Performance of balance beam task of K.T.K. by people with intellectual disability.

José Irineu Gorla  
DEAFA/FEF/UNICAMP/SP  
Prof. Dr. em Atividade Física Adaptação e Saúde

Anselmo de Athayde Costa e Silva  
DEAFA/FEF/UNICAMP/SP/Bolsista Mestrado CNPQ  
Aluno de Pós Graduação em Atividade Física Adaptação e Saúde

Leonardo Trevizan Costa  
DEAFA/FEF/UNICAMP/SP/ Bolsista Mestrado CNPQ  
Aluno de Pós Graduação em Atividade Física Adaptação e Saúde

Paulo Ferreira de Araújo  
DEAFA/FEF/UNICAMP/SP  
Prof. Dr. em Atividade Física Adaptação e Saúde

RESUMO

O equilíbrio corporal (EC) é considerado indispensável para um desenvolvimento motor adequado. Com isso, foi analisado o EC de 9 crianças com deficiência intelectual (DI) entre 6-11 anos, verificando-se o impacto de um programa de atividade física em seu aprimoramento. Foi realizado o Teste de Equilíbrio na Trave - KTK e os sujeitos foram submetidos a um programa de educação física orientado. Os dados foram analisados através do teste “t” Student para apontar as diferenças significantes, adotando p<0,05. Observou-se diferença significante no EC após a intervenção (pré=6.55 e pós=14.11). Porém algumas características individuais contribuíram para um desempenho insatisfatório de alguns sujeitos. Conclui-se que o EC de crianças com DI apresentaram melhoria após a intervenção.

Palavras Chave: Deficiência Intelectual; Equilíbrio musculoesquelético; Crianças;

ABSTRACT

The balance performance (BP) is considered indispensable for an appropriate motor development. The, we analyze the BP of 9 children with intellectual disability (ID) with age between 6-11 years, and verify the impact of a physical activity program in your improved. The test of balance was accomplished in the Balance Beam task - KTK and the subjects were submitted a physical education program guide. Data were analyzed using the test "t" Student to point the significant differences, adopting p <0,05. There was a significant difference in the BP after intervention (previous=6.55 and post=14.11). However some individual characteristics contributed to an unsatisfactory performance in some subjects. We concluded that BP in children's with ID improvement after the intervention.

Keywords: Mental Retardation. Musculoskeletal Equilibrium . Child
INTRODUCTION

Children with intellectual and multiple disabilities have such a wide variety of severe and profound disabilities that they are heavily dependent on their direct support people for all aspects of their daily existence (NAKKEN; VLASKAMP, 2002; PUTTEN et al., 2005).

In addition to significant limitations in intellectual functioning and adaptive behaviour, children with intellectual disabilities (ID) are also characterized by delay of motor milestones and impairment of sensorimotor function that affects sensory, neuromusculoskeletal and motor systems (HOGAN; ROGERS; MSALL, 2000; WUANG et al., 2008).

These deficits greatly impede the quality and quantity of the child's participation or performance in activities in school, at home and in the community (DOLVA; COSTER; LILJA, 2004). Showed specific cognitive deficits on tasks of attention (SIMONOFF et al., 2007), information processing (DETTERMAN et al., 1992), language (VICARI; CASELLI; TONUCCI, 2000), verbal short-term memory (BROCK; JARROLD, 2005; VAN Der MOLEN et al., 2007), visual perception (Di BLASI et al., 2007), and executive function (ROWE; LAVENDER; TURK, 2006).

With that, an ID subject presents different characteristics of development in their physical designs, space organization, balance, agility and strength, among others. In certain cases, these characteristics can be considered pathological, that is, developing with particularities and sequences that are different from what is considered "normal" development, and in other cases they are simply considered as retarded, meaning the development is normal in every way, except for being behind the chronological age.

Some children encounter difficulties in motor abilities such as writing, drawing, handling objects and building, while others have difficulties with recreation, games that involve running, jumping, hopping, throwing, with balance, space and time orientation, side movements, sports and even movement and daily activities.

According to the American Association of Mental Retard (2006), the motor development of those children’s can present functional incapacities, limiting the execution of activities and restricting the participation of several situations of the real life. Therefore it is important to analyze the individuals' motor aspects with ID.

One of the variables to be analyzed is the balance, that requires inputs from visual, somatosensory, and vestibular inputs as well as their integration to reference
the self within the environment (SHUMWAY-COOK; WOOLLACOTT, 2001) and deficits in balance may result in delayed motor development (GEUZE, 2003) because as postural control is generally presumed to be a precondition for the development of motor skills. However, current data regarding the effects of intellectual disability on balance performance are limited.

In agreement with the exposed, the aim of this study was describe the performance in the Balance Beam task (KIPHARD; SCHILLING, 1974) and analyze the effects of the physical activity comparing the result before and after intervention in children with intellectual disability.

**MATERIAL AND METHODS**

Transverse analytic study was accomplished in a sample of 11 children diagnosed as having intellectual disability without syndromes and belonged to different classrooms, with chronological age between six and 11 years of both sexes, but only one subject was female. The subjects are members of the APAE of Rolândia, Paraná, Brazil.

The individual characterization of the subjects in this study was based on students’ portfolios, the classroom teacher’s, the physical education teacher’s and the psychologist’s reports.

The present study obeyed the ethical criteria of the terms and norms of the Resolution 196/96 and 251/97 of the National Council of Health and before participation, informed consent was obtained from the subjects’ parents or legal guardians and participants gave oral assent to participate. The study was approved by the Committee of Ethics of the State University of Campinas – UNICAMP – Brazil.

In relationship to balance performance, it was applied the task of Balance on the Beam present in battery of motor coordination tests K.T.K.

Before the beginning of the specific program of physical education the previous test was applied, and in the end of the program of physical activity the post-test with the intention of verifying an improvement, or progress in motor coordination of children’s with ID.

The protocol of the applied test is described:

**Objective:** steadiness of balance while walking backwards on the beam.

**Material:** 3 beams measuring 3 meters long and 3 cm high and width of 6 cm, 4.5cm and 3 cm. On the bottom, they are locked by staples measuring 15 x 1.5 x 5cm distant 50cm from each other. Then, beams reach a total height of 5cm. As a starting
base, there is a platform measuring 25 x 25 x 5cm put at one end of the beam. The three beams are put parallel.

**Execution:** The task consists of three valid walks on each one of the beams. The evaluator demonstrates the task, walking forward, balancing on the beam until the platform, stopping for an instant on it, feet put together, and then walking again, now backwards, balancing on the same beam.

For each beam there is a rehearsal exercise in which the subject walks once forward and once backwards, as demonstrated by the evaluator.

In the rehearsal exercise, the subject must balance walking backwards along the whole beam (should he lose balance at any time and touch the ground with the foot, he would continue from the same point) so that he can better estimate the distance to be walked and become more familiar with the process of balance on the beam.

If the subject touches the floor (in any of the valid attempts), he should go back to the platform and start a new attempt of walking on the beam (three valid chances for each beam). Thus, on each beam, the subject is going to rehearse walking once forward and once backwards and then, in order to measure results, walk three times backwards.

**Verbal Instructions:** “First, we are going to practice a little bit of balance. You have to walk forward on this beam until the platform. Then you stop for a while with your two feet together. Then you carefully walk backwards. You can’t touch the floor with your feet; then, I’ll count how many steps you can take. If you touch the floor, then you go back to the platform and start again”.

**Evaluation of the Task:** Steps on the beam are counted in the following way:

The subject is standing still, feet close together on the platform. The first foot moving backwards doesn’t score a point. Every step backwards after that scores a point and these are counted aloud by the evaluator. The steps are counted until eight points are scored or one of the feet touches the floor. If the subject can go along the whole beam with less than 8 steps, eight points are also scored.

When the subject is balancing walking backwards, the results of each one of the three attempts are considered ADN added. Therefore, there is a total for each beam. These sub-totals are then added, resulting in the total score for each individual on the whole task.

This way, 8 points maximum can be scored per walk per beam. This allows a final score of $3 \times 3 \times 8 = 72$. 
Task Balance on the Beam Table: The results for each attempt are recorded and then added to a subtotal. Then, the results of the nine attempts are added, resulting a total score.

After applying the motor coordination previous-test, using the KTK test, it was possible to observe what the variables were in which the subjects had the greatest difficulties and which needed the most attention.

Once selected, the children became part of a 10-week specific task intervention of a specific physical education program, in a total of 23 sessions.

In the present study, a mid-test was applied after the thirteenth intervention session because it became apparent at this point that it was necessary to evaluate the program being developed, since some of the individuals were not progressing. This evaluation proved important in detecting some of the changes that would be necessary before the end of the twenty-third session, thus enabling more reliable work based on more criteria. After the mid-test, there were 10 more intervention sessions and finally the post-test, whose results will be detailed later on in this paper.

And, the training session was made with the researchers' direct and constant supervision. The classes were previously structured in way so that the students progressed to each training and they received the researchers' feedback after each execution.

The statistical analysis of the results was conducted with the Bioestat 5.0 program. Firstly the descriptive analysis of the data was applied, being obtained the central tendencies (averages) and dispersion (standard deviations). The Wilcoxon test, a referential, non-parametrical test, allowed us to evaluate the effect of the intervention on the subjects, at a significance level of p<0,05.

**RESULTS AND DISCUSSION**

The results of the balance performance task can be visualized in the table 1. It is noticed that the individuals demonstrated superior values after the intervention of the specific program of physical education. Reveal a score increase of 6.55 for 14.11 after intervention. These values were statistically significant at the level of p < 0,05, thus confirming the influence of the Specific Physical Education Program they went through.
TABLE 1. Mean, standard deviation and results of test “z” in the study of the balance task on the beam – pre and post test.

<table>
<thead>
<tr>
<th>Test</th>
<th>N</th>
<th>Pre-test</th>
<th>Post-test</th>
<th>“z”</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>Std</td>
<td>Mean</td>
<td>Std</td>
</tr>
<tr>
<td>Bar</td>
<td>9</td>
<td>6,5</td>
<td>+2,73</td>
<td>14,11</td>
<td>+5,14</td>
</tr>
</tbody>
</table>

Statistically significant values at level p<0,05

The results demonstrated in the table 1 are interesting, because as best goes the children's motor repertoire, larger they will be development possibilities and motor improvement, whose significance values obtained in the post test, we can reaffirm the idea that the training of the motor abilities can represent an improvement in the coordination, in this case, the balance.

We should mention, however, that, when analyzed individually, according to table 2, children I, II, V and VII didn't have a significant growth in the balance task, walking backwards on the beam. Probably due because that movement tasks require precision, stability, directionability and balance, need as well some degree of concentration. These individuals presented anxiety situations, amusement, deficit of attention and shyness in their behaviors. These disturbances cause difficulties in concentration, what might probably have interfered in their performance during the interventions and the evaluations. However, there was not any case in that the results became inferior after the intervention and there are not studies that demonstrate normative values for subject with ID in balance performance.

TABLE 2 Average and standard deviation of the subjects’ individual scores in the study of the motor tasks of Balance on the Beam – previous and post-test.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Age</th>
<th>Beam (PRE)</th>
<th>Beam (POST)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>6</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>II</td>
<td>6</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>III</td>
<td>7</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>IV</td>
<td>7</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>V</td>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>VI</td>
<td>8</td>
<td>19</td>
<td>36</td>
</tr>
<tr>
<td>VII</td>
<td>9</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>VIII</td>
<td>9</td>
<td>21</td>
<td>40</td>
</tr>
</tbody>
</table>
The performance of the subjects in the task of Balance on the Beam can also be visualized through the graphic representation 1.0. It seems relevant to mention that subject I presented, during the phases of the program, arrhythmic movements, lack of balance capacity and slowness of movements, in the preparation and in the execution of the task. And during the execution of the balance on beam task, the subjects I, II, V and VII presented inappropriately fast, abrupt impulses, with slow motor reaction, unbalance, etc.

<table>
<thead>
<tr>
<th></th>
<th>IX</th>
<th>11</th>
<th>8</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>7,77</td>
<td>6,55</td>
<td>14,11</td>
<td></td>
</tr>
<tr>
<td>SD</td>
<td>+1,64</td>
<td>+8,20</td>
<td>+15,43</td>
<td></td>
</tr>
</tbody>
</table>

Graphic 1. Average and standard deviation of the individual score of the studied subjects in the balance beam task.

In agreement with the exposed, some subject of the sample might not have developed after the intervention due to the Beam task is very complex and dependent of several variables, and, according to the literature, as larger the neurological compromising, larger the probabilities of the motor compromising.

It is also observed, that the exercise has been demonstrating to improve the life quality of most of the people with ID. However, the improvement of the functional capacity many times it is not accompanied by an increment in the physical fitness, because the motivation and the understanding of the task are important for the success of any program of physical exercises.
One of the few existing longitudinal studies that focused on the physical fitness of adults with ID was carried out by Graham and Reid (2000). The Canadian Standardized Test of Fitness was used to assess 32 participants with mild and moderate ID, 14 women and 18 men, aged 34–57 in 1983 and in a 13-year followup. Four participants had Down syndrome. The physical fitness of adults with ID was lower than for the nondisabled participants and declined over time. In addition, the magnitude of change over years, as compared to the participants without ID, was greater for both males and females in body mass index and for the females only in sit-up test.

In a study accomplished by Santos et al. (1999) the level of development of the motor coordination was evaluated in a group of seven children with ID. The participants' age group was from five to nine years of age. To verify the effects of the activities of Olympic gymnastics on the motor coordination, data were collected using the Test of Coordination Motor for Children - KTK before and after the intervention. According to the verification of the test KTK, the group obtained in the first evaluation a motor coefficient to regulate. After the intervention, in the re-test, the motor coefficient showed normal index. It was verified like this, that the practice of the Olympic gymnastics, inside of the work proposal, it influenced in the improvement of the development of the participants' motor coordination.

Another study with ID performed at a significantly lower level in abdominal strength/endurance, static balance, and manual dexterity, when compared to nondisabled peers in early adolescence (LAHTINEN; RINTALA; MALIN, 2007).

Then, it is noticed that the practice of the physical activity constitutes an important resource in the training and people's training with mental deficiency (GIMINEZ et al., 2004).

Data explaining more about this specific population in several sub-areas in Physical Education involving body coordination slowly starts to appear. It is necessary to obtain quantitative and qualitative explanations about certain variables that are of great importance to help the professionals in the area, as well as for the people with mental disability, specifying cognitive, social and motor aspects.

**CONCLUSION**

In global terms, they were verified significant changes in the balance performance of children’s with ID submitted to the specific physical education program. The classes had, therefore, positive effects in the development of this
multidimensional variable. However, some individuals didn’t have satisfactory results post-test, indicating a necessity of more time for the interventions and deeper analysis about other behaviors. On the other hand, there is not available literature that could bring an explanation for the pattern observed in the sample.

In agreement with the results, we can conclude that the positive alteration happened in the scores, through the intervention, in children with ID, suggests that a program of physical education needs continuity, together with the medical area that can make possible more improvement and quality of those children's life. And the evaluation and the precocious intervention minimize the difficulties and they make possible the individual a more pleasant conviviality.

However, it’s necessary the development of researches in the area of the Adapted Physical Education, as well as the development of protocols, of projects and programs of motor rehabilitation. Suggesting new investigations as soon as should be accomplished in the attempt of better consolidating the knowledge in this research line.

REFERENCES


Endereço para correspondência:
José Irineu Gorla
Rua General Ozório, 39, apto. 123. CEP 13.271-130
Valinhos – SP
(19) 8179 – 1995

Apoio CNPQ

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