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Original article

Malignant solid tumors in basra pediatric oncology center

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ABSTRACT

Malignant solid tumors represent about 50% of all malignant neoplasm in children aged less than 15 years ,They make more than 80% of all malignancies in infants. To focus on clinical and biological characteristics of patients with various types of malignant solid tumors who have been admitted to the Oncology center at Basra Maternity and Children Hospital during the period from the 1st of January 2004 till the end of December 2009. A retrospective study was carried out at Basra Maternity and Children Hospital during the period from the 1st of January 2004 till the end of December 2009.Total cases of cancer admitted to the Center during that period were 704 cases, malignant Solid tumors represented 27.5% of total cases(194 cases). One hundred sixty five patients were included in the study, their age ranged from one month to 14 years, 85 males and 80 females. Sympathetic nervous system tumors represented the highest percentage (35.8%) followed by renal tumors (26.1%), soft tissue sarcomas (18.2%), germ cell tumors (10.3%), retinoblastoma (6.7%) and the least percentage was for hepatic tumors (3%) . The highest frequency of malignant solid tumors was found in the age group of (1-4years), that included 79 patient (47.9%), most of them had neuroblastoma ;32 patients (40%). Most cases with malignant solid tumors were from the center and northern areas of Basra (28.5%,14.6% respectively) and to a lesser extent in western (10.3%), southern (6%), and eastern areas(1.2%). Other governorates like ThiQar and Maysan account for high rates

(21.8%,16.4% respectively) of admissions in Basra pediatric oncology center. The overall mortality was 27.3% (45 cases), it ranged from 11.8%-40%, and most common cause of death was advanced metastatic disease. Non compliance or discontinuation of treatment is an important dilemma for all types of cancer. This study revealed that sympathetic nervous system tumors, the commonest of them was neuroblastoma , most cases presented in stage III or stage IV of the disease. So Improving the diagnostic facilities in Basra Oncology Center by introducing specific type of investigation for evaluation of patient with malignant solid tumors like metaiodobenzylguanidine (MIBG) scan, positron emission tomography (PET), genetic study, and other important biochemical investigations could assign the patient risk group, and not depending only on simple criteria for the classification of the disease.

1. Introduction

Childhood cancer remains the leading cause of disease related mortality among children 1 to 14 years of age and there were approximately 1400 cancer related deaths annually in united states among children younger than 15 years (1).

Malignant solid tumors represent about 50% of all malignant neoplasms in children aged less than 15 years (2,3). They make more than 80% of all malignancies in infants (3).

Globally, the problem of malignant solid tumors is particularly more pressing in developing countries. In most developed countries early diagnosis and recent advances in therapy have contributed to significantly improved outcome of these tumors. The outcome in most developing countries has however remain generally poor (4).

Among the diverse types of pediatric solid tumors are tumors of the central nervous system (35%); neuroblastoma (10%); soft-tissue sarcoma, including rhabdomyosarcoma (7%); Wilm's tumor (6%); bone tumors, including osteosarcoma and Ewing's sarcoma (8%); retinoblastoma (3%); and miscellaneous tumors including hepatoblastoma, germ cell tumors, and melanoma (17%) (5).

Neuroblastoma is the neoplasm of the sympathetic nervous system (6). It's the most common extra cranial solid tumor in children (7)and it's the most common malignancy during infancy (3).

Renal tumors comprise 7-8% of all tumors in the first 15 years of life. Wilms' tumor (~85% of cases) , renal cell carcinomas(~3-5%), mesoblastic nephroma (~3%), clear cell sarcoma of the kidney (~3-4%), rhabdoid tumor of the kidney (~2%) and miscellaneous rare tumors (~2%)(8).

Wilms tumor(WT), or nephroblastoma, is the most common primary renal malignancy of childhood. The annual incidence of WT is 8 per million children younger than 15 years, representing 6.3% of cases of childhood cancers(9).

Pediatric soft tissue sarcomas are a group of malignant tumors that originate from primitive mesenchymal tissue (10). Rhabdomyosarcomas, tumors of striated muscle, and undifferentiated sarcomas account for more than half of all cases of soft tissue sarcomas in children(11).

Rhabdomyosarcoma (RMS) is the common soft tissue sarcoma of childhood. The incidence of RMS in those 20 years of age or younger is 4.3 cases per million each year in United States. Among the extracranial solid tumors of childhood , RMS is the third most common neoplasm after neuroblastoma and WT(12).

Germ cell tumors (GCT) include a diverse group of tumors that arise from primordial germ cells either in the gonads or nongonadal sites. Gonadal and extragonadal GCT are infrequent in childhood, occurring at a rate of 2.4 cases per million children and representing approximately 1% of cancers diagnosed in persons younger than 15 years(13).

Retinoblastoma (RB) is a relatively uncommon tumor of childhood that arises in the retina. Although RB may occur at any age, it most often occurs in children younger than 2 years. RB diagnosed in patients older than 5 years has a poorer prognosis (14).

Malignant liver tumors account for slightly > 1% of all pediatric malignancies. Hepatoblastoma accounts for two thirds of liver tumors in children. Other liver malignancies in children include hepatocellular carcinoma , sarcomas, GCT, and Rhabdoid tumors(15).

To study selected demographic and clinical features of malignant solid tumors in Basrah pediatric oncology center and evaluate the response to treatment and outcome of the patients.

2. Patients and methods

2.1. Patients

A retrospective study was carried out on children less than 15 years of age who were diagnosed with malignant solid tumors. Patients were admitted and diagnosed in Pediatric Oncology Center at Basrah Maternity and Children Hospital during the period from the 1st of January 2004 till the end of December 2009.

Total cases of cancer admitted to the Center during that period were 704 cases, Solid tumors were 194 cases (27.5% of total cases), of them CNS tumors (11 cases) and bone tumors (15 cases), were excluded from the study because most of them not managed in the center.

One hundred sixty eight patients were reviewed, their ages ranged from one month to 14 years, 3 patients were excluded because of lack of adequate information for analysis, so 165 patients were included in the study.

The diagnosis of sympathetic nervous system tumors, renal tumors, soft tissue sarcomas, germ cell tumors and hepatic tumors was based on history, clinical examination, imaging studies, and histopathological examination of a biopsy specimen, also certain tumor markers like α- fetoprotein and β-HCG were used to help in the diagnosis of germ cell tumors and hepatic tumors.

Retinoblastoma diagnosed by history, clinical examination and ophthalmologic examination.

2.2. Data collection

A special data sheet was designed for the purpose of the study (Appendix I). The following information were taken from patients files, name, age (date of birth),date of admission, gender. Residence of patients with malignant solid tumors were taken and to simplify the major areas of Basrah ,a classification was designed by Habib OS et al in 2007 (16) in which Basrah was divided into 5major areas, Basrah center, northern area (that include Qurna, Qarma, Modina, Hartha),and western area (Al Zubiar district),eastern area (Shatt Alarab and Alshlamja). and southern area (Abu Alkhaseeb and Fao). Other governorates like Thi Qar, Maysan,…etc also included in the sheet which also included the type of malignancy (sympathetic nervous system tumors, renal tumors, soft tissue sarcomas, germ cell tumors, retinoblastoma and hepatic tumors), clinical features at presentation including symptoms and signs , fever, pallor, anorexia, weight loss, dyspnea, abdominal mass, abdominal distension, hepatosplenomegaly, hematuria, hypertension, lymphadenopathy, leukocoria, Proptosis, Nasal mass, lower back mass and others.

Histopathology was reviewed, treatment modalities(chemotherapy, surgery and radiotherapy), staging of tumor (I,II,III,IV,V), distant metastasis and site of metastasis (bone marrow, lung, liver, liver and spleen, bone, orbit, brain and others) were included in the sheet.

The outcome of the patient (completed treatment, on treatment, non compliance, recurrence, died) also included , non compliance defined as refusing treatment from the beginning, stopping the treatment or receiving treatment irregularly.

Causes of death(advanced metastatic disease, infection, renal failure, bleeding and others) also included.

2.3. Statistical analysis

Statistical analysis was done using SPSS program (11), data were expressed and mean + standard deviation was performed. P-value of<0.05 was considered statistically significant.

3. Results

3.1. Distribution of cases according to the types of malignant solid tumors

Different malignant solid tumors and their percentages were evaluated in Table (1)

Table 1
Distribution of total cases according to the types of malignant solid tumors from 2004-2009.

Type of tumor	Cases	
	Number	Percentage
Sympathetic Nerve Tumors	59	35.8%
Renal Tumors	43	26.1%
Soft Tissue sarcomas	30	18.2%
Germ cell tumors	17	10.3%
Retinoblastoma	11	6.7%
Hepatic Tumors	5	3%
Total	165	100%

A total of 165 patients were included in this study , sympathetic nervous system tumors represented the highest percentage 35.8% followed by renal tumors 26.1%,then soft tissue sarcomas 18.2%, germ cell tumors 10.3%, retinoblastoma 6.7%, and lastly hepatic tumors 3%.

3.2. Distribution of patients with malignant solid tumors according to the years of admission

All patients with malignant solid tumors were classified according to the years of admission.

Table 2
Distribution of patients with malignant solid tumors according to years of admission.

Years	Types of tumor						Total	Percentage
	SNT	RT	STS	GCT	RB	H T		
2004	8	7	1	2	1	1	20	12.1%
2005	7	6	4	3	2	1	23	13.9%
2006	4	6	10	3	2	2	27	16.4%
2007	9	8	7	1	3	0	28	17%
2008	6	9	4	3	3	1	26	15.8%
2009	25	7	4	5	0	0	41	24.8%
Total	59	43	30	17	11	5	165	100%

This table reveals that the percentage of the patients has doubled from 12.1% at 2004 to 24.8% at 2009.

3.3. Distribution of patients with malignant solid tumors in relation to the sex and age

All patients with malignant solid tumors were classified according to the sex and age at diagnosis, the results are shown in the Table (3-3).

This table shows that males are more than females (85,80 respectively), most of cases had occurred in age group 1-4 years and followed by age group 5-9 years. Also this table shows that for both sexes the most common type of tumors below 1 year was sympathetic nervous system tumors, the same thing for age group 1-4 years, while in age group 5-9 years the most common type of tumors was renal tumors, and for 10-14 years the most common type was soft tissue sarcomas.

The table also shows that retinoblastoma, hepatic tumors and sympathetic nervous system tumors are more in males with M/F ratio(4.5,1, 1.5,1, 1.36,1 respectively), soft tissue sarcomas equal in males and females M/F ratio (1,1), while renal tumors and germ cell tumors are more in females with M/F ratio (0.65,1 and 0.7,1 respectively), also the table shows the mean age for each type, for total patients the mean age was 3.7 years.

Table 3
Distribution of patients with malignant solid tumors in relation to the sex and age.

Type of malignancy	Male				Total	Female				Total	M/F ratio	Mean age +SD
	<1 year	1-4 years	5-9 years	10-14 years		<1 year	1- 4 years	5-9 years	10-14 years			
SNT	9	16	7	2	34	3	16	5	1	25	1.36,1	2.8 + 2.3
	26.5%	47.1%	20.5%	5.9%	100%	12%	64%	20%	4%	100%		
RT	0	8	9	0	17	2	11	11	2	26	0.65,1	4.1 + 2.3
		47.1%	52.9%		100%	7.7%	42.3%	42.3%	7.7%	100%		
STS	0	5	7	3	15	3	4	3	5	15	1,1	5.2 + 3.3
		33.3%	46.7%	20%	100%	20%	26.7%	20%	33.3%	100%		
GCT	1	4	2	0	7	0	4	4	2	10	0.7,1	4.3 + 3.2
	14.3%	57.1%	28.6%		100%		50%	50%		100%		
RB	2	6	1	0	9	0	1	1	0	2	4.5,1	2.6 + 1.6
	22.2%	66.7%	11.1%		100%		50%	50%		100%		
HT	0	3	0	0	3	1	1	0	0	2	1.5,1	1.6 + 0.8
		100%			100%	50%	50%			100%		
Total	12	42	26	5	85	9	37	24	10	80	1.06,1	3.7 + 2.7
%	14.1%	49.4%	30.5%	5.8%	100%	11.2 %	46.2%	30%	12.5%	100%		

*SNT, sympathetic nervous system tumors, RT, renal tumors, STS, soft tissue sarcomas, GCT, germ cell tumors, RB, retinoblastoma, HT, hepatic tumors, M/F ratio, male to female ratio, SD, standard deviation.

3.4. Residence of patients with malignant solid tumors.

Most patients with malignant solid tumors came from Basrah, the results are shown in Table (4).

Table 4
Distribution of patients with malignant solid tumors according to their residence.

Residence	Type of malignancy						Total
	SNT(%)	RT(%)	STS(%)	GCT(%)	RB(%)	HT(%)	No(%)
Basrah	33(55.9)	27(62.8)	21(70)	9(52.9)	8(72.7)	2(40)	100(60.6)
Thi Qar	12(20.3)	11(25.5)	5(16.6)	4(23.5)	2(18.2)	2(40)	36(21.8)
Maysan	14(23.7)	4(9.3)	3(10)	4(23.5)	1(9.1)	1(20)	27(16.4)
Al-Muthana	0	0	1(3.3)	0	0	0	1(0.6)
Kurkuk	0	1(2.3)	0	0	0	0	1(0.6)
Total	59(100)	43(100)	30(100)	17(100)	11(100)	5(100)	165(100)

This table shows that most of the patients were from Basrah (100 patient represent 60.6% of total admission). Other governorates like Thi Qar and Maysan represented (21.8%,16.4% of admitted cases respectively).

3.5. Distribution of patients with malignant solid tumors in basrah

Most of patients were from center and northern areas of Basrah, the results are interpreted in Table (5).
This table shows that most patients were from the center and northern areas of Basrah (47%, 24% respectively), then western areas (17%), southern areas(10%) and lastly eastern areas (2%). P- value is statistically significant(<0.001).

3.6. Clinical features of patients with malignant solid tumors

Many clinical features were observed in patients with malignant solid tumors at presentation, these are (fever, pallor, anorexia, abdominal mass, abdominal distension, hepatosplenomegaly, hematuria, weight loss, dyspnea, leukocoria, proptosis, lymphadenopathy, hypertension, lower back mass, nasal mass with nasal obstruction, and others) , these features were studied and presented in Table (6).

This table shows that most patients with sympathetic nervous system tumors presented with abdominal mass (59.3%), abdominal distension (30.5%), pallor (39%) and fever (25.4%).

Table 5

Distribution of patients with malignant solid tumors in Basrah.

Residence		Type of malignancy						Total	P-Value
		SNT(%)	RT(%)	STS(%)	GCT(%)	RB(%)	HT(%)		
Basrah	Basrah center	22(66.6)	9(33.3)	6(28.6)	5(55.6)	3(37.5)	2(100)	47(47)	
	Northern areas	5(15.5)	12(44.4)	4(19)	2(22.2)	1(12.5)	0	24(24)	
	Southern areas	3(9)	5(18.5)	1(4.8)	1(11.1)	0	0	10 (10)	
	Eastern Areas	0	0	1(4.8)	0	1(12.5)	0	2 (2)	
	Western areas	3(9)	1(3.7)	9(42.8)	1(11.1)	3(37.5)	0	17(17)	<0.001
Total		33(100)	27(100)	21(100)	9(100)	8(100)	2(100)	100(100)	

Most of patients with renal tumors presented with abdominal mass(72.1%) followed by hematuria(27.9%).

Patients with soft tissue sarcomas presented with Proptosis(36.6%), nasal mass and nasal obstruction(16.7%), and other features(like, urine retention, constipation, cervical swelling, shoulder swelling)(36.6%).

Germ cell tumors presented with abdominal mass(47.1%), pallor (29.4%), lower back mass(23.5%) and other features(like, testicular swelling, constipation, urine incontinence)(35.3%).

Retinoblastoma presented with Proptosis(54.5%) and leukocoria(36.4%).

Hepatic tumors presented with abdominal mass (100%), abdominal distension(20%), fever(20%)and lymphadenopathy(20%).

Table 6

Clinical features of patients with malignant solid tumors.

Clinical features		Type of tumor					
		SNT	RT	STS	GCT	RB	HT
		59	43	30	17	11	5
Fever	No.	15	3	2	3	0	1
	%	25.4%	7%	6.7%	17.6%		20%
Pallor	No.	23	7	3	5	0	0
	%	39%	16.3%	10%	29.4%		
Anorexia	No.	5			2	0	0
	%	8.5%	0	0	11.8%		
Abdominal	No.	35	31	4	8	0	5
mass	%	59.3%	72.1%	13.3%	47.1%		100%
Abdominal distension	No.	18	9	0	1	0	1
	%	30.5%	20.9%		5.9%		20%
Hepato-	No.	12	3	0	0	0	0
splenomegaly	%	20.3%	7%				
Hematuria	No.	0	12	0	0	0	0
	%		27.9%				
Weight loss	No.	5	5	3	5	1	0
	%	8.5%	11.6%	10%	29.4%	9.1%	
Dyspnea	No.	5	5	0	0	0	0

	%	8.5%	11.6%				
leukocoria	No.	0	0	0	0	4	0
	%					36.4%	
Proptosis	No.	10	0	11	0	6	0
	%	16.9%		36.6%		54.5%	
Lymphadenopathy	No.	12	2	2	1	0	1
	%	20.3%	6.7%	4.7%	5.9%		20%
Hypertension	No.	4	1	0	0	0	0
	%	6.8%	2.3%				
Lower back mass	No.	0	0	0	4	0	0
	%				23.5%		
Nasal mass and nasal obstruction	No.	0	0	5	0	0	0
	%			16.7%			
Others	No.	20	8	11	6	3	1
	%	33.9%	18.6%	36.6%	35.3%	27.3%	20%

3.7. Distribution of patients according to type and stage of cancer at presentation

Type of malignant solid tumor and stage at presentation are shown in table (7).

Table 7
Distribution of patients according to type and stage of cancer at presentation.

Stage of the disease		Type of tumor						Total
		SNT	R T	STS	GCT	RB	H T	
Stage 1	No.	0	9	0	2	0	0	11
	%		20.9%		11.8%			6.7%
Stage 2	No.	2	11	8	5	5	1	32
	%	3.4%	25.6%	26.7%	29.4%	45.5%	20%	19.4%
Stage 3	No.	25	13	17	9	5	3	72
	%	42.4%	30.2%	56.6%	52.9%	45.5%	60%	43.6%
Stage 4	No.	32	9	5	1	1	1	49
	%	54.2%	20.9%	16.7%	5.9%	9.1%	20%	29.7%
Stage 5	No.	0	1	0	0	0	0	1
	%		2.3%					0.6%
Total	No.	59	43	30	17	11	5	165

This table reveals that high percentage of patients presented with stage 3 (43.6%) and stage 4 (29.7%) of the disease.

3.8. Site of metastasis in relation to type of cancer

Number of patients that had metastatic disease at presentation and different sites of metastasis are presented in Table (3-8).

Table 8
Distribution of patients according to site of metastasis in relation to type of cancer.

Site of metastasis	Type of tumor						Total
	SNT	RT	STS	GCT	RB	HT	
Multiple sites of metastasis	20	4	1	0	0	0	25
	64.5%	40%	25%				52.1%
Lung	0	5	0	0	0	1	6
		50%				100%	12.5%
Liver	3	1	1	1	0	0	6
	9.7%	10%	25%	100%			12.5%

Liver and spleen	3 9.7%	0	0	0	0	0	3 6.2%
Bone	3 9.7%	0	2 50%	0	0	0	5 10.4%
Orbit	2 6.5%	0	0	0	0	0	2 4.2%
Brain	0	0	0	0	1 100%	0	1 2.1%
Total	31 100%	10 100%	4 100%	1 100%	1 100%	1 100%	48 100%

This table shows that 48 patients with malignant solid tumors had metastatic disease at presentation, high percentage of them had multiple sites of metastasis (52.1%), most of them with sympathetic nervous system tumors.

3.9. Treatment modalities

Treatment modalities of patients with malignant solid tumors managed in Basrah pediatric oncology center were evaluated and the results shown in Table (9).

Table 9
Treatment modalities in relation to types of tumors.

Treatment Modalities	type of tumor						Total
	SNT	RT	STS	GCT	RB	HT	
Chemotherapy	29 49.2%	5 11.6%	4 13.3%	1 5.9%	2 18.2%	3 60%	44 26.7%
Surgery	3 5.1%	6 14%	1 3.3%	0	0	0	10 6.1%
Chemotherapy +surgery	17 28.8%	29 60.5%	19 63.3%	16 94.1%	9 81.8%	2 40%	92 55.8%
Chemotherapy +surgery +radiotherapy	0	1 2.3%	3 10%	0	0	0	4 2.4%
Chemotherapy +radiotherapy	10 16.9%	2 4.7%	3 10%	0	0	0	15 9%
Total	59 100%	43 100%	30 100%	17 100%	11 100%	5 100%	165 100%

This table shows that most patients were managed with chemotherapy and surgery (55.8%), or with chemotherapy alone (26.7%). Management with radiotherapy less common.

3.10. Histopathology of malignant solid tumors

Histopathology of malignant solid tumors diagnosed at Basrah pediatric oncology center shown in Table (10).

This table shows that the most common type of sympathetic nervous system tumors was neuroblastoma (93.2%).

Most cases with malignant renal tumors were wilms' tumors (39 case), most of them with favorable histopathology (89.7% of wilms' tumor cases).

Two types of soft tissue sarcomas, rhabdomyosarcoma and fibrosarcoma (76.7% , 23.3% respectively), the most common type of rhabdomyosarcoma was embryonal rhabdomyosarcoma (65.2% of RMS cases).

Most common type of germ cell tumors was Yolk sac tumor (41.2%), then teratocarcinoma (35.3%).

Only one type of hepatic tumors diagnosed in Basrah pediatric oncology center which was Hepatoblastoma.

3.11. Outcomes of patients with malignant solid tumors

Patients with different malignant solid tumors were evaluated regarding their fate and the results illustrated in Table(11).

Table 10
Distribution of patients with malignant solid tumors according to histopathology.

Type of tumor	Histopathology					Total
Sympathetic nervous system tumors	Neuroblastoma 55 (93.2%)			Ganglioneuroblastoma 4 (6.8%)		59 (100%)
Renal tumors	Wilms' tumor		Renal cell carcinoma	Clear cell sarcoma	Rhabdoid tumor of kidney	43 (100%)
	Favorable 35(81.4%)	Unfavorable 4(9.3%)	2(4.7%)	1(2.3%)	1(2.3%)	
Soft tissue sarcomas	Rhabdomyosarcoma				Fibrosarcoma	30
	embryonal 15(50%)	Alveolar 7(23.3%)	Botryoid 1(3.3%)		7(23.3%)	(100%)
Germ cell tumors	Yolk Sac Tumor 7(41.2%)	Teratocarcinoma 6(35.3%)	Embryonal carcinoma 3(17.6%)		Dysgerminoma 1(5.9%)	17 (100%)
Hepatic tumors	Hepatoblastoma 5(100%)					5 (100%)

Table 11
Outcomes of patients with malignant solid tumor.

Outcome		Type of tumor						Total	P Value
		SNT	R T	STS	GCT	RB	H T		
Completed treatment	No.	5	9	1	12	2	1	30	
	%	8.5%	20.9%	3.3%	70.6%	18.2%	20%	18.2%	
Non compliance	No.	22	13	8	3	3	2	51	
	%	37.3%	30.2%	26.7%	17.6%	27.3%	40%	30.9%	
On Treatment	No.	9	3	2	0	3	0	17	
	%	15.3%	7%	6.7%		27.3%		10.3%	<0.05
Recurrence	No.	5	8	8	0	1	0	22	
	%	8.5%	18.6%	26.7%		9.1%		13.3%	
Died	No.	18	10	11	2	2	2	45	
	%	30.5%	23.3%	36.7%	11.8%	18.2%	40%	27.3%	
Total	No.	59	43	30	17	11	5	165	

This table illustrates high percentage of non compliance to treatment (30.9%), and also high percentage of death (27.3%), patients who end their therapy represent(18.2%) of all patients, most of them with germ cell tumors(40% of patients who end there therapy). P-value is highly significant(<0.005).

3.12. Causes of death in patients with malignant solid tumors

Causes of death were assessed and the results shown in Table (12). This table shows that the most common cause of death for patients with malignant solid tumors was the advanced metastatic disease(55.6%), the 2nd cause of death was the infections (26.7%), then renal failure (8.9%)and bleeding (4.4%). Other causes, one patient with hebatoblastoma died due to heart failure and other one had wilms' tumor died during anesthesia.

Discussion

Pediatric cancers today are highly treatable, but 80% of children with malignancies die because they live in the developing countries where access to medical care is inadequate.

There are marked geographic variations in incidences and presentations observed in the spectrum of pediatric malignancies(17).

Table 12
Causes of death in patients with malignant solid tumors.

Cause of death		Type of tumor						Total
		SNT	R T	STS	GCT	RB	H T	
Advanced metastatic	No.	15	5	4	0	1	0	25
Disease	%	83.2%	50%	36.4%	0	50%	0	55.6%
Infections	No.	1	2	5	2	1	1	12
	%	5.6%	20%	45.6%	100%	50%	50%	26.7%
Renal Failure	No.	1	2	1	0	0	0	4
	%	5.6%	20%	9%				8.9%
Bleeding	No.	1	0	1	0	0	0	2
	%	5.6%		9%				4.4%
Others	No.	0	1	0	0	0	1	2
	%		10%				50%	4.4%
Total	No.	18	10	11	2	2	2	45

This study is the 1st study in Iraq that assessed selected demographic features and clinical features of malignant solid tumors, and evaluated the response to treatment and outcome of the patients.

The study showed that the most common type of malignant solid tumors was sympathetic nervous system tumors(35.8%) (of which neuroblastoma was the commonest type(93.2%)) ,this is similar to study that was done in UAE by El-Hayek et al (18), which revealed that neuroblastoma was the commonest among pediatric malignant solid tumors , while in study done in Pakistan by Memon et al (2), retinoblastoma was the most common type of all malignant solid tumors there, they explained that by possible existence of genetic trait in population of Pakistan.

Another study was done in Nigeria by Tanko et al (19), showed that rhabdomyosarcoma was the commonest type among pediatric malignant solid tumors, the explanation was some of small round blue cell tumors that were diagnosed as lymphomas are now diagnosed accurately as rhabdomyosarcomas.

The present study showed that the number of patients with malignant solid tumors that were managed in Basrah pediatric oncology center increased from 20 patients at 2004 to 41 patients at 2009, this might be due to awareness of people about the presence of specialized center for managing cancer in Basrah and also due to improved registration of cases.

This study revealed that most cases of malignant solid tumors occur in age group 1-4 years similar to result of study that was done in France(20), while in Nigerian study (5), the predominance of malignant solid tumors occur in age group 5-9 years.

The present study found that most common type of malignant tumors in age groups below one year and 1-4 years was neuroblastoma, similar result was observed in France study (20) and this is because neuroblastoma is a disease of infancy and early childhood(21).

In a study done in Nigerian(5), the predominant type in age group below one year was neuroblastoma, while in age group 1-4 years wilms' tumor was the commonest type, and this may be due to the fact that wilms' tumor has higher incidence in black population(6,21).

In this study, the predominant type of malignant solid tumors in age group 5-9 years was wilms' tumor .

About age group 10-14 years, the predominant type of malignant solid tumors in this study were soft tissue sarcomas.

Sixty percent of patients with malignant solid tumors were from Basrah (mostly from center and northern areas of Basrah).

Most patients with malignant solid tumors presented to Basrah pediatric oncology center were in late stages of the disease, stage III (43,6%) or stage IV (29.7%), this result was also observed in study that was done in Mexico (22), and other was done in Nigeria(5).

Delayed presentation may be due to ignorance, poverty, delayed referral from other doctors because of wrong diagnosis and due to that some people still believe and use traditional treatment and herbal medicine by local healers.

Late stages of the disease observed in 73.3% of patients with malignant solid tumors in Basrah pediatric oncology center, a finding that generally mean the prognosis would be poor.

In this study 48 patients had distant metastasis at diagnosis, 52.1% of them had metastasis to multiple sites of the body, most of them with neuroblastoma (80%), and this correlated with delayed presentation of those patients.

The most common site of metastasis for neuroblastoma, in this study, was the bone marrow which occur in 51.5% of metastatic neuroblastomas, similar result was found in study that was done in India(23) .

In this study all cases of neuroblastoma with bone marrow metastasis had metastasis to other sites.

The present study found that all cases of renal tumors that had distant metastasis were wilms' tumors, the most common site of metastasis was the lung, occur in 50% of metastatic wilms' tumors, a study was done in Iran(24), also found that the lung was the most frequent site of distant metastases for wilms' tumor (43%).

About treatment modalities, most patients with malignant solid tumors were managed with chemotherapy and surgery (50.9%) or with chemotherapy alone (26.7%), management with radiotherapy was the least common, although many patients required radiotherapy in their management, they didn't receive it due to unavailability of radiotherapy in Basrah.

This study revealed that among sympathetic nervous system tumors neuroblastoma was the most common histological subtype representing (93.2%), followed by ganglioneuroblastoma (6.8%), similar results were found in Moscow study (3). The mean age for patients with sympathetic nervous system tumors was 2.9 years and male, female ratio was 1.36,1, these were nearly similar to the results of Indian study(23), mean age was 2.5 years, male, female ratio 1.6,1.

The major presenting complaints of patients with sympathetic nervous system tumors were abdominal mass (59.3%) followed by pallor(39%) , Indian study(23), also revealed that abdominal mass and pallor were the major presenting features.

This study revealed that most common type of renal tumors was Wilms' tumor (90.7%), followed by clear cell sarcoma (4.7%), renal cell carcinoma (2.3%) and Rhabdoid tumor of the kidney (2.3%), in Moscow study(3), Wilms' tumor also the commonest (84.9%), then clear cell sarcoma (9.1%), renal cell carcinoma (3%) and Rhabdoid tumor of the kidney (3%).

Most cases of wilms' tumor had favorable histopathology (89.7%), this was similar to the result of a study was done in Egypt(25), which revealed that favorable histopathology presented in 86.3% of wilms' tumor cases , while in Iran study (24), favorable histopathology was observed in 54.5% of cases and unfavorable histopathology in 43.6%, they suggest the existence of a more aggressive form of the disease in their region as an explanation for high percentage of unfavorable histopathology.

There was female predominance for wilms' tumor cases, this was similar to that observed in USA(26), but different from Iran(24), where there is male predominance.

The commonest clinical features of wilms' tumor at presentation in this study were abdominal mass (72.1%) and hematuria (27.9%). In Egyptian study(25), the common presenting features were abdominal mass (77.4%) and abdominal pain (17%), in Iran study(24), abdominal mass was also the commonest presenting feature (90.9 %), followed by hematuria (14.5%).

Two types of soft tissue sarcomas were found in Basrah pediatric oncology center, rhabdomyosarcoma which was the commonest (76.7%) and fibrosarcoma (23.3%), similar to the result of Nigerian study(5), which showed that rhabdomyosarcoma was the commonest followed by fibrosarcoma.

The most common histological subtype of rhabdomyosarcoma in this study was embryonal subtype (65.2%), similar to the result of a study was done in Morocco(27).

The mean age for patients with rhabdomyosarcomas in this study was 5.2 years and male, female ratio 1,1, in Morocco study(27), mean age was 5 years while male to female ratio was 2,1. In the present study the most common clinical feature of rhabdomyosarcoma at presentation were Proptosis 36.6% while in Morocco study(27) the common feature was facial and extremity masses.

Germ cell tumors represented 10.3% of cases in this study, the mean age for the patients 4.3 years , these tumors were more in females with male, female ratio 0.7,1. The most common histological subtype of germ cell tumors in this study was yolk sac tumor (41.2), similar result was observed in Nigerian study(19).

Retinoblastoma represented 6.7% of all cases in this study, the mean age for patients with retinoblastoma was 2.6 years, this tumor was more in males with male, female ratio 4.5,1, while in study(2) in Pakistan the mean age was 3.6 years, and male, female ratio 0.8,1.

This study revealed that the most common presenting features of retinoblastoma was proptosis (54.5%), and leukocoria (36.4%), while in a study was done in Pakistan by Arif et al (28), the most common presenting features was leukocoria (57.1%), then proptosis (14.3%),this is because most patients in Basrah oncology center presented with late stages of the disease.

In this study four patients(36.4%) had bilateral retinoblastoma , while in Pakistan study(28), 50% had bilateral retinoblastoma.

Hepatoblastoma was the only type of liver malignancy in this study and represented 3% of total cases, the mean age was 1.6 years, it was more in males with male, female ratio 1.5,1, all the patients presented with abdominal mass, a study was done in Turkey by Abbasoglu et al(29), also found that the mean age was 1.6 years and most of their patients were males with male, female ratio 1.4,1, and the common presenting features was abdominal distention.

This study found that high percentage of patients were not complaint with treatment, 51(30.9%) patients, and this was an important dilemma affecting the treatment and the outcome of the patients, common reasons for non-compliance was poverty, living away from the treating center , inability to tolerate side effects of chemotherapeutic drugs , also most families that seek treatment for their children with cancer believe that they will die, this pessimistic belief sometimes leads to non-compliance with the treatment. Non compliance was also observed in Nigerian study(5).

High mortality was observed among patients in this study, 45(27.3%) patients, higher death occur among patients who presented with late stage of the disease and most of death occur due to the advanced metastatic disease (55.6%) and infections including sepsis and pneumonia (26.7%), other causes of death were renal failure (8.8%), and bleeding (4.4%).

High mortality was also observed in Nigerian study(5), it was 43.4%, and mostly occurred in patients with late stages of the disease. In Conclusions neuroblastoma was the most common type of pediatric malignant solid tumors in Basra pediatric oncology center, non compliance is a major problem and this interferes with treatment and outcome of the patients and high mortality occur among patients with malignant solid tumors and advanced metastatic disease. So Improving the diagnostic facilities in Basra Oncology Center by introducing specific type of investigation for evaluation of patient with malignant solid tumors like metaiodobenzylguanidine (MIBG) scan, positron emission tomography (PET), genetic study, and other important biochemical investigations could assign the patient risk group, and not depending only on simple criteria for the classification of the disease .

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