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Hepatitis C Virus infection in the Yemen: Mini Review (1993-2018)

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Abstract

Background: *The understanding of viral hepatitis has evolved more rapidly in the last 30 years than at any other time in history. Although epidemics of Jaundice were recognized as early as the middle ages, the notion that such out – breaks were the result of hepatitis caused by infectious agents was not known until the years at World War 2 Much of the agents and pathogenesis of viral hepatitis were derived from inoculation experiments with human volunteers in various countries during World War 2.*

Objectives: *Hepatitis C Virus cause a major public health problem in Yemen and increased incidence by HCV has been observed to occur in Yemen from years to years. Because of santiness of information on epidemiology of the Hepatitis C Virus among population in the Yemen, the current review is intended to covers the available information on the aspects of epidemiology and diagnostic techniques elaborated for diagnostic of HCV in Yemen.*

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Material and methods: *We reviewed the papers to document the epidemiology of hepatitis C virus in Yemen and some areas of world. Different published research papers and books and annual reports from 1993 to 2018 on Hepatitis C Virus were review.*

Results: *The prevalence rate of Hepatitis C Virus infection in the Yemen is ranging from 0.2% to 2.8%. Most of the surveys were conducted in Ibb and Amran governorates. and the risk factors for HCV infection, blood transfusion Surgery, family history of jaundice, visit to dentists, parenteral injury, cupping were considered significant risk factors for transmission of HCV in Yemen.*

Conclusion: *Hepatitis C Virus is higher prevalent among Yemenis citizen, the risk factors play role in HCV transmission. More area-wide investigations concerning HCV infection in Yemen among different groups at risk from different areas of the country is recommended.*

Keywords: HCV, prevalence, epidemiology, diagnosis, Yemen

INTRODUCTION

Viral hepatitis is a major global public health problem, the discovery of hepatitis C virus (HCV) in 1989 ended a period of intensive research aimed at finding the agent responsible agent responsible for 80% of transfusion associated (non A, non B) hepatitis cases[1,2]. Hepatitis is an important cause of morbidity and mortality among human population both from acute infection, chronic sequel which include HBV and HCV infection, chronic hepatitis, cirrhosis and primarily liver cancer .The main routes of HCV transmission arc parenteral exposure, blood transfusion, surgery, dialysis and dental surgery, however, controversy still rises concerning other routes of transmission such as, family contacts, horizontal and vertical transmissions[3]. HCV is classified into 7 major genotypes and 67 subtypes, showing different distributions by geographical region[4]. Variations of the viral genes that encode cellular and humoral immune response proteins play a crucial role in escape from the host immune system[5].

Worldwide, it is estimated that there are approximately 170 million persons infected with HCV, this is nearly 3% of the world population[6]**.** It is estimated that 150-200 million People, or about (3%)

of the World's population, are living with chronic hepatitis C. About 3-4 million people are infected per year, and more than 350,000 people die yearly from hepatitis related disease. During 2010 it is estimated that 16,000 people died from acute infections while 196,000 deaths occurred from liver cancer secondary to the infection. Rates have increased substantially in the 20th century due to a combination of intravenous drug abuse and reused but poorly sterilized medical equipment. Rates are high (>3.5% population infected) in Central and East Asia, they are intermediate(1.5%-3.5%) in South and Southeast Asia, Sub-Saharan Africa, Andean, Central and Southern Latin America, Caribbean, Oceania, Australasia and Central, Eastern and Western Europe, and they are low (<1.5%) in Asia Pacific, Tropical Latin America and North America)[6]**.** Hepatitis C is a contagious liver disease caused by the hepatitis C virus (HCV). The virus is endemic throughout the world, and a recent analysis including 1217 studies representing 117 countries and 90% of the global population concluded that approximately 180 million people worldwide are HCV-seropositive. It was calculated that HCV genotype 1 is the most prevalent worldwide, comprising 83.4 million cases (46.2% of all HCV cases), approximately one-third of which are in East Asia. Genotype 3 is the next most prevalent globally (54.3 million, 30.1%); genotypes 2, 4, and 6 are responsible for a total 22.8% of all cases; genotype 5 makes up the remaining < 1%.[7]**.** In addition to recipients of blood transfusion and medical treatment with unsterilised needles, diagnostic screening has identified the extensive spread of infection through needle- sharing drug abuse, an epidemic starting in the 1960s or earlier in Western countries and the primary route of ongoing transmission of infection following the introduction of effective blood donor screening and blood product inactivation steps in the 1990s[8]**.**

In the United States, about (2%) of people have hepatitis C, with the number of new cases per year stabilized at 17,000 since 2007. The number of deaths from hepatitis C has increased to 15,800 in 2008 and by 2007 had overtaken HIV/AIDS as a cause of death in the USA. In Europe the percentage of people with chronic infections has been estimated to be between (0.13 and 3.26%)[7]**.** In some highly endemic areas of the world the prevalence rates range from 10% to 30%. In the most highly endemic areas of the world, HCV infection is prevalent among persons older than 40 years but is uncommon in those younger than 20 years[9]**.** Although HCV is endemic worldwide,

there is a large degree of geographic variability in its distribution. Countries with the highest reported prevalence rates are located in Africa and Asia; areas with lower prevalence include the industrialized nations in North America, northern and western Europe, and Australia. Populous nations in the developed world with relatively low rates of HCV seroprevalence include Germany (0·6%), Canada (0·8%), France (1·1%), and Australia (1·1%). Low, but slightly higher seroprevalence rates have been reported in the USA (1·8%), Japan (1·5–2·3%), and Italy (2·2%)[10]**.** The prevalence of anti-HCV Saudi Arabia was (0.4%)[11], (0.3%) in Iraq[12]**,** (0.90%) in Brazil[13], (1.46%) in Cameron[14]. The latter data have allowed the Centres for Diseases Control and Prevention (CDC) to estimate nearly 4 million people are infected with HCV in the USA. Significantly higher rates of infection have been found in parts of Eastern Europe and Africa[15]**.** The prevalent rates of HCV were documented (1.7%) in Ghana[16], and in Egypt (3.5%)[17] and in Syria (3.8%)[18]. The virus is major concern in Algeria, Libya, Mauritania, Morocco, and Tunisia, where 1·2–1·9% of inhabitants are positive for anti-HCV antibodies[19]. The prevalence of HCV in Sudan (1.82%)[20] and in Ghana (0.9%)[21], and in Senegal (1.2%)[22].

Meager information regarding the prevalence and serotypes that infect people in /Yemen . the only documented information were reported from blood donors in in Sana'a and Aden and Hodeida and Hajjah and Ibb and Amran governorate. However, scientific reports on Hepatitis C Virus in the Yemen are very few. Basic data is important to develop an appropriate control strategy for prevention and treatment of HCV. Such data is spares in the Yemen Therefore, the present paper was planned to review the available reports on Hepatitis C Virus in the Yemen. For the current review, more than 34 sources including journals, books, annual reports were consulted.

CURRENT KNOWLEDGE OF HEPATITIS C VIRUS IN YEMEN

Hepatitis C Virus was reported in the Yemen since 1993 when Gunied and *et al.,* investigated 243 samples in Al-Thawra Hospital Taiz from province of the country. They reported an overall seroprevalen antibodies to hepatitis C (anti-HCV) were found in 2.1% healthy individuals[23]. This finding was supported by Al-Mazgagy *et al.*, 2014 in Ibb Governorate, Were the prevalence Hepatitis C Virus 2.1%[24].

Hepatitis C Virus was reported in the Yemen when Sallam *et al.,* 2003., investigated 494 blood donors from Aden, 493 blood donors from Sana'a, 97 residents from an African ethnic minority in Sana'a and 99 residents of Soqotra Island, the prevalence of HCV antibodies (0.6, 0.2, 5.2 and 5.1% respectively)[25].

In other study was conducted from April 1997 through to September 1999 in Hajjah governorate by Haider 2002, among healthy blood donors, The screened blood donors for HCV were 2434 with a prevalence of 1.1% for anti-HCV[26]. Study conducted on 6304 Yemeni volunteer blood donors revealed that the prevalence of HCV was 1.45 %, anti-HCV[27].

Recently, Al-Hadheq 2018 investigated 800 samples from the blood bank and clinical visitors. he reported an overall seroprevalence of Hepatitis C Virus were found in 2.8% among blood donors and clinical visitors (unpublished data)[28]. Figure (1). Show prevalence of Hepatitis C Virus in Yemen.

The risk factors in all review, blood transfusion Surgery, family history of jaundice, visit to dentists, parenteral injury, cupping were considered significant risk factors for transmission of hepatitis C virus. In the Middle East, the majority of infections occur through childhood and perinatal transmission[29]. In addition, hospital-acquired infection is very common in Yemen, and prevention is ultimately possible by applying standard policies of sterilization, disinfection and personal training to enforce this policy and ensure refinements in the screening of blood donors[30].

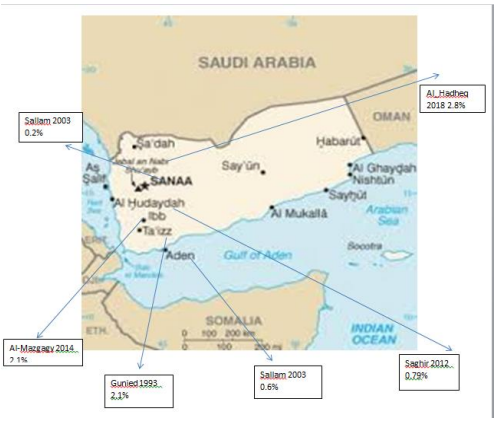

Figure (1). Show prevalence of Hepatitis C Virus in Yemen.

DIAGNOSTIC TECHNIQUES FOR HEPATITIS C VIRUS IN YEMEN:

Globally, the Main laboratory diagnostic tools utilized for Hepatitis C Virus infection are Immuno-chromatography techniques, serologic tests, molecular biology, this virus are usually detected by indirect methods. Accu-Tell Rapid Anti-HCV Test (rapid diagnostic test-cassette) for the qualitative detection of antibodies to hepatitis C virus (HCV) in human serum[31].

Anti-HCV antibodies can persist throughout life in patients with spontaneously resolving infection, although in some cases they may fall slowly, or disappear after several years in chronically infected patients, antibodies persist for life. They may become undetectable during hemodialysis or profound immunodepression[32].

Third-generation enzyme immunoassays (EIAs) detect mixed antibodies against HCV core, NS3, NS4 and NS5 antigens. The target antigens are coated on microliter plates, microbeads or holders designed for "closed" automated devices. The specificity of current more difficult to determine. In routine use, more than 99% of immunocompetent patients with detectable HCV RNA are positive with current EIAs[33].

Anti-HCV is the most important serological marker for identifying infection. It may not be detectable early in acute infection, but will develop in later serum samples. Anti-HCV is always present during chronic infection. In the presence of elevated liver tests, anti-HCV is highly specific and need not be confirmed by immunoblotting or HCV-RNA testing. However, in patients with normal liver enzymes, anti-HCV should be confirmed by one of these techniques[34].

The gold standard for genotyping is direct sequencing of the NS5B or E1 region. This is followed by sequence alignment with reference sequences and by phylogenetic analysis[35]. In practice, HCV is genotyped by direct sequence analysis, restriction fragment length polymorphism analysis, or reverse hybridization to genotype-specific oligonucleotide probes[35,36]. Two commercial kits are based on PCR amplification of the 5' noncoding region. The TrugeneTM HCV 5'NC genotyping kit (Bayer Corporation, Tarrytown, New Jersey) is based on direct sequencing of PCR amplicons and database interpretation. The INNO-LiPA HCV II line-probe test (Innogenetics, Gent, Belgium) is based on reverse hybridization of PCR amplicons, using a nitrocellulose strip coated with genotype-specific oligonucleotide

probes, and colorimetric determination. The six HCV types, and also many subtypes, can be identified with the two tests, although subtyping errors occur in 10% to 25% of cases because of variability in the target 5' noncoding region. However, clinical decision-making is solely based on the type, not the subtype[35,37].

Serological detection of antibodies Hepatitis C Virus was used in all of the reviewed papers documented for HCV infection in Yemen, used Enzyme Linked Immuno-Sorbent Assay (ELISA)[23,24,25,26,27].

PCR technique only appears in the work of Al_Hadheq in 2018 where they detected a prevalence rate of 2.8% from blood donors and clinical visitors (unpublished data)[28].

CONCLUDING REMARKS:

Hepatitis C Virus has well been studied world-wide including Asia. The virus, Hepatitis C Virus, that causes the hepatitis which belongs to the member of the RNA *Flaviviridae,* is considered to be of most important pathogen that emerges recently especially after blood transfusion. Although Hepatitis C Virus in the Yemen was recorded since 1993 , there are very few reports available. However, few, most of these reports were from Sana'a, Aden, Hajjah, Hodeida, Ibb, Taiz and Amran. The prevalence rate of Hepatitis C Virus infection in the Yemen is ranging from 0.2% to 2.8%. The prevalence rate of Hepatitis C Virus in the Yemen is lower than that reported in Egypt, Syria. Hospital-acquired infection is very common in Yemen, and prevention is ultimately possible by applying standard policies of sterilization, disinfection and personal training to enforce this policy and ensure refinements in the screening of blood donors The link between clinical data and rate of infection by HCV among study population in the all governorates, the risk factor surgery, family history of jaundice, visit to dentists, parenteral injury, cupping, blood transfusion were considered significant risk factors for transmission of HCV.

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