

## Original Research Article

# Alphabet problems linked with learning disability in children: a cross sectional study

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## ABSTRACT

**Background:** Learning Disability (LD) is a frequently neglected entity in our set up, with the affected children being labeled as dull and worthless. The feeling of inadequacy and shame leads to psychological problems in approx. 30% of these children. These include low self-esteem, school phobia, anxiety, depression, oppositional-defiant behavior and conduct disorders. Early recognition of this disability in the primary school children and initiating appropriate remedial measures can significantly reduce morbidity. Authors objective was to study the prevalence and pattern of alphabet problems in children with learning disability.

**Methods:** This was a cross sectional study done in the Child Guidance Clinic of a tertiary care teaching hospital in Chitradurga district, Karnataka, between January 2016 and January 2018. After obtaining informed consent from parents, children between ages 5 to 17 years, diagnosed to have learning disability, were asked to write upper and lower case alphabets in English. Alphabet problem was diagnosed if child had mixing of upper and lower case alphabets, missing of alphabets, reversals and improper sequence. Association of alphabet problems with age and sex was studied.

**Results:** There were 293 children with learning disability, between 5-17 yr of age, attending our Child Guidance Clinic, who were assessed for alphabet problems. Alphabet problems were noted in 83.6% children. Mixing of upper and lower case alphabets was seen in 74.74%, missing of alphabets in 25.94%, reversal of alphabet in 21.50% and errors in sequencing in 12.97%. The prevalence of alphabet problems was higher in the 5-8yr age group. Prevalence of alphabet problems was more in males compared to females.

**Conclusions:** Alphabet problems were present in a significant number of children with learning disability. Presence of alphabet problems could be used as a simple screening tool for children with learning disabilities.

**Keywords:** Alphabet problems, Learning disabilities, Scholastic backwardness

## INTRODUCTION

Scholastic backwardness is an important problem in children which is of concern to both parents and teachers alike.<sup>1</sup> Scholastic backwardness affects child's education, achievements, self-esteem and employment in future.<sup>2</sup> An estimated 5-15% of school-going children have scholastic backwardness.<sup>3</sup> A simple way of identifying SB in a child is if he or she failed regularly in all subjects or had class

failure (detention) in the previous year.<sup>3,4</sup> The determinants of scholastic backwardness include physical problems like chronic illnesses, vision and hearing defects, social and environmental conditions, behavioral problems, low IQ and learning disabilities.<sup>5,6</sup>

One of the important causes of scholastic backwardness in children is specific learning disability. Specific learning disability (SLD) is a developmental disorder,

manifesting as difficulty in reading, writing, comprehending or using language, calculations, wherein the child has normal intelligence and conventional schooling, adequate motivation and opportunity, and intact hearing and visual capacity.<sup>7,8</sup> Dyslexia is the most common and most carefully studied of the specific learning disability, affecting 80% of all those identified as learning-disabled.<sup>9</sup> The incidence of dyslexia in school children in USA ranges between 5.3-11.8%.<sup>10</sup> 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%.<sup>11-13</sup>

Alphabet problems are common in children with learning disabilities. Problems include illegible handwriting, mixing of upper and lower case letters, reversals, inability to write online and within margins.<sup>14</sup> This study was conducted to find out the prevalence of alphabet problems and the pattern of alphabet problems in children with learning disability.

## METHODS

This hospital based cross sectional study was done in the Child Guidance Clinic, Department of Paediatrics, Basaveshwara Medical College Hospital and Research Center, Chitradurga, Karnataka. Institutional Ethics Committee clearance was taken before the commencement of the study. The study was conducted from Jan 2016 to Jan 2018 (2 years). The participants consisted of children with learning disability between ages 5 to 17, attending our Child Guidance Clinic. The diagnosis of learning disability was made by an experienced clinical psychologist, using NIMHANS index for specific learning disabilities.<sup>15</sup>

Informed consent was obtained from the parents and assent was obtained from participating children after explaining the purpose of the study in their own language. The participants were asked to write in sequence the English upper and lower case alphabets.

### Statistical analysis

The data collected was compiled in MS Excel and analyzed using SPSS.V.16.0. Continuous variables are expressed in the mean and SD, categorical data is expressed in number and percentage. Chi square test is applied to test the significance of association among categorical variables and associations with p value of less than 0.05 were considered to be statistically significant.

### Inclusion criteria

- Children with learning disability between ages 5 to 17.
- Children studying in an urban setup English medium school from LKG onwards.
- Children who are able to write all the capital letters and at least some small letters.

- Children who gave assent and whose parents gave informed consent.

### Exclusion criteria

- Children with learning difficulties due to intellectual disability, visual or hearing impairment.
- Children coming from rural areas or from Kannada medium schools.
- Children who are unable to write small letters.

### Definitions

#### Mixing of alphabets

Writing lower case alphabets in the uppercase sequence and vice versa.

#### Missing of alphabets

One or more alphabets are missing in the sequence.

#### Reversal of alphabets

Mirror image of alphabet is written.

#### Improper sequence

Incorrect sequence of alphabets is noted.

## RESULTS

There were 293 children with learning disability, between ages 5-17 yr, included in the study. The group consisted of 221 (75.4%) male children and 72 (24.6%) female children (Table 1).

**Table 1: Distribution of study children according to age and sex.**

Age (years)	Male	Female	Total
5 to 8 yrs	63(76.8%)	19(23.2%)	82(100.0%)
9 to 12yrs	109(72.7%)	41(27.3%)	150(100.0%)
13 to 17yrs	49(80.3%)	12(19.7%)	61(100.0%)
Total	221(75.4%)	72(24.6%)	293(100.0%)

There were 82 children in 5-8yr age group, 150 in 9-12 yr age group and 61 in 13-17 yr age group (Table 1). Alphabet problems were noticed in 83.6% of children with learning disabilities (Table 2). Prevalence of alphabet problems among males was 86.9% and among females was 73.6% (Table 2).

The difference was statistically significant (p value 0.008) The prevalence of alphabet problems in the age group of 5-8 yr was 90.2%, 9-12 yr was 83.3% and 13-17 yr was 75.4% (Table 3). The difference was statistically significant (p value <00001). Mixing of upper and lower case alphabets was seen in 74.74%, missing of alphabets

was seen in 25.94%, reversal of alphabet was seen in 21.50% and improper sequencing was seen in 12.97% of study subjects (Table 4).

The prevalence of all the four problems were more in males compared to females (Table 4). The difference was statistically significant for missing (p value 0.0027) and reversals (p value 0.032).

**Table 2: distribution of alphabet problems in children with learning disabilities according to sex of the children.**

Sex	Alphabet problems present	Alphabet problems absent	Total
Male	192(86.9%)	29(13.1%)	221(100.0%)
Female	53(73.6%)	19(26.4%)	72(100.0%)
Total	245(83.6%)	48(16.4%)	293(100.0%)

The chi-square statistic is 6.9777. The p-value is 0.008253. The result is significant at  $p < 0.05$ .

#### Interpretation

The prevalence of learning disabilities was significantly higher among male children (86.9%) when compared to female children (73.6%).

**Table 3: Age wise prevalence of alphabet problems in children with learning disability.**

Age (years)	Alphabet problems present	Alphabet problems absent	Total
5 to 8 yrs	74(90.2%)	8(9.8%)	82(100.0%)
9 to 12yrs	125(83.3%)	135(25%)	150(100.0%)
13 to 17 yrs	46(75.4%)	15(24.6%)	61(100.0%)
Total	245(83.6%)	48(16.4%)	293(100.0%)

The chi-square statistic is 52.9466. The p-value is  $< 0.00001$ . The result is significant at  $p < 0.05$ .

The problem of mixing of alphabets is present among 74.74% of children. A total of 76.47% of male children and 69.44% of female children had this problem; this association was not statistically significant.

The problem of missing of alphabets was found among 25.94% of children. This problem was significantly higher among male children (30.32%) compared to female children (12.5%).

The problem of reversal of alphabets was found among 21.50% of children. This problem was significantly higher among male children (24.43%) compared to female children (12.5%).

**Table 4: Prevalence of different types of alphabet problems among children with learning disabilities.**

Sex	Problem in mixing of alphabets		Problem in missing of alphabets		Problem in reversal of alphabets		Problem in improper sequence	
	Present n (%)	Absent n (%)	Present n (%)	Absent n (%)	Present n (%)	Absent n (%)	Present n (%)	Absent n (%)
Male (n=221)	169(76.47%)	52(23.5%)	67(30.32%)	154(69.7%)	54(24.43%)	167(75.6%)	36(16.29%)	185(83.7%)
Female (n=72)	50(69.44%)	22(30.6%)	9(12.5%)	63(87.5%)	9(12.5%)	63(87.5%)	2(2.78%)	70(97.2%)
Total (N=293)	219(74.74%)	74(25.3%)	76(25.94%)	217(74.1%)	63(21.50%)	230(78.5%)	38(12.97%)	255(87.0%)
	Chi sq: 1.42 p value: 0.23		Chi sq: 8.97 p value: 0.0027		Chi sq: 4.58 p value: 0.032		Chi sq cannot be calculated. Value of one of the cell is $< 5$	

## DISCUSSION

Scholastic backwardness is an important problem in children which affects child's education, achievements, self-esteem and employment.<sup>1,2</sup> The rates of scholastic backwardness reported in Indian literature are quite variable. Shenoy et al, studied 5-8 year old children and reported a rate of 10.38%, while Karande et al, found a rate of 20% among Indian school children.<sup>16,17</sup> Studies in adolescents reported rates of 5-15% Nair et al, and 25% Nayak et al.<sup>3,18</sup> Specific learning disability is an important

cause of scholastic backwardness and includes reading disability (dyslexia), writing disability (dysgraphia) and maths disability (dyscalculia).<sup>19</sup> However, the three disorders are not isolated. Most children have a combination of problems.<sup>20</sup>

Many studies have shown a high correlation of writing skills with reading ability.<sup>21</sup> In a study by Berninger et al, both children and adults with dyslexia had significant writing problems.<sup>22</sup> Dyslexics have a general deficit in automaticity, assessed by both rapid automatic naming of

letters or rapid automatic writing of letters.<sup>23</sup> Alphabet problems in children with learning disabilities include illegible letters, irregular size, spacing, mixing capital and small letters and omitting letters. They have difficulty in recognizing alphabets and retrieving alphabets from memory.<sup>19</sup> Reversals and sequencing problems are also more common in children with learning disability.<sup>24,25</sup>

In their study, 83.6% of learning disabled children had alphabetical problems. Mixing of alphabets was observed in 74.74%, missing alphabets in 25.94%, reversals in 21.5% and improper sequence in 12.97%.

In comparison, in a study by Priti Arun et al, only 18.4% of school going children had errors in writing.<sup>20</sup> They found that improper spacing, wrong capitals and alphabet insertions were significantly higher among children with learning disability. A study done at NIMHANS, Bangalore in 2002, studying the alphabetical skills of normal first standard children (mean age 6.5 y) showed that 23% made errors in capital letters and 31% in small letters.<sup>26</sup>

In this study, the prevalence of alphabet problems was significantly higher in the 5-8 yr age group (90.2%) compared to 13-17 yr age group (75.4%). This could be due to gradual acquisition of alphabet skills with age.

Authors noticed that among children with learning disability, writing problems were significantly higher among boys (86.9%) compared to girls (73.6%). Similar observations were made by Berninger et al.<sup>27</sup> They studied 122 children (80 boys and 42 girls) and 200 adults (115 fathers and 85 mothers) who showed behavioral markers of dyslexia in a family genetics study. Boys and men were found to be more impaired in handwriting, composing and spelling compared to girls and women.

This study shows that alphabet problems occur in majority of children with learning disabilities. Testing for mixing, missing, reversals and improper sequence is a simple method for rapid screening for learning disability, especially in children between 5-8yr. This may be useful in early recognition of learning disability in the primary school age group by the schoolteachers, paving way for early intervention through remedial training and improved outcomes.

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