EVALUATION AND COMPARISON OF MANUAL DEXTERITY IN CHILDREN WITH DOWN SYNDROME AND NEUROTYPICAL DEVELOPMENT: CASE REPORT

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ABSTRACT

Objective: To evaluate and compare manual dexterity using the Box and Block Test in children with Down syndrome and neurotypical development. **Methodology:** This is a case report in which the manual dexterity of one child with Down syndrome and one neurotypical child was evaluated and compared.**Results:** The comparison revealed that both children were more agile with their non-dominant hand. The child with Down syndrome (DS) manipulated 29 blocks with the dominant hand and 33 blocks with the non-dominant hand, while the neurotypical child manipulated 50 blocks with the dominant hand and 58 blocks with the non-dominant hand.**Conclusion:** It was concluded that both children, with DS and neurotypical development, showed greater agility with the non-dominant hand. However, the neurotypical child demonstrated superior performance, manipulating more blocks with both hands.

Keywords: Down Syndrome; Neurotypical; Manual Dexterity.

INTRODUCTION

Down syndrome (DS) is a genetic condition caused by trisomy of chromosome 21. It is characterized by specific physical, cognitive, and motor aspects and is one of the most common chromosomal disorders, with an approximate incidence of one in every 700 live births (Trindade; Nascimento, 2016).

Neurotypical children follow a typical motor and cognitive development pattern, whereas children with DS show delays due to factors such as muscle hypotonia and cognitive deficits. Additionally, they present distinct physical characteristics, such as brachycephaly and protruding tongue, which impact development and require specific interventions.

According to Silva and Dessen, phenotypic characteristics of DS include brachycephaly, reduced fronto-occipital diameter, upward-slanting palpebral fissures, epicanthic folds, flattened nasal bridge, and midface hypoplasia. Other features include a short neck, single palmar crease, small and dysplastic ears, protruding and hypotonic tongue, clinodactyly of the fifth finger, and increased spacing between the first and second toes. Children with DS usually present muscle hypotonia, excessive sleepiness, difficulties in sucking and swallowing, delayed reflex development, and possible alterations in hip posture.

Among the main deficits associated with DS, motor development delay is one of the most studied aspects, since these individuals face significant challenges in both fine and gross motor skills compared to neurotypical children. Motor development is essential for autonomy and quality of life, and identifying the most affected areas is crucial for implementing appropriate interventions (Silva; Dessen, 2002).

The Box and Block Test is designed to evaluate and quantify gross manual dexterity and functional skills. It allows assessment of time and endurance during the task performance (Turco et al., 2018).

OBJECTIVE

To evaluate and compare manual dexterity using the Box and Block Test in children with Down syndrome and neurotypical development.

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METHODOLOGY

This study complies with the Guidelines and Regulatory Standards for research involving human beings established by the National Health Council, Ministry of Health (Brazil), first formulated in October 1996 and updated in Resolution 466/2012. The study was submitted to the Ethics Committee of Universidade Evangélica de Goiás – UniEVANGÉLICA, Anápolis-GO.

All legal guardians authorized the participation of the children by signing the Informed Consent Form (ICF), declaring awareness that the procedure was voluntary, free of charge, and experimental. Participants were ensured full access

to all relevant information and could withdraw consent at any time without any harm or prejudice. Confidentiality and privacy were guaranteed.

The study was conducted at the Human Movement Analysis Laboratory at Universidade Evangélica de Goiás – UniEVANGÉLICA, in collaboration with the Association of Parents and Friends of Exceptional Children (APAE) in Anápolis and Casa da Joana.

The child with DS was selected according to the following inclusion criteria: confirmed DS diagnosis; adequate comprehension and cooperation; age between 10 and 17 years; impaired upper-limb motor coordination; and signed informed consent from a legal guardian. Exclusion criteria (for both phases of the study) were: history of surgical procedures in the 12 months prior to the study; upper-limb or spinal orthopedic deformities requiring surgery; uncontrolled epilepsy; metallic implants in the skull or hearing devices; associated neurological disorders; or pacemaker use.

STUDY DESIGN

This is a case report involving one child with Down syndrome and one neurotypical child.

Procedures

Manual dexterity assessment – Box and Block Test

The test aimed to evaluate and quantify gross manual dexterity and functional skills. The participant was instructed to sit in a height-adjusted chair, with the test box positioned horizontally on a table, allowing full visualization (Figure 1). The test consists of moving small wooden cubes from one side of the box to the other within one minute. The number of cubes transferred was recorded separately for the dominant and non-dominant upper limbs, with two attempts performed for each hand.

Figure 1 – Box and Block Test used for functional assessment.

RESULTS

The comparative analysis of manual dexterity using the Box and Block Test, with the child with Down syndrome and the neurotypical child, considered the number of blocks manipulated with the dominant and non-dominant hands. The child with Down syndrome manipulated 29 blocks with the dominant hand and 33 blocks with the non-dominant hand, whereas the neurotypical child manipulated 50 blocks with the dominant hand and 58 blocks with the non-dominant hand. It was noted that both children showed greater agility with the non-dominant hand.

The neurotypical child demonstrated superior performance, manipulating 21 more blocks with the dominant hand and 25 more blocks with the non-dominant hand compared to the child with Down syndrome.

CONCLUSION

It was concluded that both children, with Down syndrome and neurotypical development, showed greater agility with the non-dominant hand. However, the neurotypical child had a superior performance, manipulating more blocks with both hands.

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