Kufa Medical Journal | Vol. 18, No. 2, 2022

Original article | DOI: https://doi.org/10.36330/kmj.v18i2.10314

Submitted at: 29 Sept. 22
Accepted at: 23 Nov. 22

Prevalence of Small Round Cell Tumors in Pediatric Age Group in the last 10 Years Registered in Al- Najaf Governorate

Luma Talib Farhod[(1)], Dr. Kaswer Musa Al-Turaihi[(2)]

[(1)] M.B.Ch.B., F.I.C.M.S Path, Al Najaf teaching hospital/department of Pathology, [(2)]M.B.Ch.B., F.I.C.M.S Path, Consultant Pathologist, Faculty of Medicine / University of Kufa, Department of Pathologygy & forensic medicine.

Corresponding author: Luma Talib Farhod, lumaalwaiely@gmail.com

Abstract

Malignant small round cell tumors (MSRCT) are referred to as tumors made up of malignant small round cells. The cells in this type of neoplasms are tiny, rounded, and largely undifferentiated. Ewing's sarcoma (ES), peripheral neuroectodermal tumor, rhabdomyosarcoma, non-Hodgkin lymphoma, retinoblastoma, neuroblastoma, hepatoblastoma, and nephroblastoma are a few of the more common ones. The aim of this study is to estimate the prevalence and types of pediatric small round cell tumors in Najaf Province/Iraq, over the 10 years period between 2010-2019.

Method: This is a retrospective observational study. Cases were collected from pathology laboratories in As-Sadr Medical City and some private laboratories in Najaf over a 10 year-period extending from 2010 to 2019.

Results: A 6366 pediatric surgical biopsy cases were reported during the study period and this represent 8.7% of all cases. Out of these cases, 108 cases with small round cell tumors (SRCT) have given a prevalence rate of 17 per 1000 pediatric cases and 1.5 per 1000 of total (73504) adult and pediatric cases during the same period. The mean age of these SRCT cases was 6.3± 1.6 (range: one month-19) years. The higher proportion of cases was reported in the age of 1-5 years, contributed for 43.5%. Male to female ratio is 59/108 vs. 49/108, respectively, the male to female ratio being at 1.2 to 1.0.

Conclusions: The mean age of SRCTs cases was 6.3± 1.6, ranging from one month to 19 years. The higher proportion of SRCTs cases was reported in the age ranging from 1-5 years; with a ratio of males to females being 1.2 to 1.0.

Keywords: Ewing's sarcoma, Malignant small round cell tumors, retinoblastoma.

Introduction

Malignant small round cell tumors (MSRCT) are referred to as tumors made up of these cells[1]. The cells in this type of neoplasms are tiny, rounded, and largely undifferentiated. Ewing's sarcoma (ES), peripheral neuroectodermal tumor, rhabdomyosarcoma, non-Hodgkin lymphoma, retinoblastoma, neuroblastoma, hepatoblastoma, and nephroblastoma are a few of the more common ones[2]. Small cell osteogenic sarcoma, granulocytic sarcoma, and intraabdominal desmoplastic small round cell tumor are further differential diagnosis for small round cell tumors (SRCT). Due to their undifferentiated or primitive nature, tiny round cell tumors are particularly challenging to identify. It is typically simple to diagnose tumors that exhibit good differentiation, but when a tumor exhibits poor differentiation, it may be impossible to identify the diagnostic morphological features[2]. Around the world, cancer is the primary cause of mortality in children; each year, 300,000 children between the ages of 1 day and 19 years are given a cancer diagnosis.[3]. Leukemias, brain malignancies, lymphomas, and solid tumors, like neuroblastoma and Wilms tumor, are the most prevalent types of childhood cancer[3]. In many low- and middle-income countries (LMICs), only approximately 20% of children with cancer are cured, compared to more than 80% in high-income nations[4].

Materials and Methods

Cases were collected from pathology laboratories in As-Sadr Medical City and some private laboratories in Najaf over a 10-year period extending between 2010 and 2020. The study included only pediatric patients (1day - 19 years) of age who were diagnosed with SRCT. Elective data bases were reviewed over the 10 years period, extending from 2010 to 2020. A total 73504 surgical biopsy cases were reported, 6366 (8.7%) represent pediatric cases; furthermore, 108 cases diagnosed as SRCTs. Study group: 108 SRCT pediatric cases, the range of age of these cases was one day-19 years .

Results

During the 10 year-period, 2010 – 2019, a total of 73504 cases were reported in the department of Pathology in As-Sadr Medical City in Najaf Province and in some private laboratories in there including both pediatric and adult cases. Among them, 6366 pediatric cases were reported which represented 8.7% of all cases. Out of the 6366 pediatric cases, 108 cases with SRCT were giving a prevalence rate of 17 per 1000 pediatric cases and 1.5 per 1000 of total (73504) adult and pediatric cases during the same period (Table 1, Figures 1,2).

In 2010, the total surgical biopsy cases were 6143, pediatric cases were 306, and SRCT cases were 10 (27.8 prevalence per 1000 pediatric cases, and 1.6 prevalence per 1000 total cases).

In 2011, the total surgical biopsy cases were 5086, pediatric cases were 484, and SRCT cases were 4 (8.3 prevalence per 1000 pediatric cases, and 0.8 prevalence per 1000 total cases).

In 2012, the total surgical biopsy cases were 6960, pediatric cases were 634, and SRCT cases were 4 (6.3 prevalence per 1000 pediatric cases, and 0.6 prevalence per 1000 total cases).

In 2013, the total surgical biopsy cases were 4715, pediatric cases were 348, and SRCT cases were 12 (34.5 prevalence per 1000 pediatric cases, and 2.5 prevalence per 1000 total cases).

In 2014, the total surgical biopsy cases were 9773, pediatric cases were 1083, and SRCT cases were 7 (6.5 prevalence per

1000 pediatric cases, and 0.7 prevalence per 1000 total cases).

In 2015, the total surgical biopsy cases were 5817, pediatric cases were 502, and SRCT cases were 10 (19.9 prevalence per 1000 pediatric cases, and 1.7 prevalence per 1000 total cases).

In 2016, the total surgical biopsy cases were 8086, pediatric cases were 634, and SRCT cases were 13 (20.5 prevalence per 1000 pediatric cases, and 1.6 prevalence per 1000 total cases).

In 2017,the total surgical biopsy cases were 8836, pediatric cases were 740, and SRCT cases were 25 (33.8 prevalence per 1000 pediatric cases, and 2.8 prevalence per 1000 total cases).

In 2018, the total surgical biopsy cases were 10086, pediatric cases were 778, and SRCT cases were 10 (12.9 prevalence per 1000 pediatric cases, and 1.0 prevalence per 1000 total cases).

In 2019, the total surgical biopsy cases were 8002, pediatric cases were 803, and SRCT cases were 13 (16.2 prevalence per 1000 pediatric cases, and 1.6 prevalence per 1000 total cases) (Table 1).

Regarding the characteristics of the 108 SRCT pediatric cases , the mean age of these cases was 6.3± 1.6 (range: one month-19) years. The highest proportion of cases was reported in the age of 1-5 years, contributed to 43.5%, (Table 2). Males were more dominant than females; 59/108 vs. 49/108, respectively, with a male to female ratio of 1.2 to 1.0, (Table 3). No significant differences between both genders in all types of tumors (P>0.05) (Table 4). Across the age, Neuroblastoma, Wilms tumor and Retinoblastoma were noticeably more common in the younger age group., (P. value < 0.05). Ewing sarcoma was much more common in the older age group (P<0.05). No significant differences across the age in other types of tumors, (P>0.05) (Table 5).

Table1: Frequencies and Prevalence rates of SRCT in pediatric cases during the period 2010-2019.

Year	Total cases	Pediatric cases	SRCT	Prevalence per 1000 pediatric cases	Prevalence per 1000 total cases
2010	6143	360	10	27.8	1.6
2011	5086	484	4	8.3	0.8
2012	6960	634	4	6.3	0.6
2013	4715	348	12	34.5	2.5
2014	9773	1083	7	6.5	0.7
2015	5817	502	10	19.9	1.7
2016	8086	634	13	20.5	1.6
2017	8836	740	25	33.8	2.8
2018	10086	778	10	12.9	1.0
2019	8002	803	13	16.2	1.6
Total	73504	6366	108	17.0	1.5

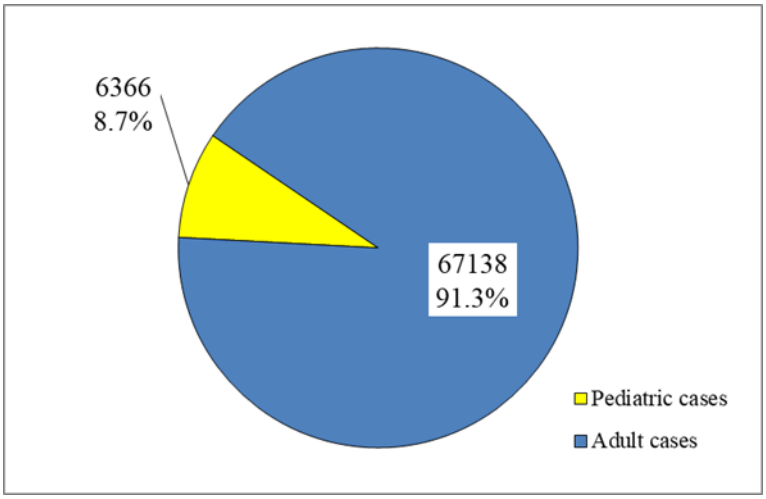

Figure 1: Overall cumulative prevalence rate of tumors pediatric cases during the period 2010-2019 in Najaf

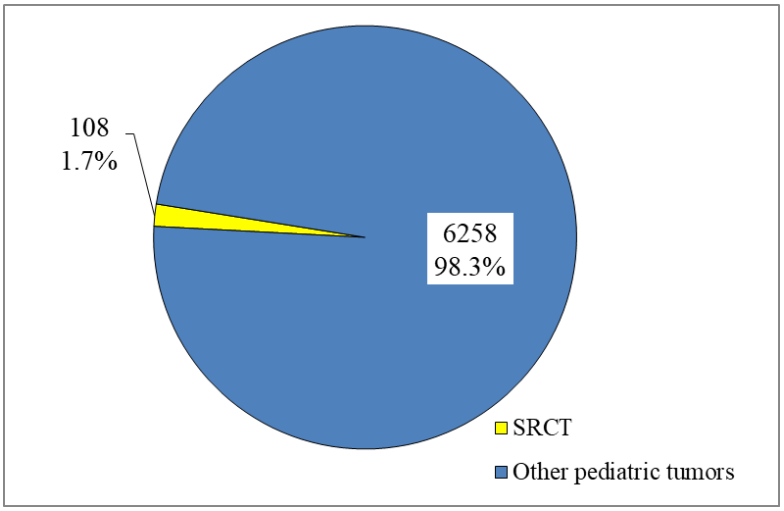

Figure 2: Overall cumulative prevalence rate of SRCT among all pediatric tumors during the period 2010-2019 in Najaf

Table 2: Distribution of 108 small round cell tumor pediatric cases in the last 10 years (2010-2019) according to Age

Age (year)	No.	%
< 1 year	18	16.7
1 – 5	47	43.5
6 – 10	15	13.9
11 – 15	18	16.7
15 – 19	10	9.3
Mean ± SD	6.3 ± 1.6	-
Range	One month- 19 years	

SD: standard deviation

Table 3: Distribution of 108 small round cell tumor pediatric cases in the last 10 years (2010-2019) according to gender

Gender	No.	%
Male	59	54.6
Female	49	45.4
Total	108	100
Male: Female ratio	1.2 : 1	-

Table 4: contrast among types of tumors based on gender of patient

Type of tumor	Total number	Male	Female	P. value*
Neuroblastoma	26	10	16	0.239
Wilms tumor	22	13	9	0.394
Ewing sarcoma	20	9	11	0.655
Retinoblastoma	17	8	9	0.808
Medulloblastoma	9	7	2	0.096
Alveolar rhabdomyosarcoma	4	3	1	0.317
Embryonal rhabdomyosarcoma	4	3	1	0.317
Hepatoblastoma	3	3	0	0.102
Lymphoblastic lymphoma	3	3	0	0.102
Total	108	59	49	0.220

Table 5: contrast among types of tumors based on age of patient

Type of tumor	Total No.	Age (years)					P. value
		< 1 year	1 – 5	6 – 10	11 - 15	> 15	
Neuroblastoma	26	12	10	2	2	0	**0.005 sig**
Wilms tumor	22	2	15	5	0	0	**0.002 sig**
Ewing sarcoma	20	0	2	3	10	5	**0.028 sig**
Retinoblastoma	17	2	14	1	0	0	**0.001 sig**
Medulloblastoma	9	0	5	2	1	1	0.189 ns
Alveolar rhabdomyosarcoma	4	0	0	0	1	3	0.317 ns
Embryonal rhabdomyosarcoma	4	0	1	2	1	0	0.779 ns
Hepatoblastoma	3	2	0	0	1	0	0.564 ns
Lymphoblastic lymphoma	3	0	0	0	2	1	0.564 ns
Total	108	18	47	15	18	10	**0.001 sig**

Discussion

In the present study, the most common type of SRCT was Neuroblastoma while the least common was Hepatoblastoma and Lymphoblastic lymphoma. Neuroblastoma was also common in other cancer registries compared, where it was more prevalent in a Japanese study published in 2017 [5], also in the western Australia pediatric cancer registry in 2008 [6] and pediatric cancer registry in England 2015 to 2016 Report [7]. It is worth noting that in the present study, Ewing sarcoma was the third most common SRTs while it moved to the last of the list in the Japanese study published in 2017 [5] and in the western Australia pediatric cancer registry in 2008 [6] while in another study done in Dohuk, Iraq (2020), it was reported that the Ewing sarcoma at the top of the list [8].

In regard to the tumors comparison according to gender, it has been found that neuroblastoma was more common in female gender (16 female,10 males) in the present study in contrast to pediatric cancer registry in England[7] where the incidence is slightly more in males. This study also describes the prevalence of neuroblastoma in Southern-Eastern Europe (SEE)[9]. However, in the western Australia pediatric cancer registry in 2008[6] the incidence was equal in both genders, Wilm's tumor was more common in male in our present study (13 males, 9 females) compared to the results of the western Australia pediatric cancer registry in 2008[6] , in contrast to the pediatric cancer registry in England 2015 to 2016 Report[7] where Wilm's was reported to be more common in females. Besides, in a study done by J.S. Ali et al., in sulaimanyah, Iraq (2018), they found that willms tumor is more common in females (29 female, 21 males)[10].

Ewing sarcoma in the present study females were reported to be more common than males (11 females, 9 males) while Munlima Hazarika et al, reported that Male: Female ratio was 1:1 in a study in 2020[11] . In contrast to the pediatric cancer registry in England 2015 to 2016 Report[7] , in which Ewing sarcoma is reported more in males, the same result was reported by Sazgar H. Majeed et al.,in Iraq (2019) [12] they reprted that from 31 pediatric ES patients overall 58% were male, and 42% were female. Retinoblastoma was slightly more in females in the present study (9 females, 8 males) which was similar to the result of Joshua F. A. Owoeye et al…who reported that male to female ratio of 1:1.2.in his study in 2008 [13] , in contrast to the reports of the western Australia pediatric cancer registry in 2008[6] , in which the incidence more in males than females.

Rhabdomyosarcoma was more common in male gender in the present study (6 males, 2 females) which was similar to the reports of registries of the western Australia pediatric cancer registry in 2008[6] and also similar to results of Häußler, S. M.,et al study in 2017 [14], including 28 patients (17 males, 11 females). Medulloblastoma in the present study was more common in male gender (7 males, 2 females); this is similar to results of Fruehwald-Pallamar, J., et al study [15] who reported that the ratio of male/female was 1.5:1 (38 males ,26 females). They also reported that males are more likely than females to have MB, with a male: female ratio of 1.8:1.

Lymphoblastic lymphoma in the present study was more commen in males (3 males, 0 females); this is comparable to the study of PATEL, Amol, et al in 2019 who found that male : female ratio of 2.25:1[16] and also comparable to the study of Sergio Cortelazzo ,et al. in 2017 who

report that males are more likely than females to have LBL, with a male to female ratio of 1.4..[17] Hepatoblastoma in our presnt study was more common in male gender (3males, 0 females) this result was comparable to what reported by Dawooda, L. J.,et al, in basara Iraq (2015)[20] . In regard to the comparison of tumors in relation to age groups, Neuroblastoma in the present study was significantly more common in children less than 1 year age group and (1-5 years) which was similar to Japanese study published in 2017[5] . Wilms tumor was more common in the age group (1-5 years) in a significant manner in the present study, similar to the reports of the comparable three registries (japan,WA, and England)[5-7] ; also similar to J.S. Ali et al., 8 in sulaimanyah, Iraq (2018) [10].

Ewing was significantly more common in the age group (11-15 years) in the present study with a P value of 0.028, which was similar Japanese study published in 2017 [5] and pediatric cancer registry in England 2015 to 2016 Report published in 2016[7]; it is also similar to study of Sazgar H. Majeed et al.,in Iraq (2019)[12] who reported that the average patient age upon diagnosis was 13 years. Retinoblastoma was more common in the age group (1-5 years) in the present study with a significant P value of 0.001; it was similar to a Japanese study published in 2017 [5], and to the western Australia pediatric cancer registry in 2008[6] ,pediatric cancer registry in England 2015 to 2016 Report published in 2016.[7] and report of Mohammed Faranoush, et al., in Tehran 2020[18].

Rhabdomyosarcoma in the present study Adolescents had a higher prevalence of alveolar RMS compared to younger children who had a higher prevalence of embryonal type. This result is similar to what reported by Perez, Eduardo A., et al.[19] Medulloblastoma in the present study was more common in (1-5 years) group, followed by (6-10 years) age group similar to a Japanese study published in 2017[5].

Lymphoblastic lymphoma in the study was more prevalent in the (11-15 years) age group but was not significant statistically, this is similar to what is reported by PATEL, Amol, et al (2019)[16], who found that median age was (12 years) while in Japan pediatric registry was more common in the (5-9 years) age group. These differences may be due to different environmental factors. Hepatoblastoma in the study was more prevalent in the (<1 year) age group, which was comparable the Japanese and England cancer registries [5,7] , while the study of Dawooda, L. J.,et al, in Basra- Iraq (2015)[20] showed more prevalence in (1-4 years) age group.

Conclusion:

The mean age of SRCTs cases was 6.3± 1.6 (range: one month-19) years. The highest proportion of SRCTs cases was reported in the age ranging from 1-5 years. Ratio of males to females 1.2 to 1.0. Neuroblastoma was the most common type while lymphoblastic lymphoma was the least one.

Conflict of Interest: None

Source of Funding: None

Ethical Clearance: Compliance with ethical standers.

References

1. Kocjan G. Diagnostic dilemas in FNAC cytology: small round cell tumors. In: Schroder G, editor. Fine needle aspiration cytology diagnostic principles and dilemmas. Berlin: Springer-Verlag; 2006. pp. 133–4.

2. J cytol. 2009 Jan-Mar; 26(1): 1–10.

3. Steliarova-Foucher E, Colombet M, Ries LAG, et al. International incidence of childhood cancer, 2001-10: a population-based registry study. Lancet Oncol. 2017;18(6):719-731.

4. Howard SC, Zaidi A, Cao X, et al. The My Child Matters programme: effect of public-private

partnerships on paediatric cancer care in low-income and middle-income countries. Lancet Oncol. 2018;19(5):e252-e266.

5. X.Childhood, adolescent and young adult cancer incidence in Japan in 2009-2011. Katanoda K, Shibata A, Matsuda T, Hori M, Nakata K, Narita Y, Ogawa C, Munakata W, Kawai A, Nishimoto H. Japanese Journal of Clinical Oncology 2017; 47: 762-771.

6. Cancer incidence and mortality in Western Australia 2008 ,published by Western Australia cancer registry.

7. Childhood cancer registration in England: 2015 to 2016 Report , published in 2016 by public health England.

8. PITY, INTISAR SALIM; YOUNUS, SHILAN AMEEN. Paediatric Malignant Blue Cell Tumours-A Practical Pathological and Immunohistochemical Study in Duhok, Iraq. Journal of Clinical & Diagnostic Research, 2020, 14.9.

9. Georgakis, M. K., Dessypris, N., Baka, M., Moschovi, M., Papadakis, V., Polychronopoulou, S., . & Petridou, E. T. (2018). Neuroblastoma among children in Southern and Eastern European cancer registries: Variations in incidence and temporal trends compared to US. International journal of cancer, 142(10), 1977-1985.

10. Ali, J. S., et al. "Wilms' Tumor in a war-torn nation: 10-year single institution experience from Iraq." Radiotherapy and Oncology. Vol. 127. ELSEVIER HOUSE, BROOKVALE PLAZA, EAST PARK SHANNON, CO, CLARE, 00000, IRELAND: ELSEVIER IRELAND LTD, 2018.

11. Hazarika, M., Sarangi, S. S., Saikia, B. J., Roy, P. S., Borthakur, B. B., Bhattacharyya, M., & Sarma, A. (2020). PEDIATRIC EWING'S SARCOMA– AN EXPERIENCE IN A TERTIARY CANCER CARE CENTER IN NORTH EAST INDIA. Global Journal For Research Analysis (GJRA), 9(8) 111

12. Majeed, Sazgar S., et al. "Treatment outcomes of pediatric patients with Ewing sarcoma in a war-torn nation: A single-institute experience from Iraq." Journal of global oncology 4 (2019): 1-9

13. Joshua F. A. Owoeye1*, Enoch A. O. Afolayan2, Dupe S. AdemolaPopoola (2008). Retinoblastoma -a clinico - pathological study in Ilorin, Nigeria. Aferecan jurnal of health scinces 13(1).

14. Häußler, S. M., Stromberger, C., Olze, H., Seifert, G., Knopke, S., & Böttcher, A. (2018). Head and neck rhabdomyosarcoma in children: a 20-year retrospective study at a tertiary referral center. Journal of cancer research and clinical oncology, 144(2), 371-379

15. FRUEHWALD-PALLAMAR, Julia, et al. Magnetic resonance imaging spectrum of medulloblastoma. Neuroradiology, 2011, 53.6: 387-396.

16. PATEL, Amol, et al. Clinical predictors and prognostic model for pediatric lymphoblastic lymphoma treated with uniform BFM90 protocol: A singlecenter experience of 65 patients from Asia. Clinical Lymphoma Myeloma and Leukemia, 2019, 19.6: e291-e298.

17. CORTELAZZO, Sergio, et al. Lymphoblastic lymphoma. Critical reviews in oncology/hematology, 2017, 113: 304-317.

18. Faranoush, Mohammad, et al. "Retinoblastoma presentation, treatment and outcome in a large referral centre in Tehran: a 10-year retrospective analysis." Eye (2020): 1-9.

19. Perez, Eduardo A., et al. "Rhabdomyosarcoma in children: a SEER population based study." Journal of Surgical Research 170.2 (2011): e243-e251

20. Dawooda, L. J., J. G. Hasanb, and H. M. Salahb. "Malignant solid tumors in basra pediatric oncology center." Scientific Journal of Medical Science 4.2 (2015): 392-404