Pakistan Journal of Psychological Research, 2011, Vol. 26, No. 1, 73-85

Prevalence of Dyslexia in Secondary School Students in Lahore

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Present study is a cross-sectional study aimed to determine the prevalence of dyslexia in the secondary school students in 6th, 7th, and 8th grades of Lahore city in Pakistan. The sample of 500 students (250 girls and 250 boys) was taken from government schools with age between 11-17 years. Bangor Dyslexia Test (Miles, 1997), Standard Progressive Matrices (Raven, Court, & Raven, 1977), Slosson Intelligence Test (Slosson, Nicholson, & Hibpshman, 1963), and the Academic Record of the students were used to screen out dyslexia. Descriptive and nonparametric statistics were used to determine the prevalence and gender difference in dyslexia. Out of the total sample, 5.37% students were screened out with dyslexia. In 6th and 7th grades, dyslexia was more prevalent in male students than female students, while in 8th grade, the percentage did not vary much in both genders. Otherwise, gender differences were nonsignificant.

Keywords: Dyslexia, learning disability, epidemiology, screening

When human beings started to communicate, the problem of dyslexia was identified. It is a hereditary condition which mainly reflects in writing and reading. "The problem of dyslexia has been highlighted by the developing need of humans to communicate via the written word. The term 'dyslexia' was first coined and put into our written language by Berlin in 1892. The word *dyslexia* comes from the Greek words *dys* meaning impaired and *lexis* meaning word" (Thomson & Watkins, 1998, p.1). Orton (1937) described that reading difficulty manifested in the form of letter and word confusions or reversals, extreme reading and spelling difficulties, as well as difficulties with writing. Moreover, Evans (2001) states that dyslexia can be revealed through reading and writing

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abilities, however, in certain cases other difficulties have been reported such as deficits in processing spoken language as well as nonlanguage difficulties e.g., directionality.

Mcloughlin, Fitzgibbon, and Young (1994) states that although no single definition of dyslexia is universally accepted, but according to Thomson and Gilchrist (2000) most widely used following definition:

> "Dyslexia is a neurologically-based, often familial, disorder which interferes with the acquisition and processing of language. Varying in degrees of severity, it is manifested by difficulties in receptive and expressive language, including phonological processing, in reading, writing, spelling, handwriting, and sometimes in arithmetic. Dyslexia is not the result of lack of motivation, sensory impairment, inadequate instructional or environmental opportunities, or other limiting conditions, but may occur together with these conditions. Although dyslexia is lifelong, individuals with dyslexia frequently respond successfully to timely and appropriate intervention" (p. 5)

Thomson in 1984 and 1990 defined Dyslexia as "a severe difficulty with the written form of language independent of intellectual, cultural, and emotional causation. It is characterized by the individual's reading, writing, and spelling attainments being well below the level expected based on intelligence and chronological age. The difficulty is a cognitive one, affecting those language skills associated with the written form, particularly visual-to-verbal coding, short-term memory, order perception and sequencing" (as cited in Thomson & Watkins, 1998, p. 3).

Mcloughlin et al. (1994) gave certain features for the description of people with dyslexia for instance, people with dyslexia make specific types of error in reading a word; they have extreme difficulty to recognize words. They know phonics, but encounter difficulty to sound out an unknown word. They usually misread, such as "form-from" or "trial-trail". They are also in the habit of omission or subtraction of the alphabet in the word as "could-cold" or "star-stair". They may also have sequence difficulty with words such as they read who-how, lots-lost, saw-was, or girl-grill. "b-d" confusion is considered a hall-mark feature of dyslexia. Directionality confusion is also noticed in dyslexics like, before-after, next-previous, over-under, yesterday-tomorrow.

They have problem with memorizing spellings and certain time they invent spellings. They cannot copy exactly from the board or the book. It is notified that their narration is better than written expression. Most of them have difficulty in handling space on page like space in between word and within word. Adults with dyslexia may exhibit their problem in the form of difficulty in understanding maps and memorizing some sequential work, e.g., any work in which various steps are involved. Nonmeaning full facts like multiplication tables, days of week, water boils at 212 degrees is very difficult for them to memorize.

DSM-IV-TR (American Psychiatric Association; APA, 2000) illustrates difficulty in determining the exact ratio of dyslexia because mostly researches focused learning disability as a whole, but careful review of these researches depicted 60 to 80% of individuals with reading disorders are male, while overall 4% of school age children are diagnosed with this condition. Shaywitz (1998) after reviewing the various articles states the prevalence rate of dyslexia between 5 to 17.5%.

Evans (2001) reported that 5% of the student population is affected by it in Europe. Rutter et al. (2004) conducted four epidemiological studies in Europe (Dunedin study, Christchurch study, ONS study, and E-Risk study) and results of all four studies showed that dyslexia is more prevalent in male as compare to female gender.

Bhakta, Hackett, and Hackett (2002) conducted the study for ruling out the reading difficulties in Calicut, India. The mean age of the sample was 10.61 and they used Malayalam Graded Reading and Vocabulary Test (teacher based assessment), Coloured Progressive Matrices, Short-Form Oseretsky test of Motor Proficiency for screening out reading difficulty. Their results indicated 8.2% overall prevalence and they identified that it's more prevalent in male as compare to female gender.

Shaywitz, Shaywitz, Fletcher, and Escobar (1990) conducted research on Connecticut Children of grade 2 or 3 with the assumption that previous researches which indicated high prevalence of dyslexia in boys were biased in their sample selection. They took two groups of sample, one group (215 girls and 199 boys) was selected randomly by the researchers and second group (216 girls and 196 boys) was selected by school asking teachers to identify those students who had learning difficulties. They gave statistics that gender difference of dyslexia was nonsignificant in the first group but significant in the second.

According to various researches (Evans, 2001; Shaywitz, 1998; Sadock & Sadock, 2007) dyslexia runs in families, although no consensus has been found around the debate of its more prevalence in male gender in nonclinical population.

In Pakistan, availability of indigenous psychological measures is limited and that's why researchers (Rehman & Arif, 2006; Sitwat & Aumbreen, 2006) used psychological tests developed in West. In the present research, because of non-availability of indigenous psychological measures European psychological tests were used. Ziegler, Perry, Ma-Wyatt, Ladner, and Koorne (2003) were studying dyslexia in different European languages and compared the diagnosed cases with English dyslexia i.e., they took a sample which was diagnosed first with English dyslexia assessment tools then assessed the sample with their native language dyslexia assessment tools. They provided the evidence that "the similarities between orthographies were far bigger than their differences" (p. 188). The focus of present research was to study the overall prevalence of dyslexia in secondary school children (both male and female). Moreover, it was intended to find out the prevalence rate of dyslexia in each gender and that too in each secondary grade level (6^{th}, 7^{th}, and 8^{th}).

Method

Research Design

A cross-sectional design was followed in the present study. This is mostly used in the prevalence studies where a subject is assessed one time in life. This design gives privilege to study different age ranges at a time and the chance of subjects dropping out during the course of study is not there, as this threat is present in longitudinal studies (Shaughnessy, Zechmeister, & Zechmeister, 2010).

Sample

Simple random sampling was used. The sample comprised of 500 students (250 from each gender) of secondary school with mean age of 12.66 and *SD* of 1.28. The sample was collected from 16 Government Schools of Lahore (which included 8 girls' and 8 boys' school). The schools were selected randomly by following every 5^{th} school in the list of 100 schools. The inclusion criterion

of government schools was made because these schools represent all three socioeconomic statuses at a time. The school administrator randomly selected the two sections from each grade. For randomization, even numbers were used. For instance, if a school had six sections (A-F), researchers gave them numbers such as 1-6 and the school administrator selected any two even number either it was 2 and 4 or 4 and 6 (by selecting 2, 4, and 6 numbers, it means researcher selected B, D, and F section).

Initially, researchers and their assistants used to give 5 random even roll numbers for each section to the class teachers, and she/he was required to bring these students to the researchers for testing. However, due to practical constraints it did not work. As sometimes the selected student with respective roll number was absent or refused to participate in the study. With a result, the teacher had to come back to the researchers to ask for another roll number. Otherwise, researchers did not get permission from school authorities to personally select the students at random for disciplinary reasons. To overcome this practical problem, researchers made a guideline for teachers for the selection of students from each grade. According to the guidelines, the teacher would select randomly 5 even roll numbers from the list. The list was given by researchers to them, that list had just the roll numbers from 1 to 50 without having any student's name. Teachers were instructed to select one even roll number from each row of ten roll numbers, if number of the students was 50. If it was less than 50 like 40 or 30 they were asked to select one even roll number from each row of 8 or 6 roll numbers. Researchers initially targeted 80 students from each grade but all schools had more sections in 6^{th} grade (like A-F) as compare to 7^{th} and 8^{th} grades (like A-D). Therefore, researchers selected 90 students from grade 6^{th} to give equal representation to all grades.

Table 1

Demographic Description of Sample

Grades	Students from each school	Students from each grade	Age		
			Range	*M*	*SD*
		Male students[a]			
6^{th}	10	90	11-14	11.58	.76
7^{th}	10	80	12-15	12.85	.73
8^{th}	10	80	14-17	14.6	.64

Continued...

Grades	Students from each school	Students from each grade	Age		
			Range	*M*	*SD*
		Female Students [b]			
6th	10	90	11-13	11.47	.56
7th	10	80	11-14	12.45	.72
8th	10	80	12-15	13.3	.86

Note. [a] $n = 250$, [b] $n = 250$.

Instruments

Standard Progressive Matrices. It is a test of clear observation and thinking used for the age range of 6.5 year to 70 years. "The test measures a child's capacity to apprehend meaningless figures, see the relationship between them, conceive the nature of the figure, completing each system of relations presented and develop a systematic method of reasoning" (Raven et al., 1977, p.1). The test retest reliability and predictive validity of the test is .85 and .70 respectively (Raven et al., 1977).

The criterion used for IQ measuring on Raven Progressive Matrices was: "Intellectually Superior" if scores lies at or above the 95th percentile; "Definitely above the average in intellectual capacity" if scores lies at or above the 75th percentile; "Intellectual average" if scores lies between the 25th and 75th percentile; "Definitely below average in intellectual capacity" if scores lies at or below the 25th percentile (Raven et al., 1977, p. 17).

Slosson Intelligence Test. It was originally developed by Slosson, Nicholson, and Hibpshman (1963). It can be used for age range of birth to 27 years of age. It has quite high test retest reliability and criterion validity which is .97 and .93, respectively (Slosson et al., 1963). "It gives an indication of a person's ability to learn, solve, and understand problems and a rough estimate of an individual's capacity to reason, judge, and retain knowledge" (Slosson et al., 1963, p.1). The criterion used for measuring IQ in this test was 69 and below intellectually deficient (poor), 70-79 borderline (doubtful), 80-119 average (normal), 120-129 superior (higher), 130+ very superior (bright). The above categories of IQ test scores had been recommended by the British Psychological Society (Hernstein & Murray, 1994). The two IQ tests were used with the rationale to measure verbal IQ and nonverbal Intellectual capacity.

Bangor Dyslexia Test. Originally developed by Miles (1997) this test was used for screening out the features of dyslexia. It acts as an initial screening test for dyslexia. It could be used for individuals with age between 9-18 years. The test was comprised of 10 items which were basically indicators of dyslexia based on left-right (body part), repeating polysyllabic words, subtraction, tables, month's forwards, months reversed, digit forwards, and digit reversed, b-d confusion, and familial incidence. According to the given scoring creation for the researches in the manual of the Bangor Dyslexia Test, 5 positive indicators were used as an indicator of the dyslexia (Miles, 1997, p. 3).

Miles (1997) reported in the manual of Bangor dyslexia test that test construction and standardization was discussed in first manual which was published in 1983. Beech and Singleton (1997) cited that Miles reported in 1983 that he generated the test items on the basis of his collected data (n = 291) in between 1972-1978 but no evidence of reliability and validity is found in the manual. They also state that Bangor dyslexia test is available in various languages such as in German, Greek and Japanese but technical information regarding item construction and its standardization is also not addressed in them.

Academic performance. To assess the academic performance of children, the last two examination result of the students was taken from the school record.

Procedure

The sample was taken from a total of 16 Government school of Lahore, Pakistan. Researchers approached 18 schools in total out of which two refused to give permission for data collection for administrative reasons. The data was collected by two researchers and two research assistants (Masters in Psychology). Out of the total 16 schools, 8 were girls' school and 8 were boys'. Before conducting the research, official permission was sought from the school principals for data collection after assuring them that information taken from their students would be kept confidential and would only be used for research purpose. Tests instructions and test items were presented into Urdu only when students felt difficulty in understanding in English. All three tests were individually administered. The total time spent on each student was 50-60 minutes.

Results and Discussion

The present study was conducted to assess the prevalence of dyslexia and related gender differences among secondary school students in Lahore, Pakistan. Most studies conducted on dyslexia followed different definitions and criteria for diagnosis of dyslexia (Paulesu, et al., 2001). Few researches (Bhakta et al., 2002; Shaywitz et al., 1990) have used IQ test, reading ability tests, and teachers' assessment for screening out dyslexia. The present research followed DSM-IV-TR (APA, 2000) diagnostic criteria for dyslexia. According to this criterion, those students who achieved average IQ in both verbal and nonverbal intelligence test, and showed any 5 positive indicators on Bangor Dyslexia Test, and performed below average in their last two exams were screened out for dyslexia. The research used descriptive and non-parametric statistics. In descriptive statistics, frequencies and percentages were calculated to find out the prevalence and chi-square was used to identify gender difference. SPSS 10 was used for statistical analysis.

Overall Prevalence of the Dyslexia

The sample included 310(62%) students with an average IQ, 60(12%) students in borderline IQ category, 80(16%) students in the above average IQ category, while 50(10%) fell in the below average category. The researchers identified that 422 students were declared "pass by" the schools in the last two school examinations.

Out of the total sample, 5.37% students were screened out with dyslexia. When results were analyzed in another way in which 78 students those who failed in the last two or one exam, falling in any category of IQ, but scored low on dyslexia were excluded, the indicated prevalence rate reached 27(6.32%) students.

According to DSM-IV-TR (APA, 2000), the epidemiological studies determined the prevalence rate of dyslexia in between 2 to 8%. Plume and Warnke (2007) found that in Germany about 6% of the students were affected by dyslexia. Miles (1997) gave statistics of 3% severe and 6% mild cases of dyslexia in Great Britain. Chan, Ho, Tsang, Lee, and Chung (2007) conducted the research in Hong Kong. They screened out 99 children with problem of dyslexia out of 690 children aged between 6 and 10 years.

Gender Differences in Prevalence of Dyslexia

To determine gender differences frequencies and percentages were computed for male and female students of 6th, 7th, and 8th grades.

Table 2

Frequencies and Percentages of Prevalence of Dyslexia in each Grade in Middle School Students

Grades	Male students (n = 250)		Female students (n = 250)	
	f	%	f	%
6th	7	7.7	3	3.3
7th	6	7.5	5	6.3
8th	3	3.8	3	3.8

The results in Table 2 depict that the prevalence rate was high for boys in 6th and 7th grades; while in 8th grade dyslexia prevailed equally in both genders. Bhakta et al. (2002) studied 1192 children from general population of Calicut District, India, and reported that boys and girls aged 8 years were identified with dyslexia 21.6% and 6.5% respectively, while in age 12 they appeared with approximately same percentage i.e., 4.5 for boys and 4.1 for girls.

Shaywitz, Shaywitz, Fletcher and Escobar (1990) conducted longitudinal study on 414 Connecticut children and reported epidemiological data. He reported that the prevalence rate was 5.6% in first grade children, 7% in third grade and 5.4% in fifth grade. He provided evidence of predictable year to year variability. According to his findings 28% of children remained dyslexic at the end of the first grade and in third grade, this percentage increased by 47% for the fifth grade students. The result of the present research was not in direct line with the above mentioned research, may be because of different operational definition of dyslexia followed and socio-cultural variation. Furthermore in the present study, dyslexia is equally prevalent in boys and girls in 8th grade this can be explained in terms of their different age groups as in 8th grade the age of boys fell under 14-17 years of age, whereas, girls fell in between 12-15 years. Researchers assumed that boys might learn how to cope with features of dyslexia over a period of time. That might be the reason that those who had this problem were not screened out.

Table 3

Chi-square for Gender Difference in Dyslexia

Gender	*f*	%	X^2	*p*
Male	16	6.31		
			.429	.323
Female	11	4.43		

Table 3 reveals nonsignificant gender differences in the prevalence of dyslexia.

Chan et al. (2007) conducted the research in Hong Kong on 690 Chinese children. They found gender ratio of boy and girl was 1.6 to 1. Roongpraiwan, Ruangdaraganon, Visudhiphan, and Santikul (2002) found that the prevalence of dyslexia in primary students of Thailand was 6.3% and 12.6% in female and male students, respectively. According to DSM-IV-TR (APA, 2000) those prevalence studies which gathered sample carefully revealed the equal rate of dyslexia in both genders. Wadsworth, DeFries, Stevenson, Gilger, and Pennington (1992) and Shaywitz et al. (1990) conducted research on Connecticut Children of grade 2 or 3 and found out nonsignificant difference across gender. The later states that those researches which showed high rate of dyslexia prevalence in male gender collected their data from clinical population. Similarly, DSM-IV-TR (APA, 2000) states that boys exhibit more behavior problems with dyslexia, therefore, they were referred to clinicians and were identified in more numbers than girls. Former researchers also argued for the biased selection of the sample in those researches where prevalence of dyslexia was high in boys as compare to girls, as those researchers asked teachers to identify students who were exhibiting the problem of dyslexia. However, if in these researches the sample would have been selected randomly it would have produced more reliable results.

Conclusion and Suggestions

Dyslexia is an area that has not received sufficient attention from researchers in Pakistan, yet. Most research data was found on European sample and few South Asian researches on young age children such as China, India, and etc. DSM-IV-TR (APA, 2000) states the prevalence of Dyslexia may vary in different countries.

Screening for dyslexia in the present study revealed that 27(5.37%) secondary school students out of 500 students showed a high likelihood of dyslexia. The results are comparable with

already existing literature besides the fact that they used different definitions and psychological measures.

As indigenous psychological measures are not available, the researchers used European psychological measures. With the perspective, that dyslexia is considered neurological, genetic, and language specific problem (Paulesu et al., 2001). However, Ziegler et al. (2003) provided evidence that if a dyslexia condition is existing in a person, it can be screened out through local language tests and foreign language (English) tests.

Currently in Pakistan, this problem is not highlighted in schools and there is no special psychological assessment available for the diagnosis of dyslexia. As Hunter-Carsch (2001) argued that teachers have no awareness about the needs of dyslexic conditions and they judge students as overall academically weak. As a result, students with dyslexia feel discouraged and upset.

Therefore, special training for teachers to deal with those students who are suffering from dyslexia should be introduced; it will help the teacher to highlight the students' strengths. The researchers would like to suggest that those students who are predisposed with the dyslexia should get extra benefits in exams e.g., extra time for attempting the paper and should not be penalized for wrong spellings etc.

The current research can be concluded by shedding light on its strengths as well as weaknesses. Dyslexia is considered as a developmental disorder so there is a need to measure this condition over years. Therefore, future researchers are suggested to use longitudinal research design rather than cross-sectional design. There is a possibility of teacher's bias in sample selection, although every possible effort was made to collect a randomized sample. For instance, there is a chance that teachers knew the students names along with their roll numbers and sent only those students for participation in the study who either performed well or poor academically. It is suggested that future researches should develop some procedure to overcome these issues. The research gave a comprehensive description of the psychological tests used though these were not indigenous. However, the present study does not focus on a symptoms analysis of dyslexia because it may be planned to take place in another study in future. Future studies should plan to collect larger data for making the results more normative and should use indigenous tools. Moreover, future prevalence studies may determine prevalence in primary or high school students as well as in the general population.

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Received February 16, 2008
Revision received April 11, 2011