IMPACT OF AN EDUCATION PROGRAM ON PARENTAL KNOWLEDGE OF SPECIFIC LEARNING DISABILITY

SUNIL KARANDE, VISHAL MEHTA, MADHURI KULKARNI

ABSTRACT

BACKGROUND: A supportive home environment is one of the factors that can favorably determine the outcome of specific learning disability (SpLD) in a school-going child. However, there is no reliable information available on parental knowledge about SpLD. AIMS: To investigate parental knowledge of SpLD and to evaluate the impact of an educational intervention on it. SETTINGS AND DESIGN: Prospective questionnaire-based study conducted in our clinic. MATERIALS AND METHODS: From April to November 2002, 50 parents who were conversant in English and willing to follow up were interviewed. After the interview, each parent was administered a structured educational program and re-interviewed after 3 months. STATISTICAL ANALYSIS: The pre- and post-intervention responses were compared using Chi-square test. RESULTS: After the intervention, there was significant improvement in parental knowledge of (i) the meaning of the term 'SpLD' (32/50 vs. 50/50, P < 0.0001), (ii) the fact that remedial education given by a special educator is the recommended therapy for SpLD (33/50 vs. 45/50, P = 0.004), (iii) the meaning of the term 'remedial education' (24/50 vs. 46/50, P < 0.0001), (iv) the frequency and duration of remedial education necessary to achieve academic competence (7/50 vs. 31/50, P < 0.0001), (v) the meaning and purpose of provisions (28/50 vs. 49/50, P < 0.0001) and (vi) the fact that SpLD is a lifelong disorder (11/50 vs. 22/50, P = 0.019). However, parental knowledge about the cause of SpLD did not improve (8/50 vs. 14/50, P = 0.147). CONCLUSION: Parental knowledge of their child's SpLD is inadequate and this can be significantly improved by a single-session educational program.

Key words: Dyslexia, educational intervention, parental perceptions, students

'Specific learning disability' (SpLD) is a generic term that refers to a heterogeneous group of neurobehavioral disorders manifested by significant unexpected, specific and persistent difficulties in the acquisition and use of efficient reading ('dyslexia'), writing ('dysgraphia') or mathematical ('dyscalculia') abilities despite

Learning Disability Clinic, Division of Pediatric Neurology, Department of Pediatrics, Lokmanya Tilak Municipal Medical College and General Hospital, Sion, Mumbai, India!

Correspondence:
Dr. Sunil Karande,!
Learning Disability Clinic, Division of Pediatric Neurology, Department of Pediatrics, Lokmanya Tilak Municipal Medical College and General Hospital, Sion, Mumbai - 400 022, India.
E-mail: karandesunil@yahoo.com!

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conventional instruction, intact senses, normal intelligence, proper motivation and adequate sociocultural opportunity.[1,2] SpLDs are intrinsic to the individual and are due to central nervous system dysfunction.[3] Recent genetic linkage studies have implicated loci on chromosomes 6 and 15 in dyslexia.[4,5] The prevalence of dyslexia in school children in USA ranges between 5.3 and 11.8%.[6] Information about SpLD occurring in Indian children is scanty because of a general lack of awareness about this invisible handicap.

Children with SpLD fail to achieve school grades at a level that is commensurate with their intelligence.[1,2] Repeated spelling mistakes, untidy or illegible handwriting with poor sequencing, inability to perform simple mathematical calculations correctly are the hallmarks of this lifelong condition.[1,2] It is important to identify SpLD early, rather than when chronic poor school performance and its attendant emotional sequelae such as low self-esteem and behavioral problems ensue.[1,2] Children with SpLD are often rejected by their peers and may fall into substance abuse addiction and become delinquents.[1,2]

Currently, SpLD cannot be conclusively diagnosed until the child is about 8 years old.[1,2] The cornerstone of treatment of SpLD is remedial education. Because of the central nervous system's higher plasticity in early years, remedial education should be started as early as possible - when the child is in primary school, viz., before the age of 10 years - to achieve maximal benefit.[1,2,7,8] The child needs to undergo remedial education sessions twice or thrice weekly for a few years to achieve academic competence.[7]

The management of SpLD in the more time-demanding setting of secondary school is based more on providing provisions (accommodations) rather than remediation.[1,2,7] Also, it is generally believed that since brain plasticity is limited after the age of 12 years, remedial education may not benefit the 'secondary school'-going child.[1,2,7,8] These provisions are adjustments offered in the school curriculum - for example, exemption from spelling mistakes, availing extra time or a writer for all written tests, dropping a language or having lower grade of mathematics - and are meant to enable the child achieve academic performance commensurate with his/her intellectual ability and continue education in a regular mainstream school.[1,2]

In our city, awareness about SpLD has developed amongst school authorities only in the last few years. Children with academic underachievement or failure are referred to our clinic for diagnosing SpLD by the school principal with a referral letter describing the child's academic difficulties. Generally, either the school principal or the classroom teacher or the school counselor has already discussed with the parent(s) the reason for the referral and given them some preliminary information about SpLD. Most schools do not employ special educators as staff members, and children with SpLD have to necessarily take remedial education from private special educators, outside their regular school hours.

Over the years during our interactions with parents, who accompany their children to our clinic for diagnosis and during follow up, we have formed a general opinion that they were not adequately knowledgeable about SpLD and its management. We have come across parents

who (1) did not accept the diagnosis of SpLD, (2) had not begun remedial education but instead employed a regular teacher (having no training in remediation) to give private tuitions, (3) discontinued remedial education within a few weeks or months for lack of perceived benefit and (4) refused to avail provisions for their child as availing this option would have restricted future career options (e.g., at present in our educational system, a child who has opted for lower grade of mathematics cannot later opt for a career in engineering).

It is well known that a supportive home environment is one of the factors that can favorably determine the outcome of specific learning disability (SpLD) in a school-going child.[1,2] The aims of the present study were (1) to determine the parents' knowledge of their child's SpLD and (2) to evaluate the impact of a single-session educational intervention on it.

MATERIALS AND METHODS

Parent enrolment

This study was conducted from April 2002 to mid-November 2002. The parent sample was by necessity a convenience sample, and the first 50 parents (either mother or father) who were conversant in English and willing to follow up were included in the study. All parents were aware that their child had been referred to our clinic with a 'suspected' diagnosis of SpLD.

Consent and ethical approval

Our study was approved by the scientific and ethics committees of our institution. All parents had signed an informed consent form to participate in the study.

Diagnosis of SpLD

Each child was assessed by a multidisciplinary team comprising of pediatrician, counselor, clinical psychologist and special educator before the diagnosis of SpLD was confirmed.[1,9,10] Audiometric and ophthalmic examinations were done to rule out noncorrectable hearing and visual deficits, as children with these deficits do not qualify for a diagnosis of SpLD. The pediatrician took detailed clinical history and did a detailed neurological examination. The counselor ruled out the possibility that emotional problem due to stress at home was *primarily* responsible for the child's academic underachievement. The clinical psychologist conducted the standard test, viz., Wechsler Intelligence Scale for Children - Revised (WISC) [Indian adaptation by MC Bhatt], to determine that the child's level of intellectual functioning was average or above average (Global Intelligence Quotient score ≥85).[11] Children with borderline intellectual functioning and mild mental retardation (Global Intelligence Quotient scores <85) did not qualify for a diagnosis of SpLD.[1,9,10]

Curriculum-based assessments is a recommended method of diagnosing SpLD.[9,10,12] Employing a locally developed curriculum-based test, the special educator conducted the educational assessment in specific areas of learning, viz., basic learning skills, reading comprehension, oral expression, listening comprehension, written expression, mathematical calculation and mathematical reasoning. This test is a criterion-referenced test based on the state education board curriculum.

Composition of questionnaire and educational program

Both the questionnaire and the educational ! program were composed by the authors and ! were critiqued for validity and clarity by two ! experts in research methods [Tables 1, 2]. The ! structured educational program included the ! appropriate responses to the questionnaire. The ! program was devised to educate the parents ! about the 'core basic issues' regarding SpLD ! [Table 2]. The program aimed to make parents ! knowledgeable that their child's poor school ! performance was due to a 'real' disability which ! has a neural and genetic basis. Secondly, it ! aimed to educate parents about not only the ! importance and meaning of remedial education ! but also its optimum frequency and duration and ! that it should necessarily be given by a special ! educator. Thirdly, it aimed to educate parents ! about the meaning of, and need for, provisions. ! Lastly, it aimed to make parents aware that ! SpLD is a lifelong disorder.

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Parental comprehension of the content of the ! questionnaire was tested in a pilot study.

Table 1: Questionnaire used for the interview

No.	*Question asked*
1.	What is meant by the term "SpLD"?!
2.	What according to you causes SpLD?!
3.	What is the recommended treatment for SpLD and who ! gives it?
4.	What is meant by the term 'remedial education'? !
5.	How often and for how long should remedial education ! be continued?!
6.	What is meant by the term 'provisions' and what is their ! purpose?!
7.	Is SpLD a lifelong disorder?!

SpLD - Specific learning disability!

Table 2: Appropriate responses to the questionnaire

No.	*Appropriate response*
1	SpLD is a disorder characterized by persistent difficul-! ties in acquiring efficient reading ('dyslexia'), writing ! ('dysgraphia') and mathematical abilities ('dyscalculia') in ! children in spite of normal intelligence, adequate ! motivation and proper schooling.
2 !	Dysfunction in the child's brain causes SpLD, and it has a ! strong genetic basis.
3 !	Remedial education is the recommended treatment for ! SpLD. A special educator gives remedial education.
4	Remedial education is a form of education wherein ! specific teaching strategies are employed to reduce or ! eliminate the child's deficiencies in reading, writing and ! mathematics.
5	The child needs to undergo remedial education sessions ! twice or thrice weekly for a period of 1-3 years to achieve ! academic competence.
6	Provisions are adjustments in the curriculum that are ! available to a child with SpLD - for example, exemption ! from spelling mistakes, availing extra time or writer for ! written tests, dropping a language or having lower grade ! of mathematics. Their purpose is to enable the child ! achieve academic performance corresponding to his/ her ! intellectual ability and continue education in a regular ! mainstream school.
7 ! !	SpLD is a lifelong disorder. Even after adequate ! ! remedial education, subtle deficiencies in reading, writing ! and mathematical abilities persist.

SpLD - Specific learning disability

Initial interview

The initial interview was conducted using ! the questionnaire and was carried out by a ! single investigator (V.M.). It was conducted ! when the parent was visiting our clinic to ! receive the child's SpLD certificate. The ! parent's responses were noted down *'ad verbatim.'* The demographic data of the parents ! and children, viz., age, gender, educational ! status and socioeconomic status as per ! modified Kuppuswami's classification, was ! noted.[13,14] At the end of the interview, each ! parent was administered the educational ! program using 'flash cards' on which the ! appropriate responses to the questionnaire ! were displayed. The initial interview (15 to 20 min) and subsequent educational program (25 to 30 min) were generally conducted over a ! total period of 40 to 50 min.

Re-interview after education program

The parents served as their own controls and ! were interviewed 3 months apart, once before ! and once after the intervention, to eliminate the ! effects of prior knowledge on the study results. To ensure compliance, a telephone call was ! made by V.M. to each parent a few days before ! the post-intervention interview was due. The ! post-intervention interview was conducted by ! the same investigator (V.M.) over a period of ! 15 to 20 min.

Data analysis

The differences of parental responses to the ! questionnaire before and after the intervention ! were analyzed with the Chi-square (χ^2) test, ! using the Statistical Package for the Social ! Sciences program, version 11 for Windows ! (SPSS Ltd., Chicago, Illinois, USA). A two-tailed ! *P* value of <0.05 was used to define statistical ! significance; and confidence intervals and odds ! ratios were calculated.

RESULTS

Parental characteristics

All 50 parents followed up to answer the post-! intervention questionnaire [Table 3]. The 'mean ! age (years) ± SD' of mothers was 38.7 ± 4.7, ! fathers was 43.1 ± 4.7 and all parents was 40.3 ! ± 5.1. The mothers: fathers ratio was 1.78:1. All parents were literate, and 66% were either ! graduates or postgraduates, but none were ! doctors. All parents belonged to either the middle ! or upper socioeconomic strata of society.

SpLD children characteristics

All 50 children were studying in English-! medium schools situated in our city [Table 4]. In 48 children, a diagnosis of all three types of ! SpLD (dyslexia, dysgraphia and dyscalculia) ! was made; while in the remaining 2 children, ! a diagnosis of dyslexia and dysgraphia was ! made. The boys: girls ratio was 3.17:1. Only ! 6 (12%) children were below 10 years of age. Before referral to our clinic, 23 (46%) children ! had already been detained to repeat a class ! standard due to failure in their annual school ! examinations [Table 4]. Of these, 21 (42%) ! children had been detained once and 2 (4%) ! had been detained twice.

Impact of education program [Table 5]

1. *Definition of SpLD:* After the intervention, ! all the parents could correctly explain the ! term 'SpLD,' compared to 64% before !

Table 3: Demographic data of the parents

Parent characteristics	*Mothers*		*Fathers*		*All*	
	n = 32	*%*	*n = 18*	*%*	*n = 50*	*%*
Age (years) !					!	
30-<35	8	25.0	0	0.0	8	16.0
35-<40	15	46.9	5	27.8	20	40.0
40-<45	6	18.7	10	55.6	16	32.0
45-<50 !	3 !	9.4 !	1 !	5.5 !	4 !	8.0
50-<55 !	0 !	0.0 !	2 !	11.1 !	2 !	4.0
Educational status	!		!		!	
Middle school !	2 !	6.2 !	0 !	0.0 !	2 !	4.0!
Secondary school !	7 !	21.9 !	3 !	16.7 !	10 !	20.0!
Intermediate !	4 !	12.5 !	1 !	5.5 !	5 !	10.0!
Graduate !	16	50.0	!12	66.7	!28	56.0!
Postgraduate !	3 !	9.4 !	2 !	11.1 !	5 !	10.0!
Socioeconomic status			!		!	
Upper	14	43.7	8	44.4	22	44.0
Middle !	18	56.3	!10	55.6	!28	56.0
Lower !	0 !	0.0 !	0 !	0.0 !	0 !	0.0

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Table 4: Demographic data of the children with specific learning disability

Child characteristics	*Boys*		*Girls*		*All*	
	n = 38	*%*	*n = 12*	*%*	*n = 50*	*%*
Age (years)!						
8-<9 !	2 !	5.3 !	0 !	0.0 !	2 !	4.0!
9-<10 !	2 !	5.3 !	2 !	16.7 !	4 !	8.0!
10-<11 !	5 !	13.2 !	1 !	8.3 !	6 !	12.0!
11-<12 !	4 !	10.5 !	4 !	33.3 !	8 !	16.0!
12-<13	6	15.8	4	33.3	10	20.0!
13-<14 !	8 !	21.0 !	1 !	8.3 !	9 !	18.0!
14-<15 !	8 !	21.0 !	0 !	0.0 !	8 !	16.0!
15-<16 !	3 !	7.9 !	0 !	0.0 !	3 !	6.0!
Class in school !	!	!	!	!		
3rd !	2 (0)[a] !	5.3 (0.0)[b] !	1 (1)[a] !	8.3 (8.3)[b] !	3 (1)[a] !	6 (2.0)[b]!
4th !	2 (0) !	5.3 (0.0) !	1 (1) !	8.3 (8.3) !	3 (1) !	6 (2.0)!
5th !	7 (5) !	18.4 (13.2) !	2 (2) !	16.7 (16.7) !	9 (7) !	18 (14.0)!
6th !	5 (3) !	13.1 (7.9) !	3 (1) !	25 (8.3) !	8 (4) !	16 (8.0)!
7th !	7 (5) !	18.4 (13.2) !	3 (0) !	25 (0.0) !	10 (5) !	20 (10.0)!
8th !	7 (3) !	18.4 (7.9) !	2 (1) !	16.7 (8.3) !	9 (4) !	18 (8.0)!
9th !	6 (1) !	15.8 (2.6) !	0 (0) !	0 (0.0) !	6 (1) !	12 (2.0)!
10th !	2 (0) !	5.3 (0.0) !	0 (0) !	0 (0.0) !	2 (0) !	4 (0.0)!

Note: Figures in parentheses indicate number[a] and percentage[b] respectively of children who had experienced class detention!

Table 5: Parental responses to questionnaire before and after educational program

Question	*Responses before intervention*		*Responses after intervention*		*OR*[a]	*95% CI*	*P value*[b]
	Appropriate	*Inappropriate*	*Appropriate*	*Inappropriate*			
1 !	32 (64.0) !	18 (36.0) !	50 (100.0) !	0 (0.0) !	- [c] !	22.7-49.3	< 0.0001!
2 !	8 (16.0) !	42 (84.0) !	14 (28.0) !	36 (72.0) !	0.49 !	- 4.1-28.1 !	0.147!
3 !	33 (66.0) !	17 (34.0) !	45 (90.0) !	5 (10.0) !	0.22 !	8.5-39.5 !	0.004!
4 !	24 (48.0) !	26 (52.0) !	46 (92.0) !	4 (8.0) !	0.08 !	28.2-59.8 !	< 0.0001!
5 !	7 (14.0) !	43 (86.0) !	31 (62.0) !	19 (38.0) !	0.10 !	31.5-64.5 !	< 0.0001!
6 !	28 (56.0) !	22 (44.0) !	49 (98.0) !	1 (2.0) !	0.03 !	27.7-56.3 !	< 0.0001!
7 !	11 (22.0) !	39 (78.0) !	22 (44.0) !	28 (56.0) !	0.36 !	4.1-39.9 !	0.019!

OR - Odds ratio; CI - Confidence interval, [a]OR calculated by bivariate analysis. [b]χ^2 test; $P < 0.05$ significant. [c]OR cannot be ! computed. They are only computed for 2 × 2 tables without empty cells. Figures in parentheses indicate percentage.

the intervention; and this difference was ! statistically significant ($P < 0.0001$).

2. *Cause of SpLD:* Few (16%) parents were ! aware of the cause of SpLD before the ! intervention. Even the intervention failed to ! significantly improve the parents' knowledge ! about the cause of SpLD ($P = 0.147$).
3. *Recommended treatment for SpLD:* Even ! before the intervention, the majority (66%) ! of parents answered that 'some type of ! special education' was the treatment ! recommended for SpLD and that it was ! given by a 'specially trained teacher.' ! Although they did not state the terms ! 'remedial education' and 'special educator,' ! we have acknowledged that they were ! aware that treatment of SpLD requires ! something more than the regular education ! and that a teacher with specialized training ! gives it; therefore, we marked their ! responses as being appropriate. After ! the intervention, there was a significantly ! increased awareness amongst the ! parents that remedial education was the ! recommended treatment for SpLD and that ! it needs to be given by a special educator ! ($P = 0.004$). Also before the intervention, ! nine (18%) parents answered that private !

tuitions taken from the regular classroom ! teacher is the treatment for SpLD; but after ! the intervention, only two (4%) parents ! persisted in giving this wrong answer.

4. *Definition of remedial education:* After the ! intervention, 92% parents could correctly ! explain the term 'remedial education,' ! compared to 48% before the intervention; ! and this difference was statistically ! significant ($P < 0.0001$).
5. *Frequency and duration of remedial education:* Before the intervention, few ! (14%) parents were aware that a child ! with SpLD needs to undergo remedial ! education sessions twice or thrice weekly ! for a period of 1-3 years to achieve ! academic competence. Although 38% of ! the parents still remained unaware of the ! optimum frequency and duration of remedial ! education after the intervention, this was still ! a significant improvement as compared to ! the awareness level before the intervention ! ($P < 0.0001$).
6. *Meaning and purpose of provisions:* ! After the intervention, 98% parents could ! correctly explain the meaning and purpose ! of provisions, compared to 56% before ! the intervention; and this difference was ! statistically significant ($P < 0.0001$).
7. *Awareness of SpLD as a lifelong disorder:* ! Before the intervention, few (11%) parents ! were aware that SpLD is a lifelong disorder. ! After the intervention although 56% of ! the parents still remained unaware that ! even after adequate remedial education ! subtle deficiencies in reading, writing and ! mathematical abilities persist, this was still a ! significant improvement as compared to the ! awareness level before the intervention ($P =$! 0.019).

DISCUSSION

Although all the parents were literate (66% ! were highly educated) and economically well ! off, they lacked sufficient knowledge regarding ! the core basic issues of SpLD. It is important to note that before SpLD was suspected, ! 46% children had already repeated a class ! standard and 88% of children had already ! crossed the optimum age for effective remedial ! education. This indicates that not only parents ! but even school authorities in our city may be ! lacking sufficient knowledge regarding this ! invisible handicap. Our results indicate that the ! educational intervention significantly helped ! improve the parents' knowledge of (1) the ! meaning of the term 'SpLD,' (2) the fact that ! remedial education given by a special educator ! is the recommended treatment of SpLD, (3) the ! meaning of the term 'remedial education,' (4) ! the fact that remedial sessions are necessary ! twice or thrice weekly for a period of 1-3 years ! to achieve academic competence, (5) the ! meaning and purpose of provisions and (6) the ! fact that SpLD is a lifelong disorder.

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We believe that once parents are empowered ! with this core knowledge about SpLD right ! from the time of its diagnosis in their child, ! they would not only accept the diagnosis but ! also begin remedial education from a special ! educator without further delay and continue ! it for an adequate time period. Remedial ! education sessions are quite expensive in our ! city. (One session costs about Rs. 250). Parents ! once convinced that remedial education is the ! only recommended treatment for SpLD would ! also possibly not mind spending money on it. Parents would also not dissuade their child ! from availing provisions if their child's academic !

deficiencies continue (as they often do) in spite ! of remedial education.[1,2] Parental awareness ! of SpLD being a lifelong disorder would also ! empower them to guide their child select an ! appropriate career for adult life.

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The educational intervention failed to improve ! parental knowledge with regard to the fact that ! dysfunction in their child's brain causes SpLD ! and it has a strong genetic basis. We cannot ! explain the reasons for this, but it is possible ! that the concept of 'brain dysfunction' was too ! medical for parents to grasp and retain.

We cannot compare the present study with ! previous work because there isn't any. A ! detailed Medline search did not find any study ! which has evaluated parents' knowledge about ! SpLD at the time of diagnosis and evaluated ! the impact of an educational intervention on it.

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Our study has four limitations. First, some ! children with severe SpLD even with ! appropriate remedial education and provisions ! are still unable to cope up and need to ! continue their education in special schools.[1,2] ! We intentionally did not address the issue ! of severity of SpLD as there are no well-! established objective methods to measure ! severity and we did not want to include ! negative information in the educational ! program as we believed that such information ! could dishearten the parents. Second, we ! did not attempt to educate the parents about ! attention deficit hyperactivity disorder, which ! is a comorbid condition found in 12-24% of ! children with SpLD.[1,2] We felt that including ! information about attention deficit hyperactivity ! disorder would make the educational program ! complicated. Third, because of lack of facilities ! and funds, the interviews could not be recorded ! with a tape recorder for later analysis by an ! unbiased investigator. Lastly, although we ! took care to eliminate the effects of prior ! knowledge on the study results, it is possible ! that after the educational intervention some ! parents might have on their own made efforts ! to get better informed about SpLD by reading ! articles or browsing the internet. Both ethically ! and practically, it would have been improper to ! disallow parents from getting better informed ! about SpLD. However, we would like to believe ! that our educational intervention could have ! inspired these parents to learn more about ! SpLD. We have no reason to believe that these ! limitations adversely affect the utility of our ! results. Both due to the limitations as outlined ! above and the general paucity of data, there is ! a need for further study of this topic in SpLD ! clinics situated all over the world.

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To conclude, implementation of educational ! intervention will enable parents to help their ! children overcome this hidden disability and ! become well-adjusted individuals as they ! mature into adulthood.

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