

Study of Neurological, Cognitive and Behavioral Profiles in Dyslexic Children and their Parental Stress Assessment

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Abstract

Background: Dyslexia is the most common learning disorder. Usually it is associated with cognitive processing dysfunction, Association of dyslexia and developmental coordination disorder is frequent, and has been studied for quite long of time, about 50% of dyslexic children has to have Motor co- ordination problems disorder and behavioral disorders. Dyslexia negatively influences the child- mother relationship causing maternal stress and parenting dysfunction that threatens the family compliance and cohesion.

Aim: Was to assess the neurological, cognitive and behavioral associated problems and their parental stress.

Methodology: Thirty children with dyslexia (20 boys and 10 girls) aging between (8- 13) years old and their mothers were involved in the study were collected from learning rehabilitation unit in the special needs children center. All the children were subjected to quick neurological screening, cognitive processing and behavioral problems assessment. All the mothers were subjected to parental stress assessment.

Results: The showed that 83.3% of the children have motor coordination problems, 50% have cognitive processing dysfunction, particularly weakness in planning and visual- spatial related skills, 80% of the children have at least one co- morbid behavioral disorder, the commonest being depression and anxiety, with girls having higher levels of depression than the boys, moreover, there was statistically significant incompetency regarding social and sports related activities. Regarding the mothers, 90% had extremely high level of parental stress which is more related to their children behavioral problems and characteristics and also mother characteristics.

Conclusion: From this study, it has been concluded that dyslexia is a disabling disorder associated with coordination problems, cognitive processing dysfunction and seriously compromises the child's overall behavioral aspects and social competency. In addition, dyslexia is considered as a major stress factor negatively affecting the child/mother parenting interaction.

Keywords: Dyslexia- CAS- Cognitive processing assessment- Parental stress- Developmental coordination disorder.

دراسة الأوجه العصبية والمعرفية والسلوكية عند الأطفال

الذين يعانون من عسر القراءة وتقييم التوتر النفسى لوالديهم

الخلفية: عسر القراءة هو الأكثر شيوعاً من اضطرابات التعلم، وعادة ما يكون مصاحباً له خلل وظيفي في العمليات المعرفية وقد أثبتت الدراسات وجود اضطرابات في والتناسق الحركي النمائي في كثير من حالات عسر القراءة وكذلك اضطرابات سلوكية مصاحبة متعددة مثل الاكتئاب والقلق وعدم الكفاءة الاجتماعية، وهو يؤثر سلباً على العلاقة بين الأم والطفل مسبباً عبء وضغوط على الأم مما يؤثر على الوظيفة الوالدية لها مما يهدد الترابط الأسري.

هدف الدراسة: تقييم كل من المشاكل العصبية، المعرفية والسلوكية المصاحبة لعسر القراءة مع تقييم الضغوط الوالدية.

طريقة البحث: اشترك في هذه الدراسة ٣٠ طفلاً ممن لديهم عسر القراءة منهم ٢٠ ولد و ١٠ بنات عمرهم يتراوح من ٨ إلى ١٣ عام مع أمهاتهم. كل الأطفال خضعوا للاختبارات الآتية: اختبار الفرز العصبي السريع، نظام التقييم المعرفي، قائمة سلوك الطفل والأمهات خضعن لاختبار تقييم الضغوط الوالدية، وقد تم جمع العينة من الأطفال المترددين على وحدة صعوبات التعلم في مركز ذوي الاحتياجات الخاصة- جامعة عين شمس.

النتائج: أظهرت النتائج أن ٨٣,٣% من الأطفال لديهم مشاكل في التناسق الحركي ٥٠% لديهم مشاكل في التقييم المعرفي خاصة في عمليات التخطيط والمهارات البصرية المكانية (الثاني). وأن ٨٠% لديهم على الأقل واحد من الاضطرابات السلوكية وقد كان الاكتئاب والقلق هم الأكثر شيوعاً وأن البنات يعانين من الاكتئاب بدرجة أشد من البنين. وأيضاً أن أطفال العينة يعانون من قصور في الكفاءة المجتمعية من ناحية الأنشطة الرياضية والاجتماعية مما يؤثر سلباً على دورهم في المجتمع. وأوضحت الدراسة أن ٩٠% من الأمهات يعانين من ضغوط في غاية الشدة والتوتر بسبب الأمور المتعلقة بما يخص الطفل من عسر القراءة والاضطرابات السلوكية المصاحبة لذلك مما يؤثر سلباً على العلاقة الوالدية والاندماج الأسري.

الخلاصة: عسر القراءة اضطراب يسبب الإعاقة للطفل مصحوباً بمشاكل في التناسق الحركي والعمليات المعرفية ويسبب مشاكل سلوكية بدرجة خطيرة وقصور في الكفاءة المجتمعية له. عسر القراءة يعتبر من عوامل التوتر الشديدة التي تؤثر سلباً على العلاقة الوالدية بين الأم وطفلها.

الكلمات الدالة: عسر القراءة- نظام التقييم المعرفي- الضغوط الوالدية- اضطراب التناسق الحركي.

Introduction:

Dyslexia or specific reading disorder is a neuro- developmental disorder with a Biological origin characterized by difficulties with accurate and or fluent word recognition, Poor comprehension and Difficulties with Spelling. These difficulties result from deficit in the phonological component of language and accompanied by specific deficits in cognitive abilities related to literacy skills. These difficulties are unexpected in relation to other Cognitive abilities and provision of effective classroom instruction and not attributable to vision or hearing problems (APA- DSM- 5, 2013).

Dyslexia is the most common disorder of learning difficulties. International Epidemiological studies report a prevalence of 10% for dyslexia, and it is the most extensively investigated learning disorder in international studies regarding its features and also its co- morbidity (Sprenger- Charolles, et.al., 2012).

Association of dyslexia and developmental co- ordination disorder is frequent, and has been studied for quite long of time, About 50% of dyslexic children has to have motor co- ordination problems disorder (Ramus et.al., 2003). Cooccurrence would reflect common etiological basis. It has been suggested that cerebral dysfunction could constitute a common causal factor in co morbid reading disability and motor impairment (Nicoloson et.al., 2001). Ohare and Khalid (2002) found that 70% of children with developmental coordination Disorder (DCD) had reading problems. It is reported that approximately 60% of children with dyslexia also meet the criteria for at least one Neuropsychiatric disorder (Willcut et.al., 2000).

Bandura et.al. (1999) showed how poor school performance can predict an increase in depressive symptoms, Failure in achieving tasks may constitute a stress factor that can trigger depressive symptoms, also school problems represent a risk factor for anxiety (Feng et.al., 2005). Children diagnosed with dyslexia show more depressive mood, anxiety symptoms and co- morbidities with external behavior problems (Gray et.al., 2014); (Morris et.al., 2013). Soo and Baily (2006) have noted that frequent co- morbidity of inattention and hyper Activity included with dyslexia puts the child at a higher risk of psychopathology. Across the studies, Pennington (2006) noted that around 30%- 45% of children with dyslexia also meet the criteria for ADHD.

Dyslexia represents challenge for the student and also for the parent (Elliot and Nicolson, 2016). Dyslexia adds stress to family members also, especially to mothers who have higher levels of stress and depression in comparison to mothers of non- dyslexic children (Snowling, et.al., 2007).

Stress of different sorts (e.g. unfortunate life events financial or health problems, anxiety, depression, lack of social support) can cause parental emotional distress and cause couples conflict and difficulty with their relationship, Sequentially these responses to stress disrupt parenting and the interactions between parent and child which lead to short term or lasting poor outcomes. (Antshel and Joseph, 2006)

Aim of the Study:

The study aims to address the Neurological, Cognitive functions, behavioral profiles in dyslexic children and the psychological impact of parenting a child with dyslexia.

Patients and Methods**Design Of The Study:**

Descriptive cross sectional study.

Place Of The Study:

This study was held at the center of special needs children- Faculty of postgraduate childhood studies- Ain Shams University in Cairo.

Subjects:

✧ Sample Selection:

1. Participants were selected from dyslexic children attending the learning disabilities rehabilitation unit from 1st February 2017 to end of December 2017.
2. The participants were 30 children (20 boys& 10 girls) along with their mothers who fulfilled inclusion criteria, their contact numbers were obtained to facilitate communication and recruitment.

✧ Inclusion Criteria:

1. Age group: (8- 18) years old.
2. Both boys and girls were included; 20 boys and 10 girls.
3. Average and above average IQ.
4. Having specific reading disorder (Dyslexia), according to DSM-

✧ Exclusion Criteria:

1. Visual and hearing impairment (not corrected).
2. Children who refused or did not complete the tests.
3. Children with neuromuscular diseases (muscular dystrophy diagnosis) cerebral palsy or Epilepsy.

✧ Ethical Considerations: The study was approved by the ethical committee of the faculty of Postgraduate Childhood Studies, Ain Shams University, written approval was obtained from the center of special needs children and verbal informed consent was obtained from children's mothers after explanation of the study and its benefits and before children's enrolment in the study.

Procedures:

All children participated in the study were subjected to:

1. Full medical history and examination.
2. Psychiatric interview with focusing on:
 - a. Prenatal and postnatal history including Health problems, smoking during pregnancy, Mode of delivery, Prematurity, Admission to Neonatal intensive care and Jaundice.
 - b. Developmental history including, Gross and fine motor, Language and Social development.
 - c. Present or past history of medical illness e.g. Epilepsy, muscular, neuropsychiatric problems, Vision or hearing problems, Family history of dyslexia or poor reading and academic achievement and school related problems.
 - d. All children were subjected to:

- ✧ Neurological screening using Quick Neurological screening test (QNST).
- ✧ Cognitive processing assessment using cognitive Assessment System (CAS) scale.
- ✧ Behavioralproblems assessment using Children Behavior Check list (CBCL) parent form. The mothers were subjected to parental stress assessment using Parental Stress Index (PSI).

Statistical Analysis:

Data was statistically analyzed using Statistical Package For Social Science (SPSS) version 20. Quantitative data was represented as minimum, maximum, mean± standard deviation. Qualitative data was represented as frequency and percentage. Paired t- test was used in comparison p- value≤ 0.05 was considered statistically significant.

Results:

The results of these study showed that, 83.3% of the study sample have motor coordination problems with statistically significant better coordination performance with older age dyslexic children. Regarding cognitive processing assessment, the study results showed that about 50% of the study sample got mean scores ranging between below average and very low level reflecting the variation in severity of dyslexia and the presence of associated cognitive problems. Planning and simultaneous processes scoring were categorized in below average indicating weakness in planning and visual spatial related skills. The findings of the study revealed that there was no significant relation between the severity of coordination problems and cognitive processing impairment in dyslexic children. Moreover, the study results showed that 80% of study sample have at least one co- morbid psychiatric behavioral disorder, 70% have depression, 46.7% have anxiety, 36.7% have ADHD, 30% have conduct disorder and 23.3% have oppositional defiant disorder the commonest disorders were depression and anxiety. The study revealed that the girls were statistically significant more depressed than boys (p- value= 0.04) and there is no statistically significant relation severity of coordination problems and behavioral problems in the study group.

In our study, about 63.22% of study sample have multiple emotional behavioral problems, 13.3% of them with five diagnoses, 6.66% with four diagnoses, 26.6% with three diagnoses, 16.6% with two diagnoses and 16.6% have one diagnosis. Only 20% of study sample has no behavior co morbidity, the most common problems in our study are depression, anxiety, conduct and ODD. The study showed that 83% of study sample have competency problems mainly in sports activities and social related functions and to the least extent in school related functions. There is statistically significant competence dysfunction regarding social and sports related activities in dyslexic children without coordination problems.

In the study, 90% of mothers have extremely high level of total stress; in addition, it was found that 90% of the mothers were on the 94th percentile on child domain. 80% of mothers were on 90th percentile on parent domain, indicating that the behavioral characteristics of dyslexic children such as high level of demanding, poor acceptability and absence

of positive reinforcement, contribute to overall stress in parent child interaction more than the mother characteristics. The study results showed that the maternal characteristics that negatively affect mother- child relation are depression and role restriction, incompetence and social isolation. The study revealed that the life stressors did not tend to intensify the total stress the mothers experience as 73.3% of mothers were on normal percentile score and more than 25% of the mothers are suffering from high level of life stressors. The results of the study revealed a negative impact of dyslexia on cognition, behavioral aspects and association of motor coordination problems, not only that, but also considering dyslexia a major stress factor that threaten child- mother relation.

Table (1) Quick Neurological Screening Test (QNST), total score of the study group

	The study group (n= 30)	
	mean± SD (Range)	
Total Score Of QNST	38.933±12.947(14- 69)	
	F	%
Normal Range: ≤25	5	16.7
Suspicion range: 26- 50	20	66.6
High Range: >50	5	16.7

Table (1) shows the results of motor coordination performance that was screened using QNST. More than 80% of the study sample has poor performance in QNST, 16.7% (5) of cases earned high range total score (> 50) indicating severe motor coordination dysfunction, 66.6% (20) of cases had suspicious range score, 16.7% (5) of cases had normal motor coordination performance. According to these results, the participants were divided into 3 groups according to QNST total score. Group (A): with high score (> 50), Group (B): with suspicious score (26- 50), Group (C): with normal score (≤ 25).

Table (2) QNST, Comparison between Studied Groups Regarding Age, Gender and IQ

	Group A (high range) N= 5	Group B (Suspicious Range) N= 20	Group C (Normal Range) N= 5	F	P (Sig)
Age	8.4±0.547	9.55±0.998	10.8±1.483	6.722	0.004 (S)
	N%	N%	N%	X	P (Sig)
Gender	Male 4 (80)	14 (70)	2 (40)	2.100	0.349 (NS)
	Female 1 (20)	6 (30)	3 (60)		
IQ	Mean SD	Mean SD	Mean SD	F	P (Sig)
	97.4±6.580	98.0±7.725	96.0±6.123		

Table (2) Shows that neurological motor coordination performance was improved as the age increased, where the age of group (A) is 8.4 years old, group (B) is 9.6 years old and group (C) is 10.8 years old with statistically significant difference between A, B and C verifying that the age might be impart affect the motor coordination performance (r), there was no statistically significant difference between groups A, B and C regarding IQ level, where group A IQ (97), group B IQ (98), group C IQ (96), verifying that average IQ levels has no influence on motor coordination performance.

Table (3) Cognitive Assessment System (CAS) test, distribution of the study sample according to the total score

	The Study Group (n= 30)	
	Mean± SD (Range)	
CAS Total Standard Score	90.4±11.562 (Average) (63- 116)	
	F	%
40- 69 (very low)	1	3.3
70- 79 (low)	3	10
80- 89 (below average)	11	36.7
90- 109 (average)	14	46.7
110- 119 (above average)	1	3.3
120- 129 (excellent)	0	0
130 and above (superior)	0	0

Table (3) shows the level of cognitive processing that relates to the academic achievement, minimum total score of the study sample was 63 and maximum was 116 with mean 90.4, classified in the category of average level, 50% of the study sample (36.7%, 10%, 3.3%) earned scores ranging from below average, low and very low level respectively, revealing heterogeneity of the study sample regarding the severity of information processing impairment that relates to academic achievement and 46.7% were classified in average level and one case above average.

Table (4) CAS, Description of CAS subscales regarding total scoring and level of Classification Subscales Total Standard Score

	The study group (n= 30)	
	mean± SD (Range)	Level Of Classification
Planning Subscale Standard Score	86.633±10.407 (67- 104)	Below Average
Attention Subscale Standard Score	102.233±15.345(47- 121)	Above Average
Simultaneous Subscale Standard Score	82.133±13.858 (60- 110)	Below Average
Successive Subscale Standard Score	97.066±16.442 (71- 143)	Average

Table (4) shows weakness in two cognitive processes out of four, first one is planning process, within below average classification, the second weak process is simultaneous processing, within below average classification.

Table (5) CAS, Comparison between studied groups (A, B, C) regarding CAS subscale scoring

	Group A (High Range) N= 5	Group B (Suspicious Range) N= 20	Group C (Normal Range) N= 5	F	P (Sig)
	Mean±SD	Mean±SD	Mean±SD		
Planning Score	82.2±11.519	87.55±10.961	89.0±7.257	0.596	0.558 (NS)
Attention Score	104.0±6.00	103.45±12.68	95.6±28.987	0.545	0.585 (NS)
Simultaneous Score	76.2±11.713	83.3±14.754	83.4±12.973	0.532	0.593 (NS)
Successive Score	99.2±16.751	94.3±16.638	106.0±14.849	1.068	0.357 (NS)

Table (5) shows that the comparison between groups A, B, C regarding CAS subscales, no statistically significant difference between the groups,

Table (6) Children behavior check list (CBCL), Description of scoring, DSM- oriented problems of the study group

(CBCL)	The study group (n= 30)	
	f	%
Affective Problem (Depression)	Normal <65	5 16.7
	Borderline 65- 69	4 13.3
	Clinical >69	21 70.0
Anxiety Problem	Normal <65	10 33.3
	Borderline 65- 69	6 20.0
	Clinical >69	14 46.7
Somatic Problem	Normal <65	17 56.7
	Borderline 65- 69	8 26.7
	Clinical >69	5 16.7

(CBCL)	The study group (n= 30)	
	f	%
Attention deficit hyperactivity Problem (ADHD)	Normal <65	15 50.0
	Borderline 65- 69	4 13.3
	Clinical >69	11 36.7
Oppositional Defiant Problem (Odd)	Normal <65	22 73.3
	Borderline 65- 69	1 3.3
	Clinical >69	7 23.3
Conduct Problem	Normal <65	14 46.7
	Borderline 65- 69	7 23.3
	Clinical >69	9 30.0

Table (6) shows that assessment of co morbid psychiatric diagnosis, depression was the commonest emotional behavioral comorbidity in the study sample where 70% of cases earned clinical score, anxiety problems were the second common comorbidity where 46.7% had clinical score, 36.7% have ADHD, 30%, 23.3% and 16.7% have conduct, ODD or somatic comorbidity respectively.

Table (7) Comparison between studied groups (A, B and C) regarding CBCL/DSM oriented scale scoring

	Group A (High Range) N= 5	Group B (Suspicious Range) N= 20	Group C (Normal Range) N= 5	F	P (Sig)
	Mean±SD	Mean±SD	Mean±SD		
Affective Problems (Depression)	69.4±2.607 (Clinical)	71.6±8.425 (Clinical)	70.4±11.393 (Clinical)	0.155	0.857 (NS)
Anxiety Problems	66.65±6.503 (Border Line)	64.4±8.443 (Normal)	68.4±8.532 (Border Line)	0.449	0.642 (NS)
Somatic Problems	60.8±10.034 (Normal)	59.8±7.871 (Normal)	61.4±10.899 (Normal)	0.079	0.923 (NS)
Attention deficit hyper- activity problems (ADHD)	62.6±3.847 (Normal)	64.8±9.111 (Border Line)	71.0±6.284 (Clinical)	1.527	0.235 (NS)
Oppositional defiant problems (ODD)	63.2±7.429 (Normal)	58.25±10.632 (Normal)	63.2±6.058 (Normal)	0.876	0.427 (Ns)
Conduct Problems	62.2±8.526 (Normal)	62.25±9.469 (Normal)	65.6±12.054 (Border Line)	0.2466	0.783 (NS)

Table (7) showed that assessment of the emotional behavioral comorbidity among A, B and C groups revealed that different psychiatric comorbidity showed no statically significant difference between the three groups, verifying that presence or severity of motor co- ordination dysfunction have no major role in psychiatric co- morbidity with Dyslexia.

Table (8) CBCL, Scoring of Competence scale (total and subscales) of the study sample

CBCL/ Competence Mean± Sd (Range)	Score Level	The study group N= 30	
		F	%
Total Competence Score 27.133± 8.977 (17- 48)	Normal Range ≥ 41	3	10
	Borderline: 37- 40	2	6.7
	Clinical Range: < 37	25	83.3
Activities 30.67± 9.911 (20- 59)	Normal ≥ 36	8	26.7
	Borderline: 31- 35	4	13.3
	Clinical: <31	18	60.0
Social 34.366± 9.488 (23- 52)	Normal ≥ 36	13	43.3
	Borderline: 31- 35	4	13.3
	Clinical: ≤ 31	13	43.3
School Subscale 36.133± 3.866 (27- 43)	Normal ≥ 36	19	63.3
	Borderline: 31- 35	9	30
	Clinical: <31	2	6.7

Table (8) shows that competence profile of dyslexic children, poor

adaptive functioning, 83.3% of dyslexic children earned clinical score, in addition 6.7% earned borderline score. Assessment of the competence areas reveals poorest functioning is in activities aspect including sports (mean score= 30, clinical range), Social subscale mean score equal 34 (borderline) indicate rather poor functioning in social area. Regarding school subscale, mean score= 36 (normal score) but 43.3% have clinical score and 13.3%, borderline score.

Table (9) Parenting stress index (PSI), Parent- Child (P- C) Total score of the study sample

	The study group (n= 30)	
	Mean± SD (Range)	
Psi Ts	93.166±9.656	
PSI total score (child and parent domains in percentile)	(50- 97)	
PSI Total Score	F	%
<15 th percentile: extremely low	0	0
15 th - 80 th : normal range	3	10
≥ 85 th percentile: high stress score	0	0
≥ 90 th : clinically significant level	27	90

Table (9) shows critical dysfunctional parent- child system where 90% of the mothers earned score on ≥ 90th percentile (mean score on 93th percentile) this extremely high score suggests high clinical level of stress that mother are experiencing in their parenting functioning. Only 3% of mothers experience normal level of stress.

Discussion:

In our study, the dyslexic cases are divided into three groups according to the scoring of QNST, Group A: with high score, represent 16.7% of cases (5/ 30), high score means poorer performance and poorer neurological dysfunction regarding motor co- ordination and sensory integration. These study results are in agreement with other studies reported that, association of DCD and dyslexia is frequent (Chaix et.al., 2007). Also, the study results are similar to Kaplan et.al. (2001), in their study, they demonstrated that a rate of co- morbidity of DCD is 16- 70% of children with dyslexia and they noted that the high percentage of occurrence of DCD with cases of dyslexia were cases overlapped with ADHD too. Results of Group A and B reflect that 83.3% of the study sample probably has a diagnosis of DCD, Which is similar to Nicolson et.al. (2001) study who noted that DCD can affect from 60% to even up to 80% of persons with dyslexia.

Our study shows statistically significant difference in coordination performance between the studied groups regarding the age, where mean age in Group A was 8.4 years, in Group B was 9.5 years and in Group C was 10.8 years, reflecting better motor coordination performance with higher age, suggesting that low performance in comparison to age may indicate delayed maturation or sensory integration problems. This is in accordance with a study for Mutti et.al. (2012), noted that normal children perform most of QNST motor task by age of 8, and poor performance in advanced age suggests that Neuro- developmental immaturity, impairment of sensory integration or impairment in motor co- ordination development, and according to study for Asonitou et.al. (2012), improvement may occur in some coordination motor skills in children

with DCD suggesting that DCD and neurological soft signs (NSS) reflect neurodevelopmental immaturity.

In the study sample, CAS scale mean total score was 90.4, classified as average level in cognitive processing performance. In our study, mean IQ was 97.5 (average), the lower CAS score than IQ can be explained by Das et.al. (1994) study when they concluded that, although IQ can never be an explanatory construct to the definition of reading problems, cognitive processing skills; such as planning, attention, simultaneous and successive (PASS) processing have been found to be relevant in understanding reading problems and IQ scores should not be used in definition of reading disability. This is consistent with other studies, explained that Dyslexia reflects the problem in brain areas that help in interpretation of language, it does not interfere with thinking abilities, and most children with Dyslexia has average or above average intelligence (Kelly and Natalie, 2016). In the study, in attention processing subscale, there is a large a difference between lowest and highest score ranged from (47- 121) classified from very low to excellent level, highlighted the strong and marked heterogeneity of the study sample regarding attention processing.

Attention processing subscale yielded the highest mean score, 102.2 (within average classification) reveling good performance in attention process. It was strange to see this result especially because it known that dyslexia is usually co morbid with ADHD as a study done by Pennington et.al. (2009), revealed that 30%- 45% of children with Dyslexia meet the criteria of ADHD and vice versa.

In the study, planning processing mean score was 86.6 which it is in below average classification suggesting weaknesses in planning process and indicate problems in organizational behavior, selecting, constructing strategies and/or monitoring performance. The large difference between the lowest and highest score (71- 143) classified from low to superior, reflecting huge variation in the study sample performance, may be explained by, different degree of severity of dyslexia and co- morbidity with emotional behavioral problems such as, anxiety, depression or ADHD that may negatively affect the executive functions and their needs to enhance their problem solving skills. In a study for Naglieri and Rojahn (2004), they compared children, having dyslexia associated with ADHD and children enrolled in Regular education, they showed that the ADHD with dyslexia group had lower scores on simultaneous and planning scores than the regular education group.

In the study, successive processing mean score was 97 categorized in average classification demonstrating no weakness in successive processing associated with sequential decoding of sounds and it is an essential measure for temporal sequence. Our result is in contrast with other studies done by Das et.al. (2007); Papadopoulous (2004) where they concluded that poor successive processing is one of the primary characteristics of children with dyslexia. Das et.al. (1994) revealed in their study that successive processing measure in CAS can successfully identify about 75% to 80% of children with dyslexia.

In our study, the large difference between lowest and highest score in

the successive process (71- 143) representing a range from low to superior level, may suggest, inter- individual variations in auditory working memory, verbal abilities in our study sample. according to Crozman (2017), in dyslexia profile, the potential for reading difficulty occur alongside cognitive strengths or talents such as high ability to process verbal (Berninger and Abbot, 2013) or nonverbal information (Gilger et.al., 2013) may mask dyslexia traits, complicate dyslexia diagnosis or help dyslexics to compensate for their reading difficulty (Silverman, 2009; van Viersen et.al., 2016).

In the study, simultaneous processing mean score was 82.1, classified as below average level revealing weakness in visual- spatial related skills Suggesting weakness through recall of stimuli and weakness in understanding how words and verbal concept are integrated and indicate the importance of enhancement of non verbalskills. Lohman (1996) defines visuo- spatial ability as “the ability to generate, retain, retrieve, and transform well- structure damages” and he included factors that comprise visuo- spatial ability such as spatial orientation, spatial relations, spatial visualization, tasks requiring encoding, transforming, remembering and matching and cognitive activities involving perceptual speed, visual memory, left to right orientation. There are studies have looked at visual- spatial deficits and visual- spatial associations with dyslexia, Facoetti and colleagues (2010) have shown connection between visuo- spatial attention and auditory processing deficits in families at risk for dyslexia other researchers. In our study, the comparison between groups A, B, C regarding CAS subscales performance, shows that for all processes (planning, attention, simultaneous and successive), there is no statistically significant difference between group A, B, C, revealing shared profiles between groups (pure dyslexic and dyslexics with poor motor coordination) in cognitive processing indicating that Dyslexia per se has a major influence on the cognitive processing and not the co morbidity with motor- coordination problems and the presence of some differences in scoring between the groups in each process indicate that the effect of co morbidity with motor- coordination and sensory integration problems in cognitive processing is marginal and not a significant influence.

In the study sample 80% have co- morbid neuropsychiatric disorder. This result is higher than the result of other studies done by sheikh et.al. (2016) that revealed 47.8% of their sample of Egyptian dyslexic children had co- morbid psychiatric diagnosis and Willcut et.al. (2000) who reported that 60% of children with dyslexia meet the criteria for at least one neuropsychiatric disorder. This finding of large number in our study can be due to that our sample children are recruited from Specialized Unit of Learning Disabilities and many of them were diagnosed since long time and they are suffering from labeling as dyslexic or stupid.

In the study 70% of children have depression and 46.7% have anxiety disorder these results are higher than that estimated by Sheikh et.al. (2016), they found 16.2% of their Egyptian Dyslexic sample had depression and 12% had anxiety disorder (Their sample participants were recruited from primary school Egyptian students diagnosed for the first

time as Dyslexic and they were not labeled before as Dyslexic).

Our results appear in line with conclusion of other study done by Lu and his colleagues (2012), concluded that depression often occur with children under stress, having learning disorder, attention, conduct or anxiety disorder. Chabrolle et.al. (2010) noted that rate of anxiety disorder in children with Dyslexia is persistently increasing and they are more exposed to higher risk of depression.

In the study 36.7% of children have ADHD, this result agrees with previous study done by Pennington et.al. (2006), revealed that 30%- 45% of children with Dyslexia meet the criteria of ADHD and vice versa. These children with ADHD in our study may get benefit from medical treatment; therefore more evaluations may be needed before the decision of medicinal treatment. Our result is in line with Sheikh et.al. (2016) study where they found that 24.3% of their study sample had ADHD. In our study 30% of children have conduct disorder, 23.3% have opposition defiant disorder. These percentages are higher than what was estimated in Sheikh et.al. (2016) were they found that 13% of their study sample had conduct disorder (CD) and 5.4% has oppositional defiant disorder (ODD); this difference may be due to the presence of more risk factor for aggression in our study sample. In our study there is statistically significant difference between A, B and C groups revealed that children with Dyslexia alone are more dysfunction in social and sports related activities and they are generally less competent in their lives than those with co- morbid co- ordination problems. May be, those children are mainly concerned with their learning disability and academic underachievement. In the study 90% of mothers had PSI total score on > 90th percentile which is clinically significant level revealed the extremely high stress that mothers experiencing and sever parent- child system dysfunction; 80% of mothers were on > 90th percentile score in parent domain representing that parent stress originated from parental functioning including parent and family context factors that influence a parent ability to function as a competent care giver. This agree with study for AL- Yagon (2003) who documented that having a child with dyslexia predispose the parent to higher level of frustration and dissatisfaction affects the parenting style.

In the study 90% of mothers were on 94th percentile in child domain; indicating that behavioral characteristics of the study children are the main contributor cause difficulty for the parent to give care and greatly add to the overall stress in parent- child system than the mother’s characteristics and both are in critical significant levels that indicate the importance of intervention to manage that parenting dysfunction.

Depression was the first maternal characteristics that yielded highest percentile score in parent domain. Mothers were on 86th percentile suggests dissatisfaction with self and life circumstances and the mothers have less energy to fulfill parenting responsibilities; This is in line with Elliot and Nicolson (2016), revealed that dyslexia represents a challenge for the student and also for the parent. In a study for Lee (2013), assessing the maternal stress, wellbeing and impaired sleep in mothers with

developmental disabilities, he reported the bidirectional relationship between maternal stress and depressive symptoms and concluded that child behavior problems were significantly associated with both maternal stress and depressive symptoms. Child domain on PSI provided an estimation of the child problematic characteristics that contribute to the overall stress in parent- child system. In the study 90% of mothers were on the 94th percentile score in child domain; suggesting that behavioral characteristics of the children in the study sample are the main cause of mother- child dysfunctional parenting, this is consistent with other studies for Freeman and his colleagues (1991) concluded that parental stress and health outcome is related to child characteristics such as severity of disability, diagnosis and extent of coexisting behavioral problems; another study for Hasting et.al. (2002) they documented that co morbid behavioral problems predict parent stress to higher extent than the severity of disability. Acceptability and demanding sub domains yielded the highest score, 98th percentile and 93rd percentile respectively; suggesting that disruptive behavior in Dyslexic child does not match the expectance that the mother had for her child and the rejection between them may arise; especially when the mother is overly committed to being a model mother and they see themselves as being dominated and controlled by their children's demands. In our study, the mothers are highly educated and they are effortful keeping on attending extra educational remediation sessions in the learning disability services.

In our study, children are not considered as a source of positive enforcement for their mothers the score was on 88th percentile (high); suggesting that the interaction between mother and her child failed to produce good feeling by the mother about herself; the possibilities may be the child is depressed, the mother is depressed or the mother is unable to understand her child.

Adaptability of the child to adjust the changes in his social environment yielded high score (86th percentile) suggests easily emotional upset; this is consistent with the social incompetence which is revealed in CBCL- competence scale in our study; This is consistent with Mishna study (2003), many children with dyslexia demonstrate social dysfunction manifestations such as poor peer relations, loneliness disruptive behavior and distractibility.

Mood and distractibility characteristics yielded normal scores, 80th and 78th percentile respectively; these results are slightly in contrast with CBCL results about depression and ADHD; suggesting that the children display signs of happiness and they feel the presence their mother with them. These points refer to the effort that mothers are doing to keep up with their children. This results agrees with other studies revealed that, different cognitive and behavior aspects are impaired in dyslexia and negatively impacting on multiple aspects of their lives (McArthur et.al., 2016; Nelson and Greeg, 2012), including mood regulation, inattentiveness and low self-esteem.

Regarding life stressors, 73.3% of mothers were on normal percentile score; suggesting that life stressors do not tend to intensify total stress that

mothers are experiencing. In the study 23.3%, 3.3% of mothers are on the clinically significant level, high level of life stress respectively, which means that more than 25% of the mothers are suffering and the life stressors tend to intensify distress they are experiencing and referral for professional assistance is considered; Antshel and Joseph (2006), documented that mothers who reported a high level of stress such as having a child with learning disorder, stressful life events health problems, depression and couple conflict appear to be more controlling, abusive and punitive than mothers who have lower stress.

The most common (46.7%) life stressors they are facing are aspects related to dyslexia including concerns about child future without academic achievement, treatment and prognosis and concerns about available educational services at schools to support those dyslexics. next problems were marital conflicts then decreased income

Generally, our study results agree with other study for Loprieno and Gagliano (2016), they revealed that learning difficulties and/or scholastic problems tend to impact negatively on parenting quality, especially if there is behavioral problems such as ADHD and create intolerance toward the child by the family and general public and negative family functioning.

Conclusion:

From this study, it has been concluded that dyslexia is a disabling disorder associated with coordination problems, cognitive processing dysfunction and seriously compromises the child's overall emotional behavioral aspects and social competency. In addition, dyslexia is considered as a major stress factor negatively affecting the child/ mother parenting interaction.

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