

# Seroprevalence of Hepatitis A among Medical Students of a Tertiary Care Centre in Kerala, Southern India

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## ABSTRACT

**Introduction:** Hepatitis A Virus (HAV) is a major cause of acute viral hepatitis caused by a Ribonucleic Acid (RNA) virus. The mode of transmission is fecal-oral route and the risk factors include unsafe water, poor personal hygiene and sanitation. Even though seroprevalence rate is high in low socio-economic regions, it is low in urban areas and the need of vaccination is looked for.

**Aim:** To estimate the seroprevalence of hepatitis A in medical students of Southern India.

**Materials and Methods:** The present study was a cross-sectional study conducted in the medical students of Government Medical College, Manjeri, Kerala, India. Blood samples of 377 students during the year 2015-2018 were taken. These students were in their 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> year MBBS course who admitted in the

years 2018, 2017, 2016 and 2015, respectively. Commercially available Enzyme-Linked Immunoassay (ELISA) kits for anti HAV IgG antibodies were used. Chi-square test was used for statistical analysis.

**Results:** Out of 377 participants 238 (63.2%) were females and 139 (36.8%) were males. A total of 51 (13.5%) were positive for IgG antibodies. A total of 43 were in 21-22 age group with a p-value >0.05. An association of seropositivity and seronegativity with frequency of dining out pattern was there with a p-value <0.05.

**Conclusion:** The seroprevalence of hepatitis A was found in a declining stage hence, vaccination against hepatitis A should be included in the National Immunisation Schedule.

**Keywords:** Fecal-oral route, Infectious hepatitis, Immunisation, Young adults

## INTRODUCTION

Hepatitis A (Infectious hepatitis) is an enterically transmitted highly endemic viral disease of global importance affecting children and young adults. It can cause significant economic and social consequences in the community. Natural infection with HAV is seen only in humans. It is a vaccine preventable, communicable disease affecting liver. The most important risk factors associated with this viral infection are unsafe water, poor personal hygiene and inadequate sanitation [1]. In developing countries, since hepatitis A is the most common cause of acute viral hepatitis, a large proportion of population acquires immunity through symptomatic or asymptomatic infection during childhood itself causing significant social and economic consequences in the community. But the acquisition of antibodies following infection against the virus confers lifelong immunity [2,3].

It is caused by a 25-32 nm sized icosahedral single stranded RNA virus of hepatovirus genus of the family *Picornaviridae* [1]. The incubation period is 25-30 days and the mode of transmission is by fecal-oral route [4]. Ingestion of contaminated food and water also causes the disease. The symptoms include gastrointestinal, mainly fatigue, nausea, stomach pain and jaundice. The likelihood of hepatitis A with clinical features is seen more in young adults than in children [5]. Even though complications like fulminant hepatitis and cholestatic hepatitis occur, there is no evidence of carrier stage or chronicity [1,5]. The IgG antibodies persist for decades in the serum and its detection can be used to denote past infection or recovery. The seroepidemiological studies on hepatitis A are limited [6-8]. It is seen that there is a gradual decline in the seroprevalence of the disease from 70-45% in the highly endemic regions of Asia and Europe during the period 1975- 2014 [6,7,9]. A serological study in the 91 Healthcare workers of Maulana Azad Medical College, New Delhi showed that 37.4% were seronegative for IgG antibodies against hepatitis A [8]. So, vaccination against hepatitis A has been recommended in healthcare workers and other young adults of

age group 16-35 years [7,8]. This study was done to estimate the seroprevalence of hepatitis A in medical students and assess the need for vaccination.

## MATERIALS AND METHODS

This was a cross-sectional study carried out on serum samples of the students studying in 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> year MBBS course, who got their admission in the years 2018, 2017, 2016, 2015 respectively, after getting informed consent. The study was conducted in December 2018 at Government Medical College, Manjeri, Kerala, India. The approval for the study was received from the Research and Ethics Committee of the institution (Ref No. IEC/GMCM/13/17).

**Sample size collection:** The minimum sample size was calculated as 266, anticipating a prevalence rate of 26.2% in patients of six centres in five cities of India [10]. Another study showed a prevalence rate of 15.2% among the healthy adults including healthcare workers attending a tertiary care centre in Thrissur (Kerala) [11].

**Inclusion criteria:** The students were in the age group of 18-33 years. The subjects were those medical students who were willing to give informed consent, take part in the study and give information asked in the proforma.

**Exclusion criteria:** A total of 23 subjects were not willing to give information asked in the proforma and were excluded.

The students were given a proforma which included information regarding the history of jaundice for themselves, family members or roommates, personal details, food pattern, locality, frequency of dining out and history of vaccination against hepatitis A. Three mL of blood sample was drawn under aseptic precautions from each one and serum was separated and subjected to the detection of IgG antibodies against hepatitis A by ELISA method with commercially available kits (Bionevan, China). All the tests were done according to the manufacturer's guidelines.

## STATISTICAL ANALYSIS

Qualitative variables were expressed as frequency and percentage. For the prevalence of hepatitis A percentage along with 95% confidence interval were presented. To study the association between socio-demographic and clinical variables and prevalence of hepatitis A, Chi-square test was used. Statistical significance was achieved when  $p$ -value  $<0.05$ .

## RESULTS

Out of 377 samples, 238 were that of females and 139 were of males. A total of 51 (13.5%) were positive for anti-HAV IgG antibodies of which 22 students were 3<sup>rd</sup> year, 15 were 4<sup>th</sup> year, 8 were 2<sup>nd</sup> year and 6 were 1<sup>st</sup> year. Out of total positives 33 (64.7%) were females and 18 (35.3%) were males [Table/Fig-1].

Number of samples	No. of positives
Total (377)	51
Male (139)	18 (35.3%)
Female (238)	33 (64.7%)

[Table/Fig-1]: Sex wise distribution of positivity.

No significant difference in the seropositivity with gender and vegetarian, non vegetarian food habits were seen ( $p$ -value  $>0.05$ ). A total of 43 (15.6%) students were in 21-22 years age group. Out of 51 only two had a history of jaundice, three students gave a history of jaundice in the family members and none gave a history for roommates, which had no statistical significance ( $p$ -value  $>0.05$ ). Another important finding was that all the 51 seropositive samples were not vaccinated against hepatitis A [Table/Fig-2]. Out of these 51, 42 people were with a habit of dining out frequently that is more than once in a month showed a  $p$ -value=0.005 [Table/Fig-3].

Variables	Present, n (%)	Absent, n (%)	p-value
Age (years)			
<20	6 (7.1)	79 (92.9)	>0.05
21-22	43 (15.6)	232 (84.4)	
>23	2 (11.8)	15 (88.2)	
Sex			
Male	18 (12.9)	121 (87.1)	>0.05
Female	33 (13.9)	205 (86.1)	
History of jaundice			
Yes	2 (16.7)	10 (83.3)	>0.05
No	49 (13.4)	316 (86.6)	
History of jaundice in family			
Yes	3 (9.4)	29 (90.6)	>0.05
No	48 (13.9)	297 (86.1)	
History of jaundice in roommates			
Yes	0	6 (100.0)	>0.05
No	51 (13.7)	320 (86.3)	
Hepatitis A vaccinated			
Yes	0	14 (100.0)	>0.05
No	51 (14.6)	312 (85.4)	
Diet			
Vegetarian	1 (10.0)	9 (90.0)	>0.05
Mixed	50 (13.6)	317 (86.4)	

[Table/Fig-2]: Distribution of positivity.  
 $p$ -value  $<0.005$  was considered statistically significant

## DISCUSSION

Infectious hepatitis caused by HAV is a vaccine preventable, communicable disease seen in healthcare workers and general population. Since, the anti HAV IgG antibodies persist life long, the detection of the same denote past infection or recovery. Sero

Personal history	Seropositive	Seronegative	Seroprevalence p-value
History of dining out once in a month	9 (6.4%)	131 (93.6%)	0.005
History of dining out more than once a month	42 (18%)	191 (82%)	
No history of dining out	0(0%)	4 (100%)	

[Table/Fig-3]: Dining out habit and distribution of positivity.  
 $p$ -value  $<0.005$  was considered statistically significant

epidemiological studies show a decline in IgG pattern in last two decades in Western India [11]. A total of 377 samples of medical students were screened for IgG HAV of which 51 were seropositive. So, the prevalence with 95% CI was 13.5% (10.1-16.9). Different studies have showed that the prevalence of hepatitis A varies from 15.2-97.2% [10,11] depending upon socio-economic status, quality of water supply, sanitation and the vaccination coverage rates [12]. In a cross-sectional study from South India in a group of asymptomatic healthy adults including voluntary blood donors, antenatal women and the medical students showed a prevalence rate of 15.2% [11].

A changing pattern of seroepidemiology of hepatitis A can be seen in studies of different areas of India and Kuwait [Table/Fig-4] [3,10,11,13,14]. In a study on the prevalence of the disease in the medical students of Maulana Azad Medical College, Delhi, showed a rate of 62.6% and insisted the necessity of vaccination because of increased risk in healthcare workers [8]. In a study by Gadgil PS et al., on voluntary blood donors from middle and high socio-economic strata and Jacobsen KH and Koopman JS attribute the low prevalence in the North American and European countries to the increase in income, water quality, sanitation, education and personal and environmental hygiene [15,16]. The people of Kerala have high standard of living and sanitation like that of developed countries. These findings were also consistent with previous studies [17-19]. The high seroprevalence rate in the people of low socio-economic status in different countries is showed in [Table/Fig-5] [10,12,19-22].

HAV IgG	Batra Y et al., [3]	Mall ML et al., [10]	Venunath M et al., [11]	Agrawal A et al., [13]	Alkhalidi J et al., [14]	Current study
Seroprevalence	36.7%	26.2%	15.2%	31.8%	28.8%	13.5%
Region	North India	Urban India	South India	Urban India	Kuwait	South India
Year of publication	2002	2001	2019	2019	2009	2021

[Table/Fig-4]: Data from different studies on HAV IgG seroprevalence [3,10,11,13,14].

Low socio-economic status	Mall ML et al., [10]	Chauhan S et al., [12]	Dhavan PS et al., [19]	Altinkaynak S et al., [20]	Saha SK et al., [21]	Ariyaratna N et al., [22]
Seroprevalence	88%	97.2%	85%	65.7%	96.5%	80.7%
Region	Kolkata	North India	Mumbai	Turkey	Bangladesh	Srilanka
Year of publication	2001	2019	1998	2008	2009	2019

[Table/Fig-5]: Data in low socioeconomic status from previous studies [10,12,19-22].

Another important finding of this study was the association of taking food from outside which showed a  $p$ -value=0.005 [Table/Fig-3]. Kotwal KA et al., in his multicentric cross-sectional study in 4175 young adults from different regions of India found out the regular consumption of food outside home as a risk factor for hepatitis A [23]. Gurav YK et al., in their study about hepatitis A outbreak in South India, 86.1% of the participants gave a history of taking food from the same restaurant. HAV is considered as major cause of global food borne viral infections transmitting mainly through raw foods like green leaves, fresh and frozen fruits and pipeline water mixed with sewage [24-26]. Only 3/377 had taken vaccination against

hepatitis A, but none showed IgG antibodies. A study by Verma R and Khanna P in their immunogenicity studies from India showed only >95% seroconversion after immunisation with live attenuated vaccine [27]. Early recognition of cases, awareness programmes and strict adherence to hand hygiene measures should also be followed for the effective control of hepatitis A [28]. In this study, authors could find out the low seroprevalence rate of hepatitis A in medical students and substantiate the relationship between food borne disease and dining out habit.

### Limitation(s)

Since the subjects were staying in the hostel, all of them were from the same locality. Larger studies are essential to get a better picture of the seroprevalence of hepatitis A among general population.

### CONCLUSION(S)

Seroprevalence of hepatitis A in medical students was 13.5% in present study. Healthcare workers including the medical students are at high risk of acquiring this food borne viral disease. Healthcare workers should be aware of avoiding taking food in between duty time and the importance of adherence to strict hand hygiene as the main mode of transmission is through fecal-oral route. It is essential to vaccinate healthcare workers against hepatitis A in Universal Immunisation schedule as the rate of hepatitis A is much higher when compared with that of general population.

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