Research Article ISSN 2689-1085

Journal of Pediatrics & Neonatology

Rare Childhood Cancer Burden in a Tertiary Care Hospital of Dhaka, Bangladesh

Ghosh AK[1], Diba F[2], and Vu T[3]

[1]*Assistant Professor, Department of Paediatric Haematology and Oncology, National Institute of Cancer Research and Hospital, Bangladesh.*

[2]*Registrar, Department of Paediatric Haematology and Oncology, National Institute of Cancer Research and Hospital, Bangladesh.*

[3]*WHO country Office. Caicoli. Dili. East-Timor.*

***Correspondence:**
Ashis Kumar Ghosh, Assistant Professor, Department of Paediatric Haematology and Oncology, National Institute of Cancer Research and Hospital, Bangladesh. Email. ashiskumarghosh@gmail.com.

Received: 01 November 2021; **Accepted:** 29 November 2021

Citation: Ghosh AK, Diba F, Vu T. Rare Childhood Cancer Burden in a Tertiary Care Hospital of Dhaka, Bangladesh. J Pediatr Neonatal. 2021; 3(4): 1-8.

ABSTRACT

Background: *Accurate childhood cancer burden data are crucial for resource planning and health policy prioritization. In Bangladesh we have no national population based cancer registry. Data about the total burden of childhood cancer in our country is unknown. But a hospital based cancer registry is the cheapest way to assess the tumor burden of a nation. So we investigate the total pediatric cancer burden and the percentage of different types of rare childhood cancers (RCC) of National Institute of Cancer Research and Hospital (NICRH), Dhaka, during the year 2014 – 2018.*

Aim: *To investigate the total number of pediatric cancers, frequency of different types of rare cancer and percentage of rare childhood cancer in the Pediatric Hematology and Oncology (PHO) department.*

Methods: *Data were collected from all pediatric (0-17 years) patients between the year 2014 and 2018 prospectively. Definitive diagnosis of cases were established by histopathological and or immunohistochemical study. As we have no population-based cancer registry, we considered the rare tumors in our study according to the Children's Oncology Group (COG) and the German Childhood Cancer Registry (GCCR).*

Results: *Total number of childhood cancers and RCC was 2242 and 351 respectively. Percentage of rare tumors was 15.66% in our center. Benign rare tumors were 18.52% (N-65) cases. Common age group was the 5-9 years group (54.13 %). Most common RCC groups were Non-Rhabdomyosarcoma soft tissue sarcoma (NRSTS) constituting 49.29 %, followed by Malignant epithelial neoplasms and melanomas (38.18%). Diagnostic delay was 3.52 months. Most common malignancy was Synovial Sarcoma (N-40, 11.39%), Peripheral Neuroectodermal Tumor (N-39, 11.11%), Nasopharyngeal carcinoma (N-35, 9.97%), Malignant small round cell tumor (N-31, 8.83%) and Carcinoma rectum and colon (N-23, 6.55%).*

Conclusion: *We have found that our Institutional (NICRH) rare tumor rate (15.66%) was a bit higher than US national RCC (15%). Though Institutional cancer data reflect the national burden, to estimate the accurate number and percentage of RCC, National Cancer Registry is needed.*

Keywords

Rare Childhood cancer burden, Rare childhood cancer, Non-rhabdomyosarcoma soft tissue sarcoma.

Introduction

The World Health Organization mentioned that the burden of cancer in developing countries is growing and threatens to exact a heavy morbidity, mortality, and economic cost in the next 20

years. Pediatric cancer incidence has been steadily increasing over the last several decades with the largest increases reported in infants [1]. About 2% of all cancers in developing countries arise in children, whereas in Europe and North America, childhood cancers constitute less than 0.5% of total incident cases. Every year, 429,000 children and adolescents are expected to develop cancer. The vast majority of those – 384,000 – are from developing countries, according to a pediatric cancer study published in science magazine [2].

Within pediatric cancer, there are groups of diseases that occur so infrequently that they are not captured by currently available registries or treatment protocols. The small numbers and diversity of these histologic subtypes pose challenges to the investigation of their biologic and clinical behavior. Therefore, children and adolescents with rare tumor histology represent a vulnerable population that has not benefited from the treatment success achieved in other childhood cancer populations [3], these tumors are called "Rare Childhood Cancers (RCC)." Pediatric oncologists have increasingly realized that there are several tumor entities, which they might see once only in their lifetime practice. Hence, knowledge of the clinical presentation, management, and long-term outcome of these tumors has been based on limited single institution data or extrapolation from adult studies [2,4].

Optimal care for these patients poses a great challenge as no clinical or scientific structures have been developed to ensure accurate diagnosis and evidence-based treatment, research projects appear to be impossible due to the rarity of these entities, and the interest of the pharmaceutical industry to develop and evaluate new drugs for these entities is rather limited [5,6]. Rare childhood tumors have no specific protocol or drugs for chemotherapy and most of the case old drugs (those invented in 7th decade of last century) with adult protocols are used for treatment.

A rare cancer affects a small percentage of the population and the definition differs according to geographical location. Definition of a rare or infrequent tumor in the pediatric age is complex, has been interpreted in different ways and is not uniform among international groups. At last, the Italian cooperative project on rare pediatric tumors (Tumori Rari in Eta Pediatrica [TREP]) defined a pediatric rare tumor as any solid malignancies characterized by annual incidence <2 per million population and not considered in any other clinical trials [7].

It should be remembered that the study of rare cancers is not limited to rare histologic variants but also it includes sub-groups that can be difficult to study in common cancers e.g. Juvenile myelomonocytic leukemia, Chronic myeloid leukemia, Acute megakaryoblastic leukemia. Conversely, rare cancers can be rare episodes of common cancers that present in uncommon hosts such as male breast cancer [8] or can present in uncommon atypical locations [9], like osteosarcoma in the base of the skull.

In US incidence of rare childhood tumors are 15% of all childhood cancer [4], in EU rare childhood tumors (Figure 1) about 8-15% [7,10], in turkey 3.7% [11] and despite their presumed relative rarity, as defined by the COG, rare childhood cancers collectively (in the world) account for 15% of all cancers in children younger than 20 years [4]. To calculate the incidence of rare childhood cancer Population-based cancer registry is mandatory. Like most of the developing countries Bangladesh has no population-based cancer registry, so we have no known incidence data of childhood cancer. Information about childhood cancer incidence in low-income countries (LIC) comes from hospital-based registries, population-based registries, international organizations, and specific research projects [12]. And such registries can be maintained at low cost and comprise a key component of a pediatric oncology data management program [13].

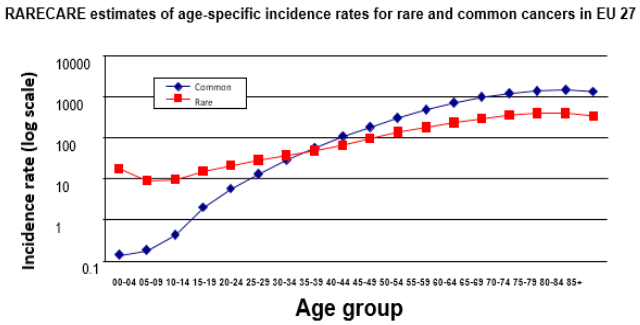

Figure 1: Age-specific incidence rates for rare and common pediatric cancers in EU [14].

All over the world Pediatric rare tumors are considered 'orphan diseases', which are inappropriately classified, diagnosed, and consequently inadequately treated but their total number is not insignificant. A major problem with rare tumors was that their real impact on population has not been studied in depth in many countries worldwide, even in developed nations. But the scenario of rare cancers research and management has been changing from last decade with establishment of several organizations, research plans and fund allocation in developed countries. But in resource-limited settings, many cases of cancer are detected too late for effective treatment, and are compounded by comorbidities (especially malnutrition), affordability and restricted access to treatment and care [15].

Aim of the research

1. To investigate the incidence of rare childhood tumors (RCC) among hospital enrolled patients (0-<18 years).
2. To investigate the trends in different RCC types of our hospital.

Methodology

This was a descriptive cross-sectional study. Data including age, sex, diagnosis, diagnostic delay etc. were collected from patients (age<18 years) with pathologically proven Childhood tumors from January 2014 to December 2018 at Department of Pediatric Hematology and Oncology (PHO) of National Institute of cancer Research and Hospital (NICRH) during admission or at

the edge of enrollment. Clinical features, radiological evidence, histopathological and /or immunohistochemical study of tissue from core biopsy or operated sample or bone marrow were considered for final diagnosis of cases. The extended International Classification of Childhood cancer (ICCC-3) [16] was used by our data managers and utilized in this study. Population based cancer registry is mandatory for leveling rare cancer but as we have no such registry so we considered the rare tumors of our study according to Children's Oncology Group (COG) and German Childhood Cancer Registry (GCCR) rare cancer list.

We calculate the total patient number per year attended at PHO and number of rare childhood tumors among them. The data were analyzed using the software Microsoft Excel and PSPP.

Result

Total 2242 patients were diagnosed at PHO during 2014-2018. Average burden of cancer patients was 447 per year at our center. Among them, a total 351(15.66%) children were leveled as rare childhood tumors (Table 1). Figure-2 shows the increasing rate of total pediatric Tumors and RCC over years in the present study. In 2015 the highest percentage (18.13%) of rare tumors were diagnosed at PHO (Figure 2).

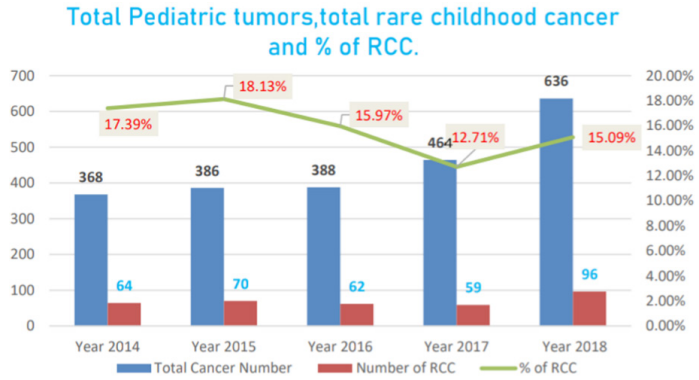

Figure 2: Increasing rate of total childhood tumors and RCC in NICRH.

Common age group was 5-9 years group (fig-3) and 54.13 % patients were in this age group. Mean age of presentation was 8.67 years. Diagnostic delay that means from the start of symptoms to final diagnosis or start of treatment, which was 3.52 months (Range- 4 to 142 months) in the present study.

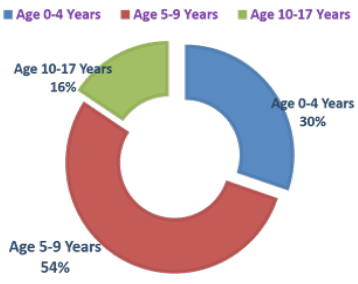

Figure 3: Common age group of the study population.

We collected data according to ICCC-3 but presented them in three main groups. The most common RCC group was non-Rhabdomyosarcoma soft tissue sarcoma (NRSTS) constituting 49.29 % (N-173), malignant epithelial neoplasms and melanomas 38.18% (N-134) And Others RCC (Brain Tumors, Bone tumors, Germ cell Tumors, Hematological Tumors)12.53 % (N-44). Benign tumors (B) were 65 (18.52 %) in number and malignant tumors were 81.48 % (N- 286). Age distribution and sex ratio was depicted in table 1.

Table 1: Common clinical, histopathological and epidemiological data.

Sl.	Variables	Frequency	Percentage
1.	Age Mean age Age range Age 0-4 yrs Age 5-9 yrs Age 10-17 yrs	 8.67 years 2 Mon-17.5 Yr 106 190 55	 30.16 % 54.13 % 15.71 %
2.	Male Female	203 148	57.83 % 42.17 %
3.	1. Malignant epithelial neoplasms and melanomas 2. non-Rhabdomyosarcoma soft tissue sarcoma. 3. Others (Brain Tumors, Bone tumors, Germ cell Tumors, Hematological Tumors)	134 173 44	38.18 % 49.29 % 12.53 %
4.	Benign Malignant	65 286	18.52 % 81.48 %
5.	Year of study	Total Childhood Cancer (RCC)	% of RCC
	a) 2014	368 (64)	17.39 %
	b) 2015	386 (70)	18.13 %
	c) 2016	388 (62)	15.97 %
	d) 2017	464 (59)	12.71 %
	e) 2018	636 (96)	15.09 %

Non-Rhabdomyosarcoma soft tissue sarcoma constitutes 49.29 % of RCC. Most common tumor was Synovial Sarcoma 11.39% (N-40), Peripheral Neuroectodermal Tumor (PNET) 11.11% (N-39), Malignant small round cell tumor 8.83% (N-31),Fibrosarcoma 5.7% (N-20), Undifferentiated or Spindle cell sarcoma1.99% (N-7) and Malignant nerve sheath tumor 1.99% (N-7).

Second most common RCC group was malignant epithelial neoplasms and melanomas (38.18%, N-134). Most common carcinomas of this group were Nasopharyngeal carcinoma (N-35, 9.97%), Carcinoma rectum and colon (N-23, 6.55%). *Mucoepidermoid Carcinoma (MEC)* of *salivary glands (N*-15, 4.27%). This group included Group-XI of ICCC (3rd ed.) plus carcinoma of renal tumors and hepatic tumors.

Other than Carcinoma and NRSTS, rare childhood cancers were small in size. Most common type was Meningioma of Brain (N-14, 3.99%), Pineoblastoma of CNS (N-10, 2.85%), Granulosa cell Tumor (N-6, 1.7%) and Paraganglioma of abdomen (N-4, 1.14%).

Table 2: Non-rhabdomyosarcoma soft tissue sarcoma (B-Benign).

Sl	Name of Tumors	2014 N-38	2015 N-37	2016 N-27	2017 N-31	2018 N-40	Total (%) N-173
1	Peripheral Neuroectodermal Tumor	6	7	7	8	11	39 (11.11%)
2	Synovial Sarcoma	6	10	9	8	7	40 (11.39%)
3	Malignant small round cell tumor	9	8	2	8	4	31 (8.83%)
4	Fibrosarcoma (B/M)	6	3	5	2	4	20 (5.7%)
5	Clear- cell Sarcoma of soft tissue	1					1 (0.28%)
6	Undifferentiated or Spindle cell sarcoma		1			6	7 (1.99%)
7	Desmoplastic small round cell tumor (Abdomen/Pelvis)	2				1	3 (0.85%)
8	Congenital Mesoblastic Nephroma (B)	1			2		3 (0.85%)
9	Malignant nerve sheath tumor	4	2		1		7 (1.99%)
10	Malignant Fibrous Histiocytoma		1	2			3 (0.85%)
11	Lipoma (B)	1				1	2 (0.57%)
12	Angiosarcoma of skin		1	1			2 (0.57%)
13	Hemangioendothelioma		1				1 (0.28%)
14	Lipoblastoma (B)	1					1 (0.28%)
15	Angiomyxoma Hamartoma (B)	1	1				2 (0.57%)
16	Malignant mesenchymoma		1	1			2 (0.57%)
17	Epithelioid Sarcoma				1		1 (0.28%)
18	Tongue Sarcoma		1				1 (0.28%)
19	Fibro sarcoma of Parotid Gland					1	1 (0.28%)
20	Liposarcoma					1	1 (0.28%)
21	Gastrointestinal stromal tumors (GIST)					1	1 (0.28%)
22	Neurofibroma (B)				1	1	2 (0.57%)
23	Breast Tumor: Fibroadenoma (B)					1	1 (0.28%)
24	Hemangioma (B)					1	1 (0.28%)

Table 3: Malignant epithelial neoplasms and melanomas (B-Benign).

Sl	Name of Tumors	2014 N-20	2015 N-24	2016 N-24	2017 N-24	2018 N-42	Total (%) N-134
1	Nasopharyngeal carcinoma	3	6	4	6	16	35 (9.97%)
2	Parotid/Salivary gland carcinoma	1	1	3		3	8 (2.27%)
3	Carcinoma rectum and colon	7	3	3	5	5	23 (6.55%)
4	Stomach cancer and esophageal carcinoma		3			4	7 (1.99%)
5	Pancreatic Carcinoma		1	1			2 (0.57%)
6	Squamous cell carcinoma of skin.	1	3		4	1	9 (2.56%)
7	*MEC* of *salivary glands*.	1	2	5	3	4	15 (4.27%)
8	Adenoid cystic carcinoma of Lacrimal gland	1		1	2		4 (1.14%)
9	Basal cell carcinoma/Adenoma	2				1	3 (0.85%)
10	Bronchogenic Carcinoma				1		1 (0.28%)
11	Adrenocortical carcinoma		2			1	3 (0.85%)
12	Embryonal carcinoma of intestine			1			1 (0.28%)
13	Thyroid carcinoma		1		1		2 (0.57%)
14	Thymoma		1	1			2 (0.57%)
15	Lung cancer	1		1	1		3 (0.85%)
16	Malignant Melanoma		1			1	2 (0.57%)
17	Metastatic carcinoma of the Pleura			1			1 (0.28%)
18	Ocular choroidal melanoma	1					1 (0.28%)
19	Laryngeal carcinoma				1		1 (0.28%)
20	Carcinoid Tumor of Lung					1	1 (0.28%)
21	Sebacious carcinoma of skin					1	1 (0.28%)
22	*Familial adenomatous polyposis* (FAP)					1	1 (0.28%)
23	Fibroadenoma of breast(B)					1	1 (0.28%)
24	Sinonasal adenocarcinoma,					1	1 (0.28%)
25	Renal Cell Carcinoma	2		3		0	5 (1.42%)
26	Hepatocellular carcinoma					1	1 (0.28%)

Table 4: Other RCC except NRSTS and carcinoma (B-Benign).

Sl	Name of Tumors	2014 N-6	2015 N-8	2016 N-12	2017 N-4	2018 N-14	Total (%) N-44
1	Meningioma of Brain	3	1	4		5	14 (3.99%)
2	Schwannoma (B)		2			0	2 (0.57%)
3	Giant cell tumor of bone (B)		1			2	3 (0.85%)
4	Optic Nerve Glioma of brain (B)		1		1	0	2 (0.57%)
5	Paraganglioma of abdomen (B)		1	1		2	4 (1.14%)
6	Choroid plexus papilloma (B)	1				0	1 (0.28%)
7	Pineoblastoma and PNET of CNS	1	1	3	1	4	10 (2.85%)
8	Histiocytic Sarcoma (Non-LCH)				1	0	1 (0.28%)
9	Granulosa cell Tumor (B)		1	3	1	1	6 (1.7%)
10	Mesenchymal chondrosarcoma of bone.	1				0	1 (0.28%)

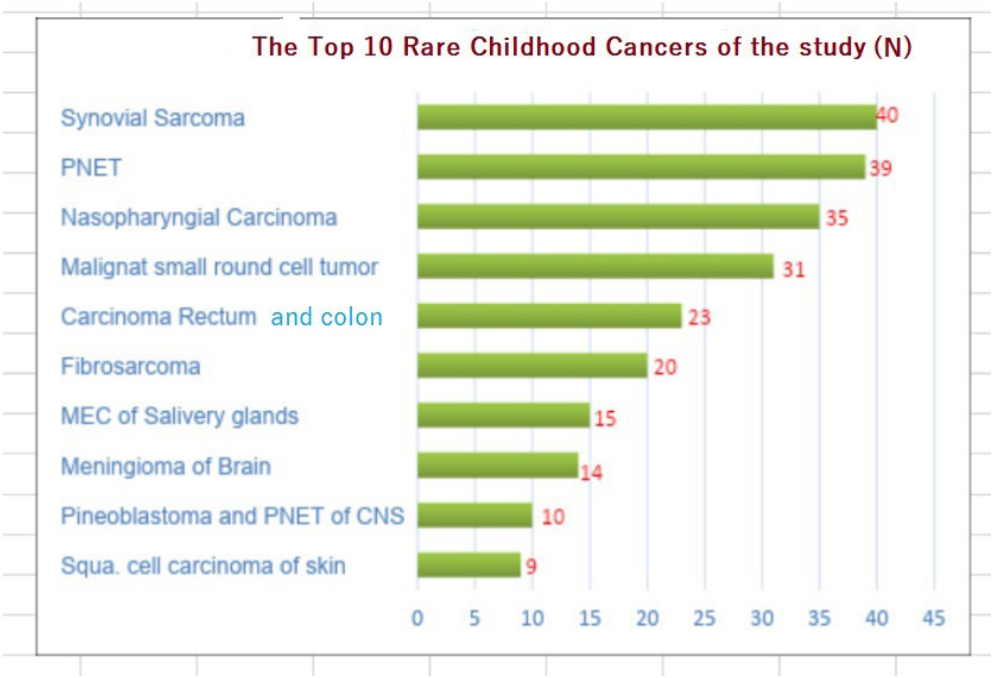

Figure 4: Most common RCC (Top 10) of the study.

Top ten RCC (Figure 4) of our study were Synovial Sarcoma (N-40) Peripheral Neuroectodermal Tumor (N-39), Nasopharyngeal carcinoma (N-35), Malignant small round cell tumor (N-31), Carcinoma rectum and colon (N-23). Fibrosarcoma (N-20), Mucoepidermoid carcinoma of salivary glands (N-15), Meningioma of brain (N-14), Pineoblastoma of CNS (N-10), Squamous cell carcinoma of skin (N-9).

Discussion

The study of rare pediatric cancers is challenging. Multiple mechanisms should be explored in order to advance our understanding of these diseases [17]. For this understanding first of all we need to estimate the burden of childhood cancer from national cancer registry. But we have no population-based cancer registry in Bangladesh. It is expected that every year about 13,000 new cases of childhood cancer are entering in Bangladesh [18] and like other developing countries, childhood cancers are emerging as major childhood killers [19].

In this study, we comprehensively ascertained the incidence of childhood rare cancers by epidemiological means of our Institute. As rare childhood cancer epidemiology of every country is different from the rest of the world, so the use of international registries can help us a little to identify the numbers of patients at risk for a specific rare cancer. Our institute is a 500 bed specialized tertiary care cancer Hospital, where PHO tries to strictly maintain the patient registry of pediatric cases.

Figure 2 showed that the total pediatric tumors of our Institute has increased yearly and rare childhood cancers also raised every year with rising percentages. This trend is completely anticipated in developing countries. The rare tumors of our study contributed to approximately 15.66% (351/2242) of childhood cancer of our center. A study in a Medical College at Uttar Pradesh of India where rare childhood cancer (Age upto12 years) was 47.6% of total pediatric cancers [20]. The reports on national incidence of rare tumors vary between 3.7% to 15% in Turkish and American

studies [3,21]. But data from COG, rare childhood cancers collectively account for 11% of all cancers in those age 20 years [22]. Rare malignant tumors (RMT) make up 10% of all cancer in the pediatric age of Mexico [23].

Table 1 showed that there was a significant male preponderance with male: female ratio of 1.37:1 in our study. More than half of the patients (54.13 %) presented with age between 5-10 years (Figure 3). But a South Indian study [24] showed different picture and 33% percent of the cases were above 10 years while infants constituted 15.8%. German study revealed 47% patients belonged to 10-14 age group [25]. Benign tumors of the study were 65 (18.52%) in number and malignant tumors were 286 (81.48%) in number.

In a previous study of our Institute revealed diagnostic delayed were >90 days in case of all type's pediatric tumors [26]. Diagnostic delay is much more in our patients and was 3.52 months (Range- 4 to 142 months). This too much delay of our patients than national pediatric tumors and international experience, were due to economical constraint of patients, delayed transfer of patients to the oncology center, delay in surgical intervention, late delivery of pathological and Immunohistochemical report from Laboratory.

In the present study the most common group of RCC was Non-rhabdomyosarcoma soft tissue sarcoma (NRSTS) constituting 49.29% (N-173). In an Indian study [24] the most common RCC was also NRSTS but the incidence was 36.1%. Most common RCC in Mexico [23] and Turkey [27] was Thyroid carcinoma with incident rate 26.96% and 11.60% respectively. But we got no thyroid carcinoma in our study.

Rare Cancer incidence varies significantly from one continent to another, one nation to another. In Turkey most common carcinomas were Thyroid carcinoma, Carcinoid tumor and Thymic carcinoma [27] but in our study common carcinoma were Nasopharyngeal carcinoma, Carcinoma rectum, and Mucoepidermoid Carcinoma (MEC) of salivary glands. On the other hand, common sarcomas of Turkey study [27] were synovial sarcoma, Giant cell granuloma, Desmoid tumor but in our study determined Synovial Sarcoma, Peripheral Neuroectodermal Tumor and Malignant small round cell tumor as common sarcoma.

Among top10 RCC, synovial sarcoma cases were the largest number (11.39 %, N-40) of cases. In a study by Tacyildiz et al. in Turkey, synovial sarcoma revealed second most frequent tumor (9.3%) of RCC [27]. Synovial sarcoma is thought to arise from primitive mesenchymal cells rather than from the synovial membrane as its name implies. Although these tumors can occur anywhere in the body, including locations distant from joint spaces such as the abdominal cavity, approximately 90% of synovial sarcomas in children occur in the extremities [28].

Peripheral PNET is a rare malignant tumor that shares a similar histology, immunohistology and cytogenetics to Ewing's sarcoma. It comprises about 11.11% (N-39) of RCC of the present study. A Turkey study estimated 4.65% PNET of the RCC [27]. We considered those tumors as PNET (separating it from Ewing's Sarcoma) which showed more developed features of cells associated with the nervous system. And there was no use of molecular technologies like FISH and PCR in this diagnosis.

Nasopharyngeal carcinoma (NPC) is very rare in childhood. It differs from its adult counterpart in the prevalence of the nonkeratinizing, undifferentiated subtype and by an advanced clinical stage at onset and better chances of survival. The present study revealed 9.97% (N-35) NPC but in an Italian study [29] NPC was estimated 7.4% (48/652).

Malignant small round cell tumors (MSRCT) are characterized by small, round, relatively undifferentiated cells. They generally include Ewing's sarcoma, peripheral neuroectodermal tumor, rhabdomyosarcoma, synovial sarcoma, non-Hodgkin's lymphoma, retinoblastoma, neuroblastoma, hepatoblastoma, and nephroblastoma or Wilms' tumor [30]. We diagnosed 31 cases (8.83%) of MSRC, mostly during the early years of our study when Immunohistochemistry was not available in our country.

Colorectal cancer is rare in children with an incidence of 1.3 to 2 cases per million children as per National Cancer Institute Monograph Bethesda, USA. 1981. Most of these cases in children occur in the second decade of life. We diagnosed 23 cases (6.55%) in five years. In India colorectal carcinoma does not figure amongst the 10 most common malignancies [18].

Fibrosarcoma is a rare malignant (cancerous) type of soft tissue sarcoma. It was most common in infants and young children under 5 years and in patients 10 to 15 years old. Like other sarcomas, fibrosarcoma involved the extremities and deeper structures of the body. We determined 20 cases which were 5.7% of RCC.

Mucoepidermoid carcinomas are the most common type of salivary gland cancer. Most started in the parotid glands in our study. They developed less in the submandibular glands or in minor salivary glands inside the mouth. We diagnosed 15 (4.27%) cases during the five years studied. But total salivary gland tumor (Salivary gland carcinoma + MEC of salivary gland) was 6.55% (N-23), where Italian Rare Tumors in Pediatric Age [TREP] [29] project estimated 1.99% of salivary cancer among RCC.

Meningiomas are usually slowly growing benign tumors originating from arachnoid cap cells of the meninges [31]. They constitute 20–30% of all intracranial neoplasms in adulthood but pediatric meningiomas are relatively rare. We determined 14 cases (3.99%) during our study period.

Pineal gland tumors as a group of rare tumors, accounting for less than 1% of all primary brain tumors. Pineoblastoma represents just under half of all pineal gland tumors. Researchers believe they develop from primitive (undeveloped) nerve cells in the brain. They are similar to medulloblastoma. Our study estimated

6.6% (N-10) pineoblastoma among RCC, where in India 4.5% pineoblastoma were documented in a South Indian study [24].

In pediatric patients the origin of Squamous cell Sarcoma (SCC) is different and the disease is often more difficult to diagnose pathologically. Pediatric SCC are more aggressive than its adult counterpart. Our data revealed 2.56% (N-9) SCC among the RCC but Viswanathan et al. [24] reported 1.5% SCC in an Indian Cancer Center.

In Bangladesh Total population was 16.4 million during our study period (2014-2018 AD) and the pediatric population (age<18years) was 44.1% [32] of total population at that time, which means total pediatric population in our country during the study period was 7.2 million. According to definition > 14 cases per year of a single cancer is needed to level it as common childhood cancer. So, if the total number of patients of any single childhood cancer is less than 70 (from 2014 t0 2018) that cancer should be considered as a rare cancer. We diagnosed many cancers whose total number was 1-5 during the five years study period and we believe that there was no possibility to reach the number more than 70 in our country as most of the rare tumors of Bangladesh enroll and treat in the NICRH. We have not included those tumors (Table 5) in our RCC list as COG and GCCR has not mentioned them in their schedule.

Table 5: Name of the cancer whose number was less but not included in our RCC list.

Sl.	Name of Cancer	Number
1.	Basal Ganglia Lymphoma	1
2.	Brain Hemangioma	1
3	Cavernous Hemangioma(B)	1
4.	Malignant Hemangiopericytomas. BRAIN	3
5.	Myeloid Sarcoma	2
6.	Chronic Myeloid Leukemia	3
7.	Rosai-Dorfman disease	1
8.	Reactive Plasmacytosis	1
9.	Fibrous Dysplasia of bone	1
10.	Aneurysmal bone cyst	2
11.	Chondrosarcoma	5
12.	Neurofibroma	1
13.	Olfactory Neuroblastoma	5
14.	Renal Cyst	1
15.	Nephroblastomatosis	1
16.	Congenital mesoblastic nephroma	4
	Total	33

Limitation

It has been mentioned that we have no National cancer registry and used the COG and GCCR database to prepare a list of RCC. Another limitation of our series is that we do not have the genetic and molecular characterization of any of our samples.

Conclusion

The present study provides information on increasing the size of the pediatric cancer and childhood rare cancer burden in Bangladesh. From this study we have come to know the most common rare cancer of our country.

Rare tumors are a real challenge for the pediatric oncologist. Rare cancers have not been investigated much all over the world because of their low prevalence. That is why epidemiological studies have difficulties in identifying risk factors. The resources to identify and explain rare cancer incidence, explore their etiology and decide the possible methods for prevention, diagnosis, therapies etc. do not really exist in Bangladesh, which is still a big health problem like other developing countries.

References

1. Hubbard AK, Spector LG, Fortuna G, et al. Trends in International Incidence of Pediatric Cancers in Children Under 5 Years of Age: 1988-2012. JNCI Cancer Spectr. 2019; 3: 007.
2. Hodal K. Children's chances of surviving cancer less than 30% in poor nations- study. The Guardian. 2019.
3. Pappo AS, Furman WL, Schultz KA, et al. Rare Tumors in Children: Progress Through Collaboration. J Clin Oncol. 2015; 33: 3047-3054.
4. Pashankar FD, Rodriguez-Galindo C, Pappo A. Development of a therapeutic approach to rare cancers in children: the Children's Oncology Group experience. J Pediatr Hematol Oncol. 2012; 34: 37-38.
5. Bisogno G, Ferrari A, Bien E, et al. Rare cancers in children-The EXPeRT initiative: A report from the European Cooperative Study Group on pediatric rare tumors. Klin Padiatr. 2012; 224: 416-420.
6. Schneider DT, Brecht IB. Care for rare cancers: Improved care requires improved communication. Klin Padiatr. 2010; 222: 124-126.
7. Ferrari A, Bisogno G, De Salvo GL, et al. The challenge of very rare tumours in childhood: the Italian TREP project. Eur J Cancer. 2007; 43: 654-659.
8. Ottini L. Male breast cancer: a rare disease that might uncover underlying pathways of breast cancer. Nat Rev Cancer. 2014; 14: 643.
9. Harms D, Schmidt D. Rare tumors in childhood: pathological aspects. Experience of the Kiel Pediatric Tumor Registry. Med Pediatr Oncol. 1993; 21: 239-248.
10. Brecht IB, Kaatsch P. Epidemiology In: Schneider DT, Brecht IB, Olson TA, Ferrari A. Rare tumors in children and adolescents. Berlin Heidelberg: Springer.2012.
11. Kutluk T. Epidemiology of childhood cancer and current status in Turkey. J Pediatr Sci. 2009; 5: 1-8.
12. Parkin DM, Kramarova E, Draper GJ, et al. The International Incidence of Childhood Cancer, Vol II. Inter-national Agency for Cancer Research. 1998; 144: 1-391.
13. Howard SC, Monika LM, Judith AW, et al. Childhood Cancer Epidemiology in Low-Income Countries. CANCER. 2008; 112: 461-472.
14. Gemma Gatta, Jan Maarten van der Zwan, Paolo G Casali, et al. Rare cancers are not so rare: The rare cancer burden in Europe. European Journal of Cancer. 2011; 47: 2493-2511.

15. Chirdan LB, Bode-Thomas F, Chirdan OO. Childhood cancers: challenges and strategies for management in developing countries. Afr J Paediatr Surg. 2009; 6: 126-130.
16. Steliarova-Foucher E, Stiller C, Lacour B, et al. International classification of childhood cancer. Cancer. 2005; 103: 1457-1467.
17. Pappo AS. Treating Rare Cancer in Children: The Importance of Evidence. American Society of Clinical Oncology Educational Book. 2012; 32: 586-588.
18. Ray N. Developing defence against childhood. The Financial Express. 2020.
19. Margrath I, Shad A, Epelman S, et al. Pediatric oncology in countries with limited resources. In: Principles and Practice of pediatric oncology. Pizzo PA, Poplack DG, editors. 1997; 1395-1420.
20. Hasan M, Qadri S, Akhtar K, et al. Rare pediatric tumors in western uttar pradesh- a profile with review of literature. Glob J Bio Agri Hel Sci. 2014; 3: 270-273.
21. Özyörük D, Yavuz G, nal E, et al. Rare childhood tumors in a Turkish pediatric oncology center. Ind J Med Paediatr Oncol. 2013; 34: 264-269.
22. Shaw PH, Hayes-Lattin B, Johnson R, et al. Improving enrollment in clinical trials for adolescents with cancer. Pediatrics. 2014; 133: 109-113.
23. Araceli N, López-Facundo, Velasco-Hidalgo L, et al. Rare Malignant Tumors in Mexican Pediatric Patients: A Cooperative Pediatric Oncology Research Group Report. Journal of Rare Disorders: Diagnosis & Therapy. 2019; 5: 2.
24. Viswanathan A, Arun Kumar, Avinash T, et al. Rare pediatric malignancies- A twenty year experience from an oncology institute in South India. Pediatric Hematology Oncology Journal. 2021; 6: 100-104.
25. Brecht IB, Claudia B, Dominik TS, et al. Rare Malignant Pediatric Tumors Registered in the German Childhood Cancer Registry 2001-2010. Pediatr Blood Cancer. 2014; 61: 1202-1209.
26. Begum M, Islam M, Akhtar M, et al. Evaluation of delays in diagnosis and treatment of childhood malignancies in Bangladesh. South Asian J Cancer. 2016; 5: 192-193.
27. Tacyildiz N, Özyörük D, Gülsan Y, et al. Rare childhood tumors in a Turkish pediatric oncology center. Indian Journal of Medical and Paediatric Oncology. 2013; 34: 264-269.
28. Bixby SD, Hettmer S, Taylor GA, et al. Synovial sarcoma in children: Imaging features and common benign mimics. AJR Am J Roentgenol. 2010; 195: 1026-1032.
29. Bisogno G, Ferrari A, Cecchetto G. Very Rare Tumours in Paediatric Age- From 'Tumori Rari in Età Pediatrica' to the European Cooperative Study Group for Paediatric Rare Tumours. European Oncology & Haematology. 2012; 8: 130-134.
30. Rajwanshi A, Srinivas R, Upasana G. Malignant small round cell tumors. J Cytol. 2009; 26: 1-10.
31. Alexiou GA, Mpairamidis E, Psarros A, et al. Intracranial meningiomas in children. Report of 8 cases. Pediatr Neurosurg. 2008; 44: 373-375.
32. Age-Sex Composition of Bangladesh Population. Bangladesh Bureau of Statistics, Statistics and Informatics Division, Ministry of Planning. 2015.