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ORIGINAL RESEARCH

Prechtl's General Movements Assessment (GMA) in early detection for child development risk

Avaliação dos Movimentos Gerais de Prechtl (GMA) na detecção precoce de risco ao desenvolvimento

Evaluación de los Movimientos Generales de Prechtl (GMA) en la detección precoz del riesgo de desarrollo

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ABSTRACT | To verify the relationship between the general movements assessment (GMA) and obstetric variables (maternal breastfeeding, pregnancy complications, gestational medication, alcohol consumption during gestation, smoking during gestation, intercurrence at birth, need for neonatal ICU admission, and need for mechanical ventilation), the presence of psychological risk and the outcome in language, cognitive, and motor development at 18 and 24 months. In total, 42 infants composed the sample and were filmed until the age of four months, in spontaneous movement for 15 minutes. The general movements were evaluated by videos using the qualitative evaluation of Prechtl and they were classified as normal or abnormal depending on the presence of fluency, complexity, and variability. The data were statistically analyzed regarding obstetric variables and the presence of psychological risk evaluated by the PREAUT signs, clinical indicators of developmental risk and M-CHAT. It was verified that there was no association between the GMA method and the analyzed variables. It is believed that because the sample was mostly composed of full-term infants or late premature infants without intercurrence, and the evaluation was transverse in a single moment, it was not possible to analyze whether the movements evaluated as abnormalities were or were not transient. The change of movements by the Prechtl method was not associated with the variables analyzed in the sample of late and term premature infants.

Keywords | Child Development; Risk Assessment; Risk Factors; Movement Disorders; Disability Evaluation.

RESUMO | Verificar a relação entre a avaliação dos movimentos gerais (*General Movements Assessment* – GMA) com as variáveis obstétricas (aleitamento materno, intercorrência na gestação, medicação na gestação, álcool na gestação, fumo na gestação, intercorrência ao nascer, necessidade de internação em UTI neonatal e necessidade de ventilação mecânica), a presença de risco psíquico e o desfecho no desenvolvimento da linguagem, cognitivo e motor aos 18 e 24 meses. A amostra foi composta por 42 bebês, que foram filmados até a faixa etária de quatro meses, em movimentação espontânea por 15 minutos. Os movimentos gerais foram avaliados por vídeos usando a avaliação qualitativa de Prechtl e classificados como normais ou anormais dependendo da presença de fluência, complexidade e variabilidade. Os dados foram analisados estatisticamente em sua relação com variáveis obstétricas e com a presença de risco psíquico, avaliada por meio dos Sinais PREAUT, dos indicadores clínicos de risco ao desenvolvimento e do M-CHAT. Verificou-se que não houve associação entre o método GMA e as variáveis analisadas. Acredita-se que, pelo fato de a amostra ter sido composta, em sua maioria, por bebês nascidos a termo ou prematuros tardios sem intercorrências e de a avaliação ter sido de forma transversal, em um único momento, não foi possível analisar se os movimentos avaliados como anormais foram ou não transitórios. A alteração dos movimentos por meio do método Prechtl não apresentou associação com as variáveis analisadas na amostra de bebês prematuros tardios e nascidos a termo.

Descritores | Desenvolvimento Infantil; Medição de Risco; Fatores de Risco; Transtornos dos Movimentos; Avaliação da Deficiência.

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RESUMEN | Este estudio tiene como objetivo verificar la relación entre la evaluación de los movimientos generales (GMA) con las variables obstétricas (lactancia materna, complicaciones del embarazo, medicación durante el embarazo, alcohol en el embarazo, tabaquismo durante el embarazo, complicaciones al nacer, necesidad de ingreso en la UCI neonatal y necesidad de mecánica ventilatoria), la presencia de riesgo psicológico y el resultado en el desarrollo del lenguaje, cognitivo y motor en bebés entre los 18 y 24 meses. La muestra constó de 42 bebés y se filmaron sus movimientos espontáneos por 15 minutos hasta los cuatro meses de edad. Los movimientos generales se determinaron por la técnica de evaluación cualitativa de Prechtl, los cuales se clasificaron como normales o anormales según la presencia de fluidez, complejidad y variabilidad. Los datos se analizaron estadísticamente con relación a las variables obstétricas y la presencia de riesgo psíquico, evaluadas por los Señales PREAUT, los indicadores clínicos de riesgo al desarrollo y el M-CHAT. Se encontró que no hubo asociación entre el método GMA y las variables analizadas. Debido a que la muestra estuvo compuesta mayoritariamente por bebés nacidos a término o prematuros tardíos sin complicaciones y que la evaluación fue transversal, en un solo momento, no fue posible analizar si los movimientos evaluados como anormales fueron transitorios o no. Los cambios en los movimientos mediante el método de Prechtl no se asociaron con las variables analizadas en la muestra de prematuros tardíos y nacidos a término.
Palabras clave | Desarrollo Infantil; Medición de Riesgo; Factores de Riesgo; Trastornos del Movimiento; Evaluación de la Discapacidad.

INTRODUCTION

After birth, the first four years of a child are seen as critical for establishing a solid foundation for the children's further development. Most children have a normal development, usually needing only routine appointments with the pediatrician. However, the initial development of a subgroup of children is punctuated by delays, that, if neglected, can give rise to later course of difficulties or developmental disorders, which require specialized attention from reference professionals[1].

Several factors can influence the development of the infants before, during and after their birth. Among the biological risk factors, premature birth is highlighted, since it is usually followed by low birth weight, length of stay in the neonatal intensive care unit (NICU), and use of mechanical ventilation (MV). Among the environmental factors that can negatively influence the future development of child are low maternal education and family income, as well as gestational and emotional conditions, such as altered maternal mood, insufficient mother-newborn interaction and low supply of stimuli and toys to the baby[1]. These factors emphasize the significance of conducting early assessments in order to prevent problems or delays in child development.

The occurrence of risk factors at a certain age does not mean that the child will present problems in the future, however, it is important that they receive a special follow-up, with appointments and routine evaluations. Thus, it is possible that changes are identified early and the family receives the appropriate guidance. Family members are also listened to, so that they can perceive changes in their daily lives that may affect the child development[2]. In this sense, the works on psychological risk assessment[3] suggest the need to take possible risks in an indicatory way and not as a negative forecast, for, based on fact that the development of the child is ongoing and not yet consolidated, it is possible to think that both brain plasticity and qualified interactions in the environment can reverse the risk. This is especially significant when thinking about autism, which is considered a congenital pathology that affects intentional movements and communicative intendation[4]. Some studies show the possibility of identifying autism earlier in the first year of life[5,6] and others in the second year[7]. The earlier the detection of psychological risk, the better the conditions for the child's development: the detection can be decisive for the development of an intellectual disability associated, for example, with the risk of autism[8].

In this context, evaluations of psychomotor development in the field of Physical therapy; language and hearing in the field of Speech Therapy; cognition and the Constitution of psychological aspects in Psychology, and children's daily life in the field of Occupational Therapy are examples of aspects that are of interest in the study of child development. Specifically regarding motor development, the Prechtl's General Movements Assessment (GMA) method is innovative and seeks to analyze the child's movements for the detection of neurological problems[9]. Scales such as the Bayley Scales of Infant and Toddler Development (Bayley III) are among the best instruments for assessing child development and are recognized worldwide[10].

Considering the greater specificity and sensitivity of the Bayley III test, as well as the new studies on General Movements, this research evaluated infants from birth to the second year of life. Based on the analysis of footage recorded during the evaluations, it was possible to observe the interaction of babies with their mothers at three months and the presence or absence of some movement indicative of neurological problems, by the test with the GMA method, as well as its quality and relationship with outcome in child development at 18 and 24 months of the infants' life with Bayley III. This follow-up is justified by the greater brain plasticity in this age group[11] and by the possibility of investigating signs that allow differentiating the earlier demands for intervention.

Therefore, this research investigates the relationship between the evaluation of the motor repertoire analyzed by GMA method and the obstetric variables (breastfeeding; complications during pregnancy; medication use during pregnancy; alcohol during pregnancy; smoking during pregnancy; complications at birth, and the need for hospitalization in the neonatal ICU, and the need for mechanical ventilation), the presence of a risk to the psychological aspects, and the outcome of the development of language, cognitive, and motor aspects to the age of 18 and 24 months. It is believed that if it is possible to check some type of signal indicating risk or motor delay early with the GMA, it would be possible to quickly intervene in order to avoid further problems. Thus, it is questioned whether there is a relationship between the results of the GMA in the third month of life with the outcome of development in the second year of life.

METHOD

Study location and subjects

This study was conducted in the facilites of the Speech Therapy Service of a university in the central region of the state of Rio Grande do Sul. The survey was conducted between August 2016 and March 2017, upon signing the informed consent form by the parents/guardians. The evaluations were carried out from the third month of life of the infants and the data prior to the 17th month were collected retrospectively, as they were part of a larger research carried out with preterm and full-term babies, from the project "Análise comparativa do desenvolvimento de bebês prematuros e a termo, com e sem risco psíquico: da detecção à intervenção," *(Comparative analysis of development in premature and full-term babies, with and without psychic risk, from detection to intervention)* coordinated by the author Ana Paula Ramos de Souza. The children were accompanied by the project from their first days of life, with periodic evaluations.

Type of study and sample

Longitudinal study, with analytical, prospective and retrospective character, evaluating child development up to 24 months.

This study used a convenience sample, based on the demand of the evaluations of the mother project, in which a subsample of this research participated. Thus, 47 infants were evaluated. Five of these were excluded because it was not possible to analyze GMA in the video, due to interference of some object or even the positioning of the mother, making it difficult to observe the baby. Therefore, the sample consisted of 42 babies, 12 premature and 17 full-term. Gestational age was corrected to 24 months in preterm births.

Data collection procedure

The collection began after the explanation of the study procedures, which consisted of observations and recording during the first two months of development. The babies were selected in a basic health unit on the day they attended the heel prick test. Some babies and their guardians were also invited to follow-up for extreme preterm infants at a University hospital near the unit. Mostly, they were full-term and late preterm infants. At this time, an interview was conducted with family members in order to collect data about the history of the infant, especially obstetric information and initial care. After this interview, the mother was directed to return at another time for the evaluation of the infant's development. This evaluation occurred in five age groups, in which the evaluations used in this research were performed, among others of the larger project. The following are described only the procedures of this research:

- Infants from 3 months and 1 day to 4 months and 29 days: the evaluations were performed with the PREAUT signs (*Programme de Recherche et Evaluation sur l'autisme*)[5]; Clinical Risk Indicators in Child Development (IRDI)[4] Phase

I; recording of the baby interacting with the mother for 15 minutes – and for six minutes the baby remains in ventral decubitus and prone. From this footage, analysis was performed using the GMA method. It is worth highlighting the complementary nature between PREAUT and IRDI signs in the evaluation of psychological aspects[12].

- Infants from 8 months and 1 day to 8 months and 29 days: evaluations were performed with PREAUT signs, IRDI Phase II and 15-minute footage of the infant sitting with a toy box corresponding to the age group and interacting with the mother.
- Infants from 11 months and 1 day to 12 months and 29 days: evaluations were performed with the IRDI Phase III and 15-minute footage of the infant sitting with a toy box corresponding to the age group and interacting with the mother.
- Infants aged 17 months and 1 day to 18 months and 29 days: evaluations were performed with the IRDI phase IV; application of the M-CHAT[13] questionnaire; 15-minute filming of the infant sitting with a toy box corresponding to the age group and interacting with the mother; the Bayley III test was performed[14].
- Infants from 23 months and 1 day to 24 months and 29 days: evaluations were performed with the M-CHAT questionnaire; 15-minute filming of the infant sitting with toy box corresponding to the age group and interacting with the mother; Bayley III test was performed.

Filming with infants and mothers was part of the larger project. For this research, we used record clips of the moments in which the infant remained in a ventral position, when it was possible to observe their movements. The tests for the detection of psychological issues risk, PREAUT signals, IRDI script, and M-CHAT were observed by the researchers during the interviews and recording of each age group and marked in their values.

PREAUT signals are specific to capture risk for autism when your score is less than five points and risk for other psychopathology when your score is between five and 15 points. Children with 15 points are considered out of risk[4].

The IRDI roadmap consists of 18 indicators, distributed in four age groups. If the baby has two or more missing indicators, it can be considered a case of risk at 18 months. This risk can affect the development, when there is no risk of emergence of a psychopathology, or risk for a psychopathology, such as autism or psychose[12].

The M-CHAT test aims to assess the risk for autism spectrum disorder (ASD) and it is a scientifically validated tool designed for screening children aged 18 and 24 months. This is a questionnaire with 23 questions in which parents indicate the presence or absence of a certain behavior[7,13,15]. The test is composed of 19 questions related to the presence or absence of skills and four questions related to the presence or absence of atypical behaviors. For typical children, the expected answer to questions relating to typical skills is 'yes'; the answer to questions indicating atypical behaviour is 'no.' Among the questions of the questionnaire, there are six that are considered critical items for autistic development (questions number 2, 7, 9, 13, 14, and 15). Thus, a risk for development of autism is considered when the child fails in two or more critical items or in three items of any nature[13].

The GMA method addresses spontaneous movements of the infant that involve the whole body with a variable sequence of movements of arms, legs, neck, and trunk, alternating in amplitude and speed. It is performed by observation since birth to 15 weeks after birth, enabling the evaluation of very premature infants soon after birth, including babies on mechanical ventilation[16]. In this study, it was performed together with the first filming (from 3 months and 1 day to 4 months and 29 days) by a qualified professional, who had no information about whether the baby was born full-term or preterm, or about the general profile of the sample. The test is based on the observation of spontaneous movements of the child without intervention or external stimulus, performed by recording the child lying on a bench while they are awake, resting in the incubator or in the bed[17]. General movements are evaluated qualitatively and classified as normal or abnormal according to their fluency, variability, and complexity. Normal GM have gradual beginning and end; they involve the whole body in complex and variable patterns of flexion, extension, and rotation that give an impression of fluency and elegance. GM from 10 weeks of age Post term are called *Fidgety Movements* (FM)[16]. The organization of FM varies with age, and that organization in the initial phase (from 6 to 8 weeks) arise in isolated moments, with increased frequency, and it decrease again after 15-18 weeks, coinciding with the period in which antigravitational and intentional movements begin to dominate. FM can be normal

(continuous, intermittent, and sporadic) and abnormal (absent and sporadic in some parts of the body)[17].

The Bayley III test was performed by a physical therapist trained for its application only between the 18 and 24 months of the infants, because it was an extensive test (two sessions for application) that had little adherence by family members. In the research, the focus was the Bayley III test for the outcome, because its significance as a gold standard is understood in the international literature[18]. Although they are not part of the analyses presented here, the infants were accompanied with other tests during recording in the larger research. The functioning of the Bayley III scale was explained to parents/guardians, and they were asked to neither help nor interfere during the test unless requested – otherwise the question might not be scored. Initially, the gestational age of the infants was estimated, correcting when preterm up to 24 months. Then, we checked the starting point of the test and found the basis for each infant (three correct questions). The test was only completed when the infant answered five incorrect questions. In the assessment with the Bayley III scale in this research, three of the five subtests were used: language development, which addresses receptive and expressive communication, cognitive development, and development of fine and gross motor coordination.

Variables under analysis

The variables analyzed in this research are gestational and birth, such as breastfeeding, pregnancy complications, gestational medication, alcohol consumption during pregnancy, smoking during pregnancy, intercurrent diseases at childbirth, need for hospitalization in neonatal ICU and need for the use of mechanical ventilation; tests for the detection of mental disorders risk, PREAUT at 9 months, total IRDI up to 18 months and M-CHAT at 18 and 24 months; Bayley III test at 18 and 24 months (cognitive, language, and motor).

Data analysis

Initially, the percentages for the variables of interest were estimated. Subsequently, the associations between GMA method with obstetric variables, birth conditions, psychological tests and the final outcome of the Bayley III test (in the second year of life) were evaluated, using the Fisher's exact test (for small frequencies) and, for the GMA method with breastfeeding, the Chi-Square test. For the analysis, the software Statistica 9.1 was used, and 5% significance level was considered.

RESULTS

The sample was composed of 42 infants, 61.9% (N=26) male and 38.1% (N=16) female, 40.5% (n=17) preterm and 59.5% (n=25) full-term. Table 1 presents the results of the GMA method considering the comparison between full-term and preterm childbirths. Out of the 42 babies evaluated by the GMA method, 29 (69.0%) presented normality in the evaluation of Fidgety Movements – out of these 12 (41.4%) were born premature and 17 (58.6%) full-term. Out of the 13 (31.0%) infants who presented abnormality in Fidgety Movements, 5 (38.5%) were premature and 8 (61.5%) were born full-term. There was no difference between being premature or not in the analysis of GMA, since both preterm and full-term percentages were very close.

Table 1. Percentage distribution of GMA method and comparison according to gestational age

GMA	N (%)	PTNB	FTNB	p_value**
Normal	29 (69.0%)	12 (41.4%)	17 (58.6%)	1.0000
Altered/abnormal	13 (31.0%)	5 (38.5%)	8 (61.5%)	

*p value ≤0.05; ** Fisher's exact test; PTNB: preterm newborn; FTNB: full-term newborn; GMA: Prechtl's General Movements Assessment; N: number; %: percentage.

Table 2 refers to data of the GMA method and the type of breastfeeding performed, exclusively breastfeeding, mixed or artificial feeding. According to the analysis of the association with the chi-square test, there was no association between these variables. Table 3 shows the result between the GMA method and the pre- and postnatal obstetric variables (pregnancy complication, gestational medication, alcohol consumption pregnancy, smoking during pregnancy, intercurrent diseases during birth, neonatal ICU and mechanical ventilation). There was no association between these variables.

Table 2. Percentage distribution of the GMA method and comparison according to the type of breastfeeding

Type of breastfeeding	Normal GMA		Altered/ abnormal GMA		p_value**
	N	(%)	n	(%)	
Exclusive	13	46.4	9	69.3	0.1611
Mixed feeding	9	32.2	4	30.7	
Artificial feeding	6	21.4	0	0	

*p value ≤0.05; ** Chi-square test; GMA: Prechtl's General Movements Assessment; N: number; %: percentage.

Table 3. Percentage distribution of the GMA method and comparison accorzding to pre-and postnatal obstetric variables

Characteristic	Normal GMA		Altered/abnormal GMA		p_value**
	n	(%)	n	(%)	
Pregnancy complications (n=41)					
Yes	16	57.1%	7	53.9%	1.0000
No	12	42.9%	6	46.1%	
Gestational medication (n=40)					
Yes	15	55.6%	4	30.8%	0.1861
No	12	44.4%	9	69.23	
Alcohol consumption during pregnancy (n=38)					
Yes	0	0	0	0	1.0000
No	26	100%	12	100%	
Smoking during pregnancy (n=38)					
Yes	2	7.7%	0	0	1.0000
No	24	92.3%	12	100%	
Intercurrent diseases during childbirth (n=41)					
Yes	5	17.9%	4	30.8%	0.4288
No	23	82.1%	9	69.2%	
Neonatal ICU (n=41)					
Yes	5	17.9%	4	30.8%	0.4288
No	23	82.1%	9	69.2%	
Mechanical ventilation (n=38)					
Yes	4	15.4%	1	8.3	1.0000
No	22	84.2%	11	91.7%	

*p value ≤0.05; ** Fisher's exact test; GM: General Movements; GMA: Prechtl's General Movements Assessment; N: number; %: percentage; ICU: Intensive Care Unit.

Table 4 shows the results between the relationship of the GMA method with the psychological tests (PREAUT, IRDI, M-CHAT). Each test varied according to the participation of the infants in each stage of the study. It is possible to observe that there was no statistically significant association between the results of the psychological tests and the GMA method. Table 5 refers to the analysis of the association between the results of GMA method and the final outcome with the Bayley III test at 18 and 24 months. There was no association of the presence or absence of delay in the Bayley III test with normality or abnormality with the GMA method.

Table 4. Percentage distribution of the association analysis between the GMA method and psychological tests (PREAUT, IRDI, M-CHAT)

Test	General movements				
	Normal		altered/abnormal		
	n	%	n	%	p_value**
PREAUT 9 months (n=40)					
No risk	20	74.1%	10	76.9%	1.0000
With risk	7	25.9%	3	23.1%	
Total IRDI (n=42)					
No risk	22	75.9%	9	69.2%	0.7132
With risk	7	24.1%	4	30.8%	
M-CHAT 18 months (n=35)					
No risk	19	76.0%	7	70.0%	0.6936
With risk	6	24.0%	3	30.0%	
M-CHAT 24 months (n=37)					
No risk	25	92.6%	8	80.0%	0.2914
With risk	2	7.4%	2	20.0%	

* p value ≤0.05; ** Fisher's exact test; N: number; %: percentage.

Table 5. Percentage distribution of the association analysis between the GMA and Bayley III method

Test	General movements				
	Normal		Altered/abnormal		
	n	%	n	%	p_value**
Bayley cognitive 18 months (n=27)	Mean: 103.9		Mean: 107.5		
No delay	16	84.2%	8	100%	0.5323
With delay	3	15.8%	0	0	
Bayley cognitive 24 months (n=40)	Mean: 91.9		Mean: 96.9		
No delay	16	59.3%	9	69.2%	0.7301
With delay	11	40.7%	4	30.8%	
Bayley language 18 months (n=27)	Mean: 85.1		Mean: 91.8		
No delay	9	47.4%	5	62.5%	0.6776
With delay	10	52.6%	3	37.5%	
Bayley language 24 months (n=40)	Mean: 87.7		Mean: 91.5		
No delay	13	48.2%	8	61.5%	0.5106
With delay	14	51.8%	5	38.5%	
Bayley motor 18 months (n=26)	Mena: 98.4		Mean: 105.0		
No delay	18	94.7%	6	85.7%	0.4738
With delay	1	5.3%	1	14.3%	
Bayley motor 24 months (n=40)	Mean: 94.9		Mean: 96.6		
No delay	23	85.2%	10	76.9	0.6622
With delay	4	14.8%	3	23.1%	

* p value ≤0.05; ** Fisher's exact test; N: number.

DISCUSSION

The variables of breastfeeding; pregnancy complications; gestational medication; alcohol consumption during pregnancy; smoking during pregnancy; intercurrent diseases at birth; need for neonatal ICU, and mechanical ventilation did not present significant results when analyzed with the GMA evaluation. The absence of significance seems to be related to the fact that most sample was composed of late preterm infants (15 babies) and full-term infants, basically without major birth complications, and GMA is a procedure that has possibly shown greater sensitivity in cases that present cumulative effects of biological, environmental risk, and birth intercurrences[5,19-22].

The literature reports that the evaluation of general movements is a reliable indicator to evaluate the integrity of the young nervous system, being a reliable tool to identify children at risk of neuromotor[23,24], behavioral, and cognitive deficiencies[17]. Evidence suggests that GMA has greater specificity in high-risk cohorts and for a diagnosis of cerebral palsy, mainly linked to absent Fidgety general movements (GM)[25-28]. Other authors have described an atypical pattern of GM during the first 20 weeks of life in infants later diagnosed with autism spectrum disorder[29-31]. However, it is noteworthy that the prediction of the evaluation of GM is based on the trajectories of development of these movements and that a single evaluation – in a cross-sectional way – does not reveal whether the GM evaluated as abnormal or sporadic are only transient or will be, in fact, present for several weeks, confirming a diagnosis. This suggests some limitation in the application of this method by the observation of a single video, as occurred in this research, and suggests the need for future studies in which infants can be evaluated in more than one session in the first weeks.

The number of infants with breastfeeding is percent higher in the group with altered GMA (69.3 %), demonstrating that breastfeeding, at least initially, was not protective for this group, which is opposed to the results of several studies on the benefits of breastfeeding. However, it is possible, considering the low percentage of infants with altered motor development during their follow-up, that breastfeeding was protective in the evolutionary course of these infants with initial change in GMA. Breastfeeding, in addition to favoring the bond between mother and baby and bringing several well-documented benefits to infant health, is strongly associated to general intellectual capacity. Therefore, breastfeeding should

always be encouraged in developing countries, where children are exposed to several environmental and biological risks, with high prevalence of diseases and even unfavorable or premature pregnancies and poor socioeconomic conditions[32].

The study by Spittle et al.[33] aimed to verify the neurological development of preterm births with the GM method in the first and third months of life and Bayley III at two and four years. It was shown that when the GM showed abnormal results in the first month of life, the results of the Bayley III motor subtest were worse at two and four years. The evaluation of GM in the third month with abnormal result was associated with worse cognitive, language, and motor performance at two and four years of age. Therefore, it can be affirmed that abnormal GM in the third month of life is predictive of worse neurological development. Unlike the study by Spittle et al.[33], the results of this research showed no significant result between the association of the Bayley III test and the GMA method. This fact can also be explained based on the profile of the sample that participated in the GM collection, since this differs greatly from studies already published.

Abnormal, absent, or sporadic Fidgety Movements indicate a greater predisposition to later neurological dysfunctions when compared to normal ones, especially when followed by other smooth and fluent movements. Early recognition of these neurological signs facilitates early intervention, especially related to neonates who are more exposed to risk factors[17]. In this study, we did not verify the same type of alteration of other studies, due to the lack of relationship between the variables in the studied sample regarding the outcomes in cognition, language, and motor skills in the Bayley III test with the evaluation performed in the GMA.

It should be noted that the simple application of the GMA method on recording – provided that a professional physical therapist qualified to observe the videos is present, allows us to indicate that this is a low-cost technology and that it can integrate the telehealth system, which is desirable in a country with the territorial extension of Brazil and a small number of physical therapists in primary care. The absence of a career in health creates significant obstacles for the scientific knowledge of the professions that study Child Development to reach childcare, which is still very limited to physical growth, nutrition, and disease detection in the Brazilian reality. However, the presence of physical therapists in the centers of assistance to the family health strategy could use the GMA method as a way of selecting infants who require more specific evaluation of the physical therapist.

CONCLUSION

Based on the results of this research, it was found that there was no relationship between the GMA method and the variables analyzed. Thus, considering that the sample was composed mostly of infants born full-term or late premature, without intercurrence and the evaluation was transversal, in a single moment, it was not possible to analyze whether the movements evaluated as abnormal were transient or not. These results contribute to reinforce the significance of carrying out longitudinal evaluations of infants who are in fact considered at risk, either due to premature birth or some other type of complication.

The sample limitation of this study occurred because of the loss of subjects due to the impossibility of attending two Bayley III evaluations, since a survey with a larger sample would be more consistent to generalize the results. However, this research emphasizes the significance of using the GMA method in cases of extreme prematurity and in infants who underwent intercurrence before, during and after birth. The organizational limitations of childcare in Brazil require teams to make choices of the most effective methods for each population. The advantage of GMA is the possibility of its use on recording, without any stress to the infant, safeguarded the infant's age and the quality of the footage for viewing – something that, with access to technologies, such as that of mobile phones, is facilitated today.

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