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Viral Hepatitis in Lebanon: Prevalence, Challenges, and Future Directions.

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INTRODUCTION

Viral hepatitis remains a significant global health challenge, affecting millions of individuals worldwide. In Lebanon, understanding the prevalence and impact of viral hepatitis is crucial, given its implications not only for the health and well-being of the Lebanese population but also for regional and global health security. The epidemiology of viral hepatitis in Lebanon has evolved over time, influenced by various socio-economic and political factors.

Historically, Lebanon has made substantial progress in combating viral hepatitis through public health initiatives, vaccination programs, and awareness campaigns. However, recent challenges, including the Syrian refugee crisis and the severe economic downturn, have posed significant obstacles. The influx of refugees has strained the healthcare system, leading to changes in disease dynamics and a resurgence of certain infectious diseases, including viral hepatitis. Additionally, economic instability has impacted healthcare infrastructure and accessibility, further complicating efforts to control and prevent the spread of viral hepatitis.

This review aims to provide a comprehensive overview of the prevalence, risk factors, and consequences of viral hepatitis in Lebanon. We will examine the epidemiological trends, identifying key populations at risk and the primary modes of transmission. Furthermore, this article will explore the efforts and initiatives undertaken by both governmental and non-governmental organizations (NGOs) to combat this silent epidemic. These efforts include vaccination programs, public health campaigns, and strategies for improving diagnosis and treatment.

Moreover, we will emphasize the crucial role of public awareness and education in the prevention and early diagnosis of viral hepatitis. Public understanding of the disease, its transmission, and prevention measures is essential in reducing incidence and improving health outcomes. By enhancing knowledge and fostering community engagement, Lebanon can make strides toward eliminating viral hepatitis as a public health threat. In summary, this review seeks to shed light on the current state of viral hepatitis in Lebanon, the multifaceted challenges faced, and the collective efforts needed to address this pressing health issue. Through a detailed exploration of epidemiological data, public health initiatives, and the role of education, we aim to provide a thorough understanding of the landscape of viral hepatitis in Lebanon.

HEPATITIS A VIRUS (HAV)

Over the past three decades, two major observations have emerged regarding Hepatitis A Virus (HAV) in Lebanon. Firstly, there has been a progressive shift in the age of infection from early childhood to adulthood (1). This epidemiological change has been primarily attributed to improvements in sanitary and socioeconomic conditions (2), resulting in an increase in susceptible young cohorts and thus an increased risk of severe and symptomatic HAV. The second observation concerns the clinical presentation of hepatitis A, which appears to evolve from asymptomatic or mild infection in children to symptomatic and sometimes severe infection in adults (3).

A 2015 study (4) showed that the prevalence of anti-HAV antibodies in the general population is estimated at 72%, with rates increasing with age, ranging from 60% among individuals aged 19 to 29 years to 91% among those aged 50 to 59 years. Previous Lebanese data indicated a gradual increase in the seroprevalence of anti-HAV antibodies with age: 11%, 28%, 57%, and 70% in subjects aged 1 to 5 years, 6 to 10 years, 11 to 15 years, and 16 to 20 years, respectively (5). These statistics underscore the changing epidemiology of HAV in Lebanon, highlighting the need for targeted public health interventions. According to data from the Epidemiological Surveillance Unit

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(ESU) of the Ministry of Health in Lebanon, between 2001 and 2014, 7,501 cases of hepatitis A were reported (6), with the majority occurring in rural areas.

Lebanon has witnessed several hepatitis A outbreaks over the past three decades, with the average annual number increasing from around 300 cases between 2001 and 2012 to 2,600 cases in 2013, particularly in the Northern and Bekaa governorates (7). A resurgence of the hepatitis A epidemic was noted in Lebanon in 2022, with 609 reported symptomatic cases (8,9), most of which were residents of the aforementioned governorates (9), especially young individuals; 32.5% were aged 10 to 19 years and 29.8% were aged 20 to 39 years (9).

The possible causes of this epidemic are multifaceted. Firstly, the immigration of Syrian refugees seeking shelter and their settlement in camps may have increased the risk of disease (10). Poor sanitation, unsafe water supply, and substandard housing conditions in the camps are factors that could contribute to the rapid spread of HAV. Secondly, the current economic crisis affecting Lebanese society is a significant factor contributing to the increase in cases. Lebanon faces severe economic challenges that have repercussions on the standard of living of the population: more than half currently live below the poverty line (11,12). As a result, living conditions are deteriorating, and people are grappling with shortages of several essential medicines and vaccines, including the HAV vaccine (13). Additionally, poor infrastructure and widespread pollution (11)further exacerbate the risk of contracting HAV.

Given these challenges, Lebanese health authorities must intensify their efforts in monitoring and preventing hepatitis A. Ensuring the accessibility and sustainability of a clean water supply, adequate health infrastructure, and vaccination are crucial interventions to contain and prevent the spread of HAV during this challenging period of economic crisis and the influx of refugees into Lebanon. Currently, vaccination against HAV is not included in the Lebanese Ministry of Health's vaccination schedule, and the main obstacle to the nationalization of this vaccine is primarily financial.

To address this gap, it is imperative for international organizations and local authorities to collaborate on securing funding and resources for HAV vaccination programs. Public health campaigns should also focus on educating the population about preventive measures and the importance of maintaining hygiene and sanitation standards.

In conclusion, while significant strides have been made in improving the sanitary and socioeconomic conditions in Lebanon, the evolving epidemiology of HAV, compounded by external challenges such as the refugee crisis and economic instability, necessitates a robust and coordinated public health response. By addressing these issues comprehensively, Lebanon can work towards mitigating the impact of HAV and protecting the health of its population.

HEPATITIS E VIRUS (HEV)

Hepatitis E Virus (HEV) is an emerging public health concern globally, particularly in regions with poor sanitation and limited access to clean water. HEV is typically transmitted through the fecal-oral route, often via contaminated water or food. While HEV infection is usually self-limiting, it can lead to severe complications in certain populations, such as pregnant women and immunocompromised individuals.

In Lebanon, very limited data are available regarding the presence and prevalence of HEV. An early study conducted among blood donors revealed the presence of antibodies against HEV in 4% of them(14). This finding suggests a baseline level of exposure to the virus in the general population, though the overall risk remains unclear.

Further insights come from a study indicating that the prevalence of anti-HEV immunoglobulin G (IgG) is 0.22% among pregnant women (15). While this rate appears low, it is important to recognize that pregnant women are at a higher risk of severe complications from HEV infection, including fulminant hepatitis and increased maternal and fetal mortality rates. Therefore, even a small prevalence in this group warrants attention and preventive measures.

The prevalence of anti-HEV IgG rises significantly to 21.63% among hemodialysis patients (16). This high prevalence rate is concerning, as it highlights a vulnerable population with an increased risk of HEV infection, potentially due to compromised immunity and frequent exposure to blood products. The elevated prevalence in this group underscores the need for targeted screening and preventive strategies in healthcare settings.

The limited data on HEV in Lebanon point to a need for comprehensive epidemiological studies to better understand the virus's spread and impact. Additionally, public health initiatives should focus on improving sanitation and access to clean water, which are critical measures in preventing HEV transmission.

In conclusion, while the current data on HEV in Lebanon are sparse, the available studies indicate potential exposure and risk in specific populations. Further research is necessary to elucidate the epidemiology of HEV in Lebanon and to inform public health strategies aimed at reducing the burden of this virus. Enhanced surveillance, improved sanitation, and targeted preventive measures for high-risk groups, such as pregnant women and hemodialysis patients, are essential steps in addressing HEV in Lebanon.

HEPATITIS B VIRUS (HBV) AND HEPATITIS D VIRUS (HDV)

Hepatitis B Virus (HBV) and Hepatitis D Virus (HDV) are significant public health concerns in Lebanon. Numerous

studies have examined the incidence and prevalence of hepatitis B in Lebanon since 1972 (17), showing a rise in prevalence from less than 2% to over 3% (18). A recent national study (19) indicates a hepatitis B prevalence of 1.74% in Lebanon, with the highest rates in the Southern and Nabatieh governorates. The majority of HBV-seropositive individuals are aged 20 to 59 years (19), with a slight difference between men and women (52% versus 48%).

Epidemiology and Risk Factors

Several interventions, including HBV vaccination of all newborns since 1998, prenuptial screening since 1994, and awareness campaigns, have contributed to reducing the prevalence of hepatitis B over the past three decades. Among blood donors, the prevalence of HBV varies from 0.9% to 1.6% (20, 21). Among detainees, the prevalence of hepatitis B surface antigen (HBsAg) is estimated at 2.4% (22), with risky practices such as tattooing outside of prison and anal sex being common. Among drug users, the prevalence of HBV was initially 0% (23), but a recent study conducted on 250 subjects in this population revealed an HBsAg prevalence of 1.2% (24).

A biobehavioral surveillance study on men who have sex with men (MSM) and female sex workers showed an HBsAg prevalence of 0.99% among MSM, while it was 0% among female sex workers. Notably, 30% of female sex workers were immunized against HBV, compared to only about 10% of MSM (25). Among hemodialysis patients, a 2007 study reported a prevalence of 2.62% HBsAg in 17 dialysis centers in Lebanon. A more recent study in 2016 showed a decrease in prevalence to 1.6%, with high variability (from 0 to 15%) between the 53 centers, and HBV incidence was estimated at 0.27 per 100 patient-years (23).

Genotypes and Coinfections

The isolated presence of anti-HBc among blood donors was 2.2%, nearly 4 times the positivity rate of HBsAg (0.6%) (26). A higher prevalence of occult HBV infection among HBV-infected patients for anti-HBc alone is noted, ranging from 11.9% to 44.4% (27). Genotype D predominates in Lebanon (100%) (ayw serotype), with 83% of the population having the dominant sub genotype D1 and 17% in minority with sub genotype D2 (28).

The prevalence of "delta" antibodies among Lebanese patients and HBsAg-positive blood donors is 1% [29], in contrast to a previous report from Lebanon where VHD infection was observed in 40% of patients with active chronic hepatitis [30]. Parallel to HBV genotype D, HDV genotype I appears to be the only one observed in this country's population [29].

Clinical Impact and Challenges

Regarding the stage of liver fibrosis in patients with chronic hepatitis B, 60.7% of them were at stages F0-F2, 11.2% at stage F4, 10.1% at stages F3-F4, 10.1% at stages F2-F3, and 7.8% at stage F2 (32). It is noteworthy that HBV is responsible for 48% of hepatocellular carcinomas in Lebanon (32).

Despite recommendations from the Lebanese Society of Gastroenterology and Hepatology and the Lebanese Society of Infectious Diseases regarding screening, prevention, vaccination, and treatment of HBV, their implementation is becoming increasingly challenging due to the current economic crisis. The economic challenges have affected healthcare infrastructure, leading to shortages of essential medicines and vaccines, which impedes effective disease management and control.

Public Health Recommendations

To address the ongoing challenges posed by HBV and HDV, it is crucial for Lebanese health authorities and international partners to intensify efforts in several key areas:

- **Enhanced Surveillance:** Improve data collection and monitoring systems to obtain accurate and up-to-date information on HBV and HDV prevalence and incidence.
- **Vaccination Programs:** Ensure the sustainability and accessibility of HBV vaccination programs, particularly for newborns and high-risk populations.
- **Public Awareness Campaigns:** Increase awareness about HBV transmission, prevention, and the importance of vaccination through targeted education campaigns.
- **Screening and Treatment:** Expand screening programs to identify and treat HBV-infected individuals early, reducing the risk of liver complications and transmission.
- **Healthcare Infrastructure:** Strengthen healthcare infrastructure to ensure adequate supply of essential medicines and vaccines, even amidst economic challenges.

In conclusion, while Lebanon has made significant progress in reducing HBV prevalence through vaccination and public health initiatives, the ongoing economic crisis and influx of refugees pose substantial challenges. A coordinated and sustained effort is needed to address these issues and protect the health of the Lebanese population.

HEPATITIS C VIRUS (HCV)

Several studies have assessed the distribution of HCV in Lebanon over the years. In 2002, the prevalence of hepatitis C in the country was estimated at 0.7%, with no significant difference in terms of gender or age groups . However, according to N. Irani-Hakime et al (33). the prevalence rates of hepatitis C were found to be higher in women than in

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men (0.8% versus 0.45%) between 1997 and 2003. According to a national awareness campaign in 2007, the prevalence of hepatitis C was 0.48% (unpublished data). A more recent epidemiological study, published in 2016, showed a low prevalence of HCV of 0.21% (19). This prevalence varies by governorate, estimated at 0.61% in the Nabatieh area, 0.26% in Beirut, and 0.08% in Mount Lebanon, with a male-to-female sex ratio of 0.85 (19).

Prevalence and High-Risk Groups

Among 16,084 blood donors (14,993 men with a mean age of 31.7 years and 1,084 women with a mean age of 31.4 years) during the period 1997-2003, the prevalence of HCV was 0.404%, showing a consistent decline in anti-HCV rates, which decreased from 1.22% in 1997 to 0.16% in 2003 (33). Another study, which also included hemodialysis patients and drug users, estimated the prevalence of HCV at 0.23%, 13%, and 31%, respectively (23). Among drug users, it varied over time; earlier studies estimated it at 52.8% (34), while a recent multicenter study showed an HCV rate of 15.6% among 250 drug users (24).

A study conducted in various hemodialysis centers in Lebanon showed an HCV prevalence of 4.7% (23). Among detainees, the prevalence was 3.4% (22), which significantly increased to 28.1% in subsequent years (35). Previous incarceration history and intravenous drug injection were found to be independent risk factors for HCV infection in this population.

Epidemiological Surveillance and Transmission

According to data from the Epidemiological Surveillance Unit (ESU), there were a total of 1,333 new cases of HCV reported between 2005 and 2019, with males accounting for 74.5% of the cases. Additionally, 34.2% and 28.2% of these new cases belonged to the age groups of 20-39 years and 40-59 years, respectively. The incidence varied between 1.25 and 1.7 per 100,000 individuals (36), reflecting fluctuations over time. A low incidence of HCV is noted in hemodialysis centers (0.37 per 100 patient-years) (20). The most common modes of transmission are intravenous drug use and blood transfusion, followed by hemodialysis (24). Vertical and sexual transmissions are less common, accounting for 0.2% and 0.3% of transmission cases, respectively (37).

Genotypes and Clinical Impact

Nationally, genotype 1 of HCV is the most frequently observed, followed by genotype 4 (34, 35, 37-39). Genotype 3 is most commonly observed among drug users and prisoners. Among thalassemia patients, genotype 4 represents 35% to 50% of cases, followed by genotype 1 (20% to 30%) (40-42). Among hemodialysis patients, genotype 1 accounted for 62% of cases (37).

A recent study shows that in nearly 65.5% of new HCV cases diagnosed in adults over 40 years old, they had moderate to severe liver fibrosis (43). Introducing anti-HCV treatment at such advanced stages of fibrosis would have less impact on survival, while initiating treatment at a very early stage of the disease could improve survival and reduce hepatic and extrahepatic complications. A study conducted to assess the burden of HCV in the Lebanese population, as well as the effectiveness of screening and medical management across different age groups and stages of liver fibrosis, demonstrates that adopting an intensive screening policy coupled with broader access to direct-acting antivirals (DAAs) would decrease the future burden of HCV in the Lebanese population, yielding better health outcomes for adults of all ages and a net reduction in costs (44).

Public Health Efforts and Challenges

The Ministry of Health has implemented a drug assistance program, offering free anti-HCV treatment to all Lebanese citizens without medical coverage. The criteria are based on recommendations from professional societies, which also develop periodic monitoring to to assess virological response and treatment outcome. The first real-world Lebanese data on HCV treatment with DAAs show a sustained virological response at 12 weeks (SVR12) of 93%. It's noteworthy that 50% of treated patients had cirrhosis, and 42% were not treatment-naïve [45]. Furthermore, real-world experience with HCV treatment with DAAs in hemodialysis patients shows an SVR12 of 95% [46].

A major obstacle to HCV elimination is the absence of a national screening and prevention plan, particularly for individuals over 40 years old. It's notable that HCV serology is mandatory as part of prenuptial screening. In hemodialysis patients, HCV serology is performed every 6 months. While semi-annual screening is recommended for drug users and detainees, there is currently no national needle exchange program in place. "Currently, NGOs have overseen all these programs, with the majority of awareness campaigns receiving minimal government support [47].

CONCLUSION

As Lebanon grapples with the multifaceted challenges posed by viral hepatitis, urgent action is needed to address the evolving landscape of disease burden. While strides have been made in prevention, diagnosis, and treatment, the persistence of socioeconomic disparities and external pressures necessitate innovative approaches and sustained investment. By leveraging advancements in vaccination, treatment modalities, and public health infrastructure, Lebanon has the opportunity to significantly impact the trajectory of viral hepatitis. However, success will hinge on collaborative efforts between government agencies,

healthcare providers, and civil society to ensure equitable access to care and mitigate the impact of external stressors. Embracing this collective responsibility, Lebanon can emerge as a regional leader in hepatitis control, safeguarding the health and well-being of its population and contributing to global efforts towards disease elimination.

Significant efforts in prevention, diagnosis, and treatment of viral hepatitis have been made in Lebanon, leading to favorable changes in epidemiology. Ambitious projects have been implemented to eradicate HCV and vaccinate all newborns against HAV and HBV, as well as at-risk groups. However, the severe economic crisis and the influx of Syrian refugees have complicated the implementation of these initiatives. These factors have led to increased hepatitis A outbreaks and hindered access to essential medications and vaccines for hepatitis B and C.

To move forward, Lebanon must prioritize the following strategies:

1. Strengthening Public Health Infrastructure: Ensuring clean water supply, improving sanitation, and upgrading healthcare facilities are essential to prevent hepatitis A outbreaks, especially in vulnerable populations like refugees.
2. Enhancing Vaccination Programs: Incorporating HAV vaccination into the national immunization schedule and maintaining robust HBV vaccination coverage are critical steps. Financial obstacles to nationalizing these vaccines must be addressed through international aid and local investment.
3. Expanding Screening and Treatment Access: Implementing nationwide screening programs for HBV and HCV, particularly for high-risk groups such as drug users, prisoners, and hemodialysis patients, will facilitate early diagnosis and treatment. Broadening access to direct-acting antivirals (DAAs) for HCV and ensuring the availability of HBV treatments are also vital.
4. Promoting Public Awareness and Education: Continuous public awareness campaigns are needed to educate the population on prevention, early diagnosis, and treatment options for viral hepatitis. These efforts should be supported by both government and non-governmental organizations.
5. Addressing Socioeconomic Determinants: Tackling the root causes of health disparities, such as poverty and inadequate living conditions, will be crucial in reducing the burden of viral hepatitis. Social support programs and economic reforms can mitigate the impact of the current crisis.

In conclusion, while Lebanon faces significant challenges in controlling viral hepatitis, a coordinated and comprehensive approach can lead to substantial progress. By embracing collective responsibility and focusing on sustainable interventions, Lebanon can enhance its public health outcomes and contribute to the global fight against viral hepatitis.

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