

## **Specific Learning Disability: The Invisible Handicap**

For over 100 years it has been recognized that seemingly normal children can have impairment of learning to read and write (1). In 1886, Morgan described a 14-year-old boy who was bright and intelligent, but had great difficulty to read, and termed this syndrome as “congenital word blindness”(1). However, it was not until 1962 that Kirk first used the term “learning disabilities”(2).

### **Definition and prevalence**

Specific learning disabilities (SpLD) is a generic term that refers to a heterogeneous group of neurobehavioral disorders manifested by significant unexpected, specific and persistent difficulties in the acquisition and use of efficient reading (dyslexia), writing (dysgraphia) or mathematical (dyscalculia) abilities despite conventional instruction, intact senses, normal intelligence, proper motivation and adequate socio-cultural opportunity(3,4). The term SpLD does not include children who have learning problems which are primarily the result of visual, hearing, or motor handicaps, of subnormal intelligence, of emotional disturbance, or of socio-cultural disadvantage(5,6). Although, still a matter of debate, this exclusionary definition was adopted by the diagnostic and statistical manual of mental disorders (DSM-IV) and the international classification of diseases (ICD-10), classification of mental and behavioral disorders(5,6).

SpLD are intrinsic to the individual, presumed to be due to central nervous system dysfunction, and are chronic life-long

conditions(3,4). Children with SpLD fail to achieve school grades at a level that is commensurate with their intelligence. The same dysfunctions that interfere with normal learning processes also impact on self-image, peer and family relationships, and social interactions(3,4).

Dyslexia (or specific reading disability) is the most common and most carefully studied of the SpLD, affecting 80% of all those identified as learning-disabled(4). The incidence of dyslexia in school children in USA ranges between 5.3-11.8(7). Although previously it was believed that dyslexia affects boys primarily, recent data indicate that boys and girls are affected equally(3,4). The earlier male preponderance has been attributed to a referral bias in school-identified children(8).

### **What causes dyslexia?**

There is no one single unified theory that explains the etiology of dyslexia. Recent functional MRI (fMRI) brain studies indicate that the disorder may be caused by specific deficits in the left frontotemporal region or atypical asymmetries in the left perisylvian regions(9).

However, substantial evidence has established that the children with dyslexia have deficits in phonologic awareness, which consistently distinguish them from those who are not reading-impaired(9). The functional unit of the phonologic module is the “phoneme”, defined as the smallest discernible segment of speech; for example, the word “cat” consists of three phonemes: /c//ae/ /t/ (cuh, aah, tuh). According to the “phonologic-deficit hypothesis”, children with dyslexia have difficulty developing an awareness that words, both written and

spoken, can be broken down into smaller units of sound and that; in fact, the letters constituting the printed word represent the sounds heard in the spoken word(9). Recent genetic linkage studies have implicated loci on chromosomes 6 and 15 in dyslexia(10).

### **Importance of early diagnosis of SpLD**

Preschool identification of SpLD remains extremely difficult(3,4). Also, currently the diagnosis of SpLD cannot be conclusively made until the child is in the third grade, or about eight to nine years old(3,4). A history of language delay, or of not attending to the sounds of words (trouble playing rhyming games with words, or confusing words that sound alike), along with a family history, are important red flags for dyslexia(4). It is important to identify SpLD early, rather than when chronic poor school performance and its attendant emotional sequelae ensue. The longer children with SpLD, at any level of severity, go without identification, the more difficult the task of remediation and the lower the rate of success(3,4).

To ensure that no child loses out in life due to this invisible handicap, an evaluation for SpLD should be considered for all children presenting with learning problems at school.

### **How to diagnose SpLD?**

Proper diagnosis of SpLD involves a multidisciplinary approach by a team of specialists, *viz.*, the Pediatric Neurologist, Counselor, Clinical Psychologist, Special Educator and Child Psychiatrist(3). Firstly, audiometric and ophthalmic examinations are done to rule out hearing and visual deficits, as they are common causes of poor school performance(3).

The Pediatric Neurologist takes a detailed clinical history and does a thorough physical examination to exclude medical causes, *e.g.*, hypothyroidism, chronic lead poisoning; and

neurological causes, *e.g.*, cerebral palsy, Wilson's disease; and to identify behavioral causes, *e.g.*, attention deficit hyperactivity disorder (ADHD), depression, conduct disorder, or oppositional defiant disorder, of poor school performance. Although the physical examination helps in detecting rare conditions that are known to be associated with SpLD, *e.g.*, Turner syndrome, neurofibromatosis, in overwhelming majority of children with SpLD it is normal. There are no pathognomonic neurological findings in children with SpLD, although there may be mild asymmetries of tone, and presence of soft neurological signs, *e.g.*, difficulty in standing on one foot, excess overflow movements with rapid alternating movements and finger nose pointing, difficulty with left-right orientation, graphesthesia, and finger identification(3).

The Counsellor rules out whether any environmental deprivation due to poor home or school environment, or any emotional problem due to stress at home or at school, is primarily responsible for the child's poor school performance(3).

The Clinical Psychologist conducts the standard intelligence test *viz.*, Wechsler Intelligence Scale for Children test to determine that the child's intellectual functioning is normal. This helps to exclude borderline intellectual functioning and mild mental retardation, conditions which cause poor school performance(3,4).

The Special Educator assesses the child's academic achievement by administering standard educational tests (*e.g.*, Wide Range Achievement Test, Peabody Individual Achievement Test, Woodcock-Johnson Tests of Achievement, Schonnel Attainment Test, Curriculum Based Test) to assess the child's performance in areas such as reading, spelling, written language, and mathematics. An academic achievement of two years below the

child's actual school grade placement or chronological age is considered diagnostic of SpLD (3,4).

The Child Psychiatrist plays an important role in confirming the diagnosis of ADHD, a co-morbid condition found in 12-24% of children with SpLD (3,4). Also, the Child Psychiatrist is needed to confirm diagnosis of other conditions which cause poor school performance, *viz.*, "isolated" ADHD, depression, conduct disorder, and oppositional defiant disorder.

Cranial CT/MRI scan, electroencephalogram, and blood tests (*e.g.*, vitamin B<sub>12</sub>/folate levels, thyroid hormone levels, lead levels) are not necessary for diagnosing SpLD (3).

### Management of SpLD

The cornerstone of treatment of SpLD is remedial education, which should ideally begin early, when the child is in primary school (3,4). Using specific teaching strategies and teaching materials, the Special Educator formulates an Individual Education Program to reduce, eliminate or preclude the child's deficiencies in specific learning areas such as reading, writing and mathematics identified during the child's educational assessment. The child has to undergo remedial education sessions twice or thrice weekly for a few years to achieve academic competence (11). During these sessions the child undergoes systematic and highly structured training exercises to learn that words can be segmented into smaller units of sound (phoneme awareness), and that these sounds are linked with specific letters and letter patterns (phonics) (4,11). The child also requires practice in reading stories; both to apply newly acquired decoding skills to reading words in context and to experience reading for meaning (4).

The management of SpLD in the more

time-demanding setting of secondary school is based more on providing provisions (accommodations) rather than remediation (3,4). These provisions, *e.g.*, exemption from spelling mistakes, availing extra 30 minutes for all written tests, dropping a language and substituting it with work experience, dropping algebra and geometry and substituting them with lower grade of mathematics and work experience, are meant to help the child cope up in a regular mainstream school (3,4).

If the child has associated ADHD, psychiatric consultation for counseling and/or stimulant medication, such as methylphenidate, is necessary (3,4).

### Important role of pediatrician

Every pediatrician can facilitate early detection of SpLD by: (i) enquiring about the child's school performance during a consultation, and (ii) guiding the parents for getting their child's psychoeducational assessment done, when SpLD is suspected. It is well known that favorable outcome of SpLD is dependent on a supportive home and school environment (3,4). The pediatrician should therefore counsel the parents and class teacher of a child with SpLD about the need for remedial education and provisions, and monitor the child's academic progress on a long term basis.

Parents of a child with SpLD may consult the pediatrician about the utility of unconventional therapies such as optometric training, eye muscle exercises, tinted colored lenses, anti-motion sickness medication for vestibular dysfunction, sensory integration therapy, chiropractic manipulation, megavitamin therapy, or sucrose-restricted diet; and of complementary medicine (homeopathy, ayurvedic) to treat their child's disability. None of these have proved to be effective when subjected to double-blind controlled clinical trials (12). The pediatrician can help

parents become better-informed consumers.

### **Outcome of SpLD**

The outcome in a child with SpLD depends on the severity of the disability, the age or grade when remedial education is started, the length and continuity of treatment, presence or absence of associated emotional problems, and parental and school supports(3,4). With appropriate remedial education and provisions, most children with SpLD can be expected to achieve academic competence and complete their education in a regular mainstream school(3,4). However, some children are still unable to cope up and need to continue their education in special schools (3,4).

### **Future prospects**

It is hoped that future progress in genetics will allow identification of genetic markers for risk of dyslexia, and ongoing neuroimaging studies (fMRI and positron emission tomography (PET) method with 15O radiotracer) in children and adults with dyslexia will help unravel its etiology(13,14). Tests to identify children "at risk for dyslexia" at the time of school entry are being developed, and these would help in its early intervention(15,16).

### **Indian scenario and our experience**

Information about SpLD occurring in Indian children is scanty. The incidence of dyslexia in primary school children in India has been reported to be 2-18%, of dysgraphia 14%, and of dyscalculia 5.5% (17-19). However, awareness that SpLD is an important cause of academic underachievement has recently increased.

Since the early 1990's, the national Educational Boards which conduct the Indian Certificate of Secondary Education (ICSE) and the Central Board of Secondary Education (CBSE) examinations; and the State

Governments of Maharashtra, Tamil Nadu and Karnataka have formally granted children with SpLD the benefit of availing the necessary provisions from standard I to XII. It is mandatory for the school authorities to provide these provisions to a child with SpLD. However, these provisions are not yet available to many children with SpLD in our country; and especially to those who are studying in vernacular medium schools, for non-availability of standardized psychological and educational tests.

In a recent study carried out at our clinic, there was an increase of 22% in the mean total marks obtained by children with SpLD who availed provisions at the Secondary School Certificate (SSC) examination. Their mean total marks increased from 43% before diagnosis of SpLD to 65% after availing provisions (unpublished data). Improved academic outcome also resulted in increased confidence and self-esteem in these children.

Children with SpLD who continue to experience academic failure in spite of remediation and provisions need to attend special schools accredited by the National Institute of Open Schooling (NIOS), an autonomous organization by the Ministry of Human Resource Development, Government of India (website-<http://www.nos.org/>).

Education is one of the most important aspects of human resource development. There is an urgent need in our country to increase awareness of this invisible handicap and develop centers for its proper assessment and accurate diagnosis. Pediatricians, educators, counselors, and psychologists in our country should join hands for this noble educational cause.

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