OPEN ACCESS
Saudi Journal of Pathology and Microbiology
Abbreviated Key Title: Saudi J Pathol Microbiol
ISSN 2518-3362 (Print) |ISSN 2518-3370 (Online)
Scholars Middle East Publishers, Dubai, United Arab Emirates
Journal homepage: https://saudijournals.com

Original Research Article

Clinicopathologic Evaluation of Wilms' Tumor in a Tertiary Care Children Hospital

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DOI: 10.36348/sjpm.2022.v07i12.005 | **Received:** 13.11.2022 | **Accepted:** 25.12.2022 | **Published:** 30.12.2022

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Abstract

Background and Objective: Wilms' tumor has been recognized as the most common primary malignant tumor of kidney at childhood. It comprises 5-6% of tumors in the childhood period, and manifests with various clinical symptoms. Since there have been no sufficient studies in this field in Bangladesh, therefore, this study was conducted to investigate its histopathology and different clinical symptoms. ***Materials and Methods:*** This study was carried out on existing data from 70 children with a diagnosis of Wilms' tumor at Bangladesh Shishu Hospital during the years 2015-2020. In this regard, personal and disease-related characteristics of patients including age, sex, tumor stage, histopathology, and involved kidney were evaluated and SPSS software and other statistical tests were used for data analysis. ***Results:*** The most common age of disease incidence was 2-4 years. In this regard, male and female ratio was 1.5. Meanwhile, the prevalence of an abdominal mass as the most common symptom was 85.0%. Left kidney was involved in 50% of cases and 58 (82.86%) of patients had a favorable histology. In addition, there was a significant correlation between site of kidney involvement and tumor histology ($p<0.005$). ***Conclusion:*** Considering the achieved advances in the diagnosis and treatment of Wilms' tumor, early diagnosis with regard to clinical symptoms can have a valuable role in its effective management.

Keywords: Wilms' tumor, Histopathology.

INTRODUCTION

Wilms' tumor has been recognized as the most common primary malignancy of kidney at childhood [1] which comprises 5-6% of tumors in this period [2]. Its annual incidence rate is 7.8/1000000 with the highest prevalence at the second and third years of living. This tumor is bilateral in 5-10% of cases with an incidence at a lower age [3]. The mean age of its unilateral type is 41.5 and 46.9 months in boys and girls [4]. One of the main features of Wilms' tumor is its accompaniment with some congenital abnormalities and syndromes including WAGR (Wilms' tumor, aniridia, urinary system dysfunction, and mental retardation) and Drash Denys syndrome (pseudohermaphrodism, degenerative disorder of the kidney, and Wilms' tumor itself [5]. The most common clinical symptom in patients with Wilms' tumor is the presence of an abdominal mass and other symptoms include abdominal pain, hematuria, fever, and hypertension [1]. The role of genetic factors in the pathogenesis of Wilms' tumor has been confirmed, but there is few information regarding environmental risk factors like exposure to hydrocarbons and lead at work places, maternal hypertension, and fluid retention [6].

According to National Wilms' tumor study group for its staging, tumor is classified into 5 stages. Stage I comprise those cases with solitary involvement of the kidney and can totally be removed by surgeon and at the other extreme, stage V with bilateral involvement. Meanwhile, its prognosis is affected by such factors like age, tumor stage and size, and microscopic findings. Among these factors, microscopic findings and the features of anaplasia are more important and on this basis, tumor can be histologically classified into two main classes, i.e. favorable and unfavorable [2].

There have been immense advancements in the treatment and prognosis of patients with Wilms' tumor with regard to great achievements in surgical techniques, post-operative care, and sensitivity of tumor itself to radiotherapy and chemotherapy [7]. Since Wilms' tumor is the most common primary malignancy of kidney at childhood and few researches have been performed in Bangladesh, hence, this study was carried out to determine its histopathology and clinical symptoms in referrals of Bangladesh Shishu Hospital & Institute during the years 2015-2020.

MATERIALS AND METHODS

This study was carried out on existing data from 70 children with a diagnosis of Wilms' tumor at Bangladesh Shishu (Children) Hospital & Institute during the years 2015-2020. In this regard, relevant parameters including age, gender, family history, clinical symptoms, tumor stage and grade, histopathology, and site of involvement were evaluated and SPSS software and other statistical tests were used for data analysis. In this regard, a statistical p value less than 0.05 were considered significant.

RESULTS

The minimum and maximum age of children with Wilms' tumor was 04 months and 10 years respectively and 35 (50.0%) out of them had an age less than 3 years. In addition, 42 (60.0%) and 28 cases (40.0%) out of the total were male and female respectively. Considering the clinical symptoms, 85.0% of them had referred with signs of abdominal mass that had been detected by their parents and/or physicians and the remaining cases had signs of abdominal pain, hematuria, fever, and vomiting in order of prevalence. Data obtained from laboratory analysis showed that 32 cased (45.7%) had normal WBC and 15 (21.4%) patients suffered from leukocytosis and others 23 (32.8%) had leucopenia. In addition, 50 (71.4%), 15 (21.4%), and 05 (7.1%) cases had anemia, normal hemoglobin, and hemoglobin level higher than 14 mg/dl respectively. Urine analysis showed that 20 (28.6%) of cases had hematuria and 50 (71.4%) of them were normal in this respect. Meanwhile, 96% of cases had abnormal findings on ultrasonography. Histopathological evaluation of patients showed that 58 cases (82.86%) had favorable histology and unfavorable histology was found out in 12 patients (17.14%). Table 1 shows different compositing parts of Wilms' tumor.

Table 1: Frequency distribution of different compositing parts of Wilms' tumor with favorable histology

	Number of cases	**% Frequency**
Prodominantly epithelial	**18**	**31.03**
Prodominantly Blastmal	**30**	**42.86**
Prodominantly Stromal	**06**	**10.34**
Mixed epithelial and blastmal	**02**	**2.86**
Mixed epithelial and blastmal and stromal	**02**	**2.86**
Total	58	100

Regarding tumor metastasis and its spread to other systems, renal capsule involvement (64.29%, 45 cases) comprised the most common abnormality (Table 2).

Table 2: Frequency distribution of tumor metastasis in patients

Metastasis location	Number of cases	Frequency
Renal capsule	**45**	64.29
Renal vascular system	**15**	21.43
Peri-aortic lymph glands	**05**	**7.14**
Peritoneum	**05**	**7.14**
Lungs	**04**	**5.71**

With respect to tumor staging, most of the patients were at stage II (40%) (Table 3).

Table 3: Frequency distribution for tumor stage

Stage	Number of cases	% Frequency
I	**23**	**32.86**
II	**28**	**40**
III	**04**	**5.71**
IV	**05**	**7.14**
V	**10**	**14.29**
Total	70	100

In this study, 5 patients (7.14%) had accompanying congenital malformation including horse-shoe shaped kidney, pseudohermaphrodism and anomaly of the contralateral kidney and umbilical hernia and hemihypertrophy of the kidney.

With regard to treatment strategies for patients, 65 cases (92.86%) underwent total and/or subtotal nephrectomy, 62 patients (88.57%) had post-operative chemotherapy, and 20 out of them (28.57%) had both post-surgical chemotherapy and radiotherapy. The parameters age, gender, tumor stage, and kidney involvement and their relationship with its histopathology were statistically analyzed. In this respect, a significant relationship was only obtained for kidney involvement and tumor histopathology ($p<0.005$) and patients with bilateral involvement of kidneys had unfavorable histology.

DISCUSSION

As mentioned before, 70 cases were enrolled in this study. Mean age of tumor diagnosis was 30 and 40.5 months for boys and girls respectively, which is nearly consistent with reported data in references and textbooks [1]. In this regard, Tang *et al.,* (Taiwan, 2004) in their study on 98 patients with Wilms' tumor found 44.4 months as the mean age of tumor diagnosis [8]. In another study by Painezza *et al.,* (Canada, 1990-2001) on 40 patients with Wilms' tumor, it was found out that the mean age is 28.5 months [9]. Meanwhile, this age was reported as 44.5 months by Arzanian *et al.,* (Tehran, 2004) [4]. In our study, 42 (60%) boys and 28 (40%) girls (ratio was 1.5:1) and this ratio was reported as 1.04 by Tang *et al.,* [8]. In this regard, in Ontario study, there were 18 boys and 22 girls [9]. Meanwhile Arzanian study was conducted on 28 boys and 26 girls [4]. In addition, Davari *et al.,* (Isfahan) in their study on 88 cases of Wilms' tumor had 54.5% boys and 45.5 % girls. In our study, abdominal mass was the most common clinical finding (85.0%). In this regard, Pinezza *et al.,* and some references reported this as 85% (1, 9). Meanwhile, Arzanian *et al.,* [4] and Davari *et al.,* [10] found this as 88.9 and 88.2% respectively.

Considering the involved kidneys, left kidney was involved in the majority of patients (50%) in our study. Arzanian *et al.,* reported left and right kidney involvement as 55.6% (30 cases) and 44.4% (24 cases) respectively and there was no bilateral involvement [4]. In another study conducted by an oncology department in France, 4.6% of cases had bilateral tumor [11]. In addition, left kidney in 58.5% of cases was involved in Arzanian study [10]. In our study and that done by Davari *et al.,* incidence rate for bilateral involvement was 10% and 3% respectively.

According to obtained results, the majority of patients were at stage II (40.0%) in our study, while this was 51.2% and 40% in Arzanian [4] and Ontario [9] studies respectively. Meanwhile, in Taiwan study, 43, 19.3, 23.9, and 6.8% of cases were at stages I, II, III, IV and V respectively.

Regarding tumor histopathology, 82.86% of cases had favorable histology in our study, while this was 82.5, 55, and 91.1% in Ontario [9], Arzanian, and Davari studies respectively. In this study, only a significant relationship was found out between location of kidney involvement and tumor histopathology, while Arzanian study found such a relationship for tumor histopathology and its stage also and for tumor stage and age and gender [4]. Furthermore, 7.14% of cases had accompanying anomaly, while this was 5.0% and included testis cryptorchidism and horse-shoe shaped kidney [10]. These anomalies have been reported up to 17% which may be related to not being diagnosed and/or reported.

CONCLUSION

The obtained results in this study are rather consistent with other studies and referral system and sample size should also be considered in interpretation of the results. Therefore, further studies with a larger sample size and designing a multi-center research are strongly recommended.

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