Post Graduate Institute of Children Studies Medical Department Ain Shams University

COGNITIVE EFFECTS OF CRANIAL IRRADIATION IN ACUTE CHILDHOOD LEUKEMIA

Thesis

Submitted for Fulfilment of Ph.D. Degree " Childhood Medical Department.

By

MAHA MOHAMED SABER ABD EL-LATIF

M.B.B. Ch. (1985)

Master Degree in Paediatrics. Ain Shams University (1990)

616 294 19 M. 17

Supervised by

Prof. Dr.

Galila Mohamed Mokhtar

Professor of Paediatrics

Ain Shams University

Prof Dr.

Prof. Dr.

Afaf Hamed Khalil

Professor of Psychiatry

Ain Shams University

Abdel-Baset Mohamed Sayed

Professor Of Medical Biophysics

National Research Center

Prof. Dr.

Olweya Mohamed Abdel-Baqui

Assistant Professor of Medical

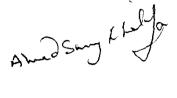
Childhood Studies

Post Graduate Institute of

Childhood Studies

Ain Shams University

1995





Post Graduate Institute of Children Studies Medical Department Ain Shams University

COGNITIVE EFFECTS OF CRANIAL IRRADIATION IN ACUTE CHILDHOOD LEUKEMIA

Thesis

Submitted for Fulfilment of Ph.D. Degree "Childhood Medical Department."

By

MAHA MOHAMED SABER ABD EL-LATIF M.B.B. Ch. (1985)

Master Degree in Paediatrics. Ain Shams University (1990)

Supervised by

Prof.

Afaf Hamed Khalil

Professor of Psychiatry Ain Shams University Prof.

Galila Mohamed Mokhtar

Professor of Paediatrics Ain Shams University

Prof

Abdel-Baset Mohamed Sayed

Professor Of Medical Biophysics National Research Center Assist. Prof.

Olweya Mohamed Abdel-Baqui

Assistant Professor of Medical Childhood Studies Post Graduate Institute of Childhood Studies Ain Shams University

1995



4

COGNITIVE EFFECTS OF CRANIAL IRRADIATION IN ACUTE CHILDHOOD LEUKEMIA

Thesis

Submitted for Fulfilment of Ph.D. Degree "Childhood Medical Department."

By MAHA MOHAMED SABER ABD EL-LATIF M.B.B. Ch. (1985)

Master Degree in Paediatrics. Ain Shams University (1990)

Supervised by

Prof.

Afaf Hamed Khalil

Professor of Psychiatry Ain Shams University

Prof

Abdel-Baset Mohamed Sayed

Professor Of Medical Biophysics National Research Center Prof.

Galila Mohamed Mokhtar

Professor of Paediatrics Ain Shams University

Assist. Prof.

Olweya Mohamed Abdel-Baqui

Assistant Professor of Medical Childhood Studies Post Graduate Institute of Childhood Studies Ain Shams University

1995

DISCUSSION AND JUDJMENT COMMITTEE

The vice-president for higher studies and research of Ain-Shams University has approved to form the following communittee for the discussion of Mr

A Prof: Afaf Homed Khalil, Pray	lessorof psychiatry
Prof: Afaf Homed Khalil, Prog Ain Shams University	- chairman
2 Prof: Ahmed Samy Khalifa, j	W ₂
17 in Shams University. And Song C 3 Prof: Montay M. Ah J	· · · · · · · · · · · · · · · · · · ·
psychiatry, Cairo University	Member Muly Mit
4	V. *
Control of the Contro	Member

بني ألغم الجمز الجب

"قالوا سيحانك لا علم لنا إلا ما علمتنا إنك " أثن المليم الحكم"

صدق الله العضيم

سورة البقرة - آيه (٣٢)

To

My dear parents and my ohnor father Professor Ahmed Samy Khalifa

ACKNOWLEDGEMENT

I would like to express my deep gratitude to Prof. Afaf Hamed Khalil, Professor of Psychiatry, Faculty of Medicine, Ain Shams University, for granting me the privilage of working under her supervision.

I wish to express my deep thanks and sincere gratitude to Prof. Galila Mohamed Mokhtar, Professor of Paediatrics, Faculty of Medicine, Ain Shams University, for her valuable guidance, instructive supervision and continuous encouragement throughout the whole work.

I am sincerely indebted to Prof. Ahmed Samy Khalifa, Professor of Pediatrics, Ain Shams University for his fatherly attitude, encouragement and helpful advice.

I am grateful to Prof. Abdel-Baset Mohamed Sayed, Professor of Medical Biophysics, National Research Center, for his generous cooperation and support.

I owe special gratitude to Assist. Prof. Olwaya Mohamed Abdel-Baqui, Assistant Professor of Medical Childhood Studies, Post Gradute Institute of Childhood Studies, Ain Shams University for her valuable supervision and instructive advices. I am grateful to Dr. Lobna Mohamed Saber, Assistant Lecturer of Biochemistry, Faculty of Medicine, Al-Azhar University for her help and advices.

Grateful acknowledgement and deep appreciation are conveyed to Mrs. Ansaf Ismail and Mrs. Amany Hossen Clinical Psychologists in Neuropsychiatry Institute, Faculty of Medicine, Ain Shams University and to all the staff in Hematology / Oncology Clinic, Ain Shams University for the help I received.

My thanks go also to all the staff in Biophysics unit, Biochemistry Department, National Research Center for their cooperation and support.

I wish to express my thanks to all the patients and their parents, their cooperation was indispensible for the performance of this work.

	Content
--	---------



Introduction and aim of the work	Page
Review of literature	
Childhood acute leukemia	1
Definition	1
Classification	2
Epidemiology and etiology	20
Clinical picture of acute leukemia	27
Diagnosis	30
Differential diagnosis	32
Prognostic factors	35
CNS leukemia	39
Treatment of leukemia	48
Drugs used in treatment of leukemia and their side	
effects	56
Irradiation of acute leukemia	65
Psychosocial complications of leukemia	71
Normal Cognitive Development	82
Intellectuality	92
michettamy	74
Subjects and methods	105
Results	123
Discussion	180
Summary and conclusion	197
Recommendations	202
References	204
Arabic summary	

& LIST OF TABLES

TADIECA	OF THE REVIEW OF THE LITERATURE	Page
Table (1)	Summary of the morphological features of ALL of L ₁ , L ₂ and L ₃ subtypes	3
Table (2)	FAB and CCGS classification of acute lymphoblastic leukemia	4
Table (3)	The French-American-British (FAB) classification of acute myeloid leukemia	6-7
Table (4)	Cytochemical stains and TdT reaction in relation to the FAB classification.	10
Table (5)	Cytochemistry and ALL immunophenotypes	10
Table (6)	Immunological classification of ALL	12
Table (7)	Chromosome Abnormalities in ALL	17
Table (8)	Chromosome Abnormalities in ANLL	19
Table (9)	Frequency of clinical and laboratory findings at diagnosis in 178 children and adults with acute lymphoblastic leukemia	27
Table (10)	Distribution of white blood count at diagnosis in children with acute leukemia	30
Table (11)	Signs and symptoms of CNS leukemia	46
Table (12)	Cancer chemotherapeutic agents	58-59
Table (13)	Disruptions of normal developmental tasks and basic interventions	72
Table (14)	Factors in psychological adjustment to hematologic malignancies	74
Table (15)	Classification of the causes of delirium in leukemia	80

	List of Tables	•••••
- TABLES	OF THE RESULTS	
Table (1)	Sex, age, weight and height of control group.	125
Table (2)	Sex, age, weight and height of children with ALL	1
` ,	(Group IIa)	126
Table (3)	Sex, age, irradiation-examination interval, age at the start of irradiation, weight and height of children with ALL (Group IIb)	127-128
Table (4)	Sex, age, irradiation-examination interval, age at the start of irradiation, weight and height of children with ALL (Group IIc)	129
Table (5)	Sex, age, weight and height of children with ANLL (group III)	130
Table (6)	Clinical findings in patients with ALL and ANLL	131
Table (7)	Hematological findings of patients with ALL and ANLL	132
Table (8)	Liver functions in patients with acute leukemia	133
Table (9)	Kidney functions in patients with acute leukemia	133
Table (10)	Bone marrow examination in patients with ALL and ANLL	134
Table (11)	IQs of control group (Group I)	135-136
Table (12)	IQs of children with ALL (Group IIa)	137
Table (13)	IQs of children with ALL (Group IIb)	138-139
Table (14)	IQs of children with ALL (Group IIc)	140
Table (15)	IQs of children with ANLL (Group III)	141
Table (16)	IQs of children with ALL [Group (IIa+IIb+IIc)] as comapred to IQ of control group (Group I)	142
Table (17)	IQs of children with ANLL (Group III) as compared to IQ of control group (Group I)	143

***************************************	List of Tables	••••••
Table (18)	IQs of children with ALL (Group IIa) as compared to IQ of control group (Group I)	145
Table (19)	IQs of children with ALL (Group IIb) as compared to control group (Group I)	146
Table (20)	IQs of children with ALL (Group IIb) as compared to (Group IIa)	147
Table (21)	IQs of children with ALL (Group IIc) as compared to control group (group I)	148
Table (22)	IQs of children with ALL (Group IIc) as compared to (group IIa)	149
Table (23)	IQs of children with ALL (Group IIb) as compared to (group IIc)	150
Table (24)	IQs of children with ALL (Group IIb+Group IIc) as comapred to (Group IIa)	152
Table (25)	IQs of children with ALL (Group IIa+IIb+IIc) as compared to IQs of children with ANLL (Group III)	154
Table (26)	IQs of children with ALL (IIb+IIc) as compared to IQs of children with ANLL (Group III)	155
Table (27)	The sex distribution and IQs in control group (group I)	156
Table (28)	The sex distribution and IQs in children with ALL (Group IIa)	157
Table (29)	The sex distribution and IQs in children with ALL (Group IIb)	158
Table (30)	The sex distribution and IQs in children with ALL (Group IIc)	159
Table (31)	IQs and the age of children with ALL [Group (IIb+IIc)] at the start of radiotherapy	160
Table (32)	Correlation of IQs with irradiation-examination interval (Group IIb+IIc)	162

***************************************	List of Tables
Table (33)	The prevalence of anxiety symptoms among children with ALL (Group IIa+b+c) as compared to control group (Group I)
Table (34)	The prevalence of depression symptoms among children with ALL (Group IIa+b+c) as compared to control group (Group I)
Table (35)	The prevalence of anxiety symptoms among children with ANLL (Group III) as comapred to control group (Group I)
Table (36)	The prevalence of depression symptoms among children with ANLL (Group III) as comapred to control group (Group I)
Table (37)	The prevalence of anxiety symptoms among children with ALL (Group IIa+b+c) as compared to children with ANLL (Group III)
Table (38)	The prevalence of depression symptoms among children with ALL (Group IIa+b+c) as compared to children with ANLL (Group III)
Table (39)	The prevalence of anxiety symptoms among the three groups of children with ALL
Table (40)	The prevalence of depression symptoms among the three groups of children with ALL
Table (41)	Anxiety symptoms among children with ALL treated with cranial irradiation (GroupIIb+c) as compared to children with ALL treated with chemotherapy alone (Group IIa).
Table (42)	Depression symptoms among children with ALL treated with cranial irradiation (GroupIIb+c) as compared to children with ALL treated with chemotherapy alone (Group IIa)
Table (43)	Anxiety symptoms in children with ALL (Group IIb) as compared to (Group IIa)
Table (44)	Anxiety symptoms in children with ALL (Group IIc)

	List of Tables	
Table (45)	The dose of irradiation and anxiety symptoms	170
Table (46)	Depression symptoms in children with ALL (Group IIb) as comapred to (Group IIa)	170
Table (47)	Depression symptoms in children with ALL (Group IIc) as compared to (Group IIa)	171
Table (48)	The dose of irradiation and depression symptoms	171
Table (49)	The sex distribution and anxiety symptoms in children with ALL	172
Table (50)	The sex distribution and depression symptoms in children with ALL	172
Table (51)	School failure in children with ALL (Group IIa+b+c) as compared to control group (Group I)	173
Table (52)	School failure in children with ALL	173
Table (53)	School failure in children with ALL (Group IIa+b+c) as compared to children with ANLL (Group III)	176
Table (54)	The sex distribution and school failure in children with leukemia.	176
Table (55)	School failure and IQs of children with leukemia	177
Table (56)	Relation of anxiety symptoms and school failure in children with leukemia.	179
Table (57)	Relation of depression symptoms and school failure in	179