

MOTOR SKILLS IN CHILDREN WITH PRIMARY HEADACHE: A PILOT CASE-CONTROL STUDY

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ABSTRACT

Background: Headache is the most common painful manifestation in the developmental age, often accompanied by severe disability such as scholastic absenteeism, low quality of academic performance and compromised emotional functioning. The aim of the study is to evaluate praxic abilities in a population of children without aural migraine.

Materials and methods: The test population consists of 10 subjects without migraine without aura (MwA), (8 Males) (mean age 8.40, SD \pm 1.17) and 11 healthy children (7 Males) (mean age 8.27; SD \pm 1.10; $p = 0.800$).

All subjects underwent evaluation of motor coordination skills through the Battery for Children Movement Assessment (M-ABC).

Results: The two groups (10 MwA vs 11 Controls) were similar for age (8.40 \pm 1.17 vs 8.27 \pm 1.10; $p = 0.800$), sex ($p = 0.730$), and BMI ($p = 0.204$). The migraine subjects show an average worse performance than the Movement ABC; specifically, migraineurs show significantly higher total score values (31.00 \pm 23.65 vs 4.72 \pm 2.61; $p = 0.001$), manual dexterity (12.10 \pm 11.20 vs 2.04 \pm 2.65; $p = 0.009$) and balance (14.85 \pm 10.08 vs. 1.04 \pm 1.05; $p < 0.001$). The mean percentile of migraine performance is significantly reduced compared to controls (9.00 \pm 3.82 vs 51.00 \pm 24.34, $p < 0.001$) (Table 1).

Conclusion: Migraine can alter many cognitive and executive functions such as motor skills in developmental age.

Keywords: primary headaches, migraine without aura, motor skills.

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Introduction

Headache is the most common painful manifestation in the developmental age, often accompanied by severe disability such as scholastic absenteeism,

low quality of academic performance and compromised emotional functioning, such as to undermine the intrafamily dynamics and the relationship with peers, with an estimated global prevalence 25% - 37% and with peaks in the 7-15 age range in which it

varies from 57 to 82%, based on the various criteria of duration considered⁽¹⁾. The most frequent forms of primary headache are migraine without aura and tension headache, which have a prevalence of 2-17% and 0.9-24%, respectively⁽²⁻⁴⁾.

There are numerous known comorbidities of migraine, but only in recent times has the literature begun to consider the importance of motor impairment linked to the attack in the case of the family hemiplegic form⁽⁵⁾ or in the case of forms with a motor sensory aura^(6,7), or even forms without aura⁽⁸⁾.

In general, in clinical practice, severe, persistent and specific difficulties in cognitive processes such as attention, motor coordination, spoken language and basic phonological mechanisms are recognized, in intellectually normalized children, without evident neurological changes, with apparently adequate educational and scholastic experiences. .

The prevalence of motor coordination development disorder (DCD), commonly referred to as dyspraxia, is estimated at around 6% of the infant population aged 5 to 11⁽⁹⁾, with a M: F ratio of 3: 1, with skills required motor skills vary according to age, sex, environment and culture.

The aim of the study is to evaluate praxic abilities in a population of children without aural migraine.

Materials and methods

The test population consists of 10 subjects without migraine without aura (MwA), (8 Males) (mean age 8.40, SD \pm 1.17) and 11 healthy children (7 Males) (mean age 8.27; SD \pm 1.10; $p = 0.800$).

All subjects underwent evaluation of motor coordination skills through the Battery for Children Movement Assessment (M-ABC).

All the subjects of both groups were recruited within the same urban area, Caucasian and homogeneous by socio-economic level.

The diagnosis of MwA was made according to the International Classification of Headaches (IHS-3)⁽¹⁰⁾.

The exclusion criteria were: mental retardation (IQ <70), genetic syndromes (eg Down syndrome, Prader-Willi syndrome, X-fragile syndrome), hypothyroidism, psychiatric disorders (schizophrenia, mood disorders, ADHD) , motor disorders, muscle diseases, epilepsy, obesity and sleep disorders.

All assessments were made after informed consent from the parents and, where appropriate, by the same subjects under consideration.

Movement Assessment Battery for children (M-ABC)

All subjects were given the Battery Assessment Movement for Children (M-ABC) test, used to evaluate the development of motor coordination during the developmental age, designed to: identify motor difficulties in children between the ages of 4 and 12, for clinical exploration and intervention planning, for program evaluation and research⁽¹¹⁾ (Figure 1).



Figure 1: shows the Movement ABC test materials.

The M-ABC test consists of eight items grouped into three sections:

- manual dexterity,
- ball skills,
- balance.

The content of the items differs according to the age of the child examined, with increasing difficulty based on age, which is why the battery consists of four different types of activities formulated in relation to the age considered (4-6 years, 7-8 years, 9-10 years and 11-12 years) .

Each subject is assessed individually in about 20-40 minutes⁽¹²⁾.

Initially, the raw performance score is recorded, assigning:

- F if the child can not complete the test,
- I if the task is not appropriate,
- R if the child does not cooperate.

The raw score of each item is then converted into a scaled score ranging from zero to five. The highest score indicates a less adequate performance. As a result, 0 reflects a full success on the part of the candidate on the task examined, while 5 reflects a failure in the execution of the task. F, I, or R are transformed into 5.

The sum of the eight item scores corresponds to the total score of impairment ranging from 0 to 40, where a lower score is a result of the best movement execution.

Thus, according to the test regulations, the total impairment score can be interpreted in percentile terms related to age, with a cut-off at <5 ° and <15th percentile.

If the child has a score below the 5th percentile it is thought that it has a clear motor impairment, while when its score varies between the 6th and the 15th percentile the child must be considered as "at risk" for a motor disability. Finally, when the test is used for clinical or educational assessment, the examiner can repeat the items in which the child performs each activity.

Furthermore, in the event that the child has failed during the first attempt and is reluctant to proceed, there are three different ways to use in the manual, so that more information is given about the child's motor skills so that they can be accumulated:

- subjecting the child to the tests of the lower age group,
- changing or adapting the evidence,
- providing the child with assistance, instruction, or feedback during the performance of the tests.

Statistical analysis

For the comparison between averages and standard deviation of data The t-Student's Test was applied from the two groups under consideration. Values of p <0.05 were considered statistically significant. STATISTICA software (version 6, StatSoft, Inc. (2001) was used for statistical analysis.

Results

The two groups (10 MwA vs 11 Controls) were similar for age (8.40 ± 1.17 vs 8.27 ± 1.10; p = 0.800), sex (p = 0. 730), and BMI (p = 0.204).

	MwA (N=10)	Controls (N=11)	p
Age	8.40 ± 1.173	8.272 ± 1.103	0.8
Manual dexterity	12.1 ± 11.222	2.045 ± 2.65	0.009
Ball skills	4.05 ± 4.621	1.636 ± 1.433	0.115
Balance	14.85 ± 10.088	1.045 ± 1.059	0
Total score	31.0 ± 23.654	4.727± 2.611	0.001
Total score Percentiles	9.0 ± 3.829	51.0 ± 24.347	0

Table 1: shows the differences between the averages between the group of children with migraine without aura (MwA) and the controls for Movement Assessment Battery for children (M-ABC).

The migraine subjects show an average worse performance than the Movement ABC; specifically, migraineurs show significantly higher total score values (31.00 ± 23.65 vs 4.72 ± 2.61; p = 0.001), manual dexterity (12.10 ± 11.20 vs 2.04 ± 2.65; p = 0.009) and balance (14.85 ± 10.08 vs. 1.04 ± 1.05; p <0.001). The mean percentile of migraine performance is significantly reduced compared to controls (9.00 ± 3.82 vs 51.00 ± 24.34, p <0.001) (Table 1).

Discussion

Praxis is the ability to correctly perform coordinated and finalized gestures. In the normal individual the acquisition of a new motor scheme progresses through stages in which the movement is controlled in an active and accurate manner. Individual movements must be produced slowly, paying attention to every single action and its consequences. Each action must be selected and the sequence must be assembled and stored in memory (order and timing), but with practice the sequence is consolidated and becomes automatic. The phases of acquisition of a praxia are identifiable in the sequence: preparation (the action is performed very slowly, under a strong control and the individual parts are treated and monitored carefully), composition (the action is performed faster, but are committed errors of execution), proceduralization (the action is carried out fluently, in an automated way). This premise is important to better understand the results of the evaluation carried out on the sample of migraine children who show a limitation in the coordination skills compared to controls. The pathogenesis of this impairment is not easily explained on the basis of current clinical knowledge, in fact there are no similar studies in the literature. Findings of the present study could be interpreted as an effect of the known alteration of some cortical structures (Anterior Cingulate Cortex)⁽¹³⁾ and subcortical (Thalamic structures)⁽¹⁴⁾ involved in the genesis of the pathology and migraine symptomatology.

In this picture, we could speculate also different putative mechanism for MwA pathogenesis, almost in children that could explain many others clinical manifestation, typical in developmental age more frequent than adulthood⁽¹⁵⁻³⁵⁾. In this perspective, we could rethink all disorders dominated by alteration in cerebral biorhythms such as primary headaches, epileptic syndromes and sleep troubles⁽³⁶⁻⁹⁷⁾.

Limitation of the study is certainly considered the small number of patients studied, although it may

be considered an interesting starting point for future studies.

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