

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

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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

Learning is a process of acquiring new knowledge and skills. During their earlier years, children first learn to understand the spoken language and then to speak. Subsequently, children learn to read, write, and do arithmetic. However, some children may not be able to learn these skills according to their age. These children who are unable to acquire these skills, in spite of having normal intellectual capacity and normal visual and hearing abilities, are said to have specific learning disability (SLD) [1].

SLD has been now included in the Rights of Persons with Disabilities Act, 2016 [2]. Some studies in India calculated the prevalence of SLD to be 3–10% [3]. In Chandigarh, the prevalence was found as 1.58% [4] and, in South India, it was 6.6% [5], while in Karnataka, the prevalence was 15.17% [6]. However, these studies are not reflecting the whole population as they have been done in pockets in some states of India and also in Madhya Pradesh, and not many studies have been done to find the prevalence. There is no screening tool available for teachers to identify SLD. The assessment of SLD is

further complicated by the fact that various education boards (central and state boards) have differing level of academic curriculum [7].

The children with SLDs have more social, emotional, and behavioral problems. The learning problems in children act as a cause for their lower performance in the examinations and these children may develop stress-related disorders if they were not intervened early. In many states, these students are getting benefitted through the State Disability Act, whereas these benefits are not being provided in Madhya Pradesh. Keeping this in mind, this study was planned to find out the prevalence of SLD in Gwalior and to find out the risk factors associated with SLD.

MATERIALS AND METHODS

This cross-sectional study was carried out between 2016 and 2017 on school students of Gwalior after approval of research protocol from the institutional ethics committee. Prior written consent was obtained from the parents and teachers. Among all

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		
Sex	Male	15	379	2.416	0.120
	Female	8	398		
School	Government	14	397	0.855	0.355
	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

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

Table 3: Comparison of different subtypes of SLD

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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