بسم الله الرحمن الرحيم

كلية نبتة
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Napata College

Medical laboratory program

Department of Microbiology

Prevalence of hepatitis B virus among donors in Khartoum hospitals

A graduation project submitted for the requirement of BSc. degree (Honor) in medical Microbiology

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الأية

قالى تعالى:

((" فَتَعَالَى اللَّهُ الْمَلِكُ الْحَقُّ ۗ وَلَا تَعْجَلْ بِالْقُرْآنِ مِن قَبْلِ أَن يُقْضَىٰ إِلَيْكَ وَحْيُهُ ۖ وَقُل رَّبِّ زِدْنِي عِلْمًا "))

صدق الله العظيم

سورة طه – الأية (144)

Dedication

This research dedicated to:

parents especially and all family members

Friends

My group

Thank you for your support

Acknowledgment

We would like to express private thankful to graduate to our supervisor Dr/Amna abuelgasim for her guidance and support in completing our project.

We would also like to extend our graduated to all staff of college especially for Dr/Tanzeel , Dr/zinab and Dr/mona also all friends and any one that can help we to complete this project .

Abstract

Background: The prevalence of transfusion associated hepatitis B virus infection across different geographical population.

We sought to estimate prevalence of hepatitis B surface antigen among blood donors in Khartoum hospitals.

Method: This was a retrospective study which involved reviewing of blood donation records for the year 2020, from Oct. to Dec. at Khartoum hospitals.
The records were analyzed to determine the prevalence of hepatitis B virus among blood donors.

Results: A total of (100) blood donors were collected from Oct. to Dec. 2020 according to Questionnaire and the analysis were show the prevalence of HBV, according to blood groups the positive group sample have higher valid percent than the Negative of group sample. According to the ages of groups, it ranged between (31-40) old, is represented the higher standard, with ratio of 54%.

Conclusion: The findings suggest that the study region is of intermediate to high endemicity with hepatitis B infection. Planning more extensive screening and vaccination campaigns and educational programs would help reduce the transmission of the infection among the general people.

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No	Aberrations	Items
1	HBV	Hepatitis b virus
2	DNA	Deoxyribonucleic Acid
3	IBTO	Iranian blood transfusion organizatio
4	HBSA	hepatitis B surface antigen
5	NTCP	sodium taurocolate cotransporting polypeptide
6	RNA	Ribonucleic Acid
7	CCC DNA	covalently closed circular
8	RBC	Red Blood Cells
9	ELIZA	Enzyme linked immunosorbrant Assay

CHAPTER ONE

Introduction and literature review

Chapter one

Introduction and literature review

1-1 Hepatitis

1-1-1 Definition:

Hepatitis is inflammation of the liver and can be caused by variety of different viruses such as hepatitis A,B,C,D and E [1]since the development of jaundice is a characteristic feature of liver disease , diagnosis can only be made by testing patient's anti-viral antigens or antibodies.[1, 2, 3].

Hepatitis B is serious and common infection disease of the liver affecting millions of people throughout the world[1,2,3,4,5] .Infection occurs very often in early childhood when it is asymptomatic and often leads to the chronic carrier state [6]

More than 2000 million people alive today have been infected with HBV at some time in their lives [7] about 350 million remain infected chronically and become carrier of the virus [1, 2, 4,6,7] three quarters of the world population live in areas where are high levels of infection [8]

Every year there are over 4 million acute clinical cases of HBV ,and about 25% of carriers ,1 million people a year die from chronic active hepatitis cirrhosis or primary liver cancer .[7]

1-1-2 Structure:

Hepatitis B has also been called type B hepatitis ,serum hepatitis ,homologous serum jaundice[2,3]

1-1-3 Causes the disease :

Hepatitis B is caused by the hepatitis B virus (BHV) an enveloped virus containing a partially double stranded circular DNA genome and classified within the family hepadnavirus[5, 1,2,8,3]

The virus interferes with the function of the liver while replicating in hepatocytes possibly eradicates the infection agent. As a consequence of pathological damage ,the liver becomes inflamed [9]

HBV may be the cause of up to 80% of all cases of hepatocellular carcinoma worldwide ,second only to tobacco among known human carcinogens.[1, 6 ,7] The prevalence of HBV infection among replacement and voluntary blood donor visiting Tamale Teaching hospital in 2009 was estimated as 11.59% and 10.79% respectively. Both rates were high among blood donors who represent a significant part of the population within the metropolis the probability of infection was found to age and sex dependent [10]. Assessment of the quality of the donor selection and safety of the blood supply can estimate by monitoring the prevalence of serologic marker of infectious disease in screening tested. The present study, change rates of HBV infection are studied in the period 1998_2007 in Iranian blood transfusion organization (IBTO). Prevalence of serological marker of HBV infection (HbsAg) was evaluated in blood Iranian as well as for Fars province representing a low prevalence, and Sistan-Baluchestan (S&B) province as a high prevalence region throughout [11]

1-2 Transmission :

Most infected people look perfectly healthy and have no symptoms of disease yet may be highly infectious hepatitis B

HBV is transmitted through percutaneous or parenteral contact infected blood , body fluids and by sexual intercourse[5 , 9 , 1, 2,]

HBV is able to remain on any surface it comes into contact with for about a week e.g. table – tops ,razor blades , blood stains without losing infectivity .[1, 3]

HBV does not cross the skin or the mucous membrane barrier . some break in this barrier , which can be minimal and insignificant is required for transmission .[3]

HBV is a large virus and does not cross the placenta, hence it cannot infect the fetus unless there have been breaks in the maternal-fetal barrier, e.g. via amniocentesis . still , pregnant women who are infected with HBV can transmit their disease to their

babies at birth. If not vaccinated at birth, many of these babies develop lifelong HBV infection, and many develop liver failure or liver cancer later in life .[2]

Partners or with persons who have multiple partners can be dangerous. Hepatitis B is the only sexually transmitted infection for which there is a protective vaccine.[2]

1-3 Morphology :

Hepatitis B virus is a member of hepadnavirus family [10] the virus particle ,called dane particle [11] (version), consists of an outer lipid envelope and an icosahedral core composed of protein the nucleocapsid encloses the viral DNA a DNA polymerase that has reverse transcriptase activity similar to retrovirus [12]

The outer envelope contains embedded proteins which are involved in viral binding of ,and entry into ,susceptible cells .the virus is one of the smallest enveloped animal viruses with a version diameter of 42 nm, but pleomorphic forms exist including filamentous and spherical bodies lacking a core .these particles are not infectious and are composed of the lipid and protein that forms part of the surface of the version ,which is called the surface antigen (HBsAg), and is produced in excess during the cycle of the virus.[13]

1-4 Antigenic structure

HBsAg- hepatitis B surface antigen (HBsAg) was the first hepatitis B virus protein to be discovered (14)it consists of small (S) medium (M) and large (L) protein [15] HBcAg (HBeAg is a splice variant) HBcAg is the main structural protein of HBV icosahedral nuclei capsid and it has function in replication of the virus (16) Capsid formation of the cell .[17] HBcAg has to HBcAg contributes to HBV clearance in vivo, but it is unknown whether HBcAg has to be in the capsid form to contribute to viral clearance.[18] Hepatitis B virus DNA polymerase HBx. Hepatitis B virus protein HBx is small,[19]

1-4-1 Cycle Life:

The life cycle of Hepatitis B virus is complex. Hepatitis B is one of a few known non-retroviral viruses which use reverse transcription as a part of its replication process.

Attachment; penetration, uncoating, replication, assembly and Release[10]

The virus gains entry into the cell by binding to receptors on the surface of the cell and entering it by endocytosis mediated by either clathrin or caveolin- 1.[20] HBV initially binds to heparin sulfate proteoglycan. The pre-S1 segment of the HBV L protein then binds tightly to the cell surface receptor sodium taurocolate cotransporting polypeptide (NTCP) encoded by the SLC10A1gene.[21] NTCP is mostly found in the sinusoidalmembrane of liver cells. The presence of NTCP in liver cells correlates with the tissue specificity of HBV infection.[20]

Penetration:Following endocytosis, the virus membrane fuses with the host cell's membrane, releasing the nucleocapsid into the cytoplasm.[22]

Uncoating:the virus multiplies via RNA made by a host enzyme, the viral genomic DNA has to be transferred to the cell nucleus. It is thought the capsid is transported on the microtubules to the nuclear pore. The core proteins dissociate from the partially double stranded viral DNA,Which is then made fully double stranded (by host DNA polymerases(and transformed into covalently closed circular DNA (cccDNA) that serves as a template for transcription of four viral mRNA[11]

Replication: the largest mRNA, (which is longer than the viral genome), is used to make the new copies of the genome and to make the capsid core protein and the viral RNA-dependent-DNA polymerase. [12]

Assembly:these four viral transcripts undergo additional processing and go on to form progeny virons which are released from the cell or returned to the nucleus and re-cycled to produce even more copies.[23],24]

release;the long mRNA is then transported back to the cytoplasm where the version protein synthesizes DNA via its reverse transcriptase activity [25]

1-4-2 Blood transfusion:

Blood transfusion is the process of transferring blood or blood products into one's circulation intravenously.[13]

Transfusions are used for various medical conditions to replace lost components of the blood. [14] Early transfusions used whole blood, but modern medical practice commonly uses only components of the blood, such as red blood cells, white blood

cells plasma, clotting factors, and platelets Red blood cells (RBC) [15]. White blood cells are not commonly used during transfusion, but are part of the immune system, and fight infections. Plasma is the "yellowish" liquid part of blood, which acts as a buffer, and contains proteins and important substances needed for the body's overall health. Platelets are involved in blood clotting, preventing the body from bleeding.

Red cell transfusion:

Historically, red blood cell transfusion was considered when the hemoglobin level fell below 10 g/dl or hematocrit fell below 30%.[2][3] Because each unit of blood given carries risks, a trigger level lower than that, at 7 to 8 g/dL, is now usually used, as it has been shown to have better patient outcomes.[4][5] The canned blood during the blood transfusion process. administration of a single unit of blood is the standard for hospitalized people who are not bleeding, with this treatment followed with re-assessment and consideration of symptoms and hemoglobin concentration.[4] Patients with poor oxygen saturation may need more blood.[4] The advisory caution to use blood transfusion only with more severe anemia is in part due to evidence that outcomes are worsened if larger amounts are given.[6] One may consider transfusion for people with symptoms of cardiovascular disease such as chest pain or shortness of breath.[3] In cases where patients have low levels of hemoglobin due to iron deficiency, but are cardiovascularly stable, parenteral iron is a preferred option based on both efficacy and safety.[7] Other blood products are given where appropriate, e.g., to treat clotting deficiencies.

Before a blood transfusion is given, there are many steps taken to ensure quality of the blood products, compatibility, and safety to the recipient. In 2012, a national blood policy was in place in 70% of countries and 69% of countries had specific legislation that covers the safety and quality of blood transfusion.[8]

1-4-3 Blood donation:

Blood transfusions use as sources of blood either one's own (autologous transfusion), or someone else's (allogeneic or homologous transfusion).[16]

The latter is much more common than the former. Using another's blood must first start with donation of blood [17] Blood is most commonly donated as whole blood obtained intravenously and mixed with an anticoagulant [18]

In developed countries, donations are usually anonymous to the recipient, but products in a blood bank are always individually traceable through the whole cycle of donation, testing, separation into components, storage, and administration to the recipient. [19]This enables management and investigation of any suspected transfusion related disease transmission or transfusion reaction.

1-4-4 ABO blood group system:

The ABO blood group system is used to denote the presence of one, both, or neither of the A and B antigens on erythrocytes.[29] In human blood transfusions it is the most important of the 38 different blood type (or group) classification systems currently recognized.[30] A mismatch (very rare in modern medicine) in this, or any other serotype, can cause a potentially fatal adverse reaction after a transfusion, or an unwanted immune response to an organ transplant.[31] The associated anti-A and anti-B antibodies are usually IgM antibodies, produced in the first years of life by sensitization to environmental substances such as food, bacteria, and viruses. ABO blood group antigens present on red blood The ABO blood types were discovered by Karl Landsteiner in 1901; he received the Nobel Prize in Physiology or Medicine in 1930 for this discovery.[32] ABO blood types are also present in other primates such as apes and Old World monkeys.[33] The ABO blood types were first discovered by an Austrian Physician Karl Landsteiner working at the Pathological-Anatomical Institute of the University of Vienna (now Medical University of g p g p cells and IgM antibodies present in the serum

1-5 Objective:

1-5-1 General objective:

-To evaluate hepatitis B virus among donors in Khartoum hospitals.

1-5-2 Specific objectives :

-To detect hepatitis B surface antigen among blood donors using enzyme linked immunesorbant assay [ELISA].

-To detect the possible major risk factors predisposing to HBV infection among blood donors.

- To determine between hepatitis B virus and ABO blood groups.

- To determine between hepatitis B virus and age groups.

CHAPTER TWO

Materials and Methods

Chapter Two

2. Materials and Methods:

2-1. Study design and period

Cross-sectional study design.carried out in time between October to December 2020

2-2. Study Area:

This study were conducted from military hospital , stack laboratory and bahri teaching hospital)

2-3. Study Population:

blood donors in blood bank center hospital

2-4. Inclusion Criteria:

All donor diagnosed positive for Hepatitis B virus by ELIZA

2-5. Exclusion Criteria:

All donor show negative for HB-SAg

2-6 Ethical approval:

Ethical approval for this study obtained from the faculty of Medical Laboratory Science, Napata college.

2-7 Sampling technique and sample size :

$$n=\frac{N}{1+N(e)2}$$

where

n is the sample size to be computed

N is population size

e is the degree of accuracy desired (or accepted margin error and it is usually set to 0.05)

100 samples

Study subject :

2-8 Data collection and analysis :

Data were collected randomly from blood bank center according to questionnaire design (appendix 1) (Appendix I).in this study which include Population demographics; (age, occupation, gender, Weight) Clinical data including symptoms, medical historyfrom each participant.. Participation on this study was voluntary and subjects were assured of anonymity for their laboratory testing.

the sample was analyzed for presence of hepatitis surface antigen [HBsAg] by commercially available enzyme linked immunesorbant assay [ELISA]

2-9 Materials:

- Distilled water.

• Sodium hypochlorite (household bleach) and sodium bicarbonate.
• Automatic or semiautomatic, adjustable or preset pipettes or multipipettes to measure and dispense 50 µl, 100 µl, 1000 µl and 10 ml.
• Graduated cylinders of 100 ml, 1 000 ml capacity
• Container for biohazards waste
• Water-bath or equivalent microplate incubator, thermostatically set at 37°C
• Manual, semiautomatic or automatic microplate washer
• Microplate reader equipped with 450, 490nm and 620-700nm filters.
• Absorbent paper.

2-10 Method :

Blood group was done for every donor before collection following Good Laboratory Practice carefully establish the sample distribution and identification plan. washing solution was Prepared according to manufacture guideline, plasma samples were dispensed by using automatic pippete on the micro plate well and the negative and positive controls for each series of determinations to validate the test results then conjugate solution were dispense quickly 50 µl into all wells, the conjugate solution shaked before used. the conjugate solution which is coloured red, after labeled it and sealed carefully incubated for 60 min at 37^{o} C then empty all wells by aspiration and washed of 5 times by Eliza washer ,the strips were dry by turning them upside down

on absorbent paper). then Substrate were added and incubated for 30 min at 37 °C ,then quickly 100 µl of prepared working solution dispensed into each well freshly prepared before use. the reaction allowed to develop in the dark for 30 minutes at room temperature ,then colouration of the substrate disappears (for the negative samples) and turns from blue to yellow (for the positive samples).

the optical density at 450/620- nm using a plate reader was read.

The result were calculated according to formula [27].

CHAPTER THREE

Result

Chapter three

Result

Table [3-1]: show the prevalence of hepatitis B Virus according to blood groups

Blood group	Frequency	Percent
Valid A+ve	33	33.0%
A-ve	3	3.0%
B+ve	25	25.0%
B-ve	2	2.0%
AB+ve	6	6.0%
O+ve	29	29.0%
O-ve	2	2.0%
Total	100	100.0%

Table [3-2] show the prevalence of hepatitis B Virus according to Age group:

	Frequency	Percent
Valid 11-20	4	4.0%
21-30	18	18.0%
31-40	54	54.0%
41-50	24	24.0%
Total	100	100.0%

Figure [3-1]: show the prevalence of hepatitis B Virus according to blood groups:

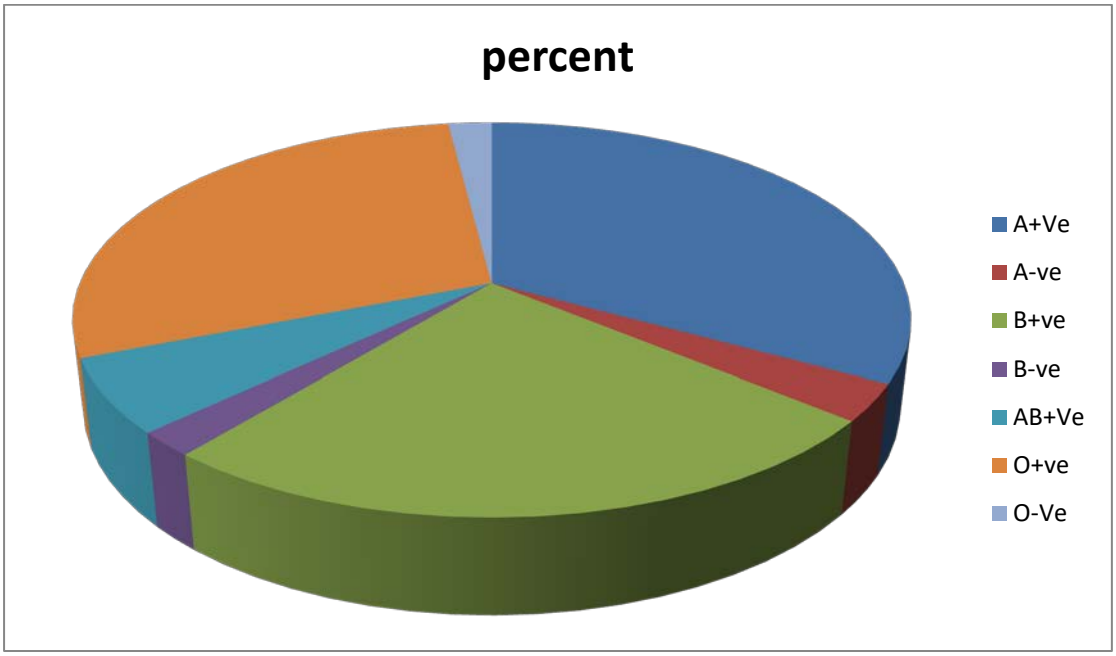
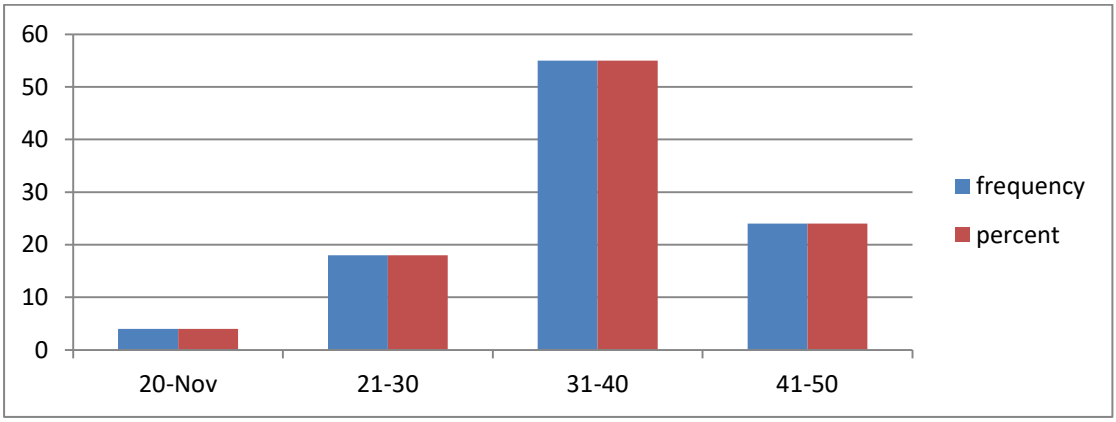


Figure [3-2]: show the prevalence of hepatitis B Virus according to Age group:



3-2 Discussion:

Among prevalence of hepatitis B virus in 100 blood sample donor: as was shown in figure [1] the highest percent in A+VE group (33%) then O+VE group (29%) then B+VE group (25%) cascading .

The lowest percent was shown in AB+VE (6%) then A-VE (3%) then B-VE and O-VE groups (2%) for any one.

According to age groups as was shown in figure [2]; the highest percent of prevalence was shown in (31-40) interval age (54%) ,then interval (41-50) a (24%) ,then interval (21-30) a (18%) and lowest percent in interval (11-20) a (4%).

The result of this study indicate that of the apparently infected male Khartoum voluntary blood donors in Khartoum region, starting from October 2020 and blood donation is usually permitted only at age 11years and older.

In summary, the prevalence of HBV markers among blood donors in the positive blood group is higher compared to the negative blood group. hence further people based study should be encouraged to better estimate the prevalence of hepatitis B virus marker, including anti-HBs, among male and female.

3-3 Conclusion:

The prevalence of HBV infection a among blood donors visiting khourtum Hospital laboratory in collected 100 positive sample was found to be age and sex dependent all sample are male and the blood donors, aged(11-20) years to be HBsAg +(p=4) fellows (21-30 years) to be HBsAg + (p =18). Fellows (31-40 years) to be HBsAg + (p=54). Fellows(41_50)years to be HBsAg + (p =24) . Among donors, the percent were lower Compared to older donor and due to blood group was found to be (A+ve 33 – A-ve 3) fellow (B+ve 25 – B-ve 2) fellow (AB+ve 6) fellow (O+ve 29 – O-ve 2) The positive group sample have higher valid percent than negative group sample

3-4 Recommendation:

1-To reduce the aforementioned prevalence, it will be necessary for the Regional Health directorate to plan major HBV vaccination campaigns

2-To educate people about risk factors for infection and benefits immunization. It will also be necessary for the Khartoum Health service to provide kits with higher sensitivity in order to eliminate as many false positives as possible.

Reference:

1.Hepatitis B -www.who.int › Newsroom › Q&A Detail

There are 5 main hepatitis viruses, referred to as types A, B, C, D and E. ... and, together, are the most common cause of liver cirrhosis and cancer. ... or may include symptoms such as jaundice (yellowing of the skin and eyes), dark ... HBV can be transmitted from infected mothers to infants at the time of birth .Sep 1, 2019 ;

2.Hepatitis: Types, Symptoms, and Treatment - Healthline

www.healthline.com › health › hepatitis

Hepatitis refers to an inflammatory condition of the liver. It's commonly caused by a viral infection, but there are other possible causes of hepatitis. ... and vitamins (A, D, E, and K); synthesis of blood proteins, such as albumin; synthesis of clotting factors ... Hepatitis C comes from the hepatitis C virus (HCV) May 9, 2017;

3.Hepatitis B virus - Lab Tests Online AU

www.labtestsonline.org.au › learning › test-index › hep...

HBV is one of five "hepatitis viruses" identified so far that are known to mainly infect the liver. The other four are hepatitis A, hepatitis C, hepatitis D Apr 2, 2020;

4.Hepatitis: General Principles | American Academy of Pediatrics

pedsinreview.aappublications.org › content

Hepatitis is a term for inflammatory diseases of the liver, grossly subdivided ... (1) Hepatic histology not only can confirm the suspected cause of ... During childhood, for example, liver disease caused by hepatitis C virus (HCV) often is ... IgM anti-HB core antibody is positive in recent HBV infection, Aug 1, 2011;

5.Medical Assisting Administrative and Clinical Competencies

books.google.com › books

May not be copied, scanned, or duplicated, in whole or in part. ... Hepatitis (He-pa-ti′-tis) Description—Hepatitis is an inflammation and infection of the liver that can result ... It is caused by a virus that has been identified in several different forms. ... B, or C, they have been called D and E. D is like A but not highly prevalent in ...

Michelle Blesi, Barbara A. Wise, Cathy Kelley-Arney · 2011;

6.Hepatitis B Virus Does Not Interfere With Innate Immune Responses in the Human LiverAuthor links open overlay panelAlekseiSuslov[1]TujanaBoldanova[12]XueyaWang[1]StefanWieland[1§]Markus H.Heim[12]

7. Hepatitis B - www.who.int › Newsroom › Fact sheets › Detail

Hepatitis B is a viral infection that attacks the liver and can cause ... WHO estimates that in 2015, 257 million people were living with chronic hepatitis B infection ... 5% in the pre-vaccine era ranging from the 1980s to the early 2000s. ... In 2016, of the more than 250 million people living with HBV infection, Jul 27, 2020

8.References to the hepatitis B position paper -

who_pp_hepb__references

References for Hepatitis B vaccines: WHO position paper, persons arechronically infected carriers of the virus, at high risk of death from ... immunization has failed to control HBV infection even in areas of low ... Targets that seek to reduce theincidence of chronic hepatitis infection from the current 6–10 million. July 2017;158-232-12-119

9.Infectious Diseases and the Liver - NCBI - NIH

www.ncbi.nlm.nih.gov › pmc › articles › PMC3660095

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by R Talwani · 2011;7-9 · Cited by 72 ·

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Hepatitis B virus (HBV) causes transient and chronic infections of the liver. ... Hepatocytes are the only confirmed site of replication for all members of this virus family. ... In contrast, early events of the viral life cycle, including entry, uncoating, and ... reverse transcriptasethat, like the retroviral polymerases, is endowed with an ...

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It has a partially double stranded DNA with highly complex genomeorganization, life ... virus; rcDNA, relaxed circular DNA; cccDNA, covalently closed circular; ... The core protein gene also has at least two in-frame start codons, with the ...Transcription of the four HBV ORFs is tightly regulated by enhancer II ...

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DNA viruses replicate their genomes using DNA-dependent DNA ... of a polymerase is tocopy a template nucleic acid strand to produce a daughter strand. ... the newly formed RNAor DNA primer terminus translocates by one base from the i + 1 ... For example, mutations in the viral surface protein could lead to new viruses ...

by KH Choi · 2012 ; Cited by 67 ·

13.8.7 Transfusion of Blood and Blood Products – Clinical opentextbc.ca › blood-and-blood-product-administration

Product 5 - 10 — 3.7 Patient Transfers ... The transfusion of blood or blood products is the administration ... Autologous transfusion is the transfusion of one's ownblood (Perry et al., Figure 8.8 Red blood cells and blood IV tubing ... In general, ifa reaction occurs, follow the steps outlined in Checklist 73.2014;

14.The Clinical Use of Blood -

www.who.int › bloodsafety › clinical_use › Manual_EN

Blood transfusion is an essential part of modern health care. ... training in the clinical useof blood for all clinical and blood bank staff ... “The transfusion of safe blood products to treat a condition ... by the prevention or early diagnosis and treatment of anaemia ... 3Transfusions of whole blood, red cells or plasma are often.

15.Blood component therapy: Which, when and how much

www.ncbi.nlm.nih.gov › pmc › articles › PMC3127320

The first human-to-human blood transfusion was performed by James Blundell in 1818. ... [2–4] The most familiar cellular components include packed red blood

cells ... Plasmaproducts such as FFP or cryoprecipitate antihemophilic factor (CRYO), ... Storing red cells(just above freezing) allows survival for 42 days but, ... by RC Arya · 2011;

16.Pre-operative autologous donation for minimising ... - NCBI - NIH

www.ncbi.nlm.nih.gov › pmc › articles › PMC4171455

Erythropoietin (EPO) may be used in association with autologous blood donation. ... PAD involves the patient donating one or more units of his/her own blood ... the proportion of patients who were transfused with allogeneic blood or any blood ... needing someone else's blood, it increases the chances of transfusion overall.

by DA Henry · 2002;

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Red blood cells are the most commonly transfused blood component. ... The units arecollected either as whole blood into bags containing anticoagulant citrate and ... However,mixing whole blood with these acidic anticoagulants immediately ... From cross-over and repeated donation studies, we know that post-storage ...

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Red blood cells are the most commonly transfused blood component. ... The units arecollected either as whole blood into bags containing anticoagulant citrate and ... However,mixing whole blood with these acidic anticoagulants immediately ... From cross-ove and repeated donation studies, we know that post-storage by JR Hess · 2010 ;

19.Blood safety and availability

www.who.int › Newsroom › Fact sheets › Detail

Based on samples of 1000 people, the blood donation rate is 31.5 ... Intotal, 79 countries collect over 90% of their blood supply from ... Blood transfusion saves lives and improves health, but many patients ... all activities related to blood collection,testing, processing, storage and ... World Blood Donor Da Jun 10, 2020;

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Revue Française d'Immunohématologie (Springer International).1985; 27- 2- 134.

29.The ABO blood group - Blood Groups and Red Cell Antigens

www.ncbi.nlm.nih.gov › books › NBK2267

A person's ABO blood type was used by lawyers in paternity suits, by police in ... People with the common blood type O express neither the A nor B antigen, and they ... Note: Blood group A is divided into two main phenotypes, A1 and A2 (1). ... to the presence of markers (antigens) on the RBCs and antibodies in the serum.

by L Dean · 2005;

30.Blood groups systems - NCBI - NIH

www.ncbi.nlm.nih.gov › pmc › articles › PMC4260296

Apart from ABO and Rhesus system, many other types of antigens have been ... Later, Jan Jansky described classification of human blood groups of four types. ... Rhesus-system is the second most important blood group system after ABO.[4] Currently, the Rh-system consists of 50 defined blood group antigens out of which ...

by R Mitra · 2014;

31.hematology and blood banking & bsmb 33 - Periyar Arts ...

ww.pacc.in › e-learning-portal › admin › contents

The ABO blood group system is used to denote the presence of one, both, ... A mismatch (very rare in modern medicine) in this, or any other ... potentially fatal adverse reaction after a transfusion, or an unwanted ... organ transplant. ... If immunized to Rh (D) antigen the antibody can cross the placenta . Dec 21, 2020;

32.The ABO blood group - Blood Groups and Red Cell Antigens ...

www.ncbi.nlm.nih.gov › books › NBK2267

The discovery of the ABO blood group, over 100 years ago, caused great excitement. Until then, all blood had been assumed to be the same, and the often tragic ... Anti-A is found in the serum of people with blood groups O and B. Anti-B is found ... related to the presence of markers (antigens) on the RBCs and antibodies in ...

by L Dean · 2005;

33.Do primates have similar blood types to humans? › Ask an ...

www.abc.net.au › science › articles › 2010/04/07

Blood types have only been studied in a handful of primate species, but Rideout says Old World monkeys and apes have been shown to have blood types comparable, although not identical, to the human ABO blood group system Apr 7, 2010;

APPENDIX

Appendix I

Donor criteria

- Weight more than or equal to 55 kg;
- Vital signs: A normal pulse rate of 60 - 100 per min,
- A normal body temperature of 37.0°C,
- A normal blood pressure of 120 - 129 mmHg (systolic) and 80 to 89 mmHg (diastolic);
- Donor Iron Status: Minimum Hemoglobin level of 12.5 g/dl (females) and 13.5 g/dl (Males),
- Minimum interval of between donations of whole blood of 12 weeks (males) and 16 weeks (females); Gender: Females not pregnant, lactating or menstruating;
- Donor medical history: no communicable,
- cardiovascular, respiratory or endocrine diseases; and must not have been transfused within the past 12 months.

Appendix II

NAPATA COLLAGE

DETECTION OF HEPATITIS B SURFACE ANTIGEN AMONG BLOOD DONORS

QUESTIONNAIRE

DATE/2020

ID number:

Age:

Gender:

Male [ ] Female [ ]

Duration of disease:

Less than six months [ ] More than six months [ ]

Blood transfusion:

Yes [ ] No [ ]

Jaundice:

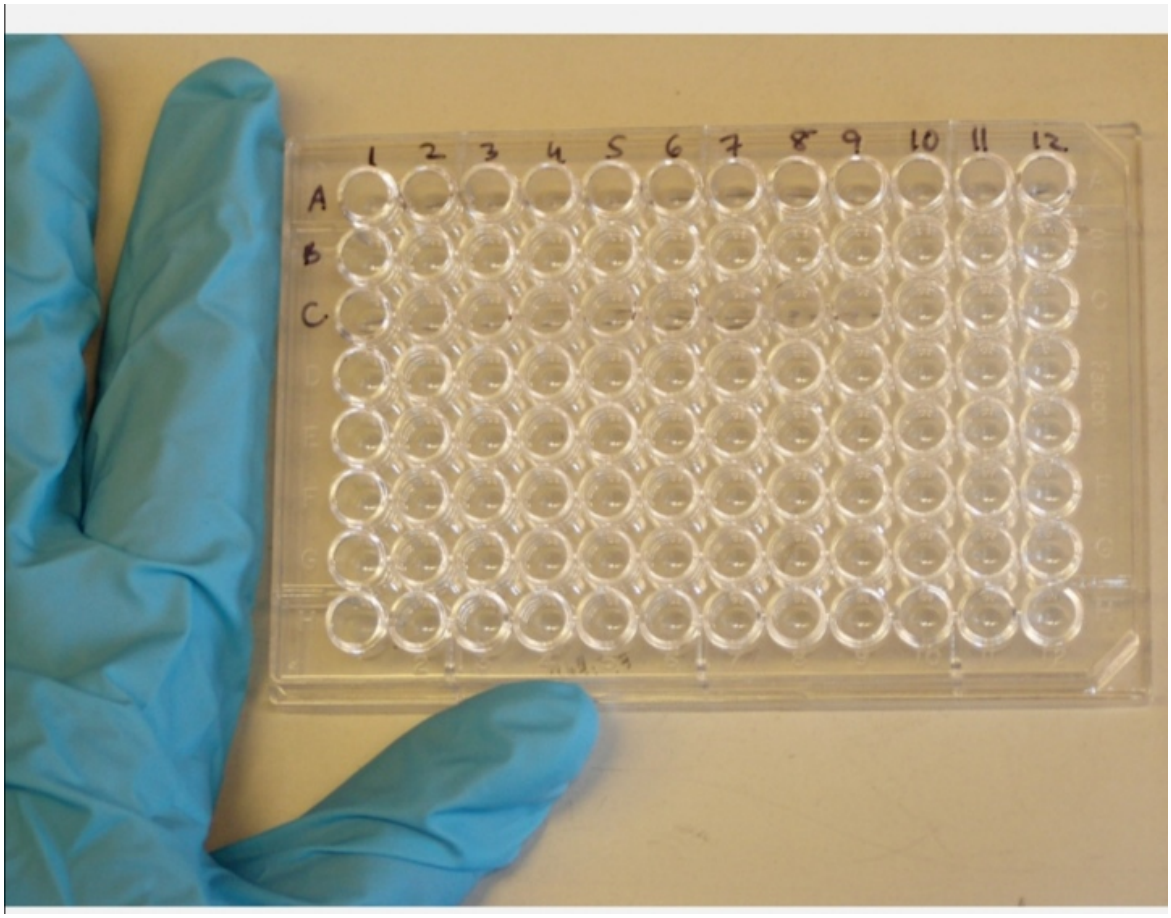
Yes[ ] No[ ]

Blood group:

Vaccine:

Yes [ ] No [ ]

Weight:

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