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Original Research Article

Trend and mortality pattern of communicable diseases in a tertiary care hospital in Kerala

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ABSTRACT

Background: Communicable disease burden in India is very high. Surveillance of communicable diseases is an important epidemiological tool to monitor current disease burden, monitor trends, and to identify outbreaks. This study was conducted in a retrospective manner to identify the changing trends of communicable diseases, and its mortality during the period of 2015-2020.
Methods: This record based cross sectional study was done in Government Medical College Thrissur. All confirmed communicable disease cases reported during the study period was included in the present study except COVID-19 positive cases. The communicable diseases were classified as: Air borne, water borne, vector borne, vaccine preventable diseases, zoonosis, and blood borne diseases. Data were entered in excel 2007 and statistical analysis was done using SPSS software version 16. Results were expressed as frequencies, percentages.
Results: Total number of cases reported were 14337. Maximum number of cases were in 2019. The most common type of communicable diseases that was reported was airborne diseases (2370, 34.85%) followed by vector borne diseases (1825, 26.83%). The total number of deaths reported was 764. Airborne diseases accounted for more than 70% of deaths. The overall CFR was found to be higher for pneumonia (19%), followed by H1N1 (17.8%).
Conclusions: Communicable disease is still a major public health problem in India. The most common type of communicable disease that was reported was airborne disease. Airborne disease also accounted for more than half of all death. The study emphasizes the importance of a proper surveillance system in controlling outbreaks of communicable diseases.

Keywords: Trend, Communicable diseases, Airborne diseases, Vector borne diseases

INTRODUCTION

"Communicable disease" means an illness caused by an infectious agent or its toxins that occurs through the direct or indirect transmission of the infectious agent or its products from an infected individual or via an animal, vector or the inanimate environment to a susceptible animal or human host.[1] As per the India state-level disease burden initiative report in 2017 India is having a paradoxical situation in which the communicable diseases situation has vastly improved from 1990 with 61% DALY to 33% in 2016 but the non-communicable diseases have increased from 30% to 55%, thus facing a problems of both communicable diseases and non-communicable diseases at the same time.[2] Infectious disease surveillance is an important epidemiological tool to monitor current disease burden, monitor trends, and to identify outbreaks and new pathogens.[3]

For the purpose of surveillance of communicable diseases in India, integrated disease surveillance project (IDSP) was initiated in November 2004 with an objective of decentralized laboratory-based IT enabled disease surveillance system for epidemic prone diseases and to detect and respond to outbreaks in early rising phase through trained rapid response team (RRTs). In the state

of Kerala even though IDSP program collects data form all the hospitals in Kerala, the data from medical colleges are collected and analyzed through a system of regional prevention of epidemic and infectious diseases cell (RPEID cell) coordinated by the state PEID cell. State PEID cell was established by government of Kerala in 1982 in medical college hospital Thiruvananthapuram with a view to strengthen the surveillance system in the state. As part of strengthening of PEID cell, regional PEID (RPEID) cells were also established in all government medical colleges in 1989. Surveillance data on communicable disease pertaining to medical colleges are made available to the health services by regional PEID cells and state PEID cell. Other activities carried out by the PEID cells includes updating knowledge on the control of disease, conduct of research, train the health personnel and to help the state and district authorities in controlling epidemics.

Analysis of data on communicable diseases and its mortality from a tertiary center with the help of RPEID cell will help us to identify the newer and changing trends of diseases and suggest control measures to be applied at the district level as well as state level. It will also help in planning of resources including personnel. So, this study was conducted in government medical college Thrissur in a retrospective manner to identify the changing trends of communicable diseases, and its mortality during the period of 2015-2020.

METHODS

This record based cross sectional study was done in the setting of government medical college Thrissur. All communicable disease cases which are confirmed reported to government medical college Thrissur during the study period of 2015 to 2020 was included in the study. Permission for the study was obtained from the superintendent of the tertiary care hospital. Ethical approval was obtained from the institutional research committee from government medical college Thrissur (IRC Protocol No: IEC/GMCTSR/105/2021).

Data collection

Data was collected from the regional prevention of epidemic and infectious disease cell (RPEID cell) in medical college Thrissur. One of the faculties of community medicine department is the coordinator of the regional prevention of epidemic and infectious disease cell. The data entry operator of the regional prevention of epidemic and infectious disease cell along with the interns posted in the department will collect the data on communicable diseases by direct visits to the wards and verifying the case sheets. The data thus collected will be cross checked by a senior resident/ Junior resident and will be discussed with the concerned ward unit members. This will be verified by the coordinator of the regional prevention of epidemic and infectious disease cell in the department before reporting. Any disparity of data or confusion in diagnosis will be cleared by discussing with the consultants in the respective units. The surveillance data thus collected for a period of 6 years from 2015 to 2020 was taken from the records of the regional prevention of epidemic and infectious disease cell to identify the trend and mortality pattern of communicable diseases. For the purpose of analysis, the communicable diseases were classified as: Air borne, water borne, vector borne, vaccine preventable diseases, zoonosis, and blood borne diseases.

Inclusion and exclusion criteria

The study included all the communicable diseases that were collected during the study period. COVID-19 cases were excluded from the study.

Operational definitions

Airborne diseases: Airborne diseases are diseases which are caused by pathogenic microbes small enough to be discharged from an infected person via coughing, sneezing, laughing and close personal contact or aerosolization of the microbe. The discharged microbes may remain suspended in the air on dust particles, respiratory and water droplets.[4]

Water borne diseases: Water borne diseases are the diseases caused by the pathogenic microorganisms that are transmitted through water. This arises from the contamination of water either by pathogenic bacteria, virus, protozoa or by chemical substances.[5]

Vector borne diseases: Vector-borne diseases are human illnesses caused by parasites, viruses and bacteria that are transmitted by vectors. [6]

Zoonosis: Zoonotic diseases are diseases caused my germs that spread between animals and humans.[7]

Statistical analysis

Data was initially entered in MS excel. Statistical analysis was done using SPSS software version 16. Descriptive statistical analysis was represented through frequencies and percentages. Morbidity and mortality of diseases were estimated. Case fatality rate for each disease were also analyzed from 2015 to 2020.

RESULTS

Total number of cases reported to government medical college Thrissur from 2015 to 2020 was 14337. The maximum number of cases was reported in the year 2019 (21.06%, n=3020), and the least number of cases was reported in the year 2020 (8.02%, n=1150). Figure 1 shows the year wise distribution of total number of cases.

It can be seen that the total number of communicable diseases reporting to the institution has remained almost

constant through 2015-2017 but during 2018 there was a small decline. Later in 2020 the overall communicable disease reported to our institution was minimal compared to the average cases from 2015 to 2019.

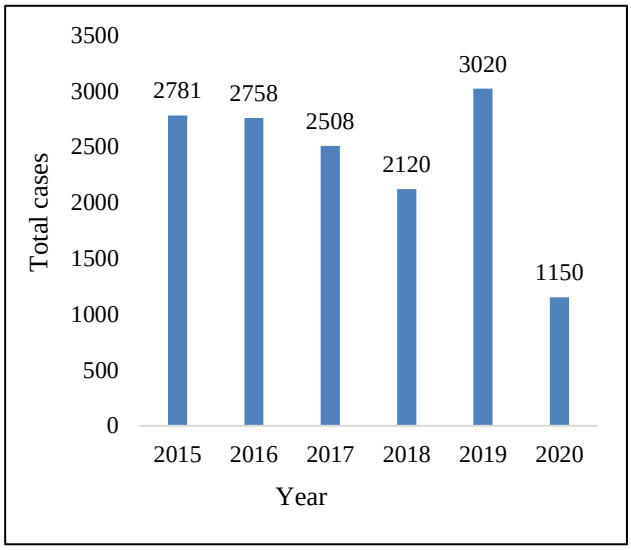

Figure 1: Year wise distribution of total number of cases.

The most common type of communicable diseases that was reported to our hospital over 5 years was airborne diseases (2370, 34.85%) followed by vector borne diseases (1825, 26. 83%), the category wise distribution of communicable disease is shown in Figure 2.

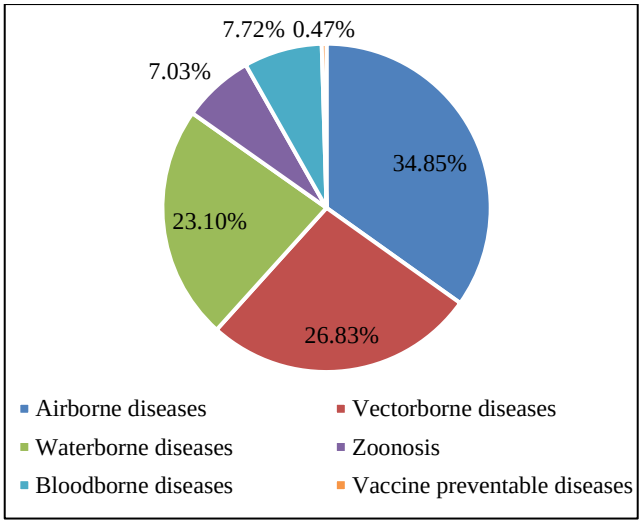

Figure 2: Distribution of communicable diseases.

Comparing the trends over the last 5-years it can be seen that airborne diseases had its peak in 2019 (n=870). Water borne diseases have remained more or less similar in numbers over the past 4 years except in 2020 (n=120) where it has remained very low. Vector borne diseases had its peak in 2017 (n=693) and smallest numbers have been reported in 2020 (n=103). Other diseases have shown a stable trend in the last 4 years. But in 2020 all the diseases seem to have decreased except in zoonosis where the cases have increased. The five-year trend of various categories of communicable diseases are given in the Figure 3.

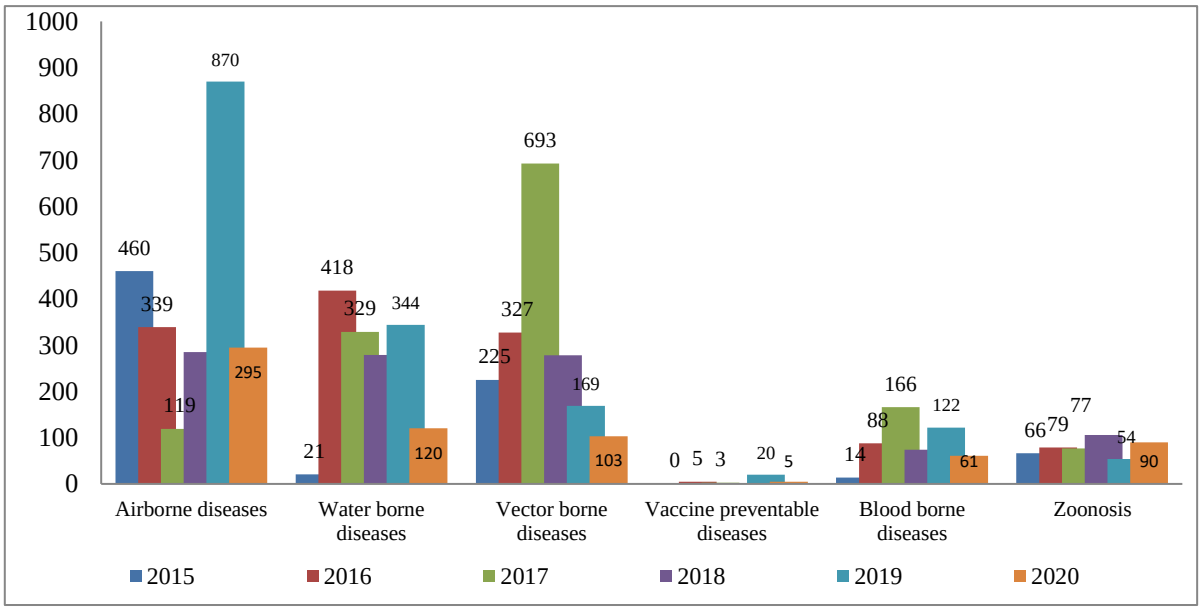

Figure 3: Five-year trend of communicable diseases.

Among the airborne diseases studied, 87.29% of cases was contributed by pneumonia (n=2069). Among the water borne diseases, it was ADD (84.46%, n=1327) which showed the maximum number of cases, and 76.43% of the vector borne diseases was contributed by dengue fever (n=1395). Considering zoonotic diseases, leptospirosis contributed a major share (83.68%, n=400 cases). The year wise distribution of pneumonia, ADD, dengue and leptospirosis is shown in Figure 4.

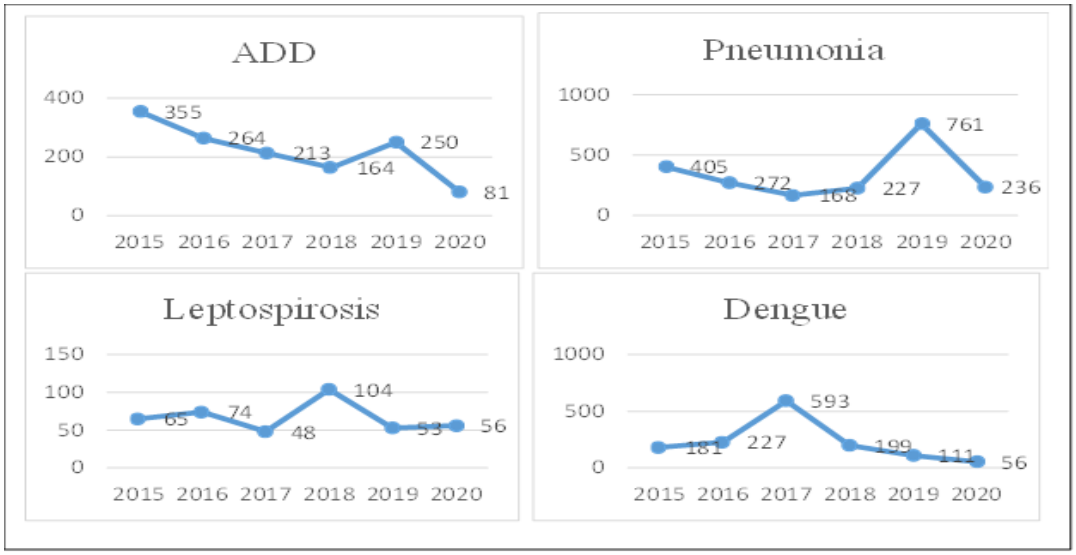

Figure 4: Yearly distribution of cases of ADD, pneumonia, leptospirosis and dengue.

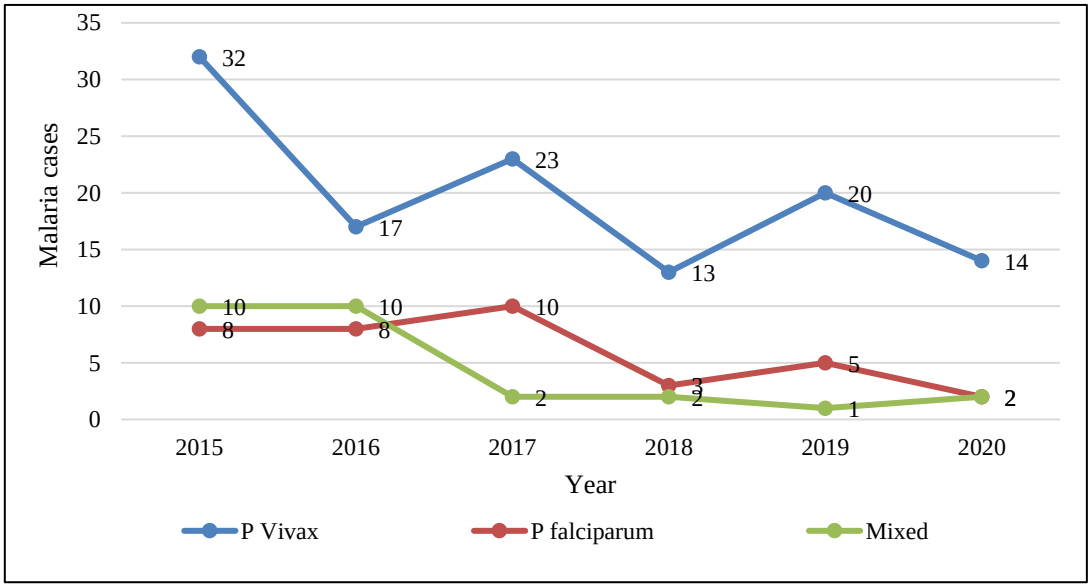

Figure 5: Trend of malaria cases as per parasitological type.

Even though Kerala is low endemic for malaria, there were a total 182 cases of malaria, during the study period. Regarding the parasitological types, 65.39% were of plasmodium vivax type (n=119), followed by plasmodium falciparum type 19.78% (n=36) and mixed type 14.83% (n=27). The overall trend during the study period for malaria cases was found to be decreasing, except for a slight raise in 2019. The trend of cases as per parasitological type is given in Figure 5.

Mortality pattern

The total number of deaths among the patients reported with communicable diseases during the period 764. Airborne diseases accounted for more than 70% of deaths. Mortality due to specific group of diseases is given in Table 1.

Table 1: Mortality pattern of communicable diseases.

Disease	N	Number of death reported, N (%)
Airborne diseases	2370	553 (72.3)
Water borne diseases	1571	19 (2.5)
Vector borne diseases	1825	19 (2.5)
Vaccine preventable diseases	32	2 (0.27)
Blood borne diseases	525	6 (0.75)
Zoonosis	478	31 (4.1)
Undiagnosed cases	7536	134 (17.6)
Total	14337	764 (100)

It can be seen that the maximum number of deaths during the period of analysis was for airborne diseases (72.3%) and the lowest for vaccine preventable diseases (0. 27%).

Among airborne diseases the highest case fatality rates was for acute respiratory infections especially pneumonias with an overall case fatality rate of 19.5% followed by chicken pox with a CFR of 11.39%. Data from 2015 to 2020 regarding mortality in pneumonias shows that it has increased from 14.7% to 29.2% in 2020. Among the waterborne diseases acute diarrheal diseases had an extremely low case fatality rate of 1.6% and an even a lower death rate for hepatitis A (0. 29%). The case fatality rates of dengue fever has been consistently low throughout the five-year period at around 1%. The CFR of malaria was at its highest in 2019 with 11.1% succumbing to the disease. In the case of leptospirosis, the case fatality rates have increased form 2.9% in 2015 to 14.2% in 2020. The five-year trend of CFR is shown in Table 2.

Table 2: Case fatality rate of communicable diseases (2015-2020).

Diseases	Total number of deaths, N (%)						
	2015	2016	2017	2018	2019	2020	Total
Pneumonia	70 (14.7)	47 (14.7)	54 (24.3)	50 (18)	210 (21.6)	69 (29.2)	431 (19)
Leptospirosis	2 (2.9)	5 (6.3)	5 (9.4)	7 (6.3)	5 (8.6)	8 (14.2)	24 (6.5)
Dengue fever	1 (0.5)	2 (0.8)	5 (0.8)	2 (0.9)	2 (1.7)	0	12 (0.9)
Malaria	0	2 (5.4)	3 (7.8)	1 (11.1)	0	0	6 (3.5)
H1NI	1 (9)	0	1 (20)	1 (14)	1 (20)	0	5 (17.8)
ADD	6 (1.6)	3 (1.1)	1 (0.4)	6 (3.5)	5 (1.9)	0	21 (1.6)
Varicella zoster	6 (13.6)	3 (6.5)	9 (19.1)	4 (9)	2 (3.6)	2 (18.2)	24 (10.1)
Diphtheria	0	0	1 (33.3)	0	1 (5.9)	0	2 (8.6)
Scrub typhus	0	1 (2.7)	0	0	0	0	1 (0.8)
Hepatitis	2 (1.6)	4 (2.1)	2 (0.9)	0	0	0	8 (0.9)

DISCUSSION

The total number of communicable diseases reported was almost constant during the study period except for 2020, which was found to be lower. The study done by Azhar et al showed a similar finding with decreasing the total number of reported communicable diseases in 2020.[8] This may be because the strict lockdown measures and containment strategies for the control of COVID-19 pandemic. This might have decreased the interaction between the agent and host for the development of communicable diseases. Another reason that can be attributed to this decline is because of the fear of going to healthcare institutions during covid times, people might have ignored mild symptoms.

As per WHO, respiratory diseases are an enormous challenge to life, health and productive human activity which are the leading cause of death and disability in the world.[9] In the present study, airborne diseases were the most common communicable diseases that were reported over the past 5 years, followed by vector borne diseases. Study done by Naveen et al in Chandigarh also reported airborne diseases as the most common communicable diseases.[10] The result was also consistent with the study done by Manjula et al.[11] State data on communicable diseases is also showed similar finding.[12]

Death was also accounted more by Airborne diseases in the present study. In a study conducted in China by Ke Wang et al on the mortality trends and characteristics of infants in a rural area, they found that ARI is the leading cause of mortality followed by diarrhea.[13] Among the airborne disease's pneumonia showed higher CFR followed by H1N1.

Trend of water borne diseases in Kerala, especially ADD shows a raising pattern as year advances.[14] In the present study this trend is not seen, in fact showed a decreasing trend except for 2019 (Figure 5). Also, the ADD cases in the present study is comparatively lower while comparing state IDSP data.[15] This may be because the majority of cases might be treated in peripheral hospitals and only very sick cases being referred to this tertiary care hospital.

Leptospirosis is a common zoonosis caused by the bacteria Leptospira. Maximum number of leptospirosis cases was found in the year 2018, which may be due to the Kerala floods 2018. This is consistent with the Kerala state data which also had maximum number of leptospirosis cases in 2018 (2079 cases). But Rameela et al in a study conducted in Northern Kerala, to find out the trend of leptospirosis cases reported there, they noticed maximum number of cases due to Leptospirosis was in 2014 and death in 2019.[16] Data from the year of 2014 was not included in the present study. In a study done by Alok et to find out the trend of leptospirosis and its association with meteorological factors, showed a seasonal trend in leptospirosis with more cases in June to October.[17]

As far as dengue cases, which is one of our major public health problem, are concerned, increased number of cases are seen in 2017. This is also consistent with the Kerala state data. Most probable reason being drought in Kerala, and people stored drinking water in containers.[18] The same year Dengue outbreak was also reported in South Indian states like Tamil Nadu and Karnataka. The most common parasitological type of malaria was found to be

of plasmodium vivax which was consistent with the study done by Sajna et al.[19]

Limitations

The results of this study are based on the secondary data available from the department of community medicine, reported according to the IDSP format. Some of the diseases were missing in some years. Thus, it was very difficult for us whether the diseases were not present or it was that of not recording in the line list. Also, the factors which could have precipitated death like presence of comorbidities and other risk factors were not studied.

CONCLUSION

Communicable disease is still a major public health problem in India even after seven decades of independence. The most common type of communicable disease that was reported was airborne disease, followed by vector borne disease. Pneumonia cases contributed a major share among airborne disease, and dengue among vector borne disease. More than half of all death due to communicable disease was also seen with airborne disease. Case fatality rate was shown a maximum for Pneumonia, followed by H1N1. Monitoring the trend of communicable disease will help us to understand regarding early warning signals for an upcoming outbreak, ultimately leading to both health benefits and economic benefits. This study shows the importance of proper surveillance system for communicable diseases and the need for adequate prevention and control measures even in this era.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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