

NUTRITIONAL EVALUATION IN PEDIATRIC PATIENTS WITH CANCER AND THE IMPACT ON MORBIDITY AND SURVIVAL

Authors: Patricia Sasse¹; Wanelia V. Afonso²; Fernanda F.S. Lima³; Sima S. Ferman⁴

¹Pediatric Oncology and Master's Student of National Cancer Institute. ²Nutritional of National Cancer Institute. ³Clinical research nurse of Pediatric Oncology of National Cancer Institute.

⁴Supervisor, Head of the Pediatric Oncology Department of the National Cancer Institute

INTRODUCTION

Child and adolescent cancer (ages 0-19) is considered rare when compared to neoplasms affecting adults, accounting for between 2% and 3% of all malignancies. Despite the improvement in treatment results in the last decades with an increase in survival rates of more than 80%, childhood and juvenile cancer remains an important cause of death in developed countries. In middle- and lower-income countries, treatment has not yet been so successful, and results have yet to be improved. Change in nutritional status has been reported as a common problem in pediatric cancer patients. It has been proposed that nutritional status may be a risk factor for increased mortality rate and may reduce the effectiveness of neoplastic treatment by reducing tolerance to treatment as well as decreasing absorption of chemotherapeutic agents.

OBJECTIVE

To determine the prevalence of changes in the nutritional status at diagnosis of pediatric cancer and during treatment.

METHOD

Prospective study of pediatric patients admitted with diagnosis of solid tumor, from June 2017 to May 2018. Nutritional assessments were performed at time of diagnosis, 3 and 6 months later.

- **Design of Study:** Prospective study of pediatric patients diagnosed with solid tumors enrolled for cancer treatment at the Instituto Nacional de Cancer from June 1, 2017 to May 31, 2018. Nutritional assessments at diagnosis, at 3 and 6 months later.
- **Population:** Children and adolescents up to 18 years and 11 months of age, enrolled in the Pediatric Oncology Department of INCA, with confirmed diagnosis of a solid tumor, having been duly informed of intended proceedings and having signed the consent form. Patients with previous oncological, chemotherapeutic or radiotherapeutic treatment are excluded from the study.
- **Data collection:** Data were collected during consultations at the pediatric oncology outpatient clinic or in the ward, if the patient is hospitalized. The nutritional status was evaluated at diagnosis, 3 and 6 months later. Measurements of weight, height, arm circumference and triceps skinfold measurement will be collected.



Malnutrition was defined (in all age groups) as a z-score below minus 2 standard deviations (SD) for any of the indexes: weight for height (W/H), weight for age (W/A) and body mass index for age (BMI/A), while for arm circumference (AC) and triceps skinfold (TSF), the percentile was less than 5.

A classification of overweight and obesity was defined: for children younger than 5 years of age, z score above 2 more SD for W/A, W/H and BMI/A; for children between 5 years and 10 years of age, above 2 more SD for the W/A index and over 1 more SD for BMI/A; for children older than the age of 10, over 1 more SD of BMI/A, while AC and TSF percentiles higher than 95 for all ages.

Anthropometric measurement < 5 years:

Critical values	Weight/age	Weight/height	BMI/age	Height/age
Z score < -3	Very low weight for age	Accentuated thinness	Accentuated thinness	Very low height for age
Z score > -3, < -2	Low weight for age	Thinness	Thinness	Low height for age
Z score > -2, < +1	Adequate weight for age	Eutrofic	Eutrofic	Appropriate height
Z score > +1, < +2	Adequate weight	Overweight risk	Overweight risk	Appropriate height
Z score > +2, < +3	High weight for age	Overweight	Overweight	Appropriate height
Z score > +3	High weight for age	Obesity	Obesity	Appropriate height

Anthropometric Classification Who 2007

Anthropometric measurement for children 5 - 10 years:

Critical values	Weight/age	BMI/age	Height/age
Z score < -3	Very low weight for age	Accentuated thinness	Very low height for age
Z score > -3, < -2	Low weight for age	Thinness	Low height for age
Z score > -2, < +1	Adequate weight for age	Eutrofic	Appropriate height
Z score > +1, < +2	Adequate weight	Overweight	Appropriate height
Z score > +2, < +3	High weight for age	Obesity	Appropriate height
Z score > +3	High weight for age	Severe obesity	Appropriate height

Anthropometric Classification Who 2007

Anthropometric measurement for children > 10 years:

Critical values	BMI/age	Height/age
Z score < -3	Accentuated thinness	Very low height for age
Z score > -3, < -2	Thinness	Low height for age
Z score > -2, < +1	Eutrofic	Appropriate height
Z score > +1, < +2	Overweight	Appropriate height
Z score > +2, < +3	Obesity	Appropriate height
Z score > +3	Severe obesity	Appropriate height

Anthropometric Classification Who 2007

RESULTS

As of this moment, evaluations have been performed at diagnosis (n = 118), 3 months (n = 72) and 6 months (n = 39). At diagnosis, 10% of malnutrition, 64% of eutrophic patients and 26% of overweight / obesity were found. At 3 months after the first evaluation, malnutrition was 7%, and overweight / obesity was 21%, maintaining the percentage of eutrophic patients.

Table1: Nutritional status and type of tumor at diagnosis

International Classification of Childhood Cancer (ICCC)	Evaluation at diagnosis			Total
	Malnutrition	Eutrofic	Overweight / obesity	
Intracranial and intraspinal neoplasms	5	22	10	37
Peripheral nervous cell tumors	2	7	1	10
Renal tumors	0	3	3	6
Hepatic tumors	0	3	1	4
Retinoblastoma	1	6	1	8
Malignant bone tumors	0	9	1	10
Soft tissue and other extraosseous sarcomas	1	24	7	32
Germ cell tumors, trophoblastic tumors, and neoplasms of gonads	0	8	4	12
Other malignant epithelial neoplasms and malignant melanomas	0	4	1	5
Total N (%)	9 (7.3%)	86 (69.4%)	29 (23.4%)	124 (100.0%)

Table2: Comparison of patients with nutritional assessment at diagnosis and after 3 months

CRITICAL VALUES	PATIENTS EVOLUTION							
	0 - 5 years		5 - 10 years		> 10 years		Total	
	Diagnosis	3 months later	Diagnosis	3 months later	Diagnosis	3 months later	Diagnosis	3 months later
Number of Patients	31		14		27		72	
Age (years)	2.9		7.2		14.6		8.1	
MALNUTRITION	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Z SCORE (weight/age)	2 (6.5%)	1 (3.2%)	2 (14.3%)	0 (0.0%)	-	-	4 (5.6%)	1 (1.4%)
Z SCORE (BMI/age)	2 (6.5%)	1 (3.2%)	3 (21.4%)	1 (7.1%)	1 (3.7%)	2 (7.4%)	6 (8.3%)	4 (5.6%)
Z SCORE (weight/height)	2 (6.5%)	1 (3.2%)	-	-	-	-	2 (2.8%)	1 (1.4%)
Total	3 (9.7%)	2 (6.5%)	3 (21.4%)	1 (7.1%)	1 (3.7%)	2 (7.4%)	7 (9.7%)	5 (6.9%)
EUTROFIC								
Z SCORE (weight/age)	25 (80.6%)	25 (80.6%)	10 (71.4%)	11 (78.6%)	-	-	62 (86.1%)	63 (87.5%)
Z SCORE (BMI/age)	25 (80.6%)	23 (74.2%)	7 (50.0%)	9 (64.3%)	16 (59.3%)	16 (59.3%)	48 (66.7%)	48 (66.7%)
Z SCORE (weight/height)	26 (83.9%)	23 (74.2%)	-	-	-	-	67 (93.1%)	64 (88.9%)
Total	23 (74.2%)	22 (71.0%)	7 (50.0%)	8 (57.1%)	16 (59.3%)	16 (59.3%)	46 (63.9%)	46 (63.9%)
OVERWEIGHT/OBESITY								
Z SCORE (weight/age)	4 (12.9%)	5 (16.1%)	2 (14.3%)	3 (21.4%)	-	-	6 (8.3%)	8 (11.1%)
Z SCORE (BMI/age)	4 (12.9%)	7 (22.6%)	4 (28.6%)	4 (28.6%)	10 (37.0%)	9 (33.3%)	18 (25.0%)	20 (27.8%)
Z SCORE (weight/height)	3 (9.7%)	7 (22.6%)	-	-	-	-	3 (4.2%)	7 (9.7%)
Total	5 (16.1%)	7 (22.6%)	4 (28.6%)	5 (35.7%)	10 (37.0%)	9 (33.3%)	19 (26.4%)	21 (29.2%)

DISCUSSION

Improvement in the percentage of malnutrition can be justified by the multi-disciplinary follow-up of the pediatric patient in the institution since of diagnosis, including nutritional consultation. The high percentage of overweight and obese patients found may be related to the increase in the prevalence of overweightness and obesity in our country.

NEXT STEPS

The project is in the final phase of the data collection, as regarding the 3 and 6 month evaluations and data analysis.

CONCLUSION

It is expected that the results of this study will contribute to the generation of new knowledge on nutritional status and its impact on cancer treatment.