

## FUNCTIONAL PERFORMANCE ACCORDING TO GESTATIONAL AGE AND BIRTH WEIGHT OF PRESCHOOL CHILDREN BORN PREMATURE OR WITH LOW WEIGHT

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### Abstract

**Objective:** Evaluate the functional performance of preschool children born with different degrees of prematurity and low birth weight who are follow in a care specialized service. **Methods:** A cross-sectional study, which used the Pediatric Evaluation Disability Inventory- PEDI, an interview structured for caregivers that assesses children's functional abilities and independence level, in the areas of self-care, mobility and social function. The test was achieved with 98 participants divided into three groups according to the degree of prematurity and according to birth weight. It was used the chi-square test and the variance analysis to verify the association and the difference between groups according the degrees of prematurity (three) or birth weight (three) and the PEDI. In all analysis it was considered the significant level of  $\alpha = 0,05$ . **Results:** There was found a delay of 10,2%, 12,2% and 14,3% in the functional abilities in the areas of self-care, mobility and social function, respectively, and of 11,2%, 19,4% and 15,3% in the assistance level received from the caregivers (independence), in the same areas. It was not found statistically significant differences or associations between groups of different degrees of prematurity or birth weight and the PEDI performance. **Conclusion:** Premature and low birth weight children demonstrated high rates of delay in functional performance at preschool age that did not vary in magnitude among different degrees of prematurity and low birth weight, suggesting that exist others factors contributing to the development outcome at this age.

**Key words:** premature, low birth weight infant, child development, activities of daily living.

### INTRODUCTION

The scientific and technological advances in obstetric and neonatal care in recent years has increased the survival of infants born under unfavorable conditions, which are highly susceptible to developmental delay or problems and the occurrence of post-natal morbidities.<sup>1,2,3,4,5,6</sup> Prematurity and low birth weight<sup>2,5,6,7</sup> are the main factors triggering immediate neonatal complications<sup>1,6</sup> and are considered as predictors of long<sup>10-14</sup> and short-term<sup>1,2,8,9</sup> problems in development.

The impairment resulting from the action of these and other factors is installed in multiple areas and can generate motor changes<sup>9-17</sup>, involving the execution of activities, functional status, among others, promoting risk for developmental delay and especially the occurrence of cerebral palsy<sup>1-3,6,14,18,19</sup>; cognitive<sup>20</sup>, behavioral<sup>21</sup>, learning<sup>21</sup>, language<sup>22</sup>, vision or hearing<sup>23</sup> problems, in the performance of functional activities of daily living<sup>4</sup> or all of these development outcomes combined<sup>9,14-17,24</sup>. Some authors report that the occurrence of morbidity, either immediate<sup>2,25</sup> or late<sup>10,2</sup>, is higher the lower the gestational age and/or birth weight. Lemos et

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al.<sup>25</sup> found that morbidity and neonatal complications were significantly higher in the group of children born weighing less than 1000g and gestational age less than 33 weeks. Allin et al.<sup>13</sup> assessing adults between 17 and 18 years who were born premature, found slight neurological changes associated with reduced neuropsychological function compared with their controls born at term.

Fily et al.<sup>24</sup> found lower coefficient of global development among more premature children. Zwicer & Harris<sup>12</sup> in a systematic review of the literature suggest that children born prematurely or with low weight at preschool age have a poorer functional performance in physical, emotional and social aspects than their controls, and that the same happens in adolescence. Studies report that as a result of prematurity, low birth-weight, the highest number of neonatal complications and neurodevelopmental problems with chronic conditions; in particular, the impairment of functionality, it is possible to observe significant increase in family stress and negative impact on quality of life of the child and family<sup>11,12</sup> that may generate other late health and social demands, as the need for special resources when at school age<sup>27</sup>. Drotar et al.<sup>7</sup>, argue that neurodevelopmental chronic conditions can enhance the impact and burden on the families of premature children with extremely low birth weight in preschool, parents requiring more time and interaction in the child's management in its daily life activities (ADLs), and imposing greater financial burden on medical services and development programs.

By being potential generators of complications and changes in children's development, prematurity and low birth weight are considered as indicators for referral for follow-up<sup>8,17</sup>. In this service care, newborns are monitored and reassessed periodically by a specialized multidisciplinary team, with the main objective of verifying the influence of risk factors, such as prematurity and low weight, on the short- and long-term development, allowing detection as soon as possible of the likely problems or delay and referral to services the infant/child needs<sup>1,17,18</sup>. The follow-up services involve high cost, high time demand and can cause anxiety in parents and children<sup>14</sup>.

Despite the many studies devoted to investigate the factors influencing the children development with premature birth and/or low weight (BLW), there is still little evidence on the impact of these factors on the long-term functional abilities, activities of daily living (ADLs), independence and participation of these children in their environmental context<sup>11</sup>, especially in Brazil. In the national literature was found only one study evaluating the functional skills of daily living and children independence at age three<sup>4</sup>. The repertoire of functional skills and the level of independence in areas such as self-care, mobility and social function are the means by which children express themselves effectively, interact and exert their integration

activities into community, such as going to school, playing with peers, learning, and other social skills, being therefore essential to healthy living and quality in the present and the future as adults<sup>19</sup>. The ADLs execution and social-community life with independence imply physical, cognitive and psychosocial functional integrity that many times, by various factors, is committed in premature and low-weight at birth children. Furthermore, studies investigating this subject most often the comparison with control groups of children not premature and/or without low weight at birth use in their analysis. Thus, there is need for conducting research comparing the group of premature and/or low weight at birth among themselves<sup>26</sup>.

The objective of the present study was to verify the functional performance in the areas of self-care, mobility and social function of children at pre-school ages born with varying degrees of prematurity and low weight.

## METHODS

### PARTICIPANTS

This transversal study was conducted at the Follow-up Service of the Health Center Care, University Hospital, from Federal University of Juiz de Fora- HU / CAS - UFJF. This service was chosen because is the regional reference service in the follow-up of risk infants and the main receptor of neonates and infants egress from the Neonatal Intensive Care Units (NICU) of Juiz de Fora and Zona da Mata's area, Minas Gerais. Inclusion criteria were premature birth and/or low weight, older than 2 years and complete registration data in the service archives. The choice for the minimum age was due to there being no longer need to use the corrected age for premature infants from age two or elder<sup>4</sup>, the psychometric characteristics of the instrument being better<sup>30</sup> and the repertoire of functional skills being better delineated<sup>14</sup> from this age.

There were found 224 potential participants for the study and, of these, four (1.8%) had died, 13 (5.8%) had changed their addresses for other state, 27 (12.1%) refused to participate, even after at least three attempts to include by the researcher, and 66 (29.5%) were not found through their data registered in the follow-up service, even after attempts to telephone contacts with neighbors and public health services close to their recorded addresses. Thus, 114 (50.9%) children underwent evaluation by their caregivers. Of these, 16 (14%) had cerebral palsy and were excluded from the study in order to not compromise the outcomes investigated, once the functional performance is clearly influenced by this condition. Thus, the study population had participation of 98 children born prematurely and/or with low weight, aged between two and seven years in the period of data collection, occurred between October 2009 and October 2010. Participants were divided according to gestational

age in three groups: extremely preterm-EP (up to 28 weeks gestational age), very preterm-VP (GA from 29 to 32 weeks) and late preterm-LP (GA from 33 to 36 weeks); and according to birth weight in other three groups: extremely low birth weight - ELBW (less than 1000 grams), very low birth weight-VLBW (1000 to 1499 grams) and low birth weight-LBW (1500 to 2499 grams). Exclusion criteria were congenital defects and/or chromosomal abnormalities, cerebral palsy and children whose parents or guardians did not allow participation in the study.

### *INSTRUMENTS*

To investigate the outcome was used the Pediatric Evaluation Inventory of Disability - PEDI, which is a standardized, validated and adapted instrument to Brazilian reality<sup>30</sup>. It consists of a structured interview conducted with the caregiver able to document the functional performance and independence in daily activities of children between six months and seven and a half years of age<sup>30</sup>. This test contains three parts that assess the repertoire of functional skills, level of independence or assistance received from the caregiver and changes of environment that the child needs in three areas, respectively: self-care, mobility and social function. Only the first two parts of the test related to the functional skills and the level of assistance received from the caregiver were used in this study and will be quickly described below. In the first part, relating to functional skills, the self-care dimension contains items covering skills related to feeding, clothing, hygiene and sphincter control; the mobility dimension evaluates the transfers and locomotion at internal and external environment; and the area of social function consists of items that reflect issues of communication (comprehension and expression), problem solving, interactive social game, interaction with colleagues, plays, self-information, temporal orientation, housekeeping activities, self-protection and community function. In each item of this section the score zero is assigned to the child who cannot meet the ability described and score "one" is assigned to the child that can perform the item; the sum of points reflects the number of activities that the child is able to perform. The second part of the test concerns the level of care that the caregiver provides the child in carrying out activities in the same dimensions (self-care, mobility and social function) and is punctuated with a decreasing degree of independence, being "five" to score of complete independence, "zero" to full service and, the others, intermediate levels of care. For data analysis, raw scores (which represent the sum of points for each dimension) obtained by children in each part were transformed into a normative score, according to the table available in the test manual<sup>30</sup>, which allows the comparison of participant's performance with what is expected for their age. After conversion, a normative score in the range between 30 and 70 is within the normal

limits for a Brazilian child in that considered age group<sup>30</sup>. This classification allowed the categorization of the child's development status in adequate or early (normative score values included in this range or higher) and late (values below 30). The use of normative score also allowed the comparison of results among participants, since the child's current age factor is statistically corrected in such normative score.

### *PROCEDURE*

An interview with the caregiver of the participant selected was performed only once using the PEDI test - Pediatric Evaluation Inventory Disability (Brazilian adapted version)<sup>30</sup> and a range of socioeconomic level identification using the "Classificação Econômica Brasil"<sup>31</sup>. The interview with the children's caregivers was pre-scheduled by the researcher, by phone, for a day and time convenient for both, that occurred in one of the follow-up service offices HU/CAS- UFJF and lasted approximately 50 minutes. Data were collected by one of the three physiotherapists from the trained team to the study, who obtained intra- and inter-examiner reliability index higher than 90% in all parts of the test. Birth characteristics such as IG, weight, type of delivery and number of neonatal complications were obtained from the records protocols of participants in that service. This study was approved by the Research Ethics Committee of the University Hospital/ HU UFJF with the protocol number: 0152/2009.

### *STATISTICAL ANALYSIS*

Descriptive analysis was performed for participants' characterization including frequencies and percentages; values of mean, median, standard deviation, 25 and 75 percentiles, minimum and maximum values were added to the numerical variables. To investigate the association between the development status (late or adequate/early, as the normal range described in the manual) measured by the PEDI test and gestational age groups (EP, VP, LP) and Birth weight (ELBW, VLBW, LBW) was used the chi-square test; for verifying the existence of differences in the normative scores on the PEDI test among groups was used the analysis of variance with one factor (ANOVA). Data were organized and stored in the Statistical Package for Social Sciences (SPSS) version 14.0 (SPSS Inc., 2005®). The significance level  $\alpha = 0.05$  was considered for all tests.

### **RESULTS**

Results of this study may contribute to a better understanding of the possible consequences of premature birth and/or low birth weight on the functional abilities and independence level of children over two years old with several risk degrees. The characterization of the study

population is described in Table 1. Most of children included were born by cesarean section (60%), with less than 33 weeks gestational age (77.4%) and weighing less than 1500 g (63.2%) and almost 60% had seven or more immediate neonatal

complications. Regarding gender, there was equivalence between the percentage of boys and girls, who had on average 4.3 years old and were mostly of low socio-economic status, with 76.6% belonging to C1, C2, or D classes.

**Table 1:** Descriptive Characteristics

	VARIABLE f	FREQUENCY (%)
GA (mean: 31; sd: 2.85)		
EP	20	(21.5)
VP	52	(55.9)
LP	21	(22.6)
Weight (mean: 1439g; SD: 445.4g)		
ELW	15	(15.6)
VLBW	46	(47.9)
LBW	35	(36.5)
Sex		
Female	50	(51.0)
Male	48	(49.0)
Type of Delivery		
Cesarean Section	57	(60.00)
Vaginal	38	(40.00)
Neonatal complications		
Until 4	4	(4.1)
5 to 6	37	(37.8)
7 to 8	33	(33.7)
9 and more	24	(24.5)
Socioeconomic level *		
B1	1	(1,0)
B2	22	(22,4)
C1	37	(37,8)
C2	32	(32,7)
D	6	(6,1)

Source: Survey data

Caption: Sample's descriptive data expressed as frequencies (f) and percentages (%); continuous variables with mean and standard deviation values (SD) GA: gestational age expressed in weeks, EP: extreme premature (<28 weeks gestational age), VP: very premature (29 to 32 weeks gestational age), LP: Late Premature 33 to 36 weeks gestational age), ELBW: Extreme low birth weight (<1000g), VLBW; Very low Birth weight (1000 to 1499g), LBW: Low Birth weight (1500 to 2499g) \*socioeconomic level= Classificação econômica Brasil.

Children's development status, according to the PEDFI test described in Table 2, shows that 10.2% of participants had delay in functional abilities of self-care (FASC), 12.2% in functional skills of mobility (FSM) and 14.3% in functional skills of social function (FSSF). By analyzing the percentages of level of assistance received from the caregiver there was 11.2% delay in

self-care (CASC), 19.4% in mobility (CAM) and 15.3% in social function (CASF). Considering the whole sample, 25.5% showed abnormal development according to the PEDFI with regard to the repertoire of functional skills presented in self-care, mobility and social function and, 32.7% in the level of assistance received from the caregiver in the same areas.

**Table 2:** Description of the development status by PEDFI

PEDFI	DELAYED		ADEQUATE		EARLY	
	N	(%)	N	(%)	N	(%)
FASC	10	(10,2)	85	(86,7)	3	(3,1)
FSM	12	(12,2)	86	(87,8)	0	(0,0)
FSSF	14	(14,3)	81	(82,7)	3	(3,1)
CASC	11	(11,2)	85	(87,8)	1	(1,0)
CAM	19	(19,4)	79	(80,6)	0	(0,0)
CASF	15	(15,3)	72	(73,5)	11	(11,2)

Source: Survey data

Caption: PEDFI: *Pediatric Evaluation Disability Inventory*; FASC: functional abilities of self-care; FSM: functional skills of mobility; FSSF: functional skills of social function; CASC: caregiver assistance in self-care; CAM: caregiver assistance in mobility; CASF: caregiver assistance in social function.

Table 3 shows the values of mean, median, standard deviation, minimum, maximum, 25th and 75th percentiles of the normative scores obtained in the PEDI test in each dimension of the Functional Skills (FS) and Received Assistance of the Caregiver (RAC). The mean and median values in all test areas were below 50.00, with the lowest mean and

median found in ACFS, 43.53 and 42.60 respectively, and the highest one in HFAC, 46.64 and 48.40 respectively. 25<sup>th</sup> percentile values ranged from 30.00 to 40.00 and the 75<sup>th</sup> percentile around 50.00 and 55.00 approximately. The minimum values were below 10.00 and the maximum ones were above 65.00.

**Table 3: Characterization of functional abilities and independence (normative scores - PEDI)**

PEDI	Mean ± SD	Mín.	P25	Median	P75	Max.
FASC	46,64 ± 13,83	<10,00	41,37	48,40	54,20	77,70
FSM	44.49 ± 13,26	<10,00	37,32	47,50	55,80	65,70
FSSF	44,83 ± 14,74	<10,00	37,40	46,60	51,35	82,00
CASC	44,49 ± 14,60	<10,00	38,00	45,85	53,30	72,60
CAM	43,97 ± 16,92	<10,00	31,82	45,90	56,27	69,70
CASF	43,53 ± 20,35	<10,00	31,95	42,60	51,60	>90,00

Source: Survey data

Caption: PEDI: *Pediatric Evaluation Disability Inventory*, FASC: functional abilities of self-care; FSM: functional skills of mobility; FSSF: functional skills of social function; CASC: caregiver assistance in self-care; CAM: caregiver assistance in mobility; CASF: caregiver assistance in social function, SD: standard deviation; Min.: minimum; Max.: maximum; P25 and P75: 25<sup>th</sup> and 75<sup>th</sup> percentiles.

The results of the chi-square test for functional development status documented by the PEDI according to the degree of prematurity are shown in Table 4. The percentage of delayed functional development in FS in all areas studied was higher in the extremely premature (EP-up to 28 weeks GA), although the p value has not been statistically significant. The CASC showed

statistically significant association (p = 0.003) with the degree of prematurity; with the highest delay percentage among infants with lower gestational age. CAM showed similar delay percentage among groups, around 20%. In CASF the highest delay percentage happened in the VP group (GA from 29 to 33 weeks), but it was not statistically significant.

**Table 4. Status of functional abilities and independence (PEDI) according to gestational**

PEDI	AGE			p-value
	Extreme premature (EP) N (%)	Very Premature (VP) N (%)	Late premature (LP) N (%)	
FASC				
Delayed	3 (15.0)	3 (5.8)	2 (9.5)	0.476
Adequate/Early	17 (85.0)	49 (94.2)	19 (90.5)	
FSM				
Delayed	4 (20.0)	4 (7.7)	3 (14.3)	0.339
Adequate/Early	16 (80.0)	48 (92.3)	18 (85.7)	
FSSF				
Delayed	4 (20.0)	5 (9.6)	2 (9.5)	0.481
Adequate/Early	16 (80.0)	47 (90.4)	19 (90.5)	
CASC				
Delayed	6 (30.0)	1 (1.9)	2 (9.5)	0.003*
Adequate/Early	14 (70.0)	51 (98.1)	19 (90.5)	
CAM				
Delayed	4 (20.0)	10 (19.2)	4 (19.0)	0.996
Adequate/Early	16 (80.0)	42 (80.8)	17(81.0)	
CASF				
Delayed	2 (10.0)	9 (17.3)	1 (4.8)	0.277
Adequate/Early	18 (90.0)	43 (82.7)	20 (95.2)	

Source: Survey data

Caption:  $\chi^2$  test.

PEDI: *Pediatric Evaluation Disability Inventory*; FASC: functional abilities of self-care; FSM: functional skills of mobility; FSSF: functional skills of social function; CASC: caregiver assistance in self-care; CAM: caregiver assistance in mobility; CASF: caregiver assistance in social function,; \*: p significant value



Table 5 presents the results of analysis of variance in all dimensions assessed by PEDI according to the GA. Those born with up to 28 weeks gestation (group EP) had lower averages in FASC, FSM CASC and CAM, but such differences were not statistically significant. In FSSF delay rates were slightly different among groups, being higher in the EP, lower in the VP and intermediate in the LP group. Similarly, values were slightly different in CASF, with lower values in the PR group. These analyses showed no statistical significance. In Table 6 are shown the results of the chi-square test for functional development status documented by the PEDI,

according to birth weight. The p value was not statistically significant in any association analyses between birth weight and functional skills groups and independence measured by the PEDI. However, the percentage of children with delayed development in FASC, FSSF and CASC was higher in the ELBW group (less than 1000g). In FSM, CAM and CASF the percentage of delayed status was similar between ELBW and MBW groups (children up to 1499g) around 13% in the first outcome about (FSM) 20% in the two others. The group of children with LBW (1500 to 2499g) remained higher percentage score than the other groups in all skills and independence.

**Tabela 5:** Escores do teste PEDI segundo idade gestacional

PEDI	GESTACIONAL AGE (GA)			p-value
	Extreme premature (EP) N (%)	Very Premature (VP) N (%)	Late premature (LP) N (%)	
FASC				
Média ± DP	44.27 ± 3.29	47.95 ± 1.45	48.48 ± 3.58	0,499
FSM				
Média ± DP	42.96 ± 3.18	45.26 ± 1.48	46.79 ± 3.64	0,638
FSSF				
Média ± DP	46.26 ± 3.56	44.81 ± 1.91	48.26 ± 2.81	0,635
CASC				
Média ± DP	39.74 ± 4.28	46.79 ± 1.47	45.97 ± 3.09	0,143
CAM				
Média ± DP	39.26 ± 4.28	45.75 ± 2.14	43.98 ± 4.24	0,362
CASF				
Média ± DP	43.34 ± 3.11	46.46 ± 3.37	40.98 ± 2.69	0,553

Source: Survey data

Caption: ANOVA, PEDI: *Pediatric Evaluation Disability Inventory*, FASC: functional abilities of self-care; FSM: functional skills of mobility; FSSF: functional skills of social function; CASC: caregiver assistance in self-care; CAM: caregiver assistance in mobility; CASF: caregiver assistance in social function, SD: standard deviation.

**Tabela 6:** Status das habilidades funcionais e independência (PEDI) segundo o peso ao nascimento

PEDI	WEIGHT			p-value
	Extreme low birth low weight (ELBW) N (%)	Very low birth weight (VLBW) N (%)	Low birth weight (LBW) N (%)	
FASC				
Delayed	3 (20,0)	5 (10,9)	2 (5,7)	0,336
Adequate/Early	12 (80,0)	41 (89,1)	33 (94,3)	
FSM				
Delayed	2 (13,3)	6 (13,0)	3 (8,6)	0,790
Adequate/Early	13 (86,7)	40 (87,0)	32 (91,4)	
FSSF				
Delayed	4 (26,7)	7 (15,2)	3 (8,6)	0,266
Adequate/Early	11 (73,3)	39 (84,8)	32 (91,4)	
CASC				
Delayed	4 (26,7)	4 (8,7)	3 (8,6)	0,192
Adequate/Early	11 (73,3)	42 (91,3)	32 (91,4)	
CAM				
Delayed	3 (20,0)	11 (23,9)	5 (14,3)	0,551
Adequate/Early	12 (80,0)	35 (76,1)	30 (85,7)	
CASF				
Delayed	3 (20,0)	9 (19,6)	3 (8,6)	0,325
Adequate/Early	12 (80,0)	37 (80,4)	32 (91,4)	

Source: Survey data

Caption:  $\chi^2$  test.

PEDI: *Pediatric Evaluation Disability Inventory*; FASC: functional abilities of self-care; FSM: functional skills of mobility; FSSF: functional skills of social function; CASC: caregiver assistance in self-care; CAM: caregiver assistance in mobility; CASF: caregiver assistance in social function.

The results of analysis of variance for groups divided according to birth weight are shown in Table 7. Means in FASC, FSSF, CASC, CAM CASF were lower in the lowest weight group (ELBW), reaching

statistical significance only in ACAC ( $p = 0.055$ ).

The mean values on the FSM outcome were similar in the EBP and MBP groups, and lower than in LBW group.

**Table 7:** Status of functional abilities and independence (PEDI) according to birth weight

PEDI	WEIGHT			p-value
	Extreme low birth low weight (ELBW) N (%)	Very low birth weight (VLBW) N (%)	Low birth weight (LBW) N (%)	
FASC				
Delayed	3 (20.0)	5 (10.9)	2 (5.7)	0.336
Adequate/Early	12 (80.0)	41 (89.1)	33 (94.3)	
FSM				
Delayed	2 (13.3)	6 (13.0)	3 (8.6)	0.790
Adequate/Early	13 (86.7)	40 (87.0)	32 (91.4)	
FSSF				
Delayed	4 (26.7)	7 (15.2)	3 (8.6)	0.266
Adequate/Early	11 (73.3)	39 (84.8)	32 (91.4)	
CASC				
Delayed	4 (26.7)	4 (8.7)	3 (8.6)	0.192
Adequate/Early	11 (73.3)	42 (91.3)	32 (91.4)	
CAM				
Delayed	3 (20.0)	11 (23.9)	5 (14.3)	0.551
Adequate/Early	12 (80.0)	35 (76.1)	30 (85.7)	
CASF				
Delayed	3 (20.0)	9 (19.6)	3 (8.6)	0.325
Adequate/Early	12 (80.0)	37 (80.4)	32 (91.4)	

Source: Survey data

Caption:  $\chi^2$  test.

PEDI: *Pediatric Evaluation Disability Inventory*; FASC: functional abilities of self-care; FSM: functional skills of mobility; FSSF: functional skills of social function; CASC: caregiver assistance in self-care; CAM: caregiver assistance in mobility; CASF: caregiver assistance in social function.

## DISCUSSION

The results of this study showed significant levels of developmental delay in functional abilities to perform activities of daily living and independence in the areas of self-care, mobility and social function among children inserted in a follow-up service. A quarter (25%) of participants showed delay in functional abilities and almost a third (32.7%) in independence, and the delay rate measured in each specific dimension was above 10%.

Corroborating these results, Rugolo<sup>1</sup> found through literature review that five to 30% of infants with ELBW have some functional limitation in motor area, self-care or communication. Msall et al.<sup>32</sup> found lower delay percentage rates, with 12% of the sample with some functional limitation: 0.88% in the area of self-care, 1.24% in mobility, 5.29% in communication and 10.46% in the learning area. This difference is probably due to the fact that the study of Msall et al.<sup>32</sup> have been done through a population-based household survey, with high number of participants, including children without previous complications or risk for developmental problems, and the use of a different interview instrument from the present study.

The lower delay incidence with regard to the repertoire of functional skills was found in the FASC, probably because many of the skills related to food,

hygiene, clothing and sphincter control were already present at the age which most children were in the sample (mean 4.3 years), as they usually are acquired at earlier ages, and even if there have been delays in its acquisition, this cannot not have been noticed in some cases due to the cross-sectional nature of this study. Msall et al.<sup>32</sup> also found minor delays in this skill. The highest delay (14.35%) was in FSSF, whose specific items involving language, problem solving, interactive play, self-protection, games, among others, are more complex and of later acquisition. Moreover, these findings are in accord to the literature review conducted by Rugolo<sup>1</sup>, which describes that premature infants of extremely low birth weight have greater difficulties to interpret information, solve problems and in social behavior regardless of cultural factors. Intermediate delay in mobility skills may be related to the variability of requirements for performing transfers and locomotion tasks at internal and external environments (scale components in this area), since children reside and live in different household and community environments with respect to architectural barriers, furniture and construction.

Regarding the level of assistance received from the caregiver, the highest delay was in the mobility area (19.4%); this finding is in agreement with those of Mancini et al.<sup>4</sup>, who argue that

caregivers of premature infants tend to provide more help than necessary, especially for underestimating children's abilities in this area. The 15.3% delay in assistance on social function and 11.2% in self-care assistance is roughly equivalent to delays in skills in the same areas, so that assistance by the caregiver seems to be provided according to the repertoire of functional abilities shown by the child.

Means and medians of all normative scores of participants in this study were within normal limits, suggesting that children included in a follow-up service may have more access to specialized treatments and family guidelines that minimize the possible negative impact on their development, as in the present sample. However, scores below the average value for Brazilian normative population, represented by the score 50.00<sup>30</sup> suggesting that, although being within the normative standards, there is a lower performance on the functional performance of premature infants and/or low birth weight than those born without such conditions, even after exclusion of cases with severe disabilities. The systematic review of Zwicker and Harris<sup>12</sup> analyzed studies on the life quality related to health of preschool children, adolescents and young adults born premature or with very low birth weight, compared with controls without such conditions, revealing lower physical, emotional and social function development of the first compared to the latter. Santos et al.<sup>5</sup> when evaluating the influence of low birth weight on motor performance of infants in the first half of life, through the Alberta Infant Motor Scale (AIMS), also found results below the normative score in their sample. Eickmann, Lima and Lira<sup>33</sup> when assessing the mental and motor development measured by the Bayley scale showed that children with low birth weight have lower performances than those of normal weight in both areas analyzed.

The analyses for verification of differences between groups and possible associations between prematurity or birth weight with the findings of the PEDI test did not indicate statistically significant values, except in CASC, where groups of lower weight and gestational age had the worst performance. These latter findings are possibly also related to the fact that caregivers of premature infants tend to offer more help than necessary. Although no statistical significance has been found in other outcomes, the worst ratings of development status and normative scores were observed in infants with gestational ages less than 33 weeks and weight less than 1500grs ( EP and VP groups, ELBW and MBW, respectively). Khan et al.<sup>9</sup> found severe and moderate neurodevelopmental disability rates (23% and 45%, respectively) in premature infants with gestational age less than 33 weeks. Fily et al.<sup>24</sup> also found that developmental quotient was less, the lower the gestational age.

The fact that the findings of associations between gestational age and birth weight for most PEDI areas have not been statistically significant in this study may be related to the not using a control group for comparison and the evaluation has been performed only between premature and low birth weight children, which may mean that the functional development of this population is more uniform in most areas investigated in spite of being lower than the norm. In addition, stratification of participants may have allocated insufficient number in each group for perception of more subtle variations in the outcomes investigated.

Although prematurity and low birth weight are considered short-, medium- and long-term predictive factors to morbidities and/or delays, there are other factors not investigated in this study, which act on child development that can generate positive or negative impacts on it. According to Eickmann et al.<sup>33</sup>, social and environmental factors have major importance on the development at later ages. Similarly, Rugolo<sup>1</sup> says that although most of disorders disappear or attenuate over time, others may arise and/or progress after age two. Thus, it is possible that factors related to socioeconomic and environmental conditions interact with the biological birth conditions exerting significant effects on the findings presented in this paper.

Limitations of this study consist of: be a cross-sectional nature, providing data on the momentary functional capabilities and participants independence, being suggested conducting longitudinal studies to confirm the findings or not; having used neonatal data from secondary records removed from the patients protocol register in the follow-up service (HU/CAS- UFJF), and using a convenience sample, although the service being reference for this type of monitoring in the city and region.

The results have revealed the existence of important effects of prematurity and low birth weight on the functional performance of children aged between two and seven years with high delay percentage in functional abilities and independence of participants (25% and 32.7%, respectively). Nevertheless, the characteristics of gestational age and birth weight, when excluded the cases of major problems in development, seem not alone explain the outcomes found between age 2 and 7 years regarding the activities of daily living and independence.

These findings allow us to better characterize the child development placed in its reality, making it possible to more clearly identify focuses of more effective clinical intervention. They also indicate the need for improvement and expansion of outpatient and follow-up services aiming at the earliest possible detection of children with potential disorders/problems in development, ensuring them a free and quality care as their needs.



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