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Epidemiological Analysis of Hepatitis A Virus (HAV) Infections at Tertiary Care Hospital, Ahmedabad, Gujarat

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ABSTRACT

Background: Viral hepatitis is a major public health problem seen in both developing and developed countries. This study aims to analyze the epidemiological pattern of Hepatitis A virus infection in patients attending GCSMCH & RC (Gujarat Cancer Society Medical College, Hospital and Research Centre), Ahmedabad.

Methods: A retrospective observational study was conducted at GCS Medical College, Hospital & Research Centre (GCSMCH & RC), Ahmedabad, analyzing data from July to December 2024. A total of 445 patients were tested for anti-HAV IgM antibodies. Demographic details, including age and gender, along with the monthly distribution of cases, were collected. Statistical analyses were performed using chi-square tests, with $p<0.05$ considered significant.

Results: Out of 445 patients, 101 (22.7%) tested positive for HAV. The highest number of cases was recorded in September (n=31), while November had the lowest (n=9). Age-wise distribution revealed a significant variation ($p<0.001$), with the majority of cases occurring in individuals aged >21 years. Gender-wise, 63 males (62.4%) and 38 females (37.6%) were affected; however, this difference was not statistically significant (p=0.103).

Conclusion: The study indicates a notable prevalence of HAV infections among adults, particularly those over 21 years old, with a peak in cases during the post-monsoon month of September. These findings underscore the need for targeted public health strategies, including improved sanitation, awareness campaigns, and consideration of adult vaccination programs to mitigate HAV transmission.

Key-words: Hepatitis A, Epidemiology, GCS Hospital, Hepatitis A virus (HAV), Age Distribution, Gender, Gujarat

INTRODUCTION

Hepatitis A virus (HAV) is a non-enveloped, single-stranded RNA virus belonging to the Picornaviridae family. It is primarily transmitted via the fecal-oral route, often through ingestion of contaminated food or water [1]. HAV infection is a significant public health concern worldwide, particularly in developing countries where sanitation infrastructure is inadequate. Poor hygiene, contaminated water supplies, and overcrowded living conditions contribute substantially to the endemicity of HAV in such regions [2].

India represents one of the countries with a high endemicity of HAV, where the burden of infection remains substantial due to socio-economic and environmental factors [3]. Infections caused by HAV can vary widely in clinical presentation. While young children often experience asymptomatic or mild infections, older children and adults are more likely to develop acute symptomatic hepatitis, which can occasionally lead to

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severe liver disease [1,4]. According to the World Health Organization, HAV accounts for a significant proportion of acute viral hepatitis cases globally, with an estimated 1.5 million symptomatic cases reported annually [1].

Several regional epidemiological studies in India have documented the endemic nature of HAV. For instance, Sarthi *et al.* [5] conducted a study in central Karnataka, revealing notable age-wise variations in HAV prevalence, with young adults showing higher susceptibility to infection. Despite these insights, there remains a lack of comprehensive hospital-based epidemiological data, particularly from western India. Understanding local transmission dynamics is crucial for targeted public health interventions.[6]

GCS Hospital, a tertiary care center located in Ahmedabad, Gujarat, provides an ideal setting to investigate HAV epidemiology in an urban Indian context. This study aims to analyze the epidemiological characteristics of HAV infections reported at GCS Ahmedabad Hospital during the second half of 2024. The focus will be on monthly trends, age distribution, and gender patterns of HAV cases. Additionally, the study seeks to identify critical risk demographics to inform and optimize local preventive strategies and public health policies.

MATERIALS AND METHODS

Research design- This retrospective observational study was conducted at GCS Hospital, Ahmedabad, Gujarat, India. The study period extended from July to December 2024.

Methodology- Data were obtained from laboratory records for all patients tested for Hepatitis A during the study period. Serological testing was performed using immunochromatography for anti-HAV IgM antibodies during this timeframe. Demographic data, including age and sex, along with test results (positive/negative) and testing month, were extracted from laboratory records. Age was stratified into five categories: 1–5 years, 6–10 years, 11–15 years, 16–20 years, and >21 years, consistent with classification in previous studies.

Inclusion criteria- Patients of all ages who underwent serological testing for HAV using immune-chromatography (anti-HAV IgM) between July and December 2024 were included in the study.

Exclusion criteria- Patients were excluded if they had incomplete demographic data or co-infections with other hepatitis viruses.

Statistical Analysis- Descriptive statistics were computed to evaluate overall positivity rates, gender and age distribution. Positivity rates were calculated as the number of positive cases per total test conducted each month. Chi-square tests were applied to assess the statistical significance of gender- and age-related differences. A $p<0.05$ was considered statistically significant. Data visualization included bar charts for monthly and age-wise distribution and pie charts for gender breakdown. All statistical analyses were performed using Python (SciPy and Seaborn packages).

RESULTS

A total of 445 patients were tested for HAV between July and December 2024. Among them, 101 individuals tested positive, indicating an overall positivity rate of 22.7%.

The distribution of positive HAV cases varied significantly across the months. September had the highest number of positive cases (n=31, 30.7%), followed by August (n=23, 22.8%). The lowest incidence was recorded in November (n=9, 8.9%). The monthly positivity rates were: July (13.9%), August (27.7%), September (27.4%), October (22.1%), November (15.5%), and December (25.5%) (Fig. 1).

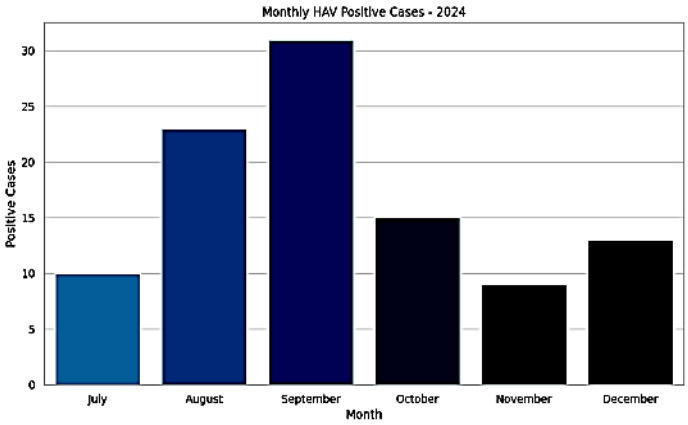

Fig. 1: Monthly Distribution of HAV Cases at GCS Ahmedabad Hospital (July–December 2024)

Among the 101 HAV-positive cases, 63 (62.4%) were male and 38 (37.6%) were female. The chi-square test revealed no statistically significant difference in infection rates between genders ($\chi^2=2.66$, $p=0.103$) (Fig. 2).

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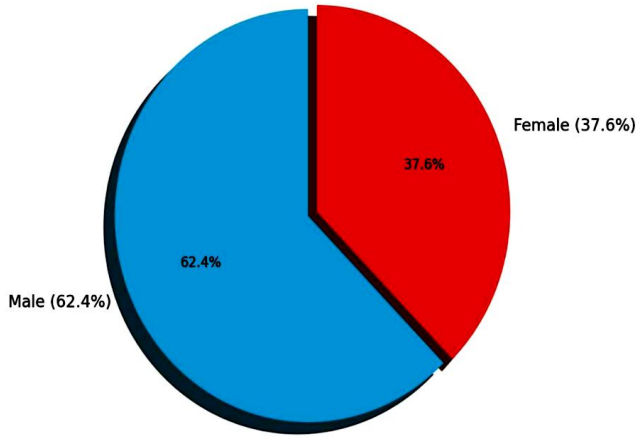

Fig. 2: Gender-wise Distribution of HAV Cases

The age-wise analysis demonstrated a significant variation in HAV positivity. The age group >21 years showed the highest number of cases (n=39, 38.6%), followed by 16–20 years (n=31, 30.7%). Other age groups showed lower prevalence: 11–15 years (n=24), 1–5 years (n=5), and 6–10 years (n=2). The chi-square test for age-wise differences was highly significant (χ^2=32.66, p<0.001) (Fig. 3).

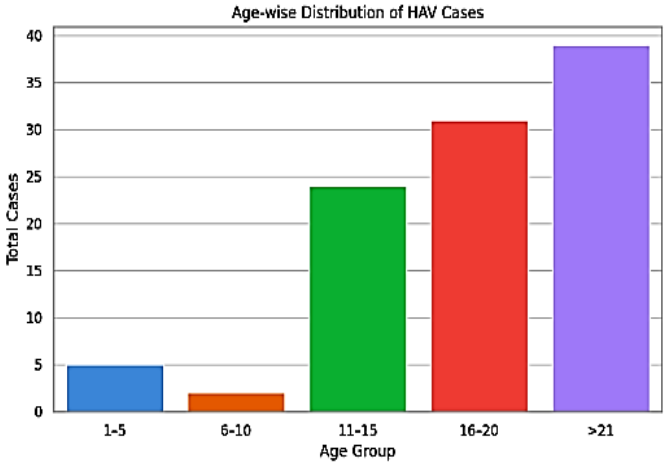

Fig. 3: Age-wise Distribution of HAV Cases

DISCUSSION

The present study provides valuable insights into the local epidemiology of HAV in Western India. The observed seasonal peak in August and September aligns with post-monsoon patterns when water contamination is most likely. Similar trends were noted in a Mumbai-based study, where the highest number of HAV cases occurred during post-monsoon months, confirming the influence of waterborne transmission in endemic areas [7].

The predominance of cases in adult age groups (>21 years) suggests a significant epidemiological transition. Historically, HAV was prevalent in early childhood; however, due to improved hygiene and sanitation, first-time exposure now occurs later in life, often with more severe clinical manifestations [8]. A recent seroprevalence study in Pune also confirmed this age shift, revealing a higher susceptibility in adolescents and young adults [9].

While males were more frequently affected in our study, the gender difference was not statistically significant. Similar observations have been made in studies from both North and South India, where no clear gender predisposition was found, suggesting comparable environmental exposure risks [10].

Notably, adult infections often carry higher morbidity and risk of fulminant hepatitis. Jacobsen *et al.* documented severe hepatic dysfunction and prolonged hospital stays in adults with HAV, highlighting the clinical burden in this age group [11]. Given this trend, extending HAV vaccination to at-risk adults, such as food handlers, healthcare workers, and slum residents, becomes essential for disease control [12].

Moreover, studies have shown that food and water safety interventions combined with targeted immunization campaigns significantly reduce HAV incidence in urban settings [13-15]. The results from our study reinforce the need for improved public health strategies, particularly focused on sanitation, water quality monitoring, and expanded adult immunization, to effectively prevent future HAV outbreaks.

CONCLUSIONS

The study demonstrates a significant burden of HAV infection among adults in an urban Indian hospital, with a seasonal surge post-monsoon. While gender distribution was not statistically significant, age-based variation was profound and merits public health attention. Tailored vaccination strategies, improved sanitation, and targeted awareness campaigns are essential to curb HAV transmission. Further, longitudinal studies are needed to monitor trends in HAV epidemiology and evaluate the long-term efficacy of intervention strategies. Integrating HAV surveillance into routine public health programs and expanding research on environmental and behavioural risk factors could significantly enhance prevention efforts. These insights can inform policy frameworks and resource allocation, ensuring a protective approach to HAV control in similar urban settings.

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LIMITATIONS

Being a hospital-based retrospective study, the findings may not be generalizable to the broader population. The study only covers a six-month data collection period, which restricts the ability to establish long-term trends. Additionally, the lack of information regarding patients' vaccination status and socioeconomic background limits the depth of the analysis and the understanding of possible confounding factors.

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Data analysis and interpretation- Leena Leuva
Literature search- Leena Leuva, Shruti Shah, Falguni V.Patel
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Critical review- Urvesh Shah
Article editing- Leena Leuva, Shruti Shah
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