



**Prevalence of Hepatitis G Virus in Chronic Hepatitis and HIV Infected
Patients and Co-infection with Some Mycotic Diseases**

Thesis

**Submitted in partial fulfillment of the requirements of the degree of Ph.D.
in Microbiology**

BY

Amal Hanafy Ahmed Mohamed

(B.Sc. Botany, 1988)

(M.Sc. Medical Microbiology, 2005)

Supervisors

Dr. Naziha Mohamed Hassanein

Professor of Mycology and Plant pathology, Microbiology Department
Faculty of Science, Ain Shams University.

Dr. Fouad Fouad Abdel-Aal

Professor of Clinical Pathology, Clinical Pathology Department
Faculty of Medicine – Al-Azhar University

Dr. Hend Mohamed Khater

Lecturer of Microbiology Faculty of Science
Ain Shams University

Dr. Omar Al-farouk Rabeea

Lecturer of Microbiology Faculty of Science
Ain Shams University

Department of Microbiology

Faculty of Science

Ain Shams University

(2016)

ACKNOWLEDGEMENT

First of all, great thanks and praises to ALLAH who gave me strength and patience to accomplish this work. Really, no word can express how grateful I am to ALLAH

I am indebted to

Professor Dr. Naziha Mohamed Hassanein, Professor of Microbiology Faculty of Science Ain Shams University for her continuous encouragement, her potential cooperation and direction, her great effort extended to me and her contribution towards the final accomplishment of this work. Without her help it was a sort of impossibility to accomplish this work.

It is a great honour for me to express my deepest feelings and sincere gratitude to

Professor Dr. Fouad Fouad Abdel-Aal, Professor and Head of Clinical Pathology Department Faculty of Medicine - Al-Azhazr University for providing the initial stimulus which aroused my interest in this work and for his continuous supports, close supervision,

valuable guidance. Without his help this work might have not appeared.

A great thanks to

Dr. Hend Mohamed Khater, Lecturer of Microbiology Faculty of Science Ain Shams University, for her kind support.

A great thanks to

Dr. Omar Al-farouk Rabeea, Lecturer of Microbiology Faculty of Science Ain Shams University, for his kind support.

A deep thank to Microbiology Department and all my Colleagues in microbiology department for their assistance, support and for providing a suitable environment during my work.

Approval sheet

Prevalence of Hepatitis G Virus in Chronic Hepatitis and HIV Infected Patients and Co-infection with Some Mycotic Diseases

By

Amal Hanafy Ahmed Mohamed

(B.Sc. Botany, 1988)

(M.Sc. Medical Microbiology, 2005)

Supervisors

Approved

Prof. Dr. Naziha Mohamed Hassanein

Professor of Microbiology,

Faculty of Science,

Ain Shams University.

Prof. Dr. Fouad Fouad Abdel-Aal

Professor of Clinical Pathology,

Faculty of Medicine,

Al-Azhar University

Dr. Hend Mohamed Khater

Lecturer of Microbiology,

Faculty of Science,

Ain Shams University

Dr. Omar Al-farouk Rabeea

Lecturer of Microbiology,

Faculty of Science,

Ain Shams University

Examination committee

Prof. Dr. Wael Refaat Abdel-Hamid

Professor of Clinical Pathology,

Faculty of Medicine,

Al-Azhar University

Prof. Dr. Eman Mohamed Fawzy Elsayed

Professor of Microbiology,

Biology Department

Faculty of Education,

Ain Shams University

Prof. Dr. Naziha Mohamed Hassanein

Professor of Microbiology,

Microbiology Department,

Faculty of Science, Ain Shams University.

Date of examination 19 / 11/ 2016

Approval date / /

University Council approved / /

CONTENTS

Page

List of Contents Page

Acknowledgement

List of Tables

List of Figures

List of Abbreviations

Abstract

Chapter I: Introduction 1

Aim of the work 9

Chapter II: Review of literature 10

Part (I) : Virology

1. Historical aspect of HGV 10

2. Morphology and ultrastructure..... 11

3. Epidemiology of HGV 13

4. Antigens, proteins and genotypes 13

5. Prevalence of HGV 15

6. Human infection 16

7. HGV replication sites 17

8. Humoral immune response to the E2 protein of hepatitis
G virus 18

9. Effect of HGV on HIV Co-infected Patients 18

10. HGV Co-infection with HIV gives beneficial effects.... 19

11. Summary of the effects of GBV-C infection in HIV
positive individuals 26

12. Transmission of HGV	27
12.1.1. Blood and blood products	27
12.1.2. Dialysis patients	30
12.2. Non parenteral transmission	32
12.2.1. Sexual transmission	32
12.2.2. Perinatal (vertical) transmission	33
12.3. Other routes of transmission	36

Part (II): Mycology

1. Introduction	37
1.2. Epidemiology	37
2. Invasive fungal infections	39
2.1. Diagnosis of invasive fungal infection	39
2.2. Aspergillosis	39
2.2.1. Aspergillosis in HIV and AIDS patients	41
2.2.2. Aspergillosis in liver disease patients	42
2.2.3. Aspergillosis in liver cirrhosis	43
2.2.4. Aspergillosis in patients with HBV liver Failure	45
2.3. Penicilliosis	46
2.3.1. Penicilliosis and HIV	46
2.4. Yeast and other fungal infections	47
2.4.1. Fungal Hepatitis	47
2.4.2. Liver fungal infection	49
2.5. Skin and cutaneous infections	52
2.5.1. Skin and cutaneous infection in chronic hepatitis C virus patients	52

2.5.2. Nail changes in patients with liver disease.....	52
Chapter III: Patients and Methods.....	55
Part (I): Virology.....	55
1-Detection of HBs Ag.....	56
2-Detection of HCV Ab.....	57
3-Detection of HIV 1 & 2 Ab.....	57
4-Liver function tests.....	58
5- CD4 Cells count.....	59
6- Qualitative Detection of HGV-RNA by RT-PCR	63
Statistical analysis of viruses	75
 Part (II): Mycology	
 1. Isolation and identification of fungi	
1.1 Isolation of fungi from patients	71
1.2. Identification of fungi	71
1.2.1. Identification of filamentous fungi	71
1.2.2. Identification of yeast	71
2. Identification	75
Statistical analysis of Fungi.....	76
 IV Results	77
Part (I): Virology.....	77
Part (II): Mycology.....	128
1. Isolation and identification of fungi from male and female patients from different groups.....	128
1.1. Isolation and identification of filamentous fungi from different patients groups.....	128
1.2. Isolation and identification of yeasts from different patients groups.....	130

2. Fungi isolated from males and females from different groups.....	132
2.1. Filamentous fungi and yeasts isolated from blood donors group.....	132
2.2. Filamentous fungi and yeasts isolated from hemodialysis group.....	136
3. Filamentous fungi and yeasts isolated from blood donors and hemodialysis groups comparing to control group.....	141
4. Filamentous fungi and yeasts isolated from positive and negative HCV, HBV, HIV and HGV patients.....	147
4.1. Filamentous fungi and yeasts isolated from positive and negative HCV patients among blood donors and hemodialysis groups.....	147
4.2. Filamentous fungi isolated from positive and negative HBV patients among blood donors and hemodialysis groups.....	157
4.3 Filamentous fungi and yeasts isolated from positiv and negative HIV patients among blood donors and hemodialysis group.....	166
4.4. Filamentous fungi and yeasts isolated from positive and negative HGV patients among blood donors and hemodialysis group.....	178
Chapter V: Discussion.....	189

Chapter VI: Summary and conclusion.....	221
Chapter VII: References.....	226
Arabic summary	

LIST OF TABLES

	Page
Table 1: Relation between control group and blood donors group	80
Table 2: Relation between control group and hemodialysis group.....	81
Table 3: Relation between hemodialysis and blood donors group	81
Table 4: Comparison between count of CD4 in cases with and without HGV	82
Table 5: Comparison between count of CD4 in HIV cases with and without HGV	82
Table 6: Demographic distribution of control group and blood donors group	82
Table 7: Demographic distribution control group and hemodialysis group	83
Table 8: Comparison between demographic distributions of blood donors group and hemodialysis group	83
Table 9: Comparison between demographic distributions of hemodialysis group and blood donors group regarding to control group	84

Table 10:	Classification of blood donors group according to detection of HCV	84
Table 11:	Classification of hemodialysis group according to detection of HCV	93
Table 12:	Comparison between the percentage of HCV in blood donors group and hemodialysis group	94
Table 13:	Comparison between blood donors group and hemodialysis group according to detection of HCV regarding to control group	95
Table 14:	Classification of blood donors group according to detection of HBV	97
Table 15:	Classification of hemodialysis group according to detection of HBV	98
Table 16:	Comparison between the percentage of HBV in blood donors group and hemodialysis group	99
Table 17:	Comparison between blood donors group and hemodialysis group according to detection of HBV regarding to control group	100
Table 18:	Classification of blood donors group according to detection of HIV	100

Table 19:	Classification of hemodialysis group according to detection of HIV	101
Table 20:	Comparison between the percentages of HIV in blood donors group and hemodialysis group	102
Table 21:	Comparison between blood donor group and hemodialysis group according to detection of HIV regarding to control group	103
Table 22:	Classification of blood donors group according to detection of HGV	105
Table 23:	Classification of hemodialysis group according to detection of HGV	106
Table 24:	Comparison between blood donor group and hemodialysis group according to detection of HGV	107
Table 25:	Comparison between blood donors and hemodialysis group according to detection of HGV regarding to control group	108
Table 26:	Classification of blood donor group according to combined detection of viruses	111
Table 27:	Classification of hemodialysis group	

	according to combined detection of viruses.....	112
Table 28:	Comparison between blood donors group and hemodialysis group according to combined detection of viruses.....	115
Table 29:	Classification of blood donor group according to the number of viruses.....	116
Table 30:	Classification of hemodialysis group according to the number of viruses.....	117
Table 31:	Comparison between blood donors and hemodialysis group according to the number of viruses	120
Table 32:	Comparison between blood donors group and hemodialysis group according to the number of viruses regarding to control group	118
Table 33:	Comparison between blood donors group and hemodialysis group according to combined detection of viruses regarding to control group	119
Table 34:	Classification of blood donors and hemodialysis according to number of viruses and combined detection of viruses.....	120

List of tables

Table 35:	List of filamentous fungi isolated from different patients group.....	128
Table 36:	List of yeasts isolated from different patients group.....	130
Table 37:	Count and percentage of filamentous fungi isolated from males and females among blood donors group.....	133
Table 38:	Count and percentage of yeasts isolated from males and females among hemodialysis group	135
Table 39:	Count and percentage of filamentous fungi isolated from male and females among hemodialysis group.....	138
Table 40:	Count and percentage of yeasts isolated from males and females among hemodialysis group	140
Table 41:	Count and percent of filamentous fungi isolated from blood donors and hemodialysis groups regarding to control group.....	144
Table 42:	Count and percent of yeasts isolated from blood donors and hemodialysis groups regarding control group	146
Table 43:	Count and percent of filamentous fungi in positive and negative HCV patients	

List of tables

	among blood donors group	149
Table 44:	Count and percent of yeasts isolated from positive and negative HCV patients among blood donors group.....	151
Table 45:	Count and percent of filamentous fungi isolated from positive and negative HCV patients among hemodialysis group	154
Table 46:	Count and percent of yeasts isolated from positive and negative HCV among hemodialysis group	156
Table 47:	Count and percent of filamentous fungi in positive and negative HBV patients among blood donors group	159
Table 48:	Count and percent of yeasts isolated from positive and negative HBV among blood donors group	161
Table 49:	Count and percent of filamentous fungi isolated from positive and negative HBV in hemodialysis group.....	163
Table 50:	Count and percent of yeasts isolated from positive and negative HBV among hemodialysis group	165
Table 51:	Count and percent of filamentous fungi isolated from positive and negative HIV	