

Lifetime prevalence of dysgraphia and associated family environment characteristics in primary schools

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ABSTRACT

The current study was designed to screen and observe dysgraphia in primary schools in Wassit governorate in Iraq. In addition, to identify the presence of any family environment characteristics associated with dysgraphia, a cross-sectional study has been applied during the period from 1st November 2018 to the end of March 2019, which was conducted on 421 students from public and private primary schools which were randomly selected. The lifetime prevalence of students with dysgraphia was 27% in the present study. Most students (53.2%) were equal to or less than 10 years old. In the population sample, dysgraphia prevailed more in boys than girls. Illiteracy was higher for the students who have fathers with dysgraphia (39.3%) as compared to the students who have non-dysgraphia fathers (29.4%). The difference was more significant for the age, gender, and level of education of parents ($p < 0.05$). It was concluded that dysgraphia among primary school students aged 7-12 years occurs at a lifetime prevalence of nearly one-third of them. In our study, it was affirmed that dysgraphia is a problem that most commonly affects males more than females. It is important to note that the difference between the two groups was statistically significant in regard to age, gender, and level of education of parents.

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1. INTRODUCTION

One of the most essential yet complex abilities children can learn is how to write by hand, which is one of their main activities in school [1]. To be able to write, people need a variety of skills. They require a range of kinesthetic and ergonomic movement control abilities, as well as cognitive, perceptual, and knowledge of what the graphic shapes signify [1], [2]. The various components of handwriting ability include writing speed, writing pressure, and accuracy [3]. Dysgraphia is a term used to describe difficulties in handwriting [4]. It is a written language disorder that is one of the common subtypes of the [5]–[7], with a prevalence in children ranging from 5 to 10% in general, and 7 to 15% among school-age children [8], [9] and it is diagnosed more often in boys than girls [10]. It can be brought on by neurological and genetic factors [11].

Some sources defined it simply as difficulty in writing, which is described as difficulty with spelling or written expression and called a silent stutter [12]–[14]. It can have a significant negative impact on a child's academic, behavioral development [4], and psychosocial growth. In addition, this circumstance results in a person's physical, mental, and motor development issues [15].

Handwriting plays important role in education [4]. Learning to write by hand helps a child's general writing development during the early years of school [16]. Despite adequate access to teaching, motivation, stimulation, and complete mental and physical health it is difficult to produce clear and understandable handwriting in a functional interval of time [17].

Often these difficulties are first noticed at school as well as will persist into adolescence and adulthood that include trouble in written linguistic expression in childhood, this disorder has a bad effect on scholastic achievement and influences performance in school [18]–[20]. Access to advanced and efficient education is a right for all children including the disabled in order to achieve their goals and ambition like their peers and colleague [21]. The mechanical skills of writing include handwriting, spelling, and punctuation and teachers are the first who communicate earlier with children to identify and understand their problems related to writing disorders [22]. This study aimed to screen and observe dysgraphia in primary schools. In addition, to identify the gender difference, if any, in the lifetime prevalence of dysgraphia and to identify the presence of any family environment characteristics associated with dysgraphia in order to correct the problem in the initial phase which might cause poor performance at school, thereby avoiding dropouts from school due to one of learning disabilities problems.

2. METHOD

The current study is cross-sectional, and data was conducted on public and private primary school students, these 16 schools were located in Wassit, Iraq. The first 6 years is the primary education, followed by three years of intermediate education and three years of secondary education, after which the student moves to the institute or university education that makes up Iraq's educational system. The study was conducted between 1st November 2018 and to end of March 2019.

Four hundred twenty-one students, ages ranging from 7-12 years, were randomly selected including 331 males and 90 females during the academic year 2018/2019, and the purpose of the study was explained to the teachers. The sample size of students was based on the cross-sectional study formula by taking dysgraphia prevalence among students to be 15% as reported in [8], [9], with a marginal error of 3.41% with a 95% confidence interval. For this study, a total of 421 students were required.

All students above seven years of age, involved in the randomly selected schools for at least one year were included in this study. Face-to-face specific questionnaires were distributed for the teachers to collect initial information from them. For the children included in the study, the closed-ended questions of a questionnaire were given regarding basic-socio demographic characteristics of the students including information about age, gender, and educational status of the fathers and mothers. It also collects data on participants' characteristics such as the number of family members, the rank of the student among his siblings, and family type.

The questionnaire and consent forms are prepared in the local language (Arabic). Then, the questionnaire questions were assessed for relevance, accuracy, and suitability, in the Iraqi context by a public health specialist, and 30 students from schools in Kut governorate were pretested on the interview schedule. The items' internal consistency was evaluated, and the questionnaire's alpha Cronbach coefficient was calculated and determined to be 0.83. Pre-test feedback was helpful in guiding necessary modifications to the questionnaire's content and structure to ensure its reliability and validity. The questionnaire is given to the participants and 10 minutes is the time to complete the questionnaire.

Screening for dysgraphia was done using the dysgraphia rating scale: The scale was prepared by the researchers with the help of experts penal and previous studies. The scale included 20 items that measure characteristics of dysgraphia. The answers to the questions were on a five-point Likert scale., rarely=1, occasionally=2, frequently=3, often=4, and always=5. After all the questions have been answered, numbers for each response are added to obtain a final score. The minimum score is 20, and the maximum is 60; 100 higher the score, the mean suggests a high probability of the presence of dysgraphia.

These scales were chosen because they are frequently used in the diagnosis of dysgraphia and are easy to use. The statistical analysis of data was conducted using SPSS software version 25. The statistical analysis included: Descriptive Statistics: mean and standard deviation, and percentiles. Qualitative variables were expressed as percentages and association measures available within cross tabs are used as tests of independence between the categorical variables, Chi-square test was used to find out the association between various factors and dysgraphia. $p < 0.05$ was considered statistically significant.

3. RESULTS AND DISCUSSION

The results of this study represent the first overview of the lifetime prevalence of dysgraphia in the Wasit governorate. The data in the present study are intended to determine the lifetime prevalence of

dysgraphia and basic family environment characteristics that associate with dysgraphia assessed as closely as possible. This is done by assigning a set of characteristics to each study participant based on the information available (for example, age, gender, and educational status of the parents). As it appears in Figure 1, the prevalence of students with dysgraphia was 27% in the present study whereas non-dysgraphia students were 73% of the participants, which is consistent with Ashraf's [23] findings where the prevalence of dysgraphia showed 25%. However, according to previous studies, between 10% and 30% of children in schools have developed dysgraphia [24], while our findings are broadly consistent with the study by Ewain *et al.* [12].

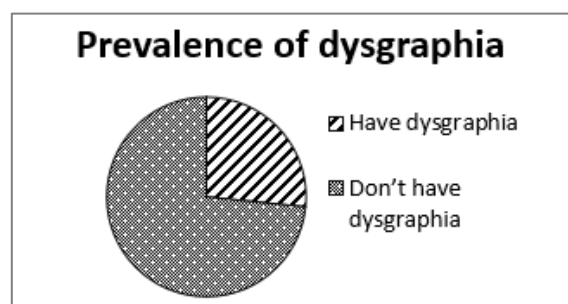


Figure 1. The prevalence of dysgraphic students

As depicted in Table 1, the total sample consisted of 421 children out of which 331(78.6%) were males and 90 (21.4%) females, a finding that is roughly consistent with prior research [25]–[27]. In addition, confirm the findings of studies investigating the impact of gender on LD including dysgraphia [28], [29]. In this study, there is a significant gender difference in dysgraphia which is consistent with what has been found on a variety of variables in previous studies (e.g., [8]). Most students (53.2%) were equal to or less than 10 years old. In this study, the mean age of students with dysgraphia was 10.18 ± 0.961 years. This study is consistent with the study done by Goel [30], while this result disagrees with the study done by Nirvana *et al.* [25], who found that the mean age of students with dysgraphia was nine years.

Table 1. Socio-demographic characteristics of study sample

Table 1: Socio-demographic characteristics of study sample						
Variables			Dysgraphiac	Non dysgraphiac	Total	p-value
Gender	Male	F (%)	74 (66.1%)	257 (83.2%)	331 (78.6%)	0.000
	Female	F (%)	38 (33.9%)	52 (16.8%)	90 (21.4%)	
Age	≤10	F (%)	69 (61.6%)	155 (50.2%)	224 (53.2%)	0.024
	>10	F (%)	43 (38.4%)	154 (49.8%)	197 (46.8%)	
Mean±SD (Range)			10.18±0.961 years		9.89±0.900 years	

Parents are their children's first teachers, and their education is critical to their learning development. It is easier for parents to raise high-quality children if they have a higher education level [31]. Furthermore, parents with a higher level of education attach more importance to interaction and exchange with their children, resulting in a tight parent-child relationship, as shown in [32]. Table 2 reveals that the majority of students who had mothers with dysgraphia and non-dysgraphia mothers had primary-level education which is 34.8% and 41.4%, respectively. Illiteracy was higher for students who had fathers with dysgraphia (39.3%) compared to students who had non-dysgraphia fathers (29.4%), followed by the primary levels of 23.2% and 24.9%, respectively. The difference was more significant for the level of education of parents ($p \leq 0.05$). Mogasale *et al.* [33] found a higher percentage of parents of students with learning disabilities including dysgraphia had an institute and higher level. However, in a study conducted in 2022 in Turkey, the difference was more significant for low mothers' education [34].

Comparison of students with dysgraphia and non-dysgraphia students according to the number of siblings, birth order, and family type are shown in Table 3. The table reveals that a greater number of students with dysgraphia and non-dysgraphia students had more than three siblings, which are 72.3% and 68.3%, respectively. In this study, students with dysgraphia were approximately equal to non-dysgraphia students in regard to birth order. Of students with dysgraphia, 12 (10.7%) were last-born, followed by the first-borns which was 23 (22.3%), and others were 75 (67%), whereas of non-dysgraphia students, 58 (13.8%) were last-born, followed by the first-borns which was 106 (25.5%), and others were 257 (61%). The

difference between the two groups was not statistically significant. This was similar to another study done in a South Indian city, which found that specific learning disorders (SLD) including dysgraphia was more common in the second birth order [35]. Both groups were comparable in terms of family type, 2.7% and 2.3% of families were nuclear. This differs from the study conducted by Pratibha and Garg [36]. Also, the results of another study [32] found the difference was significant for family type in students with learning disabilities including dysgraphia.

Table 2. Distribution of study sample according to parent's education

Parent's education			Dysgraphiac	Non dysgraphiac	Total	p-value
Mothers' education	Illiterate	F (%)	30 (26.8%)	45 (14.6%)	75 (17.8%)	0.003*
	Read and write	F (%)	1 (0.9%)	1 (0.3%)	2 (0.5%)	
	Primary	F (%)	39 (34.8%)	128 (41.4%)	167 (39.7%)	
	Intermediate	F (%)	14 (12.5%)	43 (13.9%)	57 (13.5%)	
	Secondary	F (%)	13 (11.6%)	45 (14.6%)	58 (13.8%)	
	Institute or higher	F (%)	15 (13.4%)	47 (15.2%)	62 (14.7%)	
Fathers' education	Illiterate	F (%)	44 (39.3%)	91 (29.4%)	135 (32.1%)	0.027
	Read and write	F (%)	17 (15.2%)	54 (17.5%)	71 (16.9%)	
	Primary	F (%)	26 (23.2%)	77 (24.9%)	103 (24.5%)	
	Intermediate	F (%)	7 (6.2%)	38 (12.3%)	45 (10.7%)	
	Secondary	F (%)	1 (0.9%)	19 (6.1%)	20 (4.8%)	
	Institute or higher	F (%)	17 (15.2%)	30 (9.7%)	47 (11.2%)	

*p-value calculator after inducing read and write, primary, intermediate, secondary, and institute or higher education into one

Table 3. Distribution of students according to number of siblings, birth order, and family type with dysgraphia and non-dysgraphia

Variables			Dysgraphic	Non dysgraphic	Total	p-value
Number of siblings	≤3	F (%)	31 (27.7%)	98 (31.7%)	129 (30.6%)	0.427
	>3	F (%)	81 (72.3%)	211 (68.3%)	292 (69.4%)	
Birth order	First child	F (%)	25 (22.3%)	81 (26.2%)	106 (25.2%)	0.300
	Last child	F (%)	12 (10.7%)	46 (14.9%)	58 (13.8%)	
	Others	F (%)	75 (67.0%)	182 (58.9%)	257 (61.0%)	
Family type	Joint	F (%)	109 (97.3%)	302 (97.7%)	411 (97.6%)	0.806
	Nuclear	F (%)	3 (2.7%)	7 (2.3%)	10 (2.4%)	

4. CONCLUSION

Dysgraphia among primary school students aged 7-12 years occurs at a prevalence of nearly one-third of them. In our study, it was affirmed that dysgraphia is a problem that most commonly affects males more than females. It is important to note that the difference between the two groups was statistically significant regarding age, gender, and level of education of parents. Research on dysgraphia's relationship with family environment characteristics and gender is lacking. This research was conducted in order to fill this gap. Empirical findings to understanding such relations provide insight into family environment characteristics and gender, therefore can help to correct the problem in the initial phase which might cause poor performance at school, thereby avoiding dropouts from school due to one of learning disabilities problems.

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