NUTRITIONAL STATUS OF CHILDREN UNDER 5 YEARS OF AGE WITH NEW CANCER AT NATIONAL CHILDREN'S HOSPITAL

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ABSTRACT

***Background**. Malnutrition is a disintegrating component to outcome of treatment childhood cancer. This research was carried out to assess nutritional status of children newly diagnosed with cancer under syearsold.*

***Method**. A descriptive cross-sectional, prospective study from September 2016 to September 2017 at the Oncology department, National Children's Hospital.*

***Results**. 170 children newly diagnosed with cancer under syearsold were recruited in this study. The prevalence of malnutrition children was found: 22.4% of underweight (moderate 20%, severe 2.4%); 12.4% of stunting (moderate 11.8%, severe 0.6%); 17.6% of wasting (modarate 12.4%, severe 5.3%), respectively. The prevalence of malnutrition according to middle upper arm circumference (MUAC) was 10.9%. The prevalence of overweight was 4.1%. The prevalence of malnutrition according to serum albumin was 29% and serum protein was 20%, respectively. The difference in malnutrition between various cancer diseases was not significant.*

***Conclusions**. The prevalence of malnutrition according to anthropometric indicies and biochemical profiles ranged from 10.9 to 29% of children newly diagnosed with cancer under syearsold. The rate was typical of a developing country.*

***Key words:** malnutrition, children with cancer, under 5 years of age*

I. BACKGROUND

Malnutrition is a contributing factor for decreased immune function, delayed wound healing, disturbed drug metabolism and influences to outcome of treatment childhood cancer [1]. About 300 to 350 new cancer cases are admited the National Children's Hospital, annually [2]. Supportive plan for appropriate nutrition of patients during treatment is necessary for health workers. Therefore, this research was carried out to assess nutritional status of children newly diagnosed with cancer under 5 years old at the National Children's Hospital (NCH) from 2016 to 2017.

II. METHODS

STUDY DESIGN

A cross-sectional, descriptive, prospective study of one year period from September 2016 to September 2017 was carried out among all children aged below 5 years old newly diagnosed with cacer tumors in at the Oncology department, National Children Hospital. The diagnosis was confirmed by the results of pathology for solid tumors or the results of bone marrow aspiration for acute leukemia; all written consent of agreement for participating into the study were taken from patients' parents. In case acceptance of involving into the research from patients' parents was not approved or patients

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- Received: 25/7/2019; Revised: 31/7/2019;
- Accepted: 26/8/2019
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received albumin or chemotherapy at other medical centers before admittion to NCH, children would be excluded from our study.

DATA COLLECTION AND ANALYSIS

In our study, we collected all related information, as diagnosis, age, gender, weight, height, mid-upper arm circumference (MUAC), serum albumin and protein of patients when cancer was confirmed. Weight for age, height for age, weight for height for age Z-score were calculated for each children according to WHO standards for children aged below 5 years old. Nutritional status of children were noted by Z score values of weight for age according to WHO standards and included underweight, normal, overweight, or obesity. Height for age Z-score of children reflected either stunting or normal condition; weight-for-height for age Z-score reflected wasting, normal, and overweight or obesity. Prevalence of malnutrition was compared between solid tumors and acute leukemia group. All data were cleaned, inputed and analyzed using SPSS 16.0 and Excel 2010 version, prevalence comparison was committed using Chi-square test, P – value < 0.05 was considered as statistically significant.

III. RESULTS

Among 170 children newly diagnosed with cancer under aged 0 – 60 months, group of patient from 36 to 47 months old had the highest prevalance (23.5%), while group of patient from 0 to 5 months had the lowest prevalance 8.8%. There were 61 new patients with acute leukemia and 101 with solid tumors, distributed into groups of diseases (Fig. 1). Prevalence of patients with acute leukemia was the highest (35.9%), followed by that of neuroblastoma (20.6%) and germ cell tumor (11.8%). Some solid tumors were rare at the Oncology Department, such as retinoblastoma, brain tumor… Prevalence of newly diagnosed patients in high risk groups was 28.8%.

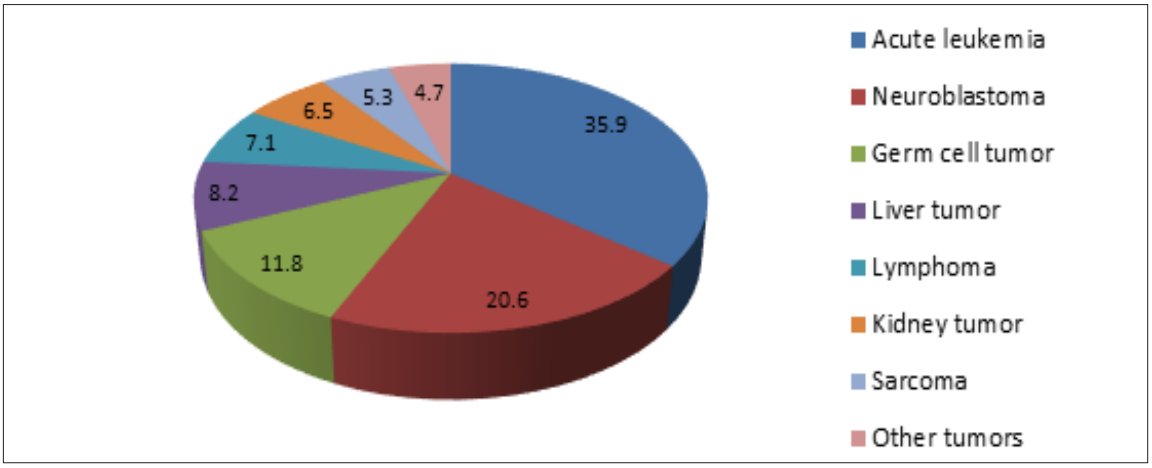

Fig 1. Prevalence of cancer patients under 5 years old by cancer groups

Among 170 children, prevalance of underweight was 22.4% (20% of which were moderate underweight, and 2.4% were severe one) among the new patients aged below 5 years old (Table 1). Prevalance of moderate underweight of solid tumor group was the same to that of acute leukemia group. Prevelance of stunting was 12.4% (11.8% of which were moderate stunting, and 0.6% of which were severe one). Prevelance of moderate stunting of solid tumor group was the same to that of acute leukemia group. 12.4% of total patients had moderate wasting, while 5.3% of which had severe wasting, and 4.1% of which was overweight. The prevalence of wasting was 17.7% in total. On the other hand, the prevalance of moderate wasting at acute leukemia group (16.4%) was higher than solid tumor group (10.1%). In contrast, the prevalance of severe wasting in solid tumor group (6.4%) was higher than that of acute leukemia group (3.3%). All differences were not statistically significant (p > 0.05).

Table 1.Nutritional status of new cancer patients according to anthropometric indicies

Nutritional status	Total n= 170 (100%)	Solid tumors n = 109 (100%)	Acute leukemia n = 61 (100%)
Underweight			
Severe	4 (2.4)	3 (2.8)	1 (1.6)
Moderate	34 (20)	22 (20.2)	12 (19.7)
Normal	128 (75.2)	83 (76.1)	45 (73.8)
Overweight	4 (2.4)	1 (0.9)	3 (4.9)
Stunting			
Severe	1 (0.6)	0 (0)	1 (1.6)
Moderate	**20 (11.8)**	**13 (11.9)**	**7 (11.5)**
Normal	149 (87.6)	96 (88.1)	52 (86.9)
Wasting			
Severe	9 (5.3)	7 (6.4)	2 (3.3)
Moderate	**21 (12.4)**	11 (10.1)	**10 (16.4)**
Normal	133 (78.2)	86 (78.9)	47 (77.0)
Overweight	7 (4.1)	5 (4.6)	2 (3.3)

Among 129 patients aged from 12 to 59 months old who measured MUAC, prevelance of malnutrition based on MUAC was 10.9% (Table 2). Prevalance of malnutrition in the solid tumors group (12%) was higher than that of acute leukemia group (9.3%), but the difference was not statistically significant (p > 0.05)

Table 2. Nutritional status according to mid-upper arm circumference

Level	Total n = 129 (100%)	Solid tumors n = 75 (%)	Acute leukemia n = 54 (%)
Malnutrition	14 (10.9)	9 (12)	5 (9.3)
Normal	115 (89.1)	66 (88)	49 (90.7)

The difference was not statistically significant in any cancer group in all kind of malnutrition (p > 0.05) showed in table 3.

Table 3. Prevalence of malnutrition of new patient under 5 years old by cancer groups

Type of malnutrition		Total n (%)	Solid tumors n (%)	Acute leukemia n (%)	p
Underweight	Malnutrition	38 (22.4)	25 (22.9)	13 (21.3)	
	No malnutrition	132 (77.6)	84 (77.1)	48 (78.7)	0.8
Stunting	Malnutrition	21 (12.4)	13 (11.9)	8 (13.1)	
	No malnutrition	149 (87.6)	96 (88.1)	53 (86.9)	0.8
Wasting	Malnutrition	30 (17.6)	18 (16.5)	12 (19.7)	
	No malnutrition	140 (82.4)	91 (83.5)	49 (80.3)	0.6
Total		170 (100)	109 (100)	61 100)	

Among 107 patients with serum albumin results, the prevalence of mild malnutrition (albumin concentration from 28-35 g/l) was 23.4% and that of moderate malnutrition (albumin concentration from

21-27 g/l) was 5.6%, so the prevelance of malnutrition with serum albumin was 29% (Table 4). Prevalance of mild malnutrition in acute leukemia group was 28.9% and higher than that of solid tumor group. All patients with moderate malnutrition had solid tumor. There was no statistically significant difference between solid tumors group and acute leukemia group ($p > 0.05$).

Table 4. Nutritional status according to serum albumin

Malnutrition level	Total (%)	Solid tumor (%)	Acute leukemia (%)
Mild malnutrition	**25 (23.4)**	**12 (19.3)**	**13 (28.9)**
Moderate malnutrition	6 (5.6)	6 (9.7)	0 (0)
Severe malnutrition	**0 (0)**	**0 (0)**	**0 (0)**
Normal	76 (71)	44 (71)	32 (71.1)
Total	107 (100)	62 (100)	45 (100)

Among 120 children with the serum protein results, the prevalence of children suffering from malnutrition by protein level was 20% (Table 5). The prevalence of malnourished children in solid tumors group was 25.7%, higher than that of acute leukemia group, though there was no significant difference ($p > 0.05$).

Table 5. Nutritional status according to serum protein

Nutritional status	Total (%)	Solid tumor (%)	Acute leukemia (%)
Malnutrition	**24 (20)**	**18 (25,7)**	**6 (12)**
Normal	96 (80)	52 (74,3)	44 (88)
Total	120 (100)	**70** (100)	50 (100)

IV. DISCUSSION

The prevalence of underweight was 22.4% among 170 children aged below 5 years old with new cancer, who were admitted at the Oncology department National Children's Hospital from September 2016 to September 2017. Insignificant difference was noted between various disease groups. Our results were similar with the results in a study of 443 cancer patients in Brazil (1995-1998), the prevalence of underweight of 23.5% [3], but lower than that of a study in India [4]. The study in India involved more patients, 1187 cancer children from 2008 to 2013, the prevalence of underweight consisted of 38%, with the malnutrition in acute leukemia and neuroblastoma are decently high; 20.63% moderate malnutrition and 16.9% severe malnutrition in acute leukemia group; 19.04% moderate malnutrition and 14.28% severe malnutrition in neuroblastoma group.

In this study, the prevalence of wasting was 17.6% intotal, 16.5% in solid tumor group, and 19.7% in acute leukemia group. Our results were lower than that of a study in India during 2012-2014 [4]. The condition and complications of cancer lead the weight to quickly losing; as a result, a higher rate of wasting was documented. In this study, the prevalence of moderate wasting was 12.4%, while the severe level took 5.3%. The prevalence of new cancer patients with underweight and wasting in developing countries remain quite high. Special attention to these children during the treatment process should be taken. According to Pietsch et al (2000, America), evaluating malnutrition cancer children by various anthropometric indices can lead to different results. The best standard for evaluation of children from 0 to 5 years old that should be used was weight-by-height Z score [5].

Our results based on MUAC indicated that the prevalence of malnutrition was 17.6% in total, 16.5% in solid tumor group, and 19.7% in acute leukemia group. The study on 2945 patients with new cancer and aged 1 to 18 years old

(2004-2007) in Central American countries showed the prevalence of moderate malnutrition and severe malnutrition based on MUAC was 18% and 45%, respectively [6]. The prevalence of malnutrition in a study in Kuala Lumpur was 45.9% in solid tumor group, 32.4% in malignant haematopoietic group [7]. A study in Morocco also showed the prevalence 59.3% of severe malnutrition at the time of diagnosis. The MUAC is a sensitive indicator to detect malnutrition in cancer children because it shows the decrease of muscle in the body, not related with the mass of tumour [8]. Our results were lower than that of other studies, which might be explained that our sample size was small and our participants were children aged below 5 years old.

Nutritional status assessed according to serum albumin concentration showed the prevalence of malnutrition was 29% (5.6% of moderate level and 23.4% of mild level), mild malnutrition was mainly in the group of children with acute leukemia (28.9%), while moderate malnutrition was mainly in solid tumor group (9.7%). This prevalence was higher than that of assessing by anthropometric indicies with 22.4% underweight, 12.4% stunting and 17.6% of wasting. Our results were higher than that of the study in Kuala Lumpur 2009 in which the prevalence of malnutrition in solid tumor group was 8.1%, in malignant haematopoetic group was 18.9%, without any differences in albumin concentration between solid tumor group and acute leukemia group [9]. This conclusion was similar to our results. Though our results were lower than that of a study in cancer children of Central American study 2004 – 2007 on big sample size and children aged from 1-18 years old (severe malnutrition according to serum albumin was 59.2%) [6].

The evaluation of malnutrition due to serum protein showed 20% of malnutrition in total, 25.3% in solid tumor group, and 12% in acute leukemia group, the difference between these 2 groups was not significant. This prevalence was lower than that of both underweight (22.4%) and malnutrition based on albumin concentration (29%), but higher than that of wasting (17.6%) and stunting (12.4%). Our results were lower than that results of the study in Kuala Lumpur (2009) with the prevalence of malnutrition according to protein concentration in solid tumor children con was of 64.9% and in malignant haematopoetic group con, 43.2% [9]. Total protein concentration and serum albumin are not sensitive indicators to evaluate nutritional status because they were affected by liver function, kidney function, metabolism and other underlying conditions. According to Murphy et al (2009), there was not a simple method to assess nutritional status of children with cancers [9].

According to Sala et al (2004), it was accepted that the prevalence of malnutrition at diagnosis was approximately 50% in children with cancer in developing countries; whereas, in developed countries, it is related to the type of tumor and the extent of the disease, ranging from 10% in patients with standard risk of acute lymphoblastic leukemia to 50% in patients with high risk of neuroblastoma [10].

V. CONCLUSION

Study of 170 children newly diagnosed with cancer under under 5 years old at Oncology department, National Children's Hospital 2016-2017 showed that the prevalence of malnutrition according to anthropometric indices and biochemical profiles ranged from 10.9 to 29%. The rate was similar typically for a developing country. The statistically significant difference in malnutrition was not noted between the solid tumor group and acute leukemia group.

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