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# A study of five years trend of Case fatality rate of leptospirosis in a tertiary care hospital in Mumbai, India

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**Abstract**

**Background:** Leptospirosis, a zoonosis associated with potentially fatal consequences, has long been a grossly under reported disease in India. There has been a sudden rise in the number of leptospirosis cases in the year 2016 as per IDSP data. The present study is conducted.
**Methodology :** A retrospective study of Lepto Positive cases from the data obtained from IDSP of LTMMC & GH.
**Results :** A total of 1117 cases were studied with respect to epidemiological factors like age, sex, residency and also thecomplication and mortality among these cases. Mean age of patients was 32.6 years and males (64%) outnumbered females (36%).. Multiple organ dysfunctions(59.34%) , ARF (34.06%) andrenal failure (20.87%) were the commonest complications. A total of 124 deaths occurred in the last five year and year 2016 contributed to forty three deaths (34.66%).
**Conclusions:** There has been a rapid rise in the incidence and complication of leptospirosis in recent year in the study area. Early diagnosis and treatment is required to reduce the burden of disease.

**Keywords:** Cases, Case Fatality Rate, Endemic, Environmental contamination.

## Introduction

Leptospirosis is reported from all parts of the world, especially from the tropical and sub-tropical areas. In India leptospirosis is endemic in most urban areas where epidemic outbreak occurs after flooding caused by heavy rainfall. Most outbreaks of leptospirosis in India are reported from the coastal regions of the states of Gujarat, Maharashtra, West Bengal, Orissa, Kerala, Tamil Nadu, Karnataka and the Andaman Islands [4]. Highest rates occur during October to November which coincides with the monsoon season in these parts. Lack of awareness, clinical suspicion and active surveillance could be the probable reason. Leptospirosis has been a neglected disease even in developed countries like USA [5]. There is a wide spectrum of clinical presentations for leptospirosis.

While most patients with Leptospira infection present only with mild fever and recover without complications, a small proportion develops various complications due to involvement of multiple organ systems. An outbreak of febrile illness occurred in the month of August and September in 2000. About 169 cases were registered out of which 73(43.2%) were positive for leptospirosis [2].The lack of information regarding the trend of leptospirosis during the previous year would be reason for such outbreak. Thus infection is underestimated and underdiagnosed because of the broad spectrum of signs and symptoms of leptospirosis. The present hospital-based study focused on the trend of the leptospirosis case and also to assess the case fatality rate of leptospirosis over a five-year period and also to study its age and sex distribution. The present study will help to know the trend and make proper measures.

## Objectives:

1. To study the trend of Leptospirosis over a period of five years.
2. To determine the trend related to case fatality rate during five year period.

## Materials and Methods

This retrospective study was restricted to 1117 patients of confirmed leptospirosis admitted to a tertiary care hospital in Mumbai, India, from January 2012 to December 2016. The data were retrieved from the Satellite disease surveillance Unit of department of Community Medicine. The patients under study were divided into different age groups of as 0-10, 11-20, 21-30,31-40,41-50.51-60 &>60 above for the analysis. The data were processed and statistically analyzed by using Microsoft excel. 'Z' and Chi-square tests were applied for comparison of proportions.

## Results

A total of 1117 confirmed patients were admitted to the hospital during the study period of five years from January 2012 to December 2016.Of these cases there were 717 (63.16%) male and 460 (36.83%) females. Maximum number of cases were in the age group of 31-40yr accounting for 24.38%.In Males 25(4.07%) patients were below 10yr of age and 589(95.92% ) were above 10yr of age. In Females 28 (10.85%) patients were below 10yr of age and 230(78.23%) were above 10yr of age. Amongst the patients 80.78% were from Mumbai and 19.22% were from non - Mumbai. About 10 patients had associated Dengue and 3patients had associated Enteric fever.

Table 1.Record of Cases of leptospirosis

*Age and sex-wise distribution of cases of leptospirosis*

| Age | Cases (N=972) | | |
|---|---|---|---|
| | Male | Female | Total (%) |
| <10 | 15 | 41 | 56(5.45) |
| 11-20 | 86 | 78 | 164(14.6) |
| 21-30 | 148 | 78 | 226(20.98) |
| 31-40 | 190 | 82 | 272(24.38) |
| 41-50 | 140 | 81 | 241(19.54) |
| 51-60 | 84 | 52 | 136(9.67) |
| >60 | 54 | 29 | 83(5.34) |
| Total | 717 | 460 | 1117 |

*No. of Cases of leptospirosis from 2012-2016.*

| YEAR | NO. OF CASES |
|---|---|
| 2012 | 207 |
| 2013 | 170 |
| 2014 | 164 |
| 2015 | 124 |
| 2016 | 512 |

*Trend of Leptospirosis cases during Monsoon period from 2012-2016.*

| | MAY | JUNE | JULY | AUGUST | SEPT | OCT | NOV |
|---|---|---|---|---|---|---|---|
| 2012 | 1 | 5 | 40 | 35 | 64 | 48 | 3 |
| 2013 | 3 | 4 | 33 | 58 | 18 | 18 | 22 |
| 2014 | 2 | 4 | 20 | 54 | 37 | 13 | 6 |
| 2015 | 2 | 12 | 52 | 38 | 43 | 24 | 8 |
| 2016 | 19 | 2 | 87 | 107 | 98 | 79 | 25 |
| Total | 27 | 27 | 232 | 292 | 260 | 182 | 64 |

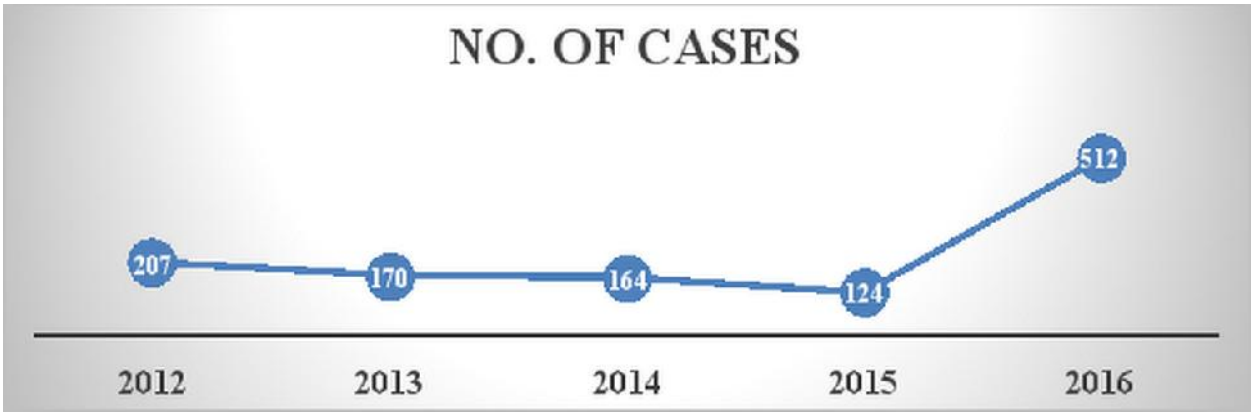
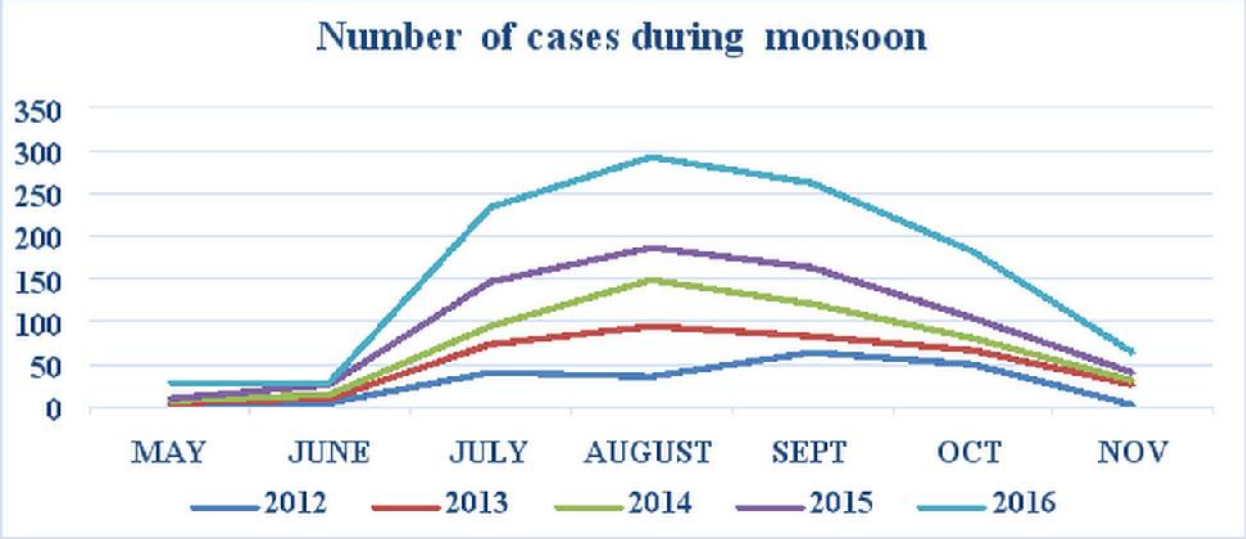



Figure 1 of Table 1 : No. of Cases of leptospirosis from 2012-2016.

Figure 2 Table 1: Trend of Leptospirosis cases during Monsoon period from 2012-2016.




About 20 cases of leptospirosis had associated co-infection with Dengue. Six cases had associated Malaria and three cases had associated enteric fever

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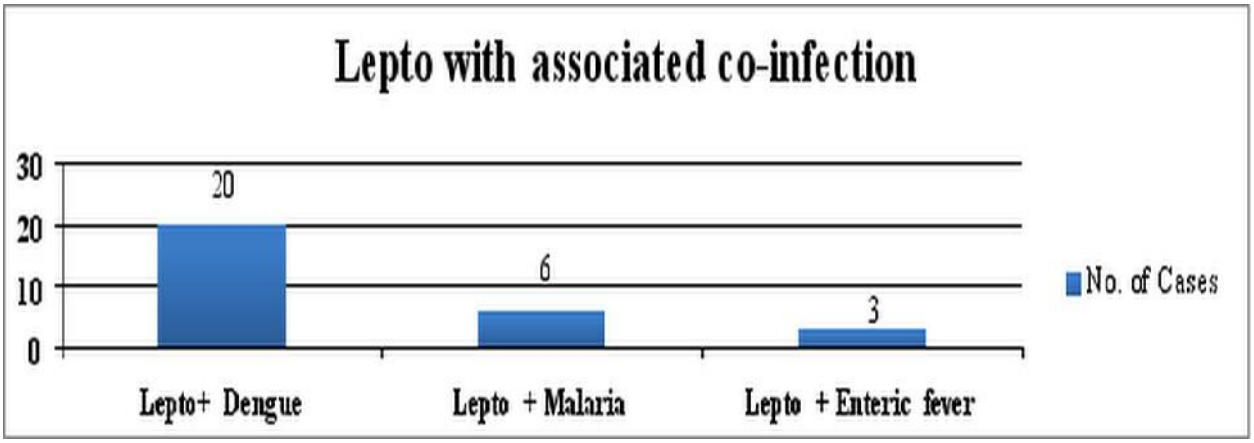
Figure 3 : Co-infection associated with Leptospirosis.




Of the confirmed cases, 124 patients died. Of these, 86 (79.12%) were male and 34 (20.78%) were female. Of the total number of died patients 71.35% were from Mumbai. Maximum number of patients were from 21-30 yr (26.37%) followed by 41-50yr (25.27%) Of these 124 deaths, 65(59.34%) were due to multiple organ dysfunctions, 42(34.06%) were due to Respiratory distress (Acute Respiratory Failure) and 30 (20.87%) due to renal failure. The case fatality of leptospirosis during the study period was fluctuant during the study period from 5.73% to 15.88%.

Table 2.Record of Deaths of leptospirosis

*Age and sex-wise distribution of deaths of leptospirosis*

| Age | Deaths (N=124) | | |
|---|---|---|---|
| | Male | Female | Total (%) |
| <10 | 2 | 4 | 1 |
| 11-20 | 11 | 4 | 11 |
| 21-30 | 25 | 8 | 27 |
| 31-40 | 16 | 6 | 18 |
| 41-50 | 14 | 5 | 14 |
| 51-60 | 18 | 4 | 18 |
| >60 | 5 | 2 | 2 |
| Total | 91 | 33 | 124 |

*No. of Deaths of leptospirosis from 2012-2016.*

| YEAR | NO. OF DEATHS |
|---|---|
| 2012 | 11 |
| 2013 | 27 |
| 2014 | 19 |
| 2015 | 24 |
| 2016 | 43 |

Figure 4 Table 2: Deaths of leptospirosis cases over five years.

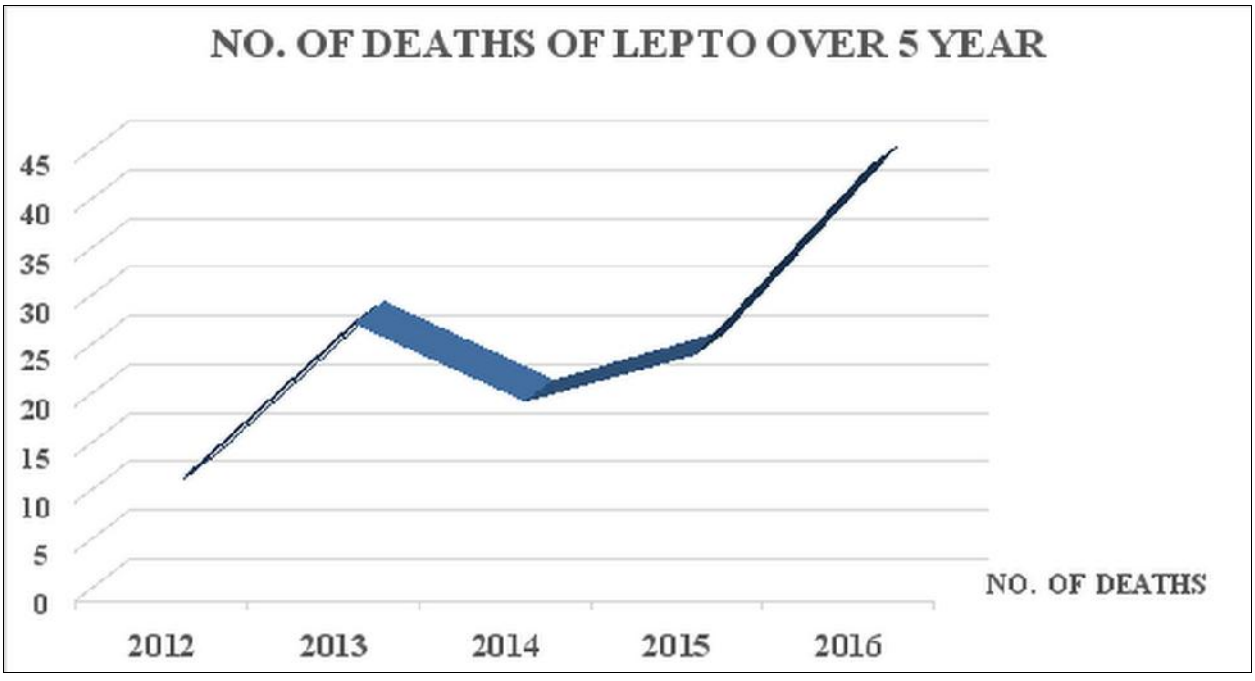
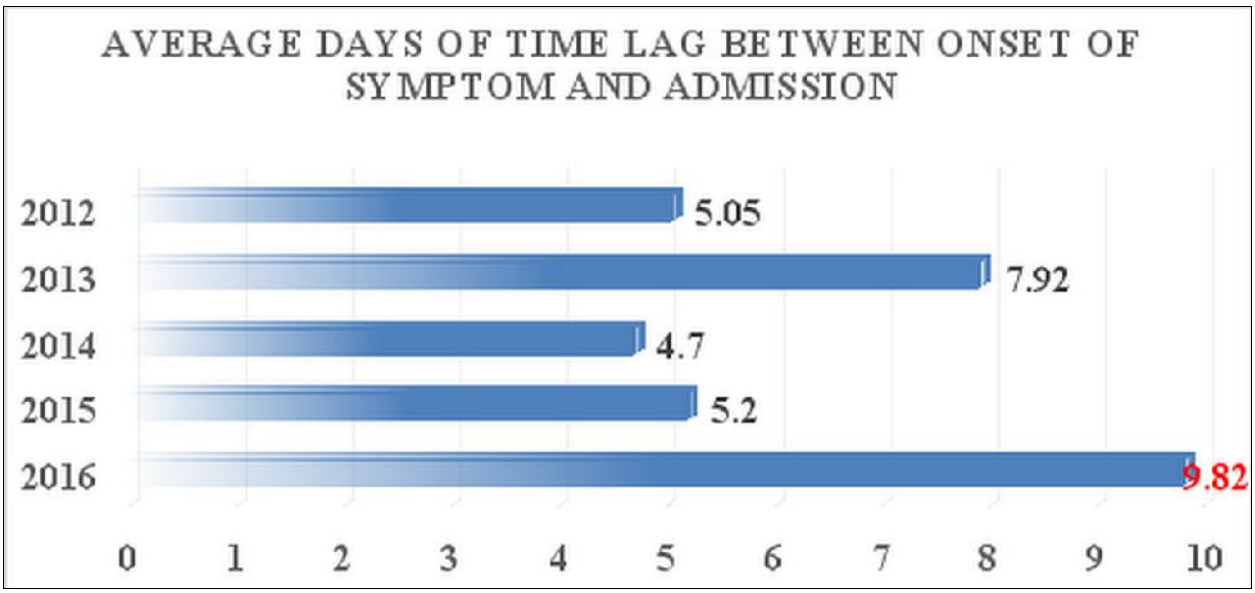


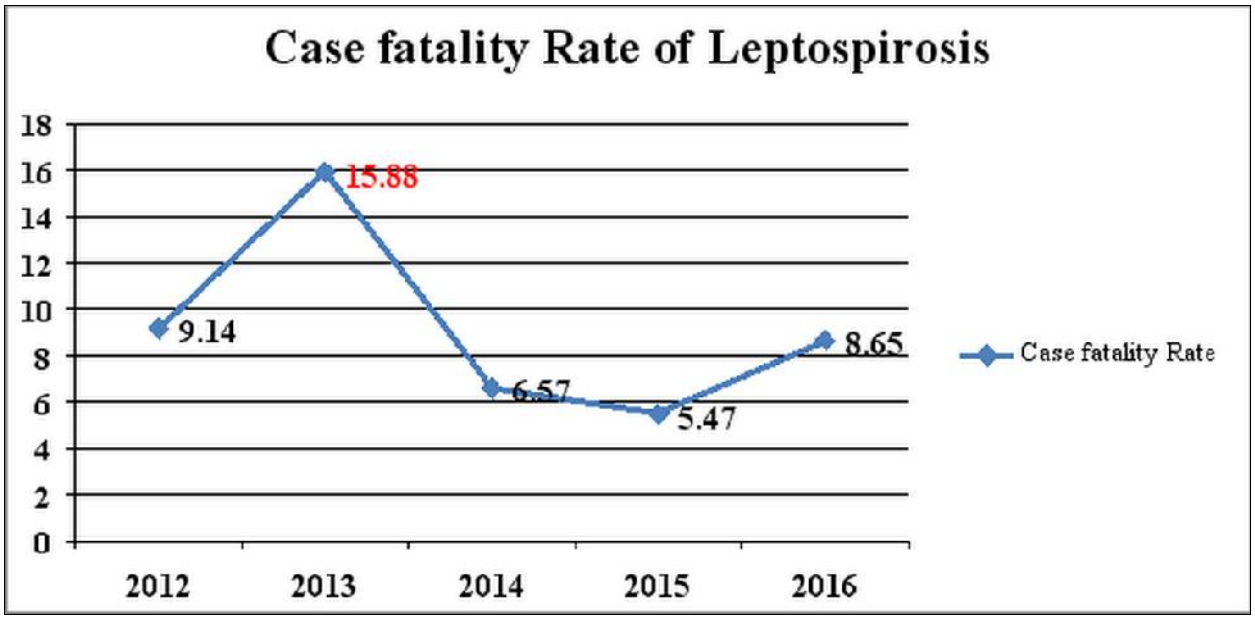
Figure 5 :Average time lag between onset of symptoms and admission to hospital over five year period.




In 2013 the average time lag was comparatively more than other years this also relates to the high case fatality seen in year 2013, thus delay in admission might be one of the cause for high case fatality rate in the year 2013.

Case fatality was maximum in 2013 which was 15.88%. The overall case fatality was 9.72%.

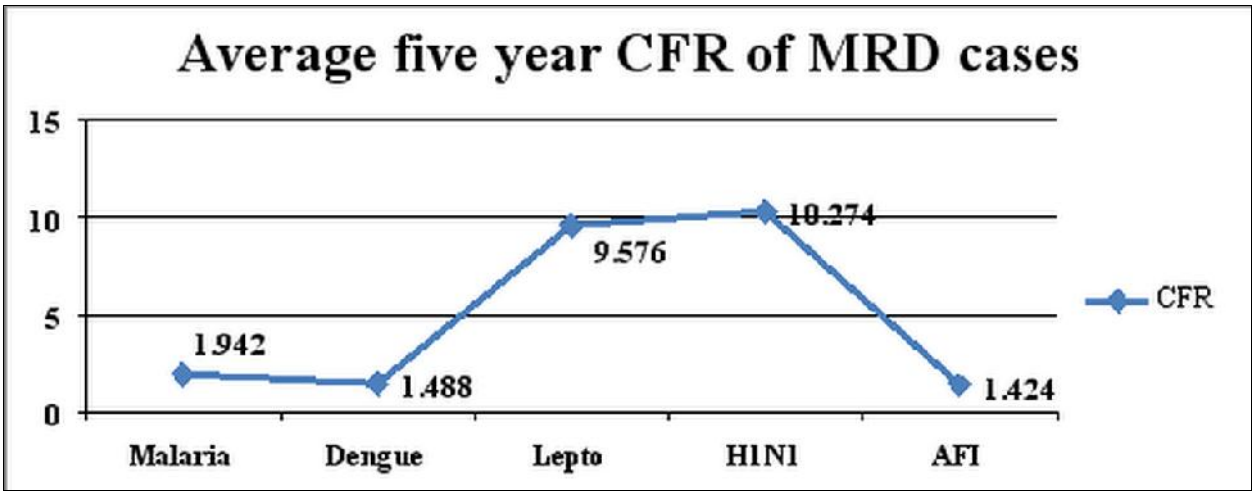
Figure 6 : Five year trend Case fatality rate of Leptospirosis.




It was 12.13% in males and 7.43% and in females. The case fatality rate of leptospirosis also increased steadily with age. It varied from 1.22% for the <20 years to 19.32% for those aged ≥60 years.

Average case fatality rate over the five for other MRD cases was as follows; Malaria (1.942%), Dengue (1.488%) , H1N1 (10.27%) and that of leptospirosis was (9.576%.).

Figure 7 : Average case fatality rate over five years for other MRD cases




Thus CFR for H1N1 was found to be comparatively higher than leptospirosis.

## Discussion

In the present study, an increase in case infection with age was observed. About 19.22% of the cases were below the age of 20 years and 83.97% were ≥20 years. The cases increased with age and maximum number of cases were between 20-40yr (44.4%) this continued up to 60 years. As per the study done in kerala. a high percentage of cases was seen in the age group of 40-60 years. Similar observation has been reported in many studies. Everard et al.[10] in their study reported that the incidence of infection in both males and females increases with age, and this increase goes up to 60 years. As per the study by Laras et al.[11] on the importance of leptospirosis in Southeast Asia revealed an increase in prevalence rate with age.

Antonio Lopes et al. [12] in their comparative study state that the case fatality of leptospirosis was significantly lower for the pediatric group (<19) than for the adult group (>19); further, in adults, the case fatality rate of leptospirosis increased steadily. The present study showed the preponderance of males in the cases and case fatality of leptospirosis. Here, 64.32% of infection was in males and 35.67% in females. The case fatality was higher in males (4.51%) than in females (3.58%) but not statistically significant. The predominance of males in disease or case fatality highlights the probability of occupational component in disease transmission. [13] Panaphut et al. in their study of prognostic factors for death in leptospirosis found a high percentage of male cases (94.2%).[14]

In the study area, water logging during monsoon period was found to be a major risk factor for occurance of large number of leptospirosis cases. In one of the study conducted in kerala , males were mainly involved in agricultural labor. Therefore, they are more susceptible to such infections as they are in continuous contact with contaminated water. Prolonged exposure of the skin to contaminated water provides an opportunity for leptospira to invade the skin, thus causing leptospirosis. [14]

In urban areas ( present study area), domestic rats and stray dogs are known to be predominant sources of the pathogenic leptospira,[15].As water logging is a recurrent issue in mumbai city and also due to presence of rat nuisance and stray dogs, these factors make the study area a leptospirosis-prone area.

In the present study out of the total complication, 65 (59.34%) were due to multiple organ dysfunctions,42 (34.06%) were due to Respiratory distress (Acute Respiratory Failure) and 30 (20.87%) due to renal failure. As per the study done by Sunil Sethi1et.al*in north india, Renal failure (60.5%), respiratory failure (20.9%), the neuro-leptospirosis (11.6%),

and disseminated intravascular coagulation (DIC) (11.6%) were the commonest complications. [2]. As per the study by Saha et.al.*in north India, Renal failure (42.4%), respiratory failure (25.9%), the neuro-leptospirosis (9.4%), and disseminated intravascular coagulation (DIC) (7.6%) were the commonest complications[3].

## Conclusion

Leptospirosis is a endemic disease in India. Unhealthy human practices with respect food and water storage increase chances of contamination from rodents and pets .This has increased the incidence of leptospirosis. Present study shows increased incidence among males (74%) and among the age group 31-59yr (44% of cases and deaths) which is the working population. The death rate was also high among the males (80%) which shows that .About 75% of Cases and Deaths of Leptospirosis belonged resident from Mumbai. 60% of the death was due to multi-organ failure, 34% due to ARDS and 20.8% due to renal failure. Large time lag between onset of symptom and admission to hospital was associated with greater case fatality rate as seen in 2016.Maximum number of cases were in monsoon season, thus proper policy should be formulated to maintain environmental cleanliness.

## Recommendation:

- Routine investigation for Lepto IgM especially in monsoon.
- Prophylactic treatment with Doxycycline should be done to patients with acute febrile illness.
- Display of IEC material in the form of Posters, Banners in public places and use of mass media will help a long way in increasing awareness of leptospirosis.
- Ensure public private partnership to reduce the burden of the disease.

**Limitation:** The data obtained is secondary data and so personal details related to occupation and lifestyle could not be collected.

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