Section: Miscellaneous

Original Research Article

OUTBREAK INVESTIGATION OF HEPATITIS A AMONG MIGRANT CHILDREN IN A BENGALURU SLUM: SANITATION AND HYGIENE CHALLENGES

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ABSTRACT

Background: Being short of health care provisions and preventive measures is a major reason for outbreaks of communicable diseases and delay in controlling its spread. An outbreak of jaundice along with diarrhoea and fever in a cluster mostly among children was investigated. The objective is to identify children suffering from jaundice and to investigate for hepatitis A outbreak. To assess control measures and to analyse epidemic curve for forecasting.

Materials and Methods: An epidemic case sheet was used to collect data from the community and health centre laboratory to do basic investigations. Discharge summary of those admitted was used to collect details of confirmation of hepatitis A illness. The Local Primary Health Centre was called in for control activities. Non- Government Organization and their trained work force engaged in health education and surveillance activities.

Results: A slum in Bengaluru had an outbreak of Hepatitis A, where 92% of the households had no drainage. 88% was practicing indiscriminate waste disposal and 12% had no toilet facility, 32% practiced open air defaecation. 48 % followed handwashing practice. Total of 25 cases reported from 3 to 16 years.

Conclusion: The study revealed sanitation and hygiene deficits. Control measures implemented with community involvement and forecasting tools can significantly improve outbreak response when combined with intersectoral coordination.

Keywords: Hepatitis A, Outbreak, Migrants, Slum Area, Forecast.

INTRODUCTION

The residents in a slum area of Bengaluru city consisted of migrants, who moved into the area in search of employment, lived with their families. They are short of sanitation and provision of clean water along with other necessities. Apart from being an unauthorised slum several deficiencies exist in their lives, the lack of entitlements being the foremost, and they have drawbacks, like the poor quality of their dwellings and infrastructure deficits such as electricity, piped water supply, sanitation, drainage system and many practice indiscriminate waste disposal exist.

Hepatitis A is a vaccine preventable disease and transmitted through faeco- oral route and close contact with the infected persons. Open air defaecation and lack of toilets are a public health problem in these slums existing in a hustling city. Efforts were made to improve personal and environmental hygiene as well as to promote health awareness and practices. These activities were carried out by trained Community Health Associates (CHAs) and health care workers to provide primary health care. A primary health centre was established by a private agency catering to this vulnerable population to provide essential health care and monitor community health.

The World Health Organization (WHO) estimates more than 100 million Hepatitis A (HAV) infections, causing approximately 1.5 million clinical cases of Hepatitis A each year.[1] Being short of health care provisions and preventive measures is a major reason for outbreaks of communicable diseases like

Hepatitis A and delay in controlling its spread. Homelessness was found to be an independent risk factor in a study done in San Diego County, where 49% of cases occurred in people experiencing homelessness.[2] Accurate disease forecasting models would markedly improve outbreak prevention and control capabilities. According to WHO, the spread of Hepatitis A Virus (HAV) cases in developing countries are higher than that of developed countries is due to poor sanitation and below average living conditions in slum areas.[3]

An outbreak of jaundice along with diarrhoea and fever in a cluster, mostly among children was investigated. Clinical expression of HAV can vary from asymptomatic cases to severe liver disorders such as jaundice, chole static hepatitis and rarely, fulminant hepatitis.[4] The epidemic curve is defined as the distribution of times of onset of the disease, which provides valuable insights for forecasting and preparedness. By analysing the curve, public health teams can estimate the incubation period, predict the likely source of infection and anticipate future cases, which enables well targeted control measures. Forecasting models play a pivotal role in modern management.

Objectives: To identify children suffering from jaundice and to investigate for Hepatitis A and to detect the outbreak. To implement control measures including treatment and to analyse epidemic curve for forecasting.

MATERIALS AND METHODS

An unauthorised Slum in Kadubisanahalli, Kariyammana Agrahara, of Bengaluru city, had a total of 3840 households hailing from 10 different communities based on the languages they speak and states from where they migrated. Among them, 3 communities out of 7, reported Hepatitis A cases. Trained CHAs, 10 of them, from the same area served them, and covered this population of 8950 from this slum area. Cases were seen from September 2022 to June 2023, where all the children in these communities who were febrile and severely jaundiced or had a history of jaundice in the recent past were brought to the health centre, who were seen and investigated in the laboratory. House to House visits were conducted to identify all the symptomatic cases and their contacts. Line listing was also carried out and the details were shared with the local Primary Health Centre.

A validated questionnaire was used for data collection, which included their demographic information and family background. An epidemiological case sheet was used to collect details including the name, age, gender, date of onset, signs and symptoms, mode of cleaning utensils, source of water, method of purification, details of hygienic practices, and other environmental information. Active surveillance to identify further cases of jaundice was undertaken, and all children in this area were monitored regularly.

The health centre laboratory was used to do basic investigations. An investigation team was formed which included staff nurses, field staff and CHAs, who visited different communities and gave health education which was the main intervention. Hand hygiene and food hygiene was stressed upon while giving health education. Data was collected by visiting their residences. Symptomatic management and follow-up were done and those with high bilirubin levels and the very sick were referred to higher centre for management and discharge sheets of those admitted to hospitals were used for data collection.

Those who had reported Hepatitis A or found to be having jaundice were taken as cases. Follow-up of children was done until their bilirubin levels reached normal range and community surveillance continued until the outbreak was under control. With help of local authorities, the landowner kept the clean drive on until the transmission was well under control. Follow-up surveillance of cases was done by clinical examination and blood investigation; environmental surveillance was carried out by field staff from PHC on a regular basis until the outbreak was curbed. Informed consent was obtained from parents/guardians of the cases and contacts.

RESULTS

A total of 143 children were investigated which included both the cases and contacts. We identified a total of 25 patients aged 3 to16 years who were symptomatic. Out of 25, 21cases were investigated at our laboratory. Only 2 cases were admitted to hospital in which 1 case was isolated and 6 cases had laboratory confirmed Hepatitis A. These cases were seen over a period of 10 months. Since there was a sudden increase in the number, clustering in time and place, we considered this as an outbreak of Hepatitis A. Among these cases 13 (52%) were not immunized according to their age and 11(44%) of these children were not attending school.

In this slum, 100% of the people lived in sheet houses of which only 2 were pucca. Indiscriminate waste disposal was practiced by 88.9%. 12.9% households had no toilet facilities and 32% practiced open air defecation potentially increasing the intensity of disease spread. 92% of the households had no proper drainage system. Proper hand washing techniques were practised by 48% of them and only 8% drank boiled water. Furthermore, 54.9% had no proper food hygiene and 100% washed household utensils in a tub of water which is stagnant. All these flaws acted as environmental drivers of transmission.

Water supply was irregular, and residents had to store water in drums. Drinking water either came from tanker lorries and stored at home or purchased for a small amount from nearby RO plants. Many community members worked as waste pickers, rag

sorters, guards, household help and as janitors in nearby offices.

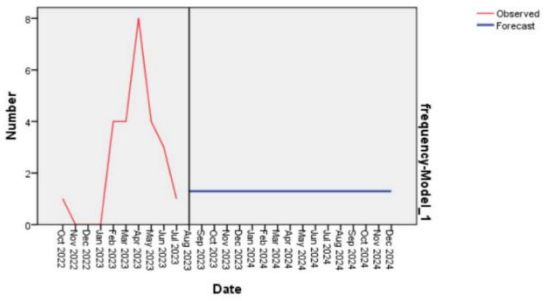
Table 1: Incidence of acute Hepatitis A cases by age and sex (N=25)

Age group	Number of cases	Percent
< 5 years	6	24
5-10 years	12	48
10 -15 years	3	12
>15 years	4	16
Gender		
Male	14	56
Female	11	44

Table 2: Frequency distribution of hepatitis A month wise (N=25)

Month observed	Frequency (n)	Percent (%)
September 2022	1	4
January 2023	4	16
February 2023	4	16
March 2023	8	32
April 2023	4	16
May 2023	3	12
June 2023	1	4

Figure 1: Hepatitis A outbreak: Epidemic curve and Statistical Forecast Model



The prolonged outbreak timeline and peak pattern reflect the intersection of viral persistence in poor environment and human behavioural factors sustaining transmission. The Epidemic curve showed a sharp rise to a peak followed by decline – which is typical of a point source outbreak, where a single exposure or cluster of exposures results in an outbreak. It then drops as the interventions take effect or the susceptible population declines. However, the extended timeline suggests continuous person-to-person transmission rather than a single point source exposure.

DISCUSSION

According to the results we obtained the outbreak had challenges and risks. The peak in cases during March 2023 likely reflects the culmination of risk factors, sanitation and hygiene deficits, overcrowding and gaps in the infrastructure with limited case detection. We primarily identified symptomatic cases, underestimating the true burden due to missed anicteric or asymptomatic infections and tracking all the contacts were herculean task. High subclinical burden was evident as only 6 laboratory confirmed cases were documented and modelling suggests asymptomatic carriers fuelled transmission. The constant influx of migrants further complicated surveillance and follow up efforts, which keeps adding to the communicable disease burden.

An outbreak lasting for 10 months (September 2022 to June 2023) affected 25 children from the age group of 3-16 years in migrant communities, with 32% of cases peaking in March 2023. The outbreak occurred due to several risk factors. It included, poor sanitation (92% of households no drainage, and 88 % practised indiscriminate waste disposal), limited access to clean water and lack of hygiene (only 8% drank boiled water, 48% reported to be handwashing). Overcrowding and open defaecation was another common risk factor (32% practiced open – air defecation).

Our findings were similar to the study conducted at Vellore urban slums where the outbreak was identified because of the symptomatic presentation of the cases.[6] The water supplied in our area might be contaminated, which needs investigation and may have served as the source of infection. The observed decline in cases post-peak suggests that coordinated public health intervention of giving health education, community surveillance and the environmental sanitation drives were effective in curbing transmission.

There is an unfavourable trend that Hepatitis A is still prevailing in hyper-endemic regions and highlights the need for targeted and specific strategies to eliminate this disease. This can be achieved by sanitation infrastructure upgrades in addition to comprehensive plan for surveillance and vaccination against hepatitis A.[7] As per a large-scale study done in western India, an explosive outbreak of Hepatitis A in children emphasized the need for proper public health strategies, such as vaccination, especially in countries which are in a transitional phase from hyper-endemic to intermediate endemicity.[8] In addition to this, there is high proportion of asymptomatic spread of HAV infection among children. According to a study conducted among children in Brazil, more than 75 percent of the HAV positive child population were having no symptoms.[9] This calls for a vaccination drive targeting the children from this community along with marked improvement in sanitation. Though, either vaccination or sanitation individually contribute to lowering the rates of infection, the most substantial impact is achieved when they are implemented together, reinforcing the value of integrated public health interventions.[10] Additionally, predictive modelling incorporating migrant movement patterns could be the model of study emphasized forecasting driven interventions in the future.

The epidemic curve is a descriptive tool which also serves a foundation for forecasting and intervention

planning. It provides actionable insights for resource allocation. In our context, the curve underscored the rapid escalation of cases, which prompted quick action by CHAs and local health authorities. The data informed transmission models helped to anticipate vulnerable populations. For our study integrating forecasting tools with real-time data from the epidemic curve helped the prediction of a short-term surge in cases, which guided resource allocation and intervention timing. Epidemic curve and forecasting models are indispensable for understanding and managing outbreaks.

Few specific areas have been identified by Indian Council of Medical Research (ICMR) to focus upon to improve ethics preparedness in dealing with outbreaks and urges all relevant stakeholders to recognize these and implement various steps to guide better public health outcomes in COVID 19 like situations, which are building public trust, protecting societal values, engaging with community and improving communication.[11,12] This is a retrospective study where participants cannot be contacted and considered all the above factors, which helped in controlling the outbreak effectively.

Strength and Limitations: Community health workers who were trained for field activities involved sincerely in identifying the cases, interventions and the surveillance was an asset in serving this community. Inter sectoral co-ordination worked in favour of curbing this outbreak effectively. Being an unauthorized slum and these migrants were floating crowd, made this population dynamic and hence tracking cases was difficult. Certain other limitations were the high degree of under reporting, as many believed it will heal by itself and choose not to intervene and thus,the true Hepatitis A occurrence is likely higher than the occurrence of reported cases.

CONCLUSION

Hepatitis A outbreak investigation and control activities involved community members and the CHA's along with public health nurses and other health system staff, this was efficient in implementing the outbreak control activities, which involved multiple stakes-holders. Simple interventions like health education regarding hand hygiene, sanitation, cleanliness promotion and regular follow up of cases and controls was very crucial in curbing the outbreak in this slum community. This outbreak was driven by environmental and behavioral risk factors. Improvement in Sanitation, hygiene and access to clean water is critical for prevention of future outbreaks. Forecasting- even with simple models helps in planning resources and interventions, should be combined with on-the ground surveillance and public health action to prevent and predict future explosive outbreaks can help in preventing further episodes in this floating population.

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