

ORIGINAL ARTICLE

DISTRIBUTION OF PEDIATRIC CATARACTS BY SEX, AGE GROUPS, LATERALITY, TYPE AND PRESENTATION IN POPULATION OF D.I.KHAN DISTRICT, PAKISTAN

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ABSTRACT

Background: Pediatric cataracts cause significant visual disability worldwide. The objectives of this study were to determine the distribution of pediatric cataracts by sex, age groups, laterality, type and presentation in population of D.I.Khan District, Pakistan.

Materials & Methods: This descriptive study was carried out at Department of Ophthalmology, Gomal Medical College, D.I.Khan, Pakistan from January 2015 to December 2015. Sample was collected from Eye unit, DHQ Teaching Hospital, D.I.Khan. Pediatric cataract patients under 14 years of age were included in the study. Demographic variables were sex and age groups. Research variables were laterality, type and presentation. All variables being nominal were analyzed through frequency and percentages. The observed and expected distribution of pediatric cataract by sex, age groups, laterality, type and presentation were respectively tested by chi-square goodness of fit test.

Results: Out of a sample of 47 patients, 29 (61.7%) were boys and 18 (38.3%) girls, 22 (46.81%) were <5 years and 25 (53.19%) 5-14 years of age. Thirty three (70.21%) had unilateral and 14 (29.79%) bilateral cataracts. Type was congenital/ developmental in 27 (57.45%) patients and traumatic in 20 (42.55%). Presentation was by defective vision in 23 (48.94%), leukocoria 14 (29.79%), strabismus 7 (14.89%) and screening in 3 (6.38%) cases. The observed distribution of pediatric cataract by sex ($p=.0158$), age groups ($p=.00002$), laterally ($p=<.00001$) and type ($p=.00001$) was similar to expected, while for presentation, it was different than expected ($p=.1033$).

Conclusion: The prevalence of pediatric cataract was higher for boys than girls and higher for older children (5-14 years) than younger (<5 years) children. Unilateral were more common than bilateral cataracts and the congenital/ developmental were more common than traumatic cataracts. Defective vision was the most common presentation of pediatric cataracts.

KEY WORDS: Pediatric Cataract; Congenital; Blindness; Prevelenc; Boys; Girls; Strabismus; Pakistan.

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1. INTRODUCTION

1.1 Background: Globally cataract is the leading cause of treatable blindness. It is also true in cases of pediatric cataracts. According to a global review

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by Shamanna & Muralikrishnan¹ in 2004, 70 million blind-person-years are caused by childhood blindness, of which about 10 million blind-person-years (14%) are due to childhood cataract. Another study by Rahi & Dezateux² on congenital cataract in the UK, from Oct. 1995 to Sep. 1996 suggested that the adjusted annual age-specific incidence of new diagnosis of congenital and infantile cataract was highest in the first year of life, being 2.49 per 10,000 Children (95% confidence interval [CI], 2.10-2.87). The incidence of bilateral congenital cataract is around 1.8 to 3.6/ 10,000 per year and prevalence from 0.63 to 9.74/ 10,000 as stated by Sheeladevi³ in 2016. In a survey done by Jadoon, et al.⁴ in 2007 in Pakistan,

the crude prevalence of blindness in adults due to bilateral cataract was 1.75%.

Naz, et al.⁵ conducted a prevalence study at Layton Rahmatullah Benevolent Trust Free Eye Hospital (LRBT), Lahore, Pakistan from October 2013 to April 2014 and examined 38,000 children under 15 years, and found cataract in 120 (0.3%) cases.

Equal prevalence for boys and girls was reported by Rahi & Dezateux²; boys 52.42% (130/248) and girls 47.58% (118/248) in UK in 1995-96 and by Haargaard, et al⁶ in nation-wide Danish study in 2004 for boys 51.50% (529/1027) and girls 48.50% (498/1027).

Higher prevalence rate for boys 77.5% (93/120) than girls 22.5% (27/120) was reported by Naz, et al.⁵ and 60.38% (314/520) boys and 39.62% (206/520) girls by Zhu, et al.⁷ in a retrospective chart review for the period from April 2009 to April 2014 from Eye and ENT Hospital of Fudan University, Shanghai, China.

Higher prevalence rate for girls 53% (31/59) than boys 47% (28/59) was reported by Fakhoury, et al.⁸ in epidemiological study over 10 years, published in 2015 from France.

Shah, et al.⁹ showed 21.38% (279/1305) eyes with congenital cataract in age group 0-5 years and 78.62% (1026/1305) in age group 6-18 years in a study for a period from January 1999 to April 2012 in Dahod, Gujarat, India.

Rahi & Dezateux² noted higher prevalence rates 70.16% (174/248) for age group > 1 year than 29.84% (74/248) for age group ≤ 1 year in UK in 1995-96.

The following authors have reported higher prevalence for bilateral than unilateral pediatric cataracts. Naz, et al.⁵ showed bilateral cataracts in 75.83% (91/120) and unilateral in 24.17% (29/120) cases. Zhu, et al.⁷ showed bilateral in 56.35% (293/520) and unilateral in 43.65% (227/520) cases. Fakhoury, et al.⁸ showed bilateral cataracts in 71% (42/59) and unilateral in 29% (17/59) cases and Qi, et al.¹⁰ for the period from January 2004 to January 2012 from Shenyang, Liaoning Province, China, showed 78% (25/32) bilateral cases and 22% (7/32) unilateral cases.

The following authors have reported higher prevalence for unilateral than bilateral pediatric cataracts. Tartarella, et al.¹¹ have reported unilateral in 52.66% (109/207) and bilateral in 47.34% (98/207) cases for the period from February 2001 to January 2011 from São Paulo, Brazil. Tomkins, et al.¹² found unilateral cataract in 75.34% (55/73) and bilateral in 24.66% (18/73) cases in Hawassa city in rural southern Ethiopia for the period from July 31, 2007, through August 1, 2008. Shrestha & Shrestha¹³ reported unilateral cataract in 67.4% (89/132) and bilateral in 32.6% (43/132) cases in Kathmandu, Nepal for the period from November, 2007 to June, 2009.

Almost equal prevalence is reported for unilateral

48.8% (160/328) and bilateral cataracts 51.2% (168/328) from Guatemala City, Republic of Guatemala for the period from 2000 to 2007 by Zimmermann-Paiz & Quiroga-Reyes.¹⁴

In a study for the period from 1985-1990, by Hochstrasser, et al.¹⁵ from Zürich, Switzerland, congenital/developmental cataracts were found in 60% (45/75) cases while traumatic cataracts were found in 40% (30/75) cases. Johar, et al.¹⁶ found 88.4% (152/172) non-traumatic cataracts and 11.6% (20/172) traumatic cataracts in a hospital-based etiological study of pediatric cataracts in Western India. Mohan & Kaur¹⁷ found 72.12% (119/165) non-traumatic cataracts and 27.88% (46/165) traumatic cataracts from April 2011 to March 2014 in a hospital-based study of pediatric cataracts from Abu Road city, Sirohi district of Rajasthan state in western India.

Zhu, et al.⁷ from China found the mode of presentation as defective vision in 41.3% (214/520), leukocoria in 38.8% (202/520), strabismus in 18.3% (95/520) and through screening in 1.73% (9/520) cases. Fakhoury, et al.⁸ from France found the presentation as systematic screening in 41% (24/59), leukocoria in 24% (14/59) and strabismus in 19% (11/59) cases.

1.2 Research Problems (RPs), Knowledge Gaps (KGs) & Research Questions (RQs): Unawareness of the distribution of pediatric cataracts by sex, age groups, laterality, type and presentation in population of D.I.Khan District, Pakistan were our five research problems. Various databases/ search engines like PubMed, PubMed Central, Cochrane Database, ProQuest, ScienceDirect, Pakistan Research Repository, Google Scholar and Google were searched out. Absence of studies on these problems for our population were our five knowledge gaps. How would be the distribution of pediatric cataracts by sex, age groups, laterality, type and presentation respectively in population of D.I.Khan District, Pakistan, would be our five research questions. Answering these RQs, filling these KGs & solving these RPs would be the rationale/ justification of our project.

1.3 Research Objectives (RO):

RO 1-5: To determine the distribution of pediatric cataracts by sex, age groups, laterality, type and presentation in population of D.I.Khan District, Pakistan.

RO 6-10: To compare the expected versus observed distribution of pediatric cataracts by sex, age groups, laterality, type and presentation in population of D.I.Khan District, Pakistan.

1.4 Research (Null) Hypotheses: Hypotheses are tentative answers to RQs. Having survey of the global and national literature, we came forwards with the following hypotheses.

H₀1: The observed distribution of pediatric cataracts by sex in population of D.I.Khan District, Pakistan is same as expected. (RO 6)

H₀2: The observed distribution of pediatric cataracts

by age groups in population of D.I.Khan District, Pakistan is same as expected. (RO 7)

H₀3: The observed distribution of pediatric cataracts by laterality in population of D.I.Khan District, Pakistan is same as expected. (RO 8)

H₀4: The observed distribution of pediatric cataracts by type in population of D.I.Khan District, Pakistan is same as expected. (RO 9)

H₀5: The observed distribution of pediatric cataracts by presentation in population of D.I.Khan District, Pakistan is same as expected. (RO 10)

2. MATERIALS & METHODS

2.1 Design, Duration & Settings: This cross-sectional study was conducted at the Department of Ophthalmology, Gomal Medical College, D.I.Khan, Pakistan from January 2015 to December 2015. The sample was collected from Eye Unit, DHQ Teaching Hospital, D.I.Khan, Pakistan.

2.2 Population & Sampling (size, technique, selection): D.I.Khan District is the catchment area of our hospital, having an estimated population of around 1.5 million in 2015. Assuming 30% population of children, our reference population will be approximately 450,000. Out of this population, a sample size of 47 was calculated through Raosoft[®],¹⁸ an online sample size calculator, with margin of error of 0.91%, confidence level of 95% and estimated prevalence of pediatric cataracts of 0.1% in D.I.Khan District, Pakistan. The sampling technique was consecutive, non-probability technique. All the patients with pediatric cataracts were eligible for inclusion. All cases with severe ocular pathology precluding surgical intervention were excluded.

2.3 Data Collection Plan: Demographic variables were sex (boys, girls) and age groups (<5 years & 5-14 years). Research variables were laterality of cataract (unilateral, bilateral), type of cataract (congenital/ developmental, traumatic) and presentation (defective vision, leukocoria, strabismus, screening). All variables were measured on nominal scale.

2.4 Data Analysis Plan

2.4.1 Descriptive Statistics and Estimation of Parameter: All variables were described by count and percentage for the sample. Then interval estimate for population was calculated as CI (confidence interval) for proportion at 80% CL (confidence level) using the normal distribution approximation for the binomial distribution through an online statistical calculator.¹⁹

2.4.2 Hypotheses Testing: All the hypotheses were substantiated through chi-square goodness-of-fit test²⁰⁻²¹ at alpha .05 using an online statistical calculator.²² Observed and expected counts, their difference, chi-square statistic, degree of freedom and level of significance were given.

3. RESULTS

3.1 Descriptive Statistics and Estimation of Parameter:

3.1.1 Out of a sample of 47 patients with pediatric cataract, the prevalence was higher for boys than girls and higher for older children (5-14 years) than younger (<5 years) children. Unilateral were more than bilateral cataracts. (Table 3.1.1)

3.1.2 The prevalence of congenital/ developmental cataract was higher than traumatic cataract.

Defective vision was the most common presentation with screening the least common. (Table 3.1.2)

3.2 Hypotheses Testing:

3.2.1 H₀1: The data from the study by Naz, et al. is assumed to represent a larger population of pediatric cataracts from the province of Punjab, Pakistan. As per our null hypothesis, we expected the same distribution for our smaller population of D.I.Khan District. Our observed distribution for boys versus girls was 29:18 (n=47) against an expected distribution by Naz, et al. of 93:27 (n=120). Chi-square goodness-of-fit test was used to testify the difference between the two distributions. For comparison we need same denominator, so we adjusted the expected counts for a sample of 47. It came to be 36:11 for boys versus girls as under.

Table 3.1.1: Distribution of pediatric cataracts by sex, age groups and laterality in population of D.I.Khan District, Pakistan (n=47)

Variables	Attributes	Sample statistics		80% CI for proportion	
		Count	Percentage	Lower	Upper
Sex	Boys	29	61.70	52.62	70.79
	Girls	18	38.30	29.21	47.38
Age groups	<5 years	22	46.81	37.48	56.14
	5-14 years	25	53.19	43.86	62.52
Laterality	Unilateral	33	70.21	61.66	78.76
	Bilateral	14	29.79	21.24	38.34

Table 3.1.2: Distribution of pediatric cataracts by type and presentation in population of D.I.Khan District, Pakistan (n=47)

Variables	Attributes	Sample statistics		80% CI for proportion	
		Count	Percentage	Lower	Upper
Type	Congenital/developmental	27	57.45	48.20	66.69
	Traumatic cataract	20	42.55	33.31	51.80
Presentation	Defective vision	23	48.94	39.59	58.28
	Leukocoria	14	29.79	21.24	38.34
	Strabismus	07	14.89	08.23	21.55
	Screening	03	06.38	01.81	10.95

Table 3.2.1: Observed versus expected distribution of pediatric cataracts by sex in population of D.I.Khan District, Pakistan (n=47)

Variable	Attributes	O	E	O-E	(O-E) ²	(O-E) ² /E	χ ² value	d.f.	P-value
Sex	Boys	29	36	-7	49	1.36	5.81	1	.0158
	Girls	18	11	7	49	4.45			
	Total	47	47	Chi-square goodness-of-fit with Yates correction at α 0.05					

O= Observed count, E= Expected count, d.f. =degree of freedom, χ²= chi-square value

Table 3.2.2: Observed versus expected distribution of pediatric cataracts by age groups in population of D.I.Khan District, Pakistan (n=47)

Variable	Attributes	O	E	O-E	(O-E) ²	(O-E) ² /E	χ ² value	d.f.	P- value
Age groups	<5 years	22	10	12	144	14.4	18.29	1	.00002
	5-14 years	25	37	-12	144	3.89			
	Total	47	47	Chi-square goodness-of-fit with Yates correction at α 0.05					

O= Observed count, E= Expected count, d.f. =degree of freedom, χ²= chi-square value

Boys= $93 \times 47 / 120 = 36$ and girls= $27 \times 47 / 120 = 11$

Putting observed and expected counts and running the test, we had p-value less than alpha, so H₀1 was rejected, showing that the observations don't fits the statistical model of the population.

In simple words the 'observed' prevalence of cataract in our population is statistically significantly lower than we expected for boys & higher than we expected for girls. (Table 3.2.1)

3.2.2 H₀2: Our observed distribution for age group <5 years versus 5-14 years was 22:25 (n=47) against an expected distribution by Shah, et al.⁹ of 279:1026 (n=1305). Chi-square goodness-of-fit test was used to testify the difference between the two distributions. For comparison we need same denominator, so we adjusted the expected counts for a sample of 47. It came to be 36:11 for age group <5 years versus 5-14 years as under.

Age group <5 years = $279 \times 47 / 1305 = 10$ and age group 5-14 years = $1026 \times 47 / 1305 = 37$

Putting observed and expected counts and running the test, we had p-value less than alpha, so H₀2 was rejected, showing that the observations don't fits the

statistical model of the population.

In simple words the 'observed' prevalence of cataract in our population is statistically significantly higher than we expected for age group <5 years & lower than we expected for age group 5-14 years. (Table 3.2.2)

3.2.3 H₀3: Our observed distribution for unilateral versus bilateral cataracts was 33:14 (n=47) against an expected distribution by Naz, et al. of 29:91 (n=120). Chi-square goodness-of-fit test was used to testify the difference between the two distributions. For comparison we need same denominator, so we adjusted the expected counts for a sample of 47. It came to be 11:36 for unilateral versus bilateral as under.

Unilateral = $29 \times 47 / 120 = 11$ and bilateral = $91 \times 47 / 120 = 36$

Putting observed and expected counts and running the test, we had p-value less than alpha, so H₀3 was rejected, showing that the observations don't fits the statistical model of the population.

In simple words the 'observed' prevalence of cataract in our population is statistically significantly higher than we expected for unilateral & lower than we expected for bilateral cataracts. (Table 3.2.3)

Table 3.2.3: Observed versus expected distribution of pediatric cataracts by laterality in population of D.I.Khan District, Pakistan (n=47)

Variable	Attributes	O	E	O-E	(O-E) ²	(O-E) ² /E	χ ² value	d.f.	P- value
Laterality	Unilateral	33	11	22	484	44.00	57.44	1	<.00001
	Bilateral	14	36	-22	484	13.44			
	Total	47	47	Chi-square goodness-of-fit with Yates correction at α 0.05					

O= Observed count, E= Expected count, d.f. =degree of freedom, χ²= chi-square value

Table 3.2.4: Observed versus expected distribution of pediatric cataracts by type in population of D.I.Khan District, Pakistan (n=47)

Variable	Attributes	O	E	O-E	(O-E) ²	(O-E) ² /E	χ ² value	d.f.	P-value
Type	Congenital/ Developmental	27	42	-15	225	05.36	50.36	1	<.00001
	Traumatic Cataract	20	05	15	225	45.00			
	Total	47	47	Chi-square goodness-of-fit with Yates correction					

O= Observed count, E= Expected count, d.f. =degree of freedom, χ²= chi-square value

Table 3.2.5: Observed versus expected distribution of pediatric cataracts by presentation in population of D.I.Khan District, Pakistan (n=47)

Variable	Attributes	O	E	O-E	(O-E) ²	(O-E) ² /E	χ ² value	P-value	
Presentation	Defective vision	23	19	4	16	0.84	d.f. = 3, α = 0.05		
	Leukocoria	14	18	-4	16	0.89	6.17	.1033	
	Strabismus	07	09	-2	04	0.44			
	Screening	03	01	2	04	4.00	H ₀₅ accepted		
	Total	47	47	Chi-square goodness-of-fit with Yates correction					

O= Observed count, E= Expected count, d.f. =degree of freedom, χ²= chi-square value

3.2.4 H₀₄: Our observed distribution for congenital/ developmental (non-traumatic) cataract versus traumatic cataract was 27:20 (n=47) against an expected distribution by Johar, et al.¹² of 152:20 (n=172). Chi-square goodness-of-fit test was used to testify the difference between the two distributions. For comparison we need same denominator, so we adjusted the expected counts for a sample of 47. It came to be 42:5 for congenital/ developmental cataract versus traumatic cataract as under.

Congenital/ developmental = $152 \times 47 / 172 = 42$ and traumatic = $20 \times 47 / 172 = 5$

Putting observed and expected counts and running the test, we had p-value less than alpha, so H₀₁ was rejected, showing that the observations don't fit the statistical model of the population.

In simple words the 'observed' prevalence of cataract in our population is statistically significantly lower than we expected for congenital/ developmental cataract & higher than we expected for traumatic cataract. (Table 3.2.4)

3.2.5 H₀₅: Our observed distribution for defective vision, leukocoria, strabismus and screening was

23:14:7:03 (n=47) against an expected distribution of 214:202:95:09 (n=520) by Zhu, et al.¹⁷ Chi-square goodness-of-fit test was used to testify the difference between the two distributions. For comparison we need same denominator, so we adjusted the expected counts for a sample of 47. It came to be 19:18:09:01 for defective vision, leukocoria, strabismus and screening as under.

Defective vision = $214 \times 47 / 520 = 19$, leukocoria = $202 \times 47 / 520 = 18$, strabismus = $95 \times 47 / 520 = 09$ and screening = $9 \times 47 / 520 = 01$.

Putting observed and expected counts and running the test, we had p-value more than alpha, so H₀₅ was accepted, showing that the observations fit the statistical model of the population.

In simple words the 'observed' presentation of cataract through four given attributes in our population is statistically similar to what we expected from literature. (Table 3.2.5)

4. DISCUSSION

4.1 Distribution of pediatric cataracts by sex. (Objective 1 & 6, H₀₁)

The prevalence of pediatric cataracts in our sample and population was higher for boys 61.7% (80% CI 52.62-70.79%) than girls 38.3% (80% CI 29.21-47.38%).

Similar findings of higher prevalence rate for boys 77.5% (93/120) than girls 22.5% (27/120) was reported by Naz, et al.⁵ from Lahore, Pakistan and 60.38% (314/520) boys and 39.62% (206/520) girls by Zhu, et al.⁷ for the period from April 2009 to April 2014 from Shanghai, China.

Higher prevalence rate for girls 53% (31/59) than boys 47% (28/59) was reported by Fakhoury, et al.⁸ in epidemiological study over 10 years, published in 2015 from France.

Equal prevalence for boys and girls was reported by Rahi & Dezateux²; boys 52.42% (130/248) and girls 47.58% (118/248) in UK in 1995-96 and by Haargaard, et al⁶ in nation-wide Danish study in 2004 with boys 51.50% (529/1027) and girls 48.50% (498/1027).

With almost equal global and Pakistan population of boys and girls, equal prevalence of pediatric cataract has logical explanation. Unequal prevalence needs further investigation.

4.2 Distribution of pediatric cataracts by age groups. (Objective 2 & 7, H₀2)

The prevalence of pediatric cataracts in our sample and population was higher for age group 5-14 years 53.19% (80% CI 43.86-62.52%) than for age group <5 years 46.81% (80% CI 37.48-56.14).

Similar to our findings are from Shah, et al.⁹ showing higher prevalence for age group 6-18 years as 78.62% (1026/1305) than age group 0-5 years as 21.38% (279/1305) in a study for a period from January 1999 to April 2012 in Dahod, Gujarat, India. Shrestha & Shrestha¹³ reported 31.8% (42/132) cases in age group 0-3 years, 22.7% (30/132) in age group >3-7 years and 45.5% (60/132) cases in age group >7-14 years from Kathmandu, Nepal for the period from November, 2007 to June, 2009.

Higher prevalence for older children (5-10 years) than younger children (<5 years) in our study can be explained by the fact that 20 out of 47 cases were traumatic and older children are relatively more exposed to trauma.

4.3 Distribution of pediatric cataracts by laterality. (Objective 3 & 8, H₀3)

The prevalence of unilateral cataracts in our sample and population was higher 70.21% (80% CI 61.66-78.76%) than bilateral cataracts 29.79% (80% CI 21.24-38.34%).

The following authors have also reported higher prevalence for unilateral than bilateral pediatric cataracts. Tartarella, et al.¹¹ have reported unilateral in 52.66% (109/207) and bilateral in 47.34% (98/207) cases for the period from February 2001 to January

2011 from São Paulo, Brazil. Tomkins, et al.¹² found unilateral cataract in 75.34% (55/73) and bilateral in 24.66% (18/73) cases in Hawassa, Ethiopia for the period from July 31, 2007, through August 1, 2008. Shrestha & Shrestha¹³ reported unilateral cataract in 67.4% (89/132) and bilateral in 32.6% (43/132) cases in Kathmandu, Nepal for the period from November, 2007 to June, 2009.

On contrary, the following authors have reported higher prevalence for bilateral than unilateral pediatric cataracts. Naz, et al.⁵ showed bilateral cataracts in 75.83% (91/120) and unilateral in 24.17% (29/120) cases. Zhu, et al.⁷ showed bilateral in 56.35% (293/520) and unilateral in 43.65% (227/520) cases. Fakhoury, et al.⁸ showed bilateral cataracts in 71% (42/59) and unilateral in 29% (17/59) cases and Qi, et al.¹⁰ for the period from January 2004 to January 2012 from Shenyang, Liaoning Province, China, showed 78% (25/32) bilateral cases and 22% (7/32) unilateral cases.

While almost equal prevalence is reported for unilateral 48.8% (160/328) and bilateral cataracts 51.2% (168/328) from Guatemala City, Republic of Guatemala for the period from 2000 to 2007 by Zimmermann-Paiz & Quiroga-Reyes.¹⁴

Higher prevalence of unilateral cataracts in our study can be explained by the fact that 20 out of 47 cases were traumatic in origin and traumatic cases are almost always unilateral.

4.4 Distribution of pediatric cataracts by type. (Objective 4 & 9, H₀4)

Congenital/ developmental cataracts were more common as 57.45% (80% CI 48.20-66.69) than traumatic cataracts as 42.55% (80% CI 33.31-51.80) in our sample and population.

Similar to our findings are from the following three studies. In a study for the period from 1985-1990, by Hochstrasser, et al.¹⁵ from Zürich, Switzerland, congenital/ developmental cataracts were found in 60% (45/75) cases while traumatic cataracts were found in 40% (30/75) cases. Johar, et al.¹⁶ found 88.4% (152/172) non-traumatic cataracts and 11.6% (20/172) traumatic cataracts in a hospital-based etiological study of pediatric cataracts in Western India. Mohan & Kaur¹⁷ found 72.12% (119/165) non-traumatic cataracts and 27.88% (46/165) traumatic cataracts from April 2011 to March 2014 in a hospital-based study of pediatric cataracts from Abu Road city, Sirohi district of Rajasthan state in western India.

4.5 Distribution of pediatric cataracts by presentation. (Objective 5 & 10, H₀5)

The presentation of cataract in our sample and population was by defective vision in 48.94% (80% CI 39.59-58.28), leukocoria in 29.79% (80% CI 21.24-38.34), strabismus in 14.89% (80% CI 8.23-21.55) and through screening in 6.38% (80% CI 1.81-10.95).

Zhu, et al.⁷ from China found the mode of presentation as defective vision in 41.3% (214/520), leukocoria in 38.8% (202/520), strabismus in 18.3% (95/520) and through screening in 1.73% (9/520) cases. Fakhoury, et al.⁸ from France found the presentation as systematic screening in 41% (24/59), leukocoria in 24% (14/59) and strabismus in 19% (11/59) cases.

4.6 Strengths of the study:

4.6.1 Research is a problem solving process for a specified population. We have defined our population by count and selection criteria, drawn a sample, observed and described the sample for variables of interest (descriptive statistics), inferred the sample results to describe the population (estimation of parameter- inferential statistics) and then compared the observed parameters of our population against certain expected parameters to see if our population behaves like other populations or is it different (hypothesis testing- inferential statistics)?²³⁻²⁴

All the studies mentioned here in introduction and discussion start from sample and end on the sample; no proper mention of a specified population, no proper sampling, no estimation of parameters or hypothesis testing to address their populations.

We were supposed to compare our population to other local, national, regional and global populations through the results of hypotheses testing to see similarities and dissimilarities between them. As none of the cited studies have put and tested their hypotheses, so we had no option except to compare our sample results to the sample results of other relevant studies, assuming their sample statistics as their point estimates.

4.6.2 Our study has a logical flow as adopted from the "Marwat's Logical Trajectory of Research Process".²³⁻²⁴ Starting from the research problems through knowledge gaps, research questions, research objectives and research hypotheses, data was collected for the variables of interest, analyzed and interpreted, so that hypotheses were tested, objectives were met, research questions were answered, knowledge gaps were filled and finally the research problems were solved.

4.7 Weakness of the study

Our sample size is not large enough. Still it is one year data of an uncommon disease of pediatric cataracts from a population of a district. We had to decrease our confidence level to 80% to have meaningful confidence intervals for proportions to describe our population parameters from sample statistics.

5. CONCLUSIONS

The prevalence of pediatric cataract was higher for boys than girls and higher for older children (5-14 years) than younger (<5 years) children. Unilateral were more common than bilateral cataracts and the congenital/ developmental cataracts were more com-

mon than traumatic cataracts. Defective vision was the most common presentation of pediatric cataracts.

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CONFLICT OF INTEREST
Authors declare no conflict of interest.
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AUTHORS' CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

Conception or Design:	MKK, IA, MM
Acquisition, Analysis or Interpretation of Data:	MKK, IA, MAK, MS, MI, MM
Manuscript Writing & Approval:	MKK, IA, MAK, MS, MI, MM

All the authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.



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