-effectiveness of second-eye surgery using a de novo economic model, and estimated 0.68 incremental quality adjusted-life years with an incremental cost-effectiveness ratio of £1964.<sup>[12]</sup> Does economic constrains lies underneath delaying the cataract surgery in second eye, among those with fellow pseudophakic eyes? This was not probed in our study. However, compared to average cost for cataract surgery in developed countries, the cost of cataract surgery is much lesser in India, but so as the gross domestic product per capita income.<sup>[12-14]</sup> In national blindness and visual impairment survey of India for 2015–2019, cost was biggest barrier in uptake of the cataract surgery among severely visually impaired.<sup>[1]</sup> Globally also high cost is major barrier among rural population in accessing eye care.<sup>[15]</sup> In our study, economic issues were not the most common obvious cause, but still it was a barrier in 20% of cases.

Patients who tend to wait for the maturity of cataract, do so for two reasons. One, they believe cataract surgery is not

needed till they are able to manage their day-to-day activities without assistance. This has been reported previously too, across the geographic boundaries.<sup>[8,10]</sup> Second reasons may be unique to contemporary elder generation of India. Their parents were operated in time when intra-capsular surgery was prevalent, and patients were asked to wait till maturity of cataract before up-taking the cataract surgery.<sup>[10]</sup> That mindset perhaps continues to be a barrier. Compared to developed countries, people in developing countries uptake cataract surgery when visual acuity is poorer.<sup>[6]</sup>

Socio-cultural issues were major barrier for uptake of cataract surgery for women and those with bilateral cataract. Women constituted larger proportion of those presenting with white cataract. Most belonged to non-agriculturist families; and lack of assistance, available to accompany was the main underlying factor. A systemic review and meta-analysis concluded that female gender remains a significant barrier for access to cataract surgery in South Asia.<sup>[16]</sup> Women have more likelihood of cataract related blindness.<sup>[17]</sup> Paradoxically, in our study average age at presentation was 2-year younger for the women than men.

Bilateral white cataract creates a complete functional dependency on others. This study revealed two barriers delaying cataract surgery among the participants. First, the non-availability of family member to escort to hospital or for postoperative care. We speculate this may be either due to increasing nuclearization of families or migration trend in India.<sup>[18,19]</sup> Second reason was economic dependency of family, almost always in cases of men. In both the scenarios, patients kept postponing the cataract surgery until day-to-day activities were not compromised due to poor vision. It seems that not only the cost of cataract surgery but also loss of income during postoperative period of rest, that perhaps lead to delay in cataract surgery. However, in India, free cataract surgery is available in government-run hospitals under national program for control of blindness (NPCB). In 2018 a government-financed social health insurance scheme named "Aayushman Bharat" or "Healthy India" was launched. It entitles eligible poor and vulnerable population of India to seek treatment for enlisted diseases, including cataract, free of cost in designated public and private sector hospitals.<sup>[20]</sup>

Nearly 5% of cases presented with lens-related glaucoma. People in this region are aware that unoperated cataract may lead to lens-related glaucoma.<sup>[21]</sup> Hence; awareness is not the sole determinant of health services utilization; and it seems cataract blindness is more of lack of access and affordability than awareness. Cataract surgery in lens-related glaucomatous conditions have increased immediate postoperative complications and affects final visual outcomes.<sup>[22,23]</sup> Therefore, cataract surgical services should ideally reach each eligible individual before visual impairment, but if not, definitely before the onset of cataract related complications.

The study has some limitations worth mentioning, foremost the design of this work was hospital-based. The proportion of white cataract in a hospital-based sample may not be true representative of population. The study subjects were mainly from rural, agriculturist background. We did not record type of family, economic class or family income. This could have helped us to understand the core issues associated with social, cultural and psychological barriers used in this study.

## Conclusion

In conclusion, white cataracts still constitute a noticeable proportion of senile cataract patients in hospital-based sample. Perhaps the penetration of cataract surgical services is still not reaching to the most eligible and underprivileged cataract patients.

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## Conflicts of interest

There are no conflicts of interest.

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