

## 147 - COMPARATIVE STUDY OF THE ANTHROPOMETRICAL GROWTH AND MOTOR DEVELOPMENT LEVEL OF CHILDREN WITH LEUKEMIA SUBMITTED TO CHEMOTHERAPY AND CHILDREN WITHOUT LEUKEMIA<sup>1</sup>

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### INTRODUCTION

Cancer is a known disease since antiquity. Hippocrates (460-370 B.C.) was the first who described it utilizing the term carcinoma, a grave ill with a bad diagnosis. He was the first in empirical medicine who had utilized the natural diagnosis of illness (MERCÊS,2004). In general, neoplasia (cancer) are more frequent in adults than children. The infantile and juvenile mortality in Brazil is about 40 deaths for each million of children per year, being 44 deaths per million in boys and 36 in girls.

The infantile cancer correspond to a group of several diseases which have in common the uncontrolled proliferation of abnormal cells and that can occur in any part of an organism. The more frequent neoplasia in childhood are the leukemia (white globules), central nervous system tumors and lymphomas (lymphatic system) (INCA,2004).

As for leukemia's morphology, this can be classified in accordance with predominant cell type and with maturational level, as example: lymph (leukemia which affects the lymphatic system); myeloma (leukemia of myeloid origin); blastic and acute (leukemia which involves immature cells); cytic and chronic (leukemia which involves mature cells) (LOPES,2008).

The acute leukemia is near 30% of all cancers in infancy. In this total, 80% correspond to acute lymphoid leukemia (ALL), this by its time, has shown astonishing results in the last decades, considering that in the 70's, the global additional life time in children with 5 years old was about 10% to 20% of the cases. These days, data estimate a additional life time in about 70% to 80% happened to a better combination of chemotherapy drugs, an improvement on support treatment and better risk management based upon cytogenetic and clinical prognosis<sup>5</sup>. But is commonly toxic and affects cells which are in process of cellular division, changing the immunological system, becoming it susceptible to hemorrhages and infections, causing anemia, thrombocytopenia and neutropenia, interfering in the gastrointestinal system and mucosa, altering the nutritional state, where there are loss of weight, muscular atrophy, anorexia and fatigue, as provide to the child the unleashing of felling as fear, sadness, depression, leaving her debilitate in growth and development phase of motors skills, which in this phase are in intense apprenticeship process (COLLET e OLIVEIRA,2002).

According to Marcondes(2004), the restriction of children in bed for long periods can cause interference in their growth and development phase.

The human organism has a biological logic to be followed till mature age. Children grow according to their age, motor skills are even more varied, complete and complexes(ROSANETO,2002).

Growth and Development are different phenomena in their physiologic composition. Growth means cellular division and consequently increasing of body mass. Development means gain of capacity obtained in psychomotor, physic social and communication fields. A child in the phases growth and development has a series of changing in function and body composition that influences nutritional necessities (COLLET e OLIVEIRA, 2002).

The anthropometrical measurements in pediatrics are of great relevance, because gives parameters for evaluation of nutritional state, health conditions, base of diet calculus, medication and drugs for intravenous infusion (FERNANDES, 2003).

Anthropometry is the science which study and evaluate the size, body mass and human body proportions through easy and fast measurements, which doesn't need high sophisticate and cost equipments (THOMAS e NELSON, 2005).

Before the importance of this problematic, an interest in doing a comparative study of the anthropometrical level and motor development of children with Acute Lymphoid Leukemia, submitted to chemotherapy at the Ophir Loyola Hospital with whom without this disease has been arisen.

### OBJECTIVES

The objectives have been identify and compare the anthropometrical and growth level and motor development of children with leukemia, at the beginning and during chemotherapy treatment with children without leukemia. As for anthropometrical characteristics body mass and height have been evaluated utilizing as reference the National Center for Health Statistics (NCHS), recommended by the World Health Organization (WHO), since 1977.

### METHOD

It has been a transversal descriptive experimental research, with delineating of comparison, which was developed in a quantitative approach<sup>10</sup> The research was submitted and approved by the Ethic Committee of the João de Barros Barreto Hospital, under the register number 3095/08.

The study subject are children with age from 2 to 5 years old, from both sexes.

The sample utilized was the intentional type, composed by 02 groups (studied group and controlled group), being the studied group composed by 12 children with leukemia in chemotherapy treatment at the Ophir Loyola Public Hospital, and 10 children from controlled group of the Cremação Infantile Education Municipal School, with same age bracket and both sexes, being the agreement term sign for their parents or tutors.

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The research's subjects have been submitted to a battery test which contemplated: small muscle control (IM1); large muscle control(IM2); balance (IM3); corporal scheme(IM4); spatial organization (IM5); and temporal organization; (IM6). The testes have been done in all research's participants following the Motor Development Scale (M.D.S) (ROSA NETO, 2002) battery.

The research scenery was developed in pediatrics and ambulatory of the Public Hospital Ophir Loyola in Belém do Pará- Brazil, which is a oncology treatment benchmark in north region of Brazil. After hospital discharge, children come back 2, 3, 7, 15, 21 and 30 days to ambulatory to continue the chemotherapy treatment according to schedule. The chemotherapy ambulatory is compose by doctor office, nursery with 10 beds, a recreation room with psycho pedagogic support for pre-school children and classroom for school children. This way, there is also psycho pedagogic support to internment. The controlled group was composed by 10 children of Cremação Infantil Education Municipal School, from maternal I and maternal II of noon and afternoon shift, from same age bracket and both sexes.

Data collect: motor testes were applied in each child with leukemia, at beginning of the treatment. The follow-up of the controlled group has occurred at same period.

The first test to be applied was the small muscle control (oculo manual), followed by large muscle control(coordination); balance (static posture); corporal scheme (posture imitation, quickness); spatial organization (space perception) and temporal organization (temporal structures language)7, which were performed by children with their normal clothes, excepted those whom have shown difficult in their movement, including shoes, preventing slipping. Besides, the testes were applied in silent places, well lighted and with fresh air free from external disturbance, with the presence of the mother or a close relative, being that in controlled group the test application has occurred in presence of School employees (ROSA NETO, 2002). The average time estimated for each was around 30 to 45 minutes. In some children it took until 60 minutes. This battery is a group of diversified testes and a specific level of difficult graduated for each age bracket from 2 to 11 years in each element of motricity, considering that each component of E.D.M. has specific testes for each age and the complexity of the task to be performed increase according with age. The participants were evaluated through the Rosa Neto(2002) concept besides body mass and height.

To calculate body mass a scale with precision of 100 grams has been utilized; child was weighed on her feet with erect body looking for a fixed point in her front, with a minimum clothes as possible.

To measure height a anthropometrical yardstick has been utilized, graduated in centimeters, which was tacked on a wall with a square, being the height determinate by the measurement between the occipital region and heel, this measure was done in aspiratory apnea(FERANANDES, 2003).

The participants were evaluated from the correspondent tests related to their chronological age in each element of motricity and the evaluation has finished when the proposed task hasn't been performed correctly, considering the successes and fails in relation to the norms established by the author, in that the value 01 (one) correspond to a full success in test, value ½ (half) to a half success in test and value 00 (zero) to a negative result. Comparing chronological age (in months) of children with specific motors ages for each evaluated component, it's been determinate the progress or delay of the motor development level of child. Each motor age was obtained by the sum of values found in testes, which are express in months(ROSANETO, 2002)..

In the proposed classification are listed seven categories, based upon the motors quotients of children, as following: 130 (more or far superior), 120-129 (superior), 110-119(high normal), 90-109 (medium normal), 80-89 (low normal), 70-79 (inferior) and 69 or less (far inferior) (ROSANETO, 2002)..

For differences analysis among means a t de Student test has been applied for independent samples when compared to studied groups, significance level adopted was  $p < 0.05$ , with confidence interval of 95% for comparative analysis. For data analysis software Bioestat 5.0 has been utilized(AYRES, 2008).

## RESULTS

The evaluation results of anthropometrical and motor development level of children with leukemia comparing the variables body mass, height, chronological age, gender and motor age with all components of motricity among the studied groups, have shown the following in Table 1.

Table 1. Sample characterization in age, body mass and height.

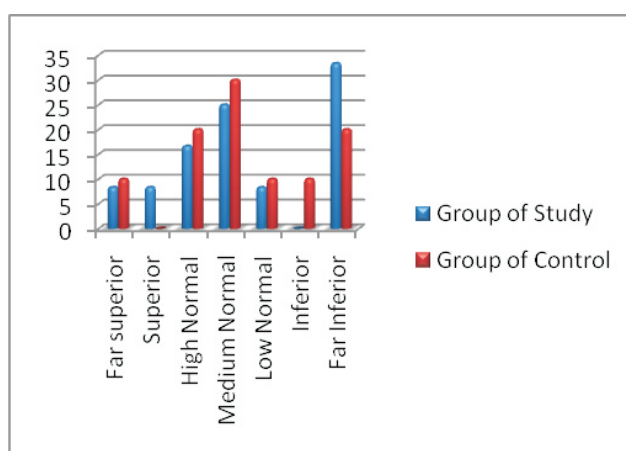
Variables	Group de study	Controlled group	p-value	T Test
	n=12	n=10		
Age (months)	48.0833	43.5	0.0936	1.3816
	±10.4051	±4.4535		
Body mass (Kg)	15.8	14.67	0.0956	1.3648
	±2.5612	±1.1786		
Height (cm)	100.333	98.7	0.2547	0.6718
	±6.3293	±4.7621		

Table 1 characterize the studied groups study and control of variables age, body mass and height. Statistic differences in the analyzed variables haven't been found.

Table 2. Evaluation of variables of means from each component of studied groups and controlled group.

VARIABLES	EVALUATION 01		
	Group study	Control group	
	Mean	Mean	p-value
Small Muscle control	51.0	44.4	0.1508
Large muscle control	44.0	39.6	0.2938
Balance	46.0	38.4	0.1803
Esq. Corporal scheme	40.0	43.2	0.3529
Spatial Organization	48.0	39.6	0.1384
Temporal Organization	47,0	40.8	0.1710
General motor Age	46.0	41.0	0.2281

Table 2 shows the results of motricity in the 1st studied and controlled groups evaluation, where statistic differences among the groups haven't been found.



Picture 1. Studied and controlled group motor quotient classification

The picture shows the motor quotients according to Rosa Neto (2002) classification, being denominated “far superior”, “superior”, “high normal”, “medium normal”, “ low normal”, “inferior” e “far inferior”, separated by analyzed groups (studied group and controlled group).

**DISCUSSION**

The present research has begun with the hypothesis of children with leukemia whom could have their anthropometrical growth and motor development thwarted by the disease and treatment imposed, because is a long term treatment, with several internments. Hospital is an environment which offers a certain degree of deprivation in the fundamentals stimulus to the motor development. These children passing through many social, sensorial and psychological deprivation and are deviated from their scholar routine .( WHALEY, WORNG, 1995)

Before the Table 1, which characterize the studied sample, it can be notice that there is no statistic differences in the analyzed variables age, body mass and height between the evaluated groups after the calculus of the t test, where the p-value has shown superior to 0.05 in the variables. The three years old child body mass is equal in mean to 14.5 kg; four years old body mass is equal in mean to 16.4kg, and five years old age the body mass is near to 18.6kg, what means, children in development phase show a annual gain correspondent to 2.3 kg. (SEGRE, 2001). In the other side, the two years old child body mass is 12kg and average height of 86.6cm, the three years old average height is 95.7 cm, being 103 cm at four years old and 109 cm at five years old, being that from the first to sixth year of life, the growth rhythmus reduces deeply, while the increase of weigh, increase about 1,800 to 2,700g per year of life, the born weigh is multiplied for four at 2 and half years old. (WHALEY, WORNG, 1995)Child growth about 25 cm in the first year of life and whereof second year, grows between 5 and 7 cm per year until the begging of puberty, when the growth speed becomes to increase, reaching a average peak of speed of 9 cm/year for girls and 10cm/year for boys (ZEFERINO, 2003). It can be affirmed that the studied children from both groups are in parameters considered normal for this age, showing, therefore their anthropometrical growth level adequate with chronological age.

Table 2 shows data from both groups referent to motor age descript in months, being small muscle control the component which has obtained better results in studied group, followed by the component spatial organization, this fact justified the way children observe and explore space around them, where give important information about their personality and the way they deal with the environment(SÁNCHEZ, 2003), this way, the best spatial organization development in the studied group revels the constraints of children with leukemia due to motor stimulation restriction imposed by the treatment itself, and also due to parent's necessity to overprotect children(NASCIMENTO,2009). In turn, the components with higher prominence in controlled group have been small muscle control followed by corporal scheme, this last variable consists in the body self control involving, posture, muscular tonus and the relationship among individual, fellows and object, being this parameter developed in this group because it's been composed by children without the leukemic pathology and that are in constant movement with activities which demands corporal dynamic movement.

The general motor quotient obtained in this study shows that among subjects of studied group, the majority of children,

that correspond to seven children have show equivalent quotient between 130 and 90, distributed among the classifications "medium normal", "high normal", "superior" and "far superior", and four children have obtained quotient "high inferior" corresponding to a 33%percent. The controlled group has revealed the result "medium normal" corresponding to 30%, followed by the classification "high normal" and "far inferior", equivalent to 20% each, according to shown in picture 1.

Observing the Rosa Neto (2002) study with 16 pre-scholar children from 3 to 4 years old without mental disturbance and using "EDM", o quotient motor general was correspondent to 108.1, characterizing a standard "medium normal", chronological age mean value was 46.13 months, motor age mean value equivalent to 52.00 months, small muscle control mean value was 48.73 months, for large muscle control mean age was 52.50, while balance mean age was 47.25 months, the found for corporal scheme mean age was 54.00 months, has obtained spatial organization mean value of 60.00 months and temporal motor organization mean age of 49.50 months. It can be notice that subjects' motor age studied by Rosa Neto (2002), was similar to the present study, but small muscle control mean component has obtained a better performance in studied group, when observed the relation between the studied subjects by Rosa Neto (2002). This fact can be explained by the different environment and characteristics of the studied samples. The same evaluation instrument of this study was utilized by Rosa Neto(2002). Therefore, it's known that the child's motor development is also related with chronological age, this way during the development phase, child gains motor and sensorial (ROSA NETO, 2002) skills.

The result found in both groups utilizing t student test, don't shows significative values of mean of all ages and neither others components of the analyzed motricity, this way, this research has obtained as result the similarity of the values obtained between both groups.

Currently, children show better growth and development conditions because early disease diagnosis and better drugs, which are more efficient and reduce the collateral damage, permit a submission to a two years long rigorous treatment and family participation in children stimulation(INCA,2008).

### CONCLUSION

The study has conclude that the children's age, as in controlled group as in studied group, are situated according to normality parameters of anthropometry and motor development. Differences statistically confirmed among the means of the investigated variables of studied and controlled group haven't been observed. It's been suggested a longitudinal research to observe during time the factor of utilization of chemotherapy that can be alter motor development or the components body mass and heig

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### COMPARATIVE STUDY OF THE ANTHROPOMETRICAL GROWTH AND MOTOR DEVELOPMENT LEVEL OF CHILDREN WITH LEUKEMIA SUBMITTED TO CHEMOTHERAPY AND CHILDREN WITHOUT LEUKEMIA

#### ABSTRACT

**Objectives:** Identified and compare the anthropometrical growth and motor development level of children with leukemia in the beginning of the chemotherapy treatment with children without leukemia. **Method:** This is a transversal cut research with delineated comparison. For motor development evaluation purpose, the Rosa Neto (2002) Scale of Motor Development Test has been applied, which comprehends a battery test involving in the components specified tasks by age: fine Motricity, global Motricity, balance, body scheme, space organization and temporal organization. The sample was separated in two groups: experimental and control, the experimental group has comprehended 12 children, whom ages have ranged from 02 to 05 years old, from both sexes, with cancer disease, and the control group composed by 10 children of the same age bracket, of both sexes students, without cancer of the Cremação Infantil Education Municipal School of Belém-BRAZIL. **Result:** The groups have obtained similar results for the investigated variables means. It has been verified that the children have been shown motor classification among the standards "medium normal", "high normal" and "much low". **Conclusion:** The study has concluded that the chronological and motor age of the children, compared between the groups, are normal according to parameters of normality as motor development and anthropometry. It hasn't been observed statistically differences, which have been confirmed between the investigated variables means. It's been suggested longitudinal researches that can visualize if the utilization of chemotherapy may alter the anthropometrical components or the motor development of children with cancer.

**KEYWORDS:** Growth and development, child, leukemia.

**ÉTUDE COMPARATIVE DU NIVEAU DE CROISSANCE ANTHROPOMÉTRIQUE ET DÉVELOPPEMENT MOTEUR DES ENFANTS ATTEINTS DE LEUCÉMIE, EM CHIMIOTHÉRAPIE, AVEC LES ENFANTS PRIVÉS DE LEUCÉMIE**

Objectifs: Identifier et comparer le niveau de croissance anthropométrique et le développement moteur des enfants atteints de leucémie, au début du traitement chimiothérapique des enfants privés de leucémie. Méthode: Il s'agit d'une recherche transversale avec comparaison. Pour évaluer le développement moteur a été appliquée tests de Échelle de Développement Moteur de Rosa Neto (2002), qui comprend une batterie de tests impliquant des tâches spécifiques d'âge par des composants: de la motricité fine, motricité globale, balance, schéma corporel, l'organisation spatiale et de l'organisation du temps. L'échantillon a été divisé en deux groupes: expérimental et de contrôle, où le groupe expérimental se composait de 12 enfants dont les âges variaient de 02 à 05 ans, des deux sexes, avec le cancer, et le groupe contrôle composé de 10 enfants du même âge et les deux genres appartenant à l'École Maternelle Municipale Cremação, ne souffrent pas de cancer. Résultats: Les groupes ont des résultats similaires pour les moyennes des variables étudiées. Il a été constaté que les enfants ont reçu la classification de la motricité entre les niveaux "normal moyen", "normal élevé", "très inférieur". Conclusion: L'étude conclut que les âges chronologiques et motrices des enfants, comparés entre les groupes, se trouvent dans les paramètres de normalité concernant l'anthropométrie et le développement moteur. Il n'y avait pas de différence statistiquement avérée entre les moyennes des variables étudiées. Sont suggérés recherches longitudinales qui peuvent afficher si l'utilisation de la chimiothérapie peut modifier les composants anthropométriques ou le développement moteur des enfants atteints du cancer ..

**MOTS-CLÉS:** Croissance et développement, enfant, leucémie.

**ESTUDIO COMPARATIVO DEL NIVEL DE CRECIMIENTO ANTROPOMÉTRICO Y DESARROLLO MOTOR DE LOS NIÑOS CON LEUCEMIA, SOMETIDOS A LA QUIMIOTERAPIA, CON NIÑOS SIN LEUCEMIA****RESUMEN**

Objetivos: Identificar y comparar el nivel de crecimiento antropométrico y el desarrollo motor de niños con leucemia, no inicio del tratamiento quimioterápico con niños sin leucemia. Método: Se trata de una pesquisa de corte transversal con delineamiento de comparación. Para evaluación del desarrollo motor ha sido aplicado testes de Escala del Desarrollo Motor de Rosa Neto (2002), que comprende una batería de testes envolviendo tareas específicas por edad nos componentes: motricidad fina, motricidad global, equilibrio, esquema corporal, organización espacial y organización temporal. La muestra ha sido dividida en dos grupos: experimental y controle, donde el grupo experimental ha comprendido 12 niños cuyas edades variaran de 02 a 05 anos, de ambos los géneros, portadores de cáncer, y el grupo controle compuesto por 10 niños de la misma faja etaria y ambos los géneros, pertenecientes a la Escuela Municipal de Educación Infantil Cremação, no portadores de cáncer. Resultado: Los grupos han obtenido resultados semejantes para las medias de las variables investigadas. Ha sido verificado que los niños han presentado clasificación motora entre los estándares "normal medio", "normal alto", "mucho inferior". Conclusión: El estudio ha concluido que las edades cronológicas y motoras de los niños, comparadas entre los grupos, encontraban-se situadas segundo parámetros de normalidad cuanto la antropometría y desarrollo motor. No han sido observadas diferencias estadísticamente comprobada entre las medias de las variables investigadas. Sugiere-se pesquisas longitudinales que posan visualizar si la utilización de quimioterápicos poden alterar los componentes antropométricos o el desarrollo motor de los niños portadores de cáncer.

**PALABRAS CLAVES:** Crecimiento y desarrollo, niño, leucemia.

**ESTUDO COMPARATIVO DO NÍVEL DE CRESCIMENTO ANTROPOMÉTRICO E DESENVOLVIMENTO MOTOR DE CRIANÇAS COM LEUCEMIA, SUBMETIDAS À QUIMIOTERAPIA, COM CRIANÇAS SEM LEUCEMIA****RESUMO**

Objetivos: Identificar e comparar o nível de crescimento antropométrico e o desenvolvimento motor de crianças com leucemia, no início e durante o tratamento quimioterápico com crianças sem leucemia. Método: Trata-se de uma pesquisa de corte transversal com delineamento de comparação. Para avaliação do desenvolvimento motor aplicou-se testes de Escala de Desenvolvimento Motor de Rosa Neto (2002), que compreende uma bateria teste envolvendo tarefas específica por idade nos componentes: motricidade fina, motricidade global, equilíbrio, esquema corporal, organização espacial e organização temporal. A amostra foi dividida em dois grupos: experimental e controle, onde o grupo experimental compreendeu 12 crianças cujas idades variaram de 2 a 5 anos, de ambos os gêneros, portadores de câncer, e o grupo controle compostos por 10 crianças da mesma faixa etária e ambos os gêneros, pertencentes a Escola Municipal de Educação Infantil Cremação, não portadoras de câncer. Resultado: Os grupos obtiveram resultados semelhantes para as médias das variáveis investigadas. Verificou-se que as crianças apresentaram classificação motora entre os padrões "normal médio", "normal alto", "muito inferior". Conclusão: O estudo conclui que as idades cronológicas e motoras das crianças comparadas entre os grupos, encontram-se situadas segundo parâmetros de normalidade quanto à antropometria e desenvolvimento motor. Não foram observadas diferenças estatisticamente comprovada entre as media das variáveis investigadas. Sugere-se pesquisas longitudinais que possam visualizar se a utilização de quimioterápicos podem vir a alterar os componentes antropométricos ou o desenvolvimento motor.

**DESCRIPTORIOS:** Crescimento e desenvolvimento, leucemia.

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