

Epidemiological trends in Kyasanur Forest Disease in Karnataka State, South India

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Abstract

Background: There is very little information about Kyasanur Forest Disease (KFD) an arboviral infection transmitted to man by bite of infective hard ticks. It is a public health problem unique for its existence in Karnataka State of south western India. **Objectives:** To know the prevalence of KFD in Karnataka state (from 2004 to 2012), to find out case fatality associated with it and to know its time trends. **Materials and Methods:** A retrospective record based study of KFD seropositive cases from the entire state (2004 to 2012). The data was accessed from the office of Joint Director, Communicable diseases, Government of Karnataka. The data was analyzed using SPSS Software Version 21.0. Prevalence (total, annual and period) was calculated for entire state and for each of the districts of the state. Chi-square test was used to know if the observed difference was statistically significant. **Results:** KFD cases are confined to only four districts of Karnataka state. The total period prevalence in the entire state was 1.054 per lakh population. Out of 556 cases, there were 16 deaths with an overall case fatality rate of 2.87%. Time trend shows a cyclical outbreak every 3 years. Majority (51.9%) of the cases were observed in the middle aged (20 – 49 years) males. **Conclusion:** KFD is limited to few places (villages) in four districts of Karnataka state with low overall prevalence & case fatality rate. Cyclical time trend indicates the potential of outbreak in near future.

Key words: Kyasanur Forest Disease, Fatality, Prevalence, Time trends, India.

INTRODUCTION

Kyasanur Forest Disease (KFD) is a tick borne febrile disease associated with haemorrhages caused by an arbovirus and transmitted to man by bite of infective hard ticks and is a public health problem unique for its existence only in Karnataka State India.^[1] It was first recognized in March 1957 at Sorab taluk of Shimoga district, Karnataka state in South Western India with unexpectedly high number of death of monkeys in the forest areas coinciding with occurrence of human cases with fatality in the adjoining villages.^[1] There were 466 reported cases in 1957 compared to only 181 in 1958 and the mortality rate dropped from 10 to 3 percent.^[1] There is one published report which outlines the number of cases from the state of Karnataka.^[2] However there are no studies which characterise the burden and the epidemiological trends in various districts within the state of Karnataka, so this study was undertaken with the



objectives, to know the prevalence of KFD, find out case fatality rate associated with it and to know the time trends.

MATERIALS AND METHODS

Background

Karnataka state located in South India with a total population (as per census) of 52,733,958 in the year 2001 and 61,130,704 in 2011 respectively is divided into 30 districts. Under the Integrated Disease Surveillance Project (IDSP) the cases of KFD that occur in any district of the state is reported to the Directorate of Health and Family welfare Government of Karnataka.^[3]

Since 2004 KFD cases are reported from four districts namely Dakshina Kannada, Uttara Kannada, Chikmagalur and Shimoga. These are districts with dense forest areas where vector (hard ticks which belongs to the species of *Haemaphysalis spinigera* & *Haemaphysalis turturis*) and amplifying host (monkey) thrives.

Study design

This is a retrospective record based study of KFD positive cases from the entire state for the years 2004 to 2012 (9 years). Study setting: The data pertains to all the cases of KFD from the state of Karnataka.

Study Population

These are KFD cases which are diagnosed by serological testing at the state reference laboratories. All cases from 2004 till 2012 are included.

Study duration

February 2013 to April 2013.

Study instrument

The Government of Karnataka has prepared a standard case investigation form which contains details like socio-demographic characteristics (age & gender), test results and outcome of the case.

Data Collection

The study protocol was approved by the Institutional Ethics and Research committee. Permission was obtained from the Joint Directorate communicable disease and Ministry of Health and Family welfare Government of Karnataka. The data was collected from each of the District Surveillance officer of the entire state. These data were manually tallied for the total cases (yearly) and death (annually). This was cross verified from the data available in the office of Joint Directorate (Communicable Disease) of Karnataka state, Bangalore. This information was transferred to MS Excel spread sheet. The data was analyzed using SPSS Software Version 21.0.

Data Analysis

Total prevalence, annual prevalence rates and period prevalence were calculated for entire state and for each of the districts of the state. The total prevalence for the state was expressed per Lakh population per year. Time trend of the affected cases are presented as line diagram. The Socio-demographic characteristics of the KFD positive cases are expressed as proportions. Chi-square test was used to know

Table 1: Year wise distribution of KFD positive cases from 2004 to 2012 in four Districts.

Year	Dakshina Kannada	Uttara Kannada	Chikmagalur	Shimoga	Total
2004	3	9	115	26	153
2005	17	0	34	11	62
2006	54	2	32	12	100
2007	0	0	14	0	14
2008	0	2	34	0	36
2009	0	8	52	0	60
2010	0	1	0	0	1
2011	0	4	15	13	32
2012	0	1	2	95	98
Total	74	27	298	157	556

Table 2: Prevalence of KFD in Karnataka state from 2004 to 2012 in the reported districts

Year	Prevalence per Lakh population				
	Dakshina Kannada	Uttara Kannada	Chikmagalur	Shimoga	Total
2004	0.15	0.66	10.07	1.58	0.29
2005	0.89	0	2.98	0.66	0.11
2006	2.84	0.14	2.80	0.73	0.18
2007	0	0	1.22	0	0.02
2008	0	0.14	2.98	0	0.06
2009	0	0.59	4.55	0	0.11
2010	0	0.07	0	0	0.001
2011	0	0.29	1.31	0.79	0.06
2012	0	0.07	0.175	5.78	0.18
Total	3.89	1.99	26.11	9.55	1.054

Table 3: District wise distributions of Case fatality rate of KFD reported & total case fatality rate per year from 2004 to 2012.

Year	Case fatality rate of four districts from 2004 to 2012 (Sep) of KFD				
	Dakshina Kannada	Uttara Kannada	Chikmagalur	Shimoga	Total
2004	*	22.22	2.60	*	3.26
2005	5.88	*	14.7	9.09	11.29
2006	1.85	*	3.125	*	2
2007	*	*	*	*	*
2008	*	*	*	*	*
2009	*	*	*	*	*
2010	*	*	*	*	*
2011	*	25	*	*	3.125
2012	*	*	*	1.05	1.020

(*) No deaths were reported in that district during that period and hence case fatality rate not applicable.

Table 4: Gender wise distribution of KFD positive cases based upon their demography and outcome (n=556).

Characteristics	Gender		n = 556 (%)	Chi-square (p)
	Males n=293 (%)	Females n=263 (%)		
Age group (years)				
≤ 19	34 (47.22)	38 (52.78)	72(100)	2.915
20 – 49	201 (51.93)	186 (48.07)	387(100)	(0.23)
≥ 50	58 (59.79)	39 (40.21)	97(100)	
District				
Dakshina Kannada	34 (45.94)	40 (54.06)	74 (100)	3.106
Uttara Kannada	12 (44.44)	15 (55.56)	27 (100)	(0.38)
Chikmagalur	158 (53.02)	140 (46.98)	298(100)	
Shimoga	89 (56.68)	68 (43.32)	157(100)	
Outcome				
Recovered	283 (52.40)	257 (47.6)	540(100)	0.635
Dead	10 (62.5)	6 (37.5)	16(100)	(0.43)

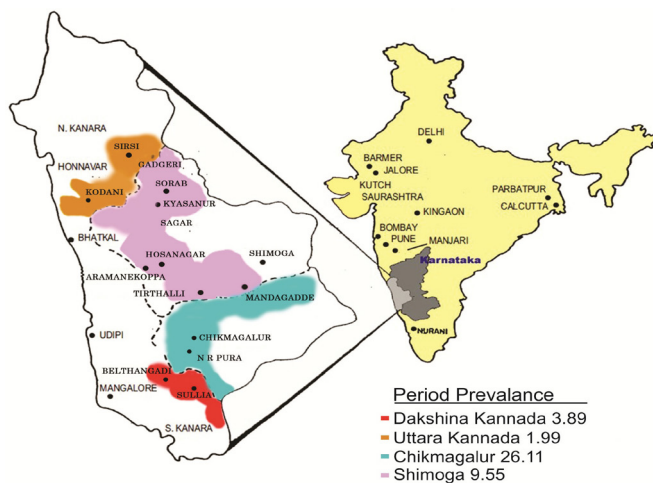


Diagram 1: Geographical Distributions of KFD Cases from 2004-2012. (The cases are limited to the Coloured areas within each District).

if the observed difference was statistically significant. Chi-square for linear trend was done to know if the observed trends were statistically significant. 'p' < 0.05 was considered statistically significant.

RESULTS

The Geographic distribution shows that KFD cases are confined to 4 districts of Karnataka state (Dakshina Kannada, Uttara Kannada, Chikmagalur and Shimoga) and within each district the disease is limited to few areas (Diagram 1). From the year 2004 to 2012 a total of 556 cases were reported. The breakup of the number of cases reported from the districts is presented in Table 1.

The total period prevalence in the state of Karnataka (from 2004 to 2012) was 1.054 per lakh population. A maximum prevalence of 10.07 (Per lakh population) was seen in Chikmagalur district in 2004, with no cases being reported from Dakshina Kannada district from 2007 onwards. The breakup of period and annual prevalence rates are presented in Table 2.

The quantum of cases has reduced in the last 9 years (from 2004 to 2012) in spite of epidemic outbreaks in between. The disease shows typical cyclical trend with increase in number of cases due to its outbreak (Diagram 2). Highest number of cases was observed in Chikmagalur district (115) in 2004; whereas Shimoga district saw KFD resurgence since 2011 as shown in Diagram 2.

Out of 556 cases, death had occurred in 16 cases giving an overall case fatality rate of 2.87%. Highest case fatality rate

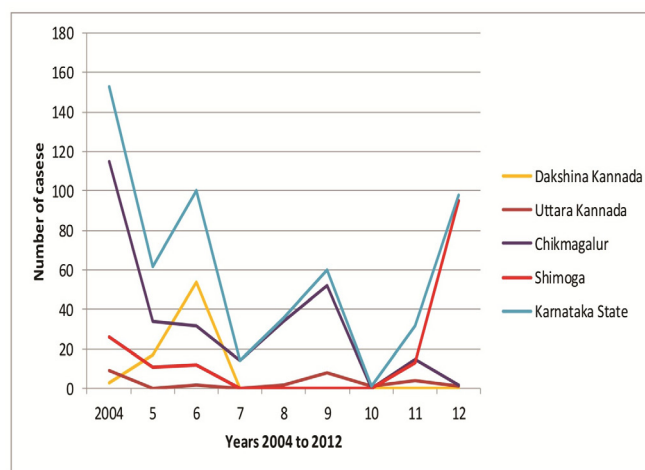


Diagram 2: Trend of KFD Cases from 2004 to 2012.

was observed in Uttara Kannada district in 2004 (22.22 %) and in 2011 (25%); with lowest observed in Shimoga (1.05%) in 2012 in spite of resurgence of the KFD. The district wise case fatality break up is presented in Table 3.

KFD cases were seen in 293 males and 263 females. The majority of the cases were observed in the middle age (20 – 49 years) group among males (51.93%) as compared to females. Majority of the death had occurred in males (62.5%). The characteristics of the cases and their outcome are presented in Table 4.

DISCUSSION

Time Trend

The number of cases and the overall prevalence in each of the reported districts has consistently reduced except for an outbreak in the year 2012 in Shimoga district. The observed differences in gender among the age group, case fatality rates, were not statistically significant. There are no comparable reports for us to compare. As there have been outbreaks once in every three years (Diagram 2) there is a possibility of an outbreak in the near future.

Geographic distribution

The four districts of Karnataka are mainly forest areas where people are dependent on cultivation and livestock, which explains the presence of the disease in those areas. The vaccine was procured by the government of Karnataka and special seasonal drive (Pre-transmission phase) was launched in the year 1990.^[4] Following this people in those

villages from where the monkey deaths were reported were annually vaccinated and also all villages within 5 KM from the affected locality were also targeted for vaccination (Directorate of Health & Family Welfare Services, Government of Karnataka, Manual on Kyasanur Forest Disease, 2005, Unpublished data).^[4] This public health intervention was repeated every year resulting in reduced number of cases. The reduced burden of the disease can also be attributed to the use of tick repellents by the villagers before visiting the forest and also due to the control measures in Hotspot (area within 50 metres of monkey death).

Limitation of the study

There were no data about the vaccination status of the cases. Similarly no data was available about control activities undertaken in those areas. So we cannot attribute or correlate the observed changes in trends with control activities.

CONCLUSION

Occurrence of KFD is now limited to few places (villages) in four districts of Karnataka state. The overall period prevalence is low with occasional outbreak at roughly three year interval. The overall case fatality rate was low. Cyclical time trend indicates the potential of outbreak in near future.

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CONFLICT OF INTERESTS

None

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None

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