Research Article

Prevalence of dyslexia among school children in Mysore

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Abstract

Background: Dyslexia is defined as difficulty in learning to read and spell despite adequate education, intelligence, socio cultural opportunities and without any obvious sensory deficits.

Objective: 1) To estimate the prevalence of dyslexia among school children. 2) To study the factors associated with dyslexia.

Materials and Methods: A cross-sectional study conducted in 4 randomly selected government schools of Mysore for a period of two months from August 2013 to September 2013. Data was collected by using a pretested dyslexia screening questionnaire.

Result: Out of 400 students overall prevalence of dyslexia was found to be 13.67%. When compared with gender, prevalence of dyslexia was 19.00 % among males and 8.50% among females. About 66.70% dyslexics gave a family history of dyslexia. History of difficulty with spellings was seen among 54.80% of dyslexics. About 61.70% experienced difficulty in copying from the blackboard, 56.30% were confused following instructions while playing games. It was noticed that about 64.30% dyslexics were left handed. It was found that 64.30% dyslexics were unable to count backwards from 100 down to 0 and about 77.80% dyslexics were observed reversing numbers or digits. Eighty percent of dyslexics had difficulty in following directions like left and right. On observing their handwriting 59.60% dyslexics had illegible handwriting.

Conclusion: This study suggests that the prevalence of dyslexia is on a higher side which suggests that more prevalence studies is required to develop remedial education and policy interventions in the educational system to improve the school performance of such children.

KEY WORDS: Dyslexia, school children, learning disability

Introduction

Dyslexia is defined as difficulty in learning to read and spell despite adequate education, intelligence, socio cultural opportunities and without any obvious sensory deficits.[1]

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This disorder with specific difficulties was identified by Oswald Berkhan in 1881.[2] The term 'dyslexia' was coined in 1887 by Rudolf Berlin, a German ophthalmologist practicing in Stuttgart, Germany.[3]

Dyslexia is one of the common learning disability with a prevalence ranging from 3 to 17.5% among school age children.[4–6] Dyslexia affects basic skills like reading, writing, speaking, and listening. Globally it is found to be more prevalent among boys.[7–9]

Genetic predisposition is seen among individuals developing dyslexia.[10] Dyslexic child can be from any background or any socio economic status and it can occur in any child in a family irrespective of the order in which he or she is born.[11] Few famous personalities who manifested language disability

are Leonardo da Vinci, Albert Einstein, Thomas Alva Edison, Alexander Graham Bell, Michael Faraday.[12,13]

Dyslexic people often have a natural talent for any of the arts (such as music, dance, drawing, or acting). They often possess capability to see patterns in noise, which helps them to produce mundane into something more interesting and exciting.[14] It adversely impacts the psychosocial development and academic achievement of affected individuals. It is an invisible handicap and a major educational problem, but the studies on prevalence of dyslexia are very limited in India. There is a lack of proper statistical data to show the prevalence of dyslexia in Indian population. Recent studies have demonstrated that intervention is effective and that prevention of reading failure is possible if preschool children at risk of dyslexia are identified and offered timely and evidence-based training.

With this background the present study was conducted with following objectives- 1. To estimate the prevalence of dyslexia among school children. 2. To study the factors associated with dyslexia.

Materials and Methods

The present study was a cross-sectional study conducted to assess the prevalence of dyslexia among primary and upper primary school children. In Mysore city there were total of 84 government schools (Primary and upper primary). The sampling frame consisted of all 84 government schools (primary and upper primary) of north and south Mysore. At the first stage, out of these 84 schools 4 schools were randomly selected using random numbers generated using Excel. At second stage the children were recruited in the study.

Sample Size

Pilot study was conducted among 50 school children in government schools. The pre-tested, structured dyslexia screening questionnaire was used. In the pilot study done on 50 subjects, the estimated prevalence of dyslexia was found to be 10%. The sample size was calculated by taking alpha error of 5% and precision level of 3%, the minimum required sample size was 385. However, 400 children were recruited for the purpose of this study. The sample selection process was as described in flow chart (Chart 1).

Study Period

The present study was conducted for a period of 2 months from August 2013 to September 2013.

Statistical Analysis

The collected data was tabulated and analysed using IBM SPSS Statistics 20.0 (Chicago Inc.) software. Frequency, percentage was calculated for the nominal variables and descriptive statistics was calculated for the quantitative variables. Further statistical analysis was carried using χ^2 test. The level of significance was set at 5%. All *p*-values less than 0.05 were treated as significant.

Result

Out of 400 students 22 (5.50%) students belonged to age group of 7 years, 93 (23.25%) students were 8 years, 118 (29.50%) students were 9 years, 100 (25.00%) students 10 years old, 41 (10.25%) students were 11 years and 26 (6.50%) students were 12 years old. The prevalence of dyslexia was found to be 13.67%.

The prevalence of dyslexia when compared with different age groups was found in 2 children (7.50%) among 7 years old children, 10 children (10.80%) among 8 years, 16 children (13.56%) among 9 years old, 18 children (18,00%) among 10 years, 6 children (14.60%) among 11 years old and 3 children (11.50%) among 12 years old children.

When compared with gender, prevalence of dyslexia was found in 37 males (19.00 %) whereas 18 females (8.50%) were found to be dyslexic. About 37 dyslexic children (66.70%) gave a family history of dyslexia present either in their parents or siblings. About 41 dyslexics (75.00%) experienced reluctance in going to school. History of difficulty with spellings was seen among 30 dyslexic children (54.80%). When asked about missing out words while reading about, 37 (66.70%) dyslexics agreed to have this problem as compared to 115 (33.30%) non dyslexics experiencing similar

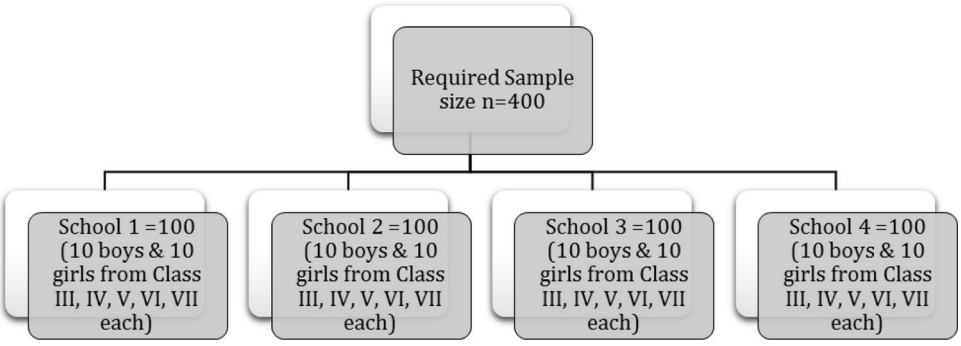

Chart 1: Flow chart of sample selection process

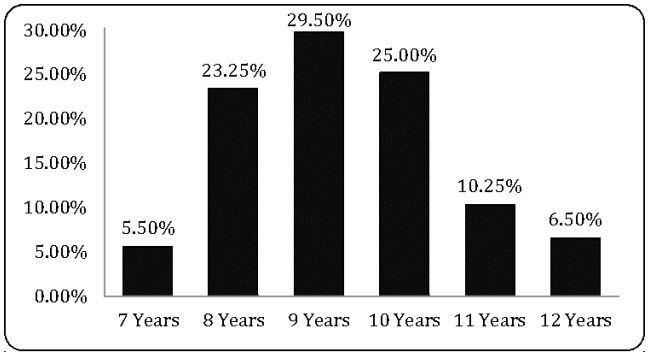

Figure 1: Age wise distribution of children (in years)

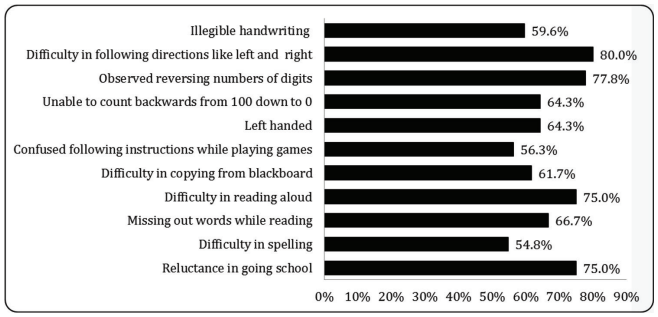

Figure 2: Difficulties experienced by dyslexics

Table 1: Age-wise prevalence of dyslexia

Age (Years)	Frequency	Percentage (%)
7	2	7.50
8	10	10.80
9	17	14.40
10	18	18.00
11	6	14.60
12	3	11.50
Total	56	13.92

Table 2: Gender-wise prevalence of dyslexia

Gender	Prevalence
Male	(38/200) 19.00%
Female	(17/200) 8.50%

Table 3: Family history of dyslexia

Family history	Frequency	Percentage (%)
Present	37	66.70
Absent	18	33.30
Total	55	100.00

problem. Forty one dyslexic children (75.00%) had difficulty in reading aloud.

About 34 dyslexic children (61.70%) experienced difficulty in copying from the blackboard, 31 children (56.30%) were confused following instructions while playing games. On observing the students being left or right handed, it was noticed that about 35 (64.30%) dyslexics were left handed. When asked about difficulty with arithmetic, 35 (64.30%) dyslexics were unable to count backwards from 100 down to 0 and about 43 (77.80%) dyslexics were observed reversing numbers or digits. Forty four (80.00%) of dyslexics had difficulty in following directions like left and right. On observing their handwriting, 33 (59.60%) dyslexics had illegible handwriting as compared to 139 (40.40%) of non-dyslexics with illegible handwriting.

Discussion

Present study is one of the few studies which aim to find the prevalence of dyslexia and other associated factors among school children. In the present study, among the school children in Mysore, the prevalence of dyslexia is found to be 13.67%. Prevalence of dyslexia was observed more among males being 19.00% and only 7.90% females were dyslexics. In the present study, history of difficulty with spellings was seen among 54.80% of dyslexics. It was observed in this study that about 66.70% dyslexics missed out words while reading. Seventy five percent dyslexics had difficulty in reading aloud. About 61.70% experienced difficulty in copying from the blackboard, 56.30% were confused following instructions while playing games. On observing the students being left or right handed, it was noticed that about 64.30% dyslexics were left handed and only 35.70% dyslexics were right handed. When asked about difficulty with arithmetic, 64.30% dyslexics were unable to count backwards from 100 down to 0 and about 77.80% dyslexics were observed reversing numbers or digits. Eighty percent of dyslexics had difficulty in following directions like left and right. On observing their handwriting 59.60% dyslexics had illegible handwriting as compared to 40.40% of non dyslexics with illegible handwriting.

As per the previous studies done, prevalence of dyslexia ranges from 3.00 to 17.50% among school age children,[4–6] when compared with the present study, prevalence is found to be 13.67%. In a study conducted among higher primary school children during 2014–15 in Dharwad urban and rural area 66.66 per cent of children were found to be at high risk of dyslexia 14.60% of children were found to be at mild risk of dyslexia and 18.74% of children were in normal category having no risk of dyslexia.[15] A study by Sridevi et al.[16] among school going children in Warangal revealed 19% of students were suffering from learning disability. In another study conducted among children aged 8–11 years in South Indian city prevalence of learning disability was 15.17%.[17] In a study done among 7–9 year old school children in Nairobi prevalence of dyslexia was

found to be 7.49%.[18] The prevalence of dyslexia was found to be 6.30% in a similar study done among first to sixth grade students at Wat Samiannaree School in Thailand by Roongpraiwan et al.[19] In a similar study done in Hong Kong among school age children, the prevalence of dyslexia is estimated to be 9.70–12.00%.[20] The prevalence rate varies in different studies, the reason may be because different studies identify cases based on different cut-off points on the continuum between mild and severe dyslexia. According to study conducted by The Parliamentary Office of Science and Technology, London the prevalence of dyslexia is found to be higher among English speakers than in speakers of any other languages. In English, the relationship between the ways a word is written and the way it sounds is erratic. One letter can represent several different sounds. For example, the letter 's' is articulated differently in each of the words eg. 'sun', 'sugar' and 'lens'.[21] Researchers propose that the disposition of dyslexia is the same globally, but that languages with more consistent letter-sound relationships allow mild cases to remain hidden.[22]

In the present study, prevalence of dyslexia was observed more among males being 19.00% and only 7.90% females were dyslexics. Various studies are all consistent with having the number of male dyslexics being more than female dyslexics. Study conducted by Saviour and Ramachandra[23] on modes of genetic transmission of dyslexia in South Indian families among 109 individuals in Karnataka, prevalence among males and females were 62.39% and 38.53%, respectively. In other studies too it was observed that males are more affected than females (1.6:1).[8,9] Similar study done by Roongpraiwan et al.[19] on primary school students in Thailand noticed male to female ratio of dyslexia was 3.4:1.

About 66.70% dyslexics gave a family history of dyslexia present either in their parents or siblings. Similar studies done by Pennington and Gilger[24] demonstrated the rate of dyslexia among siblings to be approximately 40.00% and among parents to be 27.00–49.00%. Many studies have been done on familiality which suggest that genetic factors play a significant role in predisposition of dyslexia.[25–28]. Hallgren[29] observed autosomal dominant transmission of dyslexia in 80.00% of the families studied. Similar observation of autosomal dominance was seen by Pennington et al.[30]

In the present study history of difficulty with spellings was seen among 54.80% of dyslexics. Similar finding were observed by Saviour and Ramachandra[23] among 23 dyslexic probands and their families from the state of Karnataka. They found that reading-spelling deficit is the common phenotype of dyslexia. They observed an interesting feature that reading difficulty is always associated with spelling deficit and not vice versa. Schott and Schott[31] and Schott[32] have observed that many dyslexics present with symptom of reversing of alphabets or mirror writing (for example, "Я" instead of "R"). To improve the spellings of dyslexics various techniques like weekly spelling tests with short listing of structure-based words rather than random words is found to be helpful to improve their free-writing skills.

In the present study about 66.70% dyslexics missed out words while reading. Seventy five percent dyslexics had difficulty in reading aloud. Similar finding was observed by Ise and Schulte-Körne[33] that dyslexics present with very poor spelling also called as dysorthographia, inability to read out loud, reading words in the wrong order, skipping words and sometimes saying a word similar to another word (auditory processing disorder). To help such children a structured reading scheme involving repetition of words and introducing new words slowly is extremely important. This will improve confidence and self-esteem of the child while reading. Dyslexic students should not be asked to read a book beyond their capability, this will instantly demotivate them. The child should be given advanced time to read pre-selected reading material, at home the day before. This will help ensure that the child is seen to be able to read out loud, along with other children. Present study showed that 61.70% experienced difficulty in copying from the blackboard, 56.30% were confused following instructions while playing games. To help such children, teacher should use different coloured chalks for each line or underline every second line with a different coloured chalk. Ensure that the writing is well spaced. As a dyslexic child takes a little longer time copying from the blackboard, teacher should leave the writing on the blackboard long enough to assure the child doesn't rush, or that the work is not erased from the board before the child has finished copying.

On observing the students being left or right handed, it was noticed that about 64.30% dyslexics were left handed and only 35.70% dyslexics were right handed. Similar finding was noticed by Saviour and Ramachandra[23] and Pennington et al.[24] in which dyslexia is found to be associated with left handedness.

When asked about difficulty with arithmetic, 64.30% dyslexics were unable to count backwards from 100 down to 0 and about 77.80% dyslexics were observed reversing numbers or digits. They may find it difficult to remember mathematical facts, such as multiplication tables, performing calculations in steps.[13] It has been observed that dyslexic children often have problems in at least some areas of mathematics. General mathematical terminology words need to be clearly understood before they can be used in calculations. Child should be taught to form the habit of checking his answers against the question when he has finished doing the mathematical calculation.

Present study shows 80% of dyslexics had difficulty in following directions like left and right. On observing their handwriting 59.60% dyslexics had illegible handwriting as compared to 40.40% of non dyslexics with illegible handwriting. Students with dyslexia are usually poor in learning, having poor handwriting, inaccurate oral reading as well as having delay in verbal response.[11] Reasons for poor handwriting can be due to poor motor control, tension, badly formed letters, speed etc. A cursive joined style is most helpful to children with dyslexic problems. The child should be encouraged to study their writing and be self-critical. Get

them to decide for themselves where faults lie and what improvements can be made.

Limitations of the study

The small sample size should be increased before generalization to the whole population.

The study is confined to school settings. Diagnosis of dyslexia should be done through a battery of tests. The degree of disability has not been taken into consideration.

Strengths of the study

This study was conducted to gain an understanding of the problems among dyslexic children which has implication on different interventional programs for children with learning disability in school and home settings.

Conclusion

Prevalence of dyslexia is higher among children especially among male children. It is an invisible handicap. Early diagnosis of dyslexia with appropriate intervention or learning strategies can be started to prevent further handicap in their learning. They require specially trained teacher as the language processing skills is the most important part of treatment. Emotional support for people with dyslexia is very important. Dyslexic people often have a natural flair for one or more of the arts such as music, dance, drawing, or acting etc. It's important to recognize and appreciate each person's strength to facilitate the development of their unique artistic and other abilities to its full capacity. More studies on dyslexia are required in India for implementation of legislation in the country to take utmost care of these children.

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