

## Seroprevalence of Antibodies to the Hepatitis C virus in a Hospital–Based Population: A study from western Maharashtra, India

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### Abstract

**Background:** Hepatitis C is a global health problem affecting a significant portion of the world’s population. A tertiary care hospital catering to the needs of large population represents an important center for serological surveys.

**Objectives:** To estimate the seroprevalence of HCV in both sexes and different age groups in a hospital based population.

**Materials & Methods:** Serum samples collected over a period of 12 months from patients attending OPDs and admitted to various IPDs of Krishna Hospital and Medical Research Center Karad, were included in the study. Seroprevalence of Hepatitis C virus (HCV) among hospital based general population was determined using a third generation ELISA.

**Statistical analysis:** Percentages, chi square test

**Results & Conclusion:** The study population comprised of 7373 individuals attending a tertiary care hospital in Karad, Maharashtra. The overall seroprevalence was found to be 0.38%. The seroprevalence in males and females was 0.62% and 0.19% respectively. There was no statistically significant difference in the proportion of individuals who were positive in case of males and females ( $p > 0.05$ ). Highest prevalence was found to be among males of the age group 41-50 years (2.05%) and females of the age group 51-60 years (0.87%). Prevention of hepatitis

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C should target reduction of transmission of the virus. Prevention should target those at risk of acquiring the virus and should involve providing education, risk reduction counselling, HCV screening and substance abuse treatment. Further research in transmissibility of the various genotypes is necessary.

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**Key words:** Hepatitis C, Seroprevalence, Maharashtra, hospital-based

## **Introduction**

Hepatitis C is a global health problem affecting a significant portion of the world's population. Hepatitis C was first detected in 1989 using molecular biology techniques after extensive testing of serum from experimentally infected animals.<sup>1</sup> It is an RNA virus that belongs to the Flaviviridae family and genus Hepacivirus. Hepatitis C is a contagious liver disease that results from infection with the hepatitis C virus. It can range in severity from a mild illness lasting a few weeks to a serious, lifelong illness. Every year, 3-4 million people are infected with the hepatitis C virus. About 150 million people are chronically infected and at risk of developing liver cirrhosis and/ or liver cancer. More than 350000 people die from hepatitis C related liver diseases every year. HCV is one of the silent killer diseases which are spreading undetected.<sup>2</sup>

Based on data in blood donors from varying regions of the world, the infectivity rates range from 0.3% to 14.5%. The prevalence of HCV antibodies is relatively low in the United States, northern Europe and Australia, ranging from 0.3% to 1.2% of the population. An increased prevalence of HCV ranging from 1.5%-9% has been reported in south east Asia and the Indian subcontinent, with the highest rates of HCV (2%-14%) present in northern and central Africa, the eastern Mediterranean, and the Ukraine.<sup>3</sup>

The impact of this infection is emerging in India. India's blood-banking system has serious shortcomings. Professional blood donation continues to flourish despite a law condoning this. Another malaise in our health system is the reuse of improperly sterilized needles. Both these factors are potential sources for the spread of hepatitis C in India.<sup>4</sup> In India, antibodies against HCV are present in approximately 15 million people with a prevalence rate of 2%.<sup>5</sup> Hepatitis C can present as acute or chronic hepatitis. Most of the cases of acute hepatitis C are asymptomatic with patients unaware of the underlying infection. Symptomatic acute hepatitis with jaundice is seen in only 25% of patients and this virus usually does not cause Fulminant hepatitis in immunocompetent individuals. The only acute life threatening illness caused by hepatitis C is a variant called fibrosing cholestatic hepatitis which is seen in liver transplant recipients.<sup>6</sup> Approximately a fifth of the patients with chronic hepatitis C progress to cirrhosis over a time spanning nearly a decade.<sup>7</sup>

There is paucity of large population based studies studying the prevalence of hepatitis C in the general population. These studies give an accurate index of the health burden of hepatitis C in the country. Community based seroprevalence studies are difficult to conduct in a developing country because of socioeconomic hurdles and logistic difficulties. In India most of the studies of prevalence of hepatitis C have been based in blood banks with the assumption that the blood

donors are a surrogate for the population at large. However with the advent of professional donors this assumption may be a fallacy.<sup>4</sup> Also blood donor groups are usually young adults, hence seroprevalence in other age groups like children and aged cannot be estimated. A tertiary care hospital catering to the needs of a large population represents an important centre for serological survey. The present study was carried out to estimate the seroprevalence of HCV in both sexes and different age groups in a hospital based population.

## **Materials & Methods**

The present study was carried out in the Department of Microbiology, Krishna Institute of Medical Sciences, Deemed University Karad. Ethical clearance was obtained from Institutional Ethical Committee. Patients who registered at the OPDs or were admitted to the Krishna hospital and Medical Research center- a tertiary care teaching hospital and were advised to undergo HCV antibody testing were included in the study. The blood samples were collected between March 2010 and February 2011.

### *Serology*

A 5-ml venous blood sample was collected from patients for testing of HCV antibodies. The blood was allowed to clot for 45 minutes at room temperature and the serum was separated after centrifugation at a low speed. The serum was then subjected to test.

All the sera were tested for the presence of antibodies against HCV by third generation enzyme immunoassay kit (Qulisa ELISA –Qualpro Diagnostics). All the tests were performed in accordance with manufacturer's instructions with adequate controls and the absorbance of the solution in the wells were read at 450nm within 15 minutes of the final step by ELISA reader. The reactive samples were retested in duplicates, if found reactive was considered as repeatedly reactive.

### *Statistical analysis*

The results were analyzed using chi-square test.

## **Results**

Total 7373 serum samples were tested for hepatitis C antibodies. Out of which 3238 (43.92%) were males and 4135 (56.08%) were females. Table 1 shows age and sex distribution of hospital-based population.

The seroprevalence of anti-HCV Ab was found to be 0.38%. The seroprevalence of anti-HCV Ab for males (0.62%) was higher than females (0.19%). There was no statistically significant difference in seroprevalence among males and females ( $p > 0.05$ ). The highest seroprevalence (2.05%) was found to be among males of the age group 41-50 years and females of the age group 51-60 years (0.87%). Males and females with anti HCV Ab was not detected in the age group 11-19 years. (Table 2)

## **Discussion**

The seroprevalence of HCV among our hospital based population was found to be (0.38%). This seroprevalence is much similar to the seroprevalence reported in an earlier study from Jaipur (Rajasthan) carried out in 2010 which was (0.28%) by Smita Sood et al.<sup>8</sup> Another study which was carried out in hospital-based population by Sharma et al in 2007 from Jaipur (Rajasthan) reported the seroprevalence of (1.7%).<sup>9</sup>

In India seroprevalence of HCV varies among hospital –based population with (1.57%) from Cuttack<sup>10</sup> (Orissa), (1.4%) from AIMS New Delhi<sup>11</sup> and (4.8%) from Pondicherry.<sup>12</sup> Pondicherry has a heavy load of migrant population due to tourism and industrial activities, It is an important destination for tourists, labourers and truck drivers. Some of the areas of the city and that of the neighbouring state of Tamil Nadu are socio-economically backward, Education and access to health information is limited. Safe practices like use of disposable syringes is restricted to privileged sections, may have contributory effect on the overall prevalence of HCV<sup>12</sup>.

Hospital based studies from Mauritius<sup>13</sup>, Ethiopia<sup>14</sup>, and Pakistan<sup>15</sup> have showed a seroprevalence of 5.9%, 6%, and 9% respectively.

In India several studies on voluntary or mixed donors have noted a prevalence of hepatitis C below (2%).<sup>11,16,17</sup> The two studies specifically looking at professional donors have noted a prevalence of (55.3%) and (87.3%).<sup>18,19</sup>

There is paucity of large population based studies studying the prevalence of hepatitis C in the general population. The two studies from Andhra Pradesh which reported the prevalence of (1.4%) and (2.02%).<sup>20,21</sup> Another rural survey from Maharashtra involving more than 1000 villagers showed a very low prevalence rate of HCV infection of (0.09%).<sup>22</sup> The most systematic population-based study has been reported from West Bengal reported prevalence of (0.71%).<sup>23</sup>

Similar to other studies a higher seroprevalence was found among males (0.62%) than among females (0.19%).<sup>8,24</sup> A study from south India reported that there was no statistically significant difference in the exposure rates of males and females.<sup>12</sup>

The highest seroprevalence was found to be among males of the age group 40-49 years (9.4%) and females of the age group 30-39 years (8.5%).<sup>12</sup> Study conducted in Singapore showed number of positive cases to be maximum in 36-40 years group (76.92%) than in 31-35 years age group (71.43%).<sup>25</sup> In a West Bengal study maximal prevalence was in the older age group > 60 years (1.5%) as opposed to the lowest prevalence in the age group < 10 years (0.31%).<sup>23</sup> A study

on the seroprevalence of hepatitis C in urban areas of Madagascar reported that the prevalence did not differ significantly according to gender but it increased with age.<sup>26</sup>

HCV infection is the most important cause of chronic hepatitis in several countries of the world. But at present no vaccine is available for it currently, a combination of pegylated interferon and ribavirin is used in the treatment of chronic hepatitis C. Effectiveness of treatment depends upon genotype, so further genotype studies are necessary for proper treatment of the diagnosed patients.

## Conclusion

Prevention of hepatitis C should target reduction of transmission of the virus. Prevention should target those at risk of acquiring the virus and should involve providing education, risk reduction counseling, HCV screening and substance abuse treatment.

Limitation of study-being a hospital based study we cannot generalize our findings to general population.

**Conflict of Interest:** None

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## References

1. Choo Q L, Kuo G, Weiner A J, Overby L R, Bradley D W and Houghton M Isolation of a cDNA clone derived from a blood-borne non-A, non-B viral hepatitis genome; *Science* 1989;244:359–362
  2. World Health Organization: Hepatitis C.WHO fact sheet. <http://www.who.int/mediacentre/factsheets/fs164/en/index.html>
  3. Heintges T, Wands JR. Hepatitis C virus: Epidemiology and transmission. *Hepatology* 1997; 26:521-526.
  4. Mukhopadhyaya A Hepatitis C in India; *J. Biosci.* 2008; 33: 465–473
  5. Tandon BN. Hepatitis B and C: A holistic approach. *Gastroenterol Today* 2002; 6:168-9.
  6. Taga S A, Washington M K, Terrault N, Wright T L, Somberg K A and Ferrell L D Cholestatic hepatitis C in liver allografts; *Liver Transpl. Surg.* 1998 ;4 :304–310
  7. Liang T J, Rehermann B, Seeff L B and Hoofnagle J H Pathogenesis, natural history, treatment, and prevention of hepatitis C; *Ann. Int. Med* 2000; 132 :296–305
  8. Sood S, Malvankar S. Seroprevalence of Hepatitis B surface antigen, antibodies to the Hepatitis C virus, and human immunodeficiency virus in a hospital-based population in Jaipur, Rajasthan. *Indian J Community Med* 2010;35:165-9
  9. Sharma R, Sinha P, Bachiwal R, Rishi S. Seroprevalence of Anti hepatitis C virus antibodies in a hospital based population in Jaipur, Rajasthan. *Indian J Community Med* 2007; 32:158-9.
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10. Mishra S, Chayani N, Sarangi G, Mallick B, Pati SB. Seroprevalence of anti HCV antibody in and around Cuttack, Orissa. *Indian J Med Microbiol* 2002;20:40
11. Irshad M, Acharya SK, Joshi YK. Prevalence of HCV Ab in general population and in selected groups of patients in Delhi. *Ind J Med Res* 1995; 102: 162-164.
12. Bhattacharya S, Badrinath S, Hamide A, Sujatha S. Seroprevalence of hepatitis C virus in a hospital based general population in South India. *Indian J Med Microbiol* 2003;21:43-5
13. Schwarz TF, Dobler G, Gilch S, Jöger G. Hepatitis C and arboviral antibodies in the isolated population of Mauritius and Rodrigues. *J Med Virol* 1994;44:379-84
14. Frommel D, Tekle-Haimanot R, Berhe N, Aussel L, Verdier M, Preux PM, *et al.* A survey of antibodies to hepatitis C virus in ethiopia. *Am J Trop Med Hyg* 1993; 49:435-9.
15. Khan MS, Khalid M, Ayub N, Javed M. Seroprevalence and risk factors of Hepatitis C virus (HCV) in Mardan, NWFP: A hospital based study. *Rawal Med J* 2004; 29:57-60.
16. Arankalle V A J J, Favorov M O, Chaudhari A, Fields H A, Banerjee K. Contribution of HEV and HCV in causing fulminant non-A, non-B hepatitis in western India.; *J. Viral.Hepatol.* 1995; 2: 189–193.
17. Nanu A, Sharma SP, Chatterjee K, Jyoti P. Markers for transfusion-transmissible infections in north Indian voluntary and replacement blood donors: prevalence and trends 1989-1996; *Vox Sang* 1997;73 :70–73.
18. Jha J, Banerjee K and Arankalle V A A high prevalence of antibodies to hepatitis C virus among commercial plasma donors from Western India; *J. Viral. Hepatol.*1995; 2: 257–260.
19. Nandi J, Bhawalkar V, Mody H, Elavia A, Desai P K, Banerjee K. Detection of HIV-1, HBV and HCV antibodies in blood donors from Surat, western India; *Vox Sang* .1994;67: 406–407
20. Chandra M, Khaja M N, Hussain M M, Poduri C D, Farees N, Habeeb M A, Krishnan S, Ramareddy G V and Habibullah C M. Prevalence of hepatitis B and hepatitis C viral infections in Indian patients with chronic renal failure. *Intervirology*. 2004; 47:374–376.
21. Khaja M N, Madhavi C, Thippavazzula R, Nafeesa F, Habib AM, Habibullah C M and Guntaka R V. High prevalence of hepatitis C virus infection and genotype distribution among general population, blood donors and risk groups; *Infect. Genet.Evol.* 2006; 6: 198–204.
22. Chadha M S, Tungatkar S P and Arankalle V A. Insignificant prevalence of antibodies to hepatitis C in a rural area of western Maharashtra; *Indian J. Gastroenterol.* 1999; 18: 22–23.
23. Chowdhury A, Santra A, Chaudhuri S, Dhali G K, Chaudhuri S, Maity S G, Naik T N, Bhattacharya S K and Mazumder D N. Hepatitis C virus infection in the general population: a community-based study in West Bengal, India. *Hepatology* 2003; 37:802–809.
24. Abdel-Aziz F, Habib M, Mohamed MK, Abdel-Hamid M, Gamil F, Madkour S, Mikhail NN, Thomas D, Fix AD, Strickland GT, Anwar W, Sallam I. Hepatitis C virus (HCV) infection in a community in the Nile Delta: population description and HCV prevalence. *Hepatology* 2000; 32:111-115.
25. Guan R, Yap I, Lee E, Choong L, and Woo KT. Prevalence of antibody to Hepatitis C Virus in patients with special disease conditions in Singapore. *Virus information Exchange News Letter* 1990; 7(2): 46.

26. Ramarokoto CE, Rakotomanana F, Ratsitorahina M, Raharimanga V, Razafindratsimandresy R, Randremanana R, *et al.* Seroprevalence of hepatitis C and associated risk factors in urban areas of Antananarivo, Madagascar. *BMC Infect Dis* 2008; 8:25.

**Table 1:** Age and sex distribution of the hospital-based population

Age (years)	No of males tested (%)	No of females tested (%)	Total (%)
0-10	125(62.81)	74(37.19)	199(2.70)
11-19	289(53.03)	256(46.97)	545(7.39)
20-30	759(22.90)	2556(77.10)	3315(44.96)
31-40	608(59.78)	409(40.22)	1017(13.79)
41-50	488(61)	312(39)	800(10.85)
51-60	381(62.36)	230(34.64)	611(8.29)
Above 61	588(66.36)	298(33.64)	886(12.02)
Total	3238(43.92)	4135(56.08)	7373(100)

**Table 2:** Age and sex distribution of the hospital-based population with anti HCV Ab seropositivity

Age (years)	No of males with HCV-Ab positive (%)	No of females with HCV-Ab positive (%)	Total anti-HCV positive cases (%)
0-10	1(0.8)	00(0)	1(0.50)
11-19	00(0)	00(0)	00(0)
20-30	2(0.26)	3(0.12)	5(0.15)
31-40	3(0.49)	1(0.24)	4(0.39)
41-50	10(2.05)	2(0.64)	12(1.5)
51-60	2(0.52)	2(0.87)	4(0.65)
Above 61	2(0.34)	00(0)	2(0.23)
Total	<b>20(0.62)</b>	<b>8(0.19)</b>	<b>28(0.38)</b>