



Viral Hepatitis case detection

Name: Anan Das

MPH One Health Fellow

Roll No. 0119/10

Session: 2019-2020

The thesis submitted is in the partial fulfillment of the requirements for the degree of MPH (One Health)

Department of ONE Health Institute
Chattogram Veterinary and Animal Sciences University
Chattogram-4225, Bangladesh.

Authorization

I hereby declare that I am the sole author of this thesis. I also authorize the Chattogram Veterinary and Animal Sciences University (CVASU) to lend this thesis to other institutions or individuals for the purpose of scholarly research. I further authorize the CVASU to reproduce the thesis by photocopying or by other means, in total or in part, at the request of other institutions or individuals for the purpose of scholarly research. I, the undersigned, and author of this work, declare that the **electronic copy** of this thesis has been provided to the CVASU Library, is an accurate copy of the print thesis submitted, within the limits of the technology available.

Anan Das

January 2021

Viral hepatitis case detection

Name: Anan Das

Roll no: 0119/10

Registration no.: 737

Session: 2019-2020

This is to certify that we have examined the above MPH (One Health) thesis and have found that it is complete and satisfactory in all respects, and all revisions required by the thesis examination committee have been made.



Prof. Dr. Abdul Ahad,
DVM, MS, MSc, PhD
Supervisor



Dr. Kamrul Islam,
DVM, MS, PhD (Candidate)
Co-supervisor

Prof. Sharmin Chowdhury, PhD
Chairman of the Examination Committee
One Health Institute
Chattogram Veterinary and Animal Sciences University
Chattogram-4225, Bangladesh

January 2021

Acknowledgements

All praises to almighty God , who gave me the opportunity to be enrolled in the **One Health Institute** for achieving Masters in Public Health. I would like to express my veneration to honorable supervisor Professor **Dr. Abdul Ahad** , Dean, Faculty of Veterinary Medicine, Professor, Department of Microbiology and Veterinary Public Health Faculty of Veterinary Medicine, Chattogram Veterinary and Animal Sciences University (CVASU) and co-supervisor Dr. **Kamrul Islam** PhD candidate , The University of Queensland (UQ), Brisbane, Australia, for their coherent and articulated instructions. It would not be possible to complete such a laborious task without their scholastic guidelines. It was an exquisite experience for me to work under their supervision. I feel much pleasure to convey my gratitude to honorable Professor **Dr. Mohammad Mahmudul Hassan** for his valuable suggestions and inspiration. I am grateful to Dr. Mohammad Shoaib Hossain, Assistant Professor, Department of ENT, MCMCH, for his supports in relation to data collection during the fieldwork.

I am grateful to my supervisor for providing all the laboratory facilities and other technical staffs for assistance. Specially thanks to **Dr. Tarek-Ul-Quader and Dr. Shanchita Das** for their guidance and cooperation.

I would like to acknowledge the support and encouragement received during MPH program from other teachers, technical and non-technical staffs of the One Health Institute, CVASU. I am also grateful to my parents and family members for their support.

Table of Contents

<i>Authorization</i>	<i>ii</i>
<i>Acknowledgements</i>	<i>iv</i>
<i>List of Tables and Figures</i>	<i>viii</i>
<i>List of Abbreviations</i>	<i>x</i>
<i>Abstract</i>	<i>xi</i>
<i>Chapter 1: Introduction</i>	<i>1</i>
1.1 Rationale.....	3
1.2 Objectives.....	4
<i>Chapter 2: Literature review</i>	<i>5</i>
2.1.1 Hepatitis A.....	5
2.1.2 Clinical Features.....	8
2.1.3 Laboratory Diagnosis.....	9
2.1.4 Prevention of HAV.....	9
2.2 Hepatitis B.....	10
2.2.1 Transmission of HBV.....	10
2.2.2 Epidemiology.....	10
2.2.3 Clinical course and pathogenesis of Hepatitis B Virus.....	10
2.2.4 Laboratory Diagnosis of HBV.....	11
2.2.5 Prevention of HBV.....	12
2.3 Hepatitis C.....	12
2.3.1 Transmission of HCV.....	12
2.3.2 Pathogenesis and clinical features.....	13
2.3.3 Laboratory diagnosis.....	13
2.3.4 Treatment.....	14
2.3.5 Prevention.....	14
2.4 Hepatitis D.....	14
2.4.1 Epidemiology of HDV.....	14
2.4.2 Transmission of HDV.....	15
2.4.3 Clinical Feature of HDV.....	15
2.4.4 Laboratory Diagnosis of HDV.....	16
2.4.5 Prevention of HDV.....	16
2.5 Hepatitis E.....	17

2.5.1 Epidemiology of Hepatitis E.....	18
2.5.2 Transmission of Hepatitis E.....	18
2.5.3 Clinical Features of Hepatitis E.....	19
2.5.4 Prevention of Hepatitis E	19
<i>Chapter 3: Materials and Methods</i>	20
3.1 Description of the study areas	20
3.2 Study design	21
3.3 Case definition	21
3.4 Study period	21
3.5 Sample collection	21
3.6 Data Collection	22
3.7 Statistical analysis	23
3.8 Descriptive analysis	23
<i>Chapter 4: Result</i>	24
4.1 Prevalence of Hepatitis A.....	24
4.1.1 Univariate association between Hepatitis A and selected variables.....	24
4.1.2 Gender wise percentage of Hepatitis A.....	25
4.1.3 Yearly variation of Incidences of Hepatitis A.....	25
4.2 Prevalence of Hepatitis B.....	26
4.2.1 Univariate association between Hepatitis B and selected variables.....	26
4.2.2 Gender wise percentage of Hepatitis B.....	26
4.2.3 Yearly variation of Incidences of Hepatitis B.....	27
4.3 Prevalence of Hepatitis C.....	27
4.3.1 Univariate association between Hepatitis C and selected variables.....	27
4.3.2 Gender wise percentage of Hepatitis C.....	28
4.3.3 Yearly variation of Incidences of Hepatitis C.....	28
4.4 Prevalence of Hepatitis E.....	29
4.4.1 Univariate association between Hepatitis E and selected variables.....	29
4.4.2 Gender wise percentage of Hepatitis E.....	30
4.4.3 Yearly variation of Incidences of Hepatitis E.....	30
<i>Chapter 5: Discussion</i>	31
<i>Chapter 6: Conclusion</i>	34
<i>Chapter 7: Recommendations</i>	35
<i>Chapter 8: Limitations</i>	36
<i>References</i>	37

List of Tables and Figures

Table 1. Main Hepatitis viruses.....	3
Table2. Outbreaks of Hepatitis A around the world from 2009-2018.....	7
Table 3: Frequency distribution of Hepatitis A	24
Table 4: Frequency distribution of Hepatitis B	26
Table 5: Frequency distribution of Hepatitis C	28
Table 6: Frequency distribution of Hepatitis E	29
Figure. 1 Structure of Hepatitis A virus.....	6
Figure 2. A typical course of hepatitis A.....	9
Figure 3- Serologic findings in patient with acute Hepatitis B.....	12
Figure 4: Map of the study site.....	20
Figure 5: Sample of data record sheet.....	23
Figure 6: Percentage of Hepatitis A by gender.....	25
Figure 7: Percentage of Hepatitis A by year.....	25
Figure 8: Percentage of Hepatitis B by gender.....	27
Figure 9: Percentage of Hepatitis B by year.....	27
Figure 10: Percentage of Hepatitis C by gender.	28
Figure 11: Percentage of Hepatitis C by year.....	29
Figure 12: Percentage of Hepatitis E by gender.....	30
Figure 13: Percentage of Hepatitis E by year.....	30

List of Abbreviations

Abbreviation	Elaboration
CI	Confidence interval
ELISA	Enzyme-linked immunosorbent assay
HRPO	Horse-Radish Peroxidase
TMB	Trimethyl Benzidine
HAV	Hepatitis A Virus
HBV	Hepatitis B Virus
HBsAg	Hepatitis B surface antigen
HCV	Hepatitis C Virus
HDV	Hepatitis D Virus
HEV	Hepatitis E virus
IgA	Immunoglobulin A
IgG	Immunoglobulin G
IgM	Immunoglobulin M
OR	Odds ratio
RT-PCR	Real Time- Polymerase chain reaction

Abstract

Hepatitis is a very common medical condition of the liver where the disease causes inflammation and swelling potentially leading to permanent damage in the liver tissues. Globally it has become a major public health concern since the morbidity and mortality rate of the disease is increasing and is becoming more visible as the second major killer infectious disease after tuberculosis. In Bangladesh, infections due to hepatitis A (HAV), hepatitis B (HBV), Hepatitis C (HCV), and hepatitis E (HEV) are associated with significant morbidity and mortality. A study done two decades ago (Khan, et.al., 2000) showed the prevalence of antibodies to HAV was 39% among the study subjects. HBsAg was present in 19%, HCV antibodies in 13% and HEV antibodies in 53% of the study subjects respectively. This study was conducted to observe the current situation in one district (Chattogram) of Bangladesh. A total of 3514 patients whose serum samples tested positive for any form of viral hepatitis over a three-year duration (Jan 2018- Dec 2020) were included as study subjects. For each type of hepatitis, variation across gender, season and across different years were evaluated. The overall prevalence of Hepatitis A was 1.2% (n=42) with 95% CI: (0.9-1.6), Hepatitis B was 86.06% (n=3,024) with 95% CI: (84.9-87.2), Hepatitis C was 2.93% (n=103) with 95% CI: (2.4-3.5) and Hepatitis E alone was 9.82% (n= 345) with 95% CI: (8.9-10.5). Hepatitis A, C and E were found to be significantly ($p \leq 0.01$) higher in Male patients than that of female patients throughout the year. Hepatitis B was most prevalent in female patient than that of male patient ($p < 0.001$). In seasonal variation Hepatitis B was significantly low in rainy season while hepatitis E was high in that same season. Overall, more females were affected than males and most cases were observed during rainy season. Number of cases drastically dropped in 2020.

The result indicates the importance of modern molecular techniques such as polymerase chain reaction (PCR) for reliable diagnosis of hepatitis. Moreover, identification of further risk factors such as seasonal variation, sanitation, access to safe water, living in households with infected persons, etc. associated with the occurrence of viral hepatitis would help to take proper strategies for the prevention and control in different areas especially during seasons of high infection.

Key words: Viral Hepatitis, HAV, HBV, HCV, HEV