

Prevalence of Specific Learning Disabilities among Primary School Children in Gulbarga City, Karnataka, India

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Abstract

Objectives: To measure the prevalence of specific learning disabilities (SpLDs) such as Dyslexia, Dysgraphia, Dyscalculia among primary school children aged 8-10 years from 3rd and 4th standard in Gulbarga city. **Materials and Methods:** We have conducted a multi-school cross sectional study using stratified, randomized cluster sampling technique among primary school children aged 8-10 years from third and fourth standard in Gulbarga city. A six level progressive screening tests to measure scholastic backwardness, vision, hearing, physical handicap, IQ, reading, writing, mathematical disability were used to identify SpLDs. **Results:** 13.2% of primary school children are affected by one or more SpLDs where as 4.9% children had all three types of SpLDs. The prevalence of dyslexia is 11.0%, dysgraphia is 9.9% and dyscalculia is 9.0%. **Conclusions:** The SpLDs affect significant proportion of primary school children in Gulbarga. This study measured the prevalence of specific learning disabilities using simplified screening approach and tools, which minimizes the number and time of specialist requirement and spares the expensive investigation. This approach and tools are suitable for field situations and resource scarce settings. we conclude that there is need for more prevalence studies, remedial education and policy interventions to manage SpLDs at main stream educational system to improve the school performance in Indian children.

Keywords: Specific learning disability; Dyslexia; Dysgraphia; Dyscalculia; Prevalence; Scholastic backwardness.

Introduction

Poor school performance or scholastic backwardness is estimated to affect one in every five school children in India.[1] Specific Learning Disabilities (SpLDs) are recognized as an important cause for the scholastic backwardness even though many other reasons, such as, below average intelligence, vision and hearing impairment, chronic medical and mental disorders, emotional problems and poor socio-cultural environments are suggested.[2] Specific learning disability (SpLD) is a group of neuro

developmental disorders manifesting as persistent difficulties in learning to efficiently read (dyslexia), write (dysgraphia) or perform mathematical calculations (dyscalculia) despite normal intelligence, conventional schooling, intact hearing and vision, adequate motivation and socio-cultural opportunity.[3]

It is reported that children with SpLDs felt different from the rest, tormented by the peers and suffered neglect from the teachers.[4] Undetected and unmanaged SpLDs results in chronic scholastic backwardness ensue school drop-outs[1,5], emotional and behavioral problems such as depression[6], substance

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abuse and social delinquency.[7,8,9] It also causes anxiety and stress in parents and affects quality of life in the family.[10,11] The interference of an individual's emotional status, self esteem, behavior and capacity for economical independence eventually effects the overall wellbeing of the society significantly.

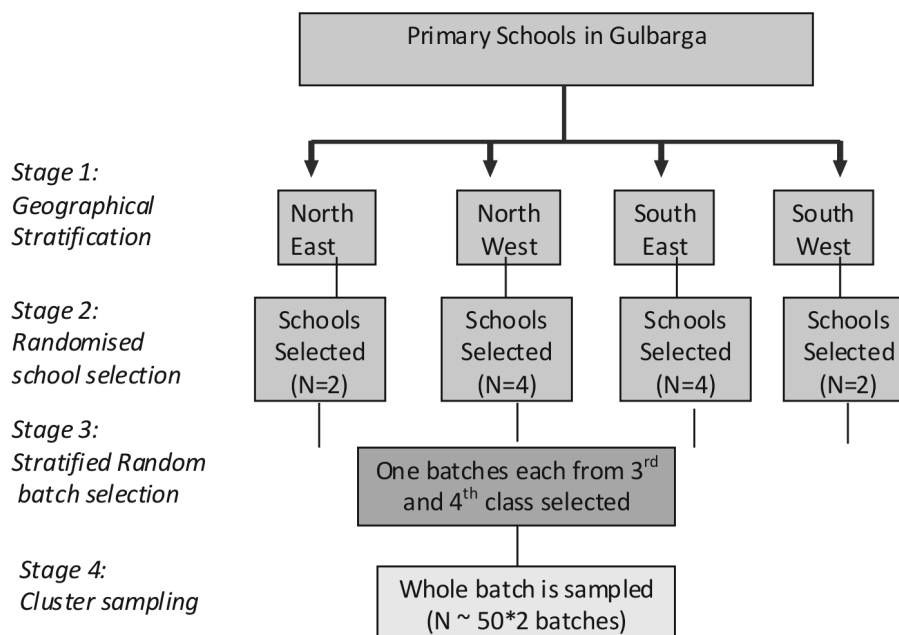
The studies to measure prevalence of SpLDs in India are scanty and its importance is under recognized.[12] The true prevalence of the problem remains disputable among the scholars due to variable diagnostic criteria and measurement tools.[5,13,14] To replenish the knowledge gap the authors have conducted study to measure the prevalence of SpLD associated with scholastic backwardness among primary school children aged 8-10 yrs. This narrow age group was selected because SpLD cannot be diagnosed conclusively before the age of 8 yrs due to higher plasticity of central nervous system in early ages and the management should be started before the age of 10 yrs to get maximum benefit.[8,13] The present study geographically represents the children studying in third and fourth standard in Gulbarga, a South Indian city.

Materials and Methods

Sampling

A cross sectional study was designed using multistaged stratified randomized cluster sampling methodology. Ethical clearance for the study was obtained from the Mahadevappa Rampure Medical college institutional ethical committee on human subjects. The list of primary schools and permission was obtained from deputy director of public instruction of Gulbarga city. All the schools in the city which follow state syllabus in 2011-2013 were geographically stratified into four sectors namely North east, Northwest, Southeast and Southwest. Based on the number of schools in each geographical sector, proportional samples of schools were drawn randomly. One batch each from third and fourth standard was selected randomly from the schools followed by a cluster sampling of all the children in that batch. Each batch was to have expected to have an average of 50 students. This overall sampling procedure ensures the geographical representation of Gulbarga city. Based on assumed spLD prevalence of 15% from the literature, sample

Figure 1: Multi Staged Stratified, Randomised Cluster Sampling Technique



size is calculated at 5% significance level and 20% allowable error with a design factor of 2, for cluster sampling. The estimated sample size was 1134.

Identification of SpLDs

The basic socio demographic information about the sampled children from third to fourth standard was collected initially. In addition parental education, occupation and socio economic status information were obtained. Further the sampled children were subjected to six level serial screening procedure to identify SpLDs (Figure 1).

At screening level one scholastic backwardness was identified if the sampled children fell under either of the two criterias. First criterion was the global impression of the class teacher on the child's scholastic backwardness which was verified with the objective questionnaire using Rutter's proforma A.[15] Teachers opinion was important because as they are in the best position to comment about academic performance.

Rutter's proforma uses simple questionnaire method to measure academic performance objectively and excludes teachers bias if any. Second criterion was review of academic record(c,c+) to ascertain poor grades in two consecutive examinations. Screening levels 2,3,4 are used to exclude children with health conditions such as impaired vision(diagnosis based on snellens charts), hearing(diagnosis based on clinical hearing tests)and severe physical conditions that may interfere with scholastic performance. Screening level 5 was used to exclude subnormal intelligence based on Seguin form board test.[16] Only children with normal and above intelligence quotient were included in the study as SpLDs cannot be labeled in children with subnormal intelligence. Seguin board test is simple to administer, less time consuming and more suitable for IQ screening for targeted age group. An IQ of 90 measured for chronological age using J. B.raj norms was considered cut off for normal. At the end all remaining children were subjected to reading, writing and mathematical performance screening in the

Table 1: Socio Demographic Features of Sample Children

Variables	Subtypes	Number (N=1210) (%)
Geographical distributing	North east	194(16.03%)
	Northwest	400(33.06)
	South east	400(33.06)
	South west	216(17.85)
Gender	Male	693(57.3)
	Female	517(42.7)
Sector	Public	396(32.7)
	Private	814(67.3)
Medium	Kannada	410(33.9)
	English	800(66.1)
Class	Third	597(49.3)
	fourth	613(50.7)
Mother tongue	Kannada	1069(89.3)
	Telugu	46(3.8)
	others	84(6.9)
	missing ^a	11(0.9)
Socioeconomic status	Class 1	155(12.8)
	Class2	319(26.4)
	Class 3	455(37.6)
	Class 4	211(17.4)
	Class5	49(4.0)
	missing ^a	21(1.7)

^aData could not be collected for missing cases

Table 2: Education and Occupation of Parents of Sampled Children

Variable	Level/type	Father (N = 1210) (%)	Mother (N = 1210) (%)
Education	Illiterate	92(7.6)	213(17.6)
	Primary	82(6.8)	265(21.9)
	Higher primary	193(16.0)	316(26.1)
	High school	360(29.8)	215(17.8)
	Preuniversity	208(17.2)	112(9.3)
	>Preuniversity	248(20.5)	67(5.5)
	Missing ^a	27(2.2)	22(1.8)
Occupation	professional	54(4.5)	16(1.3)
	Permanent job	208(17.2)	30(2.5)
	Business	347(28.7)	12(1.0)
	Skilled	138(11.4)	10(0.8)
	Unskilled	435(36.0)	210(17.4)
	Unemployed / Housewife	6(0.5)	910(75.2)
Missing ^a	22(1.8)	22(1.8)	

^aData could not be collected for missing cases

respective medium of school instruction (kannada and English) using SpLD battery test developed and validated by the national institute of mental health and Neuro sciences¹⁷ for the field situation. These screening tests have defined criteria for identification of dyslexia, dysgraphia and dyscalculia.

Three follow-up visits were made to cover those children who missed the screening procedure. All screening tests except level 5 were conducted by a pediatric post graduate also trained in administering SpLD battery test. Screening level 5 were conducted by an experienced clinical psychologist. A trained social worker assisted at screening level 1 and 6.

Results

A total cross sectional sample of 1210 children was collected from 4 public and 8 private schools of Gulbarga city using multi staged stratified randomized cluster sampling method. A total of 8 (0.6%) children were absent during the test. The data analysis was conducted using SPSS version 15.0.[18]

Sample Characteristics

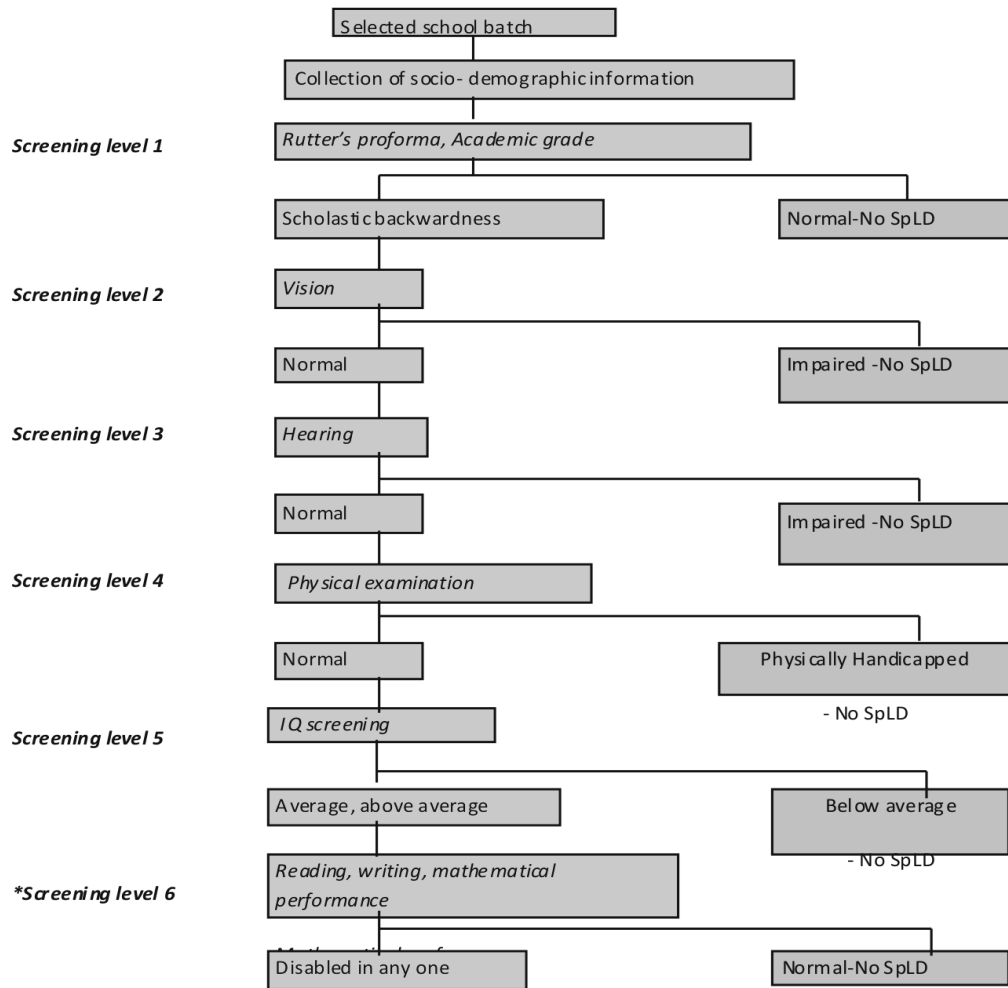
The sample proportionally represented all four geographical sectors with highest from

Northwest, South east zones (Table 1). Majority of the children studied in English medium (66.1%) and in private schools (67.3%). Boys (57.3%) outnumbered girls with almost equal number of children from 3rd and 4th standards. Mean age of children was 8.77y. Kannada was mother tongue for most of the children (88.3%) while Telugu was (3.8%) where as the rest spoke Urdu, Tamil, Marathi and Hindi. As per the modified BG Prasad classification adjusted for 2013[19] most sample children fell under class 2, 3, 4. 69% of the fathers were educated high school or above where as 7.8% were illiterates. Mothers were less educated than fathers with 33.1% of them had studied high school and above while 17.9% were illiterates (Table 2). 36.6% of the fathers were unskilled workers whereas 76.6% of mothers were housewives.

Prevalence of spLD

About 19.5% (234) of children were found to be scholastically backward (Figure 2). Among them, 61% (n=143) were identified based on Rutter's proforma and 31.1% (n=73) were identified by both Rutter's proforma and academic grades. Only 7.69% (n=18) of the scholastic backward children were identified by poor academic grades. Out of total 1,210 children 1.1% had vision problem, 0.4% had hearing impairment, 0.57% had physical

Figure 2: Flowchart for Screening Test to Identify SpLDs

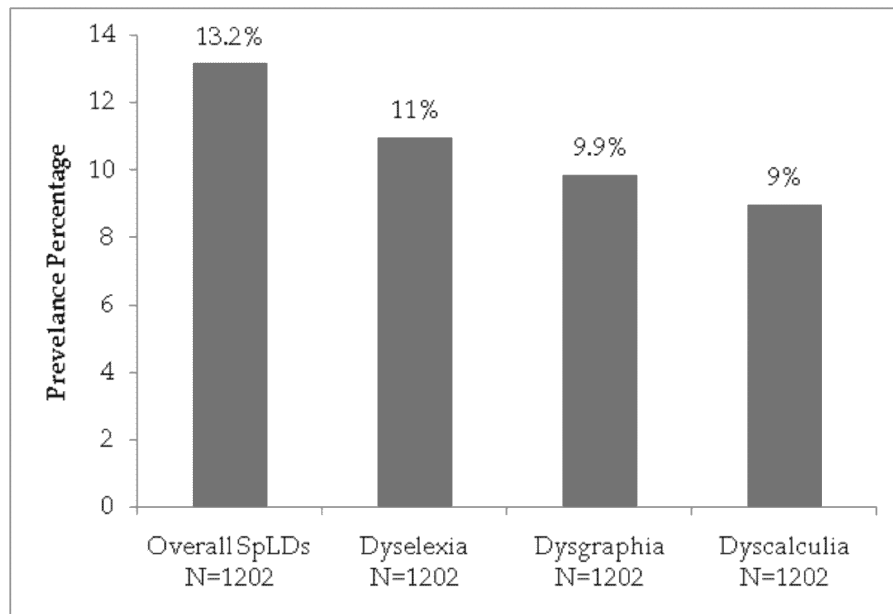


disability and 1.57% had subnormal IQ that would have affected their learning ability. These children were excluded at different levels of screening procedure. Some children (n=8) missed screening test even after 3 additional visits were excluded as they remained absent on visiting days or left school in between. Finally a total of 159 children were diagnosed with one or more SpLD after exclusion of children with inconclusive results for the specific tests. The overall prevalence of Specific learning disability was 13.2% (n=159) (Figure 3). Among them dyslexia (11%; n=132) was most frequent followed by dysgraphia (9.9%; n=119) & dyscalculia (9%; n=108). In total 4.9% (n=59) children had all 3 types of SpLDs. SpLDs are higher among boys compared to girls. Lower the parent's

education higher the prevalence of spLDs. No association found between parents occupation, socioeconomic status and SpLD.

Discussion

The present study measured SpLDs prevalence of 13.2% which is at the upper end of generally believed range of 2-18% in India & 5-17% in Worldwide^{14,20-23}. The individual prevalence of 11%, 9.9% & 9% respectively for dyslexia dysgraphia & dyscalculia converged to the peak of reported range in India which extends from 2-18% in dyslexia, 8-14% for dysgraphia & 3-4% for dyscalculia. [14,20-23] Large sample size in the present

Figure 3: Flow Chart for Screening Tests***Figure 3: Prevalence of Specific Learning Disabilities among Sampled School Children**

* indicates the corrections as per the reviewers advise.

study design confers more confidence in the outcome. The multi staged stratified randomized method in the study eliminates

bias due to convenient sampling in previously published Indian studies making it geographically more representative denoting

sectors and language to a certain extent. It favors reduction of comparable prevalence of SpLDs in similar cities across India facilitating the policy decisions & advocacy efforts for conducting interventions. The present study shows utility of practical approaches at the school level to detect SpLDs using simplified screening procedure and tools while minimizing time expensive investigation and specialist requirements.

The diagnosis of spLD is considered complex requiring a multi-disciplinary team of experts such as pediatric neurologists, child psychiatrists to rule out various exclusion criteria.[24] The authors experience was that involving school teachers and trained social workers curtail the time needed by medical personnel and clinical psychologists and saved the precious time required from other experts which is scarce in resource limited settings. In a simplified stepwise screening, large number of children were screened at level 1 as they were not scholastically backward giving less screening load to medical expert and still lesser load to clinical psychologists. The importance of this simple approach cannot be undermined in identification and management of large number of SpLD children in India. The authors acknowledge that the present study identifies only those SpLDs which are severe enough to cause scholastic backwardness while lesser ones were excluded. Nevertheless it is important to focus on children with severe SpLDs who may be benefited maximum from the intervention. Study does not screen scholastic backwardness due to emotional deprivation and poor motivation which may have misclassified small proportion of children in to SpLDs. The present tools could be different from other studies and may differ in sensitivity for different languages which limit the comparability. However it is a problem not confined to this study alone and difficult to address. A total of 8 (0.6%) children missed the screening test as they either did not attend the school on screening day or they left the school in between. It would have under or over estimated the prevalence depending upon the missed children who had SpLDs or not,

however as the number of missed children are very low it is unlikely to have big impact on the results.

Conclusion

In summary 13.2% of primary school children who are scholastically backward are affected by SpLDs in Gulbarga, Karnataka. All the three types of SpLDs namely, dyslexia, dysgraphia and dyscalculia are high and almost equally affecting the school children. The present study has important ramifications to simplify the identification approaches, to advocate the need for planning and developing public health interventions, and expanding educational policies. In a multi linguistic country like India more prevalent studies across the nation can fill the additional knowledge gap. Interventions at school including remedial education and teachers training along with building family and social support systems are very much needed efforts for this under addressed problem of SpLDs.

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Abbreviations

SpLDs: Specific Learning Disabilities, IQ: Intelligence quotient

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