SCREENING FOR READING ERRORS AMONG EGYPTIAN DYSLEXIC CHILDREN

Yomna Hassan ElFiky, Nahla Abdel-Aziz Rifaie, Sabah Mohamed Hassan, and Dalia Maged Mohamed Hassan

Phoniatrics Unit, Otorhinolaryngology Department, Faculty of Medicine, Ain Shams University, Cairo, Egypt

Corresponding author:

Yomna Hassan ElFiky

Mobile: (+2) 01111889805

E.mail:

yomna@med.asu.edu.eg

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ABSTRACT:

Background: Dyslexia is a familial, neurologically-based disorder that is interfering with getting information through prints. Degrees of severity are variable; it is manifested by difficulties in receptive and expressive language, phonological processing, reading, writing, spelling, handwriting, and sometimes in arithmetic.

Aim of the work: is screening of different reading errors among dyslexic population for better understanding of this developmental disorder, this may help further on for better interventional strategies.

Patients and methods: The Modified Arabic Dyslexia screening test was administered to 40 patients with age ranging from 8 to 10 years with complaints of poor scholastic achievement and reading difficulties. Patients scored below the 25th percentile in more than seven items were "at risk of Dyslexia". Further analysis for the “Nonsense passage reading item was done” to determine the associated reading errors.

Results: All patients in the current studies showed varieties of reading errors. The most common reading error was deletion (90%) and the least were visual and morphological errors (5 %). **Conclusion:** The present study showed that patients with developmental dyslexia showed varieties of reading errors to be studied for better evaluation and rehabilitation.

Keywords: Developmental Dyslexia; Reading errors; Screening

INTRODUCTION:

Developmental dyslexia (DD), which is included under the category of Specific learning disability with impairment in reading, can vary between problems in word reading accuracy, reading rate, or fluency and reading comprehension[(1)].

According to the "Dual-route model"[(2)], reading or writing can be achieved through "a lexical route"(which allows the correct pronunciation and writing of stored words) and "a non-lexical route"(which allows conversion of sub lexical units of phonemes or graphemes into sequences of graphemes or phonemes, respectively)[(3)].

Lesion of "lexical route" and the" non-lexical route" lead to variable reading and writing errors. [(2)] Some dyslexic Patients depend on using whole-word reading, while they are unable to pronounce words. Since there is little reliance on grapheme to phoneme conversions, these readers tend to guess words based on the initial letter observed. They cannot read new or unfamiliar words. Some dyslexic patients relies on standard phoneme to grapheme correspondence with misspelling of irregular words or very long words, since these words are hard to pronounce by grapheme-phoneme conversion only showing multiple orthographic errors as substitution, deletion, insertion or transposition of letters[(4)].

Reading errors among dyslexic patients include Visual errors: a visual error in reading is when the error shares visual similarity with the stimulus, for instance "argument" read as "arrangement". A morphological error in reading is when a prefixed word (i.e. un in "unhappy" or dis in "disappointed")or suffixed word(i.e. ly in "usually" or ing in "interesting") is read with the root of the word correct but the prefix or suffix wrong, such as "fixing" read as "fixed". Deletion, Addition, Substitution. Transposition, regularization and short vowel problem **(5).**

Researches done to assess there reading errors among Egyptian dyslexic patients are limited so the aim of this study is to detect the percentage of occurrence of these errors among this group of patients.

AIM OF THE WORK:

This study aims to analyse the different reading errors in Egyptian dyslexic children.

PARTICIPANTS AND METHODS

Patients:

This is a cross sectional study applied on patients diagnosed as being dyslexic on objective and clinical measures attending the Phoniatric outpatient clinic, Ain Shams University Hospitals. 40 patients with age ranging from 8 to 10 years with complaints of poor scholastic achievement and reading difficulties were enrolled in the study. An informed consent was obtained from all parents of children before enrollment in the study. A convenience sample was used to select the cases according the following inclusion and exclusion criteria:

Selection criteria:

Inclusion criteria:

- Average I.Q
- Normal hearing and vision.
- Fully developed language.
- Patients being diagnosed on clinical and objective tests as being dyslexic.

Exclusion criteria:

- Below average I.Q.
- Hearing or visual impairment.
- Delayed language development.

Methods: All patients underwent the following steps:

All patients were subjected to the following:

1- Elementary diagnostic procedures including patient interview and careful history taking.

2- Clinical Diagnostic Aids:

a- Stanford-Binet "4th Arabic version" to provide mental age ***(Melika, 1998)*** **(6).**

b- Complete learning disability battery:

- Language test by PLS4-modified test ***(Abou Hasiba, 2011)*** **(7).**
- Illinois test of psycholinguistic abilities ***(Elsady, 1996)*** **(8).**
- The Modified Arabic Dyslexia Screening Test as a primary screening test for Dyslexia. Patients scoring below 25th percentile in more than seven items of the test are considered "At risk of Dyslexia"***(ElFiky et al., 2016)*** **(9)**.

The Modified Arabic Dyslexia Screening Test:

The "Modified Arabic Dyslexia Screening Test" was constructed, standardized and validated to be a simple tool that can detect Egyptian children at risk for having dyslexia, exploring a range of abilities as well as to provide a general measure of literacy skills. The Modified Arabic Dyslexia Screening Test does not provide a formal diagnosis of dyslexia, but 'at risk' index, providing an indication of dyslexic traits. The risk is based on the following subtests: rapid automatized naming test and literacy skills; one minute

reading, two minutes spelling, nonsense passage reading, and one minute writing. Phonemic manipulation and backwards digit span are considered indicators of working memory functioning. Bead threading and postural stability test cerebellar function, vocabulary knowledge (WFD) and memory are tested through verbal and semantic fluency ***(ElFiky et al., 2016)*** [9].

Scoring and score interpretation

Raw scores of the eleven items are converted to percentiles that are collapsed into risk status categories. It shows simply that below the 25th percentile indicate a problems and intervention is recommended. The child is "at risk of dyslexia" if he/she scored at the risk range (below the 25th percentile) on *seven or more subtests*. The interpretation of Modified Arabic Dyslexia Screening Test scores aims to be straight forward in that lower scores point to a higher risk of having dyslexia *(ElFiky et al., 2016)* [9].

All patients included in this study scored "below the 25th percentile in more than 7 items, and so all of them were "at risk of dyslexia". Specifically among the Modified Arabic Dyslexia Screening Test the "Nonsense passage reading" subtest was analyzed in details to assess the reading errors among these patients.

Nonsense passage reading: In which the child was asked to read short paragraphs composed of meaningful, regular and irregular real words with interspersed non-meaningful pronounceable words, when read aloud it reflects the child's strategy for reading and the most apparent errors.

Statistical Analysis*:*

The collected data was revised, coded, tabulated and introduced to a PC using Statistical package for Social Science (SPSS 20). Data was presented and suitable analysis was done according to the type of data obtained for each parameter.

Descriptive statistics:

1. Mean and Standard deviation (± SD) for numerical data.
2. Frequency and percentage of non-numerical data.

RESULTS;

Demographic data for cases:

Among the cases, the age ranged from 8-10 years with a mean of 8.91± 0.71 years as shown in table (1). As regard the gender, there were28 males (70%) and 12 females (30%) and regarding handedness 39 patients (97.5%) were right handed while only 1 patient was left handed (2.5%) as shown in Table (2).

Table (1): Mean age among studied group:

	Minimum	Maximum	Mean	S.D
Age in years	8	10	8.91	0.71

Table (2): Demographic data for cases:

		Cases 40	
		Frequency	Percent
Gender	Male	28	70%
	Female	12	30%
Handedness	Lt	1	2.5%
	Rt	39	97.5%

Analysis and frequency of occurrence of reading errors among cases by Modified Dyslexia screening Test:

Most of the dyslexic children showed multiple errors in reading. The distribution of errors and their frequency of occurrence among patients showed the most frequent error was deletion, followed by addition, followed by regularization then substitution and short vowel problems. Whereas the least errors were visual and morphological errors as shown in table 3.

Table (3): Analysis and frequency of occurrence of reading errors among cases

Type of error	Number of patients reported this error	Percent of occurrence of the error
Deletion	36	90 %
Addition	28	70 %
Regularization error	21	53 %
Short vowel problem	19	48%
Substitution	19	48 %
Transposition	16	40 %
Visual error	2	5%
Morphological error	2	5%

DISCUSSION:

Arabic language is the fourth most common language among countries. Arabic orthography is written from right to left. It includes 28 letters that are written in a cursive style. All Arabic letters can be used as consonants and three of them can also be used as long vowels (a, u, i). Arabic has a rich morphological structure in both nouns and verbs. The written form of each Arabic letter is determined by two factors: its position in the word – initial, middle, or final, and whether or not it ligates to the letter that precedes it. Arabic differs than any other language as it contains a considerable source of irregularity as the under-representation of short vowels, which leads to many degrees of freedom in reading many words. Also Written Arabic is Standard Arabic, which differs in phonology, lexicon, and syntax from the Egyptian dialect.

Developmental reading errors are among the most common learning impairment with severe academic consequences. Dyslexia was documented to be more common in boys than girls (Dohla and Heim, 2016[1]; Arnett et. al, 2017[10]). Similarly in the current study the majority (70%) of dyslexic patients were males.

Assessment of reading errors through lexical and sublexical routes depends on reading of regular and irregular words in many studies but still limited in Arabic societies (Coltheart et al., 2001[11]; Friedman and Haddad, 2014[12]; Dohla and Heim, 2016[1]; Friedman and colt heart, 2018[5]; Marinelli et al., 2018) [13].

Real/regular words used in English for assessment of sub lexical route in reading includes words that depend on regular phoneme to grapheme conversion rules as (tint and same) (Friedman and coltheart, 2018[5] and Sotiropoulos & Hanley, 2018[3]), in the current study similar words that have the same characteristics were chosen for the same task.

ʔard– masr- wælæd

On the other hand, some real words have specific criteria that when read by regular phoneme grapheme conversion can

be read as other words or as incorrect words. For example, English words having silent letters as (subtle, colonel, know, knife) (Friedmann and colt heart, 2018[5]; Sotiropoulos & Hanley, 2018[3]). As well as in Arabic language, Different forms of irregularities are seen, including gemination (el shada), nunnation (tanween), hamza, long vowels (modood), passive tense, (al) which is pronounced in Arabic varie of Arabic is the definitive article in Arabic language, feminine pleural, suffixed or prefixed nouns or verbs, waw el gamaa and tah-marboota

Tanween → wa. ṭa.non feminine
pleural→ ʔæl.saj.ja:.ra:t

As recognition of this words in reading depends on the lexical route, they must be stored in one's lexicon with their rules to be identified, retrieved, decoded.

On the other hand, irregular words or orthographically inconsistent words that have to be memorized as a whole unit in the long term "orthographic lexicon" cannot be written correctly by applying the simplest phoneme to grapheme conversion rule.

Different types of errors were seen among the subjects in this study in reading tasks. These errors were orthographic errors (deletion, addition, substitution and transposition), regularization errors, visual errors, morphological error, short vowel problem and function word problem. Some of these errors were distinct while others were intersected.

In the current study deletion was the most common type of error encountered in both reading and writing similar to what was mentioned by Tainturier& Rapp (2001) **(14)**.

In this study errors such as deletion, addition, transposition and substitution were considered as a subcategory of orthographic error.

- Deletion i.e.
  3a.zi:m → 3azm.
- Addition i.e.
  3eʃt → 3æ:.ʃæt
- Substitution i.e.
  do.ru:s → to.ru:s
- Transposition i.e.
  3æ:mel → 3æ:lem

Masterson (2017)[15], as well as Sotiropoulos & Hanley (2018)[3], also considered errors as deletion (comb-com), transposition (flies-files), substitution (city-sity) and addition (root-roote) as a subcategory of orthographic errors.

On the contrary some studies as (Friedmann and Haddad, 2014)[12] that considered transposition as a specific entity of dyslexia called "letter position dyslexia ". They also considered "deletion, addition and substitution "if occurring on one side of the word typically the left side, as another entity of dyslexia called neglect dyslexia. But it's not much accepted for Arabic orthography as the letter direction in Arabic is from right to left so it would manifest itself on the right side instead of the left side which disagrees with the original description of neglect dyslexia.

In the current study regularization errors and morphological errors seen in both reading and writing were considered as two separate entities, where regularization errors occurs when the word is brought back to its root.

ʔæl.ʔæ.mæ:.ken → ʔel.mæ.kæ:n

While a morphological error occurs when a suffix or prefix of a word is deleted or changed.

wa.ṭa.ni: → wa.ṭan

On the other hand, the study of Friedmann and Haddad (2014) **(12),** on 157 Arabic speaking dyslexic children considered regularization errors as morphological errors as reading.

Visual errors were seen in the current study which occurred when the incorrect response was related to the stimulus.

jos.3ed → jo.sæ:3ed

Similarly, visual errors were mentioned in the studies performed by Karanth (2003)[16]; Rastle et al. (2006) [17].

Such as reading words as argument instead of arrangement or cat instead of cap.

In agreement to Friedmann and Haddad, (2014) [12], in which underestimation of short vowels in written Arabic orthography leads to short vowel problem, this was also seen in the current study.

kol → kæl

Eventually the importance of assessment of reading errors has to be mentioned as it will lead to more effective and detailed intervention in these cases.

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تقييم مسحى لأخطاء القراءة لدى الأطفال المصريين المصابين بعسر القراءة

يمنى حسن الفقى , نهله عبد العزيز رفاعى , صباح محمد حسن، داليا ماجد محمد حسن

المقدمه:

ان عسر القراءة التنموي، وهو اضطراب في اكتساب مهارات القراءة، يحدث عسر الكتابة التنموي على الرغم من الرؤية الكافية، والتعليم، والقدرات المعرفية الأخرى.

و يمكن القراءة والكتابة وفقًا لـ "نموذج المسار المزدوج "، من خلال "طريق معجمي" (والذي يتيح النطق الصحيح وكتابة الكلمات المخزنة) و "مسار غير معجمي "(والذي يسمح بتحويل بالصوت الصحيح الي الحرف المقابل له).

لقد أجريت هذه الدراسة على 40 مريضا تم تشخيصهم على كل من التدابير الاكلينيكية والموضوعية على أنهم عسر الكتابة التنموي وقد تمت الدراسة لتحديد الأنواع المختلفة من الأخطاء المصاحبة للقراءة بين هذة الفئة.

الهدف

تقييم الانواع المختلفة من الأخطاء المصاحبة للقراءة في الأطفال الذين يعانون من اضطراب عسر القراءه ونسبة هذة الأخطاء بين هذه الفئة..

المرضى

تم تطبيق هذة الدراسة على عدد اربعين طفلا يعانون من ضعف التحصيل الدراسي .وقد تم تشخيصهم اكلينيكيا وعن طريق الاختبارات المقننة أنهم يعانون من اضطراب عسر القراءة.

وقد شوهدت أنواع مختلفة من الأخطاء بين الموضوعات في هذه الدراسة أثناء مهام القراءة والكتابة مثل (الحذف، الإضافة، الاستبدال والتنقل)، أخطاء التنظيم، الأخطاء البصرية، الخطأ المورفولوجي، مشكلة حرف العلة القصيرة ومشكلة الكلمات الوظيفية. بعض هذه الأخطاء متميزة بينما يتقاطع البعض مع الآخر.