Quality of life and psychomotor profile of children with attention deficit hyperactivity disorder (ADHD)

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ABSTRACT
The knowledge of psychomotor development of children with attention deficit hyperactivity disorder (ADHD) may help in defining therapeutic approaches in order to minimize losses in their quality of life. The study objectives were to evaluate the quality of life and psychomotor profile of children with ADHD and check their correlation. Fourteen children, from seven to ten years, with ADHD combined type were evaluated using the scales PedsQL™ and Motor Development Scale. Results showed adverse effects of ADHD on quality of life and a deficit in motor skills. Nine participants (64.2%) were classified in motor development as “Normal Medium”, followed by the classification “Normal Low” in four (28.5%) and “Low” in one subject (7.1%). We observed a positive correlation between quality of life and psychomotor development of children with ADHD, especially in areas: fine motor and spatial organization with social and psychosocial aspects, gross motor control with the emotional and temporal organization with the emotional, psychosocial and overall quality of life.

Key words: quality of life, child development, ADHD.

The attention deficit hyperactivity disorder (ADHD) is a deficit of self-control development, which displays issues associated to attention, impulse control, and activity levels¹. In 2007, Polanczyk et al.² in a systematic review estimated the

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global incidence of the disorder of 5.29% in pediatric population.

These children normally display a lack in academic performance, in social relations, as well as in emotional aspects. They also show disadvantages regarding their relation with their parents, teachers and children of the same age, frequently proceeding to a lack of self-esteem, and a higher risk for depression, anxiety and delinquent behavior.

Klassen et al. observed that ADHD has a significant impact in multiple realms associated to the quality of life of children and adolescents. In this study, involving the parents and/or caretakers narratives, the children with this disorder show emotional and behavioral problems, in addition to influencing their parents causing emotional distress, interfering in their family activities.

Quality of life is a concept defined by the World Health Organization as the individual perception of one’s position in life, regarding to the cultural context, goals, in his/her social context and in the value system he/she is inserted. Thus, it represents the effort to assign some characteristics to the human experience, being as the major factor, the subjective sense of well-being.

To children and teenagers, well-being could be associated with the distance between their wishes and hopes, and reality as it actually is. It is also reflects their prospecting, to themselves and to others, and it is prone to change, being influenced by everyday events. The emotional aspect has strong influence over the intellectual development, being a self-regulated process which implies in making way for the individual to acquire proper independence, enabling him/her to choose and to make decisions.

Besides academic, social and emotional performance matters, children with ADHD were acknowledged as having distinctive and different motor quality, when compared to children that do not have the disorder. It is believed that the major reason for motor difficulty is an inability in planning and carrying out motor tasks.

Those children demonstrate that they are unable to select a task or their action’s overriding object consciously, and not being in charge of their own body, which indicates a disharmony between feeling, thinking and acting. The excessive level of activity with unnecessary body movements, impulsiveness, answer anticipation, and inability to wait for an event can cause difficulties in learning and motor disturbance, interfering directly in their academic life, having as a result lower grades at school, and loss of self-esteem.

Studies indicate that an ADHD child’s psychomotor ability is meaningfully lower than expected. Nearly half of those children show difficulties, but data vary from 30% to 50%.

This disorder’s impact in society is enormous, taking into account its high financial cost, the parental stress and academic and professional damage. The knowledge about psychomotor development and possible alteration in ADHD children may be of help regarding treatment goals, in order to minimize the impacts on quality of life and guide a new educational and psychosocial development of children with ADHD.

The objective of the study was to analyze quality of life and the psychomotor profiles of children with ADHD, and also to verify if there was a correlation between both variables.

**METHOD**

A cross-sectional study was conducted on patients with ADHD receiving care at the Learning Disorders Ambulatory of the Child Institute at the Hospital das Clinicas of the University of São Paulo Medical School between May and October 2007.

Fourteen children (13 males and one female) aged seven to ten years who met the DSM-IV criteria for ADHD combined subtype, without comorbidities except the oppositional-defiant disorder, participated in the study. All children were taking stimulant medication (methylphenidate). Parents provided written informed consent for their children.

The following exclusion criteria were adopted: children with visual, hearing, heart diseases, rheumatology and orthopedic dysfunctions, as well as neurological diseases and neuropsychiatric disorders.

PEDsQL Scale - Measurement Model for the Pediatric Quality of Life Inventory was chosen for this study for presents a reliable translation into Portuguese and a pediatric self-report module. It was created in order to measure the dimensions of the health core, as determined by The World Health Organization, regarding to the physical, social, emotional and academic functions. It’s made up of 23 items (physical capacity: 8 items, social aspect: 5 items, emotional aspect: 5 items, school activity: 5 items), and each item is punctuated according to the frequency in which the child presents difficulties in a particular activity. The results can be interpreted by total score or grouped according to the areas: Psychosocial Health and Physical Ability. The score is determined in absolute value ranging from 0 to 100, so that the higher the score, the better the quality of life.

Motor Development Scale was used to analyzed the psychomotor profile of the children of this study. It was published and validated by Poeta and Rosa Neto, which uses a battery of tests involving fine motor skills, global motor skills, balance and body schema, spatial organization / laterality and temporal organization. The tests include specific tasks for each age group (two to 11 years).
on each element of the motion. The scale was compiled from other motor tests, backed by classical authors, such as Ozeretski, Brunet and Lezina, Berges and Lezine, Mira-Stambak, Galifret-Granjon, Piaget and Head.

The complexity of the task being performed increases as the individual ages. The participants were evaluated taking into account the test corresponding to their chronological age (CA) on each motor element, and ended the assessment when they did not perform properly the proposed task. The age corresponding to the last test performed correctly by the child is characterized by motor age (MA). Comparing the CA and MA, the motor advancement or delay of the child can be determined.

The scales were applied at the same location, in a single session with approximately 40 minutes. Descriptive results are presented by the average and confidence interval of 95% (IC95%). The Shapiro-Wilk Test was employed to check the normality of the data. Subsequently, the test was applied for non-paired samples for variable score comparisons assessed among motor development groups. For the analysis of the data between the quality of life variables and psychomotor development, intraclass correlation coefficient (r) was employed, which according to Vincent, is the proper one, less biased correlation than Pearson’s for small samples, with a p<0.05 of significance.

RESULTS

Aspects related to quality of life are presented in a descriptive form in Table 1. In Table 2, we present psychomotor profile data that are divided into motor ages, relating to arithmetic means of the test results that are expressed in months and motor quotients that match the division between motor age and chronological age, multiplied by 100.

Nine participants (64.2%) were classified in motor development as “Normal Medium”, followed by the classification “Normal Low” in four (28.5%) and “Low” in one subject (7.1%).

In Graph, the relationship between quality of life (total score) and motor development (general motor age) of each individual is shown.

In Table 3, we can observe the intraclass correlation coefficients demonstrating the quality of life realms that have direct relation to the psychomotor aspect.

DISCUSSION

In agreement with other previous research, this study showed that ADHD has a significant impact on these children’s multiple quality of life realms, especially psychosocial health, and can compromise their psychomotor development.

Table 1. Data describing the evaluation of Quality of Life (PedsQlTM).

<table>
<thead>
<tr>
<th>Quality of Life - PedsQlTM</th>
<th>Average</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical capacity</td>
<td>79.7</td>
<td>13.9</td>
</tr>
<tr>
<td>Emotional</td>
<td>54.3</td>
<td>20.5</td>
</tr>
<tr>
<td>Social</td>
<td>67.5</td>
<td>26.3</td>
</tr>
<tr>
<td>School</td>
<td>58.9</td>
<td>26.3</td>
</tr>
<tr>
<td>Psychosocial</td>
<td>60.2</td>
<td>16.7</td>
</tr>
<tr>
<td>Total</td>
<td>67.7</td>
<td>14.7</td>
</tr>
</tbody>
</table>

Table 2. Descriptive data assessing the Psychomotor Development (MDS). Chronological age and motor age in months and motor quotients in absolute value.

<table>
<thead>
<tr>
<th>Psychomotor profile</th>
<th>Average</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronological age</td>
<td>111.4</td>
<td>13.6</td>
</tr>
<tr>
<td>Motor age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General motor age</td>
<td>102.1</td>
<td>15.3</td>
</tr>
<tr>
<td>Fine motor</td>
<td>112</td>
<td>18.1</td>
</tr>
<tr>
<td>Global motor</td>
<td>114</td>
<td>15.4</td>
</tr>
<tr>
<td>Balance</td>
<td>102</td>
<td>17.9</td>
</tr>
<tr>
<td>Body schema</td>
<td>75</td>
<td>17.2</td>
</tr>
<tr>
<td>Spatial organization</td>
<td>96</td>
<td>17.2</td>
</tr>
<tr>
<td>Temporal organization</td>
<td>120</td>
<td>22.1</td>
</tr>
<tr>
<td>Motor quotients</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fine motor</td>
<td>101.5</td>
<td>9</td>
</tr>
<tr>
<td>Global motor</td>
<td>104</td>
<td>9.9</td>
</tr>
<tr>
<td>Balance</td>
<td>92.1</td>
<td>10</td>
</tr>
<tr>
<td>Body schema</td>
<td>67.7</td>
<td>11.9</td>
</tr>
<tr>
<td>Spatial organization</td>
<td>87.5</td>
<td>12</td>
</tr>
<tr>
<td>Temporal organization</td>
<td>99.5</td>
<td>14.7</td>
</tr>
</tbody>
</table>

Graph. Distribution of individual values for the general motor age and quality of life total.
The study of Klassen et al. assessed quality of life of 131 children with ADHD aged between 6 and 17 years, through parents reports making use of the HRQL instrument (Health-Related Quality of Life), and found that these children had the greatest faults on emotional, behavioral, mental health and self-esteem issues, besides the impact on parents emotional health and family dynamics.

The scale PedsQL™, same instrument used in this study, was chosen by Varni et al. for evaluation of quality of life in children with ADHD, comparing with kids who had cancer, cerebral palsy and healthy controls. In this study, Varni et al. observed that children with ADHD have lower scores in psychosocial controls, compared to healthy controls, but there was no significant difference in physical ability.

The present study and the research conducted by Varni et al. showed similar results, mainly in the following areas: quality of life, with total score of 67 in this study, while Varni et al. obtained 70 points, and psychosocial health with 60 and 63 respectively. Domains with the lowest score in our study, and, consequently, greater injury to these children were the emotional and academic aspects, which determine a declining total score of the scale (Table 1). These results reaffirm discussions about the compromised self-esteem of bearers of ADHD since observational aspects not related directly with psychosocial health, high-impact factor for quality of life, proved less important when compared with the physical capacity of these children.

In addition to the psychosocial factors, difficulties in executing motor tasks can also reflect on self esteem and quality of life of these children, interfering with school performance, in daily activities and in the formation of the personality. Even with equivalence to normal values in the motor profile, children with ADHD have achieved lower execution levels in skills related to balance body and spatial organization scheme, suggesting the involvement of the cerebellar pathways and/or executive functions in ADHD.

For decades the cerebellum was considered with a key role in motor coordination and control of balance, but currently there’s an investigation about its role in cognitive functions, such as language, executive and visuo-spatial functions, and behavior. Strengthening the relationship of the cerebellum in ADHD, several studies have shown a lower cerebellar volume in the disorder bearers, compared to the normal controls and also there is reduction of cerebellar activity in tests on operating memory.

Currently there is no correlation between studies that determine motor compromise of children with ADHD, which can be pointed to by discrepancy in evaluation methods. Studies related to amendment more prevalent in ADHD describe motor disorder coordination, which is a type of disorder with significant impacts, but little is investigated about motor changes as an integrated symptom of ADHD.

Thompson reports that the child with ADHD presents schema and body image disorders, so he/she can’t connect the location of his/her body in the environment, with the extent and direction of movement. Motion tasks that require precision, directional stability and balance are disturbed.

Rosa Neto and Poeta studied children with indicators of ADHD through Motor Development Scale. Their results indicated a 23-month negative average motor age, demonstrating a “Normal Low” motor development. The quotients of all areas assessed showed deficits, but the biggest losses were in temporal organization, spatial organization and balance.

Most skill deficits in ADHD may be related to neurological changes found in these individuals, whose main changes found were reductions in volumes: cerebral total of prefrontal cortex of caudate nucleus, globus pallidus, cingulate gyrus, and the cerebellum, mainly in the cerebellum.
bellar vermis and lower posterior lobe. In addition to that, Shaw et al. identified a delayed maturation of cortical thickness of children with ADHD when compared to healthy controls, especially in frontal regions linked to the ability to inhibit unwanted thoughts and responses of attention, executive control, evaluation of rewards from actions, appropriate and precise motor control to the expected action and working memory.

De Nucci characterized the psychomotor profile of ten children with ADHD, also using the Motor Development Scale, and found that 40% of the sample presented “Normal Medium”, 40% “Normal Low” and 20% “Low”. Furthermore, the general motor age was less than the chronological age in 90% of the cases and the average negative age was approximately 18 months.

By outlining the psychomotor profile, we presented similar data in some indicators, however, in our study the general motor age was negative in nine months, reflecting only the impairment of balance, body and spatial organization schema (Table 2), unlike studies cited, showed that significant delays in all areas were assessed.

Methodologies of studies can explain variations in the results. Our selection criteria were more stringent on comorbidity, so frequent in ADHD, because these can influence on motor performance in a negative way, often acting more importantly than even the disorder itself. Besides that, our age of study was limited according to the association of the scales to correlate them. These factors influenced in the reduced casuistry of our research.

Too many other research studies on motor performance in ADHD were carried out using different scales, such as the Movement Assessment Battery for Children that evaluates handedness mastery, skill in handling the ball and static and dynamic balance. Even though it is a different instrument, the variables assessed demonstrate impairment in general motor performance. Pitcher, Pick and Hay evaluated children with clinical diagnosis of ADHD, comparing performance engine in the three subtypes and control group. The researchers noted that all children with ADHD have lack of effectivity when compared to the control group, but by evaluating each subtype, it was evident that the guys predominantly inactive and combined showed no significant difference when compared to the control group, suggesting a relationship between attention capacity and motor ability, which does not occur with the predominantly hyperactive-impulsive group.

In our research, we noted the absence of studies that indicate the relationship between the physical factors and quality of life or self-esteem of children, for this was the reason we began this work, in which our results could indicate the impact on the quality of life relating directly with impairment in psychomotor development.

Through intraclass correlation test, we see that there is a positive correlation between quality of life and psychomotor development, so that fine motility relates to social and psychosocial aspects, global motor to the emotional aspect, spatial organization with social and psychosocial aspects, and temporal organization with psychosocial and emotional aspects, the effectiveness of quality of life (Table 3). These results indicate that the impairment of any of these psychomotor aspects can determine a loss or an improvement in quality of life realms, demonstrating a tendency of a grievance related to the quality of life of individuals with motor impairment (Graph).

Studies suggest that children with ADHD have alteration in psychomotor development and quality of life, separately, we assessed that with this kind of direct correlation between the scales studied, an approach to improving motor development, mainly in the aspects that had significance in this study, can interfere positively on the quality of life of this child.

It is important to note that the impact on quality of life of these children will occur regardless of motor involvement, since the ADHD is a biopsychosocial disorder. However, the improvement of motor performance can develop skills and act on their feelings, improving their self-concept, and actuating on their self-esteem.

Currently children with ADHD have multidisciplinary follow-up with drug treatment, cognitive behavioral therapy, psychotherapy, speech therapies, psychopedagogical treatment, among others, indicating that the child watching is already comprehensive. Adding to these therapies, including psychomotor monitoring, with trained professionals for this purpose, the approach becomes integral, acting positively in their physical, mental and social well-being.

In conclusion, with this study we were able to verify the negative impacts of ADHD in quality of life of children, especially in psychosocial aspects. The outlined psychomotor profile showed delay in motor skills development, primarily in the body structure consciousness, balance and spatial organization.

It suggests that there is a positive correlation between the quality of life and psychomotor development of children with ADHD, although further research and other studies are necessary for the definition of an appropriate psychomotor intervention.

**REFERENCES**