INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH AND INNOVATIVE STUDIES
ISSN: 2820-7157
www.ijsrisjournal.com

October 2024 **Volume 3** **Number 5** **Pages 114-117**

Received Date: September 14, 2024 **Accepted Date:** October 12, 2024 **Published Date:** November 13, 2024

Available Online at https://www.ijsrisjournal.com/index.php/ojsfiles/article/view/232

Hepatitis C Infection: Routes of Transmission and Inheritance: A Comprehensive Review

Jafer Ibrahim Albahrani[1], Horiya Abdulrazzaq Ali Al Eid[2], Anaam Hassan Alshakes[3], Yousef Ali Alnahwi[4], Jumanah Hassan Almubarak[5], Abdulelah Abdulaziz Alhumaid[1], Mohammed Abdullah Alhussain[1], Rabab Ali Almarzooq[6], Shaa Goma Altoreef[7], Noor Hassan Almubarak[8], Maryam Ali Alabbad [6], Kharyah Abdullah Abdulrhman [9], Abdulmonem Ali Albarakat[10], Entessar Abdulhamid Jassem Aljadi[11], Shekah Hamad Alrajih[12]

1.Al-hasa branch of the ministry , Saudi Arabia.
2.Pschiatry hospital , Saudi Arabia.
3.Al-hasa P.H.C Alfadaliyah ,Ministry of Health , Saudi Arabia.
4.Al-hasa P.H.C Harath , Saudi Arabia.
5.Alsalhyah phc , Saudi Arabia.
6.Al matairfi phc , Saudi Arabia.
7.Altholathia phc , Saudi Arabia.
8.King Faisal general hospital , Saudi Arabia.
9.Health Culster in Alhasa , Saudi Arabia.
10.ERADAH AND MENTAL HEALTH COMPLEX IN Adammam , Saudi Arabia.
11.Maternity Children alahsa, , Saudi Arabia.
12.Alkilabia PHC , Saudi Arabia.

ABSTRACT

Hepatitis C Virus (HCV) infection is a global public health issue, affecting millions worldwide. This comprehensive review explores the primary routes of transmission, including blood borne exposure, medical procedures, unsafe injection practices, and vertical transmission. The review also discusses the potential genetic predisposition or familial clustering, analyzing the extent to which inheritance plays a role in the susceptibility to HCV. Although no direct inheritance of the virus occurs, genetic variations in host immune response may influence infection outcomes. Understanding the interplay between transmission pathways and genetic factors is crucial for effective prevention, treatment, and policy development.

Keywords: Hepatitis C Infection, Routes of Transmission, Inheritance.

1. Introduction

Hepatitis C is a bloodborne viral infection caused by the Hepatitis C Virus (HCV), a single-stranded RNA virus. According to the World Health Organization (WHO), approximately 58 million people globally live with chronic HCV infection, with 1.5 million new infections annually(1). HCV is a major cause of chronic liver diseases, including cirrhosis and hepatocellular carcinoma. Identifying transmission routes and understanding genetic susceptibility are essential for controlling the epidemic.

2. Routes of Transmission

2.1. Bloodborne Transmission

HCV is primarily transmitted through direct blood-to-blood contact. Key pathways include:

- **Unsafe Injection Practices**

- Intravenous drug use is the leading cause of HCV transmission globally, accounting for 60% of new infections in high-income countries (2,3).

- **Medical Procedures**

- Poorly sterilized medical equipment and unsafe blood transfusions remain significant risks, especially in low- and middle-income countries. The introduction of blood screening has drastically reduced this risk in developed nations.

2.2. Sexual Transmission

Although less efficient, sexual transmission occurs, particularly among individuals with multiple partners or coinfections such as HIV. Transmission risk increases with the presence of genital ulcers or bleeding (4,5).

2.3. Vertical Transmission

Vertical transmission from mother to child during childbirth occurs in 5–7% of HCV-infected pregnancies. Coinfection with HIV raises the risk significantly (6). However, breastfeeding is not considered a route of transmission unless nipple bleeding is present.

2.4. Nosocomial and Occupational Exposure

Healthcare workers are at risk due to accidental needlestick injuries. The risk of seroconversion following a single needlestick injury ranges from 1.8% to 3%(7).

2.5. Other Routes

- **Tattooing and Piercing:** Unregulated practices with unsterilized equipment pose a risk.

- **Household Contact:** Sharing items such as razors or toothbrushes can facilitate transmission, although the risk is relatively low.

3. Inheritance and Genetic Factors

3.1. Lack of Direct Inheritance

HCV itself is not inherited. However, familial clustering of HCV infections has been observed, primarily due to shared environmental factors, such as unsafe medical practices or shared drug paraphernalia.

3.2. Genetic Susceptibility

Certain genetic polymorphisms may influence HCV infection outcomes:

- **IL28B Gene**

- Variants of the IL28B gene (encoding interferon lambda 3) significantly impact spontaneous viral clearance and treatment response .(8)

- **HLA Alleles**

- Specific human leukocyte antigen (HLA) genotypes are associated with better immune responses to HCV, influencing disease progression(9,10).

3.3. Vertical Transmission and Genetic Interplay

Although HCV is transmitted perinatally rather than genetically, host genetics may determine the likelihood of successful immune control in the infant. Research into maternal-fetal genetic interactions is ongoing (11).

4. Prevention and Control

4.1. Public Health Interventions

- **Harm Reduction Programs**

- Needle exchange programs and opioid substitution therapy reduce the risk of transmission among drug users.

- **Safe Medical Practices**

- Strengthening infection control policies, especially in resource-limited settings, is critical.

- **Blood Screening:** Universal screening of blood donors has nearly eliminated transfusion-related HCV in high-income countries.

4.2. Vaccination Challenges

Unlike Hepatitis A and B, no vaccine is available for HCV due to its high genetic variability and rapid mutation rate. Efforts to develop a vaccine are ongoing.

4.3. Vertical Transmission Prevention

- Antiviral therapy during pregnancy may reduce maternal viral load and transmission risk.

- Cesarean delivery is not routinely recommended to prevent transmission unless warranted by obstetric factors (12).

5. Treatment Advances

The advent of direct-acting antivirals (DAAs) has revolutionized HCV treatment, achieving cure rates exceeding 95% with minimal side effects. Early identification of at-risk individuals and timely treatment are crucial for preventing complications and reducing transmission.

6. Knowledge Gaps and Future Research

While much is known about HCV transmission, areas requiring further exploration include:

- The role of genetic predisposition in vertical and sexual transmission.

- Long-term outcomes in children born to HCV-infected mothers.

- Development of effective vaccines targeting conserved viral epitopes.

Conclusion

HCV transmission occurs primarily through bloodborne pathways, with additional risks from vertical and sexual transmission. While inheritance does not play a direct role, genetic factors influence disease outcomes and immune responses. Prevention efforts focusing on harm reduction, safe medical practices, and early treatment are vital for controlling the epidemic. Future research into genetic susceptibility and vaccine development will further enhance our ability to combat HCV.

References

1.WHO. Vol. 164, WHO Fact sheet. 2011. WHO | Hepatitis C. Reid M, Price JC, Tien PC. Hepatitis C Virus Infection in the Older Patient. Vol. 31, Infectious Disease Clinics of North America. 2017.
2.Hajarizadeh B, Grebely J, Dore GJ. Epidemiology and natural history of HCV infection. Vol. 10,
3.Nature Reviews Gastroenterology and Hepatology. 2013.
4.Terrault NA. Sexual activity as a risk factor for hepatitis C. In: Hepatology. 2002.
5.Vandelli C, Renzo F, Romanò L, Tisminetzky S, De Palma M, Stroffolini T, et al. Lack of evidence of sexual transmission of hepatitis C among monogamous couples: Results of a 10-year prospective follow-up study. American Journal of Gastroenterology. 2004;99(5).

6.Benova L, Mohamoud YA, Calvert C, Abu-Raddad LJ. Vertical transmission of hepatitis C virus: Systematic review and meta-analysis. Clinical Infectious Diseases. 2014;59 (6).
7.Knight LL, Wagner K, Leyva Y, Bruce VR, White KAM, Talamantes YS, et al. Talking About Hepatitis C: FAQs From Young Adults Who Inject Drugs. Health Promot Pract. 2018;19 (6).
8.Ge D, Fellay J, Thompson AJ, Simon JS, Shianna K V., Urban TJ, et al. Genetic variation in IL28B predicts hepatitis C treatment-induced viral clearance. Nature. 2009;461 (7262).
9. Neumann-Haefelin C. [Protective role of HLA-B27 in HIV and hepatitis C virus infection]. Dtsch Med Wochenschr. 2011;136 (7).
10.Crux NB, Elahi S. Human Leukocyte Antigen (HLA) and immune regulation: How do classical and non-classical HLA alleles modulate immune response to human immunodeficiency virus and hepatitis C virus infections? Vol. 8, Frontiers in Immunology. 2017.
11.Tosone G, Maraolo AE, Mascolo S, Palmiero G, Tambaro O, Orlando R. Vertical hepatitis C virus transmission: Main questions and answers. Vol. 6, World Journal of Hepatology. 2014.
12.Cottrell EB, Chou R, Wasson N, Rahman B, Guise JM. Reducing risk for mother-to-infant transmission of hepatitis C virus: A systematic review for the U.S. preventive services task force. Vol. 158, Annals of Internal Medicine. 2013