

HCV Genotypes and Risk factors; Current Scenario in Pakistan

Muhammad Irfan^{1*}, Zahid Anwer¹, Muhammad Naveed¹, Hafsa Ayub¹, Maryam Amman¹

¹Department of Biochemistry and Molecular Biology/Biotechnology, University of Gujrat, Gujrat, Pakistan

Received: 01.Aug.2016; Accepted: 18.Aug.2016; Published Online: 30.Aug.2016

*Corresponding author: Muhammad Irfan; Email: muhammad.irfan@uog.edu.pk



Abstract

Worldwide, there are about 3.3 % victims of Hepatitis C virus. Burden of the disease is increasing at alarming rate in developing countries like Pakistan. Prevalence rate of Hepatitis C (HCV) in Pakistan is from 4.5% to 8 % (about 10 million people), that is second highest in the world. The aim of this article is to discuss the HCV genotypes and factors responsible for its transmission in Pakistan. Literature regarding topic was searched from *Pubmed* and *PakMediNet* using key words; Hepatitis C virus, Factor responsible for HCV transmissions and HCV genotypes in Pakistan. Thirty-Five studies were included and discussed in this article and it was found that Genotype 3a was most prevalent genotype in Pakistani population. The data revealed that main causes of HCV transmission in the country are; injectable drug addictions, habits of visiting barbers shops for shave purposes, unscrupulous blood transfusion, multiple uses of single needle or syringe and dental operational procedures performed by quacks and non-professionals. In Pakistan, there is a dire need of awareness programs regarding HCV transmission to reduce the disease burden.

Keywords: HCV and Pakistan, Transmission, Prevalence, Blood transfusion, Genotypes.

To cite this article: Irfan, M., Anwer, Z., Naveed, M., Ayub, H., Amman, M., 2016. HCV Genotypes and Risk factors; Current Scenario in Pakistan. *PSM Biol. Res.*, 01(S1): S1-S5.

INTRODUCTION

Hepatitis C virus was named as non-A, non-B hepatitis when it was discovered in 1989 (Choo *et al.*, 1989). It is a plus-stranded RNA virus from *Flaviviridae* family (Lindenbach *et al.*, 2001). Recently, about 115 million people are infected with HCV globally (Platt *et al.*, 2016). Almost 50% to 80% HCV positive population are chronic. According to WHO, there are about 700,000 reported deaths annually due to HCV or related liver diseases (WHO, 2016).

Pakistan is a developing country with one hundred and seventy million people living in poor health condition as well as poor education status. According to UNO-HDI report, Pakistan was ranked 134th (human development index) out of 174 countries of the world (Hamid *et al.*, 2004) and almost 10 million people were infected with HCV. Health sector is spreading awareness regarding HCV infection by broadcasting program through Television and radio, but still these programs are not enough to eradicate the HCV transmission. Like other developing countries, Pakistan has no proper legislation, SOPs and monitoring bodies available to control the problems regarding blood transfusion, multiple uses of same syringe, piercing of ear and nose by the single needle, drug addictions, visiting barbers for shaving and circumcision purposes, tattooing and non-autoclaved

surgical/dental tools (Raja *et al.*, 2008; Akhtar *et al.*, 2009). Due to HCV high prevalence rate and its increasing risk day by day, this review briefly highlight the genotypes and factors responsible for HCV infection in Pakistan.

HCV- Genotypes

There are 11 different genotypes of HCV out of which 6 are the major types which are further sub divided into many sub-types (Zein *et al.*, 1996). A study conducted in 1997 reported that 87% of the HCV positive patients were with genotype 3 in Pakistan (Shah *et al.*, 1997). A study conducted in 2004 resulted in report that 75% to 90% of Pakistani HCV victims were with genotype 3a (Hamid *et al.*, 2004). Another study reported in 2006 that seventy three percent of victims had genotype 3 whereas only 10% had genotype 1 (Qazi *et al.*, 2006). A study results declared in 2007 reported that 9.5 % of HCV positive Pakistanis were with genotype 1 and almost 81% with genotype 3 (Ahmad *et al.*, 2007). In next two year, research resulted in the reports that 51% of hepatitis C victims had genotype 3a; twenty four percent were with co-infection of 3a/3b and sixteen percent were with 3b genotype (Hakim *et al.*, 2008; Afridi *et al.*, 2009). In an elaborated and comprehensive study, genotyping done on more than three thousand samples resulted that 3a genotype is most prevalent in Pakistani population (Idrees *et al.*, 2008). Next few years' research on the topic was with almost similar results regarding HCV

genotypes. Khan *et al.* (2014) conducted a study on eighteen hundred Hepatitis C RNA positive samples and declared genotype 3a as top prevalent followed by genotype 2a. A study done in 2015 revealed that along with genotype 3 (72.9%), genotype 2 (18.8%) is also major contributing genotype, then genotype 1 with about 7.5% and finally genotype 4 (0.9%) (Baig *et al.*, 2015). Umer *et al.* (2016) conducted study on sub types of genotype 3 and reported that HCV genotype 3a continued to be at the top position (73.8%), 3b at second number (25.2%) and 3c (0.9%) at third position regarding their prevalence ratio in Pakistan.

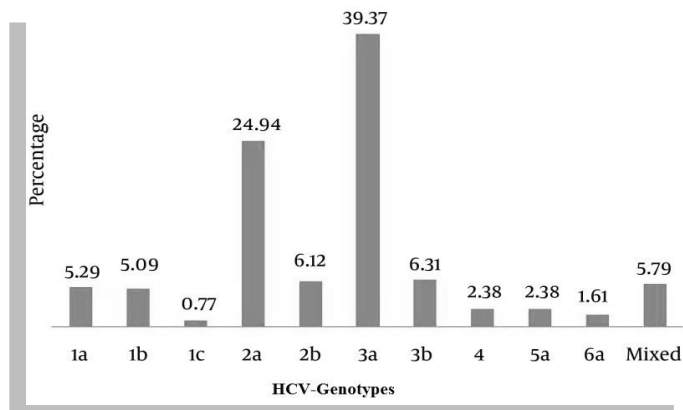


Fig. 1. HCV- Genotypes distribution in Pakistan (Khan *et al.*, 2014)

FACTORS RESPONSIBLE FOR HCV TRANSMISSION

Non-sterilized and unnecessary needles

Unfortunately, lot of Pakistani population is experiencing multiple uses of single syringe, which is the main factor responsible for HCV transmission (Khan *et al.*, 2000; Simonsen *et al.*, 1999). It was surprise to see that various small business groups were involved in collection and repacking of used syringes without sterilization. Customers were unable to distinguish between new sterilized and unsterilized repacked syringes (Abdul *et al.*, 2003). It was reported in a study that out of sixty five percent persons who received injections in last 90 days of two districts of Pakistan, only fifty four percent received the freshly opened syringes (Janjua *et al.*, 2005). A report on sharing of syringes in Sukkur and Hyderabad (two district of Pakistan) revealed that reuse of syringes was 34% and 8% respectively (Altaf *et al.*, 2009).

In Pakistani population, there is high trend of receiving injections rather than oral medication. It ranked highest in developing countries list with range of 8.2 to 13.6 injections per person per year out of which about 95% were unnecessary (Altaf *et al.*, 2007). In general population, a person who receive 4 injections annually, has eleven percent more chances to get HCV infection than person who did not receive injection (Pasha *et al.*, 1999). If oral and injectable medicine has similar beneficial effects then forty four percent of Pakistani population preferred injectable.

Over use of injectable medicine was discouraged by WHO and it was recommended that countries should formulate legislation regarding awareness in the population to not prefer injectable over oral medicines, to ensure provision of sterile surgical and dental instruments, and to properly manage medical waste (WHO, 2000). This was found to be high risk for the scavengers of getting HCV infection who are searching desired things from waste material (Abdul *et al.*, 2003).

Blood transfusion

Pakistan is a developing country with prevailing conditions like unhealthy life style, anemic conditions in pregnancies, injuries and road accidents etc. In these circumstances, blood transfusion becomes ultimate option to save the lives. WHO office in Pakistan declared that about 1.4 million blood transfusions are done in country every year (WHO, 2009). If blood is not screened properly for different infectious agents, the situation can become even adverse. A study conducted in 2000 reported that about half of the total blood banks in Karachi received blood from professional paid blood donors and quarter of the donation was from volunteers. Blood banks screened only 23% blood for HCV and about 30% blood store was without recommended temperature (Luby *et al.*, 2000).

In Pakistani population, blood transfusion is mainly from relatives and friends. Unfortunately, there is a trend to hide the disease conditions before relatives and friends; hence, pathogen born blood may have been donated. For safe blood donation, blood screening is compulsory and safe blood is that which is screened for multiple times (Choudhry *et al.*, 2007). Government of Pakistan in collaboration with German government started the blood safety systems reforms for Pakistan in 2010 which was a positive initiative to control blood transfusion. The need is to discourage the paid blood donation (Zaheer *et al.*, 2014). These problems can be solved by proper legislation and reforms in blood transfusion systems.

Barbers

In Pakistan like other developing countries, it was reported that most of the barbers were unaware of the HCV transmission knowledge (Khaliq *et al.*, 2005). A study conducted in barber community resulted that only thirteen percent of the barber community knew about the hepatitis C and the fact that it can be transmitted by infected razors; only eleven percent from them were washing razors with antiseptic solution while forty-six percent were re-using razors without washing with antiseptic solutions (Janjua *et al.*, 2005). In 2008, it was reported that forty-two percent of barbers knew about hepatitis, ninety percent did not properly clean their hands, and sixty-six percent did not change towels for new person. Circumcision (an important religious task) is also done by barbers in rural areas mainly who were unaware from the fact that HCV transmission could be through their contaminated tools (Wazir *et al.*, 2008). It was reported in a study that 48% and 70% of HCV victims were with history of arm pit and facial shave respectively (Bari *et*

al., 2001). Unfortunately, ninety-three percent of the barbers under study from district Gujrat, Pakistan, had no knowledge about the danger of multiple uses of shaving instruments on different customers (Wazir *et al.*, 2008). Besides this, drug abusers are also common factors in acquiring hepatitis C in Pakistan. Further, elaborated study was done in 2011 and it was revealed that along with razors, Potassium alum is another major contributing factor regarding HCV transmission. Seventy-five percent of barbers were rubbing same Potash Alum stone on cut resulted by facial shave which was major risk factor for HCV transmission (Waheed *et al.*, 2011). Fortunately, recent studies are depicting that situation is going in good direction, perhaps due to better implementation of awareness program and monitoring policies. In a recent study done on fifty roadside barbers of Karachi city, sixty-eight percent were reported to have basic knowledge of HCV infection and ninety-two percent were changing their razor blades for every new customer (Ahmed *et al.*, 2015).

Awareness Regarding HCV Transmission

There was little to moderate knowledge regarding HCV infection among Pakistani population while awareness regarding factors transmitting HCV infection was very poor (Alam *et al.*, 2006; Khuwaja *et al.*, 2002; Talpur *et al.*, 2007). A survey conducted in Karachi on community with some educational background revealed that about sixty-one percent participants believed that HCV infection was a viral infection, 49% knew that this infection can be transmitted through infected surgical apparatus and syringes. About five percent believed that it could be spread by ear and nose piercing, and twenty one percent believed that it can cause cancer (Khuwaja *et al.*, 2002). In 2008, it was reported by the study findings that HCV related knowledge was directly related to educational level of community (Zuberi *et al.*, 2008). A study conducted in Abbottabad, resulted that most of community of city still lack basic information regarding HCV and its transmission (Azhar *et al.*, 2016). Using electronic and print media, mass level awareness programs are required to teach the community regarding HCV basic knowledge. Moreover, basic information regarding high mortality rate of HCV should be included in primary and secondary school education syllabus to minimize the future burden of these diseases.

Financial Conditions

Pakistan is a developing country and majority of the population living in rural areas is poor. In the country, poverty rate is about 18% and about 25% population considered as poor (Haider, 2009). Only elite class can afford education and good health facilities, rest of the population has no access to these facilities. Ultimately, poor segment of community is deprived regarding basic awareness and medical facilities. Those who are unable to afford such services, generally make appointment with quacks and unqualified medical professionals for their medical checkups. This can result in loss of money and

delay in proper treatment, both of which lead to aggravation of HCV.

CONCLUSION

The article reviewed that HCV genotype 3 continued to be top prevalent genotype in Pakistani population. Recent data revealed that along with genotype 3, genotype 2 is also emerging in the country. Personal history of the HCV victims revealed that majority of them visited barber for shaving purposes and “quacks dental clinics” for teeth extraction/cavity filling purpose, which are the main roots for the HCV transmission. The level of disease awareness is very low; majority of the population believed that injectable medicine are more efficacious than oral medication. General population and many people identified as risk factors, had almost no to very low knowledge regarding factors responsible for HCV transmission. We suggest that HCV can only be effectively managed by public awareness program regarding HCV transmission, save blood transfusions, compulsory use of autoclave and sterilization techniques in health facilities and use of single use syringes and blades.

ACKNOWLEDGEMENT

The authors are highly thankful to Dr. Umer Rashid and Dr. Nadia Zeeshan, University of Gujrat, for their kind guidance to write this manuscript.

CONFLICT OF INTEREST

There is no conflict of interest.

REFERENCES

- Abdul, M.S., Adil, M.M., Altaf, A., Hutin, Y., Luby, S., 2003. Recycling of injection equipment in Pakistan. *Infect. Control. Hosp. Epidemiol.*, 24(2):145-146.
- Afridi, S., Naeem, M., Hussain, A., Kakar, N., Babar, M.E., Ahmad, J., 2009. Prevalence of hepatitis C virus (HCV) genotypes in Balochistan. *Mol. Biol. Rep.*, 36(6):1511-1514.
- Ahmad, N., Asgher, M., Shafique, M., Qureshi, J.A., 2007. An evidence of high prevalence of Hepatitis C virus in Faisalabad, Pakistan. *Saudi. Med. J.*, 28(3): 390-395.
- Ahmed, F., Moid, A., 2015. Hepatitis C knowledge and razor blade reuse practices of roadside barbers in Karachi Pakistan. *J. Liver Dis. Transplant.*, 4(2): <http://dx.doi.org/10.4172/2325-9612.1000130>
- Akhtar, S., Rozi, S., 2009. An autoregressive integrated moving average model for short-term prediction of hepatitis C virus seropositivity among male volunteer blood donors in Karachi, Pakistan. *World J. Gastroenterol.*, 15(13):1607-1612.

- Alam, M., Tariq, W., 2006. Knowledge, attitudes and practices about hepatitis B and C among young healthy males. *Pak. J. Pathol.*, 17(4):147-150.
- Altaf, A., Janjua, N.Z., Hutin, Y., 2007. The cost of unsafe injections in Pakistan and challenges for prevention program. *J. Coll. Physicians Surg. Pak.*, 16(9): 622-624.
- Altaf, A., Saleem, N., Abbas, S., Muzaffar, R., 2009. High prevalence of HIV infection among injection drug users (IDUs) in Hyderabad and Sukkur, Pakistan. *J. Pak. Med. Assoc.*, 59(3): 136-140.
- Baig, S., Siddiqi, N.M., Shaikh, I.A., 2015. Distribution frequency of hepatitis C virus genotypes in patients attending Liaquat university hospital Jamshoro/Hyderabad. *J. Post. Med. Inst.*, 28(4): 367-371.
- Chaudhary, I.A., Samiullah., Khan, S.S., Masood, R., Sardar, M.A., Mallhi, A.A., 2007. Seroprevalence of hepatitis B and C among the healthy blood donors at Fauji Foundation Hospital Rawalpindi. *Pak. J. Med. Sci.*, 23(1): 64-67.
- Choo, Q.L., Kuo, G., Weiner, A.J., Overby, L.R., Bradley, D.W., Houghton, M., 1989. Isolation of a cDNA clone derived from a blood-borne non-A, non-B viral hepatitis genome. *Sci.*, 244(4902): 359-362.
- Haider, M., 2009. WB, PC at daggers drawn over 'real' poverty figures. Retrieved on 19th June, 2009 from: <http://defence.pk/threads/17-poverty-rate-in-pakistan-world-bank.27672/>
- Hakim, S.T., Kazmi, S.U., Bagasra, O., 2008. Seroprevalence of Hepatitis B and C Genotypes among Young apparently healthy females of Karachi-Pakistan. *Libyan J. Med.*, 3(2): 66-70.
- Hamid, S., Umar, M., Alam, A., Siddiqui, A., Qureshi, H., Butt, J., 2004. PSG consensus statement on management of hepatitis C virus infection-2003. *J. Pak. Med. Assoc.*, 54(3): 146-150.
- Idrees, M., Riazuddin, S., 2008. Frequency distribution of hepatitis C virus genotypes in different geographical regions of Pakistan and their possible routes of transmission. *BMC Infect. Dis.*, 8:69.
- Janjua, N.Z., Akhtar, S., Hutin, Y.J., 2005. Injection use in two districts of Pakistan: implications for disease prevention. *Int. J. Qual Health Care.*, 17(5): 401-408.
- Khan, A.J., Luby, S.P., Fikree, F., Karim, A., Obaid, S., Dellawala, S., Mirza, S., Malik, T., Fisher-Hoch, S., McCormick, J.B., 2000. Unsafe injections and the transmission of hepatitis B and C in a periurban community in Pakistan. *Bull. World Health Organ.*, 78(8): 956-963.
- Khan, N., Akmal, M., Hayat, M., Umar, M., Ullah, A., Ahmed, I., Rahim, K., Ali, S., Bahadar, S., Saleha, S., 2014. Geographic distribution of hepatitis C virus genotypes in Pakistan. *Hepat. Mon.*, 14(10): e20299, DOI: 10.5812/hepatmon.20299
- Khuwaja, A.K., Qureshi, R., Fatmi, Z., 2002. Knowledge about hepatitis B and C among patients attending family medicine clinics in Karachi. *East. Mediterr. Health. J.*, 8(6):787-793.
- Lindenbach, B.D., Rice, C.M., 2001. Flaviviridae: the viruses and their replication. In: Knipe DM, Howley PM, eds, editors. *Fields virology*. 4th ed, vol. 1. Philadelphia: Lippincott-Raven Publishers., pp. 991-1041.
- Luby, S.P., Qamruddin, K., Shah, A.A., Omair, A., Pahsa, O., Khan, A., McCormick, J.B., Hoodbhoy, F., Fisher-Hoch, S., 1997. The relationship between therapeutic injections and high prevalence of hepatitis C infection in Hafizabad, Pakistan. *Epidemiol. Infect.*, 119:349-356.
- Pasha, O., Luby, S.P., Khan, A.J., Shah, S.A., McCormick, J. B., Fisher-Hoch, S.P., 1999. Household members of hepatitis C virus-infected people in Hafizabad, Pakistan: infection by injections from health care providers. *Epidemiol. Infect.*, 123(3):515-518.
- Platt, L., Easterbrook, P., Gower, E., McDonald, B., Sabin, K., McGowan, C., Yanny, I., Razavi, H., Vickerman, P., 2016. Prevalence and burden of HCV co-infection in people living with HIV: a global systematic review and meta-analysis. *Lancet Infect. Dis.*, 16(7): 797-808.
- Qazi, M.A., Fayyaz, M., Chaudhry, G.M., Jamil, A., Malik, A.H., Gardezi, A.I., Bukhari, M.H., 2009. Hepatitis C virus Genotypes in Bahawalpur. *Biomedica.*, 22:51-54.
- Raja, N.S., Janjua, K.A., 2008. Epidemiology of hepatitis C virus infection in Pakistan. *J. Microbiol. Immunol. Infect.*, 41(1): 4-8.
- Azhar, S., Syed, A., Yousaf, A., Khan, T. K., Mansoor, Z., Haq, N., 2016. Knowledge, Awareness, And Prevalence Among Community Regarding Hepatitis B And C In Abbottabad, Kpk, Pakistan. *Value Health.*, 19(3): A11.
- Shah, H.A., Jafri, W., Malik, I., Prescott, L., Simmonds, P., 1997. Hepatitis C virus (HCV) genotypes and chronic liver disease in Pakistan. *J. Gastroenterol. Hepatol.*, 12(11): 758-761.
- Simonsen, L., Kane, A., Lloyd, J., Zaffran, M., Kane, M., 1999. Unsafe injections in the developing world and transmission of bloodborne pathogens: a review. *Bull World Health Organ.*, 77(10):789-800.
- Talpur, A.A., Memon, N.A., Solangi, R.A., Ghumro, A.A., 2007. Knowledge and attitude of patients towards Hepatitis B and C. *Pak. J. Surg.*, 23(3):162-165.
- Umer, M., Iqbal, M., 2016. Hepatitis C virus prevalence and genotype distribution in Pakistan: Comprehensive review of recent data. *World J. Gastroenterol.*, 22(4): 1684-1700.
- Waheed, Y., Safi, S.Z., Qadri, I., 2011. Role of Potash Alum in hepatitis C virus transmission at barber's shop. *Virology*, 8: 211.
- Wazir, M.S., Mehmood, S., Ahmed, A., Jadoon, H.R., 2008. Awareness among barbers about health hazards associated with their profession. *J. Ayub Med. Coll. Abbottabad.*, 20(2): 35-38.

- WHO country office in Pakistan, blood safety. Accessed April, 2009. Available from: http://www.emro.who.int/pakistan/programmeareas_bloodsafety.htm.
- World Health Organization. Department of Measurement and Health Information. 2016 Available from: <http://www.who.int/healthinfo/statistics/bodgbddeathdalyestimates.xls>.
- World Health Organization. Epidemic and pandemic alert and response, Hepatitis C virus. 2003. Accessed April, 2009. Available from: <http://www.who.int/csr/disease/hepatitis/whocdscsrlyo2003/en/index2.html>.
- Zaheer, H.A., Waheed, U., 2014. Blood safety system reforms in Pakistan. *Blood Transfus.*, 12(4): 452-457.
- Zein, N.N., Persing, D.H., 1996. Hepatitis C genotypes: current trends and future implications. *Mayo. Clin. Proc.*, 71(5): 458-462.
- Zuberi, B.F., Zuberi, F.F., Vasvani, A., Faisal, N., Afsar, S., Rehman, J., Qamar, B., Jaffery, B., 2008. Appraisal of the knowledge of Internet users of Pakistan regarding hepatitis using on-line survey. *J. Ayub Med. Coll. Abbottabad.*, 20(1): 91-93.