Republic of Yemen
21-Septemper University
Medical and Applied sciences
Faculty of Medicine

الجمهورية اليمنية
وزارة التعليم العالي والبحث العلمي
جامعة ٢١ سبتمبر للعلوم الطبية والتطبيقية
كلية الطب البشري

Prevalence of Hepatitis B and Associated Risk Factors to Control Vertical Transmission Among Pregnant Women Attending The Governmental Hospitals in Sana'a, City 2023.

A Graduation Research Submitted In Partial Fulfillment For Obtaining A Bachelor Degree In Medicine (Internal Medicine).

By:

Nasser H.Saood
Kamal J.AL-Himyari
AL-Motasembellah A.AL-Sharabey
Hesham M.Talhan
Pakr D.Bajr
Mohammed A.AL-Najjar
Mohammed I.AL-Shebani

Supervisor:
Dr. Ahmed AL-Shahethi

Supervisor:
Dr.Samir AL-Hakimi

الجمهورية اليمنية
وزارة التعليم العالي والبحث العلمي
جامعة ٢١ سبتمبر للعلوم الطبية والتطبيقية
كلية الطب البشري

Republic of Yemen
21-Septemper University
Medical and Applied sciences
Faculty of Medicine

نسبة انتشار فيروس التهاب الكبد البائي وعوامل الخطر المصاحبة له للسيطرة على انتقال المرض من الأمهات إلى الأطفال عند النساء الحوامل اللواتي يترددن على المستشفيات الحكومية في صنعاء ٢٠٢٣.

هذه الأطروحة للحصول على درجة البكالوريوس في كلية الطب البشري(في قسم الباطنه)

الباحثون

ناصر حسين محمد سعود
كمال جميل حسن الحميري
المعتصم بالله احمد سفيان الشرعبي
هشام محمد طلحان
بكر ضيف الله بجر
محمد احمد النجار
محمد إبراهيم الشيباني

تحت أشراف

الأستاذ الدكتور:سميرالحكيمي

الأستاذ الدكتور:احمدالشاحذي

Dedication

This Research is dedicated to
Our great parents ,who never stop giving us what we look for,
To our supervisor's Dr Samir AL-Hakimi & Dr Ahmed AL-Shahethi who reserved the greatest credit for helping us to completing this research
And to our esteemed university administration staff and professor's who have taught us tirelessly,
To everyone who contributed and participated in completing this research.
To our beloved homeland.

ACKNOWLEDGMENTS

We are so thankful, grateful to our supervisors Dr. Samir AL-Hakimi and Dr. Ahmed AL-Shahethi for their continuous observing, helping, guiding and supporting us during our study.

To all staff, and nurses in AL-Sabeen& AL-Thawra& AL-Gumhouri hospitals for helping us. Without integrated cooperation of all with us, this work could not have been accomplished.

To everyone who contributed and participated in completing this research.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATION

Anti Hbc	Anti-Hepatitis B Core
AASLD	American Association For The Study Of Liver Disease
ACG	American College Of Gastroenterology
Anti Hbe	Hepatitis B Envelope Antibody
Anti Hbs	Anti-Hepatitis B Surface
CDC **CI**	Center Of Disease And Control Confidence Interval
CMV	Cytomegalovirus
DNA	Deoxyribonucleic Acid
EBV	Epstein Bar Virus
ELISA	Enzyme Linked Immunosorbant Assay
FRE	Frequency
GDM	Gestational Diabetes Mellitus
HbcAg	Hepatitis B Core Antigen
HbeAg	Hepatitis B Envelope Antigen
HBIG	Hepatitis B Immunoglobulin
HBsAg **HBV**	Hepatitis B Surface Antigen Hepatitis B Virus
HCC	Hepatocellular Carcinoma
HCV	Hepatitis C Virus
HIV	Human Immunodeficiency Virus
ICP	Increase Intracranial Pressure
IgG	Immunoglobulin G
IgM	Immunoglobulin M
IL	Interleukin
MTCT	Mother To Chilled Transmission
NO.	Number
PCR	Polymerase Chain Reaction
SD	Standard Deviation
SPSS	Statistical Package For The Social Science
USA	United State America
WHO	World Health Organization

ABSTRACT

Background of study

Hepatitis B is infectious disease caused by DNA (deoxyribonucleic acid) viruses grouped under hepadnavirus type that contains a core of DNA enveloped by surface glycoproteins.

The mood of transmission of HBV varies according to the geographic local. so there is a high prevalence of the prenatal transmission in the regions of the world during the childbirth، a representing 90% of cases ,and 10% is transmitted horizontally .HBV has a prolonged incubation period that estimates (from 2 weeks to 26 weeks), most people don't experience any symptoms when they are newly infected. however some people have acute illness with symptoms that last several weeks, including jaundice, dark urine, nausea, vomiting and abdominal pain so people with acute hepatitis b can develop acute liver failure. the full recovery is made by adult with 90-95 %، following acute HBV infection. 5-10% develop a chronic hepatitis b infection that usually lasts for life .

It's not possible on clinical ground to differentiate hepatitis b from hepatitis caused by other viral agent. Hence the laboratory confirmation is essential. and several blood tests are available to diagnosis , and to monitor and distinguish acute and chronic infected patient.

Objectives

The current study aimed to determine the prevalence of hepatitis b and it’s associated risk factors to control vertical transmission among pregnant women attending the governmental hospitals in Sana’a, 2023.

Methods

A cross sectional study was conducted among pregnant women attending delivery rooms in AL-Thawrah, AL-Sabeen and AL-Gumhouri hospitals in Sana’a, Yemen. to determine the sero-prevalence of hepatitis B infection and associated risk factors, the sample size of the target population was calculated

to include 384 Yemeni pregnant women attending the delivery rooms at the study place. the sample size was determined by using single population proportion formula. pregnant women attending hospital to deliver were consecutively enrolled until the sample size reached the saturation point. data was collected by using a close-ended questionnaire. they included the following socio-demographic characteristics: age, residence, education level, occupation, marital status, parity, and risk factors and medical history. a blood specimen was collected for detecting of HBeAg from HBsAg carrier women . data were coded and entered into SPSS version 21.0 for descriptive and inferential statistical analysis.

Results

The overall prevalence of hepatitis B was (3.2%), the vast majority of participants 99.7%were married, more than 36.1%, of the target pregnant women had basic education, 67.3% of them were housewives,33.2% of pregnant women have had a medical history of taken vaccination to HBV. While only 20.2% of the participants have had a history of blood transfusion and 42.0% of the participants have had a history surgery , more than half 37.0% of them have had a history of dental procedures, only 1,3% of participant have had a history of dialysis .

The positivity of prevalence for HBsAg was: about 5.4% among the age group 30 years and above, about 5.09% were illiterate , about 2.2% were married regarding marital status, and 5.7% were housewife Regarding the overall sero-prevalence of HBsAg only 3.2% of the participating pregnant women had a positive sero-prevalence of HBsAg.

The prevalence of HBsAg was about 5.0% among the pregnant women who had a history of dental process .The prevalence of HBsAg was about 4.5% among the pregnant women who had a history of surgery, the prevalence of HBsAg was about 2.6% among the pregnant women who had a history of blood transfusion.. About 16.7% of positive HBsAg women have had a positive HBeAg and about 33.3% of positive HBsAg women have had a vaccine and immunoglobulin for her child .

Conclusions

The sero-prevalence of hepatitis B infection was 3.2% which had a moderate severity among pregnant women who attended the governmental hospital according to WHO. The prevalence of HBeAg among positive HBsAg pregnant women was 16.7% which means that infectivity status was low . The prophylaxis treatment to prevent mother to child transmission was done in 33.30% of positive HBsAg pregnant women. there is statistically significant association between the sero-prevalence of HBV infection and low income among pregnant women who participated in the study at (P-value >0.05) . there is no statistically significant association between the sero-prevalence of HBV infection and other Demographic Characteristics among pregnant women who participated in the study. There is statistically significant association between the sero-prevalence of HBV infection and history of blood transfusions of pregnant women at level (P-value >.٠05).

Recommendation

1. To Introduce Routine Screening To Include All Pregnant Women Attending Antenatal Clinic In Health Centers Or Hospital During Antenatal Period .
2. Using Standard Infection Control To All Risk Factors Such As Blood Transfusion And Surgery .
3. Using Of HBV Infection Vaccine And Immunoglobulin To All Newborn With Positive HBsAg Mother To Prevent Vertical Transmission.
4. Introducing Antiviral Therapy In Pregnant Women Who Had HBeAg Positive To Reduce Vertical Transmission .
5. Early Case Detection And Proper Treatment, Especially If The Pregnant Women Have Jaundice.

ملخص الدراسة

خلفيه عن الدراسة:

التهاب الكبد البائي هو مرض معدي تسببه فيروسات الحمض النووي المندرجة تحت نوع فيروس الكبد ، ويحتوي على نواة من الحمض النووي المغلف بالبروتينات السكرية السطحية. يختلف طرق انتقال فيروس التهاب الكبد البائي باختلاف المنطقة الجغرافية المحلية ، في منطقة عالية الانتقال للفيروس من العالم ينتقل عن طريق الولادة بنسبه تصل لـ ٩٠ ٪ من الحالات ، وتنتقل الـ ١٠٪ المتبقية أفقيًا.

فيروس الكبد البائي له فترة حضانة مطولة تقدر من أسبوعين إلى ٢٦ أسبوعًا ، ولا يعاني معظم الأشخاص من أي أعراض عند الإصابة حديثًا ، ومع ذلك ، يعاني بعض الأشخاص من مرض حاد مع أعراض تستمر عدة أسابيع ، بما في ذلك اليرقان والبول الداكن والغثيان والقيء و الم في البطن يمكن أن يصاب الأشخاص المصابون بالتهاب الكبد الوبائي بفشل كبدي حاد.

يحدث الشفاء التام لدى ٩٠-٩٥٪ من البالغين بعد الإصابة بفيروس التهاب الكبد البائي . ٥-١٠٪ المتبقية يصابون بعدوى مزمنة بالتهاب الكبد البائي والتي عادة ما تستمر مدى الحياة.

ليس من الممكن على أرض الواقع التفريق بين التهاب الكبد البائي والتهاب الكبد الناجم عن عامل فيروسي آخر ، وبالتالي فإن التأكيد ألمخبري ضروري ، تتوفر العديد من اختبارات الدم لتشخيص ومراقبة وتمييز المريض المصاب بالعدوى الحادة والمزمنة

أهداف الدراسة

هدفت الدراسة الحالية إلى تحديد مدى انتشار التهاب الكبد البائي وعوامل الخطر المرتبطة به للسيطرة على انتقال العدوى من الأم إلى الطفل بين النساء الحوامل اللاتي يترددن على المستشفيات الحكومية في صنعاء ، ٢٠٢٣

الأدوات

أجريت دراسة مقطعية على النساء الحوامل اللواتي يترددن على غرفة الولادة في مستشفيات الثورة والسبعين والجمهوري في صنعاء ، اليمن. لتحديد الانتشار المصلي لعدوى التهاب الكبد البائي وحقائق الخطر المرتبطة به ، تم حساب حجم العينة من السكان المستهدفين ليصبح ٣٨٤ امرأة يمنية حامل في غرفة الولادة في منطقة الدراسة. تم تسجيل النساء الحوامل في المستشفيات للولادة على التوالي حتى الوصول إلى حجم العينة المطلوب. تم جمع البيانات باستخدام استبيان مغلق. البيانات بما في ذلك الخصائص الاجتماعية والديموغرافية: العمر ، والإقامة ، والمستوى التعليمي ، والمهنة ، والحالة الاجتماعية ، والتكافؤ ، وعوامل الخطر والتاريخ الطبي. تم جمع عينة الدم للكشف عن المستضد الغشائي لفيروس الكبد

البائي للحالات الحاملة للمستضد السطحي لفيروس الكبد البائي

النتائج

كان معدل الانتشار العام لالتهاب الكبد البائي (٣,٢٪) ، والغالبية العظمى من المشاركين (٩٩,٧٪) متزوجات ، و(٣٦,١٪) لديهن تعليم أساسي ، (٦٧,٣٪) منهن ربات بيوت ، (٣٣,٢٪) من النساء الحوامل لديهن تاريخ طبي لتلقي التطعيم ضد التهاب الكبد البائي.

في حين أن (٢٠,٢٪) فقط من المشاركين لديهم تاريخ في نقل الدم و (٤٢,٠٪) . من المشاركين خضعوا لجراحة سابقة ,و (٣٧,٠٪) لديهم تاريخ من إجراءات طب .الأسنان ، فقط (١,٣%) من المشاركين لديهم تاريخ من غسيل الكلى

كان معدل الانتشار المصلي لفيروس الكبد حوالي (٥,٤٪) بين الفئة العمرية ٣٠ سنة فأكثر ، وحوالي (٥,٠٩٪) من الأميين ، وحوالي (٢,٢٪) متزوجين فيما يتعلق بالحالة الاجتماعية ، و (٥,٧٪) ربة منزل من الإجمالي. الانتشار المصلي لـ (٣,٢٪) فقط من النساء الحوامل المشاركات كان لهن انتشار مصلي إيجابي لـ المستضد السطحي لفيروس الكبد البائي . كانت نسبة انتشار المرض حوالي (٥,٠٪) بين النساء الحوامل اللواتي لهن تاريخ في عمليات الأسنان. كانت نسبة انتشار المرض حوالي (٤,٥٪) بين النساء الحوامل اللواتي كان لهن تاريخ من الجراحة ، وبلغت نسبة الانتشار حوالي (٢,٦٪) بين النساء الحوامل اللواتي لهن تاريخ سابق في نقل الدم. حوالي (١٦,٧٪) من النساء المصابات كان لديهن نتائج إيجابية للمستضد الغشائي لفيروس الكبد البائي وحوالي (٣٣,٣٪) من النساء المصابات حصلن على لقاح وجلوبيولين مناعي لطفلهن.

الاستنتاجات

بلغ معدل الانتشار المصلي لعدوى التهاب الكبد البائي ٣,٢٪ وشدته متوسطة بين النساء الحوامل اللائي يترددن على المستشفيات الحكومية حسب منظمة الصحة العالمية. بلغت نسبة انتشار المستضد الغشائي بين الحوامل الإيجابيات ١٦,٧٪ مما يعني أن حالة العدوى كانت منخفضة. العلاج الوقائي لمنع انتقال العدوى من الأم إلى الطفل تم إجراؤه في ٣٣,٣٠٪ من النساء الحوامل المستضد السطحيين إيجابيات. توجد علاقة ذات دلالة إحصائية بين الانتشار المصلي لعدوى التهاب الكبد البائي وانخفاض الدخل بين الحوامل اللائي شاركن في الدراسة عند (القيمة الاحتمالية = ٠,٠٥). لا توجد علاقة ذات دلالة إحصائية بين الانتشار المصلي لعدوى التهاب الكبد البائي والشخصية الديموغرافية الأخرى بين النساء الحوامل اللائي يشاركن في الدراسة هناك علاقة ذات دلالة إحصائية بين الانتشار المصلي للعدوى التهاب الكبد البائي وتاريخ نقل الدم للحوامل النساء في المستوى (قيمة الاحتمالية =٠,٠٥).

التوصيات

١. إدخال الفحص الروتيني لجميع النساء الحوامل اللائي يترددن على عيادة ما قبل الولادة في المراكز الصحية أو المستشفى خلال فترة ما قبل الولادة.

٢. الوقاية من جميع عوامل الخطر مثل نقل الدم والجراحة .

٣.استخدام لقاح لعدوى فيروس الكبد البائي والغلوبولين المناعي لجميع الأطفال حديثي الولادة المولودين لأم إيجابية المستضد السطحي لفيروس الكبد البائي لمنع الانتقال الرأسي.

٤. تقديم العلاج المضاد للفيروسات عند النساء الحوامل اللواتي لديهن نتائج ايجابيه للمستضد الغشائي للحد من الانتقال الرأسي. الكشف المبكر عن الحالات والعلاج المناسب ، خاصة إذا كانت النساء الحوامل المصابات باليرقان.

CHAPTER ONE

INTRODUCTION

CHAPTER 1:INTRODUCTION

1.1 BACKGROUND OF THE STUDY

The liver is the second largest organ in the body whose weight is about 1.5 kilograms in average human and represents 2 percent of the total body weight.

The functional unit of liver is the liver lobule which has several millimeters and cylindrical structure contains two layers of cells arrangement around the central vein which located in the center of lobule and drain into hepatic veins and then into inferior vena cava ***(Hall et al. 2020).***

The liver has very important functions, including metabolic function as fat proteins and carbohydrates metabolism and storage function as storage some vitamins and glycogen the liver also has an important role in removing the drug hormones and other substances***(Hall et al.2020).***

The most serious primary diseases of liver are viral hepatitis, alcoholic liver disease, non alcoholic fatty liver disease and hepatocellular carcinoma ***(Kumar et al. 2017).***

The injury of hepatocytes may be reversible when the hepatocyte had simple pathological Change such as accumulation of fat or bilirubin also the hepatocyte can be safer of irreversible change when the liver cells die by necrosis or apoptosis.

The viral hepatitis is very common and may be caused by hepatotropic viruses (A B C D E) which have a specific affinity of the liver, and the hepatitis can be associated with other viruses such as Epstein bar virus (EBV) and cytomegalovirus (CMV) ***(Kumar et al.2017).***

The hepatitis B is one of the most common causes of hepatitis from hepatotropic viruses Hepatitis B is infectious disease caused by DNA viruses which grouped under hepadnavirus type that it contains a core of DNA enveloped by surface glycoprotein's which has important role in diagnosis ***(Penmanet al. 2022).***

The mood of transmission of Hepatitis B Virus (HBV) varies with the geographic local, in high prevalence region of the world prenatal transmission during childbirth accounts 90% of cases ,the remaining 10% is transmitted horizontally ***(Kumar et al.2017).***

HBV has a prolonged incubation period that estimates from 2 weeks to 26 weeks. so most people don't experience any symptoms when they are newly infected . However some people have acute illness with symptoms that last several weeks, including jaundice, dark urine, nausea, vomiting and abdominal pain . People with acute hepatitis B can develop acute liver failure***(Penmanetal.2022).***

It's not possible on the clinical ground to differentiate hepatitis B from that hepatitis caused by other viral agent .Hence laboratory confirmation is essential ,several blood tests are available to diagnosis , monitor and distinguish acute and chronic infected patient ***(Kumar et al. 2017).***

Hepatitis B virus has several antigens that can be detected and these antigens make immune response by making antibodies which can be also shown by laboratory tests **(Penmanetal.2022)** .

Hepatitis B surface antigen is an indicator of active infection HBsAg appears after incubation period and presents for a few days only . And it's antibody (anti HBs) usually appears after 3-6 month from the incubation period and lasts for years or permanently ***(Penmanetal.2022).***Hepatitis B core antigen (HBcAg) is not found in blood but Hepatitis B core antibody (anti HBc) appears early in the

illness that starts as Immunoglobulin M(IgM) antibody and then Immunoglobulin G(IgG) type appears late ***(Penmanetal.2022).***Hepatitis B envelope antigen (HBeAg) is an indicator for replication which appears early and fades before the HBsAg . Hepatitis B envelope anti body (anti HBe) appears after about 12 week and presents for life ***(Penmanetal.2022).***

Acute hepatitis B has no specific treatment. As a result, care is focused on ensuring comfort and proper nutritional balance, as well as replacing fluids lost due to vomiting and diarrhea. The most important thing is to avoid taking medications that aren't absolutely necessary. Acetaminophen, paracetamol, and anti-vomiting medications should be avoided. Chronic hepatitis B infection can be treated with medications, including antiviral drugs taken orally. Cirrhosis treatment can decrease the progression of the disease, lower the incidence of liver cancer, and enhance long-term survival. Depending on the context and eligibility criteria, World Health Organization (WHO) estimates that 12% to 25% of patients with chronic hepatitis B infection may require treatment in 2021.The World Health Organization recommends oral medications (tenofovir or entecavir) as the most effective drugs for hepatitis B viral suppression. The majority of persons who get hepatitis ***(WHO 2022).***

90 – 95 % of adults make full recovery after acute HBV infection. the remaining 5-10% develop a chronic hepatitis B infection that usually lasts for life ***(penman et al. 2022).***

1.2 PROBLEM STATEMENT

Viral hepatitis is a major public health concern that infects millions of people each year; some infections result in hepatocellular carcinoma (HCC), liver cirrhosis, and death in a significant

proportion of patients. Around 2.3 billion people worldwide are infected with one or more hepatitis viruses. Each year, approximately 1.4 million people die from viral hepatitis; HBV and Hepatitis C Virus HCV account for approximately 90% of these fatalities ,and the other hepatitis viruses representing 10%. In 2013, viral hepatitis infections, specifically Hepatitis B (HBV) and Hepatitis C (HCV), were the seventh leading cause of death globally in 1990 ***(Jefferies et al. 2018).***

Hepatitis B is one of the most prevalent and dangerous infectious diseases in the world, with a high morbidity and fatality rate .The prevalence of HBV infection is about one-third of the global population. Around 5% of this group -are chronic carriers, and 25% of these carriers go on to develop life- threatening liver conditions like chronic hepatitis, cirrhosis, and hepatocellular carcinoma.780000 HBV-related fatalities are reported worldwide each year. The virus is spread horizontally or vertically during early childhood in about one third of people who have chronic HBV infections***(Jefferies et al. 2018).***

The Ministry Of Public Health in Republic Of Yemen ranks HBV infection 12th on its major public health problem In Yemen, chronic hepatitis is a significant contributor to cirrhosis and liver cancer, although there are little research on how common these viruses are in the general population ***(Barkat et al. 2020).***

Mother to child transmission (MTST) is currently the most common HBV transmission method, accounting for over 50% of all cases worldwide .The major infection pathway in high endemic areas is Mother To Chilled Transmission (MTCT), and the risk of chronicity development is significant ***(sirilert et al. 2021).*** According to a number of studies, HBV may worsen conditions such

intrahepatic cholestasis of pregnancy, gestational diabetes, and preterm birth. These connections appear to be connected to the HBs activity like the other demographic groups, pregnant carriers of HBV may experience disease progression to immune tolerance phase, immune-active phase, or life threatening diseases such cirrhosis and HCC. The risk of maternal and fetal mortality is raised by these situations. Preterm labor, gestational diabetes, antepartum hemorrhage, preeclampsia, stillbirth and miscarriage are among risks that are increased by hepatitis B ***(sirilert et al. 2021).*** Chronic infection occurs in the majority (90%) of infants infected from the mothers or before 5 years of age. Those infected after the age of five years are much less likely (<5%) to develop a chronic infection ***(WHO 2022).*** The risk of maternal infant transmission is related to the mother's HBV replicative status, which correlates with the presence of HBeAg 90% of HBeAg- positive mothers transmit HBV infection to their offspring, whereas only 10%- 20% of HBeAg-negative mothers has Prenatal transfer of an infection to their babies ***(Navabakhsh et al.2011).*** 90% of people who are infected during pregnancy, 30%of people who are infected during early childhood, and 6% of people who are infected after the age of five have chronic infection ***(Mac et al.2019).*** Women who are severely infected with HBV or who are chronic carriers of HBV are likely to pass the virus on to their baby at the time of delivery in the absence of any prophylaxis measures or anti viral treatment ***(Liu et al. 2021).***

*1.3 Re*search Questions

1. What is the demographical distribution of participants?
2. What is the prevalence of Hepatitis B among delivering mother in Yemen?
3. What is the associated risk factors of Hepatitis B in delivering

women?

4. What is the infectivity states among pregnant women delivering at governmental hospital?
5. What is the hepatitis B vaccination coverage among the attendants?
6. What is the prophylaxis measurement that used to prevent vertical transmission among participants in hospitals?

1.4 JUSTIFICATION OF STUDY

Hepatitis B virus is a global public health issue. irrespective huge burden HBV places on communities in every region of the world, it is thought to cause 1.4 million annual deaths from acute infection, cirrhosis, and liver cancer, a death toll equivalent to that of Human Immunodeficiency Virus (HIV) and tuberculosis ***(barkat et al. 2020).*** A few studies have been done in Yemen, but this study will concentrate on the prevalence of Hepatitis B and associated risk factors to control mother to child transmission among pregnant women who attend the governmental hospital in Sana'a, Yemen. The significance of this study, according to the researcher's clinical ground, will provide baseline information on sero-prevalence and associated factors of viral hepatitis B infection among pregnant women attending governmental hospital in Sana'a, This study underscores the importance of identifying the current sero-prevalence and associated factors of viral hepatitis B infection among pregnant women that contribute to helping health authorities in the prevention of Hepatitis B virus among pregnant women who attend governmental hospital. Therefore ,this study aimed to determine the prevalence of hepatitis B and associated risk factors to control mother to child transmission among pregnant women who attend the governmental hospital in 2023.

CHAPTER TWO

LITERATURE REVIEW

CHAPTER II:LITERATURE REVIEW

2.1 Hepatitis Definition

Hepatitis is a condition that caused by liver inflammation and is characterized by the presence of inflammatory cells in the tissues of the liver, which can cause fibrosis and cirrhosis. ***(WHO2016)***

The liver may be infected by different agent that includes viral bacterial and protozoal infection

The viral infection is the most serious and can caused by A B C D E viruses or less commonly CMV and EBV .so all these viruses have similar pathological feature but differ in tendency to cause acute or chronic infection **(penman et al.2022).**

Many people with hepatitis do not have symptoms and they do not know they are infected. If an acute infection develops, symptoms may show up anywhere between two weeks and six months following exposure. Fever, exhaustion, loss of appetite, nausea, vomiting, abdominal discomfort, dark urine, light-colored feces, joint pain, and jaundice are some of the signs and symptoms of acute hepatitis. It may take decades for persistent viral hepatitis symptoms to appear according to center of disease and control ***(CDC 2019).***

2.2 epidemiology

Hepatitis B is a chronic disease and there were more than 294 million patients worldwide chronically infected .The burden hepatitis B infection is the highest in the WHO Western Pacific region and the WHO African region where 116 million (10.7%) and 81 million (6.7%) people respectively are chronically infected, 60 million people(8.8%) are infected in WHO eastern Mediterranean region , 18 million (1.1%) in the WHO south east , 14 million (1.8%) in the WHO European region

and 5 million (0.5%), in the WHO American region ***(WHO 2022).***

2.2.1 High endemicity

Hepatitis B is highly endemic in developing countries with high population such as in South Asia Western Pacific and African WHO regions (WHO 2022).

2.2.2 Moderate endemicity

Moderate endemicity was found in East Europe **(WHO 2022).**

2.2.3 Low endemicity

The endemicity of hepatitis B is low in most developed areas such as north America ,north and west Europe which only 0.5 to 1.8% are chronic carriers (WHO 2022).

2.2.4 situation in Yemen

The prevalence of hepatitis B in Yemen is 10.8% according to studies in 2013**(Murad et al.2013).**

After that , some studies done between 2013-2016 estimate the prevalence ranging from 2-9, and then in 2019 globalhep.org estimate the prevalence about 5.89% **(jhon 2020).**

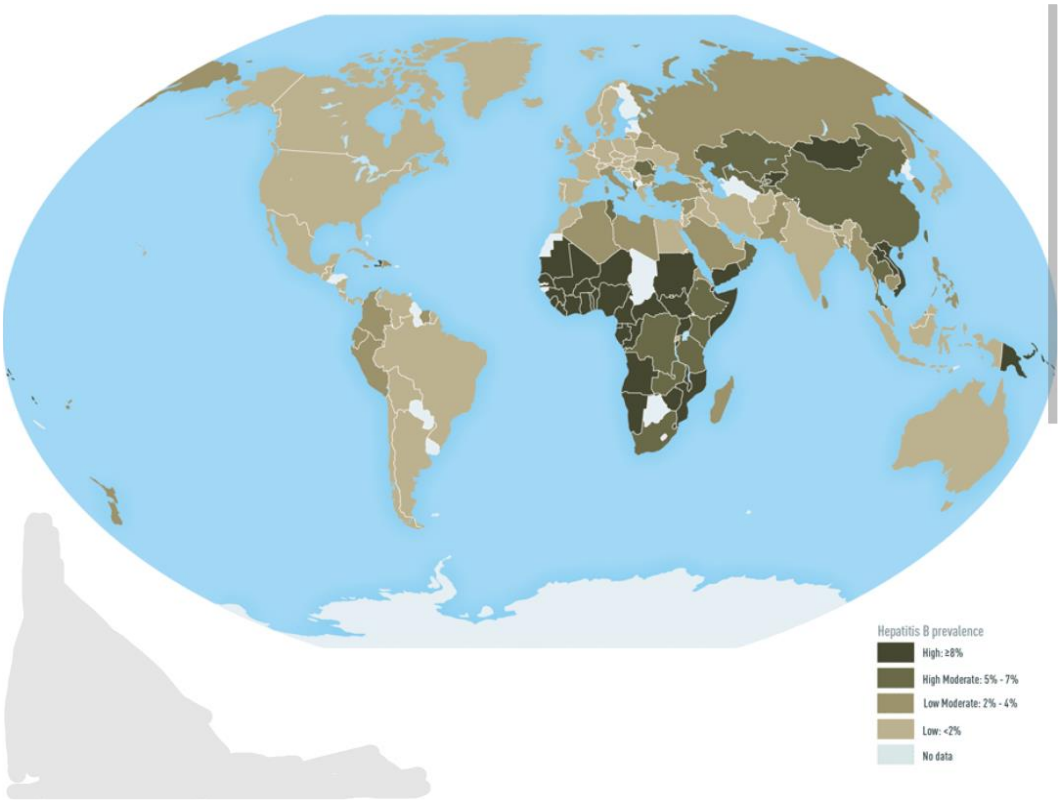

Figure 1: Geographical distribution of chronic hepatitis B ***(Aron et al.2020)***

2.3 Reservoir of infection

The main reservoir of HBV is human but related viruses are found in wood duck ground squirrels tree squirrels Peking duck and herons **(Liang2009).**

2.4 Mood of Transmission

Hepatitis B infection is caused by the hepatitis B virus (HBV). The virus is passed from person to person through blood, semen or other body fluids. It does not spread by sneezing ,coughing or saliva **(CDC 2019).**

The common ways that HBV can spread are Sexual contact. You may get hepatitis B if you have unprotected sex with someone who is infected. The virus can pass to you if the person's blood, saliva, semen or vaginal secretions enter your body. **(Mayoclinc 2022)**

Sharing of needles. HBV easily spreads through needles and

syringes contaminated with infected blood. Sharing IV drug paraphernalia puts you at high risk of hepatitis B.

Accidental needle sticks. Hepatitis B is a concern for health care workers and anyone else who comes in contact with human blood **(Mayoclinc 2022)**.

Vertical transmission contribute 90 in high endemic area **(Kumar et al.2022)**

HBV infection happens during childbirth from an infected mother. The risk of transmission from women who are sero- positive for hepatitis B surface antigen (HBsAg) and hepatitis B e antigen (HBeAg—see Serology) at the time of delivery is 70 to 90%. Women who do not have the envelope antigen or who have anti-HBe only transmit the illness 5 to 20% of the time **(Tesini 2023).**

Mother to child. Pregnant women infected with HBV can pass the virus to their babies during childbirth. However, the newborn can be vaccinated to avoid getting infected in almost all cases. Talk to your provider about being tested for hepatitis B if you are pregnant or want to become pregnant **(Tesini 2023).**

2.5 Susceptibility Of HBV

The hepatitis B is often milder in children and asymptomatic in infant but person with down syndrome , co-infection with HIV or HCV, lymph diseases and those on haemodialysis may develop chronic symptoms **(Barkat et al. 2020).**

2.6 Risk Factor of HBV

Anyone can get hepatitis B infection but some people at high risk such as infant born to infected mother ,people born in endemic countries, people on dialysis, people who live with someone has hepatitis B , people with HIV infection or hepatitis C and people

who don't take vaccine **(CDC 2019).**

The risk of HBV transmission vertically from mother to child depends on presents of HBeAg in blood of mother***(CDC 2019).***

2.7 Incubation Period of Hepatitis B

The incubation period is between 30 days to 6 months, according to the World Health Organization (WHO). The CDC states that if symptoms do develop, they may start about 90 days, or three months, after a person acquires the virus. A new, active infection is indicated by the presence of the surface antigen HBsAg in someone's blood. A test can detect this 1–9 weeks after a person has come into contact with the virus. The typical time for detection is 4 weeks following exposure. 15 weeks after the symptoms start, a person will test negative for HBsAg if they do not develop chronic hepatitis B .People who have HBsAg that persists for six months or more after an acute infection are considered HBsAg carriers ***(Sullivan 2022).***

5.8 Clinical Manifestation of Hepatitis B

Acute hepatitis B takes between one and four months to fully develop after infection. The majority of patients' clinical presentations range from asymptomatic infection to icteric hepatitis and, occasionally, fulminant liver failure. Prodromal symptoms, such as a fever, arthralgias, and rash, may be followed by constitutional symptoms, anorexia, nausea, jaundice, and discomfort in the right upper quadrant. Clinical symptoms and biochemical abnormalities are related. Jaundice and other symptoms often go away in 1 to 3 months, but in some people, fatigue may last for months even after liver function tests return to normal **(Burns et al.2014).**

The majority of persons with chronic hepatitis B have no symptoms, don't feel sick, and don't have any symptoms for years or even decades. If and when symptoms do materialize, they resemble those of an acute infection but may also be an indication of severe liver disease. Around 1 in 4 people who contract a persistent infection as children and 15% of those who do so as adults may eventually die from major liver diseases including cirrhosis (liver scarring) or liver cancer. Even when their liver develops a disease, some people continue to be symptom-free, however specific blood tests for liver function may reveal some abnormalities. Chronic hepatitis B has the potential to progress into a serious illness that can cause long-term health issues, such as liver damage, liver failure ,liver cancer and even death ***(CDC 2023).***

2.9 Co- infection:

Hepatitis B virus (HBV) and hepatitis C virus (HCV) share mechanisms of transmission, and their combined infection is very common, especially in the regions where the two viruses are widespread and among those at high risk of parenteral infections***(Raimondo et al. 2005).***.

The length of time spent receiving haemodialysis, the length of the illness, and a history of blood transfusions were all associated with HBV/HCV co-infection. Co-infection with HBV and HCV is linked to more severe liver disease, a higher chance of developing cirrhosis, and a higher incidence of HCC. Compared to HBV or HCV infection alone, those with HBV/HCV co-infection have increased mortality rates (liver-related and all causes). The mortality rate for patients with co-infection was around three times greater than for those with HBV mono-infection ***(Raimondo et al. 2005).***

2.10 Pathogenesis.

Hepatitis B sero positive pregnant women had greater rates of preterm births, early membrane rupture, and placental abruption, and HBV moms had an increased risk of gestational diabetes mellitus, antepartum hemorrhage, and threatened preterm labor, abruption, induced labor, cesarean sections, as well as prenatal mortality, low birth weight and congenital defects. The majority of these ladies lacked cirrhosis or portal hypertension, indicating a connection between the obstetric difficulties to a persistent inflammatory condition. Persistent HBV infection is connected to higher amounts of pro-inflammatory cytokines such Interleukins(IL-2, IL-6, and IL-10) and as well as migration of macrophages together with tumor necrosis factor-alpha, inhibitory factor .Pregnancy-related chronic HBV infection provides a special challenge due of the complicated interrelationship between pregnancy's physiological changes and the body's pathophysiological reaction to HBV. Infected with HBV and pregnant Women may present in a variety of clinical settings ***(Barkat et al 2020).***

2.11Complication

Viral hepatitis during pregnancy is associated with a high risk of maternal complications. It has a high risk of vertical transmission to the newborn.

Without post exposure prophylaxis, up to 90% of infants born to HBV-infected mothers in the United States will contract the virus. As a result, 90% of those infants develop chronic HBV infection, and approximately one-fourth of these infants die from liver-related complications ***(CDC 2022).***

Pregnancy complications from the Hepatitis B virus are uncommon in patients with acute or chronic HBV infection

.Hepatitis B virus infection during pregnancy is associated with an increase in maternal and prenatal mortality. Chronic HBV during pregnancy has been linked to placental abruption, preterm birth, gestational hypertension, and fetal growth restriction .Chronic HBV in pregnancy raises the risk of cirrhosis progression ***(Asafo et al. 2020).***

Women with maternal HBsAg-positive status may have an increased risk of gestational diabetes mellitus (GDM), increase intracranial pressure (ICP), preterm birth, and neonatal asphyxia; additionally, the risks of ICP and neonatal asphyxia were higher in women with HBeAg-positive status and a high HBV-DNA load during the second trimester among HBsAg-positive pregnant women, implying that careful monitoring for chronic HBV infection during pregnancy is required ***(wu et al.2020).***

٢.12Diagnosis

Diagnosis of HBV infection

HBV infection is typically diagnosed using serological and virological markers of HBV in serum, as well as biochemical and histological markers of the liver ***(Barkat et al.2020).***

Biochemical Assay

Along with molecular and serological methods, different biological markers are involved to determine hepatic function in case of hepatitis. Among these marker ALT, AST, ALP, albumin and bilirubin are considered vital for the assessment of hepatic function in the blood of infected individual ***(Rana et al.2020).***

Serological Diagnosis of HBV

Serological methods are most common, rapid and cost effective methods to detect different markers of HBV .For

identifying HBV antigens or antibodies, the Rapid Diagnostic Test and enzyme linked immunosorbant assay (ELISA) are the most effective detection techniques ***(Gosh et al 2015).***

Rapid Diagnostic Test

The WHO-approved rapid diagnostic test can identify HBV by looking for AGs or ABs in the blood. Antibodies are made by immune cells, which your body uses to fight infection. This testing has a number of benefits. It may be performed without a lab, just needs a tiny volume of blood, and does not require to be carried out by highly trained healthcare professionals. According to the WHO, it is comparable to a pregnancy test. About 20 minutes pass before the findings are ready .Because the rapid diagnostic test can detect antibodies even if you have successfully fought off the infection but do not currently have one, it is advised that you undergo a different test to confirm your diagnosis if you test positive for HBV with it. Antibodies are created by the immune cells that your body uses to fight infection ***(WHO 2022).***

Enzyme linked Immunosorbent Assay (ELISA).

The enzyme-linked immunosorbent assay (ELISA), in which the reaction is based on a primary antigen-antibody interaction, is the most widely used serologic method in developed countries for identifying HBV antigens and antibodies. Diagnostic method advancements open opportunities for improving screening, referral, and treatment. The ELISA test has the disadvantages of being time-consuming, requiring sophisticated equipment and trained technicians, and requiring a continuous supply of electricity. Mutations in antigen and antibody molecules reduce the method's diagnostic sensitivity ***(Navvabi et al 2022).***

Detection of HBV antigen

Detection of HBsAg

HBsAg is an antigen on the HBV virion envelope that is secreted as lipoprotein particles in excess of virions by an index of 1000:1. HBsAg is usually detectable during weeks 4-10 of an acute infection. The persistence of HBsAg for more than 6 months characterizes CHB virus infection***(Hepatitisb 2018)*** **.**HBsAg is the first marker to appear following HBV infection and its Positivity indicates presence of virus in a person's body. In a acute infection, it will disappears within 6 months and persistence more than 6 months indicated chronic infection and persists for several years.

Measurement of HBsAg concentration is being tried as a potential alternative marker of viremia and to monitor response to treatment, but still not well accepted ***(WHO 2022).***The most important serum marker for diagnosing HBV infection is HBsAg. The presence of HBsAg in the blood indicates infection, and the person is infected as long as HBsAg or HBV DNA can be detected. The absence of HBsAg indicates recovery from an acute illness and is one of the criteria used to distinguish between immunity caused by infection and immunity caused by vaccination ***(Bamdad et al.2022).***

Detection of HBeAg

HBeAg is viral protein produced in cells where virus is actively replicating ,and is secreted into the circulation. its presence usually indicates high viral load and high infectivity and its absence indicates lower viral load ,lower HBV DNA level .But some of them may be absent despite high viral load (due to viral mutation).HBeAg associated with high risk of HBV transmission following exposure to infection by needle- stick injury ,mother-to-child transmission ,etc***(WHO 2022).***

Detection of HBcAg

HBcAg is an intracellular virus component that is present in the nuclei of infected cells but does not manifest itself in the blood of an infected person and no clinical testing was done .This antigen is absent from the Hepatitis B vaccine ***(WHO 2022).***

Detection of HBV Antibodies

Anti-HBs Antibodies

This marker replaces HBsAg after the acute infection resolved. It typically lasts a lifetime in more than 80% of patients, which denotes immunity .

Rarely, patients with CHB infection have measurable levels of both HBsAg and anti- HBs. It's appear after time frame of many weeks to months has passed .This marker is acquired through natural HBV infection, vaccination, or passive antibodies immunization .The quantity of anti-HBs in circulation is utilized in the United State America (USA) to assess the efficacy of immunization, and an antibody level of immunity is shown by 10 ml u/ml or greater ***(Barkat et al.2020)***.

Anti-HBc Antibodies

It is the first antibody to appear with the start of acute hepatitis B symptoms, measures both IgM and IgG, and lasts a lifetime. Total anti-HBc is a marker for past or present hepatitis B virus infection over an unclear time period. Anti-HBc does not form in those who have acquired hepatitis B immunity by vaccination .Positive results show a recent (within six months) hepatitis B virus infection. Its presence suggests acute infection. Only when there is a worry about acute HBV infection can IgM anti-HBc be ordered ***(CDC 2011).***At six months, anti-HBc IgG predominates and typically lasts forever in patients who have recovered from HBV infection. Almost all

individuals who have ever been exposed to HBV exhibit anti HBc IgG antibodies .For screening, anti-HBc total is combined with anti-HBs and HBsAg for risk population ***(Barkat et al.2020).***

Anti-HBe Antibodies

Anti-HBe replaces Hepatitis Be Ag, signaling the start of disease resolution. After 6 months, anti-HBe levels are frequently no longer detectable . It presence in CHB infection indicates that the non-replicative phase has begun. In general, sero conversion of HBeAg to anti-HBe has been considered the endpoint for HBV therapy for HBeAg-positive (wild type) patients, because it has been linked to a lower risk of disease ,although it is not protective against later HCC development ***(Barkat et al.2020).***

Polymerase Chain Reaction

A nested Polymerase Chain Reaction (PCR) approach to detecting Hepatitis B virus DNA can detect as few as 102- 103 genome copies . It is at least ten times more sensitive than dot blot HBV-DNA assays. The amount of HBV DNA in serum is a proxy for viral replication. Previously, non-amplified hybridization was used to test serum HBV DNA. These assays (Dot blot hybridization, Liquid hybridization, North blot, and branched DNA assays) have a quantification limit of 105-106 copies / ml and should no longer be used for routine management of CHB infection .

Serological profiles deviate from the conventional pattern. There are two types of HBV molecular testing. First, HBV-DNA quantification assays that gauge the quantity of HBV-DNA in peripheral blood, a factor that indicates the liver's level of HBV replication (viral load). Second, the tests that pinpoint HBV genomic sequences or patterns with clinical or pathophysiological significance***(Barkat et al.2020)***.

2.12 Treatment

2.12.1 Treatment of HBV Infection

Treatment of HBV infection Pregnancy-related chronic HBV infection is mainly treated with supportive care .Throughout pregnancy, patients must undergo routine liver function checks for monitoring .A tiny group of HBV-infected women who have chronic liver disease that is quickly progressing can be managed with antiviral drugs،seven antiviral medications are currently FDA-approved for the treatment of hepatitis B ***(Barkat et al.2020)***.

Table1: Treatment of Chronic Hepatitis B

	Interferon alfa-2b	Pegylated Interferon alfa-2a	Lamivudine[b]	Adefovir	Telbivudine	Entecavir	Tenofovir
Mechanism	Immuno-modulator	Immuno-modulator	Nucleoside analogue	Nucleotide analogue	Nucleoside analogue	Nucleoside analogue	Nucleotide analogue
Pregnancy Category	C	C	C	B	B	C	B
Adult Dosage	5 MIU subcutaneously Once daily for 16 weeks	180 µg subcutaneously Once weekly for 48 weeks	100 mg orally Once daily	10 mg orally Once daily	600 mg orally Once daily	0.5–1.0 mg orally Once daily	300 mg orally Once daily
Most Common Side Effects	Depression, muscle aches, fatigue, low-grade fevers	Depression, muscle aches, fatigue, low-grade fevers	Headache, fatigue, diarrhea, and ear, nose, throat infections	Asthenia, headache, nausea, diarrhea, flatulence, dyspepsia	Headache, fatigue, diarrhea, dyspepsia, rash, myopathy	Headache, fatigue, diarrhea, dyspepsia	Asthenia, headache, nausea, diarrhea, rash, depression

[a] Data from product package inserts.

[b] Lamivudine is widely used in pregnancy among HIV-infected women with no known increased adverse outcomes for mother or infant, and there has also been a lot of experience with tenofovir being used in the third trimester of pregnancy of these women as well.

The American College of Gastroenterology (ACG) and American association for the study of liver disease (AASLD) guidelines both strongly recommend starting antiviral therapy in patients with high viremia at 28-32 weeks of gestation to reduce MTCT. The primary goal of antiviral therapy in pregnant patients is to reduce vertical transmission rates .Immuno prevention with hepatitis b immunoglobulin (HBIG) and HBV vaccination soon after birth, followed by completion of the A vaccination series has been used to prevent MTCT in HBsAG-positive mother***(Barkat et al.2020)***

Table 2 show Treatment Option for Chronic HVB in Pregnant

Drug and dose	Indication	Pregnancy category	Potential side effects	Risk of resistar
Peg-IFN 2a 180 µg/week (Finite therapy may be used prior to conception)	HBV (HBeAg-positive or -negative), compensated disease, viral replication, liver inflammation	C‡	Flu-like symptoms, fatigue, depression, cytopenias, autoimmune disorders	Low
Lamivudine 100 mg/d	Chronic HBV with viral replication and liver inflammation	C‡	Pancreatitis, lactic acidosis	High
Telbivudine 600 mg/d	Chronic HBV with viral replication, transaminitis, or active histology	B**	Myopathy, creatinine kinase elevation, lactic acidosis	Modera
Entecavir 0.5-1 mg/d	Chronic HBV with active viral replication	C‡	Lactic acidosis	Low in HBV na patient
Adefovir 10 mg/d	Chronic HBV	C‡	Acute renal failure, Fanconi syndrome, nephrogenic diabetes insipidus, lactic acidosis	Modera
Tenofovir 300 mg/d	Chronic HBV	B**	Nephropathy, Fanconi syndrome, osteomalacia, lactic acidosis	Low

2.14 Prevention

positive women should let their doctors know so that their unborn children can receive hepatitis B immune globulin (HBIG) and the hepatitis B vaccine right away. To prevention of perinatal transmission of HBV,

HBIG and concurrent hepatitis B vaccination are 95% effective; the efficacy is reduced (i.e., 85%) for maternal carriers with very high serum HBV DNA levels. When severe maternal viremia or HBIG are not available in a given area, some According to research, antiviral therapy (using lamivudine and, of more recently, telbivudine) in late pregnancy can prevent the transfer

(Barkat et al.2020).

Prenatal HBV in a safe manner Combining active and passive immunization for newborns who have been exposed to HBV is the cornerstone of perinatal HBV infection prevention. Prior to the creation of an HBV vaccine, HBV immunoglobulin (HBIG) alone, given within 12 hours of delivery, which has been demonstrated to be successful in granting momentary passive immunity, but 25% by the age of one, infected through contact with household members, of newborns***(Barkat et al.2020***).

2.15 Previous Studies

2.15.1 Global studies

According to cross-sectional data from China's National Integrated Prevention of Mother-to-Child Transmission of HIV, Syphilis, and Hepatitis B Program (iP MTCT Program), which included 2856 counties from 31 provinces, the prevalence of HBV infection among pregnant women decreased by 25.44% between

2015 and 2020, from 7.30% to 5.44% ***(Liu et al. 2021).***

A sero prevalence cross-sectional study conducted in 2022 in the northern shores of the Persian Gulf in Iran found a low prevalence of HBV infection among pregnant women in the southern part of the country, while tattooing is a risk factor for HBV infection exposure. Furthermore, all of the HBV-positive pregnant women had no symptoms and were completely unaware of their infection. Routine screening for HBV markers during pregnancy, appropriate treatment of HBV-infected women, and HBV vaccination are therefore recommended to reduce HBV transmission from mother to child***(Taherkhani et al. 2022).***

From March 4 to April 3, 2020, an institution-based cross-sectional study was conducted in Hawassa city, public hospitals in Southern Ethiopia. According to the findings of this study, HBsAg sero positivity among pregnant women in the study area was of intermediate endemicity. History of hospitalization, history of surgery, history of dental procedures, and body tattoo practices have all been linked to HBsAg sero-positivity. Ethiopia's government should improve screening for HBV as part of routine ANC in ANC clinics and treat those who test positive to prevent mother-to- child transmission ***(Kassaw et al. 2022).***

A cross-sectional study was conducted in Neigeria from November 2017 to April 2018 and reported the prevalence of HBV infection among pregnant women was high, especially among those who had not previously received HBV vaccination, those who had HIV co-infection, and those with high parity ***(magaji et al. 2020).***
A cross sectional study was conducted among pregnant women in Jazan Region of Kingdom of Saudi Arabia ,and it showed that the prevalence of hepatitis B virus in healthy pregnant women is 4.1%,

and hospitalization sand jaundice has a significant association with anti-HBV sero positivity ,making them an important risk factor for transmission. Finally, the study recommends expanding the hepatitis B vaccination program in order to reduce HBV among pregnant women ***(Ibrahim et al. 2012).***

A cross-sectional facility-based study was conducted in Ambo town, central Ethiopia, among 361 systematically selected pregnant women who received antenatal care between March 25 and May 10, 2019. Hepatitis B virus prevalence was intermediate in this study .Having an admission history ,tattoo ,multiple sexual partners, drinking alcohol, having a history of abortion, and having a history of contact with family had liver diseases should be prioritized for interventions aimed at addressing Hepatitis B virus among pregnant women ***(Wakjira et al 2022).***

From January 2000 to April 2022, a comprehensive literature research of Medline, Scopus, and Google Scholar was conducted for studies evaluating the prevalence of HBV in pregnant patients from India. The prevalence of hepatitis B surface antigen (HBsAg)in pregnant women was1.6%,indicating low edemicity. Hepatitis B e antigen was found in 26.0% of patients with HBsAg positivity. There was no statistically significant difference in HBV sero prevalence based on age (25 years vs. > 25 years), parity (primipara VS multipara), or place of residence (urban vs. rural). HBV sero prevalence was higher in those with no or primary education than in those with secondary level education or higher ***(Giri et al.2022).***

A study was obtained from the NYC Prenatal HBV Prevention Program and the NYC Office of Vital Statistics. The number of births to HBV-infected women in New York City decreased significantly among US-born women but not among non-US-born

women, which highlights the significance of successful vaccination programs worldwide***(Araciuolo et al. 2020).***

A cross-sectional study was conducted on 15,641 pregnant women in Yunnan who had routine antenatal HBsAg screening between 2013 and 2016. HBV infection was widespread among 15,641 pregnant women in Yunnan, China, with a high-intermediate endemicity. An increased prevalence of HBV infection was associated with advanced age, Hani ethnicity, unemployment, and multigravida and multiparous status. High-risk pregnant women should be given extra attention during routine antenatal care ***(Liu et al. 2020).***

In Yirgalem Hospital, a cross-sectional study was carried out between October 2015 and August 2016. 34 people (7.2%) tested positive for HBsAg, and 13 of them(38.8%) also tested positive for HBeAg.10.1% (48/475) of the population had HIV infection .Ten of the 34 HBV positive individuals (or 29.4%) also had HIV infection .The overall rate of HBV/HIV co infection was 2.1% (10/475).The significant correlations between HBsAg positivity and women with a history of several sexual partners and HIV positivity have been found. Only12 (2.5%) of the study's participants had received the HBV vaccine, while 35.4% were aware of the MTCT of HBV .Given the high prevalence of HBsAg , HBeAg , the low awareness and the utilization of HBV prevention techniques ,it is possible that prenatal transmission of HBV is the predominant mechanism of HBV transmission among responding studied population (***Amsalu et al. 2018).***

In a tertiary hospital in Mwanza, Tanzania, a cross-sectional study was conducted ,and a cohort study was performed as a follow-up. There was 3% lower-intermediate prevalence of HBV in this

group of expectant mothers .Only one out of seven children showed signs of a persistent HBV infection over the three years of follow-up. The mother of the kid tested positive for HBeAg and had a high viral load (25.9 107 IU/ml), indicating vertical transmission. These findings demonstrate the need for better HBV infection identification and care in Tanzanian pregnant women in order to stop vertical transmission . (***Amsalu et al. 2018).***

A cross-sectional study among pregnant women in Oman was done from June 2019 to December 2020, and the results revealed that, compared to earlier estimates ,the prevalence of HBV in pregnant women is lower at1.49%.Even though, because there are critical interventions for both the mother and the baby, the prenatal screening is still recommended ***(AL-Ismaili et al. 2022).***

To determine the HBV DNA threshold for maternal prepartum antiviral prophylaxis, a comprehensive review and meta-analysis was conducted to determine the HBV MTCT incidence under various prophylaxis regimens globally and regionally. From their inception until June 2013 they researched the databases of the Cochrane Library, Clinical Trials.gov, Embase, China National Knowledge Infrastructure, PubMed, and Embase. 300 studies found that 3402 of 63,293 newborns developed HBV as a result of MTCT. The pooled incidence of HBV and MTCT without prophylactic regimens was 31.3%, with ranges of 0.0%(95% confidence interval[CI] 0.0%-6.0%; European Region) to 46.1%(95%CI29.7%-63.0%;Western Pacific Region).The incidence of HBV MTCT dropped when the hepatitis B vaccine was introduced, going from 82.9% to 15.9% in women who tested positive for HBeAg and from 10.3% to 2.3 % in those who tested negative .Infant immune prophylaxis and peripartum antiviral therapy for mothers reduced

the infection rates to 0.3%.The incidence of HBV MTCT varies by region. The Western Pacific Region carries the bulk of the load .Combining baby immune prophylaxis with peripartum antiviral prophylaxis appears to be effective in stopping HBV transmission vertically ***(Yao et al 2022).***

A thorough review and meta-analysis were conducted, and in order to determine the HBV DNA threshold for MTCT, to evaluate the sensitivity and specificity of hepatitis B e antigen (HBeAg) testing to identify pregnant women with HBV DNA levels above this threshold, and to predict MTCT of HBV infection on the basis of HBeAg testing, WHO commissioned this study. The study revealed that, despite infant immune prophylaxis, maternal HBV DNA of 530 log 10 IU/ml or greater appears HBeAg has good sensitivity to predict cases of immune prophylaxis failure and is accurate in identifying women with HBV DNA levels over this threshold. HBeAg can be used as a substitute for HBV DNA assays to determine a patient's eligibility for antiviral prophylaxis in regions where they are not available **(Boucheron et al.2021).**

To explore the effectiveness and safety of pharmaceutical therapies to stop vertical transmission of the hepatitis B virus ,a systematic review and network meta-analysis were conducted up till October 28, 2020, the Medline, Cochrane, and Scopus databases were searched. According to the study, the cornerstone for preventing vertical transmission in mothers who are positive for both the hepatitis B surface antigen and the hepatitis B envelope antigen is the combination of new born immunoglobulin and hepatitis B vaccination.

The treatment considered to be the most likely to be successful and the introduction of maternal tenofovir to the baby

combination regimen. No further medications offered any additional advantage over hepatitis B vaccine alone for infants of women who had mixed, unknown, or negative hepatitis B envelop antigen status and positive hepatitis B surface antigen.

Data on the epidemiology and risk factors for maternal HBV and HCV infection in Arab and African countries were conducted from relevant studies following a systematic electronic research of the available literature. HBV and HCV infections are a recurring problem in the entire Arab world, where the average prevalence rate of HBV infection ranges from 2% to more than 8%,while the prevalence of HCV ranges from 0.4-23%. The database was searched in MEDLINE, Pubmed, MiPc library, and Google. The prevalence varies greatly between regions and even between countries in the same region. In the Arabian Peninsula region, the prevalence of HBV among pregnant women ranges from 1% to 7.1%, which is regarded as a low to intermediate range .With the exception of Saudi Arabia, there haven't been many research on HBV among expectant women in this region .According to these studies, 10.8% of pregnant women in Yemen had HBV, which is considered a high range by international standards ***(Gasim et al .2013).***

15.2 Local study:

A cross-sectional study on 130 pregnant women was conducted، to investigate the prevalence of HBsAg among pregnant women and calculate the maternal to fetal transmission. The participants were randomly selected from among those admitted to the labor ward of Al-Thawrah General Hospital in Sana'a City ,Republic of Yemen. Based on the study, 15.4% of the women in the study had HBsAg, and maternal age, previous blood transfusion history, and abortions were risk factors for +ve HBsAg maternal status, whereas parity and prior history of abortions were risk factors for materno-fetal transmission ***(SM,A.R .et al. 1991).***

At Al-Thawra hospital in Sana'a, Yemen, a cross-sectional study was undertaken in November and December 2011 to look at the sero prevalence and associated risk factors for markers of HBV (hepatitis B surface antigen ;HBsAg) and anti-HCV antibody among pregnant women. According to this study, HBsAg sero-prevalence is 10.8% and anti-HCV sero-prevalence is 8.5%.None of the females had HBV and HCV co-infections. Circumcision was strongly related with HBsAgsero positivity, according to a multivariate study .Education below the secondary level and low parity (primigravida and secundigravida) were strongly linked with anti-HCV sero-positivity. Age, place of residence, history of home delivery, miscarriage, dental manipulation ,surgery, and blood transfusion, among other socio demographic and clinical factors ,were not significantly linked with HBsAg or anti-HCV sero-positivity ***(Murad et al. 2013).***

CHAPTER THREE

OBJECTIVES OF THE

STUDY AND HYPOTHESIS

CHAPTERIII:OBJECTIVES OF THE STUDY AND HYPOTHESIS

3.1General Objective

To identify the Prevalence of hepatitis B and associated risk factors to control mother to child transmission among pregnant women who attending the governmental hospital in Sana'a, 2023

3.2Specific Objectives

The specific objectives of this study are follows:

1-To study the demographical characters such as age group and special habits ect..

2-To verify if there is an association between demographical characteristics of pregnant women and sero-prevalence of hepatitis B.

3-To identify the associated factors influencing the transmission of HBV among pregnant women in the study area.

4- To determine the infectivity states among pregnant women delivering at governmental hospital.

5-To determine the hepatitis B vaccination coverage among the attendants.

6- To determine the prophylaxis measurement that used to prevent mother to child transmission among participants in hospitals

1.3 HYPOTHESIS

1-There is no statistical significant association between the demographical characteristics of pregnant women and the sero-prevalence of hepatitis B.

2-There is significant association between the associated risk factors in pregnant women and the sero-prevalence of hepatitis B.

CHAPTER FOUR

RESEARCH

METHODOLOGY

CHAPTER IV:RESEARCH METHODOLOGY

4.1Study location:

This study was conducted in the capital of Yemen Sana'a city at three of the main governmental hospitals "AL-Thawrah hospital , AL-Sabeen hospital and AL-Gumhouri hospitals. '.

4.2 Study Design:

This study was descriptive cross sectional and hospital based in delivering women attending the main governmental hospitals, in Sana'a, Yemen

4.3 Study duration

This study was taking about 3 months starting from January and lasting in April 2023.

4.4 Study population:

This study focused on pregnant women who admitted to delivery room at AL-Thawrah, AL-Sabeen and AL-Gumhouri hospitals.

4.1.1 Inclusion criteria:

1-Pregnant women who were deliver at any age.

2-Pregnant women willing to participate in the study

4.1.2 Exclusion criteria:

1-Any pregnant women who has complication Preeclampsia , eclampsia, Bleeding sepsis.

2-Any pregnant women who are not cooperative and refuse to participate in the study

4.1.3 Sample size:

The sample size was estimated to be 384, using single population proportion formula assumed 50% prevalence HBV in

pregnant women,5%precision,95% Level of confidence that equals ١,٩٦.

$$\mathbf{n = \frac{z^2 p(1-p)}{d^2} = \frac{1.96^2 \times 0.5(1-0.5)}{0.05^2} = 384}$$

n= sample size &**z** = level of confidence &**p** =expected prevalence &**d**=precision .

4.2 Sampling method.

All pregnant women that attend obstetrics and gynecology clinic to delivery at AL-Thawrah, AL-Sabeen and AL-Gumhouri hospitals. Sana'a, Yemen, during the study period were enrolled in the study to follow investigation for antenatal care, and they were consecutively enrolled until the desired sample size was reached. Those pregnant women who are corresponding to the inclusion criteria were included in the study and those who are corresponding to exclusion criteria were excluded from the study.

4.7 Data collection:

Data on socio demography and potential risk factors are collected using structured questionnaires that developed by reviewing different literature review (.....).the data will be collected by interview face to face.

Specimen collection and laboratory test :

All pregnant women who coming for delivery has HBsAg as routine test in the selected hospital using commercial stripping test , and the pregnant women who has HBsAg positive was retesting HBeAg using ELISA.

4.8 Variability:

Age , Number Of Parity , Gestational Age , Education Level, Occupation, History Of Positive HBV, History Of Blood Transfusion, History Of Liver Disease In Family Membrane, History

Of Surgical Procedure, History Of Dental Procedure, Vaccination History And Prophylaxis Measurement For Positive Hbsag.

4.9 Data Analysis:

Data of this study was coded, entered, and analyzed ,using statistical package for the social science (SPSS) version 22 (IBM Corp., Armonk, NY, USA).We described data using either proportion or mean with standard deviation (SD). The association between participants characteristics and outcome variables (HBsAg positivity & HBeAg) was assessed by using **x2** test (or Fisher's exact test as appropriate) for categorical predictors. The data was expressed as frequencies and percentages or mean + SD . A p-value of <0.05 was regarded as significant.

4.10 Ethical consideration:

1-This study was start after approval and guidance from 21UMAS.

2- All our samples was collected after approval from the participant.

3-written informed consent was obtained after full explanation about the concept of the study to participant women.

4.13 Quality and Assurance:

The validity and completeness of data will be checked by trained supervisor.

4.14 Benefit of the study :

Sero prevalence of these infections among pregnant women may be a good indicator of general population prevalence and a determinant of vaccination policy and this study will know the risk factor that increases the rate of transmission and reducing these risk factors.

CHAPTER FIVE

RESULTS

5.1 Demographic Characteristics Of Study Participant

It was clear from the results of the below figures and table that the sample included (384) mothers and their distribution was according to marital status. It showed that (99.7%) are married, (0,3%) are widows. The study also showed that most of the factions are mothers. The study included (o+) with a rate of (49.5%), followed by (A+) with a rate of (28.3%), and the least species was (AB-) with a rate of (0.0%), as shown by the sample smokers with a rate of (23.6%) and a percentage of (76.4%) are non-smokers, which is represented (52.4%) who do not use qat, and (47.6%) who chewing qat, while the results showed that mothers who take treatment at a rate of (15.4%) and (84.6%) do not.

Table 3 Shows Demographic Characteristics Of Participant Study

Variable		FRE	%
Marital Status	Married	383	99.7
	Widower	1	0.3
	Divorce	0	0
Blood Group	o+	190	49.5
	o-	62	16.1
	A+	109	28.3
	A-	3	0.8
	B+	13	3.4
	B-	1	.3
	AB+	6	1.6
	AB-	0	0
Smoking	NO	293	76.4
	YES	91	23.6
Chewing Qat	NO	202	52.4
	YES	182	47.6
Drug	NO	321	84.6
	YES	63	15.4

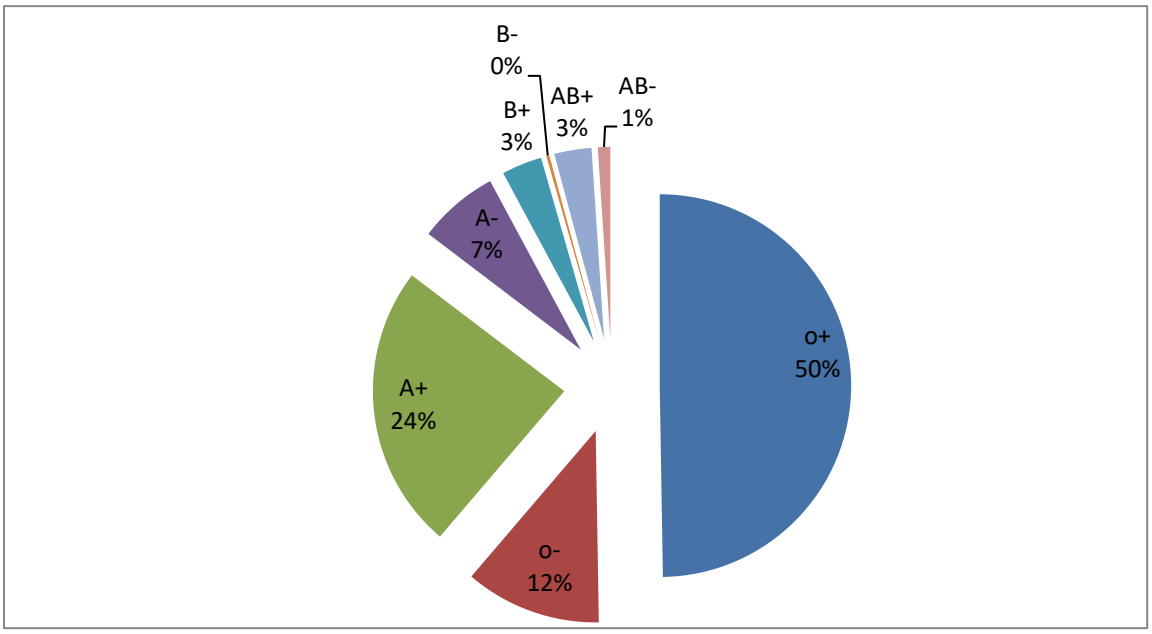

Figure 2 Demographic characteristics of study participant according blood group

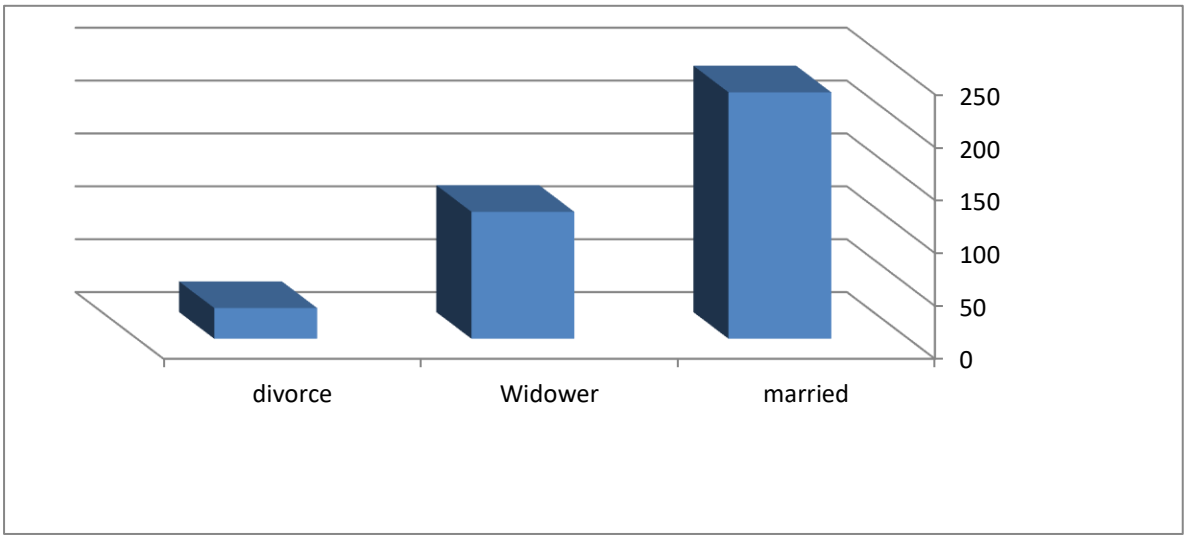

Figure 3 Demographic characteristics of study participant according marital status

The table below showed there are about (27.2%) are not educated and about (36.1%) had primary education. The study also showed there are about (32.7%) are employed and (28.5%) are free workers. also the results of the table below show there are about (46.1%) with low income and (52.9) with middle income. There are about (80.4%) of participants had animal contact and (64.9%) live in over crowded house.

Table(4) Shows Demographical Distribution Of Participants (N=384)

Variable		Frequency	Percent	Mean	Std. Deviation
educational level	None	104	27.2	2.17	.937
	Primary	136	36.1		
	Secondary	111	27.7		
	High	33	8.6		
Occupational	Employee	122	32.7	2.06	.844
	free work	110	28.5		
	Other	152	38.7		
Income	Low	180	46.1	1.55	.519
	Middle	200	52.9		
	High	4	1.0		
animal contact	NO	308	80.4	.20	.398
	YES	76	19.6		
overcrowded in the house	NO	249	64.9	.35	.477
	YES	135	34.8		

Table(5)Shows The Distribution Of Participant According to Family History Related To HBV (N=384)

Variable		Frequency	Percent
Live with persons with documented HBV	NO	364	94.8
	YES	20	5.2
Live with persons with liver disease	NO	328	85.9
	YES	56	14.1

According to results of the above table, it was found that participants live with persons with documented HBV at a rate of (5.2%) of the sample included in the study (384) and (94.8%) were not, while it was found that participants live with persons with liver disease reached (14.1%) and (85.9%) are not .

5.2 Distribution Of The Participants According To Risk Factors , Medical And Surgical History

According the results of the table below , it was found that the majority of participants have a dental surgery at a rate of (37.0%), the intravenous drugs users were at rate of (36.8%), and blood transfusions at a rate of (20.2%), participants who had a travel to highly infected country at a rate of (4.2%) and circumcision at a rate of (3.1%), while the participants who had a dialysis at a rate of (1.3%).

Table(6)Shows The Distribution Of Participant According Risk Factor (N=384)

Variable	NO		YES		Total	
	Frequency	%	Frequency	%	Mean	S.D
Blood Transfusion	306	79.8%	78	20.2%	.20	.40
Circumcision	382	96.9%	2	3.1%	.03	.17
Dialysis	380	98.7%	4	1.3%	.01	.11
intravenous drugs	244	63.2%	140	36.8%	.37	.48
living with infected country	368	95.8%	16	4.2%	.04	.20
travel to highly infected country	360	94.7%	20	5.3%	.05	.22
dental process	244	63.0%	140	37.0%	.37	.48
المتوسط العام للمحور					.15	0.14

Table (7) Percentages And Variables In The Medical And Surgical History(N=384)

Variable	NO		YES		Total	
	Frequency	%	Frequency	%	Mean	Standard Deviation
Chronic disease	344	88.7%	40	11.3%	.11	.32
previous surgery	226	58.0%	158	42.0%	.42	.49
previous children with HBV	383	99.7%	1	.3%	.01	.07

The results of the above table show that the medical and surgical history of participants that included in the study was the fallowing : Chronic disease with a rate of (11.3%), while it showed that the previous children with HBV with a rate of (.5%) and a percentage of (42.0%) represented previous surgery.

Table(8)Shows The Distribution Of Participant According Receive Vaccination(N=384)

Variable		Frequency	Percent
VACCINATION	vaccinated	128	33.2
	None	256	66.8
	Total	384	100

The results of the above table shows that the vaccination of mothers who were included in the study was at rate of (33.2%), while it showed that the none vaccinated with a rate of (66.8%).

5.3 Distribution Of Participant According Obstetrical History

It was found from the results of the table below, that the results showed, the item that has the most relative importance is drug use during pregnancy at a rate of (27.5%), with an average capacity of (.55) and a standard deviation of (.50), followed by mothers who had an abortion at birth and Before childbirth, at a rate of (31.4%) of the sample included in the study, while it showed that mothers who did not have an abortion, at a rate of (68.6%), with an average capacity of (.31), a standard deviation of (.46), and a relative importance of (15.5%), followed by bleeding. after birth, with a significance rate of (11.5%), with an average capacity of (.23) and a standard deviation of (.42) .The results concluded that the total general average at the axis was (0.21), with a significance rate of (10.64%)

Table(9)Shows The Distribution Of Participant According To Obstetrical

Variable	NO		YES		Total		RII
	Frequency	%	Frequency	%	Mean	Standard Deviation	
Abortion	262	68.6%	122	31.4%	.31	.46	15.5
Antepartum Hemorrhage,	323	83.5%	61	16.5%	.16	.37	8
Prom	294	77.2%	90	22.8%	.23	.42	11.5
Invasive Intrauterine Procedure	384	100.0%	0	0%	.03	.18	1.5
Using Drug During Pregnancy	169	45.1%	215	54.9%	.55	.50	27.5
Pet	324	85.6%	60	14.4%	.14	.35	7
Gestational Diabetes	355	93.2%	29	6.8%	.07	.25	3.5
	اجمالي المتوسط العام للمحور				0.21		10.6

History (N=384)

The results of the table below show that the gestational age for the babies of the mothers included in the study was > 32 w with a rate of (73.5%), while it showed that the method of delivery for mothers with the highest percentage is cesarean section with a rate of (73.8%) and a percentage of (25.9%) vaginal births.

The results also showed that mothers had the most live births with a rate of (92.1%) and a rate of (7.6%) still births.

the results showed that the newborn weights at birth are 2500-3500 g, with a rate of (56.5%), followed by <2500 g, with a rate of (35.1%).

Table(10)Shows The Fetus States Of Participant According To The Variable Below (N=384)

Variable		Frequency	Percent
gestational age	<28w	35	9.2
	28 - 32 w	66	17.3
	>32 w	283	73.5
Mode Of Delivery	vaginal delivery	98	25.9
	Cesarean	286	73.8
Birth	Alive	355	92.1
	still birth	29	7.6
Birth Weight	<2500g	133	35.1
	2500 -3500 g	221	56.5
	>3500	30	8.1
	2500 -3500 g	221	56.5
	>3500	30	8.1

5.4 Sero- Prevalence Of Hepatitis B Infection According Demographical Distribution

5.4.1Sero-Prevalence Of Viral Hepatitis B Infection According To Age Of The Participants

The results of the study showed that positive HBsAg was about 5.4% in the age group more than 30 years old while positive HBsAg was (1.5%) and (٣.0٥%)among the participating pregnant women in the age group 21-30 and less than 20, respectively . The results are illustrated in table No. (11).

5.4.2Sero Prevalence Of Viral Hepatitis B Infection According To Educational Level.

The results of the study showed that positive HBsAg was ٥.9% to non educated while primary , secondary and high education level were 2.2% , 3.6% and 0% , respectively the results are illustrated in table No. (11).

5.4.3Sero-Prevalence Of Viral Hepatitis B Infection According To Marital Status Of The Participants.

The results of the study showed that positive HBsAg was 2.2% among Married participants .the results are illustrated in table No. (11).

5.4.4Sero-Prevalence Of Viral Hepatitis B Infection According To The Income Of The Participants.

The results of the current study showed that positive HBsAg was 5.2% among pregnant women with low income while 5% and 0.0% among pregnant women with middle and high income ,respectively. the results are illustrated in table No.(11).

5.4.5sero-Prevalence Of Viral Hepatitis B Infection According To

Blood Group Of The Participants.

The results of the current study show that positive HBsAg was about 5.9% among the participating pregnant women who have O+ blood group while 1.1% and 0.0% in A+ and the rest of the blood group, respectively. The results showed in table NO.(12).

5.4.6 Sero – Prevalence Of Viral Hepatitis B Infection According To Smoking Habit Of The Participants.

The results of the current study showed that positive HBsAg was about 2.3% among the smoker participants while3.5% among non smoker participants .The result show in table NO.(12).

5.4.7sero-Prevalence Of Viral Hepatitis B Infection According To Chewing Qat Habit Of The Participants

The results of the current study showed that positive HBsAg was about 3.40% among the qat chewer participants while 3.0% among non qat chewers participants .The results are show in table (12).

5.4.8 Sero – Prevalence Of Viral Hepatitis B Infection According To The Occupation Of The Participants

The results of the current study showed that positive HBsAg was about 4.0% among the employed participants while3.7% and 2.0% among free work and house wife participants, respectively .See in the table (12).

Table(11)Shows Sero- Prevalence Of Hepatitis B Infection According To Demographical Characteristics (N=384)

			HBsAg for mother		X^2	*P.value*
			Negative	Positive		
Educational Level	None	FRE	99	5	1.028[a]	.906
		%	94.01%	5.09%		
	Primary	FRE	133	3		
		%	97.8%	2.2%		
	Secondary	FRE	107	4		
		%	96.4%	3.6%		
	High	FRE	33	0		
		%	100.0%	.0%		
Income	Low	FRE	171	9	8.016[a]	.018
		%	94.9%	5.1%		
	Middle	FRE	197	3		
		%	98.5%	1.5%		
	High	FRE	4	0		
		%	100.0%	0.0%		
Marital Status	Married	FRE	372	11	5.956[a]	.051
		%	97.8%	2.2%		
	Widow	FRE	0	1		
		%	0.0%	100.0%		
	Divorce	FRE	0	0		
		%	0.0%	0.0%		
Age	less than 20	FRE	61	2	1.028[a]	.906
		%	96.95%	3.05%		
	21-30	FRE	201	3		
		%	98.5%	1.5%		
	more 30	FRE	51.1%	.8%		
		%	122	7		
		FRE	94.6%	5.4%		

Table(12) Shows Sero- Prevalence Of Hepatitis B Infection According To Demographical Characteristics And Special Habits (N=384)

			HBsAg for mother		X^2	*P.value*
			Negative	Positive		
Blood Group	o+	Fre	179	11	6.788a	0.451
		%	94.10%	5.90%		
	o-	Fre	62	0		
		%	100.00%	0.00%		
	A+	Fre	108	1		
		%	98.90%	1.10%		
	A-	Fre	3	0		
		%	100.00%	0.00%		
	B+	Fre	13	0		
		%	100.00%	0.00%		
	B-	Fre	1	0		
		%	100.00%	0.00%		
	AB+	Fre	6	0		
		%	100.00%	0.00%		
	AB-	Fre	0	0		
		%	0.00%	0.00%		
Smoking	NO	Fre	283	10	.061a	0.805
		%	96.50%	3.50%		
	YES	Fre	89	2		
		%	97.70%	2.30%		
Chewing Qat	NO	Fre	196	6	.158a	0.691
		%	97.00%	3.00%		
	YES	Fre	176	6		
		%	96.60%	3.40%		
Drug	NO	FRE	311	10	.039a	0.844
		%	96.80%	3.20%		
	YES	FRE	61	2		
		%	96.60%	3.40%		
Occupation	Employee	FRE	117	5	.662a	0.416
		%	95.80%	4.20%		
	free work	FRE	106	4		
		%	96.30%	3.70%		
	Other	FRE	149	3		
		%	98.00%	2.00%		

5.5 Sero- Prevalence Of Hepatitis B Infection According To Risk Factors , Medical And Surgical History Of Participants

The results of the current study showed that the positive sero- prevalence of viral hepatitis B was about (5%) among the participating pregnant women who had a history of dental management and (1.4%) of the positive sero-prevalence of viral hepatitis B among the pregnant woman who had a history of intravenous drug .The positive sero-prevalence of Viral Hepatitis B 2.6 % was found among the pregnant participant who had a history of blood transfusion and was found 5% among pregnant women who had history of liver disease .The positive sero prevalence of viral hepatitis B (5%) found among the participating pregnant women who had a history of surgery .for more details see tables (13and 14)

Table (13) Shows Sero Prevalence Of Hepatitis B Infection According Risk Factor (N=384)

			HBsAg for mother		X^2	*P.value*
			Negative	Positive		
Dental Process	NO	FRE	239	5	**.014[a]**	**.906**
		%	98.3%	1.7%		
		% of Total	61.5%	1.1%		
	YES	FRE	133	7		
		%	95.0%	5.0%		
Traveling To Endemic Country	NO	FRE	357	11	**.307[a]**	**.580**
		%	97%	3%		
	YES	FRE	15	1		
		%	93.8%	6.3%		
Intravenous Drugs	NO	FRE	234	10	**.125[a]**	**.723**
		%	96.1%	3.9%		
	YES	FRE	138	2		
		%	98.6%	1.4%		
Dialysis	NO	FRE	368	12	**.933[a]**	**.334**
		%	97.0%	3.0%		
	YES	FRE	4	0		
		%	100.0%	0.0%		
Circumcision	NO	FRE	370	12		
		%	96.8%	3.2%		
	YES	FRE	2	0	**1.045[a]**	**.307**
		%	100.0%	0.0%		
Blood Transfusion	NO	FRE	297	9	**3.339[a]**	**.068**
		%	97.0%	3.0%		
	YES	FRE	75	3		
		%	97.4%	2.6%		

Table(14)Shows Sero- Prevalence Of Hepatitis B Infection According To Medical , Surgical And Family History Related To HBV Infection Among Participants (N=384)

			HBsAg for mother		Total
			Negative	Positive	
Chronic Disease	NO	FRE	332	12	334
		%	96.7%	3.3%	100.0%
	YES	FRE	40	0	40
		%	100.0%	0.0%	100.0%
Previous Surgery	NO	FRE	221	5	217
		%	98.2%	1.8%	100.0%
	YES	FRE	151	7	157
		%	95.5%	4.5%	100.0%
Previous Children With HBV	NO	FRE	372	11	371
		%	97.3%	2.7%	100.0%
	YES	FRE	0	1	1
		%	0%	100.0	100.0%
Persons With Liver Disease	NO	FRE	353	11	364
		%	97.0%	3.0%	100.0%
	YES	FRE	19	1	20
		%	95.0%	5.0%	100.0%
Persons With Liver Disease	NO	FRE	319	11	321
		%	96.6%	3.4%	100.0%
	YES	FRE	53	1	54
		%	98.1%	1.9%	100.0%

5.6Sero- Prevalence Of Hepatitis B Infection According To Obstetrical History And Fetus State Of Participant

The results of the current study showed that the positive sero- prevalence of viral hepatitis B was about 3.4% among the participating pregnant women who had a history of abortion and 5% of the positive sero prevalence of viral hepatitis B among the pregnant woman who had a history of ante partum hemorrhage . The positive sero–prevalence of Viral Hepatitis B (3%) was found among pregnant participants who had history of premature rupture of membrane ,and was found 2% among the pregnant women who had history of using drug during pregnancy.

The positive sero-prevalence of viral hepatitis B (3.6% and 3%) found among the participating pregnant women who had a history of preeclampsia and gestational diabetes ,respectively. The positive sero-prevalence of viral hepatitis B5.4% found among participants pregnant whose gestational age of their child was 28_32 weeks while 2.8% above 32 week .

The positive sero-prevalence of Viral Hepatitis B represented 2.2% among the participants pregnant women who had history of cesarean section .For more details see tables (15 and 16)

Table(15)Shows Sero- Prevalence Of Hepatitis B Infection According To Obstetrical History And Of Participants (N=384)

			HBsAg for mother		X^2	*P.value*
			Negative	Positive		
Abortion	NO	FRE	254	8	.008a	.929
		%	96.9%	3.1%		
	YES	FRE	118	4		
		%	96.6%	3.4%		
		%	30.4%	1.1%		
Antepartum Hemorrhage ,	NO	%	313	10	.102a	.749
		FRE	96.8%	3.2%		
		%	81.1%	2.7%		
	YES	FRE	59	2		
		%	96.7%	3.3%		
		FRE	15.7%	.5%		
PROM	NO	%	283	11	.980a	.322
		FRE	96.2%	3.8%		
		%	74.1%	2.9%		
	YES	FRE	89	1		
		%	98.8%	1.2%		
		FRE	22.7%	.3%		
Invasive Intrauterine Procedure	NO	%	372	12	.370a	.543
		FRE	96.8%	3.2%		
		%	93.3%	3.2%		
	YES	FRE	0	0		
		%	0.0%	0.0%		
Using Drug During Pregnancy	NO	FRE	159	10	5.415a	.020
		%	93.9%	6.1%		
		FRE	41.4%	2.7%		
	YES	%	213	2		
		FRE	99.0%	1.0%		
PET	NO	%	314	10	.164a	.686
		FRE	96.9%	3.1%		
		%	82.7%	2.7%		
	YES	FRE	58	2		
		%	96.4%	3.6%		
Gestational Diabetes	NO	FRE	344	11	.181a	.670
		%	96.9%	3.1%		
		FRE	90.4%	2.9%		
	YES	%	28	1		
		FRE	96.0%	4.0%		
		%	6.4%	.3%		

Table(16)Shows Sero- Prevalence Of Hepatitis B Infection According To Fetus State Of Participants (N=384)

			HBsAg for mother		Total
			Negative	positive	
Gestational Age	<28w	FRE	35	0	35
		%	100.0%	0.0%	100.0%
	28 - 32 w	FRE	62	4	56
		%	94.6%	5.4%	100.0%
	>32 w	FRE	275	8	283
		%	97.2%	2.8%	100.0%
Mode Of Delivery	vaginal delivery	FRE	93	5	98
		%	94.9%	5.1%	100.0%
	Cesarean	FRE	279	7	276
		%	97.8%	2.2%	100.0%
Birth	Alive	FRE	344	11	345
		%	97.1%	2.9%	100.0%
	still birth	FRE	28	1	29
		%	96.6%	3.4%	100.0%
Birth Wight	<2500g	FRE	130	3	133
		%	97.7%	2.3%	100.0%
	2500 - 3500 g	FRE	215	6	211
		%	97.6%	2.4%	100.0%
	>3500	FRE	27	3	30
		%	90.0%	10.0%	100.0%

5.7 Sero- Prevalence of Hepatitis B Infection According To Taking Of Vaccine Among Participant

Table(17)Shows Sero- Prevalence Of Hepatitis B Infection According To Taking Of Vaccine Among Participants (N=384)

			VACCINATION		Total
			Received	None	
HBs Ag for mother	Negative	Count	126	246	372
		% of Total	34%	66%	100%
	Positive	Count	2	10	12
		% of Total	16.7%	83.3%	100%
Total		Count	123	251	374
		% of Total	32.9%	67.1%	100 %

The results showed the rate of vaccination among participants related to HBsAg which was about 126 (34 %) a non infected women who receive vaccine of HBV and about 2 infected participants (16.7% from all HBsAg carrier) received HBV vaccine .

5.8 Infectivity State According HBeAg For HBsAg Positive

The result of the current study show that ,sero-prevalence of HBeAg in positive HBsAg pregnant women represented 16.7% .the result is showed in table No. (18)

Table (18)Shows Infectivity State For Positive Hbsag Participants (N=12)

			HBeAg for mother		Total
			Negative	positive	
HBs AG for mother	Positive	FRE	10	2	12
		%	83.3%	16.7%	100.0%
		% of Total	83.3%	16.7%	100.0%

5.9Prophylaxis Measurement That Is used to prevent MTCT among positive HBsAg participant

The results of the current study show that ,the prevalence of pregnant women who taking prophylaxis Measurement for positive HBsAg was 33.30% .The result is showed in table NO.(19)

Table(19)Shows Prophylaxis Measurement That Is Used To Prevent MTCT Among Positive Hbsag Participant (N=12)

			Taking vaccination and immunoglobline for fetus after delivery		Total
			Negative	Positive	
HBsAg for mother	Positive	FRE	8	4	12
		%	66.67%	33.30%	100.00%

5.10 Overall Sero-Prevalence Of Viral Hepatitis B Infection Among Participants

The majority (96.8%)of the participants pregnant were negative while about 3.2% of the participating revealed positive sero prevalence for viral Hepatitis B infection as shown in figure NO.4 and table NO.(20)

Table(20) Shows Overall Sero-Prevalence Of Viral Hepatitis B Infection Among Participant (N=384)

Sero positive for HBsAg	FRE	%
Negative	372	96.8
Positive	12	3.2
Total	384	100%

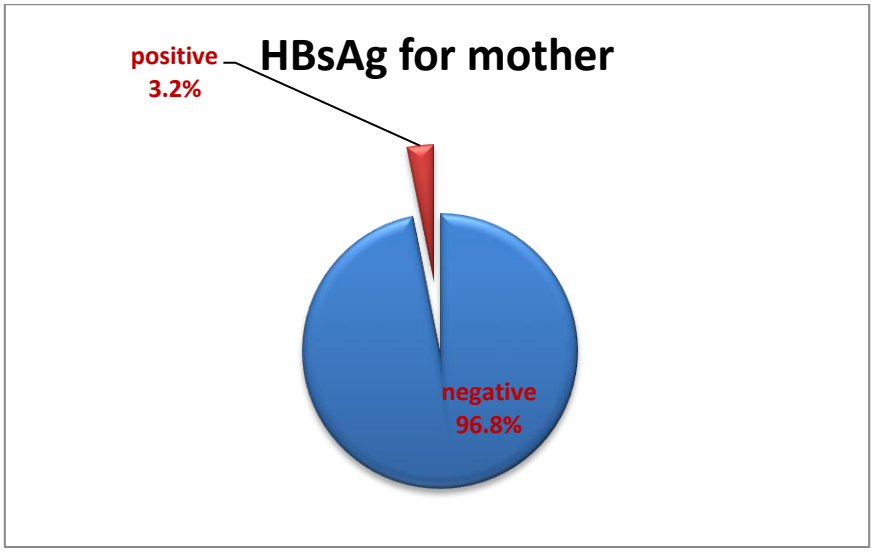

Figure 4 Overall Sero Prevalence Of Hepatitis B Infection Among Pregnant Women (N=384)

5.11Association between the Sero-prevalence of Viral Hepatitis B Infections and Demographic Characteristics of Participants.

There was no statistically significant association between the sero-prevalence of viral hepatitis B and all of demographical characteristics of the pregnant women who participate in the study except low income as there was significant association at level (P-value= 0.018) as shown in tables NO.(11 and 12)

5.12 Association Between The Sero-Prevalence Of Viral Hepatitis B Infections And Risk Factors ,Surgical And Medical History Of Participants.

There was statistically significant association between the sero-prevalence of viral hepatitis B and blood transfusion at level (P-value =.٠0٣8).but there was no statistically significant association among the sero-prevalence of hepatitis B and other risk factor and medical and surgical history .see tables NO. (13) and 14

5.13 Association Between The Sero-Prevalence Of Viral Hepatitis B Infections And Obstetric History Of Participants.

There was no statistically significant association between the sero-prevalence of viral hepatitis B and obstetric history of participants as shown in table NO. (15)

CHAPTER SIX

DISCUSSIONS

CHAPTER VI :DISCUSSION

Generally, the cross sectional descriptive survey included 384 pregnant women attending the delivering rooms at the governmental hospitals in Sana'a, Yemen. so the study aimed to determine the prevalence of HBV infections and associated risk factors among them.

This chapter presents the major findings of the study and discusses them concerning similar studies conducted by other researchers; this helped the investigator to prove that the findings were true about sero-prevalence and associated factors of viral hepatitis B infections.

In the current study, the study found that the overall prevalence of HBsAg was (3.2%) among the participating pregnant women which is lower than the earlier reported in Sana'a, Yemen by murad, et al. (10.8%) ***(Murad Et Al. 2013).*** This difference in the findings between the studies could be due to differ of study sample , study location and difference of geographical distribution among the participants.

The study finding of the prevalence of HBsAg was 3.2% lower than the finding reported in other country as in china (5.4%)(***Liu Et Al. 2021).*** in Ethiopia(7.2%)***(Amsalu Et Al.2018).***in Saudia Arabia(4.1%)***(Ibrahhim Et Al.2012).***while the overall prevalence of HBsAg of the current study was higher than that in Oman (1.49%) and in India (1.6%) and slightly high than that in Tanzania (3.0%).

It should be noted, however, that according to who classification for determining the severity of HBsAg infection in HBV endemic countries, the sero-prevalence of HBsAg was(3.2%), as observed in the present study, is classified as being of a moderate degree of HBV infection. the prevalence of HBsAg in a country is

divided into three categories: low (2%), Intermediate (Between 2-8%), And High (>8%).

In the current study, found that 3.2% tested positive for HBsAg and 16,7% of them also tested positive for HBeAg which is lower than the finding reported in other country as in Ethiopia HBsAg was 7.2% and 38.8% of them positive for HBeAg ,in India HBsAg was 1.6% and 26.0%of them positive for HBeAg ,which mean that the risk of vertical transmission in Yemen is lower than Ethiopia and India.

Regarding the overall sero-prevalence of HBsAg and according to demographic characteristics, the current study revealed the following results: the age group more than 30 years had the highest positive HBsAg (7%) ,pregnant women who were illiterate had the highest positive HBsAg (5.09) .these finding were in disagreement with the study conducted by Ibrahim who found that ,the high sero-prevalence of HBsAg (13.8%) was found among pregnant women in age group more than 40 year , and the highest sero-prevalence of HBsAg (10.6%) was found among the participants with illiterate education .

Several risk factors for developing hepatitis b virus infection were evaluated during the study period. the current study showed that socio-demographic variables like age, residence, occupation, marital status, and parity of the participating pregnant women, were not significantly associated with the risk of HBV and HCV infections . this finding is in line with the studies conducted in, Yemen ,India and Ethiopia.

Regarding the risk factor for HBV infection ,the current study showed that ,the pregnant women having previous history of blood transfusion in which (3%)was positive for HBsAg .this result is in line with same result conducted by ***(Barkat Et Al.2020)***which document

the sero-prevalence of HBsAg (8%) among pregnant women with history of blood transfusion.

The history of dental procedure is considered another risk factor ,the current study showed that ,the pregnant women having previous history of dental procedures in which(5%)was positive for HBsAg .this is far from study conducted in southern Ethiopia in which (16.7)%was positive for HBsAg among pregnant women who had history of dental management.

In the current study showed that circumcision was not significantly associated with HBsAg sero-positivity among pregnant womenThis result is far from a study conducted by ***(Murad Et Al.2013),***documented that there is significantly association between circumcision and HBsAg positivity .

In the current study there are several factors for acquiring HBV infection there is including surgical and dental procedures , and there is no significant association between surgical ,dental procedures and HBsAg and this finding is in line with same study was conducted by Ahmed In Hadramout, Yemen ., and it could be explained through the improvement in sterilization and hygienic practice **(Barkat et al.2020).**

The present study showed significantly association between the prevalence of hepatitis B infection and history of blood transfusion(P=.038) among participants pregnant women and this findings is similar to the finding reported by Ahmed .Ahmed reported that there is significant association between history of blood transfusion and risk of HBV infection (P=0.04) .

The alternative study conducted by ***(Amsalu et al)***, was not the same as the current study regarding the association between history of blood transfusion and HBV infection .Amsalu reported that the

history of blood transfusion was not found to be significantly associated with positive sero-prevalence of hepatitis B infection ***Amsalu Et Al.2018).***

Regarding the obstetric history, there are several factors that were evaluated including abortion, antepartum hemorrhage and invasive intrauterine procedures. The current study showed that there is no significantly association among abortion, antepartum hemorrhage and intrauterine procedure and sero-prevalence of HBV infection .These findings are consistent with study conducted by Murad in which the reported that ,There is no significantly association between history of abortion and sero-prevalence of HBsAg.

CHAPTER SEVEN

CONCLUSION AND

RECOMMENDATIONS

CHAPTERVII: CONCLUSION&RECOMMENDATIONS

7.1 Conclusion

This study was conducted to determined the sero-prevalence of HBV infection and .Its associated risk factors among pregnant women who attending the governmental hospitals. It is across sectional study which was conducted among the target population to control mother to child transmission during the study period.

In conclusion, this study revealed that.

1-The sero-prevalence of hepatitis B infection was 3.2% which was moderate severity among the pregnant women who attend the governmental hospitals according to WHO.

٢-The prevalence of HBeAg among positive HBsAg pregnant women was 16.7% which means the infectivity status was low.

3- The prophylaxis treatment to prevent mother to child transmission was done with 33.30% of positive HBsAg pregnant women.

4-There is statistically significant association between the sero-prevalence of HBV infection and low income among pregnant women who participate in the study at (P-value<0.05).

5-There is no statistically significant association among the sero-prevalence of HBV infection and other Demographic Characteristics among pregnant women who participate in the study at level (P-value >٠.05).

6-There is statistically significant association between the sero-prevalence of HBV infection and history of blood transfusions of pregnant women at level (P-value <٠.05).

7.2 Recommendations

This research recommended:

1-Introducing routine screening to all pregnant women attending antenatal clinics in health centers or hospitals during the antenatal period

2-Using the standard infection control to all risk factors such as blood transfusion and surgery.

3- Using HBV infection vaccine and immunoglobulin to all newborn for positive HBsAg mother to prevent vertical transmission.

4-Introducing antiviral therapy for pregnant women who have HBeAg positive to reduce vertical transmission.

5-Early case detection and proper treatment, especially if the pregnant women with jaundice.

7.3 Limitations of the Study

1-Research publication of sero prevalence of HBV infection among pregnant women in Yemen is limited, especially, in Sana'a ,Governorate.

2-There was a difficulty in creating a concrete relating study to the educational site due to war situation in the country ,which made moving from the study site to the academic center limited.

3-This is a hospital-based study, and those pregnant women attending obstetrics and gynecology clinics for antenatal at this hospital level ,were selected to be the subjects of the study. The exclusion of private patients could also affect the generalization of the findings of this study.

REFERENCES

REFERENCES

Aaron, M.harris (2020) Prevalence of HBV, Available at: https://wwwnc.cdc.gov/travel/yellowbook/2020/travel-related-infectious-diseases/hepatitis-b (Accessed: April 8, 2023).

Al-Ismaili, O.M., Al-Jardani, A., Al-Hinai, F., Al-Shukri, I., Mathew, M., Al-Abri, S. and Al-Kindi, H., 2022. Prevalence of Hepatitis B Infection Among Pregnant Women in Oman. Journal of Epidemiology and Global Health, 12(3), pp.311-315.

Amsalu, A., Ferede, G., Eshetie, S., Tadewos, A. and Assegu, D., 2018. Prevalence, infectivity, and associated risk factors of hepatitis B virus among pregnant women in Yirgalem Hospital, Ethiopia: implication of screening to control mother-to-child transmission. Journal of pregnancy, 2018.

Arciuolo, R.J., Lazaroff, J.E., Rosen, J.B., Lim, S. and Zucker, J.R., 2020. Trends in hepatitis B surveillance among pregnant women in New York city, 1998-2015. Public Health Reports, 135(5), pp.676-684.

Asafo-Agyei, K.O. and Samant, H., 2020. Pregnancy and viral hepatitis.

Bamdad, T. and Yari, A. (2022) Hepatitis viruses, Encyclopedia of Infection and Immunity. Elsevier. Available at: https://www.sciencedirect.com/science/article/pii/B9780128187319000781 (Accessed: April 14, 2023).

Barkat, B. and Naseeb, A.A., 2020. Sero-prevalence and Associated Factors of Viral Hepatitis B and C infection among Pregnant Women in Alaeen Valley, Hadhramout Governorate, Yemen (Doctoral dissertation, Al-Razi University).

Boucheron, P., Lu, Y., Yoshida, K., Zhao, T., Funk, A.L., Lunel-Fabiani, F., Guingané, A., Tuaillon, E., van Holten, J., Chou, R. and Bulterys, M., 2021. Accuracy of HBeAg to

identify pregnant women at risk of transmitting hepatitis B virus to their neonates: a systematic review and meta-analysis. The Lancet Infectious Diseases, 21(1), pp.85-96.

Burns, G.S. and Thompson, A.J. (2014) "Viral hepatitis B: Clinical and epidemiological characteristics," Cold Spring Harbor Perspectives in Medicine, 4(12). Available at: https://doi.org/10.1101/cshperspeCenters for Disease Control and Prevention. Available at: https://www.cdc.gov/hepatitis/hbv/bfaq.htm (Accessed: April 13, 2023).

Centers for Disease Control and Prevention, (2019). Hepatitis B Questions and Answers for Health Professionals. Updated July 2, 2019

Centers for Disease Control and Prevention, (2016). 'Hepatitis B'. http://scholar.google.com/scholar_url?url=https://www.ncbi.nlm.nih.gov/pmc/

Centers for Disease Control and Prevention. Available at: https://www.cdc.gov/hepatitis/hbv/bfaq.htm (Accessed: April 13, 2023).

Centers for Disease Control and Prevention HBV (2022). . Available at: https://www.cdc.gov/nchhstp/pregnancy/effects/hbv.html#:~:text=Hepatitis%20B%20virus%20infection%20in,will%20become%20infected%20with%20HBV. (Accessed: April 13, 2023).

Centers for Disease Control and Prevention, 2011. Interpretation of hepatitis B serologic test results. Department of Health and Human Services.

Gasim, G.I., Murad, I.A. and Adam, I., 2013. Hepatitis B and C virus infections among pregnant women in Arab and African countries. The Journal of Infection in Developing Countries, 7(08),
pp.566-578.

Ghosh, M., Nandi, S., Dutta, S. and Saha, M.K., 2015. Detection of hepatitis B virus

infection: a systematic review. World journal of hepatology, 7(23), p.2482.

Giri, S., Sahoo, S., Angadi, S., Afzalpurkar, S., Sundaram, S. and Bhrugumalla, S., 2022. Seroprevalence of Hepatitis B Virus Among Pregnant Women in India: A Systematic Review and Meta-Analysis. Journal of
Clinical and Experimental Hepatology

hepatitisb.org.au/bookmarks (Acce Bookmarks (2018) B Positive. Available at: https://www.hepatitisb.org.au/bookmarks (Accessed: April 13, 2023).

Hall, J.E. and Hall, M.E., 2020. Guyton and Hall textbook of medical physiology e-Book. Elsevier Health Sciences.

Ibrahim, B., Mahfouz, M.S., Erwa, M., Abdelrahim, G., Ibrahim, E., Yassin, A.O. and Ageely, H.M., 2012. Prevalence and risk factors of hepatitis B virus among pregnant women in Jazan Region-Kingdom of Saudi Arabia. Journal of Biology, Agriculture and Healthcare, 2(7), pp.39-43.

Jefferies, M., Rauff, B., Rashid, H., Lam, T. and Rafiq, S., 2018. Update on global epidemiology of viral hepatitis and preventive strategies. World journal of clinical cases, 6(13), p.589.

John, W., 2020. A Coalition Advancing Progress Toward Global Hepatitis Elimination: Achievements, Challenges and Opportunities. Medical Bulletin, 25(9).

Kassaw, B., Abera, N., Legesse, T., Workineh, A. and Ambaw, G., 2022. Sero-prevalence and associated factors of hepatitis B virus among pregnant women in Hawassa city public hospitals, Southern Ethiopia: Cross-sectional study design. SAGE Open Medicine,
10, p.20503121221140778.

Kumar, V., Abbas, A.K. and Aster, J.C., 2017. Robbins basic pathology e-book. Elsevier Health Sciences.

Liu, J.F., Chen, T.Y. and Zhao, Y.R., 2021. Vertical transmission of hepatitis B virus: propositions and future directions. Chinese Medical Journal, 134(23), pp.2825-2831.

Liang, T.J., 2009. Hepatitis B: the virus and disease. Hepatology, 49(S5), pp.S13-S21.

Liu, J., Liu, J., Liu, M., Pang, Q. and Wen, Y., 2020. Prevalence of hepatitis B virus infection and its associated factors among 15,461 pregnant women in Yunnan province, China. Annals of Epidemiology, 49, pp.13-19.

Liu, J., Wang, X., Wang, Q., Qiao, Y., Jin, X., Li, Z., Du, M., Yan, W., Jing, W., Liu, M. and Wang, A., 2021. Hepatitis B virus infection among 90 million pregnant women in 2853 Chinese counties, 2015-2020: a national observational study. The Lancet Regional Health-Western Pacific, 16, p.100267.

Mac, P.A., Suleiman, A.C. and Airiohuodion, P.E., 2019. High prevalence of hepatitis B virus infection among pregnant women attending antenatal care in Central Nigeria. J Infect Dis Epidemiol, 5(1), p.068.

Magaji, F.A., Okolo, M.O., Hassan, Z., Shambe, I.H., Pam, V.C., Ocheke, A.N., Yiltok, E.S., Golit, W., Anzaku, S.A., Daloek, M. and Ogwuche, J., 2020. Prevalence of hepatitis B virus infection among pregnant women in Jos, Nigeria. Annals of African Medicine, 19(3), p.176.

Mayoclinc, S. (2022) Symptoms and causes, Mayo Clinic. Mayo Foundation for Medical Education and Research. Available at: https://www.mayoclinic.org/diseases-conditions/hepatitis-b/symptoms-causes/syc-20366802?p=1 (Accessed: April 8, 2023).

Murad, E.A., Babiker, S.M., Gasim, G.I., Rayis, D.A. and Adam, I., 2013. Epidemiology of hepatitis B and hepatitis C virus infections in pregnant women in Sana'a, Yemen. BMC pregnancy and childbirth, 13(1), pp.1-5.

Navabakhsh, B., Mehrabi, N., Estakhri, A., Mohamadnejad, M. and Poustchi, H., 2011. Hepatitis B virus infection during pregnancy: transmission and prevention. Middle East journal of digestive diseases, 3(2), p.92.

Navvabi, N., MH Khadem Ansari, A. Navvabi, H. R. Chalipa, and F. Zitricky. "Comparative assessment of immunochromatography and ELISA diagnostic tests for HBsAg detection in PCR-confirmed HBV infection." Revista de Gastroenterología de México (English Edition) 87, no. 2 (2022): 176-180.

Penman, I.D., Ralston, S.H., Strachan, M.W. and Hobson, R. eds., 2022. Davidson's Principles and Practice of Medicine E-Book. Elsevier Health Sciences.

Raimondo, G., Cacciamo, G. and Saitta, C. (2005) Hepatitis B virus and hepatitis C virus co-infection: Additive players in chronic liver disease?, Annals of Hepatology. Elsevier. Available at: https://www.elsevier.es/en-revista-annals-hepatology-16-articulo-hepatitis-b-virus-hepatitis-c-S1665268119320721 (Accessed: April 13, 2023).

Rana, N.A., Munir, B., Hussain, N. and Imtiaz, N., 2020. Seroprevalence, biochemical investigation and risk factor assessment for HBV & HCV Infection in Hospital Based Patients of Islamabad, Pakistan. Journal of Bioresource Management, 7(2), p.2.

Sirilert, S. and Tongsong, T., 2021. Hepatitis B virus infection in pregnancy: immunological response, natural course and pregnancy outcomes. Journal of Clinical Medicine, 10(13), p.2926.

SM, A.R., Abou-Lohum, T.S., El-Didy, H., El-Eriani, H., Mansour, S. and Hafez, A.S., 1991. Hepatitis B infection in Sana'a City, Republic of Yemen. Prevalence among pregnant women and materno-foetal transmission. The Journal of the Egyptian Public Health Association, 66(5-6), pp.491-503.

Sullivan, D. (2022) Hepatitis B: Incubation Period, treatment, and getting tested , Medical

News Today. MediLexicon International. Available at: https://www.medicalnewstoday.com/articles/what-is-the-incubation-period-for-hepatitis-b (Accessed: April 13, 2023).

Taherkhani, R. and Farshadpour, F., 2022. Prevalence, genotype distribution and mutations of hepatitis B virus and the associated risk factors among pregnant women residing in the northern shores of Persian Gulf, Iran. Plos one, 17(3), p.e0265063.

Tesini, B.L. (2023) Neonatal hepatitis B virus (HBV) infection - pediatrics, MSD Manual Professional Edition. MSD Manuals. Available at: https://www.msdmanuals.com/professional/pediatrics/infections-in-neonates/neonatal-hepatitis-b-virus-hbv-infection (Accessed: April 8, 2023).

Wakjira, M., Darega, J., Oljira, H. and Tura, M.R., 2022. Prevalence of hepatitis B virus and its associated factors among pregnant women attending antenatal care in Ambo town, Central Ethiopia: A cross-sectional study. Clinical Epidemiology and Global Health, 15, p.101054.

World Health Organization, 2022. Hepatitis: Preventing mother-to-child transmission of the hepatitis B virus.

World Health Organization, www. who. int/en/news-room/fact-sheets/detail/hepatitis-b.

Wu, K., Wang, H., Li, S., Zhang, H. and Zhu, B., 2020. Maternal hepatitis B infection status and adverse pregnancy outcomes: a retrospective cohort analysis. Archives of Gynecology and Obstetrics, 302, pp.595-602.

Yao, N., Fu, S., Wu, Y., Tian, Z., Feng, Y., Li, J., Luo, X., Yang, Y., Ji, F., Chen, Y. and Liu, J., 2022. Incidence of mother-to-child transmission of hepatitis B in relation to maternal peripartum antiviral prophylaxis: A systematic review and meta-analysis. ActaObstetricia et GynecologicaScandinavica, 101(11), pp.1197-1206

Appendices

Questionnaire about mother to child transmission of hepatitis B

❖ **Personal data:**

1-NAME:……..... 2_AGE:……

3_from……4- Live in …….

5-MARITAL STATUS:……6-phone number:……..

7- BLOOD GROUP:……..

8–SPECIALHABITS :smoking( )_chewing qat( )_drug( ) _tea( ).

❖ SOCIOECONOMIC HISTORY:

1-EDUCATIONLEVEL: none( )_ primary( )_secondary( ) _high ( ).

2-OCCCUPATION: employee( )_ free work( )_ others ( ) .

3-income: low ( ) _ middle ( ) _ high ( ) .

4-Animal contact : yes ( ) no ( )

5-Overcrowded in the house no( ) yes( )

if yes how many person live in the house ……

❖ FAMILY HISTORY :

1-Persons with documented HBV : yes( ) no( )

if yes who many…… and duration of infection……..

2- Persons with liver disease : yes ( ) no ( )

If yes what is the disease ……..and duration of disease……

❖ OBSTETRIC AND ANTENATAL HISTORY

1-**Gravidity……._parity:……**

2-ABORTION: yes( ) no( )

if yes :when:….._spontaneous/ induced _evacuated/ not evacuate

3- antepartum hemorrhage: yes( ) no( )

If yes when……

4-PROM: yes ( ) no ( )

5- Invasive intrauterine procedure: yes( ) no ( )

If yes what is the type ……

6- using drug during pregnancy: yes ( ) no ( )

If yes what is the type……

7-PET :yes ( ) no ( )

8- Gestational diabetes: yes( ) no( )

9- Gestational age :<28 w ( )_28-32 w ( ) _ >32 w ( ) .

10 - MODE OF DELIVERY : vaginal delivery ( ) _ cesarean( )

11-BIRTH :alive( ) _ still birth ( ).

12-BIRTH WEAGHT:<2500g( )_ 2500-3500 () _>3500( ) .

❖ MEDICAL AND SURGICAL HISTORY

1-**VACCINATION:received( ) _ none( ).**

2-Chronic disease: yes( ) no( )

if yes what is the disease …….. and what the drug was used …….

3-Previous surgery: yes( ) no ( )

if yes what is the surgery …… and when…….

4-HBV:Onset:…….._duration of disease :……..

5-What you know about this disease and its mood of transmission ?

……

6–complication of HBV :cirrhosis ( )_ liver cancer :( ) ……

7- Previous Children with HBV yes ( ) no( )

If yes how many child was infected …….. how old are they……..

and they have any complication…….

❖ RISK FACTORS:

- **BLOOD TRANSFUSION:( )if yes :when..……why:……..**
- **circumcision:( )**
- **Dialysis:( )**
- **Intravenous drugs:( )**
- **Living with infected person :( )**

-
- **Travel to endemic area ( )**
- **Dental process ( )**

- Hepatic virology: PATIENT AGREEMENT

1-HBsAG for mother ……..
2-HBsAG for fetus ……
3-HBeAG for mother ……

Tacking VACCINE and immunoglobulin for Childs of positive HBsAg mothers yes ( ) no ( )

Republic of Yemen
Ministry of Higher Education
and Scientific Research
21SEPTEMBER UNIVERSITY FOR
MEDICAL AND APPLIED SCIENCES
UNIVERSITY PRESIDENT

بسم الله الرحمن الرحيم

الجمهورية اليمنية
وزارة التعليم العالي والبحث العلمي
جامعة ٢١ سبتمبر للعلوم الطبية والتطبيقية
رئيس الجامعة

السكرتارية

الدكتورة/ ماجدة الخطيب
مدير عام مستشفى السبعين
المحترم

الموضوع: تسهيل مهمة بحث

تهديكم رئاسة جامعة ٢١ سبتمبر للعلوم الطبية والتطبيقية أطيب تحياتها وتقديرها وإشارة إلى الموضوع أعلاه تكرموا مشكورين بالتوجيه الى من يلزم بتسهيل مهمة بحث طلاب كلية الطب للدفعة الأولى مستوى خامس قسم الباطنة مجموعة (A4b) تحت اشراف د/ سمير الحكيمي، و د/ احمد الشاحذي لعدد (٧) طلاب بحسب عنوان البحث الموضح قرين اسمائهم:-

م	الاسم	عنوان البحث
١	ناصر حسين سعود	Prevalence of Hepatitis Vertical Transmission To child And Associate Risk Factors Among Delivering Mothers Attending The Main Governmental Hospitals In Sana'a Yemen 2023
٢	كمال جميل الحميري	
٣	المعتصم بالله احمد الشرعبي	
٤	محمد احمد النجار	
٥	محمد ابراهيم الشيباني	
٦	بكر ضيف الله بجر	
٧	هشام محمد طلحان	

" تفضلوا بقبول خالص تحياتي وعميق احترامي "

الأستاذ. دكتور/
مجاهد علي معمار
رئيس الجامعة

Taiz street - Al-Sawad

الجمهورية اليمنية
هيئة مستشفى الثورة العام – صنعاء
الشؤون الاكاديمية والتدريب
قسم البحوث والنشر

الشؤون الأكاديمية والتدريب

الاخ / رئيس قسم النساء والولادة المحترم

تحية طيبة وبعد ،،،

مرفق اليكم صورة المذكرة الواردة إلينا من جامعة ٢١سبتمبر ، يرجى الاطلاع والتكرم بالتعاون مع الطلاب . في تسهيل جمع البيانات عبر الاستبيان والعينات للبحث المعنون:

نسبة انتشار مرض الكبد البائي في النساء الحوامل وعوامل الخطورة المؤثرة على انتقاله من الام للأطفال في غرف الولاد في المستشفيات الحكومية بالعاصمة صنعاء اليمن٢٠٢٣

وذلك لمدة أسبوعين من تأريخ ٥ /٢ /٢٠٢٣م

بحسب السياسة المتبعة لديكم.

وتقبلوا خالص التقدير،،،

رئيس قسم البحوث والنشر
د/عبد الرحمن الحراري

نائب المدير العام للشؤون الأكاديمية والتدريب
د/محفوظ الشهاري

نائب رئيس الهيئة لشئون الشهاري