Original Article

Knowledge of schoolteachers on learning disabilities in urban Vellore - A cross-sectional study

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Abstract

Background: Specific learning disability (SLD) is a cognitive neurobiological disorder caused by atypical brain functioning. SLD is recognized when the individual's achievement in school is below that expected for age, schooling, and level of intelligence. Screening millions of students with SLD by health personnel is a logistical impossibility. Awareness and knowledge about learning disorders among schoolteachers may play a major role in the early identification and management of children with these disorders. Therefore, the assessment of teachers' knowledge and perceptions about learning disabilities (LDs) is relevant. **Method:** A school-based cross-sectional study was conducted among teachers in government/government-aided and private schools in Vellore, India. The participants were selected by a simple random sampling method. There was a total of 80 teachers included in the study. Data capture was done using a questionnaire. A Chi-square test was done to test the association and the odds ratio test helped determine the strength of the association. A *P*-value of <0.05 was considered to be statistically significant. **Results:** The majority of the teachers (70%) had adequate general knowledge regarding LDs. When analyzed separately, 82.5% of government/aided teachers and only 57.5% of teachers were having adequate general knowledge regarding LDs. There was a significant association between the type of school and general knowledge regarding LDs. Government/aided teachers had better general knowledge regarding LDs and dyslexia than private teachers. **Conclusions:** Among 80 teachers, 70% (56) of them had adequate general knowledge regarding LDs. When analyzed separately, 82.5% (33) of government/aided teachers and only 57.5% (23) teachers were having adequate general knowledge regarding LDs. The government/aided schoolteachers had significantly higher levels of knowledge in most domains of the general knowledge section as compared to private schoolteachers. If teachers are having adequate knowledge regarding LDs, it will significantly increase the chances of children with LDs getting detected early and undergoing the treatment they require. Teacher education programs and workshops are needed to be conducted at regular intervals to improve the knowledge regarding SLDs among teachers.

Keywords: Dyscalculia, dysgraphia, dyslexia, specific learning disabilities

Introduction

Teachers can play an important role in the early detection of learning disability (LD) as they are closely associated with the process of educating the child. They are at a vantage point with regard to observing the adequacy of the academic performance of the student. They are likely to identify these learning problems sooner and can help in formulating measures to target them. Screening millions of students and identifying children with specific learning disabilities (SLDs) by health personnel is a logistical impossibility[1] Therefore, awareness and knowledge about learning disorders among schoolteachers may play a major role in the early identification and management of children with these disorders. So, the assessment of teachers' knowledge and perceptions about LDs is relevant[2] There are very few studies on this topic in India and even fewer studies from Tamil Nadu. Most

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studies that have been carried out recently in this discipline have used a convenient method of sampling and no particular method of randomization, which leads to a lack of clear generalizability.[3-5] Considering the limited number of studies in this field, this study was conceived with the objective to assess the knowledge of schoolteachers regarding LDs in selected schools in Vellore town.

Methods

Study design and setting

This cross-sectional study was conducted in 20 schools in Vellore town; 10 government/government-aided schools and 10 private schools were chosen within the town limits randomly from the list of schools. The government schools had about 10–30 children per class depending on the location and size of the schools. All schools were primary schools except for one, which was an elementary school. The private schools on the other hand had about 20–40 students per class. All visited were primary schools. This study was done during June 2018 to December 2018.

Study participants

The participants were primary and middle schoolteachers in the selected schools. The permission was sought from the Chief Educational Officer (CEO) and District Elementary Educational Officer (DEEO).

Sample size and sampling technique

The knowledge regarding LDs among schoolteachers was found to be 56% from an epidemiological study done in the north Indian city of Chandigarh.[6] Assuming a relative precision of 20% and using the formula $4pq/d^2$, the sample size required was 80 teachers. A list of government/government-aided and private schools was obtained from the AEO (assistant education officer) after granting of permission by the CEO (chief educational officer). From this list, 10 government/government-aided schools and 10 private schools were selected by simple random sampling. The headmaster/headmistress of the selected schools was contacted and permission was sought. For private schools, permission was obtained from the correspondent/principal. From each school, 3–5 primary schoolteachers were selected randomly.

Data source and measurement

Data capture was done using a questionnaire developed by the principal investigator and was adapted from these studies.[7-9] The questionnaire had five sections, namely, (1) socio-demographic details, (2) general knowledge about LDs, (3) knowledge regarding dyslexia, (4) knowledge regarding dysgraphia, and (5) knowledge regarding dyscalculia. The section on general knowledge about LDs had seven questions, dyslexia and dysgraphia sections had four questions each, and the dyscalculia section had eight questions. The maximum score for the general knowledge section was 7. Teachers scoring 4 and above were considered as having adequate general knowledge. The maximum score for dyslexia and dysgraphia sections was 4 each. Teachers scoring more than 2 in each section were classified as having adequate knowledge regarding dyslexia and dysgraphia. The maximum score for the dyscalculia section was 8. Teachers scoring more than 4 were classified as having adequate knowledge regarding dysgraphia.

After obtaining informed consent from the teachers, the questionnaire was administered by the principal investigator. The schools were visited during a time, which was convenient to the teachers, preferably during the lunch break or at end of school hours.

The questionnaire was translated into the local language (Tamil) and back-translated to English for validation. It was pilot-tested and necessary modifications were made before data collection. The data entry was done using Epidata version 3.1 (The EpiData Association) by the principal investigator.

Statistical methods

Data analysis was done using IBM Corp. Released 2011. IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp. Descriptive analysis was done for socio-demographic features like age distribution of the teachers, gender, type of school they are teaching in, educational level, and years of teaching experience. General knowledge about LDs, dyslexia, dysgraphia, and dyscalculia was measured. For further individual analysis of dyslexia, dysgraphia, and dyscalculia, only teachers who were able to name them were included. Scores for each section and descriptive statistics of the scores were calculated. Factors, which influenced the knowledge, were analyzed by Chi-square tests.

Results

From the list of schools obtained from the AEO, there were 12 government/government-aided schools in the Vellore town limit. Out of this, one school was shifted out. From this list of 11 schools, 10 schools were selected randomly. There were 37 private schools in the Vellore town limit from which 10 schools were randomly selected. From each of these schools, 3–5 teachers were selected randomly for participation. In total, 40 government/aided schoolteachers and 40 private schoolteachers were enrolled in the study.

Socio-demographic distribution of teachers

The teachers in the government/aided schools were older and more experienced [Table 1]. The mean standard deviation (SD) and the median age of the teachers in the government/aided school were 44.5 (6.6) and 46.5, respectively. This was significantly ($p = 0.001$) more than the mean (SD) and the median age of private schools' teachers which was 32.7 (7.0) and 35, respectively. Similarly, the mean (SD) and median years of teaching experience of the government/aided teachers were 13.7 (6.6) and 13, as compared to 4.8 (3.5) and 4 years of teaching experience among the private schoolteachers. There was a significant difference in the mean years ($p = 0.001$) of teaching

Table 1: Socio-demograhic distribution of the teachers

Variable	Government/Aided (*n*=40) Number (%)	Private (*n*=40) Number (%)
Age in Years		
20–30	0 (0)	13 (32.5)
31–40	13 (32.5)	25 (62.5)
41–50	18 (45)	2 (5)
51–60	9 (22.5)	0 (0)
Gender		
Male	2 (5)	6 (15)
Female	38 (95)	34 (85)
Education		
Diploma	9 (22.5)	5 (12.5)
Undergraduate	9 (22.5)	24 (60)
Postgraduate	22 (55)	11 (27.5)
Years of Teaching Experience		
0-2	1 (2.5)	13 (32.5)
3-5	2 (5)	10 (25)
6-10	9 (22.5)	11 (27.5)
Above 10	28 (70)	6 (15)

experience of teachers from the government/aided schools and the private schools. Teachers were predominantly female in both government/aided and private schools. In government/aided schools, more than half the number of teachers were postgraduates whereas, in private schools, 60% of them were undergraduates.

Knowledge among teachers regarding LDs

The government/aided teachers had better general knowledge with regard to knowing about LDs, encountering children with LDs, and saying it is a genetic problem [Table 2]. In contrast, private schoolteachers had better knowledge with regard to the causes of LDs. The government/aided teachers had some knowledge regarding the existence of integrated schools for children with dyslexia. There was no difference in knowledge with regard to dysgraphia among both sets of teachers. All teachers from government/aided schools correctly identified the sign of dyscalculia as difficulty in doing basic computation, whereas only one-third of private schoolteachers answered this correctly and this difference was significant.

None of the private schoolteachers had scored more than 2 (adequate knowledge) in the dyslexia knowledge section [Table 3]. There was a significant difference in the knowledge scores regarding general knowledge (p-value = 0.015) as well as dyslexia (p-value = 0.001) between the government/aided and private schoolteachers. Apart from that, there was no significant difference between dysgraphia and dyscalculia scores of government/aided and private schoolteachers.

Government/aided schoolteachers had significantly higher general knowledge (OR = 3.484, 95% confidence interval (CI) = 1.246–9.747, *P*-value = 0.027) than private schoolteachers. Age, gender, education level, and years of experience of the teachers had no significant association with general knowledge regarding LDs among teachers [Table 4].

Knowledge regarding dyslexia

Government/aided teachers had better knowledge regarding dyslexia (OR = 31.315, 95% CI = 1.623–604.07, *P*-value = 0.003) than private schoolteachers. Diploma teachers seemed to have better knowledge regarding dyslexia (OR = 7.000, 95% CI = 1.238–39.566, *P*-value = 0.031) than graduate teachers. Teachers who had 8 years or more of teaching experience had better knowledge regarding dyslexia (OR = 0.020, 95% CI = 0.001–0.524, *P*-value-0.001). No significant association was found between the age and gender of the teachers with knowledge regarding dyslexia [Table 4].

Knowledge regarding dysgraphia

The female teachers seemed to have significantly better knowledge regarding dysgraphia (OR = 0.038, 95% CI = 0.001–0.919, *P*-value = 0.035) than the male teachers. There was no significant association between age, type of school, education level, and years of teaching experience with knowledge regarding dysgraphia among teachers [Table 4].

Knowledge regarding dyscalculia

Younger teachers had better knowledge (OR = 24.000, 95% CI = 1.110–508.61, *P*-value = 0.052) than older teachers. There was no association between gender, type of school, education level, and years of teaching experience with knowledge regarding dyscalculia among teachers [Table 4]. All the significant variables remained the same even after the multivariate analysis of the model, which includes age, gender, type of school, education level, and teaching experience.

Discussion

Teachers play a critical role in the life of children. Children spend the majority of their time in school with their teachers. They are the ones who mold and shape the physical, intellectual, and moral powers of children. Teachers can play an important role in the early detection of LD as they are closely associated with the process of educating the child. They are likely to identify these learning problems sooner and can help in formulating measures to target them. It is important that the teachers require specific abilities to identify the different types of learning difficulties, causative factors, development of instructional strategies, media and materials, and adopting the developed remedial strategies, apart from giving guidance and counseling. Therefore, awareness and knowledge about learning disorders among schoolteachers play a major role in the early identification and management of children with these disorders.[10] In our study, we assessed the knowledge of both government/aided and private schoolteachers regarding LDs. Government/aided schoolteachers were older and more experienced. We believe the reason for this is the National Council for Teacher Education (NCTE) mandates candidates who wish to work as teachers in the government

Table 2: Distribution of knowledge among teachers regarding learning disability

Questions	Govt/Aided (*n*=40) Number (%)	Private (*n*=40) Number (%)	*P*
General Knowledge regarding learning disability			
Knows about LD	40 (100%)	26 (65%)	<0.001*
Able to name dyslexia,	17 (42.5%)	17 (42.5%)	1
dysgraphia,	21 (52.5%)	14 (35%)	0.114
dyscalculia	7 (17.5%)	6 (15%)	0.762
Knew about remedial education	30 (75%)	23 (57.5%)	0.098
Encountered children with LD	36 (90%)	23 (57.5%)	0.001*
Answered it is a genetic problem	24 (60%)	6 (15%)	<0.001*
Correctly answered causes such as reading and writing disorders	9 (22.5%)	22 (55%)	0.003*
Answered LD would not be normal as age progresses	20 (50%)	19 (47.5%)	0.823
Knowledge regarding dyslexia	***n*=17**	***n*=17**	
Dyslexia is a reading disorder	15 (88.2%)	12 (70.5%)	0.204
Dyslexia is due to genetic/neurological causes	7 (41.1%)	4 (23.5%)	0.273
Difficulty in reading as a sign of dyslexia	12 (70.5%)	14 (82.4%)	0.414
Integrated schools for children with dyslexia	4 (23.5%)	0 (0%)	0.033*
Knowledge regarding dysgraphia	***n*=21**	***n*=14**	
Dysgraphia is a writing disorder	18 (85.7%)	11 (78.6%)	0.585
Defining dysgraphia	17 (81%)	11 (78.6%)	0.862
Difficulty in organizing information while writing is a sign of dysgraphia	19 (90.5%)	10 (71.4%)	0.142
Difficulty in gripping pencil is a sign of dysgraphia	15 (71.4%)	12 (85.7%)	0.324
Knowledge regarding dyscalculia	***n*=7**	***n*=6**	
Dyscalculia is a mathematical disorder	7 (100%)	6 (100%)	1
Difficulty in doing basic computation is a sign of dyscalculia	7 (100%)	2 (33.3%)	0.009*
Dyscalculia is always not associated with dyslexia	5 (71.4%)	4 (66.6%)	0.852
Performing poorly in mathematics is a sign of dyscalculia	2 (28.6%)	3 (50%)	0.429
Unable to solve word problems	1 (14.3%)	2 (33.3%)	0.418
Unable to compare sizes is a sign of dyscalculia	4 (57.1%)	4 (66.6%)	0.726
Difficulty in sequencing elements is a sign of dyscalculia	4 (57.1%)	6 (100%)	0.067
A psychologist is the professional to treat children with dyscalculia	5 (71.4%)	3 (50%)	0.429

*Statistically significant

Table 3: Distribution of adequate knowledge scores regarding various domains of learning disability

Knowledge	Type of school	Adequate knowledge *n* (%)	*P*
Learning Disability	Govt/Aided (*n*=40)	33 (82.5%)	0.015*
	Private (*n*=40)	23 (57.5%)	
Dyslexia	Govt/Aided (*n*=17)	8 (47.1%)	0.001*
	Private (*n*=17)	0 (0%)	
Dysgraphia	Govt/Aided (*n*=21)	17 (81%)	0.862
	Private (*n*=14)	11 (78.6%)	
Dyscalculia	Govt/Aided (*n*=7)	4 (57.1%)	0.302
	Private (*n*=6)	5 (83.6%)	

*Statistically significant

sector need to pass the Teacher Eligibility Test (TET).[11] Until then teachers work at private schools gaining experience. When eventually they clear the exam and work in the government.

In our study population of 80 teachers, 70% (56) of them had adequate general knowledge regarding LDs. When analyzed separately, 82.5% (33) of government/aided teachers and only 57.5% (23) teachers were having adequate general knowledge regarding LDs. These figures are similar to two studies done in North India. These studies reported 56% and 70% of their study population having adequate knowledge regarding LDs, respectively. In our study, although the general knowledge about LD was good among the government/aided teachers and average among the private teachers, the knowledge regarding SLD was poor, especially among the private schoolteachers. There was not a single private schoolteacher who had adequate knowledge about dyslexia. This may be due to the differences in age, level of education, and years of teaching experience. The Bachelor of Education (B.Ed.) degree is compulsory for aspirants wanting to be teachers. This course syllabus is incorporated with a section in the final semester regarding LDs.[12] Apart from this, the State Council of Educational Research and Training, Tamil Nadu (SCERT)[13] has organized two workshops to scrutinize and review the research proposals regarding LDs among children and methods to diagnose them. These research projects are nearing completion.

As mentioned earlier, we found government/aided schoolteachers to have better general knowledge regarding LDs. While studying the factors influencing knowledge regarding dyslexia, the type of school, education level, and years of teaching experience are significant. Government/aided schoolteachers, teachers with more than 8 years of teaching experience, and those who had

Table 4: Factors influencing knowledge regarding learning disabilities among government/aided and private schoolteachers

Variable		LD Knowledge			Dyslexia Knowledge			Dysgraphia Knowledge			Dyscalculia Knowledge		
		Adequate *n*=56	Inadequate *n*=24	OR (95% CI)	Adequate *n*=8	Inadequate *n*=26	OR (95% CI)	Adequate *n*=28	Inadequate *n*=7	OR (95% CI)	Adequate *n*=9	Inadequate *n*=4	OR (95% CI)
Age	<38	20 (60.6%)	13 (39.4%)	0.47 (0.178–1.242)	1 (7.1%)	13 (92.9%)	0.143 (0.015–1.331)	12 (92.3%)	1 (7.7%)	4.500 (0.476–42.501)	8 (88.9%)	1 (11.1%)	24.000** (1.110–508.61)
	≥38	36 (76.6%)	11 (23.4%)		7 (35%)	13 (65%)		16 (72.7%)	6 (27.3%)		1 (25%)	3 (75%)	
Gender	Male	7 (87.5%)	1 (12.5%)	3.286 (0.382–28.294)	0 (0%)	1 (100%)	1.000 (0.037–26.935)	0 (0%)	2 (100%)	0.038** (0.001–0.919)	0 (0%)	1 (100%)	0.122 (0.004–3.781)
	Female	49 (68.1%)	23 (31.9%)		8 (75.8%)	25 (24.2%)		28 (84.9%)	5 (15.2%)		9 (75%)	3 (25%)	
Type of school	Govt/ aided	33 (82.5%)	7 (17.5%)	3.484* (1.246–9.747)	8 (47.1%)	9 (52.9%)	31.315** (1.623–604.07)	17 (81%)	4 (19%)	1.591 (0.216–6.207)	4 (57.1%)	3 (42.9%)	0.266 (0.019–3.653)
	Private	23 (57.5%)	17 (42.5%)		0 (0%)	17 (100%)		11 (78.6%)	3 (21.4%)		5 (83.3%)	1 (16.7%)	
Education level	Diploma	10 (71.4%)	4 (28.6%)	1.087 (0.304–3.881)	5 (50%)	5 (50%)	7.000** (1.238–39.566)	6 (60%)	4 (40%)	0.204 (0.035–1.174)	1 (100%)	0 (0%)	1.588 (0.053–47.519)
	Graduate	46 (69.7%)	20 (30.3%)		3 (12.5%)	21 (87.5%)		22 (88%)	3 (12%)		8 (66.7%)	4 (33.3%)	
Teaching experience	<8 yrs	26 (66.7%)	13 (33.3%)	0.733 (0.281–1.914)	0 (0%)	18 (100%)	0.020** (0.001–0.524)	13 (81.3%)	3 (18.8%)	1.155 (0.217–6.145)	7 (70%)	3 (30%)	1.166 (0.074–18.346)
	≥8 yrs	30 (72.2%)	11 (26.8%)		8 (50%)	8 (50%)		15 (78.9%)	4 (21.4%)		2 (66.7%)	1 (33.3%)	

*P<0.05 by Pearson's Chi-square test. **P<0.05 by Fisher's Exact Test

done diploma had better knowledge regarding dyslexia. When it came to factors influencing knowledge regarding dysgraphia, only gender was found to be significantly associated with knowledge regarding dysgraphia. Female teachers' knowledge regarding dysgraphia was better compared to male teachers. In terms of factors influencing knowledge regarding dyscalculia, only the age of the teachers had a significant association. Teachers who were less than 38 years of age had better knowledge regarding dyscalculia when compared to teachers who were 38 years and older. As the numbers are small, it may be difficult to draw any significant conclusion. Another study done in Punjab[14] reported similar results as our study and found an association between socio-demographic factors like age, education of the teachers, and teaching experience to have a significant association with knowledge regarding LDs. In contrast, another study done in India[15] found no association between socio-demographic factors and knowledge of LDs. This can be due to the differences in the study population and criteria used to determine the knowledge regarding LDs.

Acquiring permission from the authorities to carry out the study among schoolteachers took a lot more time than anticipated. This led to time constraints in the eventual study, which in turn resulted in a small study sample. Similar studies have also faced the same issues.[5,16] Even in the presence of the principal investigator, some teachers discussed the answers among themselves. So, the results may have been an overestimation as well. Another limitation was the use of a self-administered questionnaire where there was no control over which sequence the teachers answered the questions.

Conclusion

More than two-thirds of our study population (70%) had adequate general knowledge regarding LDs. On independent analysis, 82.5% (33) of government/aided teachers and only 57.5% (23) teachers were having adequate general knowledge regarding LDs. The government/aided schoolteachers had significantly higher levels of knowledge in most domains of the general knowledge section as compared to private schoolteachers. Government/aided schoolteachers with more than 8 years of teaching experience and those who had diplomas had better knowledge regarding dyslexia. Regarding dysgraphia, only gender was found to be significantly associated with knowledge regarding dysgraphia. Female teachers' knowledge regarding dysgraphia was better compared to their counterparts. Only the age of the teachers had a significant association with dyscalculia. Teachers who were less than 38 years of age had better knowledge regarding dyscalculia when compared to teachers who were 38 years and older. Our study emphasizes that teachers need to have adequate knowledge regarding LDs; this will significantly increase the chances of identifying children with LDs early and implementing the appropriate remedial measures. Therefore, it is important for teachers to get acquainted with the subject of LDs. Teacher education programs and workshops are needed to be conducted at regular intervals to improve and update knowledge regarding LDs among teachers.

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Conflicts of interest

There are no conflicts of interest.

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