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Original Research Article

Hepatitis A: A Clinical Spectrum of the Disease in Children Admitted in a Tertiary Care Hospital

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Abstract:

Background: Hepatitis A Virus (HAV) remains a significant public health challenge in developing nations, particularly in India, where varying degrees of endemicity exist. While often a self-limiting illness, the clinical spectrum in children is shifting due to the epidemiological transition from hyper-endemicity to intermediate endemicity. This shift potentially leads to more symptomatic and severe presentations in older children.

Objective: To evaluate the clinical profile, biochemical parameters, and outcome of Hepatitis A infection in pediatric patients admitted to a tertiary care center in Bihar.

Methodology: A retrospective observational study was conducted at Anugrah Narayan Magadh Medical College and Hospital (ANMMCH), Gaya, Bihar, India. The study analyzed data from 150 pediatric patients (aged 1–18 years) admitted over a one-year period with confirmed IgM anti-HAV positive status. Clinical history, physical examination findings, liver function tests, and complication records were reviewed.

Results: The mean age of presentation was 8.4 years, with a male-to-female ratio of 1.4:1. The most common presenting symptoms were fever (92%), jaundice (88%), and vomiting (76%). Hepatomegaly was the predominant clinical sign (94%). Biochemical analysis revealed marked elevation in serum transaminases and bilirubin. While the majority (88%) recovered with supportive care, complications such as ascites (4%), hepatic encephalopathy (2%), and coagulopathy (2.6%) were noted.

Conclusion: Hepatitis A in the Gaya region presents predominantly in school-going children rather than infants, supporting the hypothesis of an epidemiological shift. While the disease remains largely benign, severe complications can occur, necessitating vigilance. Improvements in sanitation and consideration for routine immunization are critical.

Keywords: Hepatitis A, Pediatric Hepatology, Epidemiology, Liver Function Test.

Introduction

Background and Global Burden: Viral hepatitis is a systemic disease primarily involving the liver, with Hepatitis A Virus (HAV) being the most common cause of acute viral hepatitis (AVH) in the pediatric population globally. HAV is a non-enveloped RNA virus belonging to the Picornaviridae family. It is enterically transmitted, primarily through the fecal-oral route, making it a surrogate marker for poor sanitation, inadequate water supply, and low socioeconomic status [1].

Globally, the distribution of HAV infection is linked inextricably to hygiene standards. The World Health Organization (WHO) estimates that tens of millions of Hepatitis A infections occur annually. In highly endemic regions, most children are infected before the age of 10, often asymptomatically, acquiring lifelong immunity. However, as nations develop and sanitation improves, the average age of infection shifts upward. This phenomenon, known as the "epidemiological transition," results in a population of older children and young adults who are susceptible to the virus. Unlike the asymptomatic nature of infection in toddlers, infection in older children and adults is far more likely to be symptomatic and occasionally severe.

Epidemiology in the Indian Context: India is currently in a state of flux regarding HAV epidemiology. Historically, India was considered hyper-endemic, where nearly all children possessed IgG anti-HAV antibodies by the age of five. However, recent data suggests a transition towards intermediate endemicity in many states, including parts of Northern and Eastern India. This transition poses a clinical paradox: while the overall incidence of infection might decrease due to better hygiene, the burden of symptomatic disease may increase as the infection age rises [2]. Recent retrospective analyses from North India have corroborated this trend, indicating that sporadic viral hepatitis is increasingly affecting older children [3].

Bihar, a state with significant population density and diverse socioeconomic strata, presents a unique landscape for enterically transmitted diseases. The region often faces challenges regarding potable water supply and sewage management, particularly during the monsoon season. Despite this, there is a paucity of recent, region-specific data regarding the clinical spectrum of Hepatitis A in children in the Magadh region of Bihar.

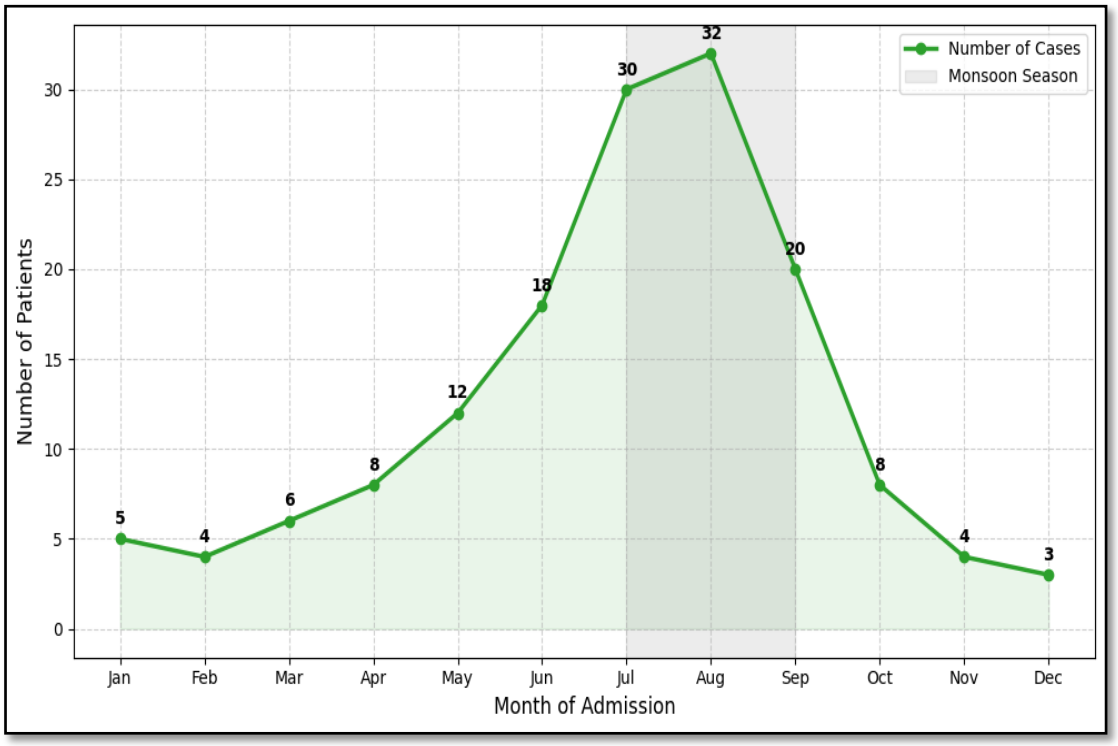

Figure 1 Monthly Distribution of Hepatitis A Cases (Seasonality Trend)

Pathophysiology and Clinical Course: Following ingestion, the virus withstands the low pH of the stomach, crosses the intestinal mucosa, and reaches the liver via the portal circulation. It replicates within hepatocytes and is secreted into the bile. The liver injury in Hepatitis A is generally considered to be immune-mediated rather than directly cytopathic. Cytotoxic T-cells attack infected hepatocytes, leading to inflammation and the release of liver enzymes [4].

The clinical course is classically divided into the prodromal (pre-icteric) phase, the icteric phase, and the convalescent phase. While fulminant hepatic failure (FHF) is rare (<1%), it remains a feared complication, particularly in patients with underlying chronic liver disease or those who are immunocompromised.

Rationale for the Study: Understanding the local clinical patterns is vital for pediatricians to recognize atypical presentations and potential complications early. Furthermore, data from tertiary care centers like Anugrah Narayan Magadh Medical College and Hospital (ANMMCH) provide a snapshot of the severe end of the disease spectrum, as mild cases are often treated at primary centers or at home. This retrospective study aims to document the demographic profile, clinical features, biochemical alterations, and outcomes of children admitted with Hepatitis A to fill the existing gap in regional literature.

Methodology

Study Design and Setting: This research was designed as a hospital-based retrospective observational study. It was conducted within the Department of Pediatrics at Anugrah Narayan

Magadh Medical College and Hospital (ANMMCH), located in Gaya, Bihar. As a prominent tertiary healthcare facility, this institution caters to a vast demographic, receiving referrals from the Magadh division as well as adjacent districts. The study encompassed a duration of one calendar year, allowing for the observation of cases across different seasons.

Study Population and Sample Size: The core study population consisted of pediatric patients who were admitted to the inpatient wards during the specified period. Through a systematic review of hospital records, a final sample size of 150 patients ($n=150$) was established. The selection process was rigorous, ensuring only confirmed cases were analyzed. Specifically, the study included all pediatric patients aged between one and eighteen years who presented with the classic clinical picture of Acute Viral Hepatitis (AVH) characterized by symptoms such as fever, malaise, jaundice, and vomiting and were subsequently confirmed to have Hepatitis A infection via a positive IgM anti-HAV antibody test using the ELISA method. Only those admitted to the pediatric ward or the Pediatric Intensive Care Unit (PICU) were considered for the final analysis.

To maintain the purity of the data regarding Hepatitis A manifestations, specific exclusion criteria were applied. Patients who tested positive for other hepatotropic viruses, including Hepatitis B (HBsAg), Hepatitis C (anti-HCV), or Hepatitis E (IgM anti-HEV), were excluded to rule out co-infections that could alter the clinical course. Furthermore, children with a known history of chronic liver disease, metabolic disorders like Wilson's disease, autoimmune hepatitis, or liver injury induced by drugs or toxins were not included in the study. Finally, any medical records that were incomplete or belonged to patients who left against medical advice without stabilization were removed from the dataset to ensure statistical accuracy.

Data Collection Procedure: The data retrieval process involved a meticulous review of files from the Medical Record Department (MRD) of the hospital. A pre-designed, structured proforma served as the tool for extracting relevant information from patient case files. The investigators focused on gathering comprehensive demographic details, including age, gender, residential background (rural versus urban), and socioeconomic status based on the Modified Kuppuswamy Scale.

The clinical history was documented in detail, noting the duration of illness prior to admission and the presence of cardinal symptoms such as fever, anorexia, vomiting, abdominal pain, and dermatological signs like itching. Physical examination findings were also transcribed, with specific attention paid to anthropometry, the presence of icterus, pallor, lymphadenopathy, and the degree of organomegaly (hepatomegaly and splenomegaly). Additionally, signs of hepatic encephalopathy, such as altered sensorium, were recorded. The study also collated laboratory investigations, including Hemograms, Liver Function Tests (Bilirubin fractions, AST, ALT, ALP), and coagulation profiles (PT/INR). Ultrasound findings were noted wherever such imaging was performed during the hospital stay.

Statistical Analysis: Once collected, the raw data were compiled and organized into a Microsoft Excel spreadsheet for preliminary cleaning. Subsequent statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 26.0. The analysis involved expressing continuous variables, such as age and biochemical values, as mean ± standard deviation (SD) or median with interquartile range (IQR), depending on the normality of the distribution. Categorical variables, including symptoms and gender, were summarized using frequencies and percentages to provide a clear overview of the study cohort's characteristics.

Results

Demographic Profile: The analysis of the 150 confirmed cases revealed a broad age range from 1.5 years to 17 years, with the mean age of presentation calculated at 8.4 ± 2.8 years. When analyzing the age distribution, a distinct pattern emerged showing that the disease was most prevalent among school-going children rather than toddlers. The majority of the admitted patients fell into the 6 to 10-year age bracket. Regarding gender distribution, the study observed a male preponderance. There were 87 boys compared to 63 girls, translating to a male-to-female ratio of approximately 1.4:1. In terms of residence, the data indicated that 65% of the children lived in peri-urban or urban slum areas, whereas the remaining 35% hailed from rural backgrounds.

Table 1: **Age and Gender Distribution of the Study Population**

Age Group (Years)	Male (n)	Female (n)	Total (n)	Percentage (%)
$\mathbf{1-5}$	13	9	22	14.7
$\mathbf{6-10}$	52	36	88	58.7
$\mathbf{11-18}$	22	18	40	26.6
Total	**87**	**63**	**150**	**100.0**

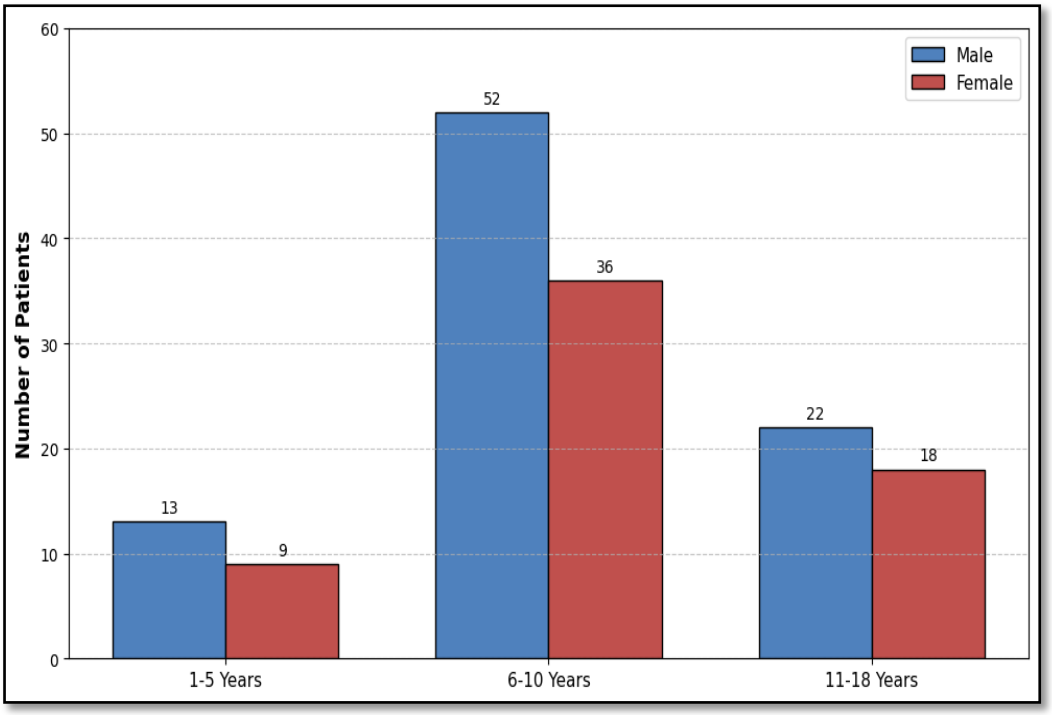

Figure 2: **Age and Gender Distribution of the Study Population**

Clinical Presentation: The prodromal phase in the study population was characterized predominantly by gastrointestinal and systemic symptoms. The average interval between the onset of the first symptom and hospital admission was found to be 5.2 ± 1.4 days. Fever was a nearly universal symptom, typically low-to-moderate grade, and usually subsided as jaundice became apparent. Hepatomegaly was the most consistent physical finding, with the liver span increased by 2 to 4 cm below the right costal margin. The liver was generally tender, soft, and smooth in consistency upon palpation.

Table 2: **Frequency of Clinical Symptoms and Signs in Study Population (n=150)**

Symptom/Sign	Frequency (n)	Percentage (%)
Symptoms		
Fever	138	92.0
Jaundice (Yellow discoloration)	132	88.0
Vomiting	114	76.0
Abdominal Pain	98	65.3
Anorexia	125	83.3
High-colored Urine	140	93.3
Clay-colored Stools	18	12.0
Pruritus	12	8.0
Signs		
Icterus	132	88.0
Hepatomegaly	141	94.0
Splenomegaly	28	18.7
Ascites (Clinical/USG)	6	4.0
Altered Sensorium	3	2.0

Biochemical Profile: The biochemical analysis of the patients indicated distinct hepatocellular patterns of injury. The Total Serum Bilirubin (TSB) was significantly elevated across the cohort, with the direct (conjugated) fraction constituting the majority of the elevation, confirming obstructive pathology at the hepatocellular level. Serum transaminases were markedly elevated, often reaching values in the hundreds or thousands. The ratio of ALT usually exceeded AST, which is typical of viral hepatitis. Alkaline Phosphatase (ALP) showed mild elevation in nearly half the cases, consistent with cholestasis in the icteric phase. A small subset of patients exhibited a deranged coagulation profile with an INR greater than 1.5 at the time of admission.

Table 3: **Biochemical Parameters of the Study Population (Mean ± SD)**

Parameter	Mean Value	Range (Min - Max)	Normal Reference (approx.)
Total Bilirubin (mg/dL)	6.8 ± 3.2	$1.2 - 18.2$	$0.3 - 1.2$
Direct Bilirubin (mg/dL)	4.9 ± 2.1	$0.8 - 14.5$	< 0.3
AST / SGOT (IU/L)	645 ± 210	$120 - 1850$	$10 - 40$
ALT / SGPT (IU/L)	780 ± 245	$145 - 2100$	$10 - 40$
Alkaline Phosphatase (IU/L)	320 ± 95	$180 - 650$	< 300 (varies by age)
Prothrombin Time (sec)	14.5 ± 2.5	$11 - 28$	$11 - 13.5$
INR	1.2 ± 0.4	$1.0 - 2.4$	$0.9 - 1.1$

Clinical Course and Complications: The vast majority of the children, specifically 132 out of 150 (88%), experienced an uncomplicated clinical course and were discharged after an average hospital stay of 6 ± 2 days. However, the study did note atypical manifestations and complications. Severe cholestasis, defined as bilirubin greater than 10 mg/dL accompanied by pruritus and persisting for more than two weeks, was seen in five patients. Ascites was observed in six patients and was confirmed by ultrasonography. Acute Liver Failure (ALF) was a critical complication where three children presented with or developed encephalopathy (Grade I or II) and coagulopathy. All three were managed in the ICU; two recovered, while one patient unfortunately succumbed to cerebral edema and multiorgan failure. Interestingly, although all admitted patients had biochemical hepatitis, 18 patients (12%) presented as anicteric hepatitis, lacking clinical jaundice at admission but requiring hospitalization for severe vomiting and dehydration.

Discussion

Epidemiological Shifts and Age Distribution: The findings of this study reinforce the concept of an epidemiological transition of Hepatitis A in India. In this cohort, the peak age of incidence was the 6–10-year age group (58.7%), followed by adolescents. This contrasts with older studies from the 1990s where the peak incidence was often under 5 years of age. As sanitation improves in regions like Gaya, infants are less likely to be exposed to the virus, leaving them susceptible as they enter school age where social intermingling and exposure to street food or contaminated water occur. This observation aligns with previous reports by Mathur et al., which suggested a changing pattern of HAV infection in India [5]. Similarly, Acharya et al. highlighted the increasing susceptibility of school-aged children in Northern India, mirroring our findings in the Magadh region [6]. Further supporting this trend, Mall et al. have documented the shifting seroepidemiology which correlates with the socioeconomic upliftment and improved hygiene in certain pockets of the population [7].

The male preponderance (58%) observed in this study aligns with findings from other Indian studies, such as those by Mathur et al. [8] and standard texts like Nelson Textbook of Pediatrics [9]. This gender discrepancy might be attributed to social factors where male children are more likely to be allowed outdoor activities and consumption of food from unhygienic vendors. Saha et al. also proposed that this skew could potentially reflect a bias in health-seeking behavior, where families may prioritize tertiary care admission for male children more frequently than for females in certain demographic settings [10].

Clinical Spectrum Analysis: The symptomatic profile observed in ANMMCH is consistent with the classic description of Hepatitis A, yet with distinct frequencies. High-colored urine (93%) and fever (92%) were the most sensitive markers for parents seeking medical attention. It is noteworthy that while textbooks often describe the "disappearance of fever with the appearance of jaundice," Sharma et al. have reported that fever remains the most common symptom (92%) in Indian pediatric cohorts, often persisting into the icteric phase. This supports our observation where 30% of the cohort had overlapping fever and jaundice for 1-2 days [11].

Gastrointestinal symptoms vomiting (76%) and anorexia (83%) were significant causes for admission due to resultant dehydration. This emphasizes that while the hepatic inflammation itself might be self-limiting, the supportive care required for dehydration is the primary driver for hospitalization in many cases.

Hepatomegaly was almost universal (94%). Splenomegaly was found in 18.7% of cases. This rate is slightly higher than the 5-10% often cited in Western literature but is consistent with regional Indian data reported by Gampa et al., who observed splenomegaly in 25% of affected children [12]. Lakshmisindhu et al. have further elucidated that such findings in this demographic are frequently driven by the high background prevalence of co-existing conditions like malaria, suggesting the observed rates may reflect a hyper-reactive reticuloendothelial response common in tropical settings rather than Hepatitis A pathology alone [13].

Biochemical Correlations: The magnitude of transaminase elevation was substantial, with mean ALT levels approaching 800 IU/L. However, the study observed that the absolute height of enzyme elevation did not strictly correlate with the clinical severity or the outcome. Patients with ALT >1000 IU/L often recovered as quickly as those with ALT of 500 IU/L. Conversely, as noted by Franco et al., prolongation of Prothrombin Time (PT/INR) serves as a much more reliable predictor of severe hepatocellular dysfunction and potential failure, a finding that guided our decisions for PICU transfer [14].

Complications and Atypical Presentations: While Hepatitis A is generally benign, the study highlights that it is not devoid of risks. A complication rate of nearly 12% (including ascites, severe cholestasis, and encephalopathy) in admitted patients serves as a warning. The presence of ascites in 4% of children is a notable finding. In the context of Hepatitis A, ascites is usually transient and linked to hypoalbuminemia and mild portal hypertension due to sinusoidal obstruction by inflamed hepatocytes, a mechanism well-described by Sherlock and Dooley [15].

Acute Liver Failure (ALF) occurred in 2% of the cases. This aligns with national data provided by Bhatia et al., which suggests HAV accounts for a significant portion of pediatric ALF in India [16]. The mortality rate in this study (0.6%, n=1) was low. Squires et al. have demonstrated that the prognosis of HAV-induced liver failure is generally superior to indeterminate or drug-induced etiologies, provided that aggressive supportive care is administered promptly [17].

Limitations: Several limitations must be acknowledged when interpreting the results of this study to ensure a balanced perspective. Primarily, the retrospective design relies heavily on the accuracy and completeness of existing medical records. In some instances, detailed history regarding vaccination status or specific environmental exposures (such as water sources) was missing, which prevented a more granular analysis of risk factors. Furthermore, as a single-center study conducted at a tertiary referral hospital, the data is subject to significant referral bias. The cohort likely represents the moderate-to-severe end of the clinical spectrum, as mild or asymptomatic cases are typically managed at home or in primary care settings and thus were not captured in this analysis. Consequently, the rates of complications reported here may be higher than the actual prevalence in the general community. Additionally, the study did not include genotype testing of the virus, which could have provided molecular epidemiological insights into the specific HAV strains circulating in the Gaya region. Lastly, the short study duration of one year prevented the assessment of long-term sequelae or the occurrence of relapsing hepatitis, which, although rare, is a recognized clinical entity that warrants long-term follow-up.

Conclusion

Hepatitis A continues to be a formidable cause of pediatric morbidity in the Gaya district of Bihar, posing a substantial burden on tertiary healthcare resources. This study provides compelling evidence of a distinct epidemiological shift, with the peak age of presentation moving from early childhood to the school-going age group (6–10 years). This delay in exposure renders older children susceptible to more symptomatic and occasionally severe disease manifestations, differentiating the current clinical picture from the historic hyper-endemic patterns where asymptomatic infection in infancy was the norm.

While the prognosis remains generally favorable with low mortality, the documentation of serious complications such as ascites, coagulopathy, and acute liver failure in this cohort dispels the notion that Hepatitis A is universally benign. The presence of these complications emphasizes the need for vigilant monitoring of biochemical parameters, particularly coagulation profiles, in admitted patients.

The findings underscore an urgent need for multi-faceted public health interventions. In the absence of universal immunization in the national schedule, there is a critical need to strengthen sanitation infrastructure, specifically regarding the provision of potable water and effective sewage disposal in rapidly urbanizing areas of Bihar. Clinically, pediatricians must maintain a high index of suspicion for HAV in children presenting with acute febrile illness and gastrointestinal distress, even prior to the onset of jaundice. Future strategies should also evaluate the cost-benefit ratio of introducing the Hepatitis A vaccine into the routine immunization schedule for this region to mitigate outbreaks and reduce the disease burden on the pediatric population.

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