

Study of behavioral and psychological disturbance in preschool, school aged, and adolescent type 1 diabetic patients

Thesis

Submitted for partial fulfillment of master degree of
Pediatrics

By

Marwa Mohammed Samy Ahmed
M.B.B.ch (2005)

Under supervision of:

Prof. Mona Abd El Kader Salem

Professor of Pediatrics
Faculty of Medicine - Ain Shams University

**Prof. Randa Mahmoud Asaad Sayed
Matter**

Professor of Pediatrics
Faculty of Medicine - Ain Shams University

Prof. Heba Hamed El Shahawi

Professor of Neuropsychiatry
Faculty of Medicine - Ain Shams University

Faculty of Medicine
Ain Shams University
2013

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

وَقُلْ اَعْمَلُوا فَسَيَرَى اللَّهُ عَمَلَكُمْ
وَرَسُولُهُ وَالْمُؤْمِنُونَ

صدق الله العظيم

سورة التوبة آية (105)



Acknowledgement

First, thanks are all due to **Allah** for Blessing this work until it has reached its end, as a part of his generous help throughout our life.

My profound thanks and deep appreciation to **Prof. Mona Abd El kader salem**, Professor of Pediatrics, Faculty of Medicine, Ain Shams University for her great support and advice, his valuable remarks that gave me the confidence and encouragement to fulfill this work,

I am also thankful to **Prof. Randa Mahmoud Asaad Sayed matter**, Professor of Pediatrics, Faculty of Medicine, Ain Shams University for her valuable supervision, co-operation and direction that extended throughout this work,

I wish to express my greatest thanks for **Prof. Heba Hamed El Shahawi**, Professor of Neuropsychiatry, Faculty of Medicine, Ain Shams University, for her great support to complete this work,

I am deeply grateful to **my mother and father** who directed and encouraged me during the preparation of this work,

I am much obliged to **my sisters and brother** who stood beside me throughout this work giving me their support.

Words fail to express my love, respect and appreciation to **my husband** for his unlimited help, support and faith.

Lastly, I'm very grateful to all my patients and their families, without their help this work would never be accomplished.

Marwa Mohammed Samy Ahmed

List of Contents

	Page
Acknowledgment	--
Abstract.....	--
List of Abbreviations	i
List of Figures	iii
List of Tables	iv
Introduction and Aim of The Work	1
Review of Literature	4
Chapter 1 : Diabetes Mellitus	4
Chapter 2 : Behavioral disturbance in children	37
Subjects and Methods.....	63
Results	69
Discussion	105
Summary	120
Conclusion	122
Recommendations	123
References	124
Arabic Summary	--
Appendix.....	

Study of behavioral and psychological disturbances in preschool, school aged, and adolescent type 1 diabetic patients

Mona A. Salem, Randa M. Matter, Heba H El Shahawi* , Marwa M Samy

Pediatric department, Neuropsychiatry department*, Ain Shams University, Cairo, Egypt

Objectives: to study the behavioral and the psychological disturbances in preschool, school aged, and adolescent type 1 diabetic patients and its relation to glycemic control and microvascular complications. **Methods:** A cross sectional case- control study was conducted on 60 children, and adolescents with type 1 diabetes mellitus. They were recruited from Diabetes Clinic, Children Hospital, Ain Shams University, Cairo, Egypt during the period from January 2011 to January 2013: 20 preschool aged 3 to 6 years, 10 females and 10 males, 20 school aged; 7 to 12 years, 12 females and 8 males, and 20 adolescents aged 13 to 18 years, 13 females and 7 males. Control group included 60 healthy subjects with comparable age and sex, 29 females and 31 males, subdivided into three similar groups. All patients were subjected to clinical assessment and glucose monitoring, mean glycated hemoglobin, and urinary microalbumin, behavioral and psychological assessment using a questionnaire: Pediatric behavior rating scale; appropriate for use in children and adolescents aged 3 to 18 years. **Results:** revealed that all patients had behavioral disturbances namely atypical behavior ($P=0.0001$), irritability ($P=0.0001$), grandiosity ($P=0.0001$), aggressive behavior ($P=0.003$), affect disorder ($P=0.0001$), disturbed social interaction ($P=0.0001$) when compared to controls. Atypical behavior ($P=0.003$), irritability ($P=0.0001$), affect disorder ($P=0.003$) were significantly increased in school aged patients compared to controls while in adolescent patients irritability ($P=0.023$) was significantly increased. Hyperactivity was increased in school aged diabetic children compared to diabetic preschool children and adolescents ($P=0.037$). Disturbed social interaction was clinically evident in optimally controlled diabetic patients when compared to suboptimally controlled patients ($P=0.009$). **Conclusions:** behavioral and psychological problems are common in type 1 diabetes in different age groups and may influence their glycemic control and compliance to treatment suggesting the potential value of interventions that address child behavior.

List of Abbreviations

A1c	: Glycated hemoglobin
ACE	: Angiotensin converting enzyme
ADA	: American diabetes association
AER	: Albumin excretion rate
ADHD	: Attention deficit hyperactive disorder
AN	: Anorexia nervosa
BADDS	: Brown Attention Deficit Disorder Scale
BG	: Blood glucose
BMI	: Body mass index
BP	: Blood pressure
CGMS	: Continous glucose monitoring system
CNS	: Central nervous system
CPT	:Continuous Performance Test
CSII	: Continous subcutaneous insulin infusion
CT	: Computed tomograghy
DKA	: Diabetic ketoacidosis
DM	: Diabetes mellitus
DN	: Diabetic nephropathy
DOC	: Drug of choice.
DSM IV	: Diagnostic and Statistic Manual of Mental Disorders . fourth edition
EEG	: Electroencephalography
ER	: Emergency room
ESRD	: End stage renal disease
FDA	: Food and drug administration
GAD	: Generalized anxiety disorder
GAD ₆₅	: Glutamic acid decarboxylase
GDM	: Gestational diabetes mellitus
Hb	: Hemoglobin
HbA1c	: Glycated hemoglobin
HIV	: Human immunodeficiency virus
HPLC	: High performance liquid chromatography
IFG	: Impaired fasting glucose

List of Abbreviations (Cont.)

ISPAD	: International Society for Pediatric and Adolescent Diabetes.
IV	: Intravenous
IVA	: Integrated Visual and Auditory
MDD	: Major depressive disorder
MDI	: Multiple daily injection
MODY	: Maturity onset diabetes of the young
MRI	: Magnetic resonance imaging
NPH	: Neutral protamine hagedorn
OGTT	: Oral glucose tolerance test
PBRs	: Pediatric behavior rating scale
PDD	: Pervasive developmental disorder
PET	: Positron emission tomography
RBP	: Retinol binding protein
SC	: Subcutaneous
SMBG	: Self monitoring blood glucose
SNRI	: Selective norepinephrine reuptake inhibitor
SSRI	: Selective serotonin reuptake inhibitor
T1DM	: Type 1 diabetes mellitus
TCA	: Tricyclic antidepressant
VDRL	: Venereal Disease Research Laboratory
WHO	: World health organization

List of Figures

Fig.	Title	Page
1	How Islet Cell Transplant surgery works.	30
2	The artificial pancreas	31
3	Insulin pump.	34

List of Tables

Table	Title	Page
1	Etiologic classification of diabetes mellitus.	5
2	Criteria for the diagnosis of diabetes mellitus.	11
3	Screening for and diagnosis of GDM.	12
4	Symptoms of Hypoglycemia in Diabetic Children and Recommendations for its Treatment.	17
5	Nutritional recommendations for children and adolescents with type 1 DM.	25
6	Types of insulin preparations and suggested action profiles according to manufacturers.	27
7	Indications for the use of the pump in children of different ages.	35
8	Neurocognitive morbidity in type 1 diabetes.	39
9	Comparison between diabetic patients and controls as regards their Demographic and Anthropometric Data.	70
10	Comparison between diabetic patients and controls as regard weight centile.	71
11	Comparison between diabetic patients and control as regard height centile.	71
12	Comparison between diabetic patients and controls as regard body mass index.	72
13	Comparison between diabetic patients and controls as regard atypical behavior.	73
14	Comparison between diabetic patients and controls as regard irritable behavior.	74
15	Comparison between diabetic patients and controls as regard grandiosity.	75
16	Comparison between diabetic patients and controls as regard hyperactive behavior.	76
17	Comparison between diabetic patients and controls as regard aggressive behavior.	77

List of Tables (Cont.)

Table	Title	Page
18	Comparison between diabetic patients and controls as regard inattention.	78
19	Comparison between diabetic patients and controls as regard affect disorder.	79
20	Comparison between diabetic patients and controls as regard disturbed social interaction.	80
21	Comparison between preschool diabetic children and controls as regard age and disturbed behaviors.	81
22	Comparison between school age diabetic children and controls as regard age and disturbed behaviors.	82
23	Comparison between diabetic adolescents and controls as regard age and disturbed behaviors.	83
24	Comparison between different age groups of diabetic patients as regard weight centile.	84
25	Comparison between different age groups of diabetic patients as regard height centile.	85
26	Comparison between different age groups of diabetic patients as regard body mass index centile.	86
27	Comparison between different age groups as regard microalbuminuria (indicating nephropathy).	87
28	Comparison between different age groups as regard glycated hemoglobin.	87
29	Comparison between different age groups of diabetic patients as regard atypical behavior.	88
30	Comparison between different age groups of diabetic patients as regard irritable behavior.	89
31	Comparison between different age groups of diabetic patients as regard grandiosity	90

List of Tables (Cont.)

Table	Title	Page
32	Comparison between different age groups of diabetic patients as regard hyperactive.	91
33	Comparison between different age groups of diabetic patients as regard aggressive behavior.	92
34	Comparison between different age groups of diabetic patients as regard inattention.	93
35	Comparison between different age groups of diabetic patients as regard affect disorder.	94
36	Comparison between different age groups of diabetic patients as regard disturbed social interaction.	95
37	Comparison between optimally controlled diabetic patients (HbA1c<7.5%) and suboptimally controlled diabetic patients (HbA1c>7.5%) as regard microalbuminria.	96
38	Comparison between optimally controlled diabetic patients and suboptimally controlled diabetic patients as regard atypical behavior.	97
39	Comparison between optimally controlled diabetic patients and suboptimally controlled diabetic patients as regard irritable behavior.	98
40	Comparison between optimally controlled diabetic patients and suboptimally controlled diabetic patients as regard grandiosty behavior.	99
41	Comparison between optimally controlled diabetic patients and suboptimally controlled diabetic patients as regard hyperactive behavior.	100
42	Comparison between optimally controlled diabetic patients and suboptimally controlled diabetic patients as regard aggressive behavior.	101

List of Tables (Cont.)

Table	Title	Page
43	Comparison between optimally controlled diabetic patients and suboptimally controlled diabetic patients as regard inattention	102
44	Comparison between optimally controlled diabetic patients and suboptimally controlled diabetic patients as regard affect disorder.	103
45	Comparison between optimally controlled diabetic patients and suboptimally controlled diabetic patients as regard disturbed social interaction.	104

Introduction

Diabetes mellitus is a group of metabolic diseases characterized by chronic hyperglycemia resulting from defects in insulin secretion, insulin action, or both. The abnormalities in carbohydrate, fat, and protein metabolism that are found in diabetes are due to deficient action of insulin on target tissues. If ketones are present in blood or urine, treatment is urgent, because ketoacidosis can evolve rapidly. Diabetes in children usually presents with characteristic symptoms such as polyuria, polydipsia, blurring of vision, and weight loss, in association with glycosuria and ketonuria. In its most severe form, ketoacidosis or rarely a non-ketotic hyperosmolar state may develop and lead to stupor, coma and in absence of effective treatment, death (*Craig et al., 2009*).

Diabetes impacts the life style, personality and overall emotional and physical well-being of the child. A diagnosis of diabetes can contribute to emotional disturbances both in the child and in the family (*Kovacs et al., 1985*).

Adults and children who cope well with diabetes seem to find a balance as they fit diabetes care into their daily living, rather than forcing life to revolve around the diabetes regimen (*Arslanian et al., 1994*).

Rigorous selfcare is very difficult for diabetic patients at any age, and it is particularly challenging for children and adolescents who want a carefree lifestyle like their peers. In addition to the everyday constraints imposed by treatment, these patients are exposed to acute metabolic crises and occasional hospitalizations (*Weissberg-Benchall et al., 1995*).

Usually, type 1 diabetic children and adolescents cannot completely follow their self-care regimen because they are unable to resist peer pressure and cannot coordinate the demands of their social environment (school, family

recreational activities, and employment) with those of the treatment (*Johnson, 1980*).

Because of these factors, it has been proposed that children with diabetes are more vulnerable to psychological problems (*Hauser, 1979*).

It is clear that diabetes is a significant burden to the family and child, important associations have been reported between maternal and child psychopathology (*Hatton et al., 1995*) and between maternal and child depression (*Mullins et al., 1995*).

Aim of The Work

To study the behavioral and the psychological disturbance in preschool, school aged, and adolescent type 1 diabetic patients and its relation to glycemic control and microvascular complications.