Original Research Article

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Trends of leptospirosis cases in a tertiary care center in Northern Kerala during January 2013 to October 2019

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ABSTRACT

Background: Leptospirosis is a zoonosis endemic in tropical climates. Though overall incidence of leptospirosis has decreased during recent years, it continues to be a major public health problem, highly underreported in India. Various trends such as seasonal, geographical, mortality have to be studied in detail for proper planning of prevention and control programs. The objective of this study was to assess geographical, seasonal, mortality trends of leptospirosis cases attending a tertiary care centre in Northern Kerala, from January 2013 to October 2019.

Methods: A record-based retrospective study was conducted where leptospirosis cases attending tertiary care centre were included. Data was entered into Microsoft Excel 2007, analysed using Epi Info 7. Results were expressed as frequencies, percentages.

Results: Among 647 leptospirosis cases, 141 were confirmed and 506 were probable. Maximum number of cases were reported in 2014 and maximum deaths were reported in 2019. Majority belonged to 51-60 years age category; males outnumbered females. Maximum cases were reported during September, August. Major hotspots for leptospirosis were Kannur and Taliparamba Municipalities and Koothuparamba.

Conclusions: During rainy season, probably younger individuals are at risk as they indulge in leisure like swimming, playing while post rainy season older individuals are at risk due to occupational exposure. The number of deaths showed a declining trend from 2013 to 2018, but increased in 2019. Few of the previous hotspots reported decline in cases probably due to improved surveillance and control activities.

Keywords: Demographic, Leptospirosis, Mortality, Trends, Seasonal

INTRODUCTION

Leptospirosis is a zoonotic bacterial disease caused by a Spirochete bacteria of genus Leptospira with high prevalence in humid tropical countries. The burden of leptospirosis is more in developing countries.² Though overall incidence of leptospirosis has decreased during recent years, it continues to be a major public health problem, highly underreported in India.3 Each year ≥5,00,000 cases are estimated to occur worldwide.⁴ Leptospirosis is endemic in Gujarat, Maharashtra, Kerala, Tamil Nadu, Karnataka and Andaman and Nicobar Islands.⁵ As a part of 11th Five Year Plan, the Government of India has launched a pilot project on 'prevention and control of leptospirosis' in Gujarat and Kerala. The lessons learnt from the same, led to extension of the program to all the endemic states under 12th Five Year Plan.6

There is paucity of information regarding the true incidence of leptospirosis. But it is estimated that 10 or more per 100,000 people are affected each year in tropical climates with leptospirosis. If there is an epidemic, the incidence may go as high as 100 or more per 100,000 people. Major epidemiological risk factors

for leptospirosis include contaminated environment and rainfall. Occupational exposure also poses a major threat to the groups such as agricultural and livestock farmers, workers in underground sewers, meat and animal handlers, and veterinarians. Children acquire the infection from dogs more commonly than do adults.²

In Kerala, it started as an isolated health problem of waterlogged areas of Alappuzha and Kottayam districts in the 1990's. According to the IDSP data by Directorate of Health Services (Kerala), number of leptospirosis cases was 1408 in 2017, 2079 in 2018 and 1211 in 2019. The number of deaths due to leptospirosis cases during 2017, 2018 and 2019 were respectively 80, 99 and 57. Lerala had witnessed heavy rainfall and floods during 2018 and 2019. Pre planning of vigorous prevention and control measures and their implementation with preference to flood-stricken areas after the floods of 2018, might have aided in bringing down the number of leptospirosis cases during 2019.

Various trends in socio-demographic factors, seasonal, geographical, mortality etc have to be studied in detail for proper planning and implementation of prevention and control programs of leptospirosis. Objective of the study was to assess the trends in demographic factors, time, geography and mortality of leptospirosis cases attending a tertiary care centre in Northern Kerala from January 2013 to October 2019.

METHODS

This was a record-based, retrospective study conducted in the setting of Government Medical College, Kannur, Kerala. All leptospirosis cases (probable and confirmed) reported to the study setting during January 2013 to October 2019 were included in the study. Data was collected from the Prevention of Epidemic and Infectious Disease (PIED) Cell records, maintained at the tertiary care centre. Data was entered into Microsoft Excel 2007 and analysed using Epi Info 7 software. Results were expressed in the form of frequencies and percentages.

Probable case is defined as a suspected case with classical clinical features and/ or weakly positive IgM from the hospital and/ or single high titre of IgM antibodies positive from an outside laboratory. Confirmed case is that which tested positive for IgM ELISA (four-fold rise in titre).

RESULTS

Total number of cases reported was 647- Confirmed (141) and Probable (506). Mean age of the study population was found to be 48.22 years. Males (486, 75.12%) were more affected than females. Figure 1 shows that majority of the cases belonged to the agegroup 51-60 (23.8%) years followed by 41-50 years (23.3%) and 61-70 years (17.6%) respectively.

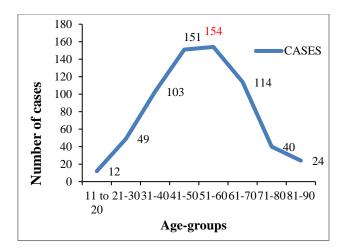


Figure 1: Trends of leptospirosis cases among various age-groups during the study period.

Table 1: Year-wise cases and deaths of leptospirosis.

Year	Total no of cases (probable+confirmed)	Number of deaths
2013	100	17
2014	124	14
2015	90	10
2016	78	9
2017	66	7
2018	105	9
2019 (till October)	84	23

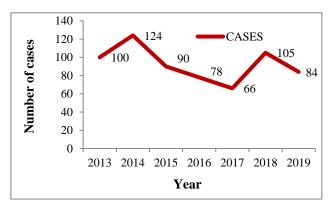


Figure 2: Year-wise trend of leptospirosis cases in tertiary care centre from 2013-2019 (till October).

Table 1 shows the number of cases and deaths of leptospirosis reported to the tertiary center during January 2013- October 2019. Maximum number of cases were reported in 2014 (124), while death toll was highest during 2019 (23). The year 2018 too, reported higher number of cases (105), probably due to the floods that hit Kerala during August month. The number deaths showed a declining trend from 2013 to 2018, but 2019 reported the highest number of deaths.

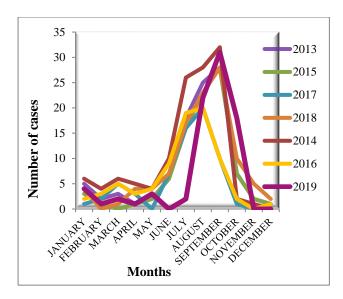


Figure 3: Month-wise trends of leptospirosis cases during 2013 to 2019 (till October).

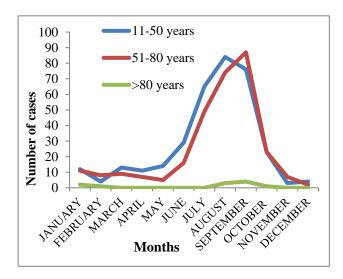


Figure 4: Month-wise trends of cases according to agegroups.

Figure 2 shows the year- wise trends of leptospirosis cases and it can be seen that there was an increase in number of cases from 2013 to 2014, thereafter shows a declining trend with a sudden increase seen in 2018. Figure 3 shows the month- wise trends of leptospirosis cases at the study setting during January 2013 to October 2019. There is a varying trend from January till May. It can be seen that increase in the number of cases began from the month of June (except in 2019), continued to rise in July and August, peaked in September (except 2016, where peak appears in August) and thereafter shows a declining trend.

Figure 4 shows the month- wise trends of leptospirosis cases according to various age-groups namely 11-50 years, 51-80 years and >80 years. Majority of the individuals belonging to 11-50 years were reported during

the months of June, July and August whereas those belonging to 51-80 years were more during September.

Table 2: Months reporting maximum number of leptospirosis cases.

Years	Months (number of cases)
2013	September (28), August (25)
2014	September (32), August (28)
2015	September (28), August (23)
2016	August (24), July (16)
2017	August (20), July (16)
2018	September (28), August (23)
2019 (till October)	September (31), August (22)

Table 2 shows the months reporting maximum number of leptospirosis cases from 2013-2019 (till October). September followed by August reported maximum number of cases throughout the period, except in 2016 and 2017. During these years, August reported maximum number of cases.

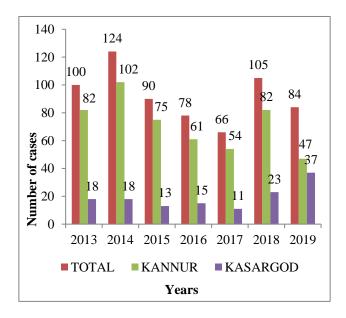


Figure 5: District-wise distribution of leptospirosis cases at tertiary care center.

Considering the district- wise distribution of cases (Figure 5), majority of the leptospirosis cases reporting to the centre was from Kannur district during the study period. But, 2019 reported an increase in number of cases from Kasargod compared to preceding years.

Table 3 depicts the major hotspots for leptospirosis in Kannur district during the study period. While Kannur and Taliparamba municipality areas and Koothuparamba reports higher number of cases consistently, Pappinissery area appears to be out from the list of hotspots. The year 2018 reports Iritty as a major hotspot.

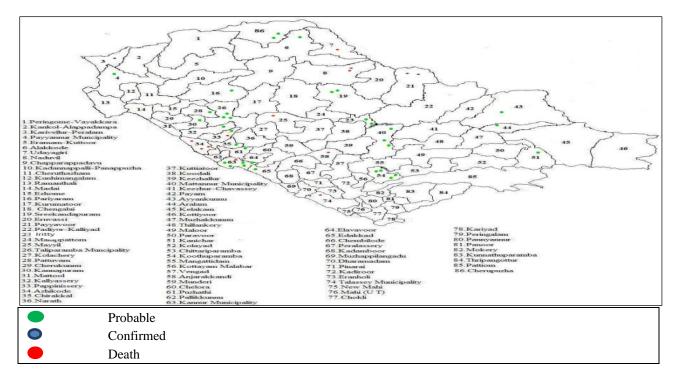


Figure 6: Spot map of Kannur district showing the areas from where leptospirosis cases were reported to the tertiary care center during 2019 (till October).

Table 3: Hotspots of leptospirosis in Kannur.

Years	Hotspots	
2013	Kannur Municipality,	
	Pappinissery	
	Kannur Municipality,	
2014	Taliparamba Municipality,	
	Pariyaram	
2015	Taliparamba Municipality,	
2015	Cherukunnu	
2016	Kannur Municipality, Pappinissery,	
2010	Koothuparamba	
2017	Kannur Municipality, Pappinissery	
2018	Iritty, Taliparamba Municipality	
2019 (Till	Kannur Municipality,	
October)	Koothuparamba	

Figure 6 shows that out of the 47 cases reported to the study setting in 2019, most of the leptospirosis cases (6 probable cases including 1 death) were from Kannur Municipality area followed by Koothuparamba (4 probable cases). From Mattannur and Taliparamba Municipality areas, 3 cases (all probable) each were reported. All the 3 cases reported from Azhikode area were death cases.

Table 4 shows the CFR trends of leptospirosis at the tertiary center. Highest CFR (27.4%) was found in 2019 (from January- October) followed by 2017 (17%) and 2014 (11.3%) respectively. Trends of mortality among various age- groups is shown in Figure 6. Majority of the

deaths that occurred among leptospirosis cases belonged to the age- group 41- 50 years (27) followed by 51-60 years (22).

Table 4: Trends of leptospirosis case fatality rates during 2013 to 2019 (October).

Years	Case fatality rates
2013	17
2014	11.3
2015	11.1
2016	11.5
2017	10.6
2018	8.6
2019 (till October)	27.4

DISCUSSION

Male preponderance (75.12%) was found in this study which was also found in studies conducted in Tirupathi, Mangalore and Ludhiana. This might be due to their increased risk of exposure than females. As per Ramesh et al's study conducted in Mangalore, majority belong to age-group of 41–60 years (40.6%), almost in line with our study with the most affected age-group being 51-60 years (23.8%). This corresponds to the people of productive age-group. According to the same study in Mangalore, mean age was 40.4 years which is much lower than that in our study (48.22 years).

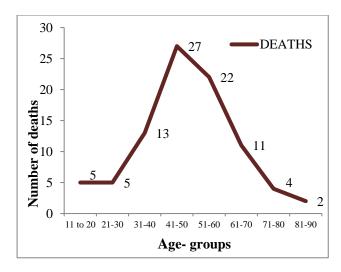


Figure 7: Trends of mortality among various agegroups.

Sunil Sethi et al found increased incidence of leptospirosis in North India, while in our study a decline in number of cases was seen from 2014 to 2017, with a sudden rise in 2018 following heavy rainfall and floods. Monthly data in this study showed peak of cases from July to September while the Directorate of Health Services data (Kerala) showed peaks from June to November. This may be due to variations in geography and human settlements prevailing in the district compared to the whole state.

Aparna et al found that in 2013 and 2014, number of cases increased during April, May, June peaking in July and August while in 2015, in addition to the peak seen in monsoon there was a peak in winter months of October, November, and December. He but in our study maximum number of cases were reported during August and September throughout the study period. The seasonality of leptospirosis especially between June to September could easily be attributed to its relationship with rainfall, flooding and temperature variations.

Mangalore study reported CFR to be 3.5% which is much lower than that in our study (13.8%).² A study done at sub-Himalayan region of North India; no deaths were reported.¹⁵ The higher case fatality rate may be due to hepatic/ renal/ respiratory complications, comorbidities and smoking/alcoholism, delayed treatment seeking behaviour among the cases.

In our study, 2019 reported maximum number of deaths than preceding years. It was also found that the number of cases from Kasargod, one of the neighboring districts of Kannur had increased during this year. Twelve out of 23 deaths were reported from Kasargod. The cases reported from Kasargod were mostly from tribal settlements who resided mainly in colonies which were overcrowded and had common source of water (stream). These reasons along with their delay in seeking treatment may be the cause for increased mortality during 2019. The

contributing factors for higher mortality rate have to be studied in- depth so as to bring down the case fatality rate.

This study has several limitations. Details of occupational exposure, risk factors, co- morbidities or any other factors which would have precipitated mortality due to leptospirosis was not studied.

CONCLUSION

Males (75.12%) outnumbered females. The age- group most affected was 51-60 years. In 2018, owing to heavy rain falls and floods of August; a sudden increase in number of cases was reported. During rainy months of July and August, majority of the cases reported belong to age group below 50 years. This may be attributed to increased risk of younger age group individuals as they engage in leisure activities such as swimming, water sports, playing outdoors etc. Post rainy month of September reported maximum number of cases in the age category of older individuals - above 50 years of age. This may be because of their increased risk due to occupational exposure. Pappinisseri which was a previous hotspot for leptospirosis in Kannur reported decline in cases, probably due to improved surveillance and control programmes. But in 2018, Iritty which was the most flood affected part of Kannur, became a hotspot in addition to Taliparamba Municipality which continues to report leptospirosis cases. Consistency of Kannur Municipality and Taliparamba Municipality regions and rise of Iritty as a hotspot necessitates the strengthening of preventive and curative services and awareness programmes in these areas. Overall case fatality rate was 13.8% in our study with highest in 2019 (27.4%). The number deaths showed a declining trend from 2013 to 2018, thereafter 2019 reported the highest number of deaths.

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Ethical approval: The study was approved by the

Institutional Ethics Committee

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