Section: Psychiatry

Original Research Article

PREVALENCE AND ASSOCIATION OF SOCIO-DEMOGRAPHIC FACTORS OF SPECIFIC LEARNING DISABILITY AMONG PRIMARY SCHOOL CHILDREN IN PUDUCHERRY – A CROSS-SECTIONAL STUDY

Maheswari Karunanidhi[1], Agila Chandran[2], Katkuri Sandeep Reddy[3], Kumaran.S.S[4], Dinesh Kamalakannan[5]

[1]Professor and HOD, Department of Paediatrics, Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry, India.
[2]Associate Professor, Department of Paediatrics, Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry, India.
[3]Senior Resident, Department of Paediatrics, Andaman and Nicobar Institute Of Medical Sciences, Port Blair, India.
[4]Professor, Department of Paediatrics, Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry, India.
[5]Associate Professor, Department of Paediatrics, Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry, India.

Received : 09/02/2026
Received in revised form : 02/04/2026
Accepted : 20/04/2026

Keywords:
Specific learning disorder, reading, writing, mathematics, SLD-SQ, NIMHANS index, early screening, neuro-developmental disorders.

Corresponding Author:
Dr. Maheswari Karunanidhi,
Email: maheswarijipmer97@gmail.com

DOI: 10.47009/jamp.2026.8.3.3

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2026; 8 (3); 12-17

ABSTRACT

Background: Specific learning disorder (SLD) is a neurodevelopmental disorder characterized by impairment in reading, written expression, and mathematics. **Aims:** This study aims to find prevalence of SLD and its determinants among the school-going children in Puducherry. **Settings and Design:** A cross sectional study was done on school-going children from first standard to sixth standard. Convenient sampling was used. **Materials and Methods:** The screening was done using SLD-SQ screening tool, and diagnosis was made using the NIMHANS index for SLD. Seguin Form Board Test was used to evaluate intelligent quotient. **Statistical analysis used:** Chi-square tests were used .A p-value <0.05 will be considered statistically significant. All the data will be entered in Excel and analyzed using IBM SPSS version 25. **Results:** The prevalence of SLD was 13.6%. The highest prevalence was noted in impairment of reading and comprehension domain (67.3%), followed by mathematic domain (36.5%), written expression with 32.7% and finally spelling difficulty was noted in 7%. There was a significant association between younger age category, low socio-economic status, father's occupation, male gender and SLD. The obstetric determinants were low birth weight, presence of developmental delay, lower birth order, preterm children that showed a strong association with SLD. **Conclusions:** The study found a higher prevalence of SLD (13.6%) and various modifiable determinants of SLD were identified. It highlights the need for early detection and remedial interventions for children with SLD.

INTRODUCTION

Specific learning disorder (SLD) is a neurodevelopmental disorder characterized by impairment in reading, written expression, and mathematics. The types of SLD are dyslexia, dysgraphia, dyscalculia, and auditory processing disorder, language processing disorder, nonverbal learning disabilities visual perceptual or visual motor deficit.[1,2] The prevalence of the specific learning disability in India varies between 5% and 15%.[3] Among the different specific learning disabilities, dyslexia, also known as specific reading disability, is the most common form of the specific learning disability. The prevalence of dyslexia was found to be 11.2%. In contrast, the prevalence of other learning disabilities, such as dysgraphia and dyscalculia, was found to be 12,5% and 10.5%, respectively. The prevalence of the combination of the disorder was estimated to be around 7.5% in studies done in the southern part of India.[4,5] NIMHANS SLD battery was used, any score of more than 40% is considered a person with a disability .Level I is for the 5 to 7 years age group, and level II is for the 8 to 12 age group. There are various tests at each level.[6] Symptoms in school-

ISSN (O): 2687-5365; ISSN (P): 2753-6556

going children are reading below the expected level for the age, unable to remember the sequences, problem in visualizing the similarities and the differences in letters and words, difficulty in spelling words, difficult to read the one syllable words such as mat or tap, difficulty in connecting sounds and also letters, difficulty in sequencing the numbers and letters. Since the research on Specific learning disorders in southern part of India is less henceforth this study is necessary to fill the lacunae.

MATERIALS AND METHODS

This cross-sectional study was carried out from June 2022 to December 2023, among children studying in the 1st standard to the 6th standard in 6 private (both financially aided by government and unaided by the government) and government schools in Puducherry. The sample contained children from 5–12 years of age. Informed consent was obtained from all individual participants' parents included in the study. Children with visual, hearing, or locomotor impairments, Children diagnosed with autism and attention deficit hyperactive disability, that interfere with the assessment; children above 12 years of age; children from whose parents a valid consent could not be obtained were excluded from the study. The sampling technique adopted was convenient sampling. Sample Size was calculated to be 382(calculated by d=0.0358, z=1.96, p=.14.99), considering prevalence as 5 to 15 %. The questionnaire and methodology for this study was approved by the Scientific Research Committee and the Institute Ethics Committee of the Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry. The study was conducted using a triphasic approach as shown in Fig-1.

1. In the first phase, the screening was done by the teachers, and the primary demographic details of the students were obtained with written consent from the parents. The children's socioeconomic status was determined using the Modified BG Prasad Classification. In this screening, a Specific Learning Disability Questionnaire was given to the teachers to assess the children. It consisted of 10 questions, and the children scoring more or equal to six were considered "at-risk" children and were subjected to the second level of the evaluation.
2. In phase II, the children were evaluated using a specific learning disability screening questionnaire with the help of the teachers. An off score of four or more was considered indicative of the possibility of having a specific learning disability. The children who were found to be positive for the specific learning disability screening questionnaire were subjected to a physical examination, vision, hearing evaluation, and intelligence quotient assessment. The visual assessment was done using the Snellen chart. And the visual acuity of less than 6/60 had been considered abnormal and is the cut-off for low vision according to ICD-10. The hearing assessment was conducted during the Tuning fork test using 512 Hz tuning for Rinne's test, and the Weber test was used to define hearing loss. The hearing was confirmed as impaired if the test was abnormal. The intelligence quotient was assessed with the Seguin Form Board Test. such to look for visual and motor skills, eye-to-hand coordination, visual and spatial perception, cognition speed and accuracy of the children in performing specific skills. And the study takes an intelligence quotient of less than 90 as low intelligence.[7]
3. In the phase III evaluation, the children were subjected to the NIMHANS-specific learning disability index, consisting of eight components. The eight main components used in the index are attention, visual discrimination, visual memory, auditory discrimination, auditory memory, speech and language, visuo-motor skills and the patient's writing skills. The children who do not perform adequately have specific learning difficulties.[8] All three phases were completed in 45 minutes.

Figure 1: Study Procedure

Statistical Analysis: For continuous variables, mean, standard deviation and range were calculated. The values obtained from the specific learning disability questionnaire can be measured by frequency and percentage. Chi-square tests were used to determine the association between the

ISSN (O): 2687-5365; ISSN (P): 2753-6556

various factors involved in the study. A p-value <0.05 will be considered statistically significant. All the data will be entered in Excel and analyzed using IBM SPSS version 25.

RESULTS

The total number of filled up screening proforma collected was 400. We had to exclude 18 proforma as we could not get some children for individual assessment. The final sample available for analysis was 382. During the evaluation of the children for the specific learning disability, about 40.1% were screened positive for the specific learning disability in Phase I. In Phase II and III of the evaluation, about 13.6% of the children were positive for the specific learning disability shown in fig 2. Table 1 shows SLD was found in 8.4 % children in age group of 5-7 years .SLD was found more in male gender 10.5%. SLD was prevalent in first standard 5.2% followed by 4th standard 2.1%. Class 4 socio-economics status had SLD prevalence 7.1% followed by class 3 with 3.4%. SLD prevalence in rural area was 9.2% and urban being 4.4%. Children with left hand dominance had 7.8% and children with right hand dominance had 5.8% prevalence. SLD prevalence in consanguinity was 10.5%. 5.2% of children had SLD whose father were unskilled labourers as shown in figure 3.

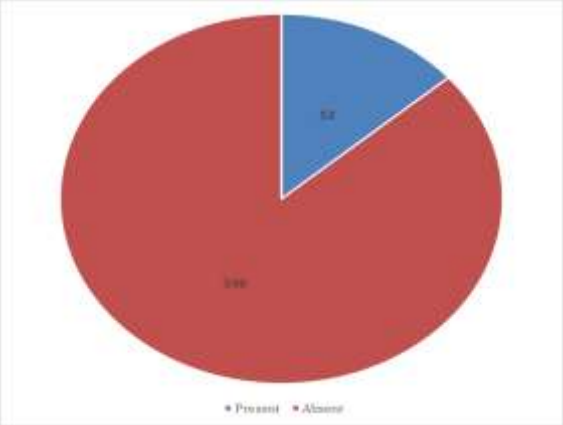

Figure 2: Distribution of children based on the diagnosis of specific learning disability

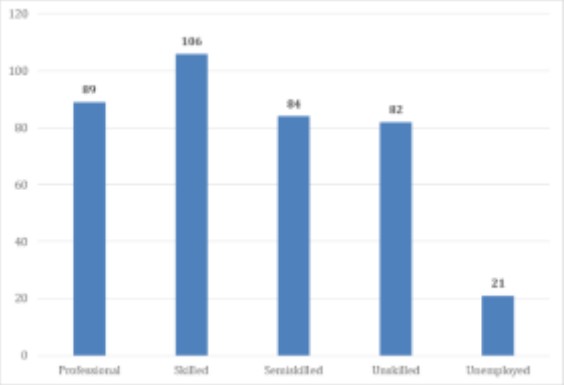

Figure 3: Relationship between father 's occupation and Specific Learning Disability

6.5% of third birth order children had SLD, followed by 4.4 % of second birth order.7.6% of children with history of preterm delivery had SLD followed by post term 4.4% followed by term 1.6%. 7.9% of children had SLD who were delivered by cesaerean section followed by normal delivery 5.8%. 10.9% of children with SLD were low birth weight children followed by 2.6 % of normal birth weight children had SLD. Among the diagnosed SLD children 11.3% had delayed milestones; only 2.3% had normal milestones as shown in Table-2

Table -3. On evaluating the types of learning disabilities among the patients with the specific learning disability, about 67.3% of the learning disability person had difficulty in reading and comprehension, respectively, followed by 36.5% of the patients had problems with arithmetic and 32.7% of the children had difficulties in writing and spelling difficulty was noted in only 7.3% of the patients with specific learning disability.

Table 1: Socio-demographic variables and presence Specific learning disabilities

Variables	Group	SLD Present		SLD Absent		Chi square p-value
		N	%	N	%	
Age in years	7-May	32	8.4	113	29.6	0.001*
	10-Aug	12	3.1	109	28.5	
	12-Nov	8	2.1	108	28.3	
Gender	Male	40	10.5	185	48.4	0.004*
	Female	12	3.1	145	37.9	
Standard	I	20	5.2	50	13.1	0.001*
	II	7	1.8	77	20.1	
	III	5	1.3	51	13.3	
	IV	8	2.1	59	15.4	
	V	4	1.1	53	13.8	
	VI	8	1.1	40	10.5	
Socio-economic status	Class I	5	1.3	84	21.9	0.001*
	Class II	7	1.8	73	19.1	

ISSN (O): 2687-5365; ISSN (P): 2753-6556

	Class III	13	3.4	98	25.6	
	Class IV	27	7.1	75	19.6	
Locality	Urban	17	4.4	218	57.1	<0.001*
	Rural	35	9.2	112	29.3	
Handedness	Right	22	5.8	299	78.3	<0.001*
	Left	30	7.8	31	8.1	
Consanguinity	Present	40	10.5	27	7.1	<0.001*
	Absent	12	3.1	303	79.3	

P<0.05, SLD – specific learning disorder

Table 2: Obstetric determinants of specific learning disability

Variables	Group	SLD Present		SLD Absent		Chi square p-value
		N(Frequency)	Percentage %	N(Frequency)	Percentage %	
Birth order	I	10	2.6	186	48.7	<0.001*
	II	17	4.4	109	28.5	
	III	25	6.5	45	11.8	
Timing of delivery	Preterm	29	7.6	59	15.4	<0.001*
	Term	6	1.6	218	57.1	
	Post-term	17	4.4	53	13.9	
Mode of delivery	Normal	22	5.8	222	58.1	0.001*
	Caesarean	30	7.9	108	28.3	
Birth weight	Low (<2.5 kg)	42	10.9	46	12.1	<0.001*
	Average (>2.5kg)	10	2.6	284	74.3	
Milestones	Normal	9	2.3	278	72.8	<0.001*
	Delayed	43	11.3	52	13.6	

P<0.05, SLD – specific learning disorder

Table 3: Types of Specific Learning Disorders in Various Categories

Break up learning disabilities.	Frequency (n)	Percentage (%)
Reading	35	67.3
Comprehension	35	67.3
Arithmetic	19	36.5
Spelling	28	7.3
Writing	17	32.7

(Nimhans Sld Index) (N=52)

DISCUSSION

Three hundred eighty-two students from five schools in Puducherry participated in the study. Overall prevalence of SLD in our study was found to be 13.6%. which was higher in comparison to a study done in school going children in Puducherry that is 7.5%.[9] But our results were matching a study done in Turkey.[10] A study showed prevalence of SLD in a city in southern India, was found to be 16.49%.[3] We had similar results to a study done in NIMHANS Bangalore found the prevalence of SLD to be 12%, and a study done at Varanasi found the prevalence of SLD as 13%.[8,11] We have used different diagnostic tools and different background characteristics in the populations were studied. An important observation was the children with SLD had never been evaluated or identified as having SLD earlier, and were not undergoing any remedial education. This shows the lack of a system for early identification of SLD and a lack of awareness about SLD among teachers and parents. The studies for early detection for SLD in this region of south India is also very less.

We found a strong association between specific learning disability in 5 to 7 years of age. This matches with a study done in Kerala, where they found majority of lower primary school children had SLD.[3] The study also showed a significant association between gender and the presence of a specific learning disability, with majority being boys 48.4%. This finding is similar to the previous studies done in this geographical location.[12,13] Also we found a significant association between specific learning disability and 1st standard children. Hence earlier screening and interventions are required especially in primary schools of this particular region. This matches with other studies which showed that SLD is much common in younger age groups.[3]

The study showed a significant association between Specific Learning disorders and majority of children in Class IV socio-economic status than other socio-economic classes. This matches with a study that showed a significant association between specific learning disability and children in rural areas.[13] So many of the students who participated in our study belonged to urban areas And this is in contrast to a study where majority (40.34%) of the students who had SLD were from the municipality regions.[3]

There was a significant association between children who were left-hand dominant and specific learning disability. On exploring the children's handedness, about 84.1% were right-handed, and the left-handed children contributed to only 15.9% of the study population. Our findings are also consistent with a study that demonstrated most of the children were found to be right-handed.[14]

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Our study showed a significant association between consanguinity and the presence of a specific learning disability. Similarly certain studies showed consanguinity is one of the well-known risk factors for many genetic disabilities, including diseases and syndromes.[15,16] Another study showed that consanguineous marriage among the Arab community leads to the development of reading disability among their offspring compared to non-consanguineous children.[17] We found a significant association between the father's occupation and the presence of a specific learning disability. Higher number of students had specific learning disorder whose fathers were unskilled labourers followed by the children of the unemployed parents.[10,16] The perception of the father regarding the specific learning disability also plays a vital role in the pathology. Our study showed a significant association between the birth order and the development of the specific learning disability. In our study, the increase in the birth order was associated with increased disease development. This is consistent with a study that also showed a significant association between the order of birth and the development of the specific learning disability.[2]

A significant association was seen in the children who were born preterm and prevalence of SLD. Moreover, SLD was more common in children with preterm birth and a previous study also gave the same finding.[18] Our study finds a significant association between the children born by caesarean section and SLD which was similar to a study done in Edirne.[10] This study finds a significant association between low birth weight and specific learning disability similar to other studies.[16,18,19,20] The study showed a significant association between the attainment of milestones by children and the presence of a specific learning disability; majority of the children with delayed milestones had specific learning disability .Our study showed a definite relationship between SLD and developmental delay, which is similar to the findings of other studies.[16,19,21] The antenatal risk factors associated with SLD were prematurity, low birth weight, and a history of hypoxia.[22]

While evaluating the types of learning disabilities among the patients with the specific learning disability in our study, about 67.3% of the learning disability person had difficulty in reading and comprehension, respectively, followed by 36.5% of the patients had problems with arithmetic and 32.7% of the children had difficulties in writing and spelling difficulty was noted in only 7.3% of the patients with specific learning disability. Similar to our study, another study done in South India also showed that about 63.3% of the total study population had problems with reading and comprehension, respectively, followed by 48.3% of the children had problems with spelling the words, and 28.3% of the population had difficulty in writing and 23.3% of the children had difficulty in doing arithmetic sums.[23] Another study done in primary school children in South India, showed the prevalence of dyslexia, dysgraphia, and dyscalculia has been reported to be 11.2%, 12.48%, and 10.5%, respectively. In our study, about 7% of the children had all three types of specific learning disability such as dyslexia, dysgraphia and dyscalculia contrastingly a study showed 65.7% of children had a combination of all three types of SLDs.[24] Some study suggested that the comorbidity of arithmetic and spelling disorder may be more strong and biologically mediated than the comorbidity of arithmetic and reading disorder.[25] The findings of our study conducted in community, showed that specific learning disability was not identified even till later age.[26] In studies conducted in different countries, the prevalence rates of subtypes of SLD were found to be different from each other, and it may be due to the differences in diagnostic tools used.[12,13,16]

CONCLUSION

The prevalence of the specific learning disability among school children was found to be 13.6%. There was a significant association between younger age category, low socio-economic status, father's occupation, male gender and SLD. The obstetric determinants were low birth weight, presence of developmental delay, lower birth order, preterm children that showed a strong association with SLD. Due to the lack of awareness regarding the specific learning disability among the parents and teachers, this problem mostly remains unnoticed, affecting the quality of life of the children and their academic growth. So, there is a need to screen children early, diagnose them with specific learning disabilities, and take appropriate remedial measures to improve their quality of life. Every Paediatrician can facilitate early detection of SLD by: (i) enquiring about the child's school performance during a consultation, and (ii) guiding the parents for getting their child's psycho-educational assessment done, when SLD is suspected. It is well known that favorable outcome of SLD is dependent on a supportive home and school environment. The Paediatrician should counsel the parents and class teacher of a child with SLD about the need for remedial education and provisions, and monitor the child's academic progress on a long term basis.[27]

Strength of the Study: The obstetric determinants were low birth weight, presence of developmental delay, lower birth order, preterm children that showed a strong association with SLD which becomes the highlight of your study. These factors can be worked by a good pre-natal care of the mother. We did an early screening and in turn we got an early diagnosis which can help the children getting remedial classes and intensive training to achieve on par excellence alongside their peers. All

ISSN (O): 2687-5365; ISSN (P): 2753-6556

these measures in turn can improve their quality of life.

Limitations: We could not assess the severity of SLD due to the non-availability of a validated tool for the same. A larger sample size could have shown more prevalence of SLD. Although neurodevelopmental disorders coexist, we were unable to assess the comorbidities of SLD as we had put them under exclusion.

Institutional Review Board: This is to certify that the project entitled " Prevalence and socio-demographic profile of school-going children with learning disablilities in Puduchery" submitted by " Dr. Katkuri Sandeep Reddy, principal investigator " , Department Of Paediatrics, under the guidance of " Prof. Dr. Kumaran.S.S" has been approved by the Institutional Ethics committee at its meeting held on 07-07-2022 at SLIMS.

Ethical Committee approval Number: IEC/C-P/10/2022

Statements and Declarations: Competing Interests and Funding:

Funding: No funds, grants, or other support was received.

Compliance with ethical standards:

Disclosure of potential conflicts of interest: The authors have no relevant financial or non-financial interests to disclose.

Informed Consent: Informed consent was obtained from all individual participants' parents included in the study

Conflict of Interest: The authors have no relevant financial or non-financial interests to disclose.

REFERENCES

1. Harm M, Hope M, Household A. American psychiatric association, 2013, diagnostic and statistical manual of mental disorders, 5th edn, Washington, DC: American psychiatric Association Anderson, J, Sapey, B, Spandler, H (eds.), 2012, Distress or Disability?, Ancaster: Centre for disability research. Arya. 2013;347:64.
2. Bandla S, Nappinnai NR, Gopalasamy S, Avula VC. Prevalence of specific learning disorders in school children in a South Indian city. Archives of Mental Health. 2023 Jul 1;24(2):128-32.
3. Chacko D, Vidhukumar K. The prevalence of specific learning disorder among school-going children in Ernakulam district, Kerala, India: Ernakulam learning disorder (ELD) study. Indian journal of psychological medicine. 2020 May;42(3):250-5.
4. Scaria LM, Bhaskaran D, George B. Prevalence of specific learning disorders (SLD) among children in India: A systematic review and meta-analysis. Indian journal of psychological medicine. 2023 May;45(3):213-9.
5. Mogasale VV, Patil VD, Patil NM, Mogasale V. Prevalence of specific learning disabilities among primary school children in a South Indian city. The Indian Journal of Pediatrics. 2012 Mar;79(3):342-7.
6. Balakrishnan A, Kulkarni K, Moirangthem S, Kumar CN, Math SB, Murthy P. The rights of persons with disabilities Act 2016: Mental health implications. Indian Journal of Psychological Medicine. 2019 Mar;41(2):119-25.
7. Koshy B, Mary TT, Samuel P, Sarkar R, Kendall S, Kang G. Seguin Form Board as an intelligence tool for young children in an Indian urban slum. Family Medicine and Community Health. 2017 Dec 1;5(4).
8. Kapur M, John A, Rozario J, Oommen A. NIMHANS Index of Specific Learning Disabilities Bangalore: Department of Clinical Psychology. NIMH ANS. 1991.
9. Chordia SL, Thandapani K, Arunagirinathan A. Children 'at risk'of developing specific learning disability in primary schools. The Indian Journal of Pediatrics. 2020 Feb;87(2):94-8.
10. Görker I, Bozatli L, Korkmazlar Ü, Karadağ MY, Ceylan C, Söğüt C, Aykutlu HC, Subay B, Turan N. The probable prevalence and sociodemographic characteristics of specific learning disorder in primary school children in Edirne. Archives of Neuropsychiatry. 2017 Nov 8;54(4):343.
11. Agarwal KN, Agarwal DK, Upadhyay SK, Singh M. Learning disability in rural primary school children. The Indian Journal of Medical Research. 1991 Apr 1;94:89-95.
12. Moll K, Kunze S, Neuhoff N, Bruder J, Schulte-Körne G. Specific learning disorder: Prevalence and gender differences. PLoS one. 2014 Jul 29;9(7):e103537.
13. Rutter M, Caspi A, Fergusson D, Horwood LJ, Goodman R, Maughan B, Moffitt TE, Meltzer H, Carroll J. Sex differences in developmental reading disability: new findings from 4 epidemiological studies. JAMA. 2004 Apr 28;291(16):2007-12.
14. Scharoun SM, Bryden PJ. Hand preference, performance abilities, and hand selection in children. Frontiers in psychology. 2014 Feb 18;5:82.
15. Saad HA, Elbedour S, Hallaq E, Merrick J, Tenenbaum A. Consanguineous marriage and intellectual and developmental disabilities among Arab Bedouins children of the Negev region in southern Israel: a pilot study. Frontiers in public health. 2014 Jan 28;2:3.
16. Bozatlı L, Aykutlu HC, Sivrikaya Giray A, Ataş T, Özkan Ç, Güneydaş Yıldırım B, Görker I. Children at risk of specific learning disorder: A study on prevalence and risk factors. Children. 2024 Jun 22;11(7):759.
17. Abu-Rabia S, Maroun L. The effect of consanguineous marriage on reading disability in the Arab community. Dyslexia. 2005 Feb;11(1):1-21.
18. Taylor HG, Espy KA, Anderson PJ. Mathematics deficiencies in children with very low birth weight or very preterm birth. Developmental disabilities research reviews. 2009;15(1):52-9.
19. Singh S, Sawani V, Deokate M, Panchal S, Subramanyam AA, Shah HR, Kamath RM. Specific learning disability: A 5 year study from India. Int J Contemp Pediatr. 2017 May;4(3):863-
20. Johnson EO, Breslau N. Increased risk of learning disabilities in low birth weight boys at age 11 years. Biological psychiatry. 2000 Mar 15;47(6):490-500.
21. Shaywitz SE. Dyslexia. New England Journal of Medicine. 1998 Jan 29;338(5):307-12.
22. Sharma N, Petchimuthu P, Gaur A, Kumar R. Prevalence of specific learning disability among schoolchildren between 8 and 12 years. Indian Journal of Child Health. 2018 May 28;5(5):355-8.
23. Bandla S, Mandadi GD, Bhogaraju A. Specific learning disabilities and psychiatric comorbidities in school children in South India. Indian journal of psychological medicine. 2017 Jan;39(1):76-82.
24. Shah CG, Buch PM. Prevalence of specific learning disabilities among Gujarati medium primary school children. Indian Journal of Child Health. 2019 Jun 26;6(6):283-6.
25. Landerl K, Moll K. Comorbidity of learning disorders: prevalence and familial transmission. Journal of child psychology and psychiatry. 2010 Mar;51(3):287-94.
26. Arun P, Chavan BS, Bhargava R, Sharma A, Kaur J. Prevalence of specific developmental disorder of scholastic skill in school students in Chandigarh, India. Indian Journal of Medical Research. 2013 Jul 1;138(1):89-98.
27. Karande S, Kulkarni M. Specific learning disability: the invisible handicap. Indian Pediatr. 2005.

ISSN (O): 2687-5365; ISSN (P): 2753-6556