

## Prevalence of learning disability in primary school students with hearing impairment in Mumbai, India

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### Abstract

The study was aimed to estimate the prevalence of learning Disability in primary school students with hearing impairment in Mumbai, India. The study was conducted in two phases. Phase I was conducted to screen the subjects for suspected learning disability using Behavioral checklist for screening the learning disabled. A total sample of 54 primary school students with hearing impairment attending English medium with a mean age of 11 years were screened for learning disability. Out of fifty four, ten were identified to be “At risk” for Learning Disability. In Phase II among the ten “At risk” learning disabled students three were found to have below average intelligence on administration of Colored Progressive Matrices (CPM). Hence, those three were discarded from the study and the rest seven were administered with Grade level assessment device and scale of early communication skills to assess type and nature of learning and academic problems and communication skills. The results of the tests indicated “At risk” Learning disabled students performed poorly both quantitatively and qualitatively on all tasks and their errors could not be solely attributed to their hearing impairment. Therefore in the present study the prevalence of learning disability in children with hearing impairment was found to be 12.9%.

**Keywords:** Prevalence, Learning disability, Hearing impairment, primary school

### Introduction

The term learning disabilities (LD) was first given by Samuel Kirk (1963) to describe children “who have disorders in development of language, speech, reading and associated communication skills needed for social interaction”.

Firstly having a learning disability means the child may have difficulty in receiving accurate information and expressing it correctly. Secondly, having a learning

disability also means a great “discrepancy” between the child’s ability and achievement. There is a great difference between the child’s expected performance and the actual performance. These differences are minor in the pre-school years and gradually become wider as the child moves up in the educational ladder.

US Department of Education (1988) has reported 2 million school children in the US been classified as having learning

disabilities in public schools before 12<sup>th</sup> grade, totaling about 5% of school enrollment and almost 50% of the children receiving special education services. Several studies conducted in India to determine the prevalence of learning disabilities in school children have reported 3-10 percent among students population (Ramaa, 2000). Arun et al. (2013) study for prevalence of specific learning disabilities indicated 1.58 % in VII to XII standard students of Chandigarh, India. In a study conducted by Agarwal and et al. (1991) in rural India, specific learning disability was reported to be 13 per cent in primary school children.

Learning is the most important factor influencing all aspects of our life and audition plays a major role in learning. Thus, it is not of surprise that learning is affected in hearing impaired population to a certain extent. Apart from this on review of literature it is seen that there are always a few hearing impaired children in classrooms who march in a different tune compared to their deaf peers, presenting continuous depression in academic performance, despite of adequate intellectual ability, appropriate schooling and sufficient time on tasks. Studies done by Myklebust (1964) have shown that deafness results in visuosensory deficits. It was hypothesized that the interrelation of the central nervous system modality systems may explain the pervasive effect of deafness on learning. If this is no, then deficits in one of the modality systems may cause a corresponding loss of functioning in other modality systems. This loss may be present even though learning is restricted to intraneurosensory processing. However, the effects on learning and achievement may vary according to the primary deficiency. Deficits in auditory processing may affect visual and tactile – kinesthetic processes, but the type and severity of the effects may be entirely different from those occurring when the primary deficit is in either the visual or the

tactile – kinesthetic system. Prevalence of learning disability in hearing impaired population has always been in controversy because of variation in terminology, definitions and assessment practices. There have been two schools of thought, one supporting the presence of learning disabilities in hearing impaired population as in normal hearing and vice – versa. In the last several years, there has been an increasing concern about the identification and provision of appropriate services to children and adolescents who are hearing impaired and who have concomitant learning disability. Laughton (1989) proposed a new working definition that is Learning Disabled hearing impaired individuals have significant difficulty with the acquisition, integration and use of language and / or non-linguistic abilities. These disorders are presumed to be caused by the coexisting conditions of central nervous system dysfunction and peripheral sensorineural hearing impairment and not by either condition exclusively. The condition can vary in its manifestation and degree of severity and can affect education, communication, self-esteem, socialization, and / or daily living activities throughout life.

The 1993 reference issue of the American Annals of the Deaf reports learning disabilities as the largest co-occurring disability in children with hearing impairment at a prevalence of 9% (Cited by Pollack, 1997). Demographic information suggests that 15 – 20% of the children and youth being educated in programmes for students with hearing impairment have at least one additional handicapping condition (Craig & Craig, 1986). Of the students with hearing impairment with additional handicapping conditions, approximately one-third have a learning disability above and beyond what is attributable to hearing impairment (Powers, Elliott & Funderburg, 1987).

According to Moores (1978), as a group the multiple handicapped hearing impaired children have suffered from a lack of systematic identification and investigation. In a study conducted by Soukup & Feinstein (2007) to ascertain the methods of identification used by teachers of the deaf who also have learning disabilities along with hearing impairment it was found that only 50% of them were confident to identify and teach these children. The teachers also expressed a desire for specialized training in identification, assessment and intervention of LD in deaf children.

Hill and etal. (1985) investigated deaf student's teacher's ability to identify children with learning disability and which academic skills support the observations of LD in children with hearing impairment. Their study evidenced teachers were accurate in identifying LD in children five out of six of who were later identified as LD. Spelling and arithematics were found to be predictors of learning problems in children.

Research has found that classroom teachers have been the major source of referrals and identification of children with learning "problems". In a self – contained classroom of children with hearing impairment, there are always those children that cause the teacher to think why the methods and materials used with the other children do not appear to produce similar results with these particular children. These children are described as exhibiting unusual learning characteristics which are considered atypical of students who are deaf and hard of hearing. These students are not progressing academically in comparison to the documented parameters of delayed language and concept learning found in the general population of students who are deaf or hard of hearing (Bunch & Melnyk, 1989).

Need of the study: As per the review of western studies it's a known fact that some of the students with hearing impairment are

not progressing well academically in comparison to the expected parameters of language acquisition and context learning. There problems of learning are not a part of regular problems faced by children with hearing impairment. Further more there is a paucity of studies in prevalence of LD in children with hearing impairment in India. Hence, the present study was attempted to identify prevalence of learning disability in primary school students with hearing impairment in Mumbai, India. This study is an attempt to provide a prototype baseline data for future epidemiological studies and clinical reference.

## **Materials and methods**

### **Study Design:**

The present study used a survey design and was conducted in two phases

### **Subjects Selection:**

A total of 54 students who satisfied the subject inclusion criteria from three Primary special schools of Hearing impairment Mumbai, India participated in the study. The students were attending 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> grade with English medium of instruction. The study inclusion criteria consisted of having bilateral severe to profound hearing loss and using amplification since minimum 5years regularly. Subjects should have normal intelligence and oral peripheral mechanism as reported by teachers. The exclusion criteria was subjects with history of visual impairment or low vision or any associated problems.

### **Tools used for the study:**

#### **Phase - I:**

Behavioral checklist for screening the Learning Disabled (B.C.S.L.D) developed by Dr. Swarup & Mehta (1989) was used. This checklist screens the children for "At risk" of learning disability. The checklist consists of 30 items positive and negative to be filled by the respective class teacher. It

attempts to integrate all aspects of learning in the checklist i.e. the ability to process visual and auditory information, memory, comprehension, thinking, psychomotor skills, self image and motivation. The maximum obtainable score is 60. Considering the top 27% of the scores (i.e. above 42.5 out of 60) as "At risk". Hence all those scoring from 42.5 to 60 may be treated as suspected cases of learning disability.

### **Phase - II:**

The tools used were:

- 1) Colored Progressive Matrices (CPM) developed by J.C. Raven, J.H. Court & J. Raven (1977) was used to assess the level of intellectual development in children with hearing impairment.
- 2) Grade Level Assessment Device for children with learning problems in schools (GLAD) developed by Narayan. J. (1997) was used to assess the academic performance in children. GLAD assesses upto IV<sup>th</sup> grade. This test consists of two formats. Format I has the test booklets of class I to class IV in the form of worksheets of Hindi, English, and Maths. Reliability and validity of the items are established. Items include tasks requiring verbal and written responses to questions. Format II: is used for noting observations while the child is performing on format I & also, contains information on child's background including personal details, family history, school history, soft neurological sign of specific learning disabilities. The scores are grouped as follows: over 70% as independent level, 40% to 69% as instructional level, and Below 40% as Frustrational level.
- 3) Scale of Early Communication Skills for the Hearing Handicapped (SECS) developed by Moog & Geers, (1975) was used to assess communication skills in four areas i.e Receptive Language Skills, Expressive Language Skills, Nonverbal Receptive Skills and Nonverbal

Expressive Skills. The items of scale are scored as '+' 1 point and '+ or -' as 1/2 point and '-' as 0 point.

### **Procedure:**

Initially the aim of the study and its procedures were explained and a written consent was sought from the school principals and parents of children who were selected for the study. The present study was conducted in two phases.

### **Phase - I:**

In this phase initially the class teachers were oriented about the purpose and usefulness of the study and then provided the B.C.S.L.D checklist. All the class teachers filled the checklist for each student. The checklists were analyzed and scored by the researchers and 'At risk' students were identified.

### **Phase II:**

All the "At risk" for LD were administered first with CPM to rule out any intellectual deficits contributing to learning problems. Secondly the children who obtained average to above average scores were administered with Grade level assessment device, Format I both the English and maths workbooks for the concerned class of the child and at the same time observational recording on Format II by the researcher was done to obtain the level of academic performance. Children were instructed prior to the administration of the test using both verbal and gestural mode. Further the children were administered with the scale for early communication skills for assessing the level of communication skills. It was observed that each student took approximately 1½ to 2 hours to complete CPM, GLAD & SECS tests.

### **Data Analysis:**

The data obtained was tabulated and subjected to descriptive statistics to obtain the Mean & S.D. The prevalence of LD was

obtained by taking the percentage of no. of students identified to be LD from the total no. of hearing impaired students evaluated. Standard error at 95% confidence limits was established.

**Results and discussion**

As the study was carried out in two phases. In Phase I, the total sample constituted of 54 subjects with hearing impairment from II to V grade with a mean age of 11 years. The distribution of number of subjects and their grades are presented in Table 1.

**Table 1: Distribution of number of subjects according to their grades.**

Sr. No.	Grade level	No. of persons	percentage
1	II	18	33
2	III	16	30
3	IV	13	25
4	V	7	13
Total		54	100

These subjects were screened for suspected learning disability with the use of B.S.C.L.D. The subjects “At risk” for LD were five in second grade, four in third grade and one from fourth grade as presented in Table 2.

**Table 2: Distribution of number of “At risk” Learning disabled subjects according to their grades.**

Sr. No.	Grade Level	No. of “At risk” for LD
1	II	5
2	III	4
3	IV	1

The phase I findings can be summarized as 10 subjects out of a sample of 54 subjects to be “At risk” for LD.

**Phase II Findings:**

The students “At risk” for LD were assessed with CPM to rule out any deficits of

intelligence. The analysis of subject’s performance on CPM indicated 3 “At risk” learning disabled subjects out of 10 with below average intelligence and from the rest of 7 subjects, 5 were intellectually average, and 2 intellectually above average. Therefore, the three subjects with below average intelligence have been discarded from the group of “At risk” Learning disabled for further detailed evaluation. The distribution of “At risk” Learning disabled subjects according to their grades on CPM is presented in Table 3.

**Table 3: Distribution of “At risk” Learning disabled subjects according to their grades on CPM.**

Sr. No	Grade Level obtained on CPM	No. of students
1	I (Intellectually superior)	1
2	II ( Above average intellectual capacity)	1
3	III (Intellectually average)	5
4	IV (Below average intelligence)	3
Total		10

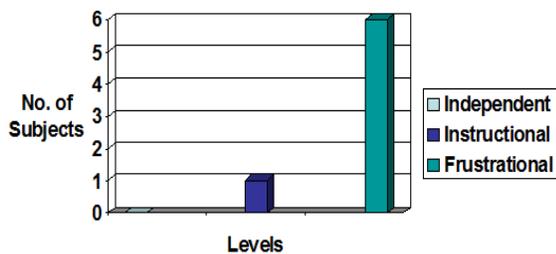
The seven “At risk” LD subjects were further assessed on both English and Maths Format I of GLAD for their respective grades. The analysis of subject’s performance in both English and Maths indicated 5 subjects from 2<sup>nd</sup> grade and 1 subject from 3<sup>rd</sup> grade falling in Frustrational level (below 40%) and 1 subject from IVth grade falling in instructional level (40 to 69%) in English subject. The performance of all the subjects in Maths were found to be much poorer than English as all of them were falling in the frustrational level. The findings on GLAD are presented in Table 4 and displayed in Figure 1.

**Table 4: The performance of subjects on GLAD who were “At risk” for Learning Disability.**

Sr. No.	Grade Level	Combined scores on GLAD		No. of subjects
		English	Maths	
1	II	39.0	22.62	5
2	III	36.6	23	1
3	IV	60.9	27	1

The Figure 1 shows the number of subjects and their level of performance in English. It indicates that there were more number of subjects in Frustrational level i.e. 6 and only one subject at instructional level in English subject.

Figure 1 : The number of subjects and their level of performance in English.



The qualitative analysis of subject’s performance in English indicated the following behaviors –

While reading omission and substitution of words, ignoring punctuations, reading too fast or too slow, asking the researcher to pronounce a word for him or her, finger tracing, frequently looking away from the reading material observed.

While reading comprehension tasks questions always needed to be gestured, answers by referring back to reading material and not responding to the questions observed.

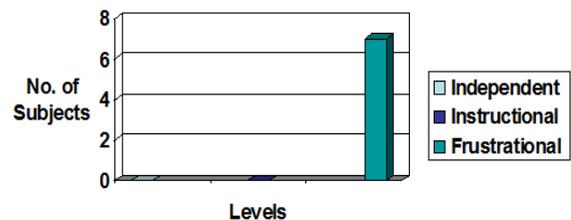
While writing not maintaining left to right orientation, ignoring line, micrographia, mixing of case capital and small letter, reversals of letters and words, spelling errors

more of phonetic in nature, missing of line in ‘t’, ‘f’ and no proper spacing between words observed.

Thus, this form of poor academic performance is supported by the findings of Sikora, and Plapinger (1997) who studied 19 students with mean age of 10 years. They compared the parent and teacher perceptions of students, academic performance with their measured performance on standardized tests. The results suggested confirmation of poorer academic performance of subjects in accordance to the perceptions of parents and teachers.

The Figure 2 indicates that all the subjects i.e. 7 were at Frustrational level in Maths. The Qualitative analysis while performing on Maths indicated errors in number identification i.e. number inversion, errors in right/left organization, errors in basic symbols used and identification eg. +, -, = etc., errors in place value – units, tens and hundreds. Ignoring carry over in addition, place value errors in multiplication and not able to perform divisions. This kind of poorer performance of subjects in arithmetic’s is indicated by Soukup & Feinsten (2007) study as one of the predictors of LD in hearing impaired students.

Figure 2 : The number of subjects and their level of performance in Maths



The subjects were further assessed for their Receptive, Expressive verbal and nonverbal aspects of communication using SECS. The results indicated poorer scores in both receptive and expressive communication i.e. mean receptive score of 7.714 and mean

expressive score of 1.285 and the prominent finding here was expression been much poorer than reception in comparison to norms provided for hearing impaired population in both verbal and nonverbal aspects. The performance on SECS is presented in Table 5.

**Table 5: The performance of subjects on Scale for early communication skills.**

	Scores on Scale for early communication skills	
	Combined Receptive scores	Combined expressive scores
Mean	7.714	1.285
S.D.	12.242	7.477
N	7	7

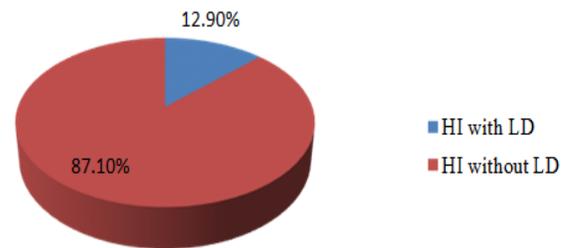
These findings are supported by similar findings of Van Vuren (1995) who studied 68 deaf students aged 6 to 12 years from which an atypical group of students were observed to be presenting complex problems than just learning disabilities. One of the main characteristics was very poor communication skills.

Thus the detailed evaluation of the “At risk” LD subjects with hearing impairment in phase II were confirmed further on the presence of Learning disability component, as the performance on CPM had discarded any IQ limitations in learning. Further GLAD provided with academic performance in both English and Maths in both quantitative and qualitative form of analysis. These students were not only showing poorer academic performance but also presented with qualitative symptoms of LD like reduced attention span, letter reversals, poor self image, difficulty copying from board without any visual problem, affected right left discrimination, forgetfulness, behavioral problems like hyperactivity in few and most of them had inadequate ability to grasp the content of the theme which are not expected to be present in an hearing

impaired child. The aspect of communication in these students was found to be much depressed in comparison to the norms provided for their age level.

Thus taking into consideration all these aspects, that is, outcome of B.S.C.L.D, IQ with CPM, Quantitative and qualitative academic performance on GLAD and receptive and expressive communication skills on SECS the 7 phase I “At risk” LD students were confirmed with the presence of Learning disability in Phase II. The prevalence of LD in children with hearing impairment is displayed in Figure 3.

**Figure 3: Prevalence of LD in children with Hearing impairment**



The Figure 3 shows the prevalence of Learning disability in primary school students with hearing impairment to be 12.9%. There are seven subjects out of total sample of fifty four hearing impaired subjects who were confirmed with the presence of LD component in them. The prevalence being 12.9% with a standard error of 4.5 with 95% confidence limits (4-22). This is supported by similar findings of Sikora and Plapinger (1994) who reported in their study out of 17 hearing impaired students with 7 to 13years of age two were diagnosed as learning disabled. Hence it is concluded that the frequency of learning disabilities in hearing impaired is similar to that found in normal hearing. Powers, Elliot & Funderberg, (1987) in their investigation of prevalence of learning disabilities in hearing impaired students suggested 15 – 20% incidence.

## Conclusion

To summarize, a prevalence of 12.9 percent in a sample of 54 primary school students with hearing impairment with a mean age of 11 years were found to have learning disability in the present study. The prevalence rate found in the present study was an attempt to establish a prototype database in children with hearing impairment for learning disability. Hence future epidemiological studies should include a larger sample size. Important lacuna of non availability of standardized psychoeducational assessment tools for this particular group and lack of different language based tests needs to be acknowledged.

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**Conflict of interest:** None.

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