

Delay in presentation of childhood cataract cases for surgery and its determinants in a tertiary care hospital of Kolkata during the Covid-19 pandemic period: a cross-sectional study

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Abstract: *Background:* In India the already existing problem of late detection and late presentation of childhood cataract got further worsened during Covid lock down period due to disruption of regular services delivery, lack of transport and fear of getting Covid infection leading to a massive reduction in hospital attendance. This study was done to find out the delay in presentation of pediatric cataract cases along with its determinants during the covid-19 pandemic and lockdown. *Methodology:* A descriptive, observational study was conducted among 96 paediatric cataract patients attending ophthalmology OPD of IPGME&R during April 2020 to March 2021. Patients were subjected to ophthalmological examination to find out the laterality and type of cataract. Principal care givers of the patients were interviewed to study the socio-demographic, Covid related and clinical variables. *Result:* Mean age of study population was 4.18±2.99 completed years. 90% of patients residing in rural areas reported with delay to the hospital which was statistically significant (p<0.05). Developmental and unilateral cataract cases had a significantly higher proportion of delayed presentation (p<0.05). Urban residence, bilateral cataract cases and patients with Covid-19 negative status of family members had significantly (p<0.05) lower odds of delayed presentation. *Conclusion:* Covid-19 lock down led to a reduction in hospital attendance due to non-availability of transport, Covid-19 positive family member, or loss of daily wages.

Keywords: Pediatric, Cataract, Hospital, Covid-19 Pandemic, Caregivers.

Introduction

Cataract is one of the leading causes of global blindness in children. It is estimated that there are 2,00,000 children worldwide blind from cataract and 20000 to 40000 children are born each year with developmental cataract [1]. With gradual reduction in preventable causes of blindness (for example, measles and vitamin A deficiency) cataract has become the major cause of treatable blindness in children [2]. A systemic and meta-analysis by Tariq et al [3] from Asia reported random effects pooled prevalence of childhood cataract as 3.78 (95% CI: 2.54–5.62)/10,000.

Pediatric cataract can be classified as congenital cataract (diagnosed at or within two months of birth and / or accompanied by nystagmus with no

other pathology) and developmental cataract (diagnosed after two months of birth having a zonular nature with no nuclear involvement) [4]. A prolonged presence of cataract, unilateral or bilateral, during childhood may compromise the visual system leading to amblyopia. So unlike adult cataract early detection is the key factor for a good post-operative vision in case of childhood cataract [5]. Thus the treatment of childhood cataract is most effective if done within the first 6-8 weeks post-birth for unilateral cases, and within the first 14 weeks, for bilateral cases [6-7].

In contrast to developed countries neonatal screening is not done routinely in India so an

early detection of childhood cataract is not possible in many cases. Generally caregivers play a pivotal role in this situation. But in India due to the lack of awareness and knowledge, most of them are not competent enough to detect the lental opacity. Even if parents detect a paediatric cataract at an earlier stage factors like barriers to health care, economical constraints etc. may prevent them from reaching a health facility quickly [8-10].

This scenario got much worsened due to Covid-19 pandemic. [10] Rapid spread of COVID 19 virus around the world resulted in a global public health threat, and it was declared a pandemic by the World Health Organization on March 11, 2020 [12]. The enforcement of the national lockdown in India in 2020 posed significant new challenges for patients to access healthcare services across the country [13]. Also there was a disruption in regular service delivery, leading to a drastic reduction in the outpatient numbers during the lockdown phase in India.

Changes in healthcare infrastructure during the pandemic caused significant difficulties in pediatric cataract management, both in terms of clinical and surgical practice [14]. For fear of getting infected by Covid 19 virus patients generally avoided hospital visits at that time. Even for the few willing patients reaching the health facility became much problematic due to the decrease in number of vehicles owing to the nationwide total lock down. Though telemedicine was used extensively and many hospital visits were converted to telemedicine visits but this facility was not widely available in rural areas. Moreover during the Covid pandemic emergency health problems gained priority over lesser pressing problems like childhood cataract in the caregiver's mind.

Gogate P et al in a study done prior to covid pandemic found that in India only 50% of the children with cataract present without delay [15]. There are some other studies which revealed various probable factors responsible for delayed presentation but no study was found which analyzed the impact of Covid-19 on childhood cataract diagnosis [16].

Currently, there is a dearth of studies on the age at presentation for childhood cataract surgery

during the Covid-19 lockdown period in India. Thus this study was undertaken in the ophthalmology OPD of a tertiary care hospital of Kolkata to find out the delay in presentation of pediatric cataract cases along with its determinants during the covid-19 pandemic and lockdown.

Material and Methods

Study design, area and participants: This descriptive, observational study with cross-sectional design was conducted in Ophthalmology OPD of Institute of Post Graduate Medical Education and Research from April 2020 to March 2021 among paediatric patients attending OPD. Inclusion criteria included all patients below 16 years attending ophthalmology OPD for the first time with lental opacity during the aforementioned study period. Children with a history of trauma leading to cataract were excluded from the study.

Sample size and sampling technique: Non-probability based sampling technique was followed. Complete enumeration of all paediatric patients meeting the inclusion criteria and visiting the OPD during the study period was done. A total of 98 childhood cataract patients attended OPD during the study period, of which 96 patients met the inclusion criteria and were included in the study.

Study Tools: The study tool included a pre-designed, pre-tested, structured questionnaire, Slit lamp.

Procedure of data collection: All consecutive patients meeting the inclusion criteria were subjected to ophthalmological examination and exit interview of the principal caregiver was conducted after proper informed consent of the caregiver and assent of the child.

Ethical Issues: Prior approval by the Institutional Ethics Committee of IPGME&R, Kolkata was granted vide IEC Memo No. IPGME&R/IEC/2022/301. Consent was obtained prior to the interview and privacy of respondents was ensured.

Study Variables: The outcome variable included delay in presentation of childhood cataract. The independent variables were socio-demographic variables like age, religion, sex, residence (rural/urban), total monthly income, number of family members, education & occupation of parents, number of siblings, marital status of parents and distance of residence from hospital, Covid related variables such as Covid 19 status of child and family members, any death due to Covid 19 in their family, loss of job of any family member due to Covid lock down and availability of transport during lock down, clinical variables e.g. type of childhood cataract, laterality (unilateral/bilateral), who first noticed the defect and the time between detection and reporting and cause of time lag between detection and reporting

Statistical analysis: Data were recorded in the Microsoft Office Excel 2010 (Microsoft Corp, Redmond, WA, USA) and the analysis was performed using Statistical Package for the Social Sciences (IBM, New York City, USA) Version 25.0. Descriptive statistical measures were employed to summarize the data. Binary logistic regression was performed to ascertain the relationship between the delay in presentation for surgery and socio-demographic and clinical profile. Chi-square test was used for testing the significance of associations between outcome variables and other factors. Logistic regression analysis was done to investigate the association and relation among socio-demographic variables and other predictors with outcome variables. A p-value of <0.05 was considered significant.

Operational definitions: Educational qualification of caregivers was classified into 6 categories as Illiterate (Any person of above 7yrs of age who cannot read or write with understanding in any one language was considered illiterate), Just literate (Any person of above 7yrs of age who can read or write but has no formal education), Primary education (Any person who has formal education up to class 5), Middle School (Any person who has formal education up to class 8), Secondary (A person who has formal education up to class 10) Higher Secondary (A person who has formal education up to class 12) and Graduate and above (Any Person who has formal education above class 12).

- *Congenital cataract* – Children whose cataract was recognised by their caregivers before 2 months of birth with or without nystagmus and no other pathology
- *Developmental cataract* – Children whose cataract was recognised by their caregivers after 2 months of birth with a zonular nature and no nuclear involvement
- *Delayed presentation* - When parents or caregivers brought their children in OPD for the first time after 1 year of recognition of lental opacity [3]

Results

Majority (%) of the study population belonged to the age group of 1yr to 5yrs (62.5%), mean age being 4.19 years. About 3/4th of them were Hindu by religion with a male: female ratio of 1.90:1. It was found that over half (53.12%) of the study participants belonged to lower middle class while a meagre proportion (6.25%) belonged to upper middle class as per modified BG Prasad scale (2021). 62.50% of these patients were from rural areas and most of them (45.84%) lived at a distance of 61 to 90 km from the health facility.

We hypothesised that education of parents was an important determinant for care seeking in childhood cataract cases. It was seen in this study that most of the fathers (30.21%) and mothers (35.41%) had primary education which was followed by an illiterate population of 22.92% and 31.25% respectively. 52.08% of fathers were daily labourers and 71.87% of mothers were housewives (Table 1).

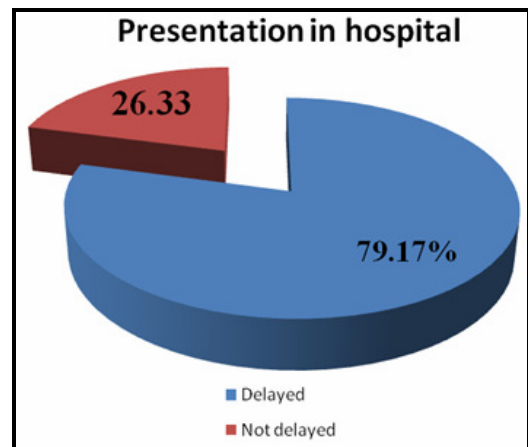
Socio-demographic profile		Number (%)
Age (in completed years)	<1	10 (10.41)
	1 – 5	60 (62.5)
	6 – 10	25 (26.05)
	>10	1(1.04)
Sex	Male	63(65.63)
	Female	33(34.37)

Socio-demographic profile		Number (%)
Socio-economic class	II (Upper middle class)	6(6.25)
	III (Middle class)	20 (20.84)
	IV (Lower middle class)	51(53.12)
	V (Lower class)	19 (19.79)
Residence	Rural	60 (62.5)
	Urban	36 (37.5)
Distance of residence from hospital(in Km)	<30	9 (9.37)
	30 – 60	25 (26.04)
	61 – 90	44 (45.84)
	>90	18 (18.75)
Religion	Hindu	75 (78.13)
	Muslim	21 (21.87)
Father's education	Graduate	9 (9.37)
	HS	12 (12.5)
	Middle School	12 (12.5)
	Primary education	29 (30.21)
	Just literate	12 (12.5)
	Illiterate	22 (22.92)
Mother's education	HS	12 (12.5)
	Middle	14 (14.58)
	Primary education	34 (35.41)
	Just literate	6 (6.26)
	Illiterate	30 (31.25)
Mother's occupation	Daily labour	12 (12.5)
	Formal employment in Government sector	5 (5.21)
	Formal employment in Private sector	10 (10.42)
	House wife	69 (71.87)
Father's Occupation	Daily labourer	50 (52.08)
	Formal employment in Government sector	19 (19.80)
	Formal employment in Private sector	27 (28.12)

Clinical Profile		Number (%)
Laterality of cataract	Unilateral	44 (45.83)
	Bilateral	52 (54.17)
Type of cataract	Congenital	43 (44.79)
	Developmental	53 (55.21)
Who first detected	Health worker	34 (35.42)
	Parents	43 (44.79)
	Relative	6 (6.25)
	School teacher	13 (13.54)

Table 2 shows that a little over half of the patients presented with (54.17%) bilateral cataract and almost a similar proportion (55.21%) had developmental cataract. In most of the cases (44.79%) parents were the first to detect the opacity which was followed by health workers (35.42%) and school teachers (13.54%).

Fig-1: Distribution of study population according to delay in presentation (n=96)



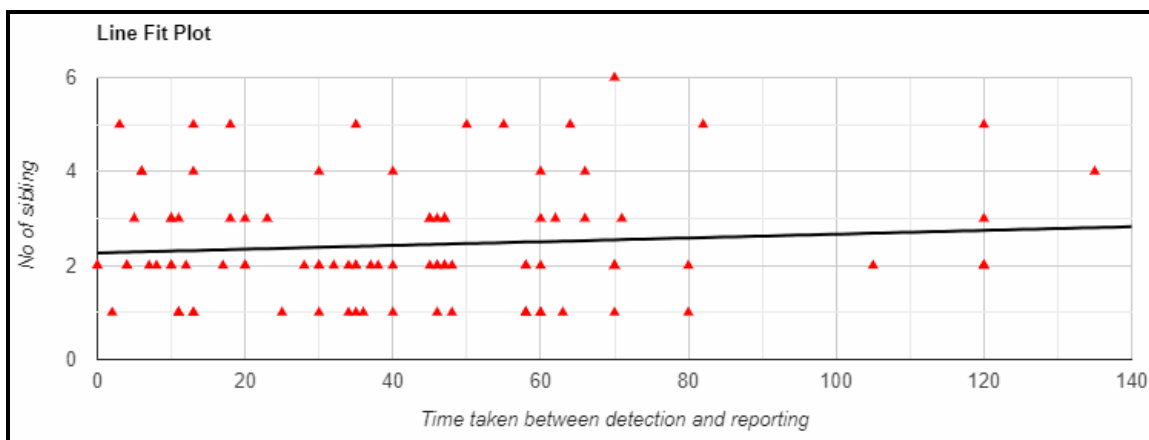
It was found that nearly 80% of the study population had delayed presentations in hospital (Figure-1). In Table 3 it is seen that 90% of the rural population had delayed presentation compared to 61.11% of urban population and this was statistically significant ($p < 0.05$). The other socio-demographic factors which were significantly associated with delayed presentation on Chi square analysis included literacy status of parents, unavailability of regular transport and Covid positive status of any family member.

Table-3: Association of socio-demographic and clinical parameters with time of reporting of childhood cataract (n=96)			
Socio-demographic and clinical factors	Delay in reporting present (%)	Delay in reporting absent (%)	Total (%)
Sex			
Male	49 (77.78)	14(22.22)	63(100)
Female	27 (81.82)	6(18.18)	33(100)
X^2 (df=1) = 4.0394, p.>0.05			
Religion			
Hindu	57 (76)	18 (24)	75(100)
Muslim	19 (90.47)	2 (9.53)	21(100)
X^2 (df=1) = 1.299, p>0.05			
Residence			
Rural	54 (90)	6 (10)	60 (100)
Urban	22 (61.11)	14 (38.89)	36 (100)
X^2 (df=1) = 9.7011, p<0.05			
Education father			
Illiterate or just literate	31 (91.18)	3 (8.82)	34 (100)
Primary or Middle school	34 (82.92)	7 (17.08)	41 (100)
Higher secondary and above	11(52.38)	10 (47.62)	21 (100)
X^2 (df=2) = 12.4602, p<0.05			
Education mother			
Illiterate or just literate	33(91.67)	3(8.33)	36(100)
Primary or Middle school	36(75)	12(25)	48(100)
Higher Secondary or above	7(58.33)	5(41.67)	12(100)
X^2 (df=2) = 7.07, p<0.05			
Availability of transport facility			
Available	23(65.71)	12(34.29)	35(100)
Unavailable	53(86.89)	8(13.11)	61(100)
X^2 (df=1) = 4.83, p=<0.05			
Covid positivity status of any family member			
Covid positive	41(91.11)	4(8.89)	45(100)
Covid negative	35(68.62)	16(31.38)	51(100)
X^2 (df=1) = 6.02, p=<0.05			
Employment status of family members			
Loss of employment in any family member	11(78.57)	3(21.43)	14(100)
No loss of employment in any family member	65(79.27)	17(20.73)	82(100)
X^2 (df=1)= 0.0035, p>0.05			
Type of cataract			
Congenital	31(72.10)	12(27.90)	43(100)
Developmental	45(84.90)	8(15.1)	53(100)
X^2 (df=1)= 4.04, p=<0.05			
Laterality			
Unilateral	40(90.90)	4(9.1)	44(100)
Bilateral	36(69.23)	16(30.77)	52(100)
X^2 (df=1)= 5.5402, p=<0.05			

Higher proportion of children with developmental cataract (84.90%) had delayed presentation compared to congenital cases (72.10%). Also 90.90% unilateral cataract cases were more prone to delayed presentation compared to 69.23% of bilateral cases. In all these cases the difference between the groups were found to be statistically significant ($p < 0.05$). However, no statistically significant difference in presentation was observed with gender, religion and loss of

employment due to the pandemic. In the present study 'Pearson correlation coefficient test' was done to find if any relation existed between number of siblings with the time lag between detection and reporting of childhood cataract. Results of the Pearson correlation indicated that there was no significant positive relationship between time taken lag between detection and reporting and number of sibling, ($r(94) = .0986, p = .339$) (Figure 2).

Fig-2: Pearson correlation between time lag between detection and reporting and number of siblings (n=96)



Socio-clinical factors		Delayed presentation (%)	OR (95% CI)	AOR (95% CI)
Religion	Hindu	57 (75)	0.33 (0.07-1.57)	0.55 (0.06-5.31)
	Muslim	19 (25)	1	1
Sex	Male	49 (64.47)	0.78 (0.27-2.260)	0.94 (0.23-3.85)
	Female	27 (35.53)	1	1
Residence	Urban	22 (28.95)	0.18 (0.06-0.51)*	0.09 (0.2-0.48)**
	Rural	54 (71.05)	1	1
Social class	Class II	2 (2.63)	0.09 (0.01-0.76)*	0.02 (0.00-7.87)
	Class III	14 (18.42)	0.44 (0.9-2.08)	0.10 (0.00-25.8)
	Class IV	44 (57.89)	1.18 (0.27-5.11)	0.4 (0.002-78.82)
	Class V	16 (21.05)	1	1
Type of cataract	Congenital	31(40.79)	0.46 (0.17-1.25)	1.084 (0.21-5.5)
	Developmental	45 (59.21)	1	1
Laterality	Bilateral	36 (47.37)	0.23 (0.07-0.74)*	0.07 (0.12-0.42)**
	Unilateral	40 (52.63)	1	1
H/O Covid 19 in any family member at time of reporting	No	35 (46.05)	0.21 (0.07-0.69)*	0.173 (0.04-0.75)**
	Yes	41 (53.95)	1	1
Loss of job of any family member during lockdown	No	65 (85.53)	1.04 (0.26-4.16)	5.108 (0.2-1076.6)
	Yes	11 (14.47)	1	1
Constant				397.033

* Significant on univariate analysis; ** Significant on multivariate analysis

On univariate binary logistic regression it was found that residing in urban areas, belonging to social class 2, bilateral presentation and Covid-19 negative status of any family member had significantly ($p < 0.05$) lower odds of delayed presentation. However, on multivariate analysis, only three variables, namely residing in urban areas, bilateral presentation and Covid-19 negative status of any family member had significantly ($p < 0.05$) lower odds of delayed presentation (Table 4).

Discussion

Childhood cataract leading to blindness is largely preventable through timely use of surgical services. Any cataract that develops in early childhood interferes with normal visual development and cause amblyopia as the critical period of vision development is up to 8 years of age. Therefore, any form of visually significant lens opacity should be recognized and removed as early as possible [17-18]. However in developing countries because of inadequate or timely use of these services prognosis becomes worse [2].

During the present study, deeply concerned by the alarming levels of spread and severity of SARS COVID-19 virus, the World Health Organization (WHO) declared it as pandemic on 11th March, 2020 [12]. This was followed by the implementation of unprecedented “social distancing” and nationwide “Lock Down” strategies considered crucial for limiting the spread of the virus. Thus, the Covid-19 pandemic posed unprecedented challenges to even the world’s best health-care systems due to exponential increase in the number of cases diverting the health care services to the tackling of the pandemic situation, as a result neglecting the delivery of essential health care services. Also due to factors like loss of job and unavailability of transport services ophthalmological health seeking behavior took a backseat.

Thus the present study provided us with the opportunity to investigate the delay in seeking care in case of childhood cataract during the pandemic. The mean age of the study population was 4.18 ± 2.99 years which was similar to the findings of Khokar et al [19] from north India who reported an overall mean age at presentation to be $4.75 (\pm 3.51)$ years. This was lower than 7.78

± 4.34 years reported by Sen et al from Madhya Pradesh conducted during the non-pandemic period [20].

In the present study no statistically significant difference in presentation was observed with gender similar to Jayashree M P et al [21]. However in contrast, in the present study unilateral cataract cases had statistically significant delayed presentation compared to bilateral cases.

In the current study, most of the cases (44.79%) were detected by parents followed by health workers (35.42%) and school teachers (13.54%). A study by Olusanya et al from Nigeria reported higher detection rate by the parents (84.7%), but a lower detection rate by the school teachers (4.3%) compared to the current study [22]. Similarly Sen et al [20] reported that mothers were the first informant of the problem in 70.5% of cases in rural India. However S. Sheeladevi et al reported that in half of the subjects (50%), a parent recognized the eye problem, in 14.2% it was recognized by another relative including grandparents or older siblings and in 26.0% cases, it was recognized by health workers [4].

As the current study was conducted during the pandemic period, we hypothesized that factors like residence, availability of transport and distance from the hospital would play a major role in the care seeking pattern of these children [11]. A study by Mwendu et al in Tanzania reported that one of the most important contributing factors to delay in presentation of children with congenital cataract was proximity to the hospital [23].

The effect of distance of residence from hospital remained predominant in the pandemic period too, as the current study reported a significantly lower odds of delayed reporting to health care facilities in children from urban areas as compared to their rural counterparts, both on univariate and multivariate analysis. Also unavailability of regular transport was significantly associated with delay in reporting to the health system during the period of “Lock Down”. Similar observation was made in a study by Gupta PC et al done during Covid-19 era [24].

Significant association was found among children with developmental cataract (84.90%) and delayed reporting for surgery when compared to congenital cases (72.10%) in the current study.

This was similar to the findings from a multicentric study by S. Sheeladevi et al. across 9 eye hospitals in 8 states of India, which reported a lower mean age at surgery for congenital cataract (4 years) than developmental cataract (8 years) [4]. The reason for increased mean age at surgery in developmental cataract may be due to delay in recognition or may be related to the level of visual loss, with some cataracts being more visually prominent than others.

They also reported that delayed presentation for surgery for congenital cataract had statistical correlation with location (e.g. rural), geographical region, parental education and age, number of siblings at home and father's occupation (all $p < 0.01$) in the univariate model and geographical region and the number of siblings at home in multivariate model.

The current study adds that on multivariate analysis, apart from residence in urban areas, Covid-19 positive status of any family member had significantly ($p < 0.05$) higher odds of delayed presentation. Literature review has revealed almost similar prevalence of bilateral and unilateral childhood cataract cases [7, 25]. This is also corroborated by the current study.

However, S. Sheeladevi et al in their multicentric study found that 86% of the children presented with bilateral cataract and only 14% presented with unilateral cataract [4]. This might be due to a lower rate of presentation of unilateral cataract, which might delay visual development and result in permanent visual impairment in one eye.

Our study found that 90.90% unilateral cataract cases were more prone to delayed presentation compared to 69.23% of bilateral cases. There were higher odds of delayed presentation in unilateral cases as compared to bilateral cases in both univariate and multivariate models.

Education of parents was significantly associated with delayed presentation in our study. Similar findings are supported by Sen et al, Sheeladevi et al and Mwendu et al [4, 20, 23].

Parental educational status may contribute to their appreciation of the value of specific healthcare interventions as well as to an increased involvement in decision making within the household. However in the setting of the pandemic and economic crisis resulting there from access to health care may be delayed even in spite of having basic education. In our study higher educational status of parents did not have significantly lower odds of delayed presentation of cataract.

Though parental understanding of the natural growth and development of infants is a function of community norms as well as experience with raising older children, the present study did not indicate any significant relationship between time taken between detection and reporting and the number of siblings. This contrasted the findings of the study by Mwendu et al who reported that children with congenital cataract who had a sibling (an older sibling) were brought to the hospital sooner than congenital cataract cases without a sibling [23].

There is dearth of literature on presentation to hospital for surgery for congenital and developmental cataract during the Covid-19 pandemic period. Thus the present study brings out the factors like Covid positive status of family members, unavailability of transport and loss of job due to pandemic which had played major roles in health care seeking behavior for childhood cataract during this period.

Since early detection and surgery are imperative in preventing future blindness in case of congenital and developmental cataract, screening by AHSAs and school teachers should be strengthened. There is a need for training and educating the parents also on early detection of these cases. The health messages on detection of congenital and developmental cataract need to be incorporated in the Maternal and Child Health cards as well for a wider distribution to antenatal and postnatal mothers.

The routine immunization services can be utilized by the health care workers for mandatory screening for developmental or

congenital cataracts. Thus during situations like “Lock Downs” and other calamities when health care seeking may be affected due to disruption of transport and economic crisis, diagnosis of congenital and developmental cataracts can be made possible at the earliest and permanent visual impairment avoided by timely referral and management.

Conclusion

Our findings suggest that Covid-19 related lockdown has greatly disrupted the management

of paediatric cataract mainly due to delayed presentation in health facilities.

Unavailability of regular transport and Covid infected family members being some of the important reasons. Patients who were at a greater distance faced tremendous difficulty in reaching the hospital. Even the economic crisis which was mainly due to loss of jobs during the lockdown period posed some problems in reaching hospitals in a few cases.

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