



Visual motor integration in children with and without reading disability

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ABSTRACT

Where there are few occupational therapists in regular practice, and an educational psychologist and special educators conducted the majority of the assessment procedure and evaluation of children with visual-motor integration (VMI). They consider assessing children with VMI as similar to the assessment of children with research instruments, and the availability of the trained occupational therapist was limited. VMI is generally expressed as the ability of the child to integrate visual perception input and to coordinate it with limb movements for the execution of motor activities in sequential order. A child with impaired VMI skills fails to execute motor-based activity. We evaluated the visual-motor integration (VMI) in children with and without reading disabilities (RDs) in the primary schools of Mudichur. Full Range Test of Visual-Motor Integration (FRTVMI) was used to evaluate the visual-motor integration among children. A total of 20 children recruited from primary schools in Mudichur. Every parent of the children gave the willingness to participate in the study; 10 children were already diagnosed as having RDs, whereas the remaining 10 children were age-matched typically developing children. The results indicated that children with reading disability scored poor on the FRTVMI than the typically developing age-matched peer-group children. The results support the impairment in visual-motor integration is strongly related to learning disabilities, and the therapist should educate teachers of primary schools to refer children with learning disabilities. However, there is a need for strong assessment among children's to quantify their skills in reading and writing, and it is vital to diagnose children in the early years to avoid academic failures. Teachers were in need to be educated to refer children who are suspected of being at risk for RDs in school settings.

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INTRODUCTION

In Mudichur village, where there are few of occupational therapists in regular practice, and an educational psychologist and special educators ([Brown et al., 2003](#)) conducted a majority of the assessment procedure and evaluation of children with visual-motor integration (VMI). They consider assessing children with VMI as similar to the assessment of children with research instruments, and the availability of the trained occupational therapist was limited. It is problematic for the parents of children to identify their child's needs and to approach treatment options ([Dewey et al., 2000](#)). VMI is gener-

ally expressed as the ability of the child to integrate visual perception input and to coordinate it with limb movements for the execution of motor activities in sequential order. A child with impaired VMI skills fails to execute motor-based activity (Harri-son, 2005). VMI skills were pre-requisite to enable a child to coordinate the visual input with the motor task. For example, in a ball catching skill, a child is instructed to catch an approaching ball towards him/her. First, the child has to perceive the input of the size of the ball, speed and direction of approaching ball later the child have to convert the input into motor action (Kooistra *et al.*, 2005).

He/she have to move his bilateral hands and foot to run and move towards the approaching ball and catch it with his stretched hands. Hence, VMI enables a child to complete the motor task in a skillful manner (Portney and Watkins, 2009). Children with reading disability experiences trouble with VMI and visual perception. VMI problems result from atypical brain functioning, and atypical information processing is the typical problem experienced by children with reading disability. VMI is essential to execute a legible handwriting task, performing building blocks games as well as to complete academic activities with adequate speed (Rosenblum *et al.*, 2010). Therefore, occupational therapist should consider using assessment tools to evaluate the Childs mental processes, and there is a need to evaluate which areas of cognitive defect is associated with academic achievement of children. Given such a lack of comprehensive assessment of cognitive processes in the assessment at Mudichur village, we aim to examine VMI in children with and without RDs.

MATERIALS AND METHODS

We included ten children with RDs and ten randomly selected normally developing children from the primary schools at Mudichur village. However, socioeconomic data are not documented as the primary schools were located to be in middle-class regions and low-class families. Primary schools offer an education system based on the institutional curriculum design and children with a reading disability were referred for the study from the therapy heads of the various special schools. A special educator was involved in the study, and she educates the parents of children with RD to participate in the study as the study focuses on only positive aspects.

Parents of children with and without RD were signed a written informed consent form and were eligible for drop-out at any time during the intervention sessions. Every child with a reading disability

was undergoing 8 hours of extra support for learning mainly for reading by the special educator. The selected participants were predominantly English and Tamil-speaking children. Based on the eligibility criteria, children were included in the RD group. He/she should have a record of poor academics in schools. He/she should be having any sensory problems, and these children should have poor achievement after receiving intensive academic support and children with RDs were recruited based on their inadequate performance on the curriculum-based tests which assessed their reading and writing skills.

The FRTVMI a recent revision of the Test of Visual-Motor Integration (TVMI) and was designed to assess the capability of children to reproduce the visual stimuli using motor response. The age range of the FRTVMI's child norms is five years to 10 years 11 months. The FRTVMI contains 18 geometric items that are given to the children in a booklet, that consists of 7 pages. Each page contains six figures in boxes. Each child is instructed to copy the design in the booklet. Factors which affects the performance of the child include his/her age, ability to draw, length of test and the speed of completing the test. Booklet also contains demographic information. Data were analyzed after completion of the test items, and results were interpreted.

RESULTS AND DISCUSSION

According to Table 1, typically developing children performed higher on the FRTVMI (M= 6.5) than did the children with RDs (M= 4.3). We examined the differences in VMI between children with and without RDs. Children with RDs scored poor on FRTVMI test as compared to typically developing children. By observation, we suggest that gender did not influence the children's performance on the FRTVMI. Previous researchers have concluded that children with RD have defects in phonological awareness and that influences their learning process. But there are other factors which play a major role in the learning process. Ability to complete most visual/motor activities at an adequate speed requires VMI. School teachers can quickly identify children's with VMI dysfunction, as they have poor handwriting. Which is often messy and unable to read as well as to copy, and they experience difficulty in playing games using blocks and using puzzle (Schneck, 2010). Few activities of the daily living task require VMI skills, tasks like fastening buttons in a shirt is easily acquired and done by typically developing age-matched peer group. Still, children with VMI dysfunction experiences trouble to perform the simple ADL events (Silver *et al.*, 2008).

Table 1: Descriptive data.

Condition of children	Gender	N	Mean	SD
Typically developing children	Male	7	5.3	3.3
	Female	3	4.3	3.2
	Total	10	6.5	3.4
Children with reading disability	Male	8	3.6	3.5
	Female	2	2.7	3.0
	Total	10	4.3	3.5

However, all these characteristics were commonly found in children with reading disability. In primary school settings, there is a need for an occupational therapist as well as special educators to examine the developmental skills in reading, writing, spelling, solving mathematics. However, analyzing the child's memory, attention and VMI plays an important role (Sankar and Monisha, 2019b). In Mudichur village, three primary schools were evaluated, and it is documented that they will not rely on such assessment techniques to examine the child. At the same time, scoring of the child in academics is taken into consideration. Thus, without a good assessment, teachers and parents were not clear about their child's defects, and honestly, they will not understand the cause of the child's academic difficulties. As a result, their parents fail to provide appropriate supports to enhance their child's academic performance (Sankar and Monisha, 2019a).

Academic difficulties exist in many children, and the reason is not specific. Many factors underlie academic difficulties, and when evaluating children with LD and Reading disabilities, there is a need to analyze cognitive functions. Previous researchers have documented that reading disability is related to impairment in cognitive processes (Harrison et al., 2008). There is less Agreement by researchers that defect in phonological awareness was not related to learning. Reading skill is not only related to visual input, but it also related to the linguistic process. However, other factors may also play a role. During the assessment, it is mandatory to teach examination of visual and other related processes to conclude the factors that hinder the child's learning and reading skill (Hecht et al., 2001).

CONCLUSIONS

The study suggests that children with RDs have impaired VMI, and all their visual-motor abilities were impaired. These children suffer from difficulties in perceiving and producing sensory-motor information in rapid succession. Further, studies using large sample size is needed to validate the

findings.

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Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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