Prevalence of learning disabilities among a sample of primary school students

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Objective The aim was to assess the prevalence and sociodemographic risk factors of learning disabilities in primary school students studying in a governmental school.

Participants and methods The present cross-sectional study was conducted on primary school children. A total of 218 students, of both sexes, represented all primary grades. All students were subjected to modified psychometric tool (MST) to identify the risk students. The students with risk of learning disorders (LDs) on MST were evaluated by the following: (a) visual acuity, hearing test, and intelligent quotient and (b) semistructured clinical interview to confirm diagnosis of LDs according to DSM-IV. In addition, our study explored the correspondence between the prevalence of LDs and the following variables: age, sex, grade level, family history, order of birth of child, and history of epilepsy or severe trauma. Finally, assessment of socioeconomic status was done to identifying the social standards of students' families.

Results A total of 36 (16.5%) students of the total screened (*n*=218) were identified as at risk by MST; of them, six students had visual and hearing impairment and were excluded from the study. There was increasing prevalence of identified LDs with increasing age, grade level, positive family history, and history of epilepsy. Moreover, students who were identified with LDs were more likely to be from low socioeconomic status. In addition, an association was found between LDs and language developmental delay.

Conclusion Learning disabilities were common in primary school students. Screening students for such disorder should be recognized and identified right within the primary school level.

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Introduction

Specific learning disorders (SLD) are the common reason for referral of an otherwise healthy child from a mainstream school. Although children do have difficulties even in early learning years in preprimary and primary school, a significant number of preadolescent children from mainstream school do present with such disabilities [1].

Despite all facilities and capabilities, few children in mainstream schools do have issues related to reading, writing, and basic arithmetic skills appropriate for the age. These children usually present at times in early learning years or present at an age when complex learning issues are involved [1].

Learning disabilities are manifested by impairment and difficulties in the acquisition and use of speaking, writing, reading, and mathematical abilities. The etiological factors are central nervous system dysfunction. Even though a learning disability may occur concomitantly with other handicapping conditions (e.g., sensory impairment, mental retardation, and social and emotional disturbance) or environmental influences (e.g., cultural differences, insufficient/inappropriate instruction, and psychogenic factors), it is not the direct result of these conditions or influences [2].

Learning disability is a condition in which the children despite appearing 'normal' are unable to perform according to their age and ability levels owing to a basic psychological problem. This psychological problem causes a discrepancy between the child's achievement and his/her actual intellectual ability in oral and listening. Students with learning disabilities are not simply low achievers, that is, students without disabilities whose academic performance is below that of their classmates [3].

Many of these students become disappointed because they fail to succeed in their education and eventually quit school early. Furthermore, if their problems are not recognized and suitable interfering programs are not provided, the risk of some disorders like depression, anxiety, and delinquency increases for these children [4].

Other possible outcomes for individuals with learning disorders (LDs) who have not received appropriate intervention or help are emotional and behavioral problems, which include low self-esteem, suicide,

family instability, substance abuse, depression, psychiatric problems, and unemployment [5].

So, learning disability is an important concern in young school-aged children. Early identification of such students can help in early institution of intervention and suitable modifications in teaching techniques.

Objective

The aim was to estimate the percentage of incidence of students who are categorized as learning disabled in primary school students and its sociodemographic risk factors.

Participants and methods

Design of the study

The present study is a descriptive and cross-sectional study on primary school children to estimate the frequency of learning disabilities among those children.

Ethics committee

The parents and teachers informed written consent and local ethical committee approval before interviewing the children.

Site of the study

The sample was recruited from Al Nahda Al Haditha Primary School, Shoubrakhi, Damanhour, Behira Governorate, Egypt.

Participants

The study was conducted on primary school children. A total of 218 students (boys and girls) represented all grades from grade 1 to grade 6 who attended school regularly. The work was carried in academic year (2016–2017), starting from September 2016 to March 2017.

The students were divided to six groups (first group include 39 students in grade 1, second group include 36 students in grade 2, third group include 38 students in grade 3, fourth group include 36 students in grade 4, fifth group include 34 students in grade 5 and sixth group include 35 students in grade 6), with age ranging from 6 to 12 years old, of both sexes, and with average intellectual abilities. Exclusion criteria were students with hearing and visual problems, handicapped, and students with neurological disorders and chronic medical conditions.

After obtaining informed consent from parents and teachers and ensuring confidentiality, all children were subjected to the following: modified psychometric tool as a screening tool: this test was done by the assistance of the school's teacher to determine the frequency of LDs among a sample of primary school children and its type [6]. Students with LDs on modified psychometric tools were furthered evaluated by visual acuity test, hearing test, intelligent quotient (Stanford-Binet Intelligence scales – 5th ed.), and semistructured clinical interview for confirmation of diagnosis of LDs based on DSM-IV criteria. Additional variables included general sociodemographic data (age, sex, grade level, and order of birth), family history of LDs, history of epilepsy, history of severe trauma, and maturation of language skills. Socioeconomic status scale is a social score to estimate social standards of families of children with chronic diseases; the indices used are education of father, education and work of mother, income of family members, crowding index, and home sanitation in general [7].

Statistical analysis

Statistical analysis was carried out using SPSS version 20 (SPSS Inc., Chicago, Illinois, USA) using percentage and Y2 test to detect significance. The results are considered significant at *P* value less than 0.05 and highly significant at *P* value less than 0.001 (Tables 1 and 2).

Results

A total of 6 children with visual and hearing impairments were excluded from this study (Tables 3–6).

Discussion

Learning disability constitutes one of the major health problems that affect the educational process. Its prevalence is approximately 10–15% among the school age children [8].

Specific learning disabilities are encountered commonly in the school setting. In recent years, major progress in the understanding of these learning problems has been made. The genetic backgrounds are being unrevealed, with

Table 1 Frequency of learning disorders among the students according to modified psychometric tool

Modified psychometric tools	*n* (%)
Positive	36 (16.5)
Negative	182 (83.5)
Total	218 (100.0)

Table 2 Visual and hearing impairments

Type of impairment	Positive	Negative
Visual impairment	3	33
Hearing impairment	3	33
Total	6	30

Table 3 Description of sample

Variables	Total sample (*n*=212)	Students with learning disabilities (*n*=30)	*P* value
Age (years)			
6	38	2	**0.019***
7	35	4	
8	37	6	
9	35	6	
10	33	5	
11	34	7	
Sex			
Boys	115	12	0.776
Girls	103	18	
Grade level			
1	38	2	**0.019***
2	35	4	
3	97	6	
4	35	6	
5	33	5	
6	34	6	

*$P<0.05$, significant.

Table 4 Relation between presences of learning disorders and studied parameters

	Presence of LD		Independent t-test	*P* value
	Mean	SD		
Sex				
Female (*N*=12)	41.83	12.94	0.287	0.776
Male (*N*=18)	40.61	10.33		
Family history				
Negative (*N*=16)	35.25	10.58	–2.971	**0.026***
Positive (*N*=14)	47.07	12.29		
Trauma and exposure to drugs before the age of 4 years				
No (*N*=17)	39.65	10.90	0.529	0.836
Epanutin syrup phenytoin (*N*=2)	55.50	2.12		
Tonsillectomy (anesthesia) (*N*=4)	32.50	10.66		
Trauma (*N*=4)	47.50	10.85		
Ventolin syrup salbutamol (*N*=3)	42.67	8.62		
History of epilepsy				
Negative (*N*=28)	37.07	10.92	–3.781	**0.013***
Positive (*N*=2)	58.50	2.12		
Order of birth				
First (*N*=6)	45.67	9.83	0.740	0.574
Second (*N*=10)	40.40	11.59		
Third (*N*=9)	39.00	11.03		
Fourth (*N*=4)	37.50	14.29		
Fifth (*N*=1)	54.00	0.00		
Natal complications and twins				
No (*N*=14)	40.50	12.45	0.345	0.881
Anoxia (*N*=3)	43.33	14.57		
Eclampsia (*N*=3)	39.33	3.79		
LBW (*N*=4)	43.75	12.34		
Smoking (*N*=4)	38.25	12.82		
Twins and low birth weight (*N*=2)	45.00	11.31		

LD, learning disorder. *$P<0.05$, significant.

advanced neuroimaging techniques, the neurophysiology mechanism of normal and cell abnormalities noted were: fine motor incoordination. The right to left confusion and abnormal learning are studied [9].

This work was aimed to study the prevalence of LDs in a sample of Egyptian children in the age group from 6 to 12 years according to DSM-IV criteria and recognition of the associated sociodemographic risk factors.

Table 5 Relation between presence of learning disorders and development of language skills

Development of language skills	Presence of LD		One-way ANOVA	
	Mean	SD	*F*	*P* value
Delayed speaking	57.00	0.00	**2.446**	**0.023***
Delayed writing	44.00	10.15		
Delayed reading	43.00	9.17		
Delayed reading and writing	37.50	6.36		
Delayed speaking and reading	37.50	13.44		

ANOVA, analysis of variance; LD, learning disorder. *$P<0.05$, significant.

Table 6 Relation between presence of learning disorders and socioeconomic status

	Students with LD		One-way ANOVA	
	Mean	SD	*F*	*P* value
Socioeconomic status				
High (*N*=10)	37.90	11.91	4.035	0.018
Middle (*N*=9)	37.56	7.49		
Low (*N*=7)	41.43	11.31		
Very low (*N*=4)	56.50	1.73		

ANOVA, analysis of variance; LD, learning disorder. *$P<0.05$, significant.

The main results that we were able to draw from this study were that the prevalence of LDs in the studied sample was 16.5%. Learning disabilities are the most prevalent of the developmental disabilities. Generally, LDs affect ~5% of school-aged children globally [10]. However, some researchers have argued that that the true prevalence could be as high as 15–20% [11].

Reportedly, 4.9% of Canadian children aged 6–15 years were found to have an LD; this prevalence varied across the age spectrum, from 1.6% among 6-year olds to 7.2% among 10-year olds [12].

Data from public schools in the USA showed an estimated LDs prevalence of 5% among school-aged children, with 2.4 million students found to have LDs [13]. On analyzing the prevalence of LD in children in USA from 2008 to 2012, findings of their studies showed that 7.66% of children had LDs. Moreover, Mogasale [14] reported a prevalence of LD of 15.17%.

When compared the total population with the positive cases, it is clearly visible that as the age and grade level increase, there are more number of student identified with learning disability; this is statistically significant at *P* less than 0.019. Hence, as the age progressed, the identification of students with LD increases, as they are not diagnosed earlier [15].

Learning disability was found to be statistically significant with the increase in grade level, because the academic study and skills are more difficult and complex learning issues are involved when grade level increases.

When sex is considered, the prevalence was not significantly different (*P* of 0.776). Hence, being male or female does not affect the presence of this disorder. This is contradictory to previous studies. Varghese and Govinda concluded that sex of the student was not associated with achievement in urban areas, but boys tended to perform better than girls in rural areas; this may be owing to differential parental encouragement and supportive facilities given to boys.

In our study, regarding a positive family history, a statistical significant difference was found; there were 14 (46.7%) children with a positive family history.

The risk for LDs among families was studied by Vogler *et al.* [16], who estimated the risk to be 40% if a male child's father is affected and 35% if his mother is affected, which represents a 5–7 fold risk over those without affected parents. For daughters, the risk of having an affected parents of either sex is approximately 17–18%, which is 10–12 fold greater than for daughters without affected parents. Pennington [17] reported a familial risk of 36–45%; this risk sufficiently significantly estimates that family history may be used to help screen for children at risk.

LDs are also linked to several chromosomal abnormalities, such as Klinefelter syndrome and fragile X syndrome in males and females and Turner syndrome in females.

Pennington [17] concluded that the precise mode of transmission is not known, but there is evidence for a

single major locus, apolygenic or multifactorial mode of transmission, and a quantitative trait locus. Grigorenko *et al.* [18] have shown linkage between chromosome 6 and phonological awareness and chromosome 15 and single word reading.

Snowling [19] observed that there is a consensus that genetic factors play a significant role in the determination of reading ability. Shephred and Uhry [20] have shown that between 35 and 40% of first-degree relatives of reading disabled children also have reading disabilities.

Trauma to the brain after birth is another factor contributing to LDs. Goldestien and Levien [21] observed that accidents and diseases occurring after birth are reported to lead to brain damage and resulting learning problems, include stroke, high fever, encephalitis, meningitis, and head trauma. They concluded that the most common etiological factor of LDs is acquired cerebral trauma associated with head injury. Incidence figures estimate that more than one million children a year sustain a head injury primarily from accidents.

Epilepsy is the most common serious neurological disorder affecting 0.5% of population. Up to fourth of patients with epilepsy are said to have LDs, and conversely, up to half of all patients with LDs are said to have seizure disorder [22].

In this study,there was a significant difference between children who had epilepsy and LDs (P=0.013).

The prevalence rate of epilepsy among people with learning disabilities has been reported as at least 20 times higher than for the general population, with seizures commonly multiple and resistant to drug treatment [23].

Cognitive impairment in epileptic children is a frequently occurring secondary consequence of epilepsy, probably secondary to ictal and interictal cortical dysfunction [24].

In our study, there was a significant difference between language development delayed and learning disabilities (P=0.023). In a study conducted by Karande *et al.* [25], 24% and 22% of children had delayed walking and delayed talking problems, respectively. A parental regularity identifies early subtle language difficulties in dyslexic children. Both prospective and retrospective longitudinal studies indicate that dyslexia is a chronic rather than transient development delayed.

Socioeconomic status in students can affect the learning process severely, particularly when parents are unemployed, or are illiterate, and consequently struggle to support the learning of their children.

In areas of poverty, there is usually a high incidence of physical, emotional, or sexual abuse and could lead to absenteeism from school, and eventually dropping out [26].

A nutrient deficiency can contribute to mobility deficits and intellectual, behavioral, learning, and mental disabilities [27].

Researchers concluded that on average, poor instruction or lack of reading practice may often be the main influence on reading disabilities in families with low socioeconomic status, whereas genes may be the main influence on reading disability among children in families with high socioeconomic status and educational support.

This may explain the results of this study regarding socioeconomic status, which were children with very low socioeconomic status had higher LDs (mean: 5.650±1.73), with statistically significant difference (P less than 0.05).

Concerning socioeconomic factors, the result of this study was consistent with that of Muthukrishna and Schoeman [28] who found a very little relationship between low socioeconomic status and LDs.

Coles [29] reported that economic pressure experience by the parents can affect children's behaviors and their ability to learn.

Limitations and further suggestions

(1) The sample size should be increased before making any generalization.
(2) Diagnosis of learning disabilities should be through a battery of tests.
(3) Effect of intervention strategies for combating learning difficulties and/or disabilities.
(4) Effect of remedial behavioral modification techniques for children with learning difficulty/ disability with emotional problems.

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Conflicts of interest

There are no conflicts of interest.

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