

Epidemiology of Hepatitis A in Kerala: Note on deliberations of a recent webinar

In view of the recent outbreaks of Hepatitis A infection, the school of Public Health organized a webinar involving health service officials, academic experts and other health service functionaries in the field.

Given below is a brief technical note based on this webinar

The state of Kerala has already initiated several programs for control of waterborne communicable diseases. People of Kerala are famous for their personal hygiene and recently efforts of community sanitation as part of 'Haritha Keralam' project has become popular. Kerala's ranking as first position in health can be attributed to socially conscious community and politically determined government.

The paradox is that in spite of all these positive aspects, communicable diseases continue as a troubling menace. Hepatitis A is a typical example. The state has already reported many outbreaks (See table 1.)

Table 1. History of Hepatitis A outbreaks in Kerala

Year	Reference	Place	Number affected	Age group	Suspected source
1980	Joshi et al (1)	Muvattupuzha, Ernakulam	376	4-10 years	Well in school
1998	Rakesh et al (2)	Central Kerala	399	Majority (65%) in age group 15-33 years	
2004	Rakesh et al (2)	Kottayam		Young adults	
2013	Rakesh et al (3)	Kollam	45	5-14	pipe water contamination supplied from a bore well
2015	Rakesh et al (2)	Kollam	114	10-25 years	
2016	Gurav et al (4)	Nellikuzhi, Ernakulam	562	Majority (68%) young adults aged 20-39 years	Restaurant in village
			223	Majority in age group 16-30 years	newly opened hotel in the area

2016	Zachariah SM et al(5)	Palakkad	49	Majority in age group 5-15 years	Consumption of welcome drink
2017	Ishaque et al (6)	Northern Kerala	82	15 -25 years	ablution pond within the compound of the mosque

Unlike those in developed countries all these outbreaks reported phenomenal number of cases. During few outbreaks only the source of infection has been established through case control methodology. One interesting feature is that most of these outbreaks are clustered around establishment like restaurant or ice cream parlour or juice parlour. The Kottayam outbreak has been extensively investigated and genetic investigation revealed usual variant only.

The burden: Endemicity refers to habitual presence of a disease or infection in an area and indicates natural transmission of the disease. The endemicity levels vary and have the potential to mount to epidemic or outbreak occurrence.

During investigation of epidemic, though the mandate is detection of source of infection, measurement of burden in terms of rates or ratio is another purpose. For this the definition of denominator is a crucial step.

Each disease has its own endemicity measurement indicator, like proportional case rate, incidence or attack rate, weekly count rate, hospital admission rate secondary attack rate etc.

Epidemic is the occurrence in excess of normal expectation. In the case of certain pathogens single case can be considered as an epidemic. In the absence of background information or baseline data, it is difficult to say whether an outbreak is epidemic or not. That is why we say the flareup of burden as outbreak only. Attack rate is the cumulative incidence of infection in a defined group over a defined period.

Hyper-endemic meso- endemic and holo-endemic are different terms used for range of burden which became popular in the context of malaria epidemiology. We can make operational definitions for this (See Wikipedia for a detailed discussion)

If the disease or infection becomes extremely common the situation is hyper-endemic and periods of quiescence is possible in between.

Now the question is what is the situation of burden of Hepatitis A in Kerala? This is difficult to say because we don't have reliable population level surveillance data. However, we can say that Kerala continued to be endemic and occurrence of

quiet frequent outbreaks makes it hyper- endemic. Generally, in endemic situations outbreaks are less common. Community with relatively better social conditions and hygiene experience new outbreaks. This is because the epidemic threshold is more than the immunity threshold. The philosophy of integrated disease surveillance is multilevel data collection and integration. Data on serology need to be integrated with clinical data and if needed additional Sero-epidemiologic surveys need to be undertaken. Then only we can comment about the endemicity and transmission potential. The concept of intermediate endemicity has been suggested by few researchers. Absence of lifelong immunity is also another cause of occurrence of outbreaks. Standard case definitions used as a part of syndromic surveillance can be used. Hepatitis A is a priority in national IDSP program.

There are short review articles available on Hepatitis A. Most of the standard clinical text books also give reasonable account on clinical and epidemiological features. Descriptive epidemiology is a powerful tool especially for health service planning and the major source of data is a well-functioning surveillance system. Age of the affected is an important clinical and epidemiological significant variable. Epidemiology of Hepatitis A is different in developing and developed countries. In the developing countries the disease is common in children and by the adulthood all become immune by natural infection during childhood. In the developed nations acquired immunity is by routine childhood vaccination and universal vaccination is yet to be happened.

Influence of Age in transmission: Has upward age-shift happened in the epidemiology of hepatitis A in Kerala is a genuine question. Some think more outbreaks of Hepatitis A as an indicator of welfare of the society. Available data was used to see whether the age shift is happening or not. It is said that by the age of ten years 90% of children have been infected and possess acquired immunity (Rakesh)The following tables indicates this. As sanitation improves chance of exposure becomes less and the age of first incidence of infection becomes higher. This is typically exemplified with the case of poliomyelitis. As most of the transmission happens due to personal contact, improvement in personal hygiene also matters much.

The age distribution of reported cases from few outbreaks is given in the table 2.

Age structure in different hepatitis A outbreaks in Kerala

Year	District	Age structure	
		Age	No. of affected people
2013 Rakesh et al(3)	Mylapore, Kollam	<5	3
		5-14	15
		15-24	22 (peak age)
		25-34	2
		35-44	1
		45-59	1
		>60	1
2016 Rakesh et al (7)	Nellikuzhi, Ernakulam	<5	2
		6-15	20
		16-30	142 (peak age)
		31-45	57
		46-60	2
		>60	0
	Kottayam	10-20	32%
		21-26	54% (peak age)
		27-52	14%
	Kollam	<12	5
		12-60	35 (peak)
		>60	7

Seasonality: Being typical water born disease hepatitis A is known to be seasonal.

What is the lesson learned from Geo-spatial distribution or local clustering

The focal distribution indicates clustering of cases and as we don't have daily line listing, we do not know how clustering happened on time scale.

Source of infection attributed for the reported outbreaks

There are many local cultural factors which operated for the increase in number of cases. These are related to source of specific suspected food or drinking water, cultural factors leading to contamination or personal contact and hand to mouth behavior etc. which led to exposure in special circumstances (Cultural factors etc)

Research priorities highlighted during discussion

Proper case control design is needed to explore further on etiology or source of infection in these outbreaks.

Clinical severity and complication rate of the disease during these outbreaks. need to be studied

Indicators: infection to clinical disease ratio, Acute hepato-cellular failure, proportion went to chronic and cirrhosis etc. Mortality is important outcome. Unless proper clinical audit is done it is difficult to comment on this and need to say any viral mutants have occurred to account for more severity

Many questions arose during discussion like relation of immune status to severity (post-Covid immune disruption) etc.

Questions about transmission dynamics in the community also can be answered by appropriate field epidemiological studies. Linkages to Covid vaccination status and post Covid scenario can be answered by this.

Intervention effectiveness: many public health interventions have been already in practice in these areas use of boiled drinking water, safe food hygiene practices are examples.

Role of vaccine in hepatitis- A control in our setting. This was suggested as an effective control policy. Govt. and Professional associations have already recommended this but cost is a limiting factor. e can prepare separately as a position paper

Risk communication, community engagement and behaviour modification aspects. Please comment on the messages in terms of ease of comprehension, availability, acceptability, scientific rigor of content etc.

Conclusions and the way forward:

Hepatitis A continues as alarming outbreaks in the state of Kerala

Unlike western countries the number of reported cases is significantly large and the severity is more including more number of deaths.

Vaccine control needs to be considered at least for selected risk groups

Complete investigation including genomic studies is more important in Kerala.

The environmental means like adequacy of chlorination and IEC need to be more targeted to specific preventive actions

IDSP need to be implemented with more integration of lab surveillance and clinical surveillance

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We sincerely thank

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