

Impact of a short term awareness teaching programme on primary and middle school teachers about the neurological factors that affect learning disability

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ABSTRACT

Background: Needs of children with specific learning disability (SLD) should be noticed and answered in the regular school. **Objective:** We aimed to find out the knowledge among school teachers about neurological factors that affect SLD. Our secondary objective was to find the effect of short-term teaching on their knowledge. **Materials and Methods:** We chose an observational study design. A total of 51 teachers of standard 1–7, from a Central board of Secondary Education school, an Indian Certificate of Secondary Education school and a state syllabus school participated. They were grouped as pre-primary, primary, and middle school. The participants were trained at their respective schools. The training program consisted of didactic lectures, case discussions, and group discussions about SLD from a multidisciplinary perspective, spanning over 3 days. A total of two questionnaires were administered to the teachers; one before and one after the 3 days training. **Results:** The mean scores obtained by the pre-primary teachers before and after training were 3.69 and 5.69, respectively (significant at 1% level of significance). The primary school teachers scored a mean of 3.44 before training and 5.11 after, with statistically significant improvement. In the pre- and post-test scores of middle school teachers (4.29 and 5.35), though improvement in knowledge was seen, it was not statistically significant. **Conclusion:** The fact that a short-term teaching program for teachers regarding the neurological aspects of SLD was effective, underscores need for regular teaching programs for all teachers. It would be ideal if the knowledge is imparted in the curriculum during basic teacher training so that all answers would be right prior to the in-service training.

Key words: Knowledge, Neurological factors, Specific learning disability, Teacher training program

Specific learning disability (SLD) encompasses specific language impairment (SLI) and developmental dyslexia. When oral language development lags behind other areas of development for no reason and cannot be explained by developmental disorders or sensory impairment, it is referred to as SLI. These children have difficulty with the production and comprehension of spoken language. Tomblin has estimated the prevalence of SLI as 7% [1]. Children with developmental dyslexia have poor literary skills in spite of normal intelligence and learning opportunity with phonological processing defects traditionally linked to it (non-phonological skills being preserved) [2]. DSM-5 considers SLD to be “a type of neurodevelopmental disorder that impedes the ability to learn or use specific academic skills (e.g., reading, writing, or arithmetic), which are the foundation for other academic learning” [3]. Although environmental factors such as parental deprivation, severe malnutrition, and educational opportunities can lead to scholastic underperformance, they can never be the primary cause of a specific learning disorder for which there are proven underlying neurological substrates [2,4].

An Indian study done in 2015 showed that the awareness among school teachers about SLD was poor [5]. An Ethiopian study revealed that the experience of the teacher was significantly associated with the perception of the child’s health problems and that school-based mental health programs were important to improve the teacher’s knowledge [6]. An analytical study on teacher’s knowledge regarding SLD revealed that 72% of teachers before training believed that the environment in which the children lived determined scholastic difficulties in all children [7].

The child with SLD may have no other illness and therefore may not even visit a doctor. When a child enters academics and starts to experience difficulties, his teacher may be the only person who can identify his learning difficulties. Hence, the teacher needs to be empowered to identify SLD. We aimed to find out the knowledge, among school teachers about the neurological factors that affect learning disability. Our secondary objective was to find out the effect of short-term teaching on the basic knowledge of these teachers.

MATERIALS AND METHODS

An observational study was undertaken on school teachers using the questionnaire method in May 2014. The inclusion criteria included primary, pre-primary, and middle school teachers of any age group teaching in three English medium schools and who consented to participate. The exclusion criteria were teachers who could not spare time or who were absent on the day of data collection and those teachers who were not well versed in English language.

A sample of 65 teachers was taken from among the teachers of standard 1–7, from a Central board of Secondary Education school, an Indian Certificate of Secondary Education school and a state syllabus school. There were 14 proformas which were incomplete and excluded. The 51 teachers included in the study, were grouped as pre-primary, primary, and middle school depending on the class they engaged. The participants were given the questionnaires and trained at the schools where they were employed.

The training program consisted of didactic lectures, case discussions, case reports, and group discussions about SLD from a multidisciplinary perspective spanning over 3 days of 6 h each. A total of two questionnaires were administered to the teachers; one before the 3-day intensive training program on SLD, specifically conducted for their empowerment and one after the training program. The questionnaire was developed by item generation through interview with pediatricians, neurologists, special educators, speech therapists, and psychologists, and literature review. The questionnaire was validated in terms of content validity through expert reviews. There were eight questions (with dichotomous, yes/no answers), regarding the medical and neurological aspects of SLD. Each correct response obtained a score of 1 and an incorrect response was scored as 0. The questionnaires were filled in by the participants themselves with help from the investigators when necessary. Table 1 shows the questions used.

Descriptive analysis included mean and standard deviation. To analyze the improvement following training, paired sample t-test was performed on the pre-post scores of the three groups of teachers separately. IBM® SPSS® Statistics 25.0 was used for data analysis. $p < 0.05$ was considered statistically significant.

RESULTS

A total of 51 teachers were included in the study. The results of the comparison of the pre-post training scores are depicted in Table 2. The mean scores obtained on the questions by the pre-primary teachers before and after training were 3.69 and 5.69, respectively, indicating a significant improvement in their post-test scores at 1% level of significance. The knowledge of the pre-primary and primary teachers about neurological factors influencing SLD improved significantly through the training. In the pre- and post-test scores of middle school teachers (4.29 and 5.35), though improvement in knowledge was seen, it was not statistically significant. This could be due to the fact that their initial knowledge of the subject was higher than their pre-primary and primary school teaching counterparts.

Further analysis of the effectiveness of the questionnaire and the relevance of the questions included the pre-post comparison of each question done using paired sample t-test (Table 3). Significant improvements in scores were seen with questions 1, 2, 3, 4, and 7 (1% level of significance). For question 6, the mean score before training was 0.31 and after training was 0.41. Although minimal improvement was perceived, the difference in value was statistically significant. No change in scores was seen for questions 5 and 8 before and after training.

Table 1: The questionnaire

Number	Question	Answer
1	Specific learning disability is a neurological disorder	Yes/No
2	A child with a learning disability can have subtle neurological signs	Yes/No
3	A form of epilepsy called absences can result in the child being vacant for a moment with no attention for seconds	Yes/No
4	A child with hyperactivity and a learning disorder could be having an underlying metabolic disorder	Yes/No
5	Thyroid deficiency can result in learning difficulty	Yes/No
6	Stimulant medication is of no use to enhance learning capacity of a child with specific learning disability	Yes/No
7	Undiagnosed refractory error in the eye can result in learning disability if not corrected with glasses	Yes/No
8	There is a single center responsible for reading, writing, and calculation in the brain	Yes/No

Table 2: Comparison of the scores before and after training

Variables	Before training	After training	“t”	p value
	Mean±SD	Mean±SD		
Pre-primary, n=16	3.69±2.60	5.69±1.25	-3.10	$p < 0.01$
Primary, n=18	3.44±1.89	5.11±1.32	-3.59	$p < 0.01$
Middle school, n=17	4.29±2.20	5.35±0.86	-1.76	$p > 0.01$

Table 3: Comparison of the difference in scoring before and after training for each question

Question	Before training	After training	t	p value
	Mean±SD	Mean±SD		
1	0.55±0.50	0.84±0.37	-3.65	$p < 0.01$
2	0.43±0.50	0.86±0.35	-5.72	$p < 0.01$
3	0.61±0.49	0.90±0.30	-3.65	$p < 0.01$
4	0.49±0.51	0.75±0.44	-3.06	$p < 0.01$
5	0.47±0.50	0.47±0.50	0.00	$p > 0.01$
6	0.31±0.47	0.41±0.50	-1.22	$p > 0.01$
7	0.71±0.46	0.90±0.30	-3.13	$p < 0.01$
8	0.24±0.55	0.24±0.43	0.00	$p > 0.01$

DISCUSSION

The results show that the baseline knowledge of school teachers regarding neurological aspects of learning disability is low, with the middle school teachers who were best, scoring only half of the expected score. This has been explained by Lingeswaran in his study as the lack of feeling among the teachers to be aware about SLD [8]. Bhasin *et al.* in their review showed a poor knowledge and attitude among school teachers regarding the association between SLD and attention deficit hyperactivity disorder and that there was improvement in the teachers' knowledge about the same following a training session [9]. Lopez *et al.* in their series highlighted the remarkable effect of a short-term training program for teachers, including change in their knowledge about the neurobiological basis and associations of SLD [7].

The observation that the answers to three specific technically more difficult questions did not improve with the training is noteworthy. Questions 5 and 8 were more technical and referred to hypothyroidism, leading to learning disability and about the fact that there are distinct centers that deal with reading, writing, and mathematics in the brain. The anatomical basis of SLD though well enunciated in the classes was not registered by the majority of the participants as question 8 was more often wrong in the responses. The anatomical basis needs to be better elucidated with better figures and examples so that the biological basis of learning and the pathophysiology of SLD are clear to the participants (who are non-medicals). The teaching program should devote more time to create awareness that hypothyroidism, a treatable medical problem which can result in SLD.

Question 6 dealt with the usefulness of stimulant medication in children with SLD. This fact besides being a medical fact perhaps was not acceptable to the teachers who would imagine a child who sits in class "drugged and sleepy."

The results also revealed that the middle school teachers had better awareness about the neurological basis of SLD possibly built up over the years based on experience with learning disabled children. Possibly, they also had more reason to be aware of SLD and catered to higher classes (hence, more likely to pick persistent academic skill deficits). Reevaluation showed that the impact of the teaching program was less among the middle school teachers possibly due to the fact that their baseline knowledge was more. However, children with SLD would benefit from early intervention and therefore awareness of the neurological basis of SLD should be part of the teacher training curriculum and not awareness built up over the years based on experience. The difference in the knowledge level between primary and pre-primary teachers and middle school teachers has to be further examined so that the training of the former group can be better structured.

On reevaluation after a teaching program, the pre-primary and primary teachers showed a statistically significant increase in their knowledge as seen by Bhasin *et al.*, Kamala *et al.*, and Williams *et al.* [9-11]. Our finding highlights the effectiveness of intensive coaching of school teachers regarding the neurological basis of SLD,

the neurological diseases that can lead to SLD, and the possibility of some drug intervention. The same opportunity can be used to empower the teacher to look for soft signs to pick up remediable causes such as hypothyroidism, refractory error, or inborn errors of metabolism.

The limitations of the study include the fact that three urban schools alone were studied. The results cannot be extrapolated to rural schools. The sample was voluntary and not randomized nor taken by lottery method. A sample size calculation based on this study with a larger sample would yield better results. Increase in knowledge regarding SLD and its neurological basis among pediatricians and physicians is also of paramount importance and similar studies should be undertaken among them.

CONCLUSION

The fact that a short-term teaching program for teachers in three schools regarding the neurological aspects of SLD was effective, underscores the need for regular teaching programs for all teachers. It would be ideal if the knowledge is imparted in the curriculum during basic teacher's training so that all answers would be right before the in-service training.

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