

DEXTERITY TESTING AS A PREDICTOR OF ORAL HYGIENE IN CHILDREN WITH DOWN SYNDROME

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OVERVIEW

ABSTRACT

BACKGROUND: Daily oral hygiene is the primary means for prevention of oral diseases. These routine procedures are technically demanding and can be affected by the compliance and manual dexterity of the patient. The delay in motor skill acquisition by special children may lead to inability to perform daily routine tasks that uses gross and fine motor coordination. Aim: The aim of the study is to analyze the co-relation between manual dexterity and oral hygiene in children with Down syndrome. **MATERIALS AND METHODS:** 26 children with Down syndrome between the age group of 10-14 years that met the inclusion criteria were selected. An exploratory correlational study design was employed. Manual dexterity evaluation was done by box and block method and oral hygiene through OHI-S index. Correlation tests were done to statistically analyze the significance between the two variables. **RESULTS:** No significant correlation can be established between manual dexterity and oral hygiene in children with Down syndrome. **CONCLUSION:** The present study showed no correlation between the two variables. However, future research with a larger sample size can further uphold the results of this study.

Keywords: Motor Skill, Down Syndrome, Oral Hygiene Index, Pediatric Dentistry, Cognitive Behavior Therapy, Psychomotor Performance

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INTRODUCTION

Manual dexterity is the ability to make coordinated hand and finger movements to grasp and manipulate objects. Manual dexterity includes muscular, skeletal, and neurological functions



to produce small, precise movements. These skills develop primarily during childhood and are fundamental for an individual to experience and learn about his or her environment.¹ The results of assessments for both manual and fine motor dexterity may be used to quantify and predict both ability and disability by gauging a person's speed and quality of movement as the hand interfaces with objects and tools related to self-care, work, or leisure pursuits.² A study conducted by Williams et al. demonstrated that dexterity was the best predictor of independence in activities of daily living (ADL) within a cohort of geriatric females.³

The Down Syndrome (DS), also known as chromosome trisomy 21, is a genetic syndrome most frequently associated with mental retardation. The function of holding objects for normal children occurs at nearly four months of age. On the other hand, nearly 40% of DS children reach that landmark in seven months.⁴ Additionally, grip strength in patients diagnosed with DS was significantly lower than typically developing individuals.⁵

The removal of plaque from teeth is a skill that can be mastered only when an individual has the dexterity to manipulate a toothbrush and an understanding of the objectives of this activity.

The aim of the study was to analyze the co-relation between manual dexterity (1st variable) and oral hygiene (2nd variable) in children with Down Syndrome.

MATERIALS AND METHODS

Before the start of the study, the study protocol was approved from the Ethics Committee of the concerned institute. Children with Down syndrome in the age group of 10-14 years and an intelligence quotient (IQ) between 30-60 were included in the study. Permission from the principal of the special school was obtained prior to starting the study. Evaluation of IQ was done by a psychologist.

Children were excluded if they were diagnosed with a disease, disability, or limiting disorder on the upper limbs; if they regularly used medication that could interfere with their motor functions; and if they showed any difficulty in understanding the test instructions.

The 'box and block' method is a valid test for analysing manual dexterity in atypically developing children.⁷ A 53.7 cm wooden box was used with a wooden partition that was



taller than the box edges, separating it into two equal compartments. A total of 150 fifty wooden blocks having a diameter of 2.5 cm were used in this study.

The present study was performed in a quiet, illuminated place without any distractions. The participants sat comfortably in an appropriate chair size. The box was placed horizontally in front of them, with the division aligned to the sagittal plane of the subject’s head. This allowed total aerial view of the apparatus used for their manual dexterity evaluation.

Each participant was allowed a 15-second trial period prior to testing. When testing began, the child grasped one block at a time with the dominant hand, transported the block over the partition, and released it into the opposite compartment. The test period was one minute. The procedure was then repeated with the non-dominant hand. After testing, the examiner counted the blocks. If a child transported two or more blocks at the same time, the number is subtracted from the total.

The result of the test is given by the number of blocks that each participant managed to transfer from one side of the box to the other in one minute. In the present study, the evaluator counted out loud, one-by-one, the number of blocks transferred from one compartment to the other. This was done to help maintain attention and continuity to the task, making it possible to better control it.

Oral hygiene was measured using the oral hygiene index simplified (OHI-S).⁸

RESULT

		Pearson Correlation for OHI-S	Bi-Serial correlation for OHI-S
Manual Dexterity	Value	0.029	-0.004
	p-value	0.889	0.985
	N	26	26

Table 1: Statistical Co-relation between Manual Dexterity and OHI-S

31 children with Down syndrome were initially assessed, out of which 26 met the inclusion criteria.

The correlation value for overall dexterity shows non-significant correlation with oral hygiene. A positive correlation for manual dexterity and OHI-S is seen when obtained with



original values. It shows non-significant negative correlation when compared with coded OHI-S (Figure 1 and Figure 2).

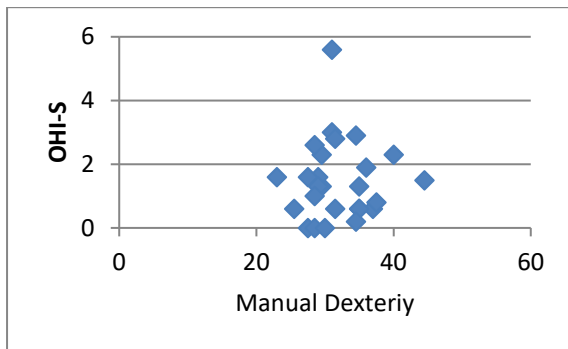


Figure 1

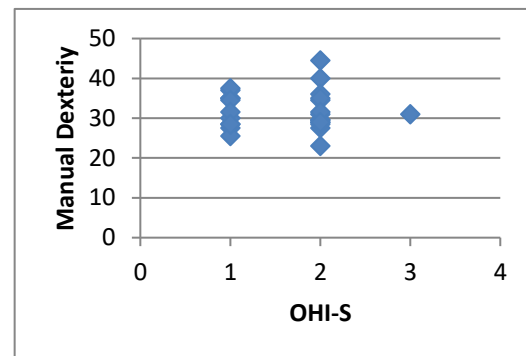


Figure 2

DISCUSSION

Down syndrome affects in 1 to 800 children. Clinically, it is characterized by generalized hypotonia, neurological changes, structural cardiopathy, respiratory problems dental anomalies, and orofacial dysmorphology, which therefore requires special attention in the dental treatment of these patients.

A delay in the development of motor skills is seen because of muscle weakness, human cerebellar hypoplasia, hypotonia, small and thick hands, and short fingers. These could cause some difficulties in manipulative activities.

Periodontal disease is the most significant oral health problem in children with Down syndrome. This can be attributed to poor motor control and lack of self-cleansing.⁹ Thus, this study used a correlation exploratory design wherein two or more variables co-vary, that is, where changes in one variable (motor skills) are reflected in changes in the other (oral hygiene). This study showed no correlation between oral hygiene and manual dexterity which was similar to previously reported studies.^{10 11} However, certain factors which could influence the results of this study include grip strength, parental attitude, and encouragement and motivation of school staff.^{12 13 14}

Children with special healthcare needs like using less fingers and hyperextending them which compromises their manipulative abilities.^{15 16} If an individual possesses only limited grasping ability modifying the toothbrush handle can be of assistance. The thicker surface can enable them to hold it in their hand and brush on their own.

CONCLUSION

The present study showed no significant relation between manual dexterity and oral hygiene level in children with Down's syndrome. However, future research can expand the scope of this research by doing evaluations on a larger sample size and considering grip strength, parental attitude and toothbrushing technique for special children.

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