

## 15 - THE MOTOR DEVELOPMENT AND THE PROBLEMS FROM MALNUTRITION: A COMPARATIVE STUDY OF 4 TO 5 YEAR-OLD-CHILDREN

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### INTRODUCTION

The first years of life are essential for children. It is the phase in which the most process in all angles of development occur (BEE, 2003; PAPALIA et al., 2006). The development of the brain occurs in a rapid way and minimal alterations in this process may cause enormous consequences on the physical structure and functional capacity of children. (GRANTHAM – MCGREGOR et al., 2007)

Beyond the development of the brain, the child shows changes on the motor behavior that, in parts, are influenced by the maturational process and environmental context. According to Conolly (2000) the motor behavior on the first childhood is an important signal of the global development of the child. Due to such characteristics, the motor development features as a process in which phases and stages of development ready to occur, can count on such influences in order to present itself in a typical way among the subjects (GALLAHUE e OZMUN, 2005).

Among the diverse factors from environment that influence the global development of children we may call attention to the chronic malnutrition. On the childhood, mainly on the critical period between 0 to 5 years old, the nutritional privation for a long period of time provokes alterations over the health state, the cognitive, psychological, motor and neurologic development of children (HALPERN et al., 2000; TEIXEIRA e HELLER, 2004).

Focusing on the recuperation of children victims on chronic malnutrition, Non-governmental Organizations (NGO) were created in order to try to minimize the bad effects of the disease. The CREN (Centro de Recuperação e Educação Nutricional) is a NGO of reference on the treatment of children with this situation in the city of Maceió. The referred centre promotes, through the answering under the regime of semi-boarding school and ambulatorial, balanced meals beyond of specialized attention offered by a multi professional team.

Beyond this type of specialized institution there is yet, in the city of Maceió, those which have as a unique objective the educational answering for children. The Federal University of Alagoas, among its projects of answering to staff, students and general community, offer integral assistance, with pedagogical emphasis, to children aged for nursery school through the NDI (Núcleo de Desenvolvimento Infantil).

In both institutions is a focus, from a pedagogical perspective, improve the potential of global development of children. Among the professionals involved in such objective we may call attention to those from physical education field. Among the tools of work of such professional, has an important role the evaluation of motor development of children. The results from evaluations permit to identify possible commitment on the motor field and consequent associations to other fields of global development of the child.

This way, the objective of the present study was to evaluate and compare the motor development of children with chronic malnutrition, aged 4 to 5 years old, assisted by the CREN (Centro de Recuperação e Educação Nutricional) and eutrophic children from NDI (Núcleo de Desenvolvimento Infantil) from the city of Maceió.

### METHODOLOGY

#### CHARACTERISTICS OF THE STUDY

It has been a study based on descriptive and comparative focus accomplished on the CREN (Centro de Recuperação e Educação Nutricional) and the NDI (Núcleo de Desenvolvimento Infantil) in the city of Maceió.

#### SAMPLE

The sample of the study is formed by 36 children: 18 children aged 48 to 60 months from CREN and 18 children aged 46 to 59 months from NDI, both from the city of Maceió. It has taken part of this sample children from CREN, diagnosed with chronic malnutrition based on the evaluation of average of height and children from the NDI with no symptoms of malnutrition. In order to minimize possible mistakes in the samples in relation to the nutritional status, at the NDI it has also been calculated, beyond the average height according to the age, the averages of weight and height according to age, placing only children considered eutrophic for the three averages.

#### INSTRUMENTS

Interviews with parents were taken in order to identify the sample. Anthropometric evaluation through weight and height of children was accomplished, using a digital scale from the brand Filizola and fix scale. And the evaluation of the motor development, which was run through the use of the EDM (Escala de Desenvolvimento Motor) de Rosa Neto (2002). This 'scale' is formed by 6 variables, defined as: fine motor force, global motor force, balance, body scheme, space and time organization.

The referred variables show specific tasks whose level of difficulty are compatible, according to Rosa Neto (2002), with chronological age which varies between 2 to 11 years old.

#### PROCEDURES

On the first moment of the study, some interviews were taken with the parents in order to have the acceptance for the commitment of their children on the research and selection of the subjects from the anthropometric evaluation on. On the second moment, the amount of Rosa Neto's tests (2002) was set in order to evaluate the motor development of the children with chronic malnutrition and eutrophic.

The variables assessed were/; chronological age (CA), general motor age (GMA) and general motor quotient (GMQ). On the third moment, the analysis of the results used was taken from the statistic program SPSS version 15.0 for windows on. The statistic analysis used was the descriptive, with percentage values, averages and standard-deviation. Yet, it was used the test t-student to compare the averages.

## RESULTS AND DISCUSSION

The final sample was formed by 36 children. From those, 18 had a malnutrition profile (cases) and 18 eutrophic profile (control). In relation to the gender, most of children (63,9%) was male. The average of chronologic age (CA) of the groups was of 57,03 months ( $\pm 7,10$ SD). With the CA of 60,33 months ( $\pm 8,13$  SD) for children with malnutrition symptoms and CA of 53,72 months ( $\pm 3,81$  SD) for eutrophic children.

From the chronologic age calculus (CA), in months, and the obtained results in the motor variables (fine and global motricity, balance, body scheme, space and time organization) of Rosa Neto's Tests (2002), it is possible to meet the general motor age (GMA) of the group, according to the following formule:

$$\text{IMG} = \frac{\text{IM1} + \text{IM2} + \text{IM3} + \text{IM4} + \text{IM5} + \text{IM6}}{6}$$

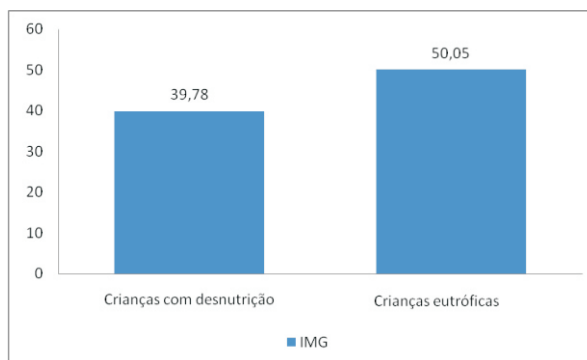
The board 1 shows the averages, in years, for each of the six motor ages assessed among the groups of children with malnutrition and eutrophic ones. Among the six motor ages, three presents significant differences between cases and controls: balance (MA3), with a value of  $p = 0,00$ ; body scheme (MA4), with  $p = 0,00$  and time organization (GMA) with  $p = 0,00$ . The variables of fine and global motricity, although having a low average on group of children with malnutrition, when compared to the eutrophic ones, did not show statistic difference, with  $p = 0,69$  and  $p = 0,46$ , respectively. The variable average of the space organization (MA%) showed to be equal among the two groups ( $p = 1,00$ ).

Variables	Malnutritions Mean (Standard Deviation)	Eutrophics Mean (Standard Deviation)	p value
Fine Motricity (MA1)	33,61 ( $\pm 1,03$ SD)	33,72 ( $\pm 0,57$ SD)	00,69
Global Motricity (MA2)	33,72 ( $\pm 1,44$ SD)	44,0 ( $\pm 0,68$ SD)	00,46
Balance (MA3)	22,11 ( $\pm 0,47$ SD)	44,33 ( $\pm 0,48$ SD)	00,00
Body Scheme (MA4)	33,05 ( $\pm 0,23$ SD)	44,33 ( $\pm 0,59$ SD)	00,00
Organization Space (MA5)	33,94 ( $\pm 1,25$ SD)	33,94 ( $\pm 0,63$ SD)	11,00
Time Organization (MA6)	33,38 ( $\pm 0,91$ SD)	55,16 ( $\pm 0,98$ SD)	00,00

Table 1 - Averages, in years, from the six motor ages studied among the group of children with malnutrition and eutrophic ones, Maceió, 2010.

According to the statistic data found, and according to Haywood and Getchell (2004), the motor development is considered as a sequential process, continuous and related to chronologic age. However, the results showed that only the variables of the balance, body scheme and time organization showed to be different among the groups, which can suggest an interference related to the nutritional privations of a long period.

According to results from board 1, it is possible to identify that children with malnutrition had a lower result for the general motor age (GMA), with an average of 39,78 months ( $\pm 6,59$  SD), while the children considered eutrophic had 50,05 months ( $\pm 3,84$  SD), a statistically significant difference ( $p = 0,00$ ) for the variable of general motor age. With this result, it is clear that both groups showed motor age lower than the respective chronologic ages. However, children with malnutrition show general motor age lower than those eutrophic ones, which can lead us to state that malnutrition seems to be potentially dangerous for the process of motor development of children in nursery school age.



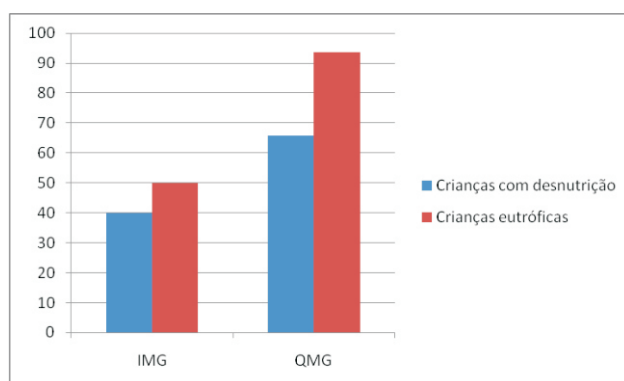
Graphic 1 - averages, in months, of the general motor age (GMA) of the group of children with malnutrition and eutrophic ones.

What can be referred to the general motor quotient (GMQ) obtained from the formula:

$$QMG = \frac{IMG \cdot 100}{IC}$$

It is possible to identify that the result of such calculus permit, through the resulting punctuation of dispositions of values, a classification of the general motor quotient of the children, between the gaps of very low to very high on the motor development scale (MDS) from Rosa Net (2002).

On the Graphic 2, the values of GMQ showed that, once more, children with malnutrition presented higher deficits than eutrophic ones, with an average of 65,88 months (+ - 9,02 DP) to the cases, while the controls obtained an average of 93,65 (+ - 10,31 DP). Thoses values, according to GMQ classification, result in very low for children of CREN and medium normal for those from NDI.



Graphic 2 - General motor ages averages (GMA) and general motor quotient (GMQ) among cases (malnutrition) and controls (eutrophic), Maceió, 2010.

### CONCLUSION

From the results obtained, it can be concluded that the averages from variables: balance, body scheme and time organization were those with statistically significant difference.

The superior chronologic age on the children with chronic malnutrition did not caused significant effect when calculated the general motor age (GMA) and the general motor quotient (GMQ). Taking into account that the motor performance of the group on each task applied, on the different variables tested, worth to the motor age inferior than the chronologic age.

The chronic malnutrition is a potential factor on the constitution of some components that form the process of motor development on children in nursery school age.

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## THE MOTOR DEVELOPMENT AND THE PROBLEMS FROM MALNUTRITION: A COMPARATIVE STUDY OF 4 TO 5 YEAR-OLD-CHILDREN

### SUMMARY

The main objective of this study is to evaluate and compare the motor development of children with chronic malnutrition, aged 4 to 5 years old, assisted by the CREN (Centro de Recuperação e Educação Nutricional) and eutrophic children from NDI (Núcleo de Desenvolvimento Infantil), both from the city of Maceió, Capital of the state of Alagoas, in Brazil. It has been based on a comparative and descriptive study. The sample was formed by 18 children with chronic malnutrition from CREN and 18 eutrophic children from NDI. The material and method used were: interview, anthropometric evaluation and evaluation of motor development accomplished through Rosa Neto's Scale (2002). The results were analyzed from the statistic program SPSS on. The statistic analysis was descriptive using the test t – Student to compare the average. The results showed that 63,9% were male children. The average of chronological age (CA) among the groups was of 53,03 months. From the six motor variable evaluated among the groups the balance, with a value of  $p=0,00$ ; body scheme with  $p=0,00$  and time organization with  $p=0,69$  and  $p=0,46$ . It has been noticed yet, that children with malnutrition showed low results for the general motor age (GMA) with an average of 39,78 months ( $\pm 6,59$  SD), eutrophic children had 50,05 months ( $\pm 3,84$  SD), a significant statistic difference ( $p=0,00$ ), for the variable GMA. The values of the general motor quotient (GMQ) showed that children with malnutrition showed bigger deficits than eutrophic children with an average of 65,88 months ( $\pm 9,02$  SD) and 93,65 ( $\pm 10,31$ SD) respectively. Resulting GMQ very low for children with malnutrition and 'medium normal' for eutrophic children. It has been concluded that the averages of the variables: balance, body scheme and time organization were those with significant statistic difference. The superior chronologic age on children with chronic malnutrition did not cause significant effect when calculated the GMA and GMQ.

**KEYWORDS:** Chronic malnutrition, Motor development, eutrophic children.

## LE DÉVELOPPEMENT MOTEUR ET LES IMPLICATIONS DE LA MALNUTRITION: UNE ÉTUDE COMPARATIVE D'ENFANTS ÂGÉS DE 4 À 5 ANS

### RÉSUMÉ

L'objectif de l'étude a été de mesurer et de comparer le développement moteur d'enfants souffrant de malnutrition chronique, âgés de 4 à 5 ans, suivis au Centre de récupération et d'éducation nutritionnelle (CREN), ainsi que des enfants eutrophiques du Núcleo de Desenvolvimento Infantil (NDI – Centre de développement d'enfants) de la ville de Maceió – Alagoas, Brésil. Cette étude a été élaborée sur le mode descriptif et comparatif. Les échantillons ont été constitués de dix-huit enfants du CREN souffrant de malnutrition chronique, et dix-huit enfants eutrophiques du NDI. Ont été utilisés les méthodes suivantes: entrevue, évaluation anthropométrique et évaluation du développement moteur, réalisées au moyen de l'échelle de Rosa Neto (2002). Les résultats ont été analysés sur la base du programme statistique SPSS. Pour l'analyse statistique descriptive, le test t – Student a été employé pour la comparaison des moyennes. Les résultats ont démontré que 63,9% des enfants étaient du sexe masculin. La moyenne d'âge chronologique (IC) des groupes étudiés était de 57,03 mois ( $\pm 7,10$  DP). Des six variables motrices évaluées entre les groupes, l'équilibre, avec une valeur de  $p=0,00$ ; le schéma corporel, avec  $p=0,00$ ; et l'organisation temporelle avec  $p=0,00$  ont présenté des différences significatives, alors que la motricité fine et la motricité globale n'ont pas révélé de différences statistiques importantes, avec  $p=0,69$  et  $p=0,46$ . D'autre part, il a été constaté que les enfants souffrant de malnutrition ont obtenu des résultats inférieurs pour l'âge moteur général (IMG), avec une moyenne de 39,78 mois ( $\pm 6,59$  DP). Les enfants eutrophiques ont enregistré 50,05 mois ( $\pm 3,84$  DP), ce qui est une différence statistiquement significative ( $p=0,00$ ), pour la variable IMG. Les valeurs du quotient moteur général (QMG) ont démontré que les enfants dénutris présentent des déficits supérieurs à ceux des enfants eutrophiques, avec des moyennes de 65,88 mois ( $\pm 9,02$  DP) et 93,65 ( $\pm 10,31$  DP), respectivement. Il en résulte un QMG "très inférieur" pour les enfants dénutris, et "normal moyen" pour les enfants eutrophiques. On en conclut que les moyennes des variables: équilibre, schéma corporel et organisation temporelle ont présenté des différences statistiquement significatives. L'âge chronologique supérieur pour les enfants souffrant de malnutrition chronique n'a pas causé d'effet significatif sur le calcul du IMG et du QMG.

**MOTS-CLÉS:** malnutrition chronique, le développement moteur, enfants eutrophiques.

## EL DESARROLLO MOTOR Y LAS IMPLICACIONES DE LA DESNUTRICIÓN: EL ESTUDIO COMPARATIVO DEL NIÑOS COM EDAD DE 4 A 5 AÑOS.

### RESUMEN

El estudio tuvo por objetivo evaluar y comparar el desarrollo motor de niños portadores de desnutrición crónica, con edad de 4 a 5 años, asistidos en el Centro de Recuperación y Educación Nutricional (CREN), y niños eutróficos del Núcleo de Desarrollo Infantil (NDI) de la ciudad de Maceió, estado de Alagoas. Se trata de un estudio descriptivo y comparativo. Componían la muestra 18 niños con desnutrición crónica del CREN y 18 niños eutróficos del NDI. Materiales y métodos utilizados: entrevista, evaluación antropométrica y evaluación del desarrollo motor realizada a través de la Escala de Rosa Neto (2002). Los resultados han sido analizados a partir del programa estadístico SPSS. El análisis estadístico fue descriptivo, utilizándose el teste t–Student para comparación de los promedios. 63,9% de los niños eran varones. El promedio de edad cronológica (IC) entre los grupo fue de 57,03 meses ( $\pm 7,10$  DP). De las seis variables motoras evaluadas entre los grupos, tres de ellas - el equilibrio, con un valor de  $p=0,00$ ; esquema corporal, con  $p=0,00$  y organización temporal con  $p=0,00$  - han presentado diferencias significativas. La motricidad fina y motricidad global no han presentado diferencias estadísticas, con  $p=0,69$  y  $p=0,46$ . Se ha verificado también que los niños con desnutrición presentan resultados inferiores para la edad motora general (IMG), con promedio de 39,78 meses ( $\pm 6,59$  DP). Niños eutróficos han tenido 50,05 meses ( $\pm 3,84$  DP), diferencia estadísticamente significativa ( $p=0,00$ ), para la variable IMG. Los valores del cociente motor general (QMG) han demostrado que niños con desnutrición presentan déficits más grandes que los niños eutróficos, con promedios de 65,88 meses ( $\pm 9,02$  DP) y 93,65 ( $\pm 10,31$  DP) respectivamente, resultando QMG "muy inferior" para los niños desnutridos y "normal medio" para niños eutróficos. Se concluye que los promedios de las variables: equilibrio, esquema corporal y organización temporal son las que han presentado diferencia estadísticamente significativa. La edad cronológica superior en los niños con desnutrición crónica no ha provocado efecto significativo para el cálculo del IMG y QMG.

**PALABRA CLAVE:** Desnutrición crónica, Desarrollo motor, Niños normales.

**O DESENVOLVIMENTO MOTOR E AS IMPLICAÇÕES DA DESNUTRIÇÃO: UM ESTUDO COMPARATIVO DE CRIANÇAS NA FAIXA ETÁRIA DE 4 A 5 ANOS****RESUMO**

O objetivo do estudo foi avaliar e comparar o desenvolvimento motor de crianças com desnutrição crônica, na faixa etária de 4 a 5 anos, assistidas no Centro de Recuperação e Educação Nutricional (CREN) e crianças eutróficas do Núcleo de Desenvolvimento Infantil (NDI) da cidade de Maceió-AL. Tratou-se de um estudo descritivo e comparativo. A amostra foi constituída por dezoito crianças com desnutrição crônica do CREN e dezoito crianças eutrófica do NDI. Materiais e métodos utilizados foram: entrevista, avaliação antropométrica e avaliação do desenvolvimento motor realizada através da Escala de Rosa Neto (2002). Os resultados foram analisados a partir do programa estatístico SPSS. A análise estatística foi descritiva sendo utilizado teste t – Student para comparação das médias. Os resultados demonstraram que 63,9% das crianças eram masculinas. A média da idade cronológica (IC) entre os grupo foi de 57,03 meses ( $\pm 7,10$  DP). Das seis variáveis motoras avaliadas entre os grupos o equilíbrio, com um valor de  $p=0,00$ ; esquema corporal, com  $p=0,00$  e organização temporal com  $p=0,00$  apresentaram diferenças significativas. Enquanto a motricidade fina e motricidade global não demonstraram diferenças estatísticas com  $p=0,69$  e  $p=0,46$ . Constatou-se ainda que crianças com desnutrição apresentam resultados inferiores para idade motora geral (IMG) com média de 39,78 meses ( $\pm 6,59$  DP). Crianças eutróficas tiveram 50,05 meses ( $\pm 3,84$  DP), diferença estatisticamente significativa ( $p=0,00$ ), para a variável IMG. Os valores do quociente motor geral (QMG) demonstraram que crianças com desnutrição apresentam maiores déficits que crianças eutróficas com média de 65,88 meses ( $\pm 9,02$  DP) e 93,65 ( $\pm 10,31$  DP) respectivamente. Resultando QMG “muito inferior” para as crianças desnutridas e “normal médio” para crianças eutróficas. Concluindo-se que as médias das variáveis: equilíbrio, esquema corporal e organização temporal foram aquelas com diferença estatisticamente significativa. A idade cronológica superior nas crianças com desnutrição crônica não causou efeito significativo quando calculado IMG e QMG.

**PALAVRAS CHAVES:** desnutrição crônica, desenvolvimento motor, crianças eutróficas.