Comprehensive Guideline for

HEPATITIS A&E

People Awarness

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PREFACE

Hepatitis A and E are two causes of acute viral hepatitis that have similar symptoms and routes of transmission. The epidemic incidence of these diseases involves risks for the entire society. These two diseases are at times transmitted by travel and tend to appear in travelers going from developed to developing countries. To prevent infection with hepatitis A and E viruses, it is necessary to strictly adhere to hygiene, have access to safe potable water and safe food. The hepatitis A vaccine can be administered to immunize against the virus and many countries recommend the immunization.

The prevalence, transmission routes, prevention and treatment of these types of hepatitis are addressed in different chapters of this book; hopefully, they can be of help in ensuring the overall health of the society.

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A Comprehensive Guide For Hepatitis A&E

TABLE OF CONTENTS

A Comprehensive Guide For Hepatitis A&E

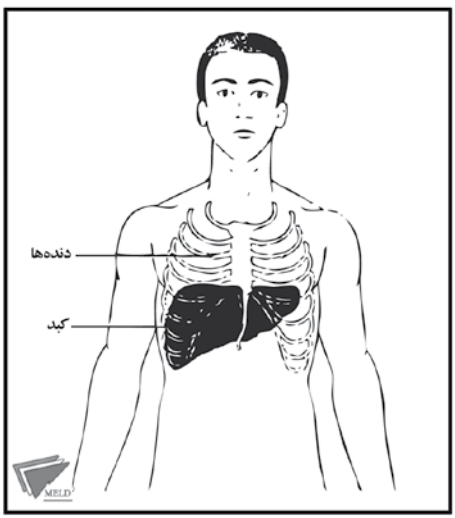
CHAPTER 01

Structure and function of the gastrointestinal tract

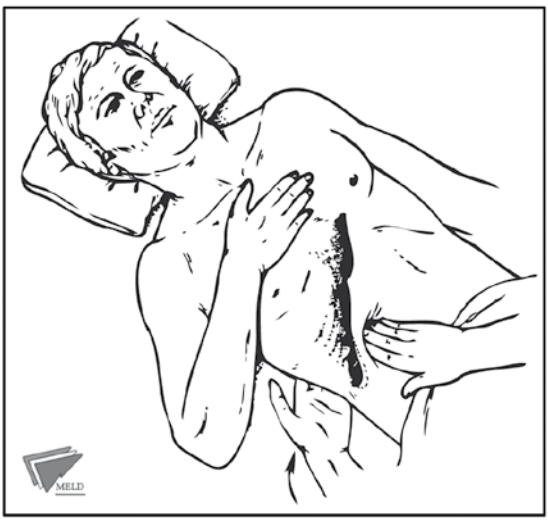
The digestive system has a hollow tubular form that begins from the mouth and ends in the anus. What we eat is first cut to pieces and ground in the mouth and then enters the stomach passing through the esophagus. Different parts of the digestive system help us in digesting the food by secreting various substances to prepare it for being absorbed in the intestines. Liver is a part of digestive system involved in digestion of food stuffs by what it secretes on them. It is located in the right upper quadrant of the abdomen and below the diaphragm.

Liver's structure and function……

Liver is the largest gland in humans and can be compared to a chemical plant designed for producing, altering, storing and discharging different substance. It's location in the abdomen plays a significant role in its function. The liver is located in the right upper quadrant of the abdomen, behind the ribs and below the diaphragm. It weighs nearly 1500 grams in adult, which is one fiftieth of the total body weight. The liver has a rich blood supply that brings nutrients absorbed in intestines, directly to it. These substances are either stored in the liver or converted to chemicals that the body needs. The lower edge of the liver is palpable 1-2 centimeters below the

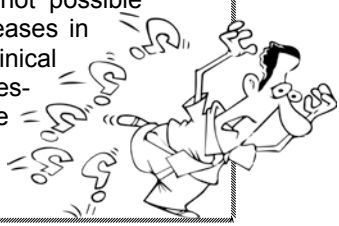


edge of ribs in the right side, during deep inspiration. This organ is normally protected by the ribs. It is consisted of liver cells, blood vessels and biliary ducts. The vascular plexus surrounding liver cells, transfers the digested and absorbed nutrients from intestines and store them. The secreted waste substances pour, through biliary tracts, into the gallbladder. The role of liver in metabolism of glucose and protein is very important. It also plays a significant role in digestion and absorption of fats, through production and secretion of bile. In addition, extraction of metabolic waste materials from blood and secreting them into the bile is performed by the liver. The produced bile is temporarily stored within gallbladder.



Q: Is it possible to detect liver diseases by examining the abdomen and palpating the liver?

No, the liver's edge is normally palpable during deep inspiration. It is worth mentioning that except in final stages of liver diseases, they are detectable through palpation of the liver and abdominal examination. Evidently, even by sonography it is not possible to diagnose liver diseases in all cases, and para-clinical findings will be necessary to ascertain the clinical diagnosis.



Liver's functions:

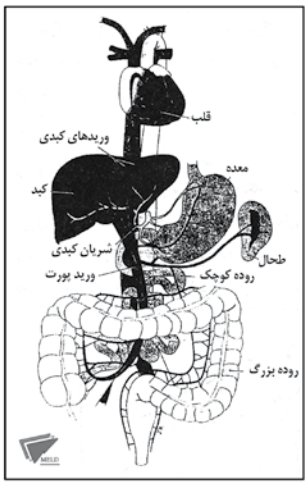
Liver is one of the largest internal organs and performs various vital functions in human body, the most important of which are mentioned below:

Upon entrance of food into the digestive tract, a series of different events occur to prepare it for use by the human body, namely entering the stomach, being mixed with the digestive juices and entering the small intestine, here, the food is

affected by chemical substances called enzymes, which are secreted by cells of small intestine's wall and also by pancreas, and prepared for being absorbed by intestinal cells. When absorbed, the nutrients pass into blood stream. These nutrients cannot be used directly by tissue cells, hence. They thereafter go to the liver to be changed to usable substances for all cells.

The role of liver in health

By making necessary changes in the absorbed nutrients and excreting toxic substances, liver plays the most Significant role in keeping us healthy. The most important of these changes include:



• Converting simple sugar (glucose) to its storable form (glycogen) and the reverse process when necessary, which play an important role in controlling the level of blood glucose.

• Converting the absorbed fat to absorbable and storable types for various cells of the body.

• Playing a major role in metabolism of protein (almost all proteins of blood plasma are produced by liver).

• Storing a number of vitamins (eg; A, B,…) and also some kind of metal (eg; iron, copper) to be used when needed.

• Destroying microorganism that enter the body through intestines. They first enter the liver in the bloodstream and it removes them by its defensive system.

The Role of Liver in Detoxification

Ammonium (NH_3) is a product of bodily chemical reactions, as well as intestinal bacterial flora, which is produced abundantly and enters the blood stream. It has detrimental effects on cells, especially brain cells, so the liver takes it up from the blood and, through a series of chemical reactions, converts it to urea, which is excreted by kidneys. The process of detoxification is not limited to ammonium a lot of harmful substances and drugs are also excreted from the body by the liver. When liver's function deteriorates, there will be an increase in the level of toxic wastes, including ammonium, which will have destructive effects on all parts of the body.

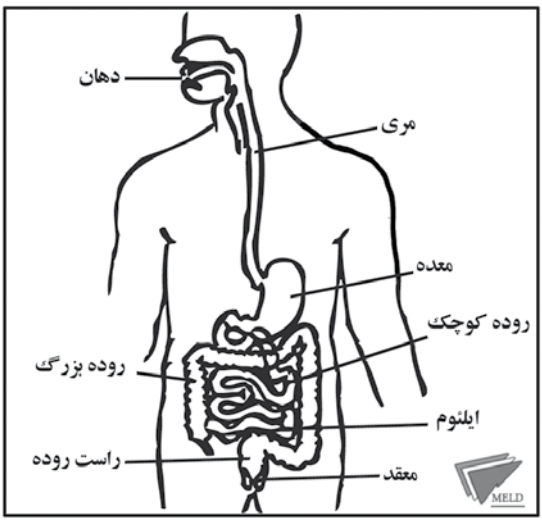
Q: Is it possible to live without a liver?

Considering the vital functions of the liver, it is surely not possible to live without it. However, in most liver diseases a small percentage of it is affected, hence only some of its functions will be out of order. Therefore, most liver diseases are not life threatening. In other words, if only one third of the liver remains functional all normal bodily needs will be met.

Protein production

Protein is one of the most important constituents of blood. Nearly two third of blood protein is albumin, which is produced solely by the liver. The average concentration of albumin in blood is 4 gr/dl. About 10 to 12 grams of protein is used by bodily cells and the same amount is produced by the liver. Indeed there is a balance between production and consumption albumin in our body. In cases of grave liver diseases like serious hepatitis or cirrhosis, the patient's serum protein decreases. Normal amounts of albumin in blood is an essen-

tial condition of health and proper blood circulation. For instance, decrease in albumin concentration results in swelling (edema) of different parts of the body (hands, feet, face). Other kinds of protein are also produced in the liver. These proteins are involved in blood coagulation (clotting) process and called coagulative factors; there are 31 of such proteins, 6 of which (factors 2, 5, 7,9,10 and 1) are produced in the liver. Their production requires presence of vitamin K. Hence, in cases of grave liver diseases or serious vitamin K deficiency, internal or subcutaneous bleedings easily occur. Other substances like transferrin are also produced in the liver, to transfer hormones within the body.



Bile production

Bile is a very bitter greenish yellow liquid produced constantly by liver cells, which is poured, through biliary ducts, into gallbladder, where it is concentrated and temporarily stored. Foodstuffs are first mixed with gastric juices in the stomach and then moves to the duodenum (the initial part of small intestine). Upon entrance of this mixture (chyme or chymus) into duodenum, bile is secreted from gallbladder and poured into duodenum. In a healthy adult, production and secretion of bile normally amounts to 500-1500 ml per day. This liquid mainly contains water, bilirubin and biliary salts that, in addition to excretion of bilirubin, helps in digestion and absorption of fats in intestines. Whenever the level of bilirubin increases in blood, jaundice occurs.

A Comprehensive Guide For Hepatitis A&E

CHAPTER 02

What are hepatitis and its different types?

Hepatitis refers to the inflammation of the liver and is also called jaundice. Viruses are the main cause of hepatitis, which is considered acute when the disease and its symptoms last under 6 months and chronic when they last over 6 months. Hepatitis is a major healthcare problem across the world today and the different types of hepatitis vary considerably in terms of their prevalence, causes, and routes of transmission depending on the level of hygiene, traditions, social habits and the degree of abiding by moral codes of conduct. Human beings have long been familiar with hepatitis; the Greek philosopher, Hippocrates, also wrote on this disease. During the American Civil War and the First World War, hepatitis was a great danger that knocked out many soldiers from the battle field and inflicted irreversible damages on the army. As recorded in medical reports, during the Second World War, too, a large number of people in the Middle East and Italy were infected with hepatitis due to poor sanitation and hygiene conditions.

What are the causes of hepatitis?

Throughout the years, countless people have gotten infected with hepatitis and many have died from the disease. Approximately 70,000 soldiers were infected with (viral) hepatitis during the First World War, and physicians found that there were two types of hepatitis in the Second World War. The first type is infectious and orally transmitted (mainly hepatitis A), and the second type is serum hepatitis transmitted through the blood (such as hepatitis B).

Different factors cause the inflammation of the liver. Viruses are the most common causes of hepatitis. Viruses are microorganisms that cannot be seen with the naked eye and require advanced equipment such as electron microscopes to be seen. Viruses are composed of a set of genetic materials and proteins. Viruses cannot survive outside the body but proliferate quickly within hours inside the body. At least 6 types of viruses have been identified to cause different types of hepatitis, which were then named based on the English alphabet, including hepatitis A, B, C, D, E and G viruses. Each virus belongs to a distinct group and the diseases they cause are not related. Hepatitis B virus was properly identified in 1960s and hepatitis A virus in 1973; however, hepatitis C virus remained a mystery for years until it was finally identified in 1989.

2.1: Overview of a hepatitis virus

Liver is the locus for the replication and growth of hepatitis viruses. The growth of viruses disturbs the liver functions.

Symptoms of hepatitis

The majority of patients with viral hepatitis do not present any symptoms for the disease and their disease is accidentally diagnosed through routine tests. Some patients, however, present acute symptoms of the disease.

Following contact with a hepatitis virus and after the incubation or latency period of weeks or months, acute symptoms of hepatitis emerge.

Symptoms of hepatic diseases vary from one case to another. Symptoms of hepatitis also range from a state of cold and flu, anorexia, lethargy, malaise, dark urine, pale stools, itching and headache to a severe jaundice, which is called acute hepatitis.

These symptoms are not specific to any one type of hepatitis and are rather seen in all types of the disease. In 95% of the cases with acute hepatitis, symptoms automatically disappear (even without treatment) within 4-6 weeks and the virus is excreted from the body. In 5% of the cases with hepatitis B, the causing virus remains in the body and makes the patient a carrier.

Symptoms of acute hepatitis

- **Yellow discoloration of the skin and eyes (jaundice)**
- **Dark urine**
- **Pale stool (clay-colored stool)**
- **Nausea and vomiting**
- **Anorexia**
- **Itching**
- **Fatigue, lethargy and decreased ability to perform daily activities.**

Are hives a symptom of hepatitis?

In most cases, no.

In some cases, after the incidence of hepatitis, skin lesions such as hives emerge that are caused by the deposition of hepatitis antigens in the skin. Chronic hives are not, however, a symptom of hepatitis in most cases.

Hives are considered a disturbing complication that is periodically experienced by some patients, and its etiology is unknown in most cases despite the different tests performed. Iranians are inclined to incorrectly associate most of their skin problems with the liver.

Hives are caused by many different factors, including food and drug allergies, chronic infections such as sinusitis, tooth infections, gallbladder diseases and parasitic infections.

What is jaundice?

Jaundice refers to the yellowing of the skin and white of the eyes due to high levels of blood bilirubin. Bilirubin is produced regularly on a daily basis after the breakdown of red blood cells and is excreted from the body by the liver through the bile. In the case of liver dysfunction (such as hepatitis) or biliary outflow obstruction (for example, the presence of gallstones), blood bilirubin is not excreted from the body and instead accumulates in the body and causes jaundice. The incidence of jaundice is not necessarily a symptom of hepatitis and might have other reasons. For instance, the excessive breakdown of red blood cells (hemolysis) may cause jaundice. Many patients with hepatitis and especially carriers of hepatitis B do not have a history of jaundice and are not yellow in color either. Symptoms of the disease should be interpreted by physicians only.

Does indulgence in carrots cause jaundice?

Yes;

this condition occurs mostly in children, but the resultant yellowing is different from jaundice. Most fruit and vegetables, including carrots and tangerines, contain a yellow pigment known as carotene. If someone drinks a glass of carrot juice every day (or indulges in the other nutrients mentioned), carotene level increases in their body to the extent that their liver cannot metabolize and excrete it anymore and its blood level therefore increases. The pigment eventually accumulates under the skin and turns it yellow. The main difference between this type of yellowing and the yellowing caused by hepatic or blood diseases is that the white of the eye (the sclera) does not turn yellow in the yellowing caused by the accumulation of carotene pigments in the blood (following indulgence in a particular nutrient). In these instances, if consumption of the particular nutrient is reduced, the yellowing gradually diminishes within weeks and does not cause problems. The incidence of jaundice is not necessarily a symptom of hepatitis and might have other reasons.

Does the incidence of hepatitis necessarily imply death?

No. The course of the disease varies with the severity and type of hepatitis. Hepatitis A has a very low rate of mortality and does not leave any complications after recovery, either. Hepatitis B is cured in most cases; however, in 5% of the patients, the virus remains in the body and leads to potential problems in the future through proliferation. Hepatitis C disappear in 30% of patients spontaneously and in remind of patients it progress slowly during 20-30 years.

A Comprehensive Guide For Hepatitis A&E

CHAPTER 03

Hepatitis A, Introduction

Infectious diseases are major health and medical problems in developing countries. Hepatitis A is a virus that causes the inflammation of the liver and is one of the most common diseases in developing countries. It is transmitted through drinking and eating contaminated water and food or close contacts within the family, in camps and in public places. Hepatitis A is caused by a highly infective and contagious virus. Over two million new symptomatic cases of infection with hepatitis A are reported every year across the world, with over half appearing in Asian countries. The improved adherence to hygiene in many countries has decreased the incidence rate of this disease at young ages and instead increased the risk of a hepatitis A epidemic among adults. Hepatitis A does not become chronic, and only a very small percentage of the adult cases develop fulminant hepatitis. The urgency of adults' infection with hepatitis A has drawn attention to the means of preventing the disease and vaccinating against it. There are various transmission routes for hepatitis A, including the fecal-oral route that transmits the disease to people with lower adherence to hygiene. Environmental hygiene and population density are among the determinants of the prevalence of hepatitis A in a region.

Hepatitis A virus

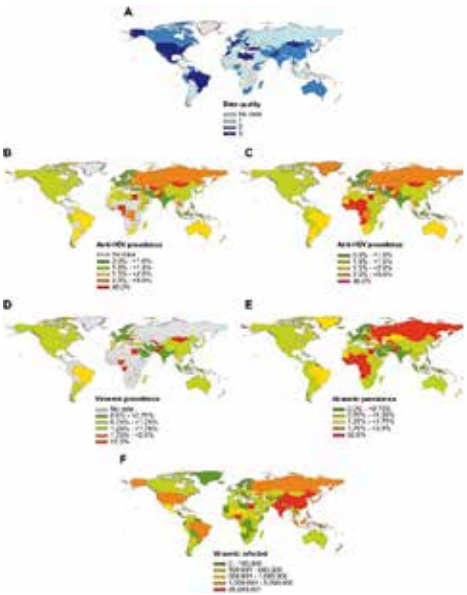
Hepatitis A is caused by an RNA virus that is uncoated and is resistant to heat, acid and ether but that disappears when boiled for one minute. The virus belongs to the Picornaviridae family and proliferates in the liver but is present in the blood, bile and feces before the acute phase of the disease begins. The virus may remain infectious for at least one month after it is dried. Compared to other hepatic viruses, the outer coating of hepatitis A virus is more resistant to certain factors such as acids; it therefore passes more easily through gastric acid.

The virus' lack of lipid coating makes it resistant to bile. It can survive on human hands and thus transmit and spread the disease. There are 7 hepatitis A virus genotypes, and 4 of them are specific to humans.

The prevalence of hepatitis A

Cases similar to infection with hepatitis A have been reported as early as the time of Hippocrates. The majority of jaundice epidemics that occurred in the 17th and 18th centuries were concurrent with the war. The virus was accurately identified in 1947 and can survive outside the human body for several months. The prevalence of hepatitis A differs from one country to another and is closely and directly linked to the society's adherence to hygiene, access to potable water and social and economic status. Along with limited hygiene

facilities, poverty facilitates the transmission of the disease. In societies with a low adherence to hygiene, the majority of children get infected with the virus before puberty and anti-HAV antibodies can be found in their body. The incidence rate of asymptomatic hepatitis A has decreased in recent years with the economic growth and improved hygiene among people, and, in effect, the number of adults susceptible to the infection has increased. Susceptibility to hepatitis A is in fact increasing in the younger generation and adults. Infection with hepatitis A is more prevalent within families of the infected and in summer camps, public places, neona-



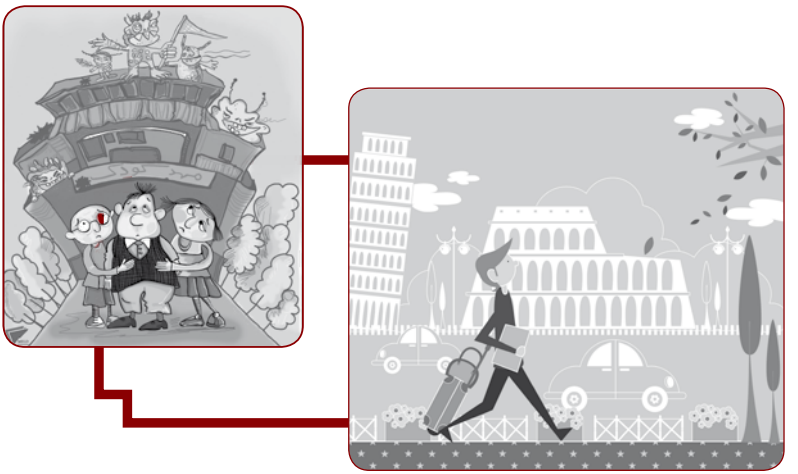
tal intensive care units and barracks where an infected person also lives or visits. The disease occurs mostly in children and adolescents, with a peak prevalence at ages 5-15. It could take individuals or become an epidemic at times and involve a large number of people who have drank the same contaminated potable water. One of the major hepatitis A epidemics occurred in 1998 in Shanghai, China, where 300,000 were infected with the acute form of the disease after consuming infected oysters caught from contaminated waters.

As previously discussed, person to person transmission occurs in regions with a low adherence to hygiene and in populated areas, and often during the late fall or late winter. Traveling from regions with a high adherence to hygiene to regions with a high prevalence of hepatitis A (endemic regions) is one transmission route for the disease, which is becoming more stressed nowadays given the increased rate of international travel. Studies conducted in different countries have proved the effectiveness of improved hygiene and accessibility to safe food and water in reducing infections. The prevalence of the disease has also been decreasing in the United States since 1996 when anti-HAV vaccination became a common practice for children.

Hepatitis A transmission routes

Hepatitis A is a viral disease transmitted from person to person or through the consumption of contaminated water and food. The prevalence of hepatitis A is directly correlated with

adherence hygiene in the society and differs from one population to another. Children are considered the main source of the virus in every society. The virus is transmitted through the oral-fecal route; it first enters the intestine with food and water through the mouth and proliferates in the intestinal cells. The virus then spreads to the liver cells and proliferates in them too. The proliferation of the virus in the liver causes liver inflammation (hepatitis) and dysfunction. Once bile is infected as well, the virus enters the intestine through biliary secretions and is then excreted with feces and infects the environment.



The transmission routes of the virus are:

1.Drinking contaminated water and eating contaminated ice.

2.Eating contaminated food, vegetables and strawberries.

3.Eating contaminated seafood, such as fish and oyster.

4.Close contacts within the family or in kindergartens.

5.transmission from hospitalized patients to the personnel working in neonatal and infectious disease wards.

Individuals at a high risk of infection are:

1.Travelers going to endemic areas of the disease;

2.Family members of patients with the acute type of the disease;

3.Sexual partners of patients with the acute type of the disease;

4.Children and their caregivers in kindergartens;

5.Individuals with high-risk sexual behaviors and injecting drug users.

As shown in the figure below, hepatitis A has a low prevalence in the United States, Western Europe, Australia, Japan, New Zealand and Canada and a higher prevalence in Latin America, Asia and Africa.

The prevalence of hepatitis A and E in Africa, Central America and Asia

Cases of epidemic hepatitis A caused by the consumption of contaminated water by the public or by soldiers have been reported in the past. Workers in take out restaurants and diners are not at a higher risk of infection with hepatitis A, but if they are infected with the disease, their risk of transmitting the disease to other people through their food is higher.

In 2014, the Missouri Department of Health declared that about 5000 people who have eaten in Red Robin from 8th-16th May 2014 are at risk for hepatitis A infection and should visit health centers for getting anti-HAV vaccines and taking tests. This declaration shows that there is a greater risk of infection with hepatitis A in people eating out.

Working in some high-risk jobs make people more prone to infection with hepatitis A. What are these jobs?

Nurses working in neonatal and infectious disease wards and caregivers of the disabled are at a higher risk of infection with hepatitis A and should get anti-HAV vaccines.

It should be noted that mountain-climbers and hikers who drink unsafe water might be infected with acute hepatitis A.

To travelers

Traveling to regions with a high prevalence of hepatitis A (endemic regions) is accompanied with the risk of infection with the disease. Hepatitis A is present everywhere across the world, but is more prevalent in Africa, Central Asia and South America (the map and …). Travelers should note that the disease is transmitted through drinking unsafe water, eating contaminated food and contact with infected people's hands. Travelers should therefore make sure to only use bottled or boiled water and avoid eating uncooked and unsafe food, and peel the fruits after washing and before eating.

Individuals deciding to travel to regions with a high prevalence of the disease are advised to get vaccinated for hepatitis A. In the past, when there was no efficient vaccine, human serum immunoglobulin was used to prevent the disease. This method could prevent infection with hepatitis A virus for 6 months after the injection; however, it is used less frequently today due to the high costs of immunoglobulin and its call for renewed injections every 3-6 months and travelers are recommended to get vaccinated instead.

The military and hepatitis A

Soldiers and militaries are at a high risk of infection with hepatitis A, although the risk is also associated with their place of service. Wars often break out in deprived and endemic regions for hepatitis A, and armed forces on mission from Western countries or UN peacekeepers from these countries are often sent to regions with poor hygiene and thus face an increased risk of infection with the disease.

Moreover, since hepatitis A is transmitted from person to person, militaries are at an even greater risk of infection due to their collective living arrangements. As discussed, infection with hepatitis A during youth is accompanied with a risk of exacerbated symptoms and higher mortality rates; the prevention of hepatitis A in soldiers and the military is therefore of great importance.

Soldiers arrive in barracks from different cities and villages for their military service, and the risk of transmission gets higher due to their different levels of hygiene. An investigation of the American military, the armed forces in a number of European countries such as Greece and Russian soldiers has showed that they are at risk for infection and should be vaccinated against hepatitis A before leaving on a military mission. In case of urgent missions when there is no time to wait for the vaccine to produce immunization, immunoglobulin can be used to prevent the disease.

A Comprehensive Guide For Hepatitis A&E

CHAPTER 04

Clinical symptoms

Hepatitis A infection is usually acute and self-limiting. The clinical symptoms of the disease depend on the age at which the infection appears and are more severe in adults than in children. In children, the disease is often asymptomatic or very mild. The clinical symptoms of the disease include fatigue, anorexia, weakness, headache, abdominal pain, fever, nausea and vomiting, joint pain and sometimes diarrhea. Symptoms tend to appear after a 30-day incubation period and are then similar to the symptoms of cold and flu or appear in the form of yellow and dark urine, clay-colored (pale) stool and yellowish eye and skin color.

Pruritus might be another irritating symptom of the disease. Coughing, diarrhea and urticaria are among the less prevalent symptoms of the disease. Symptoms of hepatitis A tend to last for two weeks, and once they appear, viruses in the patient's feces decrease and their risk of transmission to others is then reduced to a lower level.

Is jaundice the same disease as hepatitis A?

Jaundice refers to an increase in bilirubin in the blood for various reasons, one of which is viral hepatitis, including hepatitis A. Most cases of jaundice in childhood are caused by hepatitis A; however, in newborns, jaundice is not related to hepatitis A and has no hepatic causes; it is rather a blood incompatibility.

Can clinical symptoms and jaundice be used to make a definitive diagnosis of hepatitis A or is a blood test absolutely necessary?

No, a definitive diagnosis cannot be made with the symptoms alone. Symptoms tend to appear as dark urine, white stool and jaundice during the first week, and after the incidence of jaundice, the flu-like symptoms decrease and patients begin to feel better. A yellow skin, enlarged spleen and enlarged painful liver may also be detected in patients with the disease by mere touching; however, these symptoms tend to appear in all cases of hepatitis.

How long is the incubation period of the disease?

Clinical symptoms tend to appear 30 days after the virus has entered the body.

Can hepatitis A become chronic?

No cases of chronic hepatitis A have been reported to date.

Severe and complicated symptoms of hepatitis A

As discussed earlier, in adults, there is a risk for the development of severe symptoms and complications of hepatitis A. There is a very small chance of liver failure, which is manifested by irritability, severe restlessness, inability to think properly, drowsiness, loss of consciousness, swelling face and hands and nose or mouth bleeding or subcutaneous bleeding. In such conditions, the patient should be immediately hospitalized and undergo care. Some patients experience long-term jaundice for as long as 6 months, in which cases they may need to be referred to a liver transplant team for further follow-up. On rare occasions, other body organs aside from the liver, for example, the kidneys, heart, peripheral nerves, brain and eyes, are also damaged by the disease.

On rare occasions, meningitis might appear, manifested by fever and impaired consciousness. Severe and complicated cases of hepatitis A are rare.

What physicians are recommended to patients for the control and follow up of their disease?

Patients are recommended to visit liver, infectious disease and internal medicine subspecialists.

Hepatitis A during pregnancy

Considering the improved environmental hygiene and the increased age of infection with hepatitis A, women at reproductive ages are at risk for infection. Studies show that developing hepatitis A during pregnancy may cause miscarriage, low birth weight and the premature rupture of the amniotic sac before the predicted delivery date; however, the prevalence of these complications is lower than it is in patients with hepatitis E.

Diagnosis

Hepatitis A virus was first detected in liver and fecal samples using an electron microscope that is not currently used for clinical diagnoses. Serological methods and antibody blood tests have replaced the earlier method for detecting the virus. There are two types of anti-HAV antibodies, namely IgG and IgM. IgM appears in the acute phase of the disease, usually 2 weeks after infection, and remains in the blood for 6 months. IgG appears during convalescence. A definitive diagnosis of hepatitis A is therefore made when IgM is detected in the blood of the patient showing symptoms of acute hepatitis. The amount of IgG present in blood samples of every community shows its history of infection with the disease and differs from one community to another. The antibody remains in the body of the infected person for his whole life and immunes him.

Liver enzymes such as aminotransferases (AST and ALT) increase in acute hepatitis. These enzymes are normally

Is there a risk of re-infection with hepatitis A?

No, the antibody produced in the blood immunes the patients for life.

present below 35-40 units per liter of blood serum but might reach several thousand units in cases of acute hepatitis. Blood bilirubin also increases in cases of acute hepatitis, and if it gets severe, patients may be hospitalized or referred to liver transplant teams. Prothrombin (PT) levels indicate the adequacy of coagulation factors and therefore count as determinants of the disease severity.

There is a chance for autoimmune hepatitis, Wilson's disease, etc., to be misdiagnosed as hepatitis A; laboratory examinations and sometimes a liver biopsy can help differentiate these diseases from hepatitis A.

Treatment

The disease is self-limiting and does not need any specific treatments except for symptomatic and maintenance therapy. In all cases of the disease, patients are recommended to rest more and have a balanced diet. In the acute phase of the disease, patients should not tire themselves out and should only pursue a more active lifestyle after feeling better and getting the permission of their physician. Nevertheless, strict bed rest is not recommended for these patients; rather, their activities should be reduced in proportion to the patient's capacity. Patients are recommended to avoid attending school or work during their period of disease. Patients should mostly be encouraged to follow a nutritious, low-fat, high-carbohydrate (high in starch), high-calorie, vitamin-rich and high-protein diet. It should be noted that only patients with

very severe cases of jaundice and symptoms of liver failure, including hepatic coma, should reduce their protein intake. Patients are mostly recommended to consume meat, such as poultry and fish, dairy, grains and beans, foods rich in vitamins, such as fresh fruits and vegetables, and nuts. In the case of anorexia or severe nausea and vomiting, the amount of food consumed in each meal can be reduced and instead added to the number of meals per day. Patients are recommended to avoid fried food, high-fat dairy, processed food and smoked products, foods containing preservatives, oil, chocolate, cookies and cakes. They should take in more liquids, and if dehydrated and unable to drink liquids, the body's required liquid intake can be supplied through the injection of serums. Patients are strongly recommended to avoid drinking alcohol and smoking.

If nausea and vomiting cannot be controlled, physicians are allowed to prescribe some medications for controlling the complications. In the case of severe jaundice accompanied with pruritus, ursodeoxycholic acid (bile minerals) may be prescribed to the patient under the supervision of a physician.Individuals in contact with the infection are strongly recommended to adhere to hygiene in their family, separate their soap, towel and toothbrush holder and get immunoglobulin injections.

A Comprehensive Guide For Hepatitis A&E

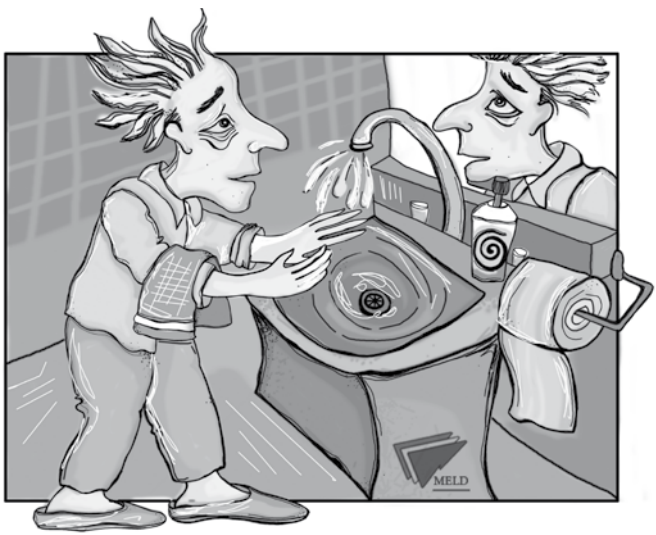
CHAPTER 05

Prevention of hepatitis A

As mentioned earlier, hepatitis A virus is transmitted orally. Improved water and food hygiene and adherence to individual and collective hygiene reduce the risk of transmission of the disease. It is recommended to avoid eating and drinking unsafe food and water in endemic regions. Washing hands, especially after using the washroom, before cooking and before eating, is very efficient in the prevention of the disease. Patients continue to excrete the virus for a long period, and given that there is a risk of transmission from an infected person to others, patients are recommended to not attend their school or work or go to public places and instead rest at home for one week after the appearance of the clinical symptoms. The virus survives under the nails for 4 hours; the best way to prevent the disease is therefore to regularly and properly wash the hands. Taking the standard precautions is therefore the best way to prevent the transmission of the virus to others. The caregivers of patients with hepatitis A are also recommended to regularly and properly wash their hands after contact with the infected.

Immunoglobulin

Individuals at the risk of infection or in contact with hepatitis A may get vaccinated or get immunoglobulin injections. If immunoglobulin is administered immediately after contact with hepatitis A, it immunes the body and prevents the disease. Family members of infected patients, individuals at the risk of unsafe sexual relations, children in kindergartens which an infected person also attends, and individuals eating unsafe restaurant food are recommended to administer immunoglobulin. In the case of close contact with an infected person, such as might be the case in schools, the classmates of the infected student are recommended to get an immunoglobulin injection.



Vaccination

Hepatitis A vaccination is the most efficient way for preventing hepatitis A, and if both doses of the vaccine are injected, the body will be 94-100% immunized. Vaccination for hepatitis A is not yet performed in many countries across the world. The national vaccination plan carried out in Iran does not necessitate an anti-HAV vaccination. There are current-

ly 4 types of inactivated hepatitis B vaccines available, all of which are completely efficient and free of complications and develop long-term immunity. None of these vaccines are effective for children under one.

In regions with a high prevalence of hepatitis A, it is recommended to conduct blood surveys and vaccine only those individuals who have not been previously infected with hepatitis A. Anti-HAV vaccination became part of the child vaccination program of the United States since 1996, and children older than 24 months received two doses of the vaccine. The Advisory Committee for Immunization Practices (ACIP) of the US reduced the age of vaccination to 12 months in 2005. The second dose of the vaccine is usually administered 6-12 months after the first dose. HAVRIX is the first inactivated vaccine used in the United States. VAQTA, AVAXIM and EPAX-AL are some other anti-HAV vaccines used. The dose and type of vaccine should be determined by a physician and according to the patient's age.

Who should receive anti-HAV vaccine and when?

• All children between their first and second year of birth;

• All individuals above the age of 1 traveling to countries with a high prevalence of hepatitis A, including Central and South America, Mexico, Africa, Asia (with the exception of Japan) and Eastern Europe;

• Patients with chronic hepatic diseases;

• Members of families deciding to adopt a child from countries with a high prevalence of hepatitis A;

• Military forces;

• Individuals with high-risk sexual behaviors;

• Injecting drug users;

• Patients with hemophilia and thalassemia; Laboratory personnel.

Is a post hepatitis A vaccination test necessary?

No, because the body is likely to respond well to the vaccine.

For how long does vaccination immune the body?

Studies have shown that vaccination immunes adults for 25 years and children for 20 years.

Can anti-HAV vaccines be used simultaneously with other vaccines?

Yes, anti-HAV vaccines can be used simultaneously with other vaccines, such as hepatitis B and typhoid.

What should one do if the injection of the second dose is delayed?

This delay calls for no special actions. The second dose should be injected as soon as possible. The first dose does not need to be repeated.

Anti-HAV vaccination is not recommended for children.

The side effects of anti-HAV vaccination

Like other vaccines and drugs, anti-HAV vaccines may cause severe side effects, such as allergic reactions; however, this vaccine has very few side effects. Its mild side effects include pain at the site of injection, headache, anorexia and fatigue, which are all transient and need only a maintenance therapy. Individuals with a history of allergic reactions to vaccines should not receive anti-HAV vaccination. Pregnant or breastfeeding women and patients with severe febrile diseases are recommended not to receive anti-HAV vaccination.

A Comprehensive Guide For Hepatitis A&E

CHAPTER 06

Hepatitis E

Hepatitis E is a viral disease transmitted through contaminated water that tends to occur epidemically or sporadically in the Indian subcontinent, Central Asia, Southeast Africa and Mexico. Cases of hepatitis E have been reported in the Middle East, including Iran, Iraq, Kurdistan, Afghanistan and Pakistan. Hepatitis E epidemics have also been reported in Africa, including Algeria, Egypt, Sudan, Somalia and Ethiopia. The majority of these epidemics were caused by the severe contamination of potable waters with human and animal feces and have often occurred during the rainy season or in the aftermath of floods.

Hepatitis E is transmitted enterally. The first hepatitis E epidemic was reported in India in 1955, and later, in the 1970s, Balayan et al. were able to detect the virus. It was first called enteric hepatitis or non-A and non-B hepatitis, as hepatitis A and B tests turned out negative in the patients. Unlike hepatitis B and C viruses that are transmitted through blood, hepatitis E virus is transmitted through the oral-fecal route and inflames the liver.

Virology

This virus is uncoated and spherical with a diameter of 30-32 μ. It has a symmetrical, twenty-dimensional, geometric structure and is relatively resistant to chemical and environmental agents.

Hepatitis E virus consists of a strand of RNA.

Electron microscopy of the virus and its structure

Hepatitis E can be found in patients' feces during the acute phase of the disease and also in the feces of some monkeys after their experimental infection. The virus has 4 human genotypes; genotype 1 of the virus causes epidemics in developing countries, such as countries in Asia and Africa; genotype 2 causes epidemics in Mexico and Africa; genotype 3 is found sporadically all across the world and in European and Japanese pigs; and genotype 4 is found specifically in Asia.

The prevalence of hepatitis E

Hepatitis E is a major health problem in developing countries in Asia, the Middle East and North Africa. The disease is epidemic in these countries and sporadic in developed countries, such as the United States and Western Europe. Hepatitis E epidemics have been reported in Asia from West China to Afghanistan, the Indo-China Peninsula, Burma, Thailand, India, Kashmir, Nepal, Pakistan, Central Asian Republics, In-

donesia and Japan. The last epidemic in Iran occurred in 1991 in Kermanshah. Other epidemics were reported in northern Baghdad during the war in Iraq. In industrial and developed countries, the majority of cases with hepatitis E are travelers returning from infected regions.

Hepatitis E occurs rarely in children and is mostly limited to young adults.

Hepatitis E transmission routes

The most common hepatitis E transmission route during all the epidemics has been the consumption of contaminated water. The disease is sometimes transmitted through contaminated food; however, it is mainly transmitted through the oral-fecal route. The disease is highly prevalent in tropical and subtropical regions, especially due to the high consumption of raw seafood. In endemic areas of the disease, hepatitis E epidemics occur in the rainy seasons due to the higher flow of water in rivers.

In these areas, domestic and wild animals have positive hepatitis E serologies, and in some cases, the type of hepatitis E virus found in the animals has been similar to that found in humans.

Hepatitis E virus might infect some animals, such as chimpanzees, monkeys, sheep and rodents. No symptoms appear if low levels of the virus enter the human body; however, high levels of the virus present in the body cause severe hepatitis.

It seems that hepatitis E is a zoonotic disease, and domestic and wild animals and pigs can all be sources of infection and infect other animals, water resources, forage and vegetables and thus transmit the disease to humans.

The disease is more likely to spread when there is heavy raining, flooding and when potable water is mixed with waste water.

The incubation period of hepatitis E is between 2 and 9 weeks, with a 6-week average, and it remains contagious for 1-5 weeks after the incidence of the symptoms.

Militaries sent on missions for war or peace to regions with a low adherence to hygiene and shortage of potable water are at the risk of infection with the disease.

The prevalence of hepatitis E was lower in American soldiers sent to Afghanistan than those sent to Pakistan as the soldiers in Afghanistan consumed the food and water sent from their own country for the most part. This rather important distinction should be taken into account on both military missions and in foreign travel.

It is important to be vaccinated against hepatitis and take the necessary precautions when using uncontaminated po-

table water, food and vegetables.

Clinical symptoms

In most cases, hepatitis E is asymptomatic and cannot be differentiated from other types of viral hepatitis with the mere observation of the clinical symptoms, if any. Symptoms of the disease appear primarily as flu-like symptoms, abdominal pain, nausea, vomiting and fever and later as jaundice. Hepatitis E tends to go away on its own but might be dangerous for pregnant women. Clinical and laboratory symptoms usually disappear within 6 weeks. Severe cases of the disease might be accompanied with severe jaundice and unbearable pruritus and may therefore necessitate hospitalization. The majority of mortalities caused by hepatitis E occur during pregnancy, and the risk of death increases by 20% in the last trimester. Rural dwellers are at a higher risk of infection with the disease. The immune system of patients with hepatitis E appears to influence the outcome of their disease.

Similar to hepatitis A, hepatitis E does not result in chronic conditions of the disease, liver cirrhosis or chronic carrier state. Chronic conditions of the disease have recently been reported with organ transplant.

Laboratory diagnosis

Human body produces antibodies IgM and IgG against hepatitis E. IgM disappears after some months, but IgG might remain permanently.

To diagnose hepatitis E, it is necessary to perform serological tests in order to determine the presence of IgM and IgG and RNA virus in the blood. In acute phases of the disease, anti-HEV IgM is first increased and then decreased within three months. The virus can be found in the feces or in the blood during the acute phase of the disease using PCR molecular techniques.

Other infectious agents, such as infectious mononucleosis and leptospirosis, which can involve the liver just as is the case for hepatitis E, should be taken into account when examining patients.

Treatment

There are no specific treatments for hepatitis E at the present moment and the symptomatic treatment of the disease is common with the other types of acute viral hepatitis. There are no oral or injection antivrial treatments for hepatitis E and corticosteroids are not a recommended drug to treat the disease either.

In the case of severe and fulminant failure, or very severe jaundice accompanied with symptoms of liver failure, and changes in consciousness, the patient should be hospitalized. During hospitalization, the body's water and electrolytes (minerals) should be balanced, and detoxifying drugs such as lactulose or oral neomycin should be administered according to the physician's order.

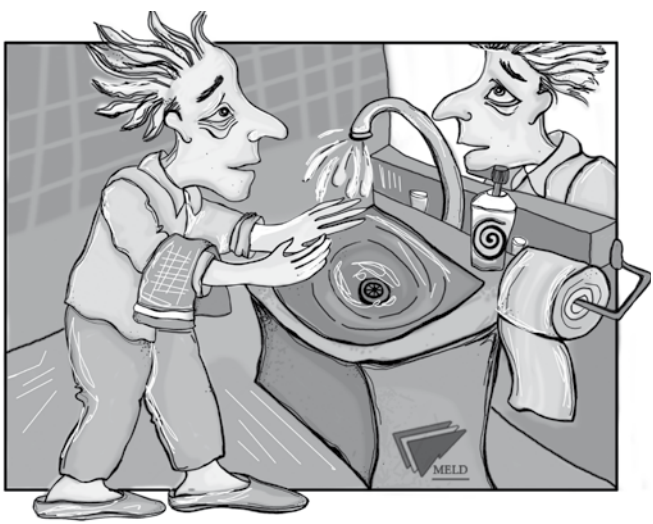
Patients should not use sedatives because these drugs may exacerbate hepatic coma.

When the disease is severe and does not respond to common treatments, the recommended solution is to sign up for a life-saving liver transplant.

Prevention

As discussed in previous chapters, the major transmission route of hepatitis E is the use of contaminated water. Hepatitis E epidemics do not occur in developed countries due to their standard potable water.

The most important preventive measure of hepatitis E is to teach the public about hygienic defecation, proper methods of washing hands after using the washroom and before having meals, and adhering to hygiene instructions for the prevention of the oral-fecal transmission of the disease.



Can immunoglobulin be used to prevent the disease?

Immunoglobulin seems to not be of any help due to the low HEV antibody titers in humans.

Are there any vaccines for preventing hepatitis E?

Yes. Numerous studies have been conducted on anti-HEV vaccines and a human vaccine has been developed, but it is often only used in hepatitis E epidemics. There is still a lack of information about the proper doses of administration and the side effects of the vaccine.

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