



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

Thesis

Submitted for fulfillment of Master degree in Childhood Studies
(Care of Children with Special Needs)
Department of Medical Studies for Children

By

Hala Ali Saleh

Diploma of Pediatrics

Under supervision of

Prof. Dr. Gamal Sami Ali

*Professor of Pediatrics
Department of Medical Studies for Children
Faculty of Postgraduate Childhood Studies
Ain Shams University*

Prof. Dr. Ahmed M. El-Kahky

*Professor of Physiotherapy
Department of Medical Studies for Children
Faculty of Postgraduate Childhood Studies
Ain Shams University*

Dr. Manal M. Mahdi Omar

*Lecturer of child Psychiatry
Department of Medical Studies for Children
Faculty of Postgraduate Childhood Studies
Ain Shams University*

2018

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

وَقَدْ اَعْمَلُوا فَسَيَرَى اللَّهُ عَمَلَكُمْ وَرَسُولُهُ

وَالْمُؤْمِنُونَ

صدق الله العظيم

سورة التوبة آية (١٠٥)



Acknowledgement

*First of all, all gratitude is due to **Allah** almighty for blessing this work, until it has reached its end, as a part of his generous help, throughout my life.*

*I would like to express my sincere gratitude to **Prof. Dr. Gamal Samy Ali**, professor of pediatrics, medical studies department, Faculty of Post Graduate Childhood Studies, Ain Shams University, for his supervision and support to make this work achievable.*

*I am greatly honored to forward my appreciation to **Prof. Dr. Ahmed El-Kahky**, Professor of Physiotherapy, medical studies department, Faculty of Post Graduate Childhood Studies, Ain Shams University, for his supervision and support.*

*I sincerely express my honor for having **Dr. Manal Omar**, Lecturer of child psychiatry, medical studies department, Faculty of Post Graduate Childhood Studies, Ain Shams University, as my supervisor, providing me with the utmost and devoted help that I find it hard to express with words my appreciation to her.*

Certainly, I am indebted to the volunteers who accepted to be a part of this study. I sincerely hope that this work would be of benefit for them.

*I am thankful to all **my family** members for being my constant support and encouraging me to accomplish this work,*

Hala Ali Saleh

List of Contents

Subject	Page
Acknowledgment	--
List of abbreviations.....	I
List of Tables.....	III
List of Figures	V
Introduction and rationale	1
Aim of the study.....	4
Review of literature	5
Chapter 1: Dyslexia.....	5
Chapter 2 : Neurobiology of reading and dyslexia	15
Chapter 3: Comorbidities with dyslexia	32
Patients and methods	43
Results.....	61
Discussion	93
Summary	124
Conclusion.....	127
Recommendations	128
References	129
Appendices	172
Arabic summary	-

List of Abbreviations

AAP	American Academy of Pediatrics
ADHD	Attention Deficit Hyperactivity Disorder
AM.....	Amplitude Modulation
APA.....	American Psychiatric Association
APD.....	Atypical Brain Development
CAPD	Central Auditory Processing Disorder
CAS	Cognitive Assessment System
CBCL.....	Child Behavioral Check List
CD	Conduct disorder
DCD.....	Developmental Coordination Disorder
DSM	Diagnostic and Statistical Manual of Mental Disorders
FM	Frequency Modulation
FMRI	Functional Magnetic resonance imaging
IQ	Intelligent Quotient
LGN.....	Lateral Geniculate Nucleus
MGN.....	Medial Geniculate Nucleus
NSS.....	Neurological Soft Science
ODD	Oppositional Defiant disorder
PASS	Planning, Attention, Simultaneous, Successive
PET	Positron Emission Tomography
PSI	Parental Stress Index
QNST.....	Quick Neurological Screening Test
VWFA	visual word form area

List of Tables

Table	Title	Page
1	Descriptive data of study group	62
2	Quick Neurological Screening Test (QNST), total score of the study group	65
3	QNST: Comparison between Studied Groups Regarding Age, Gender and IQ	66
4	QNST, Description of the study sample regarding QNST subtests scoring	67
5	QNST, Comparison between studied groups (A, B, C) regarding QNST subtests	69
6	Cognitive Assessment System (CAS) test, distribution of the study sample according to the total score	72
7	CAS, Description of CAS subscales regarding total scoring and level of Classification	73
8	CAS, Comparison between studied groups (A, B, C) regarding CAS subscale scoring	74
9	Children behavior check list (CBCL), Description of scoring, DSM-oriented problems of the study group	76
10	Comparison between studied groups (A, B and C) regarding CBCL/DSM oriented scale scoring	77
11	Comparison between males and females regarding CBCL/ DSM oriented scale scoring	78
12	CBCL/DSM oriented scale distribution of the study sample according to multiple diagnoses co-morbidity	79

List of Tables (Cont.)

Table	Title	Page
13	CBCL, Scoring of Competence scale (total and subscales) of the study sample	80
14	CBCL/Competence, Comparison between studied groups (A, B, C) regarding competence domains	81
15	CBCL-Competence Scale, Comparison between males and females regarding Competence scoring	82
16	Parenting stress index (PSI), Parent-Child (P-C) Total score of the study sample	85
17	PSI, parent domain (P) scoring of the study sample	86
18	PSI, Child domain (C) scoring of the study sample	88
19	PSI- life stress domain (L) /distribution of life problems of the study sample regarding life stressors	90

List of Figures

Table	Title	Page
1	Neural systems for reading	18
2	Three systems of reading	20
3	Dyslexic brain	20

ABSTRACT

Background: Dyslexia is the most common learning disorder. Usually it is associated with cognitive processing dysfunction, developmental coordination 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 of the study: Was to assess the neurological, cognitive and behavioral associated problems in dyslexic children 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. All the children were subjected to neurological screening by using Quick Neurological Screening Test (QNST), cognitive processing assessment by using Cognitive Assessment System (CAS) and behavioral problems assessment by using Child Behavior Checklist (CBCL). All the mothers were subjected to parental stress assessment by using Parental Stress Index (PSI).

Results: The study showed that 83% of the children have motor coordination problems, 50% have cognitive processing dysfunction, particularly weakness in planning and simultaneous processes. 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 statistical significant incompetency regarding social and sports related activities in 83% of children. Regarding the mothers, 90% had extremely high level of parental stress which is more related to their children behavioral characteristics.

Conclusion: From this study, it can be 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 factor for maternal stress and negatively affecting the child/mother parenting interaction.

Keywords: Dyslexia- CAS- Cognitive processing assessment- maternal stress- Developmental coordination disorder-Behavioral problems.

Introduction

Reading is a cognitive skill unique to human, reading fluently indicates functionally Integrated circuits of brain areas with great accuracy and remarkable speed this reading circuit is composed of neural systems that support language as well as attention, visual and orthographic process, working memory, Motor function and higher level of comprehension cognition (*Norton and Wolf, 2012*).

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; it is the most extensively investigated learning disorder in international studies regarding its features and also its co-morbidity (*Springer et al., 2011*).

According to *Margari et al. (2013)*, Co-morbidities are very common in neuropsychiatric disorders, understanding co-morbidity is important because the presence of an additional disorder may affect the expression and severity of the clinical picture, requiring specific treatments and interventions. Patients with co morbidity compared to these without co morbidity usually Exhibit more severe Neurocognitive impairment,

Negative academic experience, negative social outcome and lower treatment response.

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**). Co-occurrence 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 very destructive for the dyslexic child to have his early years at school characterized by failure to acquire one of the fundamental skills, the vicious circle of poor reading will lead to avoid of text based school work, poor motivation, emotional trauma and adoption of mal adaptive strategies as disruptive behavior and truancy (**Trzenwski et al., 2006**). 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**); (**Morries et al., 2013**).

Soo and Baily (2006) have noted that frequent co-morbidity of inattention and hyperactivity 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 (such as unfortunate life events financial or health problems, anxiety, depression and 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 to fully understand the various needs of those children and highlights some aspects of stresses that mothers of dyslexic children suffer from in order to estimate the size of the problem and consequently construct ways to alleviate that burden and improve the competence and life outcome of those children and their mothers and by doing so, the whole community will benefit.