

***Study of Some Cardiopulmonary Functions
in Insulin Dependent Diabetic Patients.***

Thesis

subjected in partial fulfillment for
Master Degree in Paediatrics

By

Amira Gamal Ramadan Tohamy

M.B.B.Ch

Under the supervision of

Prof. Dr. Mona Abd El kader Salem

Prof. of Paediatrics, Ain Shams University

Dr. Wafaa Ezzat Ibrahim

Lecturer of Paediatrics, Ain Shams University

Dr. Hanan Mohamed Ibrahim

Lecturer of Paediatrics, Ain Shams University

Ain Shams University

1998



بسم الله الرحمن الرحيم

اقالوا سبجانك لاعلم لنا إلا ها
علمتنا إنك أنت العظيم
الحكيم

صدق الله العظيم

سورة البقرة

آية ٣٢

Man is a mystery. It must be solved, and if you spend your life trying to solve it, you must not say the time was wasted.

I have chosen to occupy myself with this mystery, for I wish to be a man.

Fyodor Doestoevsky

16 August, 1839.



*To my father, my mother, and my husband who
suffered a lot during preparation of this work.*



ACKNOWLEDGEMENT

I wish to express my gratitude and thanks to Prof. Dr. Mona Abdel kader Salem for her constructive care and continous help in the research work,

I wish to express my sincere gratitude and thanks to Lecturer Dr. Wafaa Ezzat, for her continous interest, great care, constructive guidance, constant supervision, support and continous help through this work,

Also, I wish to express my deepest gratitude and respect to Lecturer Dr. Hanan Ibrahaim, for her care, which had kindly imported on this work, in form of continous criticism and specific planning, she had followed closely the progress in the thesis with great interest.

Lastly, but not least, I would like to express my gratitude to all the patients who participated in this work,

List of Contents

List of abbreviations

List of tables

List of figures

Introduction and aim of work	1
Review of literature	4
*Diabetes mellitus	4
Definition	4
Classification	4
*Insulin dependent diabetes mellitus	6
Incidence and prevalence	6
Etiology, genetics and pathogenesis	8
Pathophysiology	13
Clinical presentation	15
Treatment	16
Prediction and prevention	21
Monitoring	24
Complications	26
*Diabetic autonomic neuropathy	33
Epidemiology	33
Etiology	34
Pathophysiology of diabetic neuropathy	35
Pathogenesis of diabetic microangiopathy	37
Clinical features	40
Cardiovascular autonomic neuropathy	42
Cardiovascular reflex tests	46
*Pulmonary function testing in children	58
Ventilation assessment	59
Diffusion assessment	74

Perfusion assessment	84
*Pulmonary function impairment in IDDM	86
Lung volume impairment	87
Diffusion impairment	89
Subjects and methods	91
Results	102
Discussion	140
Summary and conclusion	165
Recommendations	170
References	172
Arabic summary	

List of Abbreviations

ABBOS:	Bovine serum albumin
ACE:	Angiotensin converting enzyme
ADP:	Adenosine di-phosphate
AER:	Albumin excretion rate
AFTs:	Autonomic function tests
Bp	Blood pressure
BTPS:	Basal temperature and pressure
C-AMP:	Cyclic adenosine monophosphate
CBM:	Capillary basement membrane
CO:	Carbon monoxide
CSII:	Continuous subcutaneous infusion of insulin
CVR:	Cardiovascular reflex
DCCT:	Diabetes control and complications trial
DLCO:	Diffusion capacity of the lung for Co
DM	Diabetes mellitus
E/I:	Expiration/inspiration ratio
ERV:	Expiratory reserve volume
ESRD:	End stage renal disease
FEF:	Forced expiratory flow
FEV1:	Forced expiratory volume in the first second
FMEF:	Forced mid-expiratory flow
FRC:	Functional residual capacity

FVC:	Forced vital capacity
GAD:	Glutamic acid decarboxylase
GBM:	Glomerular basement membrane
GFR:	Glomerular filtration rate
G-Hb:	Glycosylated hemoglobin
HLA:	Human leucocyte antigen
HR	Heart rate
IAA:	Insulin auto antibodies
IC:	Inspiratory capacity
ICA:	Islet cell antibodies
IDDM:	Insulin dependent diabetes mellitus
IRV:	Inspiratory reserve volume
JDF:	Units
MDI:	Multiple daily injections
NIDDM:	Non insulin dependent diabetes mellitus
PEFR:	Peak expiratory flow rate
RV:	Residual volume
SBGM:	Self blood glucose monitoring
SD	Standard deviation
T.V:	Tidal volume
TLC:	Total lung capacity
VC:	Vital capacity