ISSN- O: 2458 - 868X, ISSN–P: 2458 – 8687
National Library of Medicine - ID: 101731606

International Journal of Medical Science and Innovative Research (IJMSIR)
IJMSIR : A Medical Publication Hub
Available Online at: www.ijmsir.com
Volume – 7, Issue – 2, March – 2022 , Page No. : 141 - 149

Prevalence of hepatitis a virus (hav) and hepatitis e virus (hev) in patients presenting with symptoms of acute viral hepatitis in north-west zone of Rajasthan

[1]Ms. Shreshtha Shrimali, Department of Microbiology, Sardar Patel Medical College, Bikaner, Rajasthan

[2]Dr. Geeta Tinna, Department of microbiology, Sardar Patel Medical College, Bikaner, Rajasthan

[3]Dr. Sanju Pannu, Senior Demonstrator, Department of Microbiology Sardar Patel Medical College, Bikaner, Rajasthan

Corresponding Author: Dr. Sanju Pannu, Senior Demonstrator Department of Microbiology Sardar Patel Medical College, Bikaner, Rajasthan.

Citation this Article: Ms. Shreshtha Shrimali, Dr. Geeta Tinna, Dr. Sanju Pannu, "Prevalence of hepatitis a virus (hav) and hepatitis e virus (hev) in patients presenting with symptoms of acute viral hepatitis in north-west zone of Rajasthan", IJMSIR- March - 2022, Vol – 7, Issue - 2, P. No. 141 – 149.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Hepatitis A virus (HAV) and Hepatitis E virus (HEV) causes a self-limiting viral infection, transmitted by feco-oral route. These infections are major health problem worldwide, with a higher incidence in developing countries. This study was conducted to determine the seroprevalence of HAV and HEV, at a tertiary care hospital Bikaner Rajasthan. A total of 150 patients of acute viral hepatitis were included in the study, 25(16.66%) and 17(11.33%) were positive for IgM HAV and IgM HEV, respectively.

Keywords: Acute viral hepatitis, hepatitis A virus, hepatitis E virus

Introduction

Acute viral hepatitis is a systemic infection affecting the liver predominantly. Almost all cases of acute viral hepatitis are caused by one of the five viral agents: hepatitis A virus (HAV), hepatitis B virus (HBV), hepatitis C virus (HCV), the HBV associated delta agent or hepatitis D virus (HDV) and hepatitis E virus. Although these agents can be distinguished by their molecular and antigenic properties, all type of viral hepatitis produce clinically similar illnesses.[1]

Hepatitis A is the most common form of acute viral hepatitis worldwide. it is a small non-enveloped single-stranded RNA virus. It is thermostable and acid resistant. For some time after its identification, HAV was thought to be an enterovirus; in 1991, it was subclassified as a member of Hepatovirus genus of the family Picornaviridae. HAV replicates in hepatocytes and interferes with liver function, sparking an immune response that causes liver inflammation. HAV is acquired by the fecal-oral route. Person to person transmission is common and generally limited to close contacts.[2,3] Worldwide, HAV infection accounts for 1.4 million cases annually with number of cases of Asian countries ranging from 10 to 30 per 100,000 per year[4].

HAV infection largely depends on sanitary and hygiene conditions of populations. HAV infection in children is generally self-limiting but it causes significant morbidity in adults. Seroprevalence of HAV differs significantly in

different socioeconomic groups at 85.3% and 64.5% in upper and lower socioeconomic groups, respectively[5].

HEV is the leading cause of enterically transmitted hepatitis worldwide. HEV infections are ubiquitous in developing countries as a cause of epidemic and endemic acute hepatitis[6]. However, the disease is now encountered in developed countries as well[7.] According to WHO, one-third of the world population has been exposed to HEV & is responsible for more than 50% of the case of acute viral hepatitis in India[8]. It is estimated that the number of symptomatic HEV infection in the tropics exceeds 3.4 million annually, causing approximately 70,000 deaths each year[9]. Hepatitis E virus affects young to middle aged adults and causes high mortality in pregnant women (15-25%) as compared to 0.5-4% in general population[10.]

In developing countries, contaminated water is considered to be the single most important cause of serious HEV epidemic outbreaks. For this reason, hepatitis E considered to be one of the many diseases linked to the poverty of tropical and subtropical countries[11,12].

A etiology of acute viral hepatitis (AVH) cannot be differentiated on the basis of mode of presentation alone and has to be confirmed serologically. Therefore, the present study was undertaken with the aim of determining the prevalence of HAV and HEV infection amongst acute viral hepatitis cases in North-West Zone of Rajasthan.

Objectives

Determining the seroprevalence of HAV and HEV in patients presenting with symptoms of acute viral hepatitis and also detect the magnitude of problem in the north western region of Rajasthan.

Material & methods

Study Design & Study area

The hospital based cross-sectional study was carried out in department of Microbiology & Immunology by taking samples from clinically suspected cases of Acute Viral Hepatitis from different clinical departments (Medicine, gynae & obs, gastroenterology and pediatrics) at tertiary care hospital attached to Sardar Patel Medical College, Bikaner from January 2020 to December 2020.

Study Population

All patients presenting to various clinical departments in the hospital suspected to AVH as per CDC definition were included in the study. An AVH case is defined by CDC as “a person having an acute illness of <15 days duration with discrete onset of any sign or symptom (e.g. fever, headache, malaise, anorexia, nausea, vomiting, diarrhea and abdominal pain) and either (a) jaundice or (b) elevated serum alanine aminotransferase (ALT) levels >200IU/ml during the period of acute illness.

Inclusion Criteria

1. All patients with acute viral hepatitis.
2. Patient with jaundice.
3. Patient with acute illness of more than 15 days duration with discrete onset of any sign or symptom i.e. fever, headache, nausea, vomiting, diarrhea and abdominal pain.

Exclusion Criteria

Patients, who did not give written consent, have not been included for the study and acute viral hepatitis patients found positive for viral markers other than Anti-HAV and Anti-HEV IgM.

Sample Collection and processing

As a part of standard protocol 5ml of whole blood sample was collected by vein puncture, transferred into yellow capped plain vial and allowed to clot from each patient

suspected of acute viral hepatitis and thereafter submitted to laboratory for testing. In the lab, the clotted blood sample was centrifuged at 2000 rpm for 20 minutes to obtain serum, then collected in separate tube. The samples could either be tested within two hours or the serum could be separated and stored in labeled crovials at 2-8^{o}C for no more than five days from collection.

TEST FOR HAV and HEV igm

Test for HAV IgM and HEV IgM was done by ELISA method using Recombi LISA HAV IgM ELISA KIT IVD REF E0100 and Recombi LISA HEV IgM KIT IVD REF E0105 respectively. The test was performed on serum sample of the donor as per manufacturer's instructions.

Interpretation of the result

Test results were interpreted as ratio of the sample OD 450 nm and the cut-off value (S/CO) was declared according as per literature of the kit.

Result

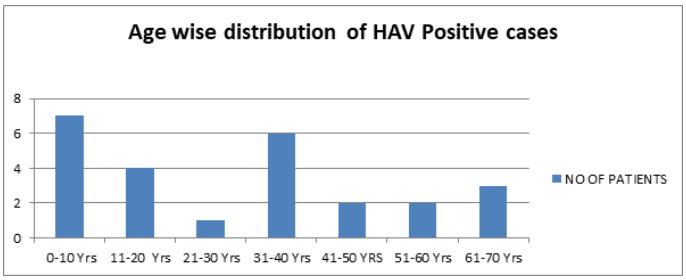
The present study was carried out in the Department of Microbiology & Immunology of Sardar Patel Medical College, Bikaner Rajasthan over a period of 12 month from January 2020 to December 2020. Total 150 patients suspected of Acute Viral Hepatitis were included in the study according to inclusion criteria. All the samples were tested for antibody to HAV & HEV, using ELISA technique. Out of 150 samples, 25 (16.66%) were HAV IgM positive and 17 (11.33%) were HEV IgM positive. Out of these 25 HAV positive samples, majority of cases belong to age group 0-10 years i.e.,7 (28%) followed by age group 31-40 years i.e., 6(24%) (Table-1) and 13 (52%) were male and 12 (48%) were female.

Prevalence of Anti HAV IgM (n=25)

Table 1: Age wise distribution of HAV Positive cases

Age Group	HAV IgM Positive Cases	Percentage
0-10 Yrs	7	28%
11-20 Yrs	4	16%
21-30 Yrs	1	4%
31-40 Yrs	6	24%
41-50 Yrs	2	8%
51-60 Yrs	2	8%
61-70 Yrs	3	12%

Chart 1: Age wise distribution of HAV Positive cases



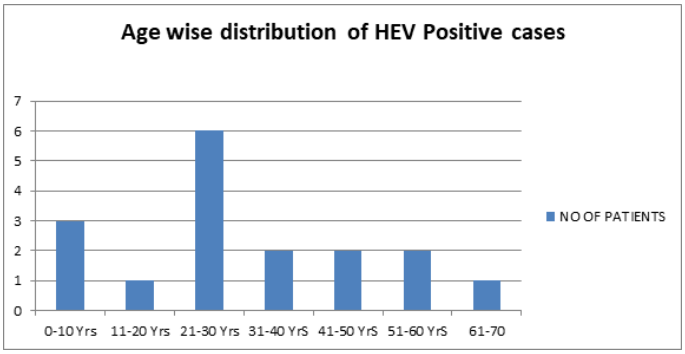
Out of total 150 samples, 17 (11.33%) were positive for IgM HEV. Out of these to age group 21-30 years followed by 3 (17.65%) cases of age group 0-10 years (Table-2) and 12 (70.58%) were male and 5 (29.41%) were female.

Prevalence of Anti HEV IgM (n=17)

Table 2: Age wise distribution of HEV Positive cases

Age Group	HEV IgM Positive Cases	Percentage
0-10 Yrs	3	17.65 %
11-20 Yrs	1	5.88 %
21-30 Yrs	6	35.29 %
31-40 Yrs	2	11.76 %
41-50 Yrs	2	11.76%
51-60 Yrs	2	11.76 %
61-70 Yrs	1	5.88 %

Chart 2: Age wise distribution of HEV Positive cases

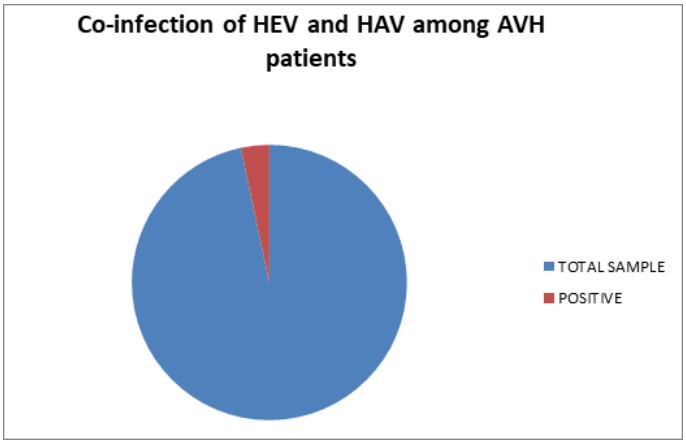


A total of 150 samples, 5(3.33%) studied serum samples show co-infection of both HAV and HEV (Table-3).

Table 3: Co-infection of HEV and HAV among AVH patients

No of samples	Co-infection of HAV and HEV	Percentage
150	5	3.33 %

Chart 3: Co-infection of HEV and HAV among AVH patients.

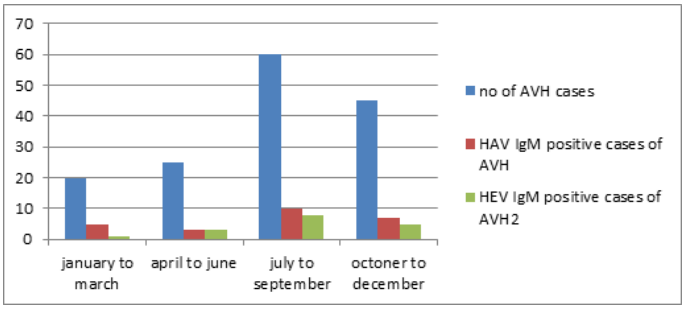


Month wise distribution of screened cases of AVH (Table- 4) shows that incidence was highest during late rainfall and in early winter season i.e., July to September.

Table 4: Month wise distribution of screened cases of AVH

Sn.	month	No of AVH cases	HAV IgM positive cases of AVH	HEV IgM positive cases of AVH
1.	January to march	20	5	1
2.	April to June	25	3	3
3.	July to September	60	10	8
4.	October to December	45	7	5

Chart 4: Month wise distribution of screened cases of AVH

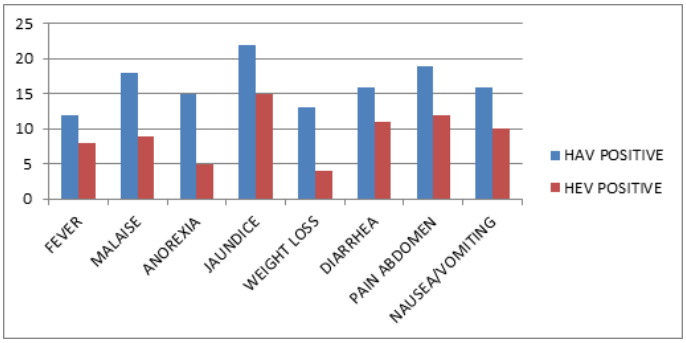


As depicted in the table-5 & graph no-5, the maximum numbers of HAV infected patients were having symptoms of jaundice, pain abdomen & malaise and HEV infected patients were having symptoms of jaundice, pain abdomen & nausea. Jaundice and pain abdomen were prominent symptoms in both.

Table 5: Clinical feature of HAV and HEV IgM seropositive cases

Clinical feature	HAV positive cases (n=25)	HEV positive cases (n=17)
Fever	12 (48%)	8 (47.06%)
Malaise	18 (72%)	9 (52.94%)
Anorexia	15 (60%)	5 (29.41%)
Jaundice	22 (88%)	15(88.23%)
Weight loss	13 (52%)	4 (23.53%)
Diarrhea	16 (64%)	11 (64.70%)
Pain Abdomen	19 (76%)	12 (70.59%)
Nausea/ Vomiting	16 (64%)	10 (58.82%)

Chart 5: Clinical feature of HAV and HEV IgM seropositive cases



Discussion

The present study was carried out from 150 patients who were clinically diagnosed as acute viral hepatitis. Among these the incidence was highest during late rainfall and in early winter with a male to female ratio of 2:1 similar to that reported by Dabadghao el al who have reported male predominance (2:1). In our study, out of 150 AVH patients 16.66% (n=25) were found positive for Anti HAV IgM. Several studies in India have been reported varying prevalence of HAV amongst AVH patients ranging from 7.67% to 54.5% as shown in table 6.

Table 6: Prevalence of HAV infection in India.

Name	Place	Year	HAV prevalence	Ref No
Yogendra Singh et. Al	Madhya Pradesh	2014	54.5%	13
Mittal A et. al	Jaipur	2016	7.67%	14
VA Arankalle et. Al	Pune	1992	39%	15
Jain P et. al	Lucknow	2011	26.96%	16
Nandi B et. al	South India	2009	33%	17
Joon A et. al	Manglore	2015	19.31%	18
Present study	Bikaner	2020	16.66%	NA

In present study, the HAV prevalence is 16.66% which is near to 19.30% HAV prevalence detected by Joon A et. AL in the year 2015 at Mangalore. A study in Madhya Pradesh and Pune was done by Yogendra Singh et. Al (2014) and VA Arankalle et al (1992) show the results higher than the result of present study i.e. 54.50% & 39.00% respectively. In 2011 at Lucknow, Jain P et al also detected 26.96% seroprevalence of HAV which is also higher.

Another study was done in our state Rajasthan at Jaipur by Mittal A et aL in 2016 shows 7.67% seroprevalence which is very less than our result. Higher prevalence of HAV in our area (Bikaner Zone) i.e. more than double in compare to the report of Mittal A et al is probably due to less sanitization and poor water supply (from canal) in our region (zone).

In our study, out of 150 AVH patients 11.33% (n=17) were found positive for Anti HEV IgM. Several studies in India have been reported varying prevalence of HEV amongst AVH patients ranging from 18% to 68% as shown in table 7.

Table 7: Prevalence of HEV infection in India

Name	Place	Year	HEV prevalence	Ref No
Kumar et. al	North India	2002-2006	38.6%	19

Amarapurkar et. al	Western India	2003-2004	35.76%	20
Chandra et. al	North Western India	2006-2008	49.30%	21
Jain et. Al	North India	2011-2012	12.97%	22
Kaur et. Al	Punjab	2015-2016	68.42%	23
Present study	Bikaner	2020	11.33%	NA

In present study, seroprevalence of HEV was 11.33% which was lower than 68.42% and 49.30% detected by Kaur et al (2015) in Punjab & Chandra et al (2006) in North West India. One more study was conducted in North India in 2002 by Kumar et al shows higher result i.e. 38.60% in comparison to present study. In 2003, Amarapurkar et al declared the result 35.76% seroprevalence of HEV in Western India which is also higher. Seroprevalence of HEV was observed 12.97% in North India by Jain et al (2011) which is very close to present study.

Higher incidence in North Western India (49.30%) in comparison to our study (11.33%) is due to poor socioeconomic conditions, sanitation condition and lack of sufficient potable water.

HAV & HEV infection were detected throughout the year as these infections are endemic. Almost 50% of seropositive cases were reported during the months of July to September. This is due to contamination of drinking water with sewage during heavy rains. Similar findings also have been reported from other studies such as Agarwal et A lwherein they also have reported peak incidence during rainy season[24].

Our study showed 72% of HAV positive and 70.58% of HEV positive patients were admitted in different wards where as 28% of HAV positive and 29.41% of HEV positive patients were treated on OPD basis. Ours being a tertiary care center, most patients reporting here are referred from primary and community health centers with deranged vitals.

Majority of patients with jaundice (88% for HAV & HEV both) followed by pain abdomen (76% in HAV & 71% in HEV) and malaise (72%) for HAV & diarrhea (65%) for HEV. Other significant clinical presentation includes diarrhea & nausea (76%), anorexia (60%) and weight loss (52%) for HAV. Other presentation for HEV includes nausea (59%), malaise (53%) and fever (47%). Most studies report similar clinical presentation in their patients with jaundice being the predominant feature[13,25].

The prevalence of HAV was more than HEV with respect to age specificity. HAV & HEV were predominantly seen among children and teenagers followed by young persons. Tsuda F et al[26] have identified fourth decade of life as the most susceptible age group for HAV infection. Kamal SM[27] reported highest number of HAV infected patients from children under 10 years age. In our study majority of seropositive cases of HAV are children followed by 31-40 years age group.

In our study majority of HEV seropositive cases were in third decade of life. Modi et al[28] have reported highest number of patients in same age group. Epidemic study from Uganda[29] has reported maximum patients from 15 years of age. These findings also agree with the results of HEV found in our study too.

In our study 3.33% patients showed evidence of HAV and HEV coinfection. This is a common feature reported by many authors since their route of transmission is same. Agarwal S et al in their study from Delhi have reported 5% HAV and HEV coinfection in their AVH patients[30] while 1.2% rate of coinfection has been

reported by Chandra et al in their study from North Western India[21]. Slight variations in the prevalence rate could be due to different geographical and social conditions.

Conclusion

Hepatitis has become major health problem globally. It hampers the quality of life and compromises the work force of a nation because it mostly affects the young, working population. In the spite of discovery of the causative viral agent, awareness about the disease remains low. As a result, in most cases it escapes diagnosis.

Availability of data regarding the prevalence, clinical pattern of presentation, risk factors for its acquisition would aid in its early diagnosis and effective management. To conclude, significant association of poor socioeconomic conditions with risk of acquiring infection. Therefore, there is important and major role of accessibility to safe drinking water, adequate sanitation and proper personal and environmental hygiene in preventing and controlling the infection.

The study data is limited by the fact that only AVH cases have been screened for anti-HAV & anti-HEV IgM. True prevalence of infection in the community cannot ascertained by the study, as it is a hospital-based study. Therefore, actual rate of infection in community is likely to be underestimated.

References

1. Krugman S. the Global Wilson Lecture. The ABC's of viral hepatitis. Trans Am Clin Climatol Assoc. 1992;103:145-156.

2. Wasley A, Fiore A, Bell BP. Hepatitis A in the of vaccination. Epidemiol Rev. 2006;28:101-111.

3. Shaprio CN, Margolis HS. Worldwide epidemiology of hepatitis A virus infection. J Hepatol. 1993;18 Suppl 2:S11-S14.

4. Khuroo MS. Hepatitis E: the enterically transmitted non-A, non-B hepatitis. Indian J Gastroenterol. 1991;10(3):96-100.

5. Goldstein ST, Alter MJ, Williams IT, Moyer LA, Judson FN, Mottram K, et al. Incidence and risk factors for acute viral hepatitis B in the United States, 1982-1998: implication for vaccination programs. J Infect Dis. 2002;185(6):713-719.

6. World Health Organization. Viral hepatitis report by the Secertariat; A62/22.

7. Rein BD, Stevens GA, Theaker J, Wittenborn JS, Wiersma ST. The global burden of hepatitis E virus genotypes 1 and 2. Hepatolog. 2012;55(4):988-97.

8. Locarnini S, Chen DS, Shibuya K. No more excuses: hepatitis can be eliminated. Lancet. 2016;387(10029):1703-1704.

9. Krugman S, Gilles J, Hammod J. infectious hepatitis Evidence for two distinct clinical, epidemiological, immunological type of infection. JAMA 1967;200:365-373.

10. Hamid SS, Atiq M, Shehzad F, Yasmeen A, Nissa T, Salam A, Siddiqui A and Jafari W. hepatitis E virus superinfection in patients with chronic liver disease. Hepatology. 2002;36(2):474-478.

11. Guthmann, J.P.; Klovstad, H.; Boccia, D.; Hamid, N; Pinoges, L.; Nizou, J.V.; Tatay, M.; Diaz, F.; Moren A, Grais RF. A large outbreak of hepatitis E among a displaced population in Darfur, Sudan, 2004: the role of water treatment methods. Clin Infect. Dis. 2006;42(12):1685-1691.

12. Kumar S, Subhadara S, Singh B, Panda BK. Hepatitis E virus: the current scenario. Int J. Infect. Dis. 2013;17(4):e228-233.

13. Verma YS, Rajput N, Rajput SS. Seroprevalence of hepatitis A virus in different age group of children. 2014;7(5):223-226.

14. Anshu Mittal, Rameshwari Bithu, Nitya Vyas, Rakesh K Maheshwari. Prevalence of hepatitis A virus and hepatitis E virus in the patients presenting with acute viral hepatitis at a tertiary care hospital Jaipur, Rajasthan. 2016;5:3:47-50

15. Arankalle VA, Tsarev SA, Alling DW, Emerson SU, BanerjeeK, Purcell RH. Age specific prevalence of antibodies to hepatitis A and E viruses in Pune, India,1982 and 1992. 199 52;171(2):447-50.

16. P Jain, S Prakash, S. Gupta, KP Singh, S Shrivastava, DD Singh, J Singh, A Jain. Prevalence of hepatitis A virus, hepatitis B virus, hepatitis C virus, hepatitis D virus and hepatitis E virus as cause of acute viral hepatitis in North India : A hospital based study 20112:31(3):261-265

17. Nandi B, Hadimani P, Arunachalam R, Ganjoo RK, Spectrum of acute viral hepatitis in Southern India.. 2009; 65(1):7-9.

18. Baliga S, Joon A, Shenoy SM, Prevalence of hepatitis A and hepatitis E virus in patients presenting with acute viral hepatitis. 2015;33Suppl:102-5.

19. Kumar S, Ratho RK, Chawla YK, Chakraborti A. The incidence of sporadic viral hepatitis in North India: a preliminary study. Hepatobiliary Pancreat Dis Int. 2007 Dec 15;6(6):596-9.

20. Amarapurkar D, Agal S, Baijal R, Gupte P, Patel N, Kamini P, Kumar P. Epidemiology of hepatitis E virus infection in western India. Hepatitis Monthly. 2008 Oct 1;8(4):258-262.

21. Chandra NS, Sharma A, Rai RR, Malhotra B. Contribution of hepatitis E virus in acute sporadic hepatitis in North Western India. The Indian Journal of Medical research. 2012 Sep;136(3):477-482.

22. Jain P, Prakash S, Gupta S, Singh KP, Shrivastava S, Singh DD, Singh J, Jain A. Prevalence of hepatitis A virus, hepatitis B virus, hepatitis C virus, hepatitis D virus and hepatitis E virus as causes of acute viral hepatitis in North India: a hospital based study. Indian journal of medical microbiology. 2013 Jul 1;31(3):261-265.

23. Kaur M, Sindhu SK, Singh K, Devi P, Kaur M, Singh NJ. Hepatitis E virus: A leading course of waterborne viral hepatitis in Northwest Districts of Punjab, India. Journal of laboratory physicians. 2017 Apr;9(2):121.

24. Begum N, Devi SG, Husain SA, Kumar SA, Kumar A, Kar P. Seroprevalence of subclinical HEV infection in pregnant women from North India: a hospital based study. Indian J Med Res. 2009 Dec 1;130(6):709-13.

25. Varsha Shirish Dabadghao, Ram Barure, Suresh Kumar Sharma and Sangram Mangudkar. A study of the clinical and biochemical profile of acute viral hepatitis. International Journal of biochemical and advance research. 2015;6(10):689-694.

26. Takahashi M, Nishizawa T, Gotanda Y, Tsuda F, Komatsu t et al. High prevalence of antibodies to hepatitis A & E viruses and viremia of hepatitis B, C and D viruses among apparently healthy population in Mangolia. Clin Diagn Lab Immunol 2004;11:392-8.

27. Kamal SM, Mahmound S, Hafez T, El-Fourly R. Viral hepatitis A & E in South Mediterranean Countries. Mediterr J Hematol Infect Dis 2010;2:e2010001.

28. Modi TN, Patel SA, Mirani KM, Vaghasiya DR, Mukadiya GS, Usdadiya JI. A study of clinical profile

and outcome in acute viral hepatitis E. Indian J Clin Pract. 2013 Mar; 23(10):635-7.

29. Teshale Eh, Howard CH, Grytdal SP, Handzel TL, Barry V, Kamili S, Drobeniuc J, Okawere S et al. hepatitis E epidemic. Uganda. Emerg. Infect. Dis. 2010;16(1):126-129.

30. Agarwal S, Anuradha, Sahoo et al. Seroprevalence of hepatitis A virus and hepatitis E virus co-infection in patients presenting with acute viral hepatitis attending a tertiary care hospital in North India. J Commun Dis, 2017;49(3):57-60.