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Review and Meta-analysis

Retinoblastoma in South Asia: A Scoping Review

Roland Joseph D. Tan	Department of Ophthalmology and Visual Sciences, Philippine General Hospital, Manila, Philippines.
Denzel C. Umerez	College of Medicine, University of the Philippines Manila, Manila, Philippines
Jasper Ian A. Alindayu	College of Medicine, University of the Philippines Manila, Manila, Philippines
Jose Manuel Ricardo M. Conjares	College of Medicine, University of the Philippines Manila, Manila, Philippines
Daniel Alexander D. Go	College of Medicine, University of the Philippines Manila, Manila, Philippines
Reynaldo Gabriel T. Paulino	College of Medicine, University of the Philippines Manila, Manila, Philippines

Introduction: Pakistan, Indonesia, Bangladesh and the Philippines are listed as among the six Asian countries which will be the sources of 43% or almost 4000 new cases of the estimated world's retinoblastoma cases in 2023.
Materials and Methods: Scoping review of literatures using the databases of Pubmed, EMBASE, Scopus, Science Direct, Google scholar and Web of Science databases as well as local and regional databases on clinical features, treatment and outcomes of retinoblastoma patients from Pakistan, Indonesia, Bangladesh and the Philippines was done. A descriptive analysis using the 2017 retinoblastoma database of the Global Retinoblastoma Study Group (GRSG) was added to supplement data for Bangladesh, Indonesia and the Philippines.
Results: A total of 17 articles were included in this review. There were 696 retinoblastoma patients involving at least 859 eyes seen in Pakistan from 1997 to 2018 and included in the 7 articles reviewed. There were 617 retinoblastoma patients involving at least 677 eyes seen in Indonesia from 2003 to 2018 and included in the 8 articles reviewed and the GRSG's database. There were 161 retinoblastoma patients involving 221 eyes identified in the descriptive analysis of the GRSG's database for Bangladesh. And there were 226 retinoblastoma patients involving 297 eyes seen in the Philippines from 1998-2020 from the 2 articles from the Philippines and the GRSG's database.
Discussion: Lack of awareness on the disease, distant centers, expensive service and cultural unacceptability of treatment were the commonly cited reasons for late consult. However, non-standardized and poor clinical reporting and monitoring, and non-standardized treatment protocols were also contributory to the low survival rates. The current management outcomes of retinoblastoma from the four countries are alarmingly below par with developed countries, India and China.
Conclusion: Although advances had been made in the management of retinoblastoma, delay in consultation which often leads to advanced disease was still common. This contributes to low survival rates in the four countries.

Introduction

A scoping review of articles that described the clinical features, treatment and outcomes of retinoblastoma patients from Pakistan, Indonesia, Bangladesh and the Philippines published from 2009 to 2021 was done. Searches were done using the terms "retinoblastoma", "clinical features", "treatment" and "outcomes", "Pakistan", "Indonesia", "Bangladesh" and "Philippines" in different combinations. Aside from Pakistan, the search returned minimal results from the Pubmed,

EMBASE, Scopus, Science Direct, Google scholar and Web of Science databases. As such, regional and local databases as well as unpublished data were also explored. Articles based on the country's national cancer registries without sufficient data on the clinical data of retinoblastoma patients were excluded. Some articles with data on clinical presentation but no data on treatment and outcomes were still included. Seven articles from Pakistan, eight from Indonesia and two from the Philippines were included in the analysis. To supplement missing data from Bangladesh and insufficiency of patients from Indonesia and the Philippines, a descriptive analysis was added using the database made publicly available by the Global Retinoblastoma Study Group [2]. The database contains clinical features of 4351 retinoblastoma patients seen in 2017 from 153 countries. Percentage, mean, median and standard deviation were computed using Microsoft Excel Ver. 3 2013 (Microsoft Corp.; Redmond, Washington USA).

Results

Pakistan

There were 696 retinoblastoma patients involving at least 859 eyes seen in Pakistan from 1997 to 2018 and included in the 7 articles reviewed (Table 1).

Clinical Features	Islamet al., 2013 [3]	Khanet al,. 2013 [4]	Kalsoomet al., 2015 [5]	Zafaret al., 2016 [6]	Adhiet al., 2018 [7]	Mianet al., 2019 [8]	Zia et al., 2020 [9]
Duration	2006-2009	2006-2011	-	2011-2014	1997-2012	2016-2018	2013-2017
Location	Al-Shifa Trust Eye Hospital, Rawalpindi	Mayo Hospital, King Edward Medical University, Lahore	Lahore General Hospital, Lahore	Al-Shifa Trust Eye Hospital, Rawalpindi	Dow University of Health Sciences Karachi	Lahore General Hospital, Lahore	The Indus Hospital, Karachi
Child/Eye	139/177	52/67	70/-	28/30	295/403	19/19	93/-
Mean age at consult (in months)	24±10	42±20	18	20±20	36±28	-	-
	(6-50)	-	(2-84)	-	-	12 (12-24)	30 (18-42)
Median delay (in months)	-	-	-	-	-	-	4 (1-12)
Sex							
Male	68 (49%)	20 (38%)	44 (63%)	11 (39%)	169 (57%)	12 (63%)	32 (34%)
Female	71 (51%)	32 (62%)	26 (37%)	17 (61%)	126 (43%)	7 (37%)	61 (66%)
Laterality							
Unilateral	101 (72%)	37 (71%)	38 (54%)	2 (7%)	187 (63%)	5 (26%)	55 (59%)
Bilateral	38 (28%)	15 (29%)	32 (46%)	26 (93%)	106 (37%)	14 (74%)	34 (36%)
Trilateral	0	0	0	0	0	0	4 (5%)
Family History	7 (5%)	-	13 (18%)	-	22 (8%)	-	-
Involvement							
Intraocular	177†	-	-	30	245 (60%)	19†	55 (59%)
Extraocular	-	-	-	-	79 (20%)	-	40 (41%)
Unknown	-	-	-	-	79 (20%)	-	0
Leukocoria	78 (44%)	20	-	-	173 (59%)	13 (68%)	-61%
ICRB					IIRC		
A	6 (3%)	-	-	-	13 (3%)	2	-
B	14 (8%)	-	-	-	19 (5%)	3	-
C	12 (7%)	-	-	-	25 (6%)	9	-
D	10 (6%)	-	-	-	78 (20%)	2	-
E	135 (76%)	-	-	-	187 (46%)	3	-
Unknown	0	-	-	-	79 (20%)	0	-

Table 1. Clinical Features of Retinoblastoma Patients from Pakistan.

ICRB, International Classification of Retinoblastoma; IIRC, International Intraocular Retinoblastoma Classification; †, Assumed intraocular based on available IIRC grouping

The mean age at consult ranged from 24 to 42 months. Median delay in consultation from a series was 4 months [9]. Both genders were equally affected. Sixty-one percent of the patients had unilateral disease and 6% had family history of retinoblastoma. Retinoblastoma was intraocular in at least 526 (61%) eyes with 322 belonging to ICRB group E. Extraocular extension was present in at least 17% of the patients. Leukocoria remained the most common presenting symptom at 49%. However, fungating mass or proptosis as presenting symptom was also high, at 22% in one series [3].

Only four articles had data on treatment and outcomes [3,7-9]. Parents of 45 patients refused treatment. In unilateral International Classification of Retinoblastoma (ICRB) group A and B, laser photocoagulation or cryotherapy was performed based on the location of the mass [3]. In bilateral Group A, patients also received systemic chemotherapy with local therapy for the fellow eye with worse ICRB grouping [3]. Local therapy which included laser and cryotherapy was done in 15 eyes. For unilateral group E eyes, primary enucleation was offered [3]. Exenteration was done for orbits with extraocular involvement [3]. Enucleation was done in 319 eyes while exenteration was done in 24 orbits. There was no data on high-risk histopathologic characteristics of enucleated eyes. Systemic chemotherapy was the most commonly given treatment for 437 patients (Table 2).

Treatment	Islam et al., 2013 [3]	Adhi et al., 2018 [7]	Mian et al., 2019 [8]	Zia et al. 2020 [9]
Duration	2006-2009	1997-2012	2016-2018	2013-2017
Child/eye	139/177	295/403	19/19	93/
Denial of any treatment (child)	17 eyes	28	-	-
Local therapy (laser, cryotherapy)	-	-	15	-
Primary Enucleation	112	164	-	43 (46%)
Secondary Enucleation	-	type NS	-	-
Exenteration	12	12	-	-
Systemic Chemoreduction	105	238	19	75 (81%)
Adjuvant Chemotherapy	-	Type NS	-	-
Intravitreal Chemotherapy	-	-	10	-
Intraarterial Chemotherapy	-	-	3	-
Primary EBRT	0	-	-	-
Adjuvant EBRT	2	-	-	27 (29%)
Median follow-up period (in month)	19 ± 18	3 (1-36)	-	-
Globe salvage	36 (22%)	-	-	-
ICRB A	-	-	2 (100%)	-
ICRB B	-	-	2 (66%)	-
ICRB C	-	-	4 (44%)	-
ICRB D	-	-	0/2	-
ICRB E	-	-	0/3	-
Lost to ff-up	23	190 (64%)	1	
Alive	92 (66%)	67 (23%)	19 (100%)	60 (64%)
Recurrence	0	37 (13%)		

Expired	22	10 (3%)		33

Table 2. Treatment of Retinoblastoma Patients from Pakistan.

EBRT, External Beam Radiotherapy; ICRB, International Classification of Retinoblastoma; NS, Not specified

For chemotherapy, intravenous vincristine, etoposide and carboplatin were given 3 to 4 weeks for six cycles for mass reduction [3]. Eight cycles were given for bilateral and advanced cases [3]. Additional external beam radiotherapy was given in cases that were not controlled with chemotherapy and local therapy or those with optic nerve involvement or extrascleral involvement [3]. The average follow-up period was 3 to 19 months. Globe salvage rate was 100% for group A, 66% for B and 44% for C. Survival rate ranged from 23 to 66% (Table 2).

Indonesia

There were 617 retinoblastoma patients involving at least 677 eyes seen in Indonesia from 2003 to 2018 and included in the 8 articles reviewed and the Global Retinoblastoma Study Group (GRSG) database (Table 3) [2].

Clinical Features	Asihet al., 2009[10]	Soebagjo et al, 2013[11]	Rahman, 2014[12]	Miranda et al. 2018[13]	Yuliawati et al., 2018[14]	Hadiman et al, 2019[15]	Naimatuningsih et al, 2019[16]	GRSG, 2020[2]	Handayani et al. 2021[17]
Duration	2004-2007	2010-2012	2003-2012	2011-2016	2014-2017	2014-2016	2018	2017	2011-2016
Location	Cipto Mangunkusumo Hospital, Jakarta	Dr. Soetomo General Hospital, Surabaya	Dr. M. Djamil Hospital, Padang	Adam Malik Hospital, Medan	Sanglah General Hospital, Denpasar	Dr. Hasan Sadikin General Hospital, Bandung	Dr. Soetomo General Hospital, Surabaya	Notspecified	Dr Sardjito Hospital, Yogyakarta
Children/ Eyes	64/84	44/-	99/-	91/91	20/-	46/-	33/-	159/199	61/-
Mean Age at consult(in months)	-	45	-	-	36±32	-	-	28±16	33
Median (range)	105	151	-	132	137	(3-130)	-	-	28 (3-130)
Sex									
Male	34 (53%)	27 (61%)	56 (57%)	46* (50%)	10 (50%)	28 (61%)	17 (52%)	84 (53%)	34 (56%)
Female	30 (47%)	17 (39%)	43 (43%)	45 (50%)	10 (50%)	18 (39%)	16 (48%)	75 (47%)	27 (44%)
Laterality									
Unilateral	44 (69%)	38 (86%)	76 (77%)	91	18	39 (85%)	29 (88%)	119 (75%)	36 (59%)
Bilateral	20 (31%)	6 (14%)	23 (23%)	0	2	7 (15%)	4 (12%)	40 (25%)	11 (18%)
Unknown	0	0	0	0	0	0	0	0	14 (23%)
Family History	-	1	-	0	0	0	-	1 (1%)	2 (3%)
Involvement									
Intraocular	6 (7%)	12 (27%)	-	18 (20%)	12 (60%)	-	20 (61%)	117 (59%)	18 (30%)
Extraocular	78 (93%)	32 (73%)	65 (66%)†	73 (80%)	8 (40%)	-	13 (39%)	71 (36%)	25 (41%)
Unknown	0	0	34	0	0	46	0	11 (5%)	18 (29%)
Leukocoria	60 (71%)	-	32 (32%)**	13 (22%)	-	25 (54%)	30	108 (54%)	52 (86%)
IRSS	MCS			RES			RES		
0	-	0	-	I-20	0	-	I-0	43 (22%)	1

1	-	6 (14%)	-	II-0	0	-	II-6	50 (25%)	↓
2	44	6 (14%)	-	III-1	10	-	III-0	4 (3%)	21
3	↓	27 (61%)	-	IV-70	↓	-	IV-3	46 (23%)	↓
4	14	5 (11%)	-		↓	-	V-11	20 (11%)	28
Unclassified	-	0	-		9	-		32 (16%)	-

Table 3. Clinical Features of Retinoblastoma Patients from Indonesia.

GRSG, Global Retinoblastoma Study Group; IRSS, International Retinoblastoma Staging System; MCS, Modified Classification System; RES- Reese-Ellsworth System; *assumed since the articles mentioned 1:1 ratio of gender distribution & yet total number of patients included were 91; **not the most common presenting symptom; † assumed based on the presence of proptosis

The mean age at consult ranged from 28 to 45 months with the 12-36 months age group most commonly affected [18]. Patients who were more than 5 years old were high at 6 (13%) in one series [15]. Median delay of consultation in a series was 12 months (0-60) [17]. Delay in consultation was primarily from socioeconomic reasons followed by lack of awareness of the disease and need for early intervention [12]. Slightly more males were affected at 54%. Seventy-nine percent had unilateral disease. Presence of family history was low at 0.6% attributed to the low over-all survival rate of retinoblastoma patients and not being able to produce offspring. Retinoblastoma was intraocular in 43% of the eyes while extraocular extension was present in 54%. The lowest proportion of extraocular disease in a series was 36% while the highest was at 93% [2,10]. Leukocoria remained the most common presenting symptom at 47%. However, two series had significant proportion of patients presenting with proptosis [10,12]. One article even had proptosis as the most common presenting symptom in 66% of the patients [12]. Thirty-two percent of the eyes had orbital disease while 12% had distant metastasis (Table 3). Calcification was found in the imaging of 92% of the patients [10].

Only five articles have data on treatment. Rahman’s series had the same amount of enucleated eyes and exenterated orbit (Table 4) [12].

Treatment	Rahman, 2014 [12]	Mirandaet al., 2018 [13]	Yuliawatiet al., 2018 [14]	Hadimanet al., 2019 [15]	Handayaniet al., 2021 [17]
Child/Eye	99/-	91/91	20/20	46/-	46
Denial of any treatment (child)	16	-	-	-	-
Globe salvage procedures (eye)	-	-	-	-	-
Enucleation	35	22	20	-	35
Exenteration	36	1	-	-	-
Primary Chemotherapy	11	53 type NS	20 type NS	46 type NS	11
Adjuvant Chemotherapy	55	-	-	-	30
Primary radiotherapy	1	-	-	-	-
Adjuvant radiotherapy	5	-	-	-	-
High-Risk Histologic Characteristic requiring adjuvant treatment	-	-	10-11*	-	-

Table 4. Treatment of Retinoblastoma Patients seen in Indonesia.

NS, Not specified; *Based on the number of eyes with scleral invasion

However, systemic chemotherapy was the most commonly used treatment option followed by enucleation. For chemotherapy, Miranda et al. used different chemotherapy regimens: Carboplatin alone, Carboplatin + Etoposide, Carboplatin + Vincristine, Carboplatin, Etoposide and Vincristine (VEC), and Methotrexate [13]. The VEC protocol was given for 6 cycles by Handayani et al. even after primary enucleation of intraocular disease [17]. For those with regional extension, the Retinoblastoma 2002 Grabowski- Abramson (GA) II/III Protocol was followed where after primary enucleation was done, 105 weeks of vincristine, methotrexate, doxorubicin and cyclophosphamide were given [17]. For metastatic disease, GA IV Protocol was used instead where cytarabine and etoposide were added to GA II/III Protocol [17]. The most common side-effect noted from chemotherapy was anemia found in 70% of the patients [15]. However, 15% had anemia already prior to the chemotherapy [15]. A baseline blood profile test was then recommended [15].

Only one article has data on survival rate which was at 20% [17]. Treatment refusal was present in 16% which was attributed to lack of parents' understanding of the disease. Other identified reasons included preference for a cheaper alternative medicine or that the patient was too young to undergo surgery [17]. Treatment abandonment was high at 40% while 20% had disease progression or relapse and the remaining 20% were documented dead [17]. Inadequacy in monitoring of treatment response was also cited to affect survival rate [13]. Younger age at diagnosis was associated with less disease relapse ($p<0.01$) and better survival ($p<0.006$). Monitoring of current status of the patient was difficult since most came from remote areas and were only able to stay in the area where the hospital was located for 1-2 weeks [13]. Educational level of parents was not statistically not associated with prognosis [16]. However, income level of the family ($p<0.03$) and the occupation status of the father ($p<0.03$) were significantly associated with prognosis [16].

Bangladesh

There were 161 retinoblastoma patients involving 221 eyes identified in the descriptive analysis of the GRSG's database [2]. The mean age at consult was 30 months with no data on delay of consult. More males were affected than females at 57%. Sixty-three percent had unilateral disease with 4% having family history of retinoblastoma. Retinoblastoma was intraocular in 81% of eyes while extraocular extension was present in 19%. Leukocoria remained the most common presenting symptom at 81%. Five percent of the eyes had orbital disease while 3% had distant metastasis (Table 5).

Clinical Features	Noguera et al., 2011 [18]	GSRG, 2020 [2]	Tan and Buyucan, 2021 [19]
	1998-2008	2017	2005-2020
	PGH, Manila	Not specified	BGHMC, Baguio
Children/Eyes	152/209	27/35	47/53
Mean age at consult (in months)	24±14	33±18	24±18
Median (range)	-		
Delay of consult			9±8
Unilateral	9±6	-	10±8
Bilateral	6±7	-	4±6
Sex			
Male	78 (51%)	19 (70%)	29 (62%)
Female	74 (49%)	8 (30%)	18 (38%)
Laterality			
Unilateral	95 (62%)	21 (78%)	41 (87%)
Bilateral	57 (38%)	6 (22%)	6 (13%)

Family History	10 (7%)	2 (8%)	2 (4%)
Leukocoria	117 (77%)	24 (68%)	33 (62%)
Involvement			
Intraocular	176 (84%)	10 (28%)	29 (55%)
Extraocular	33 (16%)	25 (72%)	24 (47%)
ICRB			
A	11 (5%)	-	-
B	10 (5%)	-	-
C	11 (5%)	-	-
D	17 (8%)	-	-
E	127 (61%)	-	-
Extraocular	33 (16%)	-	-
IRSS			
0	-	0	0
1	-	20	22 (47%)
2	-	0	6 (13%)
3	-	7	9 (19%)
4	-	8	6 (13%)
Unknown		-	4 (8%)

Table 5. Clinical Features of Retinoblastoma Patients from Philippines.

ICRB, International Classification of Retinoblastoma; IRSS, International Retinoblastoma Staging System; PGH, Philippine General Hospital; BGHMC, Baguio General Hospital and Medical Center

For International Retinoblastoma Staging System (IRSS), 78 (35%) eyes were stage 0, 88 (41%) eyes were stage 1, 25 (11%) eyes were stage 2, 10 (5%) eyes were stage 3, 6 (3%) were stage 4 and 13 (6%) were unclassified. There was no data on treatment and outcomes.

Philippines

There were 226 retinoblastoma patients involving 297 eyes seen in the Philippines from 1998 to 2020 from the 2 articles from the Philippines and the GRSG's database (Table 5) [2]. The mean age at consult ranged from 24 to 33 months with delay of consult from 4 to 10 months. Patients with unilateral disease were significantly older at initial symptom ($p<0.001$) and at consultation ($p<0.001$) than those with bilateral disease [18,19]. The mean delay at consultation was also longer in patients with unilateral disease ($p<0.03$) [18,19]. Financial constraint and misdiagnosis were the reasons for the delay [18]. More males were affected at 56%. Sixty-nine percent had unilateral disease. Almost 60% of patients with bilateral disease only initially presented with symptom in one eye with one patient even manifesting symptom on the fellow eye only after 4 months [18]. Family history of retinoblastoma was present in 8% of the patients. Retinoblastoma was intraocular in 215 (76%) eyes with at least 147 ICRB Grade D and E. Leukocoria remained the most common presenting symptom at 58%. For IRSS, at least 42 patients were stage 1 and 6 were stage 2. At least 16 patient had extraocular disease while at least 14 had metastatic disease.

Only one article had data on treatment and outcomes [19]. Of the 53 eyes, one eye of a bilaterally affected patient was managed conservatively with laser photocoagulation and systemic chemotherapy in a different institution while one eye had regressed retinoblastoma. Forty-two eyes underwent enucleation and 1 underwent exenteration. Eight eyes were not treated due to refusal. Of the 47 patients, 23 were advised to receive chemotherapy, either as primary or adjuvant treatment. Only 7 completed recommended number of cycles. The over-all survival rate was 57% for a mean follow-up period of 24±24 months [19]. There was no difference in the survival rate

based on laterality of disease (p=0.89) and sex [19].

Discussion

This review determined the clinical features, treatment options used and outcomes of retinoblastoma patients seen in four South Asian countries with high retinoblastoma incidence. In Pakistan, mean age of presentation was late compared to developed countries [7]. The mean age of presentation in Pakistan for patients for bilateral disease, which is generally earlier compared to those with unilateral disease, was almost equivalent to the mean age of patients with unilateral disease in developed countries [7]. Although there was no over-all sex preponderance, a series had 63% male in its population which was attributed to preferential treatment in health care [5]. Detection of mutation in the *RB1* gene among Pakistanis was cited as a promising tool for early detection [5]. Although leukocoria remained the most common presenting symptom, proptosis which is indicative of advanced disease was also common [7,9]. I intraocular Group E, extraocular extension or metastatic disease was common at initial presentation and was associated with delay in consultation [7,9]. Delay in presentation had been attributed to lack of knowledge on the severity of the disease and lack of access to proper and affordable eye care [7]. Similarly, resorting to alternative medicine after being diagnosed and advised on management, monitoring and prognosis can further the delay in treatment [3]. Recurrence rate was found high in a series which was attributed to a “fragmented” management where some patients already underwent enucleation in another institution but were managed post-surgically in another without proper coordination [9]. These all result to low survival rate and maintain the goal of management to life saving rather than globe salvage [3]. Although systemic chemotherapy was the most used treatment option, there are centers which already offer intraarterial and intravitreal chemotherapy, albeit expensive, and registered globe salvage in eyes with Group A to C intraocular disease [8].

In Indonesia, mean age of presentation was also late compared to developed countries [12,13]. In two series, there were two to three times more patients presenting with proptosis than leukocoria which resulted to an equal amount of exentration and enucleation done [12,13]. High risk features (HRF) were found in all enucleated eyes in a series and majority of them had more than one HRF [14]. Extraocular disease was attributed to delay in consult from lack of awareness of the disease and access to affordable eye care [12]. Travel to centers with capability to manage retinoblastoma was lengthy and expensive and almost half of the patients do not have insurance coverage [17]. In addition, there was also inadequacy of management including monitoring of treatment response either as a result of poor medical documentation or poor patient follow-up [13,17]. Resorting to alternative medicine or waiting for the condition to get worse even after being advised treatment further contributed to low survival [16]. There was a series where there were no records on the disease classification making it hard to determine which indication and treatment modality were used [13]. Another series used of multiple treatment regimens [17].

In the Philippines, mean age at presentation of those with bilateral disease was also earlier than those with unilateral disease [18,19]. Proptosis, a presenting sign indicative of extraocular extension, decreased overtime [18]. Although the mean delay at consult decreased overtime, 65% of patients still had lag time of more than 3 months [18]. Performing complete and proper ophthalmologic examination of both eyes was emphasized since more than half of patients with bilateral disease presented with only unilateral symptoms [18]. Monitoring of the disease was similarly emphasized since one patient with bilateral disease developed the disease in the other eye only after four months. Extraocular disease was still high [18,19]. Treatment refusal and abandonment were also common [19]. Although the reported survival rate in the country was low at 53%, an improvement was noted after advancement in surgical technique, determination of choroidal involvement in histologic study, and revisions in the chemotherapeutic regimen used were implemented [19].

Bangladesh registered the lowest proportion of patients with extraocular disease among the four countries. However, it is the only country without any published article on retinoblastoma alone. As such, there is no data on how retinoblastoma is being treated in the country and the outcomes of the treatment.

Common among the four countries were the older mean age of presentation and the longer delay compared to developed countries and even to India and China [20,21]. These can partly explain the significant proportions of extraocular disease and low survival rates. Lack of awareness on the fatality of the disease, distant eye care centers, expensive medical service and stays in the hospitals and cultural unacceptability of treatment and prognosis were the commonly cited reasons for late consult, treatment refusal and abandonment. However, non-standardized and poor clinical reporting and monitoring of the disease in terms of classification and staging as well as non-standardized treatment regimens or protocols were also contributory to low survival rates. Although there are centers already offering newer treatment modalities such as intraarterial chemotherapy, the progress in terms of treatment was not equitable based on the absence of standard treatment protocols in some of the countries. Bangladesh does not even have a dedicated article on retinoblastoma. The current management outcomes of retinoblastoma from the four countries are alarmingly below par with developed countries, India and China considering their high incidence of the disease [20,21]. To address these, community awareness on the disease has to be increased thru public health education drive, integration of leukocoria screening at birth and vaccination visits, training of primary health worker to recognize these symptoms and of multidisciplinary teams to handle advanced diseases and the creation of effective and affordable referral system anchored in well-equipped and properly-trained personnel and updated patient database [9,17].

In conclusion, although advances had been made in the management of retinoblastoma, delay in consultation which often leads to advanced disease was still common. This contributes to low survival rates in the four countries.

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