

ORIGINAL RESEARCH

Seroprevalence of hepatitis B and hepatitis C viruses among patients in a tertiary care hospital of North India: A hospital based retrospective study

¹Dr. Zarrin Afroz, ²Dr. Bithika Ray¹Associate Professor, ²Assistant Professor, Department of Microbiology, G.S Medical College & Hospital, Uttar Pradesh, India**Corresponding author**

Dr. Bithika Ray

Assistant Professor, Department of Microbiology, G.S Medical College & Hospital, Uttar Pradesh, India

Email: bithiray@gmail.com

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ABSTRACT

Background: Over 240 million people worldwide have chronic hepatitis B infection, while 150 million have chronic hepatitis C infection, according to the World Health Organization (WHO). This study was conducted to ascertain the prevalence of parenterally transmitted hepatotropic viruses Hepatitis B virus and Hepatitis C virus among patients presenting with acute viral hepatitis (AVH), as there is a dearth of information regarding the seroprevalence of viral hepatitis in North India. **Methods:** This retrospective observational study was conducted over the period of six months (August 2022 to February 2023) at GS medical college & hospital in north India by the department of microbiology. The study gathered data from patients who presented with acute viral hepatitis and whose samples were sent to a microbiology lab for hepatitis B and C screening and were found to be positive for hepatitis B surface antigen (HBsAg) or antibodies to hepatitis C (Anti-HCV) over a 4-year period (January 2019 to December 2022). The collected data was entered in the MS excel sheet. Frequency and percentages were used to summarise the categorical variables. **Results:** In our study, a total of 57869 patients were screened for Hepatitis B and 43518 patients were screened for Hepatitis C during period of 4 years. The overall prevalence of Hepatitis B during those 4 years was 2.27% and that of Hepatitis C was 0.73%. The age wise analysis of prevalence of Hepatitis B and C showed that the prevalence was highest in the age group of 36-50 years. In our study, the further analysis of prevalence of Hepatitis C for comparison of prevalence on the basis of age group and gender, it was observed that among female, the prevalence was highest in the 36-50 years of age group (0.83%), and was lowest in the age group of <20 years (0.39%), but for the males, the prevalence was highest in the 36-50 years of age group (1.30%), and was lowest in the age group of <20 years (0.39%) and it was statistically significant (p=0.017). **Conclusion:** Although it is well known that prevention is preferable to treatment, efforts should be undertaken to lower the prevalence of Hepatitis B and Hepatitis C by straightforward preventative measures such public education, blood and blood product screenings, and raising awareness of the value of immunization.

Keywords: Seroprevalence, hepatitis B, hepatitis C, acute viral hepatitis, ELISA

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INTRODUCTION

Hepatitis is a liver inflammation that is typically caused on by viral infections. Acute viral hepatitis (AVH) is a significant public health issue in India and other developing countries with poor sanitation. Hepatitis A (HAV) and Hepatitis E virus (HEV) are the main etiological agents of enterically transmitted viral hepatitis. Hepatitis A virus infection is widespread in less developed nations, while it has recently become less common in places where hygienic standards have improved. Whereas hepatitis C virus (HCV) is

typically spread by blood transfusions, hepatitis B virus (HBV) can be spread through parenteral, vertical, and sexual routes [1,2,3].

These viruses' clinical presentations essentially overlap. On the one hand, they range from subclinical persistent infections to rapidly progressing chronic liver disease with cirrhosis and hepatocellular carcinoma, and on the other, they range from asymptomatic and inapparent to fulminant and acute deadly infections. [4,5,6]. Over 240 million people worldwide have chronic hepatitis B infection, while

150 million have chronic hepatitis C infection, according to the World Health Organization (WHO) [7].

This study was conducted to ascertain the prevalence of parenterally transmitted hepatotropic viruses Hepatitis B virus and Hepatitis C virus among patients presenting with acute viral hepatitis (AVH), as there is a dearth of information regarding the seroprevalence of viral hepatitis in Central India. This information will allow for the proper management of cases as well as the planning of preventive strategies for this region of the country.

MATERIALS AND METHODS

After receiving approval from the institutional ethical committee, this retrospective observational study was conducted over the period of six months (August 2022 to February 2023) at G.S medical college & hospital in north India by the department of microbiology. The study gathered data from patients who presented with acute viral hepatitis and whose samples were sent to a microbiology lab for hepatitis B and C screening and were found to be positive for hepatitis B surface antigen (HBsAg) or antibodies to hepatitis C (Anti-HCV) over a 4-year period (January 2019 to December 2022). While children and the elderly were typically left out of studies, the effects of viruses on various age groups were also examined in present study, which is an advantage.

The Hepatitis B surface antigen (HBsAg) and antibodies to Hepatitis C (Anti-HCV) were screened using ELISA kits in accordance with the manufacturer's instructions on blood samples obtained by the Microbiology laboratory for testing from various outpatient and inpatient departments at our hospital. The hospital's information system was used to retrieve demographic information including age and gender.

The collected data was entered in the MS excel sheet. Frequency and percentages were used to summarise the categorical variables. After summing the positive and negative cases, the seroprevalence was calculated. Every year, prevalence rates and trends for Hepatitis B and C infections were calculated. A comparison seroprevalence of Hepatitis B and C in various age groups, and gender was further analysed using MS excel and differences was considered significant if p value was <0.05.

RESULTS

In our study, a total of 57869 patients were screened for Hepatitis B and 43518 patients were screened for Hepatitis C during period of 4 years from January 2019 to December 2022. The overall prevalence of Hepatitis B during those 4 years was 2.27% and that of Hepatitis C was 0.73% (Table 1). The prevalence of Hepatitis B was highest (2.49%) during year 2020 and that of Hepatitis C was highest (1.00%) during year 2019 (Figure 1).

Table 1: Year wise distribution of prevalence of Hepatitis B and C among screened patients.

Year	Hepatitis B screened	Hepatitis B Positive		Hepatitis C screened	Hepatitis C Positive	
		Number	%		Number	%
2019	5081	116	2.27	3233	32	1.00
2020	16890	420	2.49	12458	89	0.71
2021	16309	398	2.44	12245	95	0.78
2022	19589	381	1.95	15582	104	0.66
Total	57869	1315	2.27	43518	320	0.73

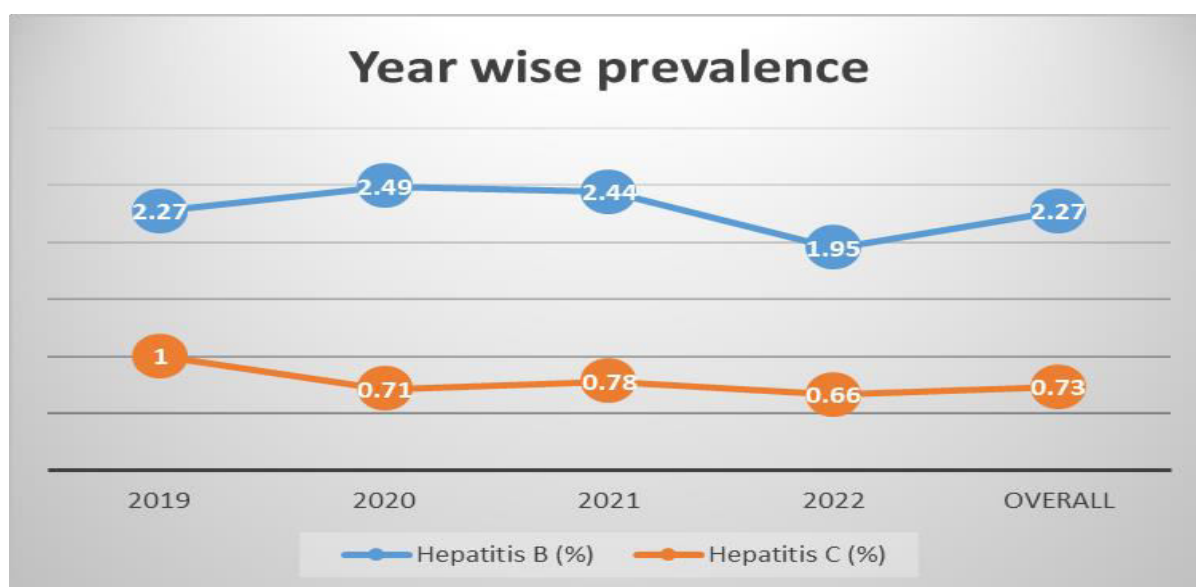


Figure 1: Year wise distribution of prevalence of Hepatitis B and C among screened patients.

The age wise analysis of prevalence of Hepatitis B showed that the prevalence was highest in the age group of 20-35 years (2.53%) and 36-50 years (2.54%) and was lowest in the age group <20 years (0.48%). The age wise analysis of prevalence of Hepatitis C showed that the prevalence was highest in the age group of 36-50 years (0.88%) and <50 years (0.87%) and was lowest in the age group <20 years (0.21%) (Table 2 and Figure 2).

Table 2: Age wise distribution of prevalence of Hepatitis B and C among screened patients.

Age group (in years)	Hepatitis B screened	Hepatitis B Positive		Hepatitis C screened	Hepatitis C Positive	
		Number	%		Number	%
<20	2186	11	0.48	1793	4	0.21
20-35	13418	340	2.53	11096	47	0.43
36-50	24614	624	2.54	16373	144	0.88
>50	17651	341	1.93	14256	125	0.87

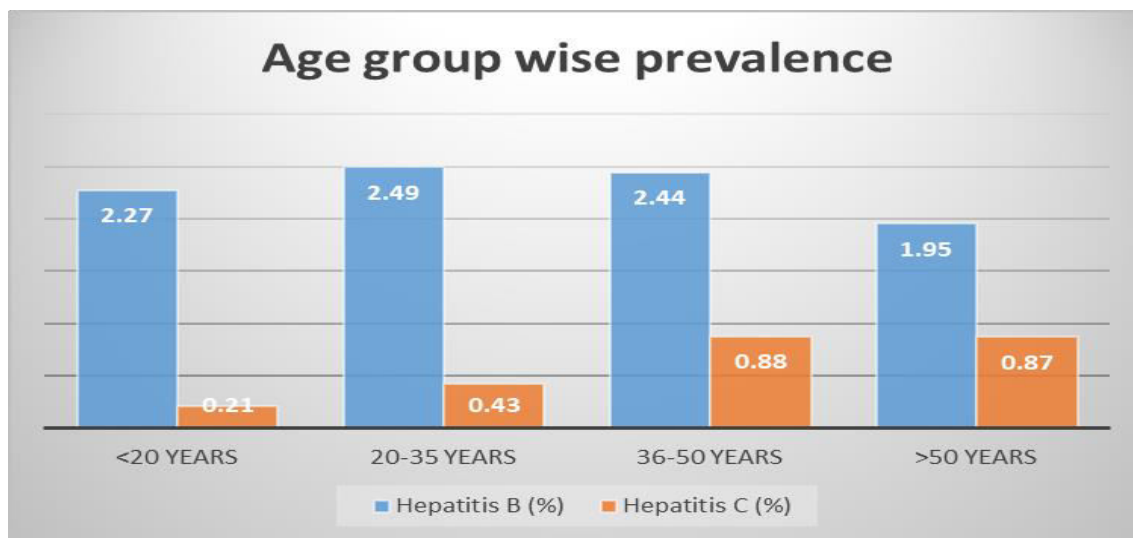


Figure 2: Age wise distribution of prevalence of Hepatitis B and C among screened patients.

The gender wise analysis of prevalence of Hepatitis B showed that the prevalence was higher among males (2.84%) as compared to the females (1.42%). Similarly, the gender wise analysis of prevalence of Hepatitis C showed that the prevalence was higher among males (0.79%) as compared to the females (0.66%) (Table 3 and Figure 3).

Table 3: Gender wise distribution of prevalence of Hepatitis B and C among screened patients.

Gender	Hepatitis B screened	Hepatitis B Positive		Hepatitis C screened	Hepatitis C Positive	
		Number	%		Number	%
Female	23107	329	1.42	17996	119	0.66
Male	34762	986	2.84	25523	201	0.79

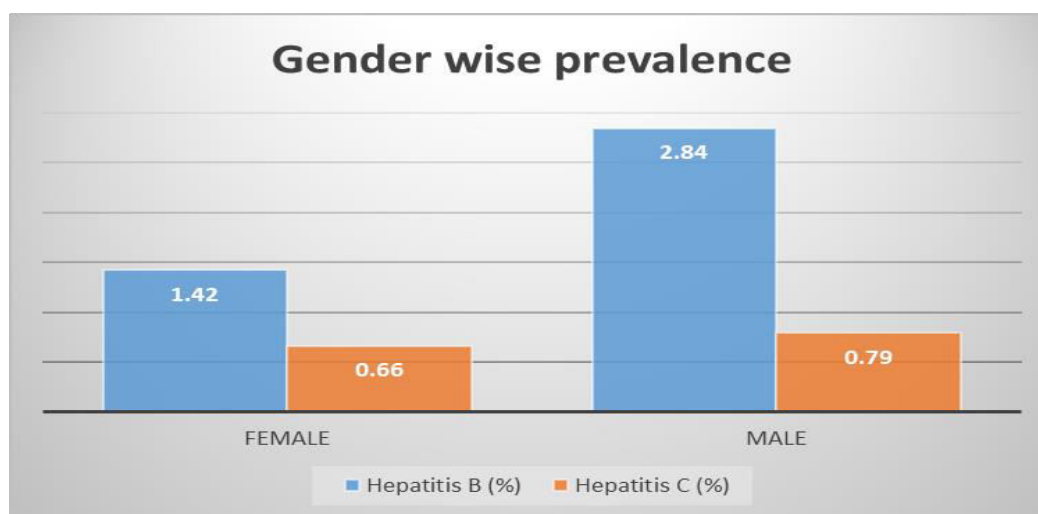


Figure 3: Gender wise distribution of prevalence of Hepatitis B and C among screened patients.

In our study, the further analysis of prevalence of Hepatitis B for comparison of prevalence on the basis of age group and gender, it was observed that among female, the prevalence was highest in the 36-50 years of age group (1.63%), and was lowest in the age group of <20 years (0.15%), but for the males, the prevalence was highest in the 20-35 years of age group (3.33%), and was lowest in the age group of <20 years (0.74%) and it was statistically insignificant (p=0.270) (Table 4 and Figure 4).

Table 4: Comparison of prevalence of Hepatitis B among screened patients.

Age group (in years)	Hepatitis B screened		Hepatitis B Positive		Hepatitis B screened		Hepatitis B Positive	
	Female		Male		Female		Male	
		Number	%		Number	%		
<20	968	2	0.15	1218	9	0.74		
20-35	6010	93	1.55	7408	247	3.33		
36-50	9934	162	1.63	14680	462	3.15		
>50	6195	73	1.17	11456	268	2.34		

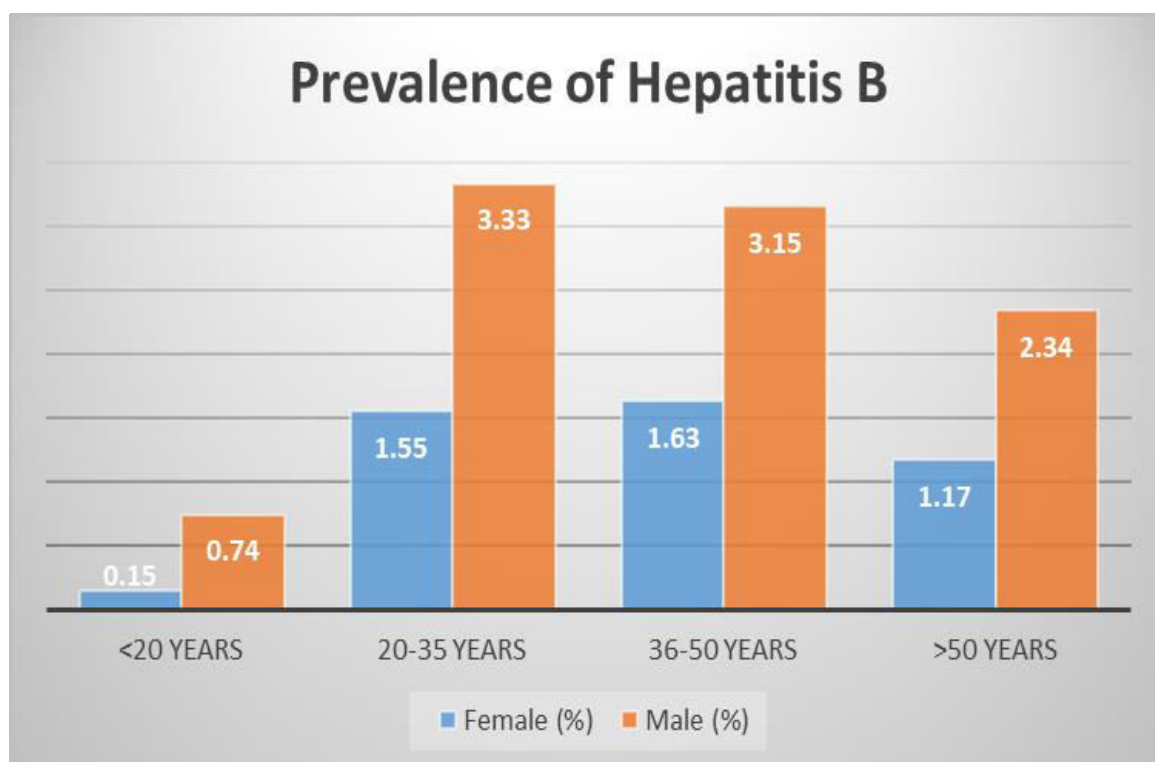


Figure 4: Comparison of prevalence of Hepatitis B among screened patients.

In our study, the further analysis of prevalence of Hepatitis C for comparison of prevalence on the basis of age group and gender, it was observed that among female, the prevalence was highest in the 36-50 years of age group (0.83%), and was lowest in the age group of <20 years (0.39%), but for the males, the prevalence was highest in the 36-50 years of age group (1.30%), and was lowest in the age group of <20 years (0.10%) and it was statistically significant (p=0.017) (Table 5 and Figure 5).

Table 5: Comparison of prevalence of Hepatitis C among screened patients.

Age group (in years)	Hepatitis C screened		Hepatitis C Positive		Hepatitis C screened		Hepatitis C Positive	
	Female		Male		Female		Male	
		Number	%		Number	%		
<20	775	3	0.39	1019	1	0.10		
20-35	4937	22	0.44	6159	34	0.55		
36-50	7829	65	0.83	10268	133	1.30		
>50	4455	29	0.64	8078	100	1.24		

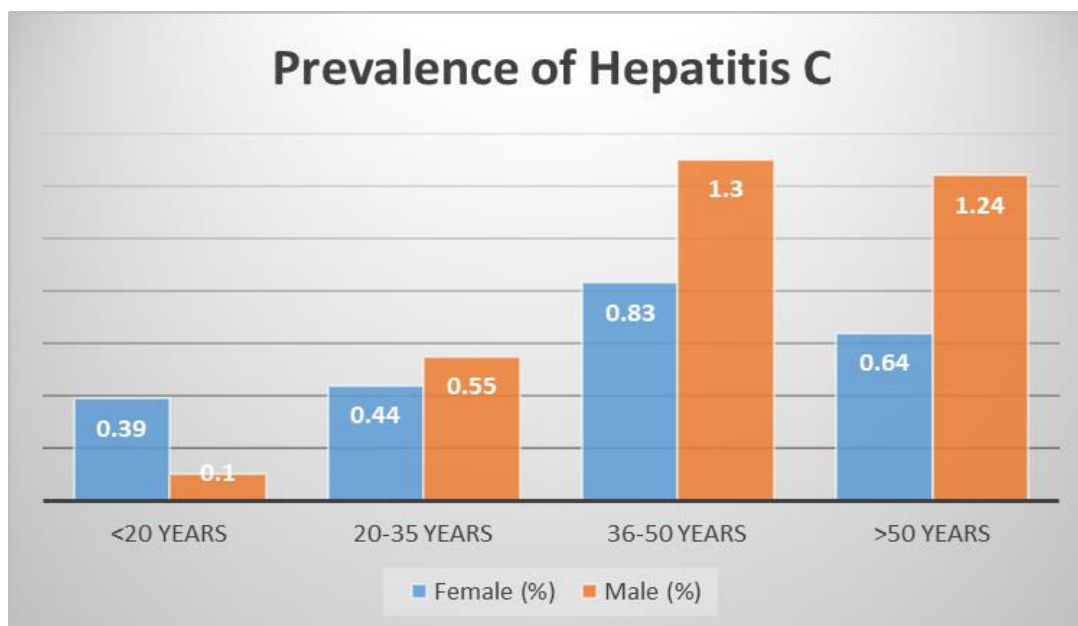


Figure 5: Comparison of prevalence of Hepatitis C among screened patients.

DISCUSSION

High global frequency, a convoluted clinical history, and the limited efficacy of currently available antiviral medication are characteristics of Hepatitis B and Hepatitis C infections. These viral infections are substantial contributors to hepatocellular carcinoma, cirrhosis of the liver, and chronic hepatitis over the world [8]. In India, there is a significant regional variance in the prevalence of HBsAg. The Andaman tribes as well as Arunachal Pradesh's tribes have recorded the highest prevalence [9]. According to WHO estimates, 2% of people worldwide have HCV infection. Due to this virus, 170 million individuals are chronically infected, and 3–4 million people contract it each year [10].

Hepatitis B seroprevalence in the current study was 2.27%, which is indicative of intermediate endemicity. In other studies, the variance in the seroprevalence of Hepatitis B was observed. In the current study, the seroprevalence of hepatitis C was 0.73% [11,12,13,14]. In other studies [25,29,15,6], the variance in the seroprevalence of Hepatitis C was observed [15,16,17,18]. As was already established, there are significant regional variations in the prevalence and trend of hepatitis B and C infections, which may be caused by host and environmental factors as well as cultural and behavioral norms. In addition to this, the various ELISA kit generations utilized, their sensitivity and specificity, and the study population chosen will affect these variations. Other factors contributing to its rise include promiscuous sexual behavior, the rising trend of tattooing, the sharing of needles by drug users, and the lack of an effective Hepatitis C vaccine.

In our study there was a gradual decrease in the Hepatitis B prevalence over the years. Studies by Ahmed et al., Ray et al., and Baitha et al., also reported similar findings [16,19,20]. Yet study by

Mukherjee et al., revealed no change in the Hepatitis B trend, but study by Arora et al., reported an increased trend [11,21]. In our study, Hepatitis C infection revealed a relatively variable tendency over the years. In line with this trend, Ray et al., and Sajjadi et al., also reported it [16,22]. In opposite, whereas Arora et al., and Masood et al., noticed an increasing trend and Baitha et al., Pahuja et al., and Shaiji et al., and reported a decreasing trend [20,21,23,24,25]. One of the important reasons for the decreasing trend of Hepatitis B may be due to availability of effective vaccine. In comparison to those who were not immunized, newborns who receive the hepatitis B vaccine convince more than 95% of seroconverts and have zero incidence of chronic infection [26].

Ages 36 to 50 were the most frequently impacted by hepatitis B infection in the current study. The infection was prevalent in younger age groups, according to studies by Tripathi et al., Khan et al., Yashovardhan et al., Antony et al., and Singh et al. [13,14,15,27,28]. Similar to the study by Tripathi et al., the age group of 36 to 50 years in the current study had the highest rate of hepatitis C infection [27]. However, investigations by Khan et al., and Antony et al., indicated that younger age groups had the highest infection rates [13,15]. Hepatitis B vaccination coverage for children, hazardous sexual behaviour among drug users, and tattooing in various communities may all be contributing factors to the variation in the most prevalent age impacted by hepatitis B and hepatitis infection.

Both HBV and HCV infection were more common in men in this study. Studies by Khan et al., Yashovardhan et al., Antony et al., Singh et al., Sood et al., Makroo RN et al., and Tripathi et al., all revealed similar findings [13,14,15,27,28,29,30]. Conversely, Antony et al., showed that females made up the majority of HCV

infected patients in their study [15]. There may be higher chances for guys to be exposed to the risk factors that have already been described, which could be one of the causes of the male preponderance.

CONCLUSION

In this study, the seroprevalence of Hepatitis B and Hepatitis C among screened patients was 2.27% and 0.73%, respectively. In our study both Hepatitis B and Hepatitis C infection exhibited a fluctuating tendency. Although it is well known that prevention is preferable to treatment, efforts should be undertaken to lower the prevalence of Hepatitis B and Hepatitis C by straightforward preventative measures such public education, blood and blood product screenings, and raising awareness of the value of immunization.

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