Prevalence of specific learning disability among schoolchildren between 8 and 12 years

Neetu Sharma¹, Prakash Petchimuthu², Ajay Gaur³, Ranjeet Kumar⁴

From ¹Associate Professor, ²Post Graduate, ³Professor and Head, Department of Pediatrics, G. R. Medical College, ⁴Assistant Professor, Department of Clinical Psychology, Gwalior Mansik Arogyashala, Gwalior, Madhya Pradesh, India

Correspondence to: Dr. Prakash Petchimuthu, Department of Pediatrics, Kamla Raja Hospital, G.R. Medical College, Gwalior, Madhya Pradesh, India. E-mail: procksmmc07@gmail.com

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ABSTRACT

Background: Specific learning disability (SLD) is known to cause a great amount of psychological and mental stress to the children and their parents. Objectives: To find out the prevalence of SLD among children in Gwalior and to find out the risk factors associated with SLD. Method: This cross-sectional study was conducted between 2016 and 2017 in two government and two private schools of Gwalior. A total of 800 students from the 3rd to 6th standard were included in the study. The details of every student were filled in a pro forma which included their academic performance. Based on this, last 10% of the low-performing students from each class were recruited and they were subjected to visual, hearing, IQ assessment, and NIMHANS index for SLD. Results: A total of 23 students were identified as having SLD, with a prevalence of 2.87%. The most common type was combined type (dyslexia and dyscalculia). The prevalence of arithmetic disability was found to be around 2.25%, reading disability was 2.5%, and that of writing disability was around 1.37%. The mean age of students diagnosed as SLD was 9.8. Among the learning-disabled students, 19 students (82%) were having only one sibling. SLD was diagnosed mostly in class IV students (p=0.023). Among SLD students, a history of prematurity was found in 11 students (48%), low birth weight in 13 students (57%), and head trauma in 13 students (57%) with SLD. Among SLD students, 7 were having attention-deficit hyperactivity disorder (ADHD). No students were identified as having ADHD in the remaining students and it was highly significant (p<0.001). Conclusion: The prevalence of SLD was 2.87%, with the most common type being combined type. The antenatal risk factors associated with SLD were prematurity, low birth weight, and a history of head trauma. The most common comorbid condition associated with SLD was attention-deficit hyperactivity disorder.

Key words: Attention-deficit hyperactivity disorder, NIMHANS index, Prevalence, Specific learning disability
the schools of the city, 2 government schools and 2 private schools were randomly selected. A total of 800 students studying in the 3rd-6th standard were recruited in the study. Out of these, the low-performing students were identified by collecting the academic records and the last 10% of low-performing students from each class were included in the study. Children with visual and hearing impairments, intellectual disability (IQ<80), and chronic medical conditions on medication were excluded from the study.

After initial assessment, those low-performing students were subjected to visual and hearing assessment in the pediatric outpatient department of the institution. Those students who do not have visual and hearing impairment were subjected to intelligence testing (IQ score) by using Malin’s intelligence scale for Indian children [8], which is an Indian version of Wechsler Intelligence Scale for Children, designed for children aged 6–15 years. Those students with IQ score <80 were excluded and the remaining students were subjected to NIMHANS index for SLD [9]. It can be applied to children aged 5–12 years. If a child’s performance was 2 classes below what was expected for him/her, the diagnosis of SLD was made. The test–retest reliability showed a high significant correlation (0.53).

All the relevant demographic details were filled in a predesigned student pro forma. Analysis was done with (SPSS Inc, IBM, UK). Descriptive and frequency analyses were done. Prevalence was calculated according to the following formula: prevalence=number of cases identified/number of students in the study population ×100. Comparison was made by Chi-square test. p<0.05 was considered statistically significant.

### RESULTS

Out of the total 800 students, 2 students had hearing difficulty (>60 db loss) and 2 students were visually impaired (>6/18) and one student had IQ score <80, so they were excluded from the study. In the remaining 795 students, 23 students were identified as having SLD, suggesting a prevalence of 2.87%, and 5 students were found to have learning difficulties. The demographic profile of the students is shown in Table 1. Out of 23 children with SLD, 15 (65.2%) were male and 8 (34.7%) were female, with a male-to-female ratio of 1.8:1. SLD was identified mostly in Class IV students. No significant association was found with consanguinity and there was no history of SLD in the family members.

Antenatal risk factors and details of family history are summarized in Table 2. Among students diagnosed with SLD, history of maternal infections, birth asphyxia, and previous hospitalization history were found to be not significant. Among the antenatal and postnatal factors, prematurity (p<0.001), low birth weight (p<0.001), and history of head trauma requiring hospital admission (p<0.001) were found to be statistically significant.

Different subtypes of SLD found in the study population are shown in Table 3. The most common subtype was combined type (87%), and the most common combination was dyslexia and dyscalculia (39%). There were no isolated cases of dysgraphia and dyscalculia. On comparing the relation between SLD and attention-deficit hyperactivity disorder (ADHD), 7 out of 23 students were having ADHD, while no child was having ADHD in whom SLD was absent (p<0.001). Out of 7 students

### Table 1: Demographic profile of students with SLD

| Variables          | Categories | Sld present | Sld absent | Chi-square value | p value |
|--------------------|------------|-------------|------------|------------------|---------|
| Age (mean)         |            | 9.8         | 9.5        | 2.416            | 0.120   |
| Sex                | Male       | 15          | 379        | 0.855            | 0.355   |
|                    | Female     | 8           | 398        |                  |         |
| School             | Government | 14          | 397        | 0.367            | 0.545   |
|                    | Private    | 9           | 380        |                  |         |
| Class              | III        | 2           | 191        | 9.526            | 0.023   |
|                    | IV         | 10          | 196        |                  |         |
|                    | V          | 9           | 193        |                  |         |
|                    | VI         | 2           | 197        |                  |         |
| Language           | Hindi      | 13          | 409        | 0.135            | 0.713   |
|                    | English    | 10          | 368        |                  |         |
| Birth order        | First      | 13          | 317        | 1.05             | 0.0814  |
|                    | Second     | 7           | 253        |                  |         |
|                    | Third      | 3           | 207        |                  |         |
| No of siblings     | One        | 19          | 351        | 4.56             | 0.048   |
|                    | Two        | 3           | 237        |                  |         |
|                    | Three      | 1           | 189        |                  |         |
| Consanguinity      | Consanguineous | 8          | 225        | 0.367            | 0.545   |
|                    | Non-consanguineous | 15      | 552        |                  |         |
| Family history of SLD | Present | 0           | 0          | Na               | NA      |
|                    | Absent     | 23          | 777        |                  |         |

SLD: Specific learning disability

Vol 5 | Issue 5 | May 2018

Indian J Child Health 356
Table 2: Antenatal and postnatal risk factors in students with SLD (from parents)

| Variables (past history of‑) | Category | SLD present | SLD absent | Chi-square value | p value |
|-----------------------------|----------|-------------|------------|-----------------|---------|
| Maternal infection during pregnancy | Yes | 3 | 28 | 0.534 | 0.451 |
|                             | No      | 20 | 749 |             |         |
| Birth asphyxia               | Yes     | 3 | 47 | 1.865 | 0.172 |
|                             | No      | 20 | 730 |             |         |
| Prematurity                  | Yes     | 11 | 75 | 33.92 | <0.001 |
|                             | No      | 12 | 702 |             |         |
| Low birth weight             | Yes     | 13 | 58 | 66.47 | <0.001 |
|                             | No      | 10 | 719 |             |         |
| Head trauma                  | Yes     | 13 | 42 | 91.16 | <0.001 |
|                             | No      | 10 | 735 |             |         |
| Previous hospitalization     | Yes     | 6  | 137| 1.08  | 0.297  |
|                             | No      | 17 | 640 |             |         |

**SLD: Specific learning disability**

| Combined types                | SLD present (%) |
|-------------------------------|-----------------|
| Combined reading and writing disorders | 2 (8.6) |
| Combined reading and arithmetic disorders | 9 (39.1) |
| Combined writing and arithmetic disorders | 3 (13) |
| Combined reading writing and arithmetic disorders | 6 (26.08) |
| Isolated reading disorders    | 3 (13) |
| Isolated writing disorders    | 0 (0) |
| Isolated arithmetic disorders | 0 (0) |

**SLD: Specific learning disability**

with ADHD, 5 had inattentive-type ADHD and 2 students had hyperactive-type ADHD.

**DISCUSSION**

In our study, the prevalence of SLD was estimated to be 2.87%. This rate was higher than that found in a study done by Arun et al. (1.58%) [4], while it was lower than the studies done by Mogasale and Patil (15%) [6]. This difference may be due to difference in the selection of tools and study setting. SLD was more in male students (ratio 1.8:1), which was in concordance with the earlier studies done by Bandla et al. [5] and Karande et al. [10]. In our study, students identified with SLD were more from government schools than private schools, which was found to be significant by Gafoor [11]. The number of SLD students studied in Hindi medium was higher than those studied in English medium. Similar results were obtained by Danda and Jagawat also [12]. This could be explained by the fact that parents of poorly performing children prefer Hindi-medium schools (mostly private). SLD was diagnosed mostly in Class IV students (younger students) and similar results were obtained by Arun et al. [4].

All subtypes of SLD were found mostly in students with birth order one as shown by Danda and Jagawat also [12]. Studies have found that students, who had less number of siblings and living in a nuclear family, had more chances of SLD [12]. Similar results were found in our study also, and SLD was more common in students with one sibling (p=0.048). In our study, we could not find a relation with consanguinity and family history of SLD. On the contrary, Bandla et al. [5] and Gross-Tsur et al. [13] found a strong evidence of family history, in parents and first‑degree relatives in students diagnosed as SLD and arithmetic disability (dyscalculia), respectively. This difference could be due to small sample size of our study and since our study was a community‑based study, the parents were not aware of SLD and were not diagnosed as learning disabled.

Among the antenatal and postnatal factors, prematurity, low birth weight, and history of head trauma were found to be significantly associated with SLD. Bandla et al. also showed a positive association with prematurity [5]. Saigal et al. [14] and Litt et al. [15], in their studies, concluded that children with very low birth weight were at higher risk for learning disabilities and cognitive deficiencies than their term born controls. As in our study, Westwood also found a relation of SLD with the history of head trauma [16]. In our study, dyslexia was seen in 2.5% and dysgraphia in 1.3% of students. The most common subtype of SLD was combined type (87%) and the most common combination was dyslexia and dyscalculia (39%). Similar results were obtained by Arun et al. [4].

In our study, ADHD was found in 7 students (30%) with SLD (p<0.001). Out of these, 5 had inattentive and 2 students had hyperactive type of ADHD. Similar finding had been consistently reported worldwide with various frequencies. Karande et al. [10] showed that ADHD occurs as a comorbidity in about 20% of the children with SLD. Bandla et al. [5] concluded that, among the comorbidities of SLD, there was a significant association with ADHD amounting to 41.9%, with trends toward inattentive subtype. Gross-Tsur et al. concluded that 26% of the students with arithmetic disability (dyscalculia) had ADHD [13].

Learning disability is a common problem among children and it is an important cause of stress. If not remedied at the earliest, learning disabilities will lead to failure in examinations and can cause emotional and behavioral problems in children. Hence, all children...
with learning problems should be evaluated for early identification of learning disability. The main limitation of this study was small sample size. Second, whole of the study population was not tested for the SLD by various scales; therefore, some of the students with SLD could have been missed. We have also taken care of school dropouts, where SLD could have been the reason of dropout.

CONCLUSION

In the present study, prevalence of SLD in children aged between 8 and 11 years was 2.87%. The most common subtype of SLD was combined type having reading disability and arithmetic disability. History of prematurity, low birth weight, and previous history of head trauma were significantly associated with SLD. ADHD was found to be a common comorbid condition associated with SLD.

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