Utility of the Wechsler Intelligence Scale for Children (IVth Edition) in the assessment of Children with Neurodevelopmental Disorders – A Case Series

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ABSTRACT

Neurodevelopmental disorders (NDD) are characterized by early-onset deficits of variable severity in personal, social, academic, or occupational functioning. Although the spectrum of NDD is heterogeneous, intellectual impairment is an important component of most children with NDD. Comprehensive psychological assessments using standardized intelligence tests are required to assess intelligence. This paper describes the profile of four children with different neurodevelopmental disorders and the utility of the Wechsler Intelligence Scale for Children (4th edition) in their evaluation. Understanding the profile of children with NDD is important in providing the optimal learning and behaviour interventions required for these children.

Key words: Neurodevelopmental disorders, Wechsler Intelligence Scales for children, profile of intelligence

INTRODUCTION:

Neurodevelopmental disorders, according to the Diagnostic and Statistical Manual of Mental Disorders 5th edition (DSM-5) (1), are characterized by early-onset deficits of variable severity in personal, social, academic, or occupational functioning. The neurodevelopmental disorders include intellectual disability, communication disorders, autism spectrum disorder, attention-deficit/hyperactivity disorder, neurodevelopmental motor disorders and specific learning disorder (2)

Intelligence integrates cognitive functions such as perception, attention, memory, language and planning (3). On the basis of this definition, intelligence can be reliably measured by standardized tests. Since impairment in intellectual functioning is often an important component of neurodevelopmental disorders, formal assessment of intelligence is warranted in these children.

The commonly used intelligence tests in Indian children include the Binet Kamat Intelligence test, Stanford-Binet Intelligence Scale, Wechsler Intelligence Scale for Children (WISC), Malin's Intelligence Scale for Indian Children and the Wechsler Preschool and Primary Scale of Intelligence (WPPSI).

The Wechsler Intelligence Scale – Fourth edition

(WISC-IV) provides an overall measure of general cognitive ability (known as Full Scale Intelligence Quotient – FSIQ), and also measures intellectual functioning in Verbal Comprehension (VC), Perceptual Reasoning (PR), Working Memory (WM) and Processing Speed (PS). The VC, PR, WM, and PS subscales provide scores for the Verbal Comprehension Index (VCI), the Perceptual Reasoning Index (PRI), the Working Memory Index (WMI), and the Processing Speed Index (PSI) respectively. Together, the VCI, PRI, WMI, and PSI provide the overall level of intelligence, or Full Scale IQ (4). The Fourth edition of the WISC (WISC-IV) has norms of Indian children and is culturally appropriate.

This article describes how assessment using the WISC–IV complemented diagnosis and therapeutic planning in four children with neurodevelopmental disorders

Case History 1:

Master Adil (name changed), 9-year-old boy, was one of twins and was born with a birth weight of 2.5 kg. He was referred with complaints that he was slow in reading and writing, had frequent omissions while reading, missed punctuation marks and disorganized in that he could not write between lines. He underwent a detailed psychological assessment. The Full scale IQ on the WISC-IV was 60. But significant difference was observed between verbal comprehension index (72) and perceptual reasoning index (49) (Figure 1A).

Because of the lower perceptual reasoning index (PRI), visual impairment was suspected. The detailed visual assessment showed that although the vision was 6/6 with spectacles, he had difficulties in crowded spaces, locating objects in a clutter and reading and copying from the blackboard. Lower visual field inattention was also suspected. With these clinical findings Cerebral Visual Impairment was considered (5). His neurologic examination was normal.

MRI showed evidence of periventricular leukomalacia (PVL) (Figure 1B). which is a well-known cause of cerebral visual impairment.

The final diagnosis was Cerebral Visual Impairment with Learning Disability. With few simple suggestions which addressed his visual difficulties his scholastic performance improved considerably.

Case History 2:

Master Benny (name changed) 14 years 6 months old, was brought with difficulties in reading, poor reading comprehension and writing difficulties. On observation, he was hesitant to read out loud and had to read multiple times to comprehend what he read. There were spelling errors, difficulties in writing between lines and poor paragraph delineation. On examination, Benny was a very pleasant and attentive boy, with normal neurological findings

On the WISC-IV, the scores were as follows: Verbal Comprehension Index – 90, Perceptual Reasoning Index -100 Working Memory Index - 98, Processing speed Index -109 and Full-Scale IQ -97. Since all of were within the average range (90-110), his intelligence was normal. Because the predominant academic difficulties an achievement test - the Wechsler Individual Assessment Test – Third edition (WIAT- III) was done.

The main difference between the WISC and the WIAT is that the former assesses intelligence while the latter is used to assess academic performance. The WIAT assesses the individual's abilities in Reading, Written Language, Mathematics, and Oral Language and is useful in planning academic interventions. His scores on the different domains of the WIAT-III were as follows. In Oral Language (OL) he scored 91 which was average, in Basic Reading (BR) he scored 82 (below average), Total Reading (TR) he scored 81 (below average), in Reading Comprehension and Fluency (RC) he scored
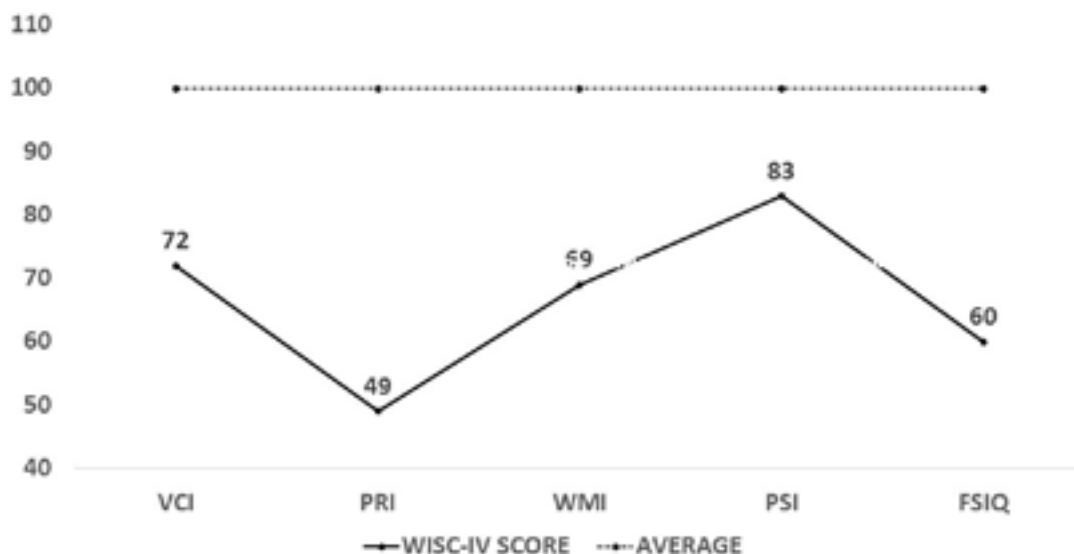
Figure 1A Difference between VCI and PRI in child with Cerebral Visual Impairment

79 (below average) and in Written Expression (WE) he scored 87 (below average). He was above average in his math abilities (102) and in Listening Comprehension (LC) - 105. His profile showed a significant difference between his cognitive ability assessed by the WISC–IV and his reading and writing abilities assessed using the WIAT - III (Figure 2). This discrepancy was indicative of specific learning disability (SLD) in Reading or Dyslexia.

Ability – achievement discrepancy (6) implies that discrepancy between cognitive development usually measured by IQ test (such as the WISC) and academic achievement (assessed using an academic test like the WIAT) is indicative of specific learning disability.

Specific interventions to improve his reading were suggested and he was able to obtain the appropriate concessions required to complete his Board examinations successfully.

Case history 3:

Master Chandran (name changed) was diagnosed to have Autism at four years of age and was on regular developmental monitoring. He was a verbal child, able to converse with strangers,
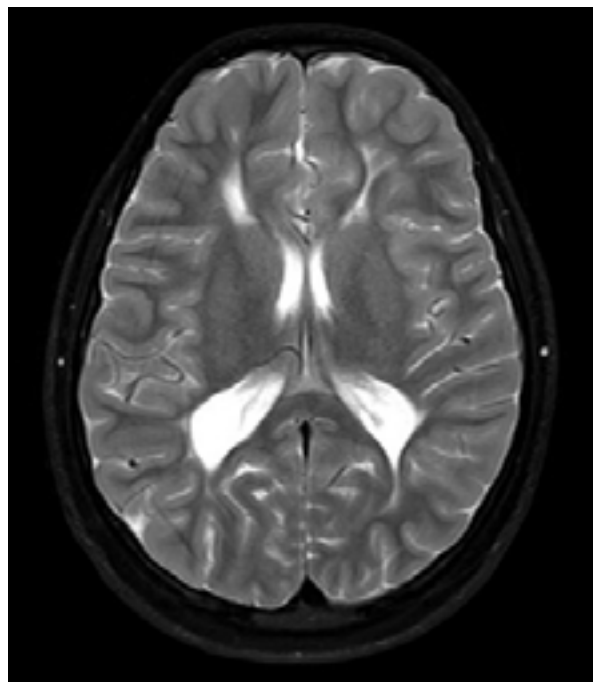

Figure 1B Periventricular leukomalacia - MRI showing posterior ventricular hyperintensities and squaring of ventricles
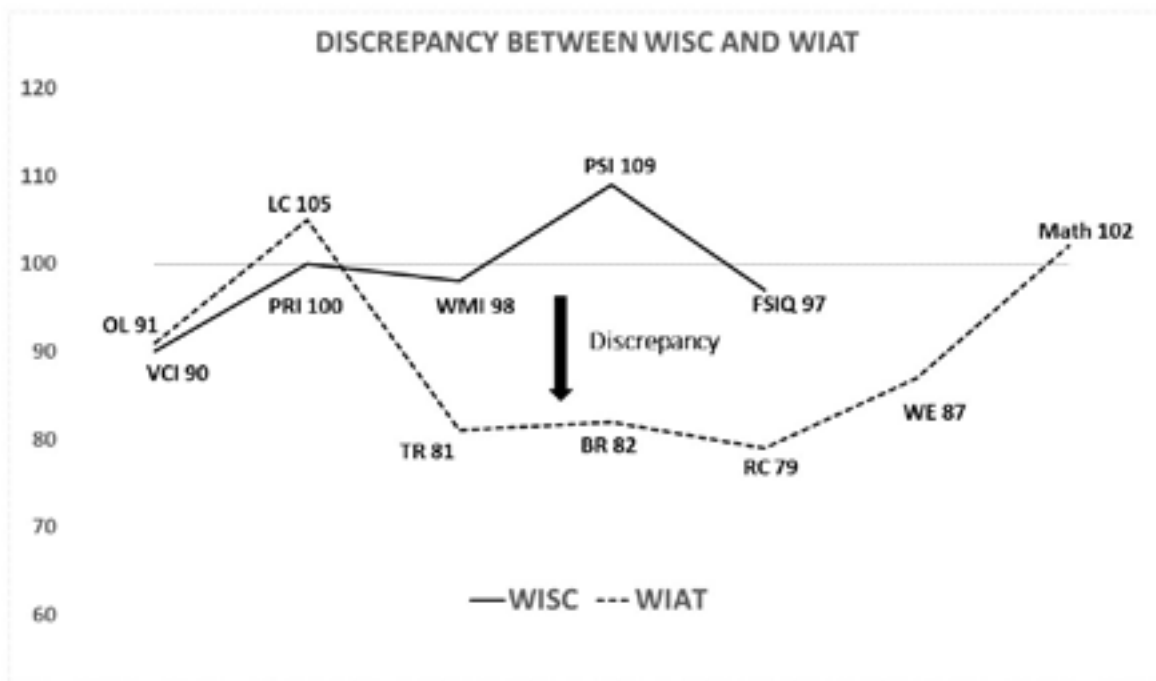
Figure 2 Discrepancy between WISC and WIAT scores in a child with Dyslexia

independent in all his activities of daily living and was attending normal school. He had difficulties with understanding emotions, had repetitive self-talk and struggled with abstract ideas and theory of mind concepts. The diagnosis of autism was confirmed by the Autism Diagnostic Observation Schedule (ADOS-2).

The Wechsler Intelligence Scale for Children IV was done at two time periods (7 years 9 months and 13 years 2 months) to understand his cognitive profile and to plan learning interventions. On both occasions the full scale IQ was in the Average range but there was a significant difference between the Perceptual Reasoning Index (PRI) and Verbal Comprehension Index (VCI) (Figure 3).

Children with ASD are known to have very good visual skills and superior skills in non-verbal concept formation, visual reasoning, visual perception and organization. Expectedly his PRI was high average on both occasions. Children with autism have significant difficulties in verbal abilities and communication, and this was obvious in the lower VCI. While doing the perceptual and visual tasks on the WISC he had good and sustained attention. But during the tests of vocabulary and comprehension and while in answering questions, he was easily distracted.

Discrepancy between verbal comprehension index (VCI) and perceptual reasoning index (PRI) is a characteristic profile in children with autism (7). With consistent learning intervention his scores improved with time as shown in Figure 3, but the discrepancy between the PRI and VCI have remained.

Case History 4:

Master Nithin (name changed), was a boy with mild diplegic cerebral palsy (Gross Motor Functional Classification Scale Level I) because of prematurity and low birth weight. There was some delay in attaining his early developmental milestones. With time he improved significantly and was attending regular school. However, the teachers expressed concerns about his scholastic performance – difficulties in copying from
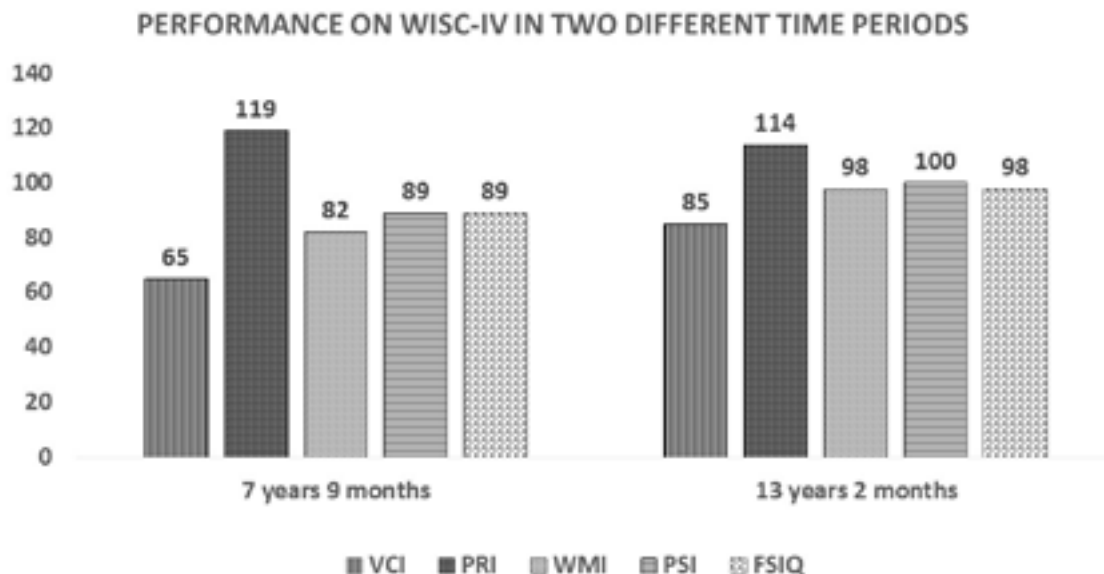
Figure 3 Profile of the child with autism on the WISC at different time periods

the board, slow in writing, poor handwriting and reading difficulties. MRI brain showed periventricular white matter hyperintensities and prominent lateral ventricles with undulated margins suggestive of periventricular leukomalacia (similar to the first child's MRI shown in Figure 1B). Neurologic examination revealed mild spasticity in his lower limbs. He was also detected to have some features of Cerebral visual impairment.

The profiles on the WISC-IV done at two time points (14 years 7 months and 15 years 11 months) (Figure 4) were similar. While doing the WISC-IV it became obvious that he had difficulties in visual-spatial organization, motor coordination, took a long time to identify pictures and symbols and there was a lot of over-writing. His strength was his verbal abilities and the VCI remained consistently higher than the other indices. This profile could be explained by the mildly increased tone of his upper limbs and the mild visual impairments because of his cerebral visual impairment. He was able to obtain concessions from the school for his writing (having a scribe and extra time for answering) and successfully completed his board examinations. Nithin's profile was consistent with other studies which have shown that the verbal abilities of spastic diplegic children are much better than their performance abilities (8).

Discussion:

Assessment of the intelligence using standardized IQ tests is an important component of the overall assessment of a child with neurodevelopmental disorder. Besides evaluating the presence of intellectual disability, the IQ assessment is also used to communicate the patterns of strength and difficulties to parents in order to provide support that is personalized to the child's cognitive ability. Evaluators typically use the Full scale IQ (FSIQ) to report the overall intellectual ability. However, children with neurodevelopmental disorders vary in their profiles and the FSIQ may not give the complete picture of the child's strengths and deficits(9).

Conclusion:
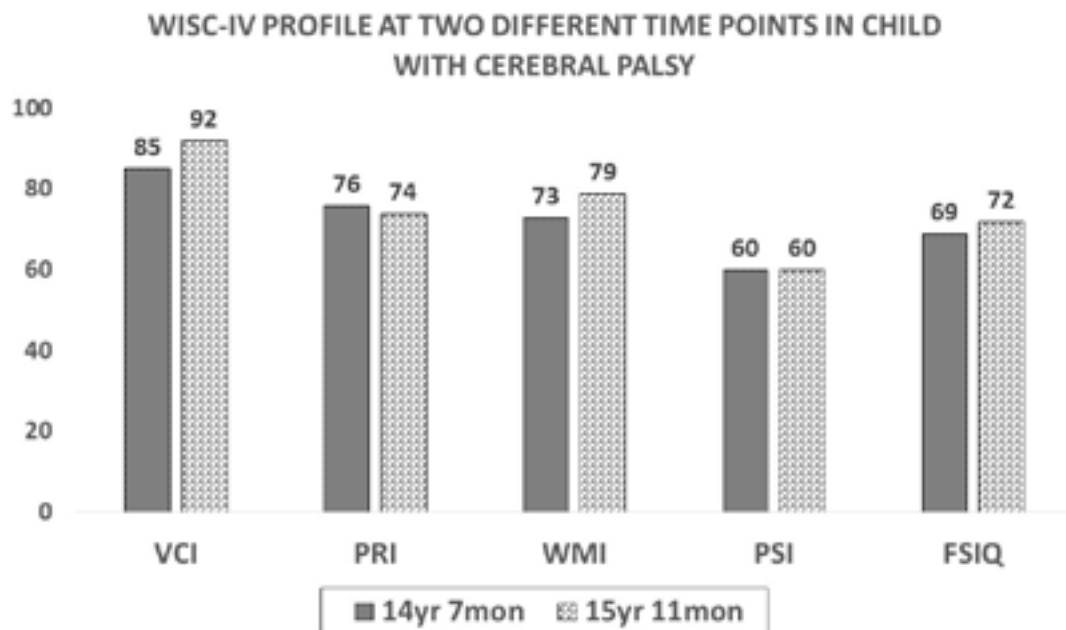
As presented through the above case histories,

Figure 4: WISC-IV profiles of child with cerebral palsy at two different time points.

detailed assessment of the different subscales of the WISC-I can provide information in establishing the diagnosis in children with neurodevelopmental disorder. This can also help in planning interventions specific to each child's educational needs.

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