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Pathology Section

Spectrum of Orbito-ocular Tumour in India: Histopathological and Immunohistochemical Study

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ABSTRACT

Introduction: Orbito-ocular tumours are an important cause of morbidity and mortality. Their incidence is low but requires immediate diagnosis and treatment. There are limited research studies on histopathological and immunohistochemical studies of ocular tumour from India and these studies may provide valuable information and aid in accurate diagnosis and management.

Aim: To elucidate distribution of age, sex, location of tumour, histopathological, immunohistochemical findings and any other relevant information with respect to orbito-ocular tumours.

Materials and Methods: A retrospective observational analysis was conducted over a period of five years from March 2008 to February 2013, in the Department of Pathology in a tertiary care centre, Assam, India. Hospital records of 55 patients with malignant ocular tumours were collected, reviewed and statistically analysed.

Results: In the present study, a total of 55 cases were included. Out of which, two cases were inconclusive due to inadequate material. Remaining, 53 cases included both intraocular and orbital malignant tumours. Tumours were found slightly more in males (34 cases) compared to females (19) with a ratio of 1.8 to 1. Squamous Cell Carcinoma (SCC) comprised the maximum number (16 cases) followed by Retinoblastoma (RB) in 15 cases and melanoma in 11 cases. In children most common malignancy was RB followed by rhadomyosarcoma (RMS).

Conclusion: In this study it was found that SCC was the most common malignant tumour in adults whereas RB was the most common tumour in children.

Keywords: Eye, Immunohistochemistry, Melanoma, Retinoblastoma, Squamous cell carcinoma

INTRODUCTION

Orbito-ocular tumours are an important cause of morbidity and mortality [1]. Incidence of ocular tumours is relatively low but requires immediate diagnosis and treatment. As per American Cancer Society's estimate in US for 2021, 3,320 new cancers of the eye and orbit were reported (1750 in men and 1570 in women) with 400 deaths (220 in males and 180 in females) [2]. The reported incidence of eye globe tumours is different in many countries showing regional difference in the prevalence of intraocular and orbital tumours [3-7]. For example, studies have shown that RB is more common than melanoma in Singapore whereas melanoma is seen to be the most common tumour in New York [5,8].

Among childhood malignant tumours in eye, most common intraocular malignant tumour was found to be RB while most common malignant orbital tumour being RMS [9]. Retinoblastoma accounts for 2% of childhood cancers, however it is not very rare in India [10,11]. Intraocular neoplasm poses an important challenge both to the clinician as well as pathologist, particularly due to some non-neoplastic mimickers such as retinal detachment that may clinically simulate ominous tumours and unnecessary enucleation in these cases may be performed. Preoperative biopsy plays an important role in diagnosis.

Therefore, any data obtained from different kind of biopsy specimen of suspected ocular and orbital tumour will provide valuable information and aid in accurate management.

To best of our knowledge, there are limited research studies on histopathological and immunohistochemical studies of ocular tumour from India. Therefore, the authors decided to conduct a five year retrospective study to analyze various morphological patterns of malignant oculo-orbital tumour in India based on histopathology with an adjunct of Immunohistochemistry (IHC).

The present study was conducted to elucidate distribution of age, sex, location of tumour, and histopathological and immunohistochemical findings and any other relevant information. This may help in early timely detection of new cases and their proper management.

MATERIALS AND METHODS

A retrospective study of hospital records of the patients with ocular tumours subjected to histopathological analysis over a period of five years from March 2008 to February 2013 was carried out in Department of Pathology, Tertiary care centre, Assam, India. All retrievable data and histopathological slides of all the ocular and orbital tumours for a period of five years were reviewed and IHC was performed wherever required for definitive diagnosis.

Inclusion criteria: Study included preoperative biopsy and enucleation specimens of clinically suspected cases with ocular malignancy. Patients of all age groups and both the sexes were included.

Exclusion criteria: All Inflammatory lesions and benign tumours were excluded from study. Two cases of clinically suspected RB were reported as endophthalmitis on histopathological examination and were excluded from study.

All available clinical and epidemiological data including chief complaint, previous significant history, age, sex, location of tumour etc. were retrieved from the hospital and laboratory records.

STATISTICAL ANALYSIS

The data was entered in MS Excel and percentage was calculated.

RESULTS

In the present study, a total of 55 cases were included. Out of which two cases were inconclusive due to inadequate material. Remaining 53 cases included both intraocular and orbital malignant tumours. Tumour types, location, relative frequency is presented in [Table/Fig-1]. Tumours were found slightly more in in males (34 cases) compared to females (19) with a ratio of 1.8 to 1. Age of patients ranged from 3-65 years. Age distribution is shown in [Table/Fig-2].

Tumour type	Number (%)	Sex		Location
		Male	Female	
Squamous cell carcinoma	16 (30.2%)	10	6	Eyelid (4 cases), Conjunctiva (12 cases)
Melanoma	11 (20.8%)	6	5	Conjunctiva (5), Choroid (6)
Retinoblastoma	15 (28.3%)	10	5	Retina
NHL	3 (5.6%)	3	0	Orbit
Rhadomyosarcoma	3 (5.6%)	2	1	Orbit
Ewing sarcoma/PNET	2 (3.8%)	2	0	Orbit
Hemangiopericytoma	2 (3.8%)	1	1	Orbit
Basal cell carcinoma	1 (1.9%)	0	1	Eyelid

[Table/Fig-1]: Number, sex and site distribution (N=53).
PNET: Primary neuroectodermal tumours; NHL: Non-hodgkin's lymphoma

Tumour type	Age range (years)							No. of cases
	01-10	11-20	21-30	31-40	41-50	51-60	>60	
Retino-blastoma	15							15
Squamous cell carcinoma					4	7	5	16
Melanoma					4	4	3	11
NHL		1	1	1				3
RMS	3							3
ES/PNET		2						2
Hemangio-pericytoma					2			2
Basal cell carcinoma						1		1

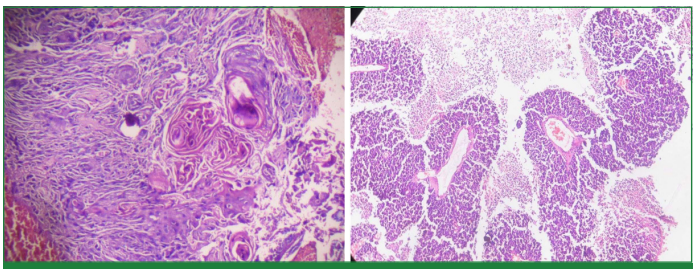
[Table/Fig-2]: Distribution of tumours according to age [N=53].
ES: Ewing's sarcoma

Immunohistochemical staining pattern of ocular tumours is shown in [Table/Fig-3].

Type of tumour	IHC
Melanoma	HMB45 positive
NHL	CD 20, Bcl2 positive
RMS	SMA positive
ES/PNET	CD99, FLI-1 positive
Hemangiopericytoma	CD34 positive

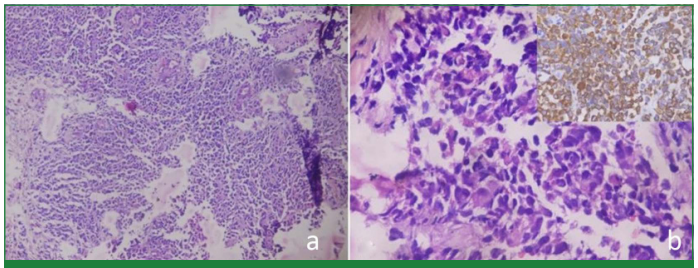
[Table/Fig-3]: Immunohistochemical staining pattern of ocular tumours.

Out of 53 cases, squamous cell carcinoma comprised the maximum number (16 cases), arising from conjunctiva followed by eyelid [Table/Fig-4]. Most common childhood tumour was found to be RB [Table/Fig-5] followed by RMS originating from soft tissue of orbit [Table/Fig-6].

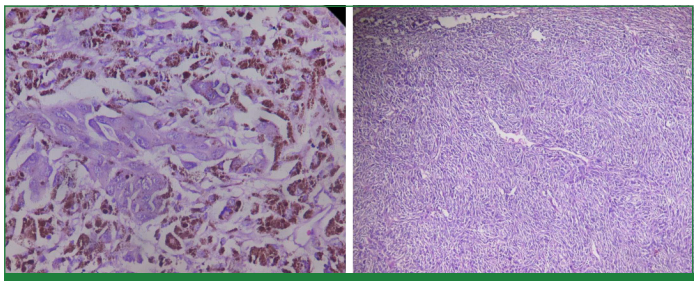


[Table/Fig-4]: Squamous cell carcinoma (H&E 100X).
[Table/Fig-5]: Retinoblastoma (H&E 100X). (Images from left to right)

Melanoma was the second most common malignant tumour originating from choroid and conjunctiva [Table/Fig-7]. Conjunctival biopsy was the most common biopsy site in this study. Preoperative diagnosis of squamous cell carcinoma was confirmed in 12 cases, remaining five cases were diagnosed as melanoma with IHC (HMB45 as an adjunct tool). One case of junctional nevus was also reported which is excluded from this study. Two cases of hemangiopericytoma were found in age group 40-50 years [Table/Fig-8].

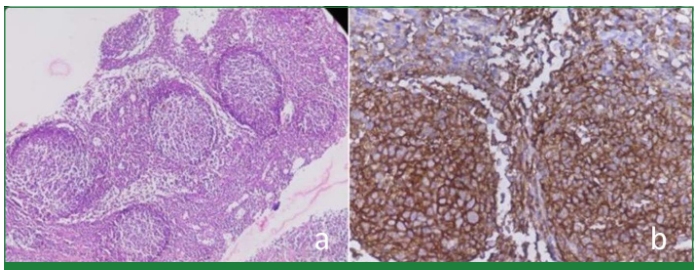


[Table/Fig-6]: a) RMS (H&E 100X); b) RMS (H&E 400X). Inset showing myogenin positivity.

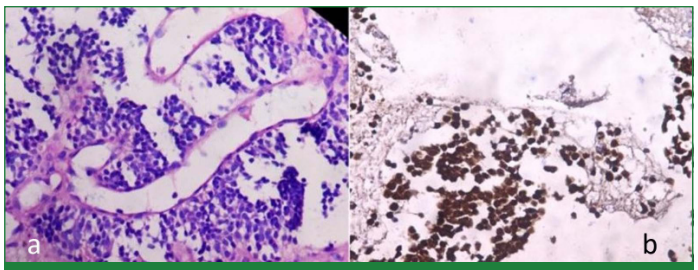


[Table/Fig-7]: Melanoma (H&E 400X).
[Table/Fig-8]: Haemangiopericytoma (H&E 100X). (Images from left to right)

Enucleation was performed on 18 children with suspicion of intraocular malignancy. Out of these 15 cases reported as retinoblastoma. Remaining two cases were reported as chronic opthalmitis and one case showed intraocular hemorrhage due to globe rupture and was excluded from study. Other tumours in children were comprised of non-hodgkin lymphoma [Table/Fig-9] and rhabdomyosarcoma (3 cases). The IHC was performed in all such cases. Two cases of Ewing sarcoma/PNET were confirmed on IHC with positivity for Friend Leukaemia Integration (FLI) transcription factor [Table/Fig-10].



[Table/Fig-9]: a) Follicular lymphoma (H&E 100X); b) The IHC with Bcl2 (400X).



[Table/Fig-10]: a) Small round cell tumour (H&E 400X); b) The IHC (positive for FLI) Ewing sarcoma / PNET (400X).

Cumulating all conjunctival, choroid, orbit, globe and eyelid specimens, most common histological diagnosis were squamous cell carcinoma (16 cases) followed by retinoblastoma in 15 cases and melanoma in 11 cases. In children most common malignancy was retinoblastoma followed by rhadomyosarcoma.

DISCUSSION

Malignant ophthalmic neoplasm are an important cause of morbidity and mortality. These tumours show geographical variations. There

are limited studies on ocular tumours. Present study was carried out to know profile of malignant orbito-ocular tumour in India.

In the present study, male outnumbered female subjects which is similar to previous studies carried out on ocular tumours [12,13]. However, Kumar R et al., in their study in Nepal showed a female predominance [14].

The study expressed a bimodal age pattern with one peak in 1st decade of life and another peak in 4th to 6th decade. This finding is close to other reports [8,14,15]. A high percentage of malignant ophthalmic tumour was observed in paediatric age group due to retinoblastoma which constituted highest number of cases (15, 28.3%) of all tumours in children. Second peak was seen due to highest number of cases of SCC and melanoma in that age group. This finding was similar to finding of Das D et al., in India and Akpe BA et al., in Nigeria [10,12]. In adults, SCC was the most frequently seen ocular malignancy followed by melanoma, conjunctiva being the most common site. This finding was similar to studies by Das D et al., Somroo T et al., and Kumar R et al [10,14,15]. However, in Singapore and Nepal most common tumour reported in adults were melanoma and basal cell carcinoma respectively [5,16]. Kaliki S and Das AV in a study of 9633 patients from a referral centre in India, found that retinoblastoma was the most common tumour encountered [17].

Among the orbital tumours, NHL and RMS were the most common malignancy constituting 5.6% of the total cases. This finding was in agreement with previous study by Akpe BA et al., [12]. In Benin city and western part of Nigeria, lymphoma was found to be most common orbital tumour following retinoblastoma [12,18]. In a study of 372 tumours of ocular adnexa and orbit in Japan, Shimizu N. et al., reported that malignant lymphoma is major malignant neoplasm [19]. Das D et al., also concluded NHL as most common orbital malignancy [13].

Limitation(s)

Preoperative biopsy may not be confirmatory in all cases as two cases were misdiagnosed as squamous intraepithelial lesion and nevus respectively which were found to be SCC and melanoma on postoperative sample. This may be due to unrepresentative sample. Another limitation is that sample size is small to detect the trend of each malignancy. In future, larger multicentre data analysis including benign lesions may help in better understanding of distribution of oculo-orbital lesions and overcome avoidable blindness in India.

CONCLUSION(S)

The present study helps in analysing geographic variation and various histomorphological pattern of orbito-ocular tumour in this part of the globe and may also help ophthalmologist in early diagnosis and shaping the management strategy.

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