ISSN: 1676-4285

OBJN Online Brazilian Journal of Nursing
ENGLISH
Federal Fluminense University
AURORA DE AFONSO COSTA NURSING SCHOOL
uff
Original Articles

Assessment of nutritional status in comparison to neuropsychomotor development in children: a descriptive study

Priscilla Sete de Carvalho Onofre[1], Natália Carolina Poma Nosse[2], Elaine Cristina Rodrigues Gesteira[3], Mariana Aparecida Costa[3], Renata Guzzo Souza Belinelo[1] and Patrícia Peres de Oliveira[3]

1 Paulista University
2 University of São Paulo
3 Federal University of São João Del-Rei

ABSTRACT

Aim: To assess nutritional status by relating it to the neuropsychomotor development of children. **Method:** This is a descriptive and quantitative study that was developed in an early childhood education center in the north part of the city of São Paulo. The sample consisted of 82 children aged one to four years. The data obtained were analyzed descriptively by calculating the absolute and relative frequencies for the quantitative variables. **Results:** Most children were male (60.9%), and had white skin color (59%). We observed an incidence of approximately 36% of cases of overweight and a relationship with the participants' psychomotor development, especially in the gross motor area and in terms of balance, where the greatest difficulties were found with regard to such overweight children. **Conclusion:** The nutritional status affects the neuropsychomotor development in the sample studied. The development of children may be influenced by their nutritional status, and obesity may pose risks in terms of gross motor performance.

Descriptors: Body Mass Index; Growth; Child Development.

Onofre PSC, Nosse NCP, Gesteira ECR, Costa MA, Belinelo RGS, Oliveira PP. Assessment of nutritional status in comparison to neuropsychomotor development in children: a descriptive study. Online braz j nurs [internet] 2015 Mar [cited year month day]; 14 (2):132-43. Available from: http://www.objnursing.uff.br/index.php/nursing/article/view/5120

INTRODUCTION

Growth is defined as an increase in the number and the size of cells, and it is externalized by an increase in physical size (weight and height); it is continuous and dynamic in that it is a process that takes place from conception to death. On the other hand, child development is influenced by intrinsic and extrinsic processes regarding the conditions under which growth occurs throughout the child's life, and determines the possibility of achieving or not achieving its maximum growth potential. In relation to linear growth (height), it is considered that the final height of the individual results from the interaction of genetic factors with environmental influences, which may or may not allow the best expression of his or her genetic potential[1,2].

Thus, the best measure in terms of defining a child's health status is growth, because nutrition and health disorders can affect it, regardless of their etiology. Studies show that most children's health and nutritional problems are the result of repeated infections and inadequate food intake. A poor nutritional status, for example, affects muscle function, which can reduce working capacity to 75%, which leads to a loss of muscle function. This is because there is a low level of muscle glycogen, which is unable to substitute fat for carbohydrate[4,5].

Proper nutrition has been accepted as an important factor for growth. For this reason, children's development is assessed in terms of various areas: sensory and motor; cognitive and social, which rely on biological factors such as prematurity, malformation and birth weight; and cultural, such as education, environment and socioeconomic status. This information in terms of nutrition related to children's health conditions, is important[8,9].

To determine children's nutritional status, anthropometric parameters are used. In addition to being used as epidemiological tools, they are considered to be health indicators that are easy to apply and understand. Using them makes it possible to make a quick, non-invasive and low cost assessment[4].

In Brazil, the statistics provided by the North American Health Statistics National Center are used. Periodic assessment allows the individual monitoring of children, identifying higher risk of morbidity and mortality and their consequences, such as malnutrition, which is the underlying cause of the initiation or worsening of child health problems[1,9].

Three anthropometric indices can be calculated for measuring weight and height: weight and age, height and age, or weight and height. For each sex there is a graph that presents weight and height curves. For these indicators there are two curves that have been set as parameters, with the upper curve corresponding to the 90th percentile and the lower corresponding to the 10th percentile. When the weight is between the 10th and 90th percentile, the values are understood to be satisfactory. However weights below the 10th percentile indicate undernourishment, low weight or malnutrition; in these cases further research into the conditions of life and disease history must be made, or a pattern of normal growth, but lower than that established as a parameter, should be set. In the event that the child is above the 90th percentile, it can be considered obese, overweight or have a large physical constitution (genetically)[7,9].

In relation to height, the value between the 10th and 90th percentile curves is considered satisfactory; below the 10th percentile it may represent a lower individual normal growth pattern. This fact can be considered a sign of illness that affects growth and leads

to chronic or prolonged malnutrition. Above the 90th percentile is generally considered normal, but the child presents a large physical constitution[7]. Children presenting poor growth values should be monitored frequently, so that their growth is evaluated in terms of growth and development[9].

There are several methods to assess the neuropsychomotor development of a child. Tests and scales are the most commonly used worldwide. In Brazil, the most commonly used is the Denver II Development Screening Test (DDST-R), created by Frankeburg in 1967 and revised in 1990, hence the name Denver II. This test includes the evaluation of social behavior, language development and motor skills[12-13].

The standardization of the Denver test was performed in a study in which the authors evaluated 3,389 children under five years of age, which allowed the test setting for the Brazilian cultural context[10].

Research that has used the Denver test show that social inequalities, housing, food and hygiene are major factors in terms of development. In Nursing, the DDST is used as a tool in the data collection process with regard to children, contributing to the preparation of prescriptions and care, aiming at comprehensive care[10,12].

Motor development is directly linked to the maturity or maturation of the nervous system and is responsible for the control of motor skills. On the other hand, personal--social conduct is assessed by the behavior with regard to cultural stimuli, while adaptive behavior evaluates the response against created objects and situations, the use of intelligence and capacity building[12-13].

Because it is easy to understand, the Denver II test can be applied in various types of care settings for children, such as health centers, outpatient clinics, day care centers or preschools, and it allows each professional a specific understanding according to their area of interest or training. The data obtained indicate whether children are progressing in a satisfactory and expected manner, taking into account their age and maturity, providing support for the planning of actions with regard to the children being evaluated and providing guidance for parents[10,13].

Given the above, it is essential to conduct a study to evaluate nutritional status in relation to the child's neuropsychomotor development, since early detection of possible nutritional deficiencies can be reversed or can cause minor impact on the neuropsychomotor development of children.

Thus, this research aims to evaluate the nutritional status relating to the neuropsychomotor development of children.

METHOD

This is a non-experimental study of a exploratory, descriptive and quantitative type, using the methodological framework of the quantitative research concepts proposed by May[14].

The survey was conducted in a Children's Educational Center (CEC) of the public network, located in the north of the city of São Paulo. It is a collective space for childhood experience for about 200 children aged one to four years.

Based on convenience sampling, we adopted the following inclusion criteria: children aged between one and four years present during the period of data collection; authorization given by parents/guardians, with the signing of an Informed Consent Form (ICF). The exclusion criteria were children

Onofre PSC, Nosse NCP, Gesteira ECR, Costa MA, Belinelo RGS, Oliveira PP. Assessment of nutritional status in comparison to neuropsychomotor development in children: a descriptive study. Online braz j nurs [internet] 2015 Mar [cited year month day]; 14 (2):132-43. Available from: http://www.objnursing.uff.br/index.php/nursing/article/view/5120

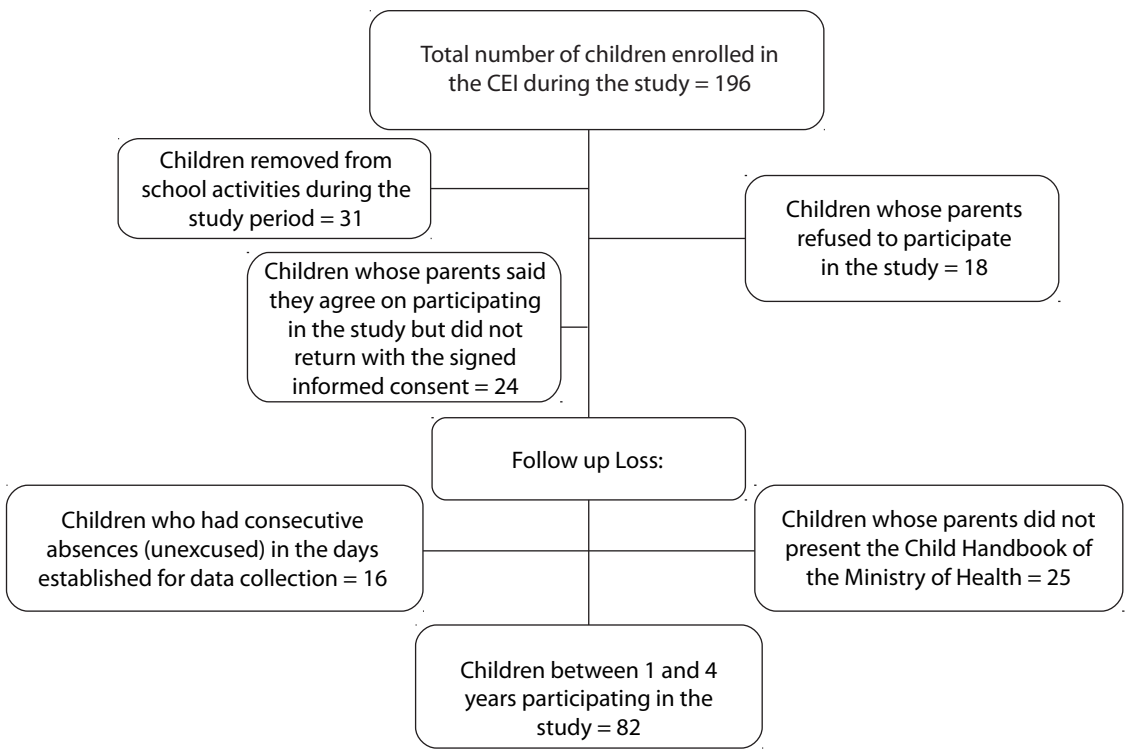
whose parents/guardians were not in possession of the Child Handbook of the Ministry of Health. There were 82 participants in the study, as described in the sample physical constitution flowchart **(Picture 1)**.

[PICTURE 1]

We use the Child Handbook of the Health Ministry as a tool in pursuit of the variables age, sex, weight, height and the calculation of body mass index (BMI) recorded by the researchers at the time of data collection in the CEI nursing room; as well as a semi-structured questionnaire exclusively designed for this study. In the questionnaire there were questions related to the type of delivery, birth weight, family income, gestational age at delivery and breastfeeding duration. The questionnaire was completed by parents or guardians. Other data that were related to nutritional evaluation and development were filled in by the researchers. For the evaluation of neuropsychomotor development we used the DDST-R, a test that was standardized and used in children from 0 to 6 years of age. The DDST-R contains 125 items and allows the evaluation of the current condition of the maturational development of the child; however, it cannot be used as an IQ or diagnostic method. To apply the test, materials such as a test model, a black pencil, a blank sulphite sheet, a rattle, among others, were used[14].

For test application it is necessary to know the age of the child and to let it feel free. It was necessary to start with the simplest items and move onto the most complex ones; for each item a maximum number of attempts should be allowed. For the realization of the test a vertical line should be crossed according to the child's age. The items on the left

Picture 1 - Flowchart of the sample of the study. São Paulo -SP, 2012



Source: Prepared by the authors, 2012.

represent the tasks that should have been completed by the child; items that are under the crossed line are the tasks that the child is currently able to perform; while the items on the right represent the tasks that still need to be carried out. The results are classified as "advanced" when the child completes at least one item to the right of the age line; "Caution" when the child refuses or fails to perform the items that cross their age line; or "delay" when the child completely fails to perform an item on the left of the age line. The results are also interpreted as "normal" when there is no delay, or at most a wariness; "Suspect" when there are one or more delays, or two or more of wariness; or "not testable" when there is complete denial of one or more items to the left of the age line[12-13].

In the event of of suspected or untestable tests, it is recommended that the test be repeated in one or two weeks to discard temporary factors, but if the revaluation remains unchanged in some of these parameters you must use clinical judgment based on the following categories: number of wariness and delays; items that showed wariness; previous rate of development; examination and medical history; and the availability of resources for indication[15].

Importantly, the researcher who conducted the test had a daily connection with the children, because of her work at CEI.

Data were collected from July to September 2012, after approval by the Ethics Committee on Humans of the Paulista University through Opinion No 42901. The researchers called parents for guidance and clarification on the research and began the study after agreement and the signing of the Informed Consent form.

The data obtained were analyzed descriptively, by calculating the absolute and relative frequencies for the quantitative variables. The data were presented discursively and in tables and graphs.

RESULTS

Table 1 contains the socio-demographic characteristics of the children. The group was composed mostly of male children (60.9%) of white skin color (59%). Regarding family income, it may be noted that more than 50% of the group receive between one and three minimum wages, and the smaller group (less than 3%) was the one that had family income over six minimum wages.

Table 1. Socio-demographic data of the children assessed. São Paulo, 2012.

Variables	N=82	f%
Age (years)		
One	6	7,32
Two	29	35,36
Three	24	29,27
Four	23	28,05
Gender		
Male	50	60,98
Female	32	39,02
Skin Color		
Yellow	1	1,22
White	59	71,95
Brown	21	25,61
Black	1	1,22
Family income (minimum wage)		
Higher than 6	2	2,44
Between 3 and 6	15	18,29
Between 1 and 3	58	70,73
Lower than 1	7	8,54

Source: Prepared by the authors, 2012.

Table 2 provides data collected through the questionnaire answered by parents, and presents the child's birth information, as well as information about the breastfeeding period. With regard to the type of delivery, no significant differences were noted between

Onofre PSC, Nosse NCP, Gesteira ECR, Costa MA, Belinelo RGS, Oliveira PP. Assessment of nutritional status in comparison to neuropsychomotor development in children: a descriptive study. Online braz j nurs [internet] 2015 Mar [cited year month day]; 14 (2):132-43. Available from: http://www.objnursing.uff.br/index.php/nursing/article/view/5120

them, but there was a higher prevalence of cesarean section. It is worth mentioning that all children were born in hospitals of the Unified Health System.

Five cases of deliveries by forceps were observed among these children. One of the children was born extremely premature, and another has a diagnosis for the "Beckwith--Wiedemann Syndrome". With regard to the gestational weeks, 79.8% of the children were born within the expected period, that is, from 37 completed weeks to 42 incomplete weeks. The other participants (19.3%) are divided into limitrophe premature (4%), moderately premature (10%) and extremely premature (2%).

We may also highlight the breastfeeding period, in which most of the group (49.6%) was breastfed for longer than six months. Children who had never been breastfed made up 3.6% of the sample.

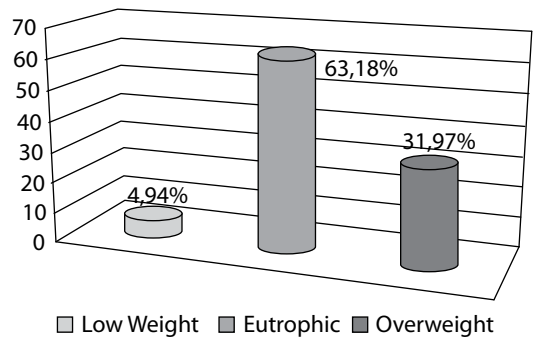
Table 2 - Birth and breastfeeding data. São Paulo, 2012.

Variables	N	%
Dlivery		
Cesarean	42	51,22
Forceps	5	6,1
Normal	35	42,68
Gestational Age		
Extreme Prematurity <30 weeks	2	2,44
Moderate Prematurity 31 to 34 weeks	10	12,2
Bordering Prematurity 35 to 36 weeks	4	4,88
full-term 37 to 42 weeks	66	80,49
Post-term> 42 weeks	0	0
Birth weight		
Up to 2 kg	3	3,66
2 kg to 2,500 kg	7	8,54
2,500 kg to 3,500 kg	34	41,46
3.500 to 4 kg	28	34,15
4 kg to 4,500 kg	6	7,32
4,500 kg to 5 kg	2	2,44
Not Specified	2	2,44
Breast Feeding		
Has never Breastfed	3	3,66
Less than 1 Month	6	7,32
Up to 3 months	9	10,98
From 3.1 to 6 months	2	2,44
Up to 6 months	21	25,61
More than 6 months	41	50
Total	82	100%

Source: Prepared by the authors.

The data presented in **Picture 2** were obtained by measuring height and weight. Thus, we calculated the body mass index (BMI) through an existing chart and the Child Medical Record of the Health Ministry.

Picture 2 -Body Mass Index (BMI) of the children surveyed. São Paulo-SP, 2012.



As can be seen, most of the sample (63.18% (n=52)) of the group is eutrophic (ideal weight for age); 31.97% (n=26) were in the overweight group; and only 4.94% (n=4) have a low weight for their age.

In **Table 3**, the results refer to the state of neurodevelopment in children with adequate nutritional status for their age (52 children); we evaluated the parameters "Personal-Social, Adaptive Fine Motor, Language and Gross Motor" by means of the Denver II test, which could present the following results: advanced for age; normal for age; suspect for age or untestable. The evaluation of the results was performed by the responses to the tests

performed for each parameter, according to the child's age.

In all parameters we note that the eutrophic children presented good performance in the proposed activities, with the highest results being "normal for age" and even "advanced for age." The children classified as advanced not only performed the activity as requested, but performed beyond what was expected.

In all parameters there were cases of "suspicious for age", ranked this way due to the fact that they did not perform what was expected for their age. They performed tasks that should have been done at a younger age. It is noteworthy that, among the children classified as suspect, there was a four year old boy diagnosed with Beckwith-Wiedmann syndrome. He had language difficulties due to macroglossia (increase of normal lingual structures), characteristic of the syndrome. He speaks, he knows the words, he understands what is requested or asked, but has difficulty in pronunciation, compared to other children of the same age.

It is noteworthy that the tests with the result "suspicious for age" were performed more than once and on alternating days, to exclude any possibility of error in the result.

The "untestable" cases were made up of children who refused to perform some activity or proved to be timid. In these situations the children were evaluated at a different time, using activities that were different from others previously used, but refused again, making it impossible to perform an assessment on certain issues.

Table 3. Relationship between Body Mass Index with the Current State of Neuropsychomotor Development in children who have the adequate nutritional condition for their age. São Paulo, 2012.

Variables	N	%
Personal-Social		
Advanced for the age	5	9,62
Normal for the age	43	82,69
Suspect for the age	4	7,69
Untestable	0	0
Adaptive fine motor		
Advanced for the age	8	15,38
Normal for the age	41	78,85
Suspect for the age	2	3,85
Untestable	1	1,92
Language		
Advanced for the age	14	26,92
Normal for the age	34	65,39
Suspect for the age	3	5,77
Untestable	1	1,92
Gross Motor		
Advanced for the age	7	13,46
Normal for the age	37	71,16
Suspect for the age	4	7,69
Untestable	4	7,69
Total	52	100%

Source: Prepared by the authors.

Of the 82 children assessed, it was found that only four had low weight in relation to their height, according to the BMI calculation. The evaluation of psychomotor development was satisfactory within the group. Only one child demonstrated "suspect" in the assessment of language, for not meeting the expectations anticipated for their age.

Table 4 highlights the relationship between BMI and the DDST-R in 26 overweight children. In general, they showed satisfactory results in relation to personal and social variables and adaptive fine motor: 84.62% were classified as "normal for age." In the "language" parameter, the results "advanced for age" and "suspicious for age" had the same percentage. It is noteworthy that "suspicious" children were evaluated more than once, and

Onofre PSC, Nosse NCP, Gesteira ECR, Costa MA, Belinelo RGS, Oliveira PP. Assessment of nutritional status in comparison to neuropsychomotor development in children: a descriptive study. Online braz j nurs [internet] 2015 Mar [cited year month day]; 14 (2):132-43. Available from: http://www.objnursing.uff.br/index.php/nursing/article/view/5120

with different approaches to eliminate any possibility of error.

The last parameter evaluated was Gross Motor. The activities proposed involved movement and motor coordination; three of the nine children who had "suspect for age" as a result were using appropriate shoes for orthopedic correction, and the other six had difficulty performing the movements of balance and gross motor coordination; one of them was physically fatigued after one of the tasks, requesting a rest before finishing the activity.

Another child tried to perform the first gross-motor skill task, but he realized that he would have difficulty, and refused to participate in all other attempts, and on different days.

Table 4. Relationship between the Body Mass Index and the current state of neuropsychomotor development in overweight children. São Paulo, 2012.

Variables	N	%
Personal-Social		
Advanced for the age	2	6,9
Normal for the age	25	86,2
Suspect for the age	2	6,9
Untestable	0	0
Adaptive fine motor		
Advanced for the age	2	6,9
Normal for the age	23	79,31
Suspect for the age	4	13,79
Untestable	0	0
Language		
Advanced for the age	6	20,69
Normal for the age	17	58,62
Suspect for the age	6	20,69
Untestable	0	0
Gross Motor		
Advanced for the age	3	10,34
Normal for the age	16	55,17
Suspect for the age	9	31,03
Untestable	1	3,45
Total	29	100%

Source: Prepared by the authors.

DISCUSSION

The group was composed mostly of children aged two years (35.36%), with an average age of 2.7 years. This group presented a lower frequency when compared to the group of one year old children. This average was expected, considering that daycare centers are institutions designed to care for and educate children from birth to four years of age. In recent decades the inclusion of children in child institutions or day care centers has increased significantly, generating new concerns in terms of the existing risks in early childhood[8,12].

Previous studies show that the children enrolled in public schools are from low-income families, and that poverty is a factor that must be taken into consideration, since poor diet and unsatisfactory hygiene and sanitary conditions are risk factors for child development[2,8,16].

In this study, all the children were born in hospitals associated to Unified Health System, yet the number of cesarean section deliveries was higher than vaginal delivery. Research previously conducted has shown that, even with all the campaigns, programs and ordinances that encourage vaginal delivery, the number of cesarean deliveries is still high, and this involves many questions and concerns. Note that cesarean delivery offers more risks, increased health service expenses, and increased maternal and fetal mortality. Fetal distress and risks to the mother are indications for the choice of cesarean section; however, this is often a subjective evaluation, unrelated to clinical questions, but for convenience or due to lack of preparation in carrying out normal deliveries[17-19].

Beckwith-Wiedemann syndrome manifests itself sporadically or as a result of hereditary transmission, and its incidence is

1:17,000 live births. Among the clinical features we can highlight a distinct triad of congenital anomalies: omphalocele, macroglossia and gigantism. You can also find neonatal hypoglycemia, mild microcephaly, capillary hemangioma on the forehead, abnormal grooves on the earlobes, exophthalmos, nasal dorsum extended with flattened alar cartilages, occipital prominence, maxillary hypoplasia, shallow orbital floor and hypoplasia of the midface. The chance of development of malignancy is high, and this usually occurs before the age of ten[18].

Preterm births may be associated with some obstetric and demographic risk factors such as maternal age below 21 or greater than 36, low socioeconomic status, preterm birth history, maternal height less than 1.52m, twin pregnancy, vaginal bleeding in the 2nd quarter, cervical ripening and increased uterine activity before the 29th week of gestation.

Prematurity may be due to diverse and unexpected circumstances in all places and social classes. It affects families and society at large with a financial and social cost that is difficult to measure. It requires care structure expertise and equipment that is not always available. It also affects the family structure, changing the expectations that permeate perinatality. Premature newborn babies may present a series of complications after birth, and the low birth weight associated with prematurity offers more risks of morbidity and mortality to infants. Morbidity is directly related to respiratory and neurological disorders and also infectious complications[17].

According to a study[19], the duration and prevalence of breastfeeding have increased in recent years. Nursing has a significant contribution to play in this advancement through interventions that begin before delivery, when the alimentation of children is discussed, for example, and also during the initiation of lactation, when there is an opportunity to review what was discussed in prenatal classes and to assist with difficulties in understanding the newborn behavior, in the evaluation of breastfeeding effectiveness, providing not only instrumental support, but also by providing guidance and encouragement to the mother and family[19].

Studies have shown different results from the current research in that the incidence of malnutrition was great and there were high rate of delay in psychomotor development in both studies[4.6].

The latest research alerts us to changes in the nutritional status of children and the food patterns of this population. Food consumption has been a reference for overweight and obesity, not only due to the amount of food eaten, but also its quality. Obesity today is discussed not only because of body mass gain, but also for being the cause of various diseases such as hypertension, diabetes, coronary heart disease, respiratory complications and osteoarthritis of large and small joints, as well as motion mechanical problems[3.20].

The treatment of macroglossia requires clinical, radiographic and functional assessment in order to verify the interference of respiration, mastication and deglutition. In this case treatment making use of a speech therapist may be indicated in order to provide a satisfactory performance in terms of speech, mastication and deglutition functions[20].

Scientific evidence alerts us to the importance of paying attention to the growth and development of children during the first three years of life, as stunting is limited after this period and extends into adulthood. Height is a very important factor for cognitive development, health status and productive performance. In this context, it is necessary

Onofre PSC, Nosse NCP, Gesteira ECR, Costa MA, Belinelo RGS, Oliveira PP. Assessment of nutritional status in comparison to neuropsychomotor development in children: a descriptive study. Online braz j nurs [internet] 2015 Mar [cited year month day]; 14 (2):132-43. Available from: http://www.objnursing.uff.br/index.php/nursing/article/view/5120

to point out that the first three years of life are the most important period, considering that this stage is the most vulnerable and is related to the presence of infections, malnutrition, and major changes in the central nervous system[3].

Childhood obesity has been discussed and studied by some authors, showing changes in stabilizing balance and normal motor patterns. Obesity affects the body's balance by the fact that the weight gain caused by excess body mass produces greater instability because adiposity moves the body's mass center forward, affecting postural stability. It can be said that most obese individuals are more likely to suffer imbalance precisely because of the abnormal distribution of mass[20].

From an emotional point of view, obese children have more difficulty in socialization. Often they try to get rid of the feeling of anger through something that gives them pleasure such as food, snacks, soft drinks; and they often take refuge in video games, television. In addition, they do not practice physical exercises. These attitudes contribute even more to social isolation and excessive weight gain[5-7].

Despite being in accordance with the criteria set out in the methodology, one of the limitations of the study was the sample size, considered small, being made up of children of a single CEI and limited to a period of three months of collection and fulfillment. These drawbacks limit the generalizability of the results, but do not invalidate the research and respond satisfactorily to its propositions. The findings encourage the continuation of this type of evaluation with a larger group for a longer period and with the more detailed measurement of membership criteria for a possible confirmation of the preliminary results.

CONCLUSION

Knowing that nutritional status influences the overall condition of the child, it can be concluded that the cases of nutritional disorders cannot be classified only as malnutrition, but also as obesity, since 31.97% of the cases were overweight.

A nutrition transition has occurred in recent years. Social changes mean that individuals seek faster and more practical things such as fast food, and children are included in this new reality.

In the present study we observed the incidence of overweight and its relationship to neuropsychomotor development, especially in gross motor and balance areas, where the greatest difficulties were found within that class. It is concluded that nutritional status influences the neuropsychomotor development in the sample.

In this new perspective, nursing plays a fundamental role in terms of growth and development from birth to adulthood. Professionals should accept their role as educators, guiding on good eating habits, sensitizing the family to improving the quality of life, and thus encouraging children to do the same, since the formation of personality and the incorporation of good habits occur during this stage, making this period suitable for family and professional guidance.

The survey revealed that the child's development can be influenced by their nutritional state and that obesity can have a negative effect in terms of good gross motor performance, and brings risks in terms of their social interaction, and can hinder physical exercise. More studies on this theme should be developed in order to provide confirmation.

REFERENCES

1. Ministério da Saúde (Brasil), Secretaria de Atenção à Saúde, Departamento de Atenção Básica. Orientações para a coleta e análise de dados antropométricos em serviços de saúde: Norma Técnica do Sistema de Vigilância Alimentar e Nutricional – SISVAN. Brasília (DF): Ministério da Saúde; 2011.
2. Silva SA, Moura EC. Determinantes do estado de saúde de crianças ribeirinhas menores de dois anos de idade do Estado do Pará, Brasil: um estudo transversal. Cad Saúde Pública. 2010; 26(2):273-85.
3. Pedraza DF,Queiroz D. Micronutrientes no crescimento e desenvolvimento infantil. Rev.Bras.Crescimento Desenvolvimento Hum.2011;21(1):156-171.
4. Reichert APS, Almeida AB, Souza LC, Silva MEA, Collet N. Vigilância do crescimento infantil: conhecimento e práticas de enfermeiros da atenção primária à saúde. Rev Rene. 2012; 13(1):114-26.
5. Vieira ME, Linhares MB. Developmental outcomes and quality of life in children born preterm at preschool- and school-age. J Pediatr. 2011; 87:281-91.
6.Guardiola A,Egewarth C,Rotta NT.Avaliação do desenvolvimento neuropsicomotor em escolares de primeira série e sua relação com o estado nutricional.J Pediatr(RJ).2011;77(3):189-96.
7.Murta AMG, Lessa AC, Santos AS, Murta NMG, Cambraia RP.Cognição,Motrocidade,Autocuidados,Linguagem e Socialização no Desenvolvimento de Crianças em Creche. Rer Bras Cresc e Desenv Hum. 2011;21(2):220-229.
8. Guellec I, Lapillonne A, Renolleau S, Charlaluk ML, Roze JC, Marret S, et al. Neurologic outcomes at school age in very preterm infants born with severe or mild growth restriction. Pediatrics. 2011; 127:e883-91.
9. Barboza CL, Barreto MS, Marcon SS. Records of childcare in primary care: descriptive study. Online braz J nurs [online]. 2012 Aug [cited 2014 sep 03];11(2): 359-75 Available from:http://www.objnursing.uff.br/index.php/nursing/article/view/3687
10.Brito CML,Vieira GO,Costa COM,Oliveira NF.Desenvolvimento neuropsicomotor: o teste de Denver na triagem dos atrasos cognitivos e neuromotores de pré-escolares.Cad Saúde Pública,2011;27(7):1403-14.
11.Amorim RCA, Laurentino GEC,Barros KMFT,Ferreira ALPR,Filho AGM,Raposo MCF.Programa de Saúde da família:proposta para identificação de fatores de risco para o desenvolvimento neuropsicomotor.Rev Bras Fisioter.2009;13(6):506-13.
12.Frankenburg WK, Dodds JB, editores. Denver II training manual. Denver: Denver Developmental Materials; 1990.
13.Moraes MW,Weber APR,Santos COM,Almeida FA.Teste de Denver II: avaliação do desenvolvimento de crianças atendidas no ambulatório do Projeto Einstein na Comunidade de Paraisópolis. Einstein. 2010; 8(1):149-53
14.May T. Social Research: Issues, Methods and Research. 4 ed. London: British Library, 2011.
15.Niquini RP, Bittencourt AS, Lacerda EMA, Saunders C, Leal MC. Avaliação da estrutura de sete unidades de saúde da família para a oferta da assistência nutricional no pré-natal no município do Rio de Janeiro, Brasil. Rev Bras Saúde Matern Infant. 2010; 10 (Supl. 1):S61-8
16.Monteiro PM,Caetano JA,Araújo TL.Enfermagem na Saúde da Criança:Estudo Bibliográfico Acerca da Avaliação Nutricional. Esc Anna Nery Ver Enferm.2010;14(2):406-411
17. Charkaluk ML, Truffert P, Fily A, Ancel PY, Pierrat V; Epitage study group. Neurodevelopment of children born very preterm and free of severe disabilities: the Nord-Pas de Calais Epipage cohort study. Acta Paediatr. 2010;99(5):684-9.
18. Eckmann-Scholz C, Jonat W. 3-D ultrasound imaging of a prenatally diagnosed Beckwith--Wiedemann syndrome. Arch Gynecol Obstet. 2011;284:1051-2.
19. Onofre PSC, Oliveira PP de, Belinelo RGS, Ferreira SSAS. The knowledge of breastfeeding among pregnant women assisted in a primary healthcare unit. Rev enferm UFPE online. 2012[cited 2014 Oct 11];6(6):1302-10. Available from: http://www.revista.ufpe.br/revistaenfermagem/index.php/revista/article/viewArticle/2473

Onofre PSC, Nosse NCP, Gesteira ECR, Costa MA, Belinelo RGS, Oliveira PP. Assessment of nutritional status in comparison to neuropsychomotor development in children: a descriptive study. Online braz j nurs [internet] 2015 Mar [cited year month day]; 14 (2):132-43. Available from: http://www.objnursing.uff.br/index.php/nursing/article/view/5120

20. Lima MAA, Oliveira MAA, Ferreira HS. Confiabilidade dos dados antropométricos obtidos em crianças atendidas na Rede Básica de Saúde de Alagoas. Rev Bras Epidemiol. 2010; 13(1):69-82.

All authors participated in the phases of this publication in one or more of the following steps, in According to the recommendations of the International Committee of Medical Journal Editors (ICMJE, 2013): (a) substantial involvement in the planning or preparation of the manuscript or in the collection, analysis or interpretation of data; (b) preparation of the manuscript or conducting critical revision of intellectual content; (c) approval of the versión submitted of this manuscript. All authors declare for the appropriate purposes that the responsibilities related to all aspects of the manuscript submitted to OBJN are yours. They ensure that issues related to the accuracy or integrity of any part of the article were properly investigated and resolved. Therefore, they exempt the OBJN of any participation whatsoever in any imbroglios concerning the content under consideration. All authors declare that they have no conflict of interest of financial or personal nature concerning this manuscript which may influence the writing and/or interpretation of the findings. This statement has been digitally signed by all authors as recommended by the ICMJE, whose model is available in http://www.objnursing.uff.br/normas/DUDE_eng_13-06-2013.pdf

Received: 12/19/2014
Revised: 03/09/2015
Approved: 03/16/2015