الآيـــــــــــــــــــــة

بِسْمِ اللّهِ الرَّحْمَنِ الرَّحِيمِ

قال تعالــى:

سَنُرِيهِمْ آيَاتِنَا فِي الْآفَاقِ وَفِي أَنفُسِهِمْ
حَتَّى يَتَبَيَّنَ لَهُمْ أَنَّهُ الْحَقُّ أَوَلَمْ يَكْفِ
بِرَبِّكَ أَنَّهُ عَلَى كُلِّ شَيْءٍ شَهِيدٌ

صدق الله العظيم

سورة فصلت الآية 53

Dedication

To my parents

To my brothers

To my friends

And To my family

Acknowledgments

Firstly grateful thanks to ALMIGHTY ALLAH, for helping me in completing this research. I would like to acknowledge Dr. Yousif Fadlalla Hamedelnil, for his unfailing patience, expert advices, supervision, guidance and valuable time. Thanks extended to College of Medical Laboratory Science staff. My thanks and appreciations are extended to my colleges and friends who strongly supported me throughout this study.

A lot of thanks to the staff of Alboluk Pediatrics Hospital.

Abstract

The main aim of this study was to determine the presence of acute hepatitis E virus infection among children in Khartoum State using Enzyme-Linked Immunosorbent Assay (ELISA). The study was carried out during the period from October 2013 to January 2014. Ninety one children with signs and symptoms of jaundice attended to Alboluk Pediatrics Hospital were enrolled in this study. Three (3.3%) were positive for anti-HEV IgM while 88 (96.7%) were negative for anti-HEV IgM. 52 (57.1%) were males while 39 (42.9%) were females. Out of 3 IgM positive of children it was found that 2 males (2.2%) and one female (1.1%) were anti-HEV IgM positive. 41(45.1%) were localized in rural area while 50 (54.9%) were localized in urban area. It was found that 2 from rural area (2.2%) and one from urban area (1.1%) were anti-HEV IgM positive. According to age group 33 (36.3%) were between 2-5 years, 36 (39.6%) were between 6-10 years while 22 (24.2%) were between 11 to 14 years. It was found that all positive anti-HEV IgM were in the group aged between 11-14.The gender of the children had no significant effect ($p > 0.05$) on prevalence of anti-HEV IgM among children examined. The geographic area of the children had no significant effect on prevalence of anti-HEV IgM ($p > 0.05$). The age group had a significant effect on prevalence of anti-HEV IgM ($p < 0.05$). This study concluded that acute HEV has

low frequency among children. This study recommend to enhance the testing for Hepatitis E virus in all acute hepatitis cases, especially for those negative for Hepatitis B and C. HEV vaccine is recommended for risk groups.

E الهدف الرئيسى من هذه الدراسة هو الكشف المصلى الأجسام المضاده لفيروس الكبد الوبائي عند الأطفال باستخدام جهاز يعتمد على نظرية التقارب اللونى لتحديد الأجسام المضاده من تم جمع 91 عينه دم من أطفال يعانون من علامات واعراض اليرقان (IgM). النمط حضروا إلى مستشفى البلك التخصصي للاطفال. من بين 91 طفل وجد ان 3 (3 3.%) يعانون و 88 .96.7)%(لا يعانون من الاصابة. (IgM). من الاصابة بفيروس الكبد الوبائي إي الحاد من بين 91 طفل ,52 منهم كانوا ذكورا (.157%) و 39 كانوا اناثا 42.9).%). من بين 3 أطفال ايجابى الأجسام المضادة 2 منهم كانوا ذكورا (2.2%) وواحدة منهم كانت انثى (1.1%) كما انه لا توجد فروقات ذات دلالة احصائيه حسب النوع (القيمة الاحتماليه أكبر من 0.05). وجد أن الـ 3 اطفال ايجابى الأجسام المضاده اثنان منهم كانوا من الريف وواحد كان من ومكان العيش (القيمة (IgM) الحضر, لاتوجد دلالة احصائية بين وجود الاجسام المضادة الاحتمالية أكبر من 0.05). كما أنه لا توجد فروقات ذات دلالة احصائيه بين ووجود القيمة الاحتمالية أكبر من 0.05).. كذلك وجد أنه لا توجد) (IgM) الأجسام المضادة من النمط فروقات ذات دلاله احصائية بين (القيمة الاحتمالية أكبر من 0.05). من هذه الدراسة وجد أن هنالك نسبة منخفضة للاصابة بفيروس الكبد الوبائي إي فى الأطفال. اوصت الدراسة باهمية الكشف عن فيروس الكبد الوبائي إي في الاشخاص الذين لم تظهر اصابتهم بفيروس E. كذلك اوصت بضرورة التحصين ضد فيروس الكبد الوبائي .B و A الكبد الوبائي

Contents

No	Subject	Page
	الايـــــــــــــــــــة	I
Dedication		II
Acknowledgments		III
Abstract		IV
ملخص الدراسة		V
Contents		VI
List of tables		XI
Chapter one: Introduction and Objectives		
1.1	Introduction	1
1.2	Rationale	3
1.3	Objectives	4
1.3.1	General objective	4

1.3.1	Specific objectives	4
Chapter two: Literature review		
2.	Literature review	5
2.1	Hepatitis E virus	5
2.1.1	History	5
2. 1.2	Classification	5
2.1.3	HEV biology	6
2.1.4	Routes of transmission	6
2.1.5	Risk groups	6
2.1.6.1	Epidemiology	7
2.1.6,2	Geographic distribution according to genotypes	8
2.1.7	HEV pathogenesis	9
2.1.7.1	Incubation period	9
2.1.7.2	Virus replication	9
2.1.7.3	Clinical features	10
2.1.8	Laboratory diagnosis	11

2.1.8.1	Diagnostic assay formats	11
2.1.8.2	Rapid diagnostic assays	11
2.1.8.3	Immune fluorescence microscopy	12
2.1.8.4	Indirect ELISA	12
2.1.8.5	Sandwich ELISA	13
2.1.8.6	Western blot-based assay	13
2.1.8.7	Molecular techniques	14
2.1.9	Treatment of HEV infection	14
2.1.10	Prevention of hepatitis E virus infection	15
2.2	Background studies	15
Chapter three: Materials & Methods		
3.	Materials & Methods	17
3.1	Study approach	17
3.2	Study type	17
3.3	Study design	17
3.4	Study area	17
3.5	Study period	17

3.6	Study population	17
3.7	Inclusion criteria	17
3.8	Exclusion criteria	17
3.9	Sampling technique	17
3.10	Sample size	17
3.11	Data analysis	17
3.12	Ethical consideration	18
3.13	Experimental work	18
3.13.1	Method of data collection	18
3.13.2	Specimen collection	18
3.13.3	Laboratory methods	18
3.13.3.1	ELISA technique for detection of HEV	18
3.13.3.2	Principle	18
3.13.3.3	Assay procedure	19
3.13.3.4	Quality control, calculation and interpretation of results	20

Chapter four: Results		
4.	Results	22
4.1	Frequency of anti-HEV IgM among children	22
4.2	Distribution of anti-HEV IgM according to gender	23
4.3	Distribution of anti-HEV IgM according to geographic area	24
4.4	Distribution of anti-HEV IgM according to age group	25
Chapter five: Discussion, Conclusion and Recommendations		
	Discussion	26
	Conclusion	28
	Recommendations	29
References		30
Appendices		36

LIST OF TABLES

Table No	Legend	Page
4.1	Frequency of anti-HEV IgM among children	22
4.2	Distribution of anti-HEV IgM according to gender	23
4.3	Distribution of anti-HEV IgM according to geographic area	24
4.4	Distribution of anti-HEV IgM according to age group	25