62 - EVALUATION OF MOTOR COORDINATION DEVELOPMENT OF CHILDREN FROM 2 THROUGH 6 YEARS

GREISY KELLI BROIO ROSA[1]; JOSIANE MEDINA[1 2]; CARINA BARBIERO BASTOS[1] ; INARA MARQUES[1]
[1]GEPEDAM/ State University of Londrina PR/LONDRINA PR/BRASIL
[2]CECOM/ Federal University of Parana PR/CURITIBA PR/BRASIL
e-mail: greisykelli@pop.com.br

1. INTRODUTION

During elementary years, the children's motor ability emerge and maturate (ULRICH, 2000), passing through important alterations in their motor development, which means a gradual blooming of the latent abilities of a child. The rudimentary movements are quite simple, and became more varied and complex over the time. Stage to stage, the fist acquisitions are modified, structured and adapted to fine movement patterns and skills, more selective (GALLAHUE; OZMUN, 2003). Pre-scholar years are crucial, serving as a base to the development of later skills.

Physical Growth and the history of the child about movement experiences have a fundamental role, influencing the movement pattern changes (ULRICH, 2000). If there is a deficit on motor development and it is not identified and mediated, the child can have future problems over the life in the acquisition of specialized motor skills. Thus, the studies about infantile motricity would be an important feature in intervention programs. Rosa Neto (2002) says that studies about infantile motricity are conducted purposing to know better the child and to establish valid instruments to evaluate, to analyze and to study the motor development of students in different evolutive steps.

To establish valid instruments to evaluate the development is fundamental to the professionals that work with pre-school children, because, even there many ways of evaluating the motor development of a child, there are no longer perfect instruments, and they don't embrace holistically the whole aspects of development (ROSA NETO, 2002).

In base of this, the Motor Development Scale proposed by Rosa Neto (2002), intending to be more wide-ranging, understands a set of varied tests, giving conditions to evaluate the children's motor development level according to their chronological age at the gross and fine motor skills tests, balance, corporal scheme, temporal and spacial organization, considering successes and errors. The motor evaluation can provide data about the developmental profile of the children, which serve like subsidies to the establishment of diagnoses and more precise interventions. Besides, the early detection of possible delays on motor development can be a important indicator to underlie a intervention process.

Thus, this study aim to evaluate the development of fine and gross motor skills in pre-school children and get a motor profile of that specific population.

2. MATERIAL AND METHODS

This study consists in a qualitative and descriptive fieldwork, which the goal is evaluate the development of the fine and gross motor skill in children of the elementary education, and also identify the correlation level between Motor and Chronological Age.

The sample was composed by 26 children from 2 to 6 years old, both genders, students of the Centro de Educação Infantil Pequeno Iapar from the city of Londrina, Paraná, Brazil. All the evaluated children participated of an extension project involving Physical Education students of the Universidade Estadual de Londrina during the year 2004.

For the motor development evaluation of the children, we adopted the protocol suggested in the Motor Evaluation Manual proposed by Rosa Neto (2002), which consists in the application of several motor tests with specific activities according to the age, concerning fine and gross motor coordination, equilibrium, body scheme, space organization, temporal organization and laterality. The focus of the present study is fine and gross motor skill areas specifically. The choice of analyze other important elements, besides the motor profile, in the relation with activities developed during the normal school duties of learning how to read and write, since the fine motor skill refers to the control of a group of movements of certain parts of the body with minimum strength willing to achieve an accurate response, and also the gross motor skill, involve the ability of controlling the contraction of the great muscles in the generation of wide movements (GALLAHUE; OZMUN, 2003; ROSA NETO, 2002). Particularly, the development of the fine motor skill is important concerning its relation with the learning of written language and the handling of materials that require control and precision. Concerning the development of the gross motor skill, we notice its application in handling activities that require the control of a great part of the body in amplitude and locomotion movements, very requested during this period of life.

To perform such evaluations, each child was asked to execute the activities of fine and gross motor skill suggested in the Motor Evaluation Manual, beginning by the activity corresponding to the chronological age (CA). Succeeding this first test, the child was faced with the activity corresponding to a higher age. Failing, the activity corresponding to a lower age was presented to the child and, succeeding then, the initial activity was repeated.

The evaluations were performed individually with each child, being in the room only the child and the evaluator.

2.1 Data Analysis

The software *Statistics* 6.0 (Windows version) was used for statistical analysis. First of all we applied the Shapiro Wilks Test to test data normality. In case of non-normality we used the non-parametric statistic. The results are presented through the medians descriptive analysis. The Spearman co relational test permitted the identification of the relation between the chronological (CA) and motor age (MA), and the Wilcoxon test was used to verify differences between the ages. The significance level was $p<0.05$.

3. RESULTS AND DISCUSSION

According to the proposed objectives of analysing the development of fine and gross motor skill, we will firstly present the descriptive analysis of the sample based on the Chronological Age (CA) and Motor Age (MA) in each test.

The median value for CA was 50.86 months, while the median value for MA of the fine (FMS) and gross motor skill (GMS) was 54 and 69 months, respectively (FIGURE 1).

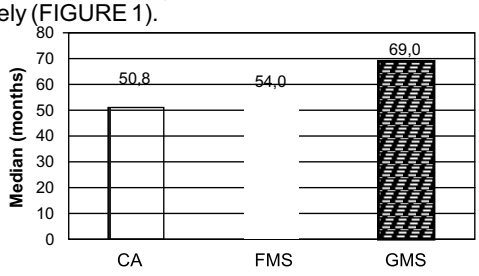

FIGURE 1 Descriptive Analysis of the medians for cronological age (CA), fine motor skill (FMS), gross motor skill (GMS).

The results presented in figure 1 show that the development of the Fine motor skill and the Gross Motor skill were higher than expected for the relative CA. The Spearman Test identified a strong correlation between CA, FMS and GMS, where the relation between CA and FMS was r = 0.856, between CA and GMS was r = 0.857 and between FMS and GMS was r = 0.796; all with p=0.000.

That means the development of the fine and gross motor skill have a strong relation with the CA, that is, the increasing CA also meant the increase of the MA of FMS and GMS. This way, growing and developing, children become capable of performing more complex activities that require general motor coordination skills. However, it is important to understand the experiences faced by these children because they are crucial in the development analysis.

According to the results observed by RESENDE et al. (2003) in a report about the development of the motor coordination, the authors indicated a plateau in the development of this ability between 2 and 3 year old children. This increase tends to continue between 4 and 5 years old and an even higher improvement was verified at 6 years old. This way the development of the fine motor skill seems to be entirely related to the differences concerning the experiences, opportunities and the encouragement to explore the body and the environment through motor actions.

In this perspective, the results of the present study seem to demonstrate this situation, since the evaluated children participate of activities performed in the Centro de Educação Infantil by the trainees of the Physical Education university course. So, the development of motor aspects, particularly fine and gross motor skill, can be well stimulated by the pedagogical activities performed in this context. The report of LEITE et al. (2002) also corroborates such evidences because, according to the authors, their results were also satisfactory in gross motor skill test, in which the improvement was attributed to the constant motor activities of these children, even in the school physical education or in the motor experience faced in their environment. In figures 2 and 3 we can observe a detailed analysis of the MA values in each specific test relating to the CA. In both the fine and gross motor skill analysis only 2 children presented MA lower than CA. Then, most of the observed results had scores of motor age very close or identical to the respective chronological age; about 10 children concerning the fine motor skill development and 5 concerning the gross motor skill development.

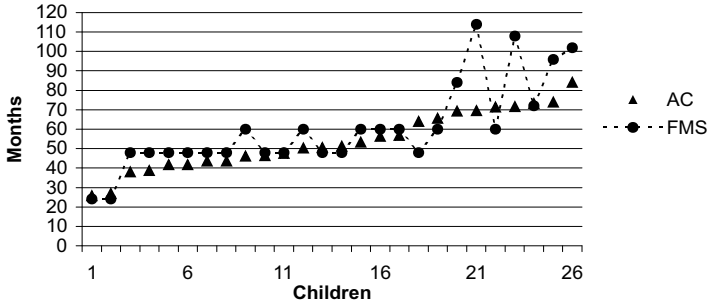

FIGURE 2 Relation between chronological and motor age in the fine motor skill test.

Besides two children presented MA lower than expected, most of them showed an efficient development concerning the components of fine and global motor coordination, checking the motor ages. Thus, we believe that this is a positive aspect in their motor development, which can help the children afterwards in the improvement of specific skills and also during learning how to read and write.

According to BERESFORD et al. (2002), the need to develop most of the motor skills during childhood is more significant when the process of learning how to read and write is faced in the following years. The Physical Education professional should be aware to the fact that if basic patterns are not solid, the emergency of more complex patterns will be affected later on (SILVEIRA et al., 2005). Besides, the early detection of possible motor delays and an emergent intervention proposal are crucial in the process to help the efficient development of new skills.

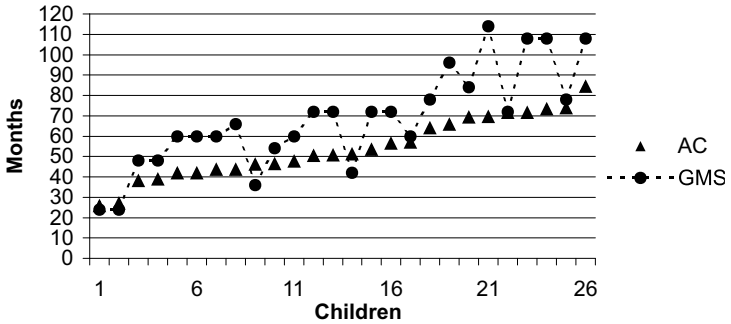

FIGURE 3 Relation between chronological and motor age in the gross motor skill test.

Lastly, when the differences between the chronological and motor ages are compared in each of the tests, the Wilcoxon test had a significant difference between chronological age and fine motor skill (z=2.50; p=0.012) and between chronological age and gross motor skill (z=3,92; p=0,000). These results show that the MAs observed in both tests are significant different and in a positive way concerning the CA, what enhances the importance of the development of motor coordination aspects of the children.

According to the following results we can say that most of the evaluated children presented satisfactory motor ages facing the analyzed components. The maximization in the development of motor skills during elementary education, as well as the proposal of differentiated motor activities involving the motor coordination aspects, are important elements in the process of learning and improvement of more complex skills.

4. CONCLUSION

We could observe through the data analysis that the development of the fine and gross motor skill in the evaluated children was higher than expected for the chronological age. Besides, the results show a strong relation between CA and MA, in what seems to be a linear relation. The development of the motor age following the increase of the chronological age is one of the requirements to the conquest of more complex movements, aiming a skill improvement. Thus, these children would be more capable to acquire new skills.

However, it is important to notice the possible influence of the pedagogical activities proposed by the students of the Physical Education university course in the motor development of these children. This way, there is in fact the need to investigate such effects under the influence of the environment, physical and pedagogical resources in the development of the motor age in the different areas.

5. REFERENCES

BERESFORD, H.; QUEIROZ, M.; NOGUEIRA, A. B. Avaliação das relações cognitivas e motoras na aquisição instrucional das habilidades para a aprendizagem da linguagem escrita. **Revista ensaio: Avaliação política pública educacional**, v. 10, n.37, pp.493-502, out./dez. 2002.

GALLAHUE, D.; OZMUN, J. C. **Compreendendo o desenvolvimento motor:** bebês, crianças, adolescentes e adultos. 2.ed. São Paulo: Phorte, 2003.

HENDERSON, S. E.; SUGDEN, D. A. **Movement Assessment battery for children.** London: The Psychological Corporation, 1992.

LEITE, L.; ROSA NETO, F.; FRANCESCHI, C. R. Perfil motor em praticantes precoces de futebol de salão. In: Krebs, R. J. (org.) **II Encontro latino-americano para estudos da criança: desenvolvimento infantil.** Florianópolis: Universidade do Estado de Santa Catarina, pp. 60, 2002.

RESENDE, A. B.; CAETANO, M. J. D; ROSSI, A. C. S.; SILVEIRA, C. R. A.; CANDIDO, R. P.; GOBBI, L. T. B. Idade cronológica e motricidade fina em pré-escolares. **Revista Motriz,** v.09, n.01, supl., pp. S109-200, jan./abr. 2003.

ROSA NETO, F. **Manual de avaliação motora.** Porto Alegre: Artmed, 2002.

SILVEIRA, C. R. A.; GOBBI, L. T. B.; CAETANO, M. J. D.; ROSSI, A. C. S.; CANDIDO, R. P.
Avaliação motora de pré-escolares: relações entre idade motora e idade cronológica. **Lecturas: educacion fisica y deportes.** Buenos Aires, año10, n.83, abril, 2005.

ULRICH, D. A. **The test of Gross Motor Development (2nd Edition).** Austins, TX: PRO-ED Publishers, 2000.

ENDEREÇO PARA CORRESPONDÊNCIA:
Greisy Kelli Broio Rosa
Rua: Alfred Nobel 496 apt. 104
CEP: 86063-420 Londrina-PR-Brasil
e-mail: greisykelli@pop.com.br

EVALUATION OF MOTOR COORDINATION DEVELOPMENT OF CHILDREN FROM 2 THROUGH 6 YEARS

ABSTRACT

The purpose of this study was to evaluate the fine motor skill (FMS) and gross motor skill (GMS) in children and to identify the relation between Motor Age (MA) from FMS and GMS and Chronological Age (CA). Participated of this study 26 children from 2 through 6 years old, boys and girls, students from Centro de Educação Infantil Pequeno Iapar, located at Londrina-Pr. The Motor Evaluation Manual (ROSA NETO, 2002) was used as the instrument to collect the data. The task was presented to the children in base of their chronological age, going forward or backward if they were successful or not. The Spearman's coefficient identified a significant correlation (rho=0,856; p=0,000) between CA and FMS and (rho=0,857; p=0,000) between FMS and GMS between CA and GMS and (rho=0,796; p=0,000) between FMS and GMS. Wilcoxon's test found significant difference between FMS (Z=2,501; p=0,012 and GMS (Z=3,923; p=0,000). The GMS and FMS development was linearly related to CA, which can indicate that children would be predisposed to develop in direction to skilled movements. We suggest the realization of new studies that should investigate the influence of environment, materials and Physical Education classes on FMS and GMS. **Key-words:** motor development, fine and gross motor skill, motor evaluation.

ÉVALUATION DU DÉVELOPPEMENT DE LA COORDINATION MOTRICE DES ENFANTS DE 2 À 6 ANS

RESUMÉ

L'objectif de cet étude a été evaluer le développement de la Motricité Mince (MM) et la Motricité Global (MG) aux enfants maternel et identifier le niveau de relation entre l'âge motrice de la (MM/MG) et l'âge cronologique (AC). Il participe de cet étude 26 enfants de 2 à 6 ans, des garçons et des filles, qui sont éleves du Centre d'Education Maternel Pequeno Iapar, à la ville de Londrina au Paraná.

Comme instrument de la collete d'information on a utilisé le " Manual de Avaliação Motora (le Manuel d'evaluation Motrice) (Rosa NETO, 2002). Les activités ont été presentés aux enfants à l'âge cronologique, en gradissant ou en diminuant le niveau de difficultés par rapport la reussité ou l'échec. Par le coefficent de Spearman a été identifié une significatif relaction (rho= 0,856; p= 0,000) entre IC et MM et (rho= 0,0857; p= 0,000) entre MM et MG. Le texte de Wilconxon a trouvé une significatif diference MM (z= 2,501; p= 0,012) et MG (z= 3,923; p= 0,000). Le développement de la MM et de la MG a suivi de manière regulière l' IC, ce qu'il peut indiquer que les enfants ètaient disposés au développement des moviments avec l'habilité. On sugère des nouveaux études en classes d'Education Fisique dans la coordination.

Mots Clefs: Developpement Motrice, Motricité Mince et Global, Évaluation motrice

EVALUACIÓN DEL DESAROLLO DE LA COORDINACIÓN MOTORA EN NIÑOS DE 26 AÑOS DE EDAD

RESUMEN

El objetivo del trabajo fue evaluar el desarrollo del motricidade fino (MF) y del motricidade global (MG) en un grupo de niños y identificar el nivel de la correlación entre la edad motora (IM) de la MF y MG y la edad cronologica (IC). La edad de los niños fue 2-6 años, pupilos del centro de la educación infantil pequeño Iapar, en Londrina-PR. Como el instrumento para la evaluación utilizó el Manual de Avaliação Motora (ROSA NETO, 2002). Las tareas fueron presentadas a los niños empezando por la su edad cronologica, siguiendo adelante o volvendo cuando consiguió éxito o no. El coeficiente del Spearman identifico un correlación significativa entre IC y MF (rho=0,856; p=0,000), entre IC y MG (rho=0,857; p=0,000) y entre MF y MG (rho=0.796; p=0,000). La prueba de Wilcoxon encontró diferencia significativa entre IC e MF (z=2,50; p=0,01) y IC e MG (z=3,92; p=0,00). El desarrollo de la motricidade fino y motricidade global seguió un forma linear, lo qué puede indicar que los niños se presentan dispuestos al desarrollar la ruta de los movimientos peritos. Esto sugiere que los nuevos estudios puedan investigar la influencia del ambiente, de los materiales y de las classes de Educación fisica en la motricidade.

Palabra-llave: Desarrollo motor, motricidade fino y global, evaluación motora

AVALIAÇÃO DO DESENVOLVIMENTO DA COORDENAÇÃO MOTORA DE CRIANÇAS DE 2 A 6 ANOS DE IDADE

RESUMO

O objetivo do presente estudo foi avaliar o desenvolvimento da motricidade fina (MF) e motricidade global (MG) em crianças da educação infantil e identificar o nível de correlação entre Idade Motora (IM) e Idade Cronológica (IC). Participaram deste estudo 26 crianças de 2 a 6 anos de idade, de ambos os gêneros, alunos do Centro de Educação Infantil Pequeno Iapar, localizado na cidade de Londrina-Pr. Como instrumento para coleta de dados utilizou-se o Manual de Avaliação Motora (ROSA NETO, 2002). As tarefas foram apresentadas às crianças a partir da idade cronológica, avançando ou retrocedendo à medida que obtivesse êxito ou não. Por meio do coeficiente de Spearman, identificou-se uma correlação significativa entre IC e MF (rho=0,856; p=0,000), entre IC e MG (rho=0,857; p=0,000) e entre MF e MG (0,796; p=0,000). O teste de Wilcoxon encontrou diferença significativa para IC e motricidade fina (z=2,501; p=0,012) e IC e motricidade global (z=3,923; p=0,000). Com base nesses resultados pode-se inferir que o desenvolvimento da motricidade fina e motricidade global acompanhou de forma linear a idade cronológica, o que pode indicar que as crianças em questão têm-se desenvolvido de maneira compatível, estabelecendo vínculos importantes para o desenvolvimento de movimentos mais habilidosos. Sugere-se novos estudos que possam investigar a influência do ambiente, dos materiais e das aulas de Educação Física no desenvolvimento da coordenação.

Palavras-chave: desenvolvimento motor, motricidade fina, motricidade global, avaliação motora.