Original Article

Rising trend of dengue in urban areas: A challenge

Ravi Nimonkar[1], Shafique Ahmed[1], Rahul Thombre[2], Maninder Pal Singh Pardal[1], Arun Yadav[1], Prabhakar Teli[1]

Departments of [1]Community Medicine and [2]Dermatology, Armed Forces Medical Services, Pune, Maharashtra, India

Abstract

Context: Dengue, a mosquito-borne illness, is endemic over 100 countries around the world. Dengue cases have been on rise in India in the past decade. The present study was conducted to describe dengue cases of a ward in an urban area. **Aims:** To analyse the 5-year trend of cases of dengue fever, the 5-year trend of disease burden attributable to dengue as a proportion of all consultations, and the 5-year trend of mortality attributable to dengue as a proportion of all deaths in an urban area. **Settings:** The present study is a retrospective record-based study, carried out from January 2014 to December 2019. **Material and Methods:** Descriptive analysis was used to describe the cases. Standard statistical tools such as Chi square for linear trends were utilised for data analysis. **Results:** Except for a marginal dip in the year 2017, we observed that the trend of dengue significantly increased during the period of our study (Chi square for linear trend = 217.54; $P = 0$). We also observed a generally significantly increasing trend in burden of dengue as a disease, measured as a proportion of all consultations (Chi square for linear trend = 14302.72; $P = 0$). Mortality attributable to dengue measured as a ratio of deaths because of dengue and deaths because of all causes also shows a generally increasing trend with a slight decrease in 2018 (Chi square for linear trend = 371.24; $P = 0$). **Conclusion:** Dengue cases and the percentage of consultations attributable to dengue show an increasing trend over the past 5 years.

Keywords: Dengue, morbidity, mortality, trend, urban areas

Introduction

Worldwide, dengue is endemic in over 100 countries. In the past decade, several researchers have reported an increase in number of dengue cases in India.[1,2]

Despite the lack of data regarding the global burden of dengue, the epidemiological patterns which are observed ring an alarm for not only human health but also the global economy. Because of increased and unplanned urbanization, scarcity of water, and environmental change, dengue has been labelled as a disease of the future by Guzman MG *et al*.[3] The disease has historically been considered an urban disease.[4] The researchers carried out an extensive medline search and observed that adequate data pertaining to the trend of dengue fever in various countries across the globe, particularly in India, were conspicuous by the paucity. Keeping in view the lack of adequate data in this regard and the importance of dengue as a public health problem in urban areas, the researchers proceeded to analyse the trend of dengue fever in their setup. In this paper, we aim to share our experience in cases of dengue in an urban area.

Address for correspondence: Dr. Maninder Pal Singh Pardal, Mandara A2/504, Nyati Epitome, Opposite Corinthian Club, Mohammadwadi, Pune – 411 060, Maharashtra, India.
E-mail: ltcolpmpsingh@yahoo.Com

Received: 01-03-2022 **Revised:** 16-06-2022
Accepted: 27-06-2022 **Published:** 31-10-2022

Access this article online

Quick Response Code:

Website: www.jfmpc.com

DOI: 10.4103/jfmpc.jfmpc_492_22

Material and Methods

Study design

The researchers used retrospective cohort study design to conduct their study.

Settings

The study was conducted in the western part of India. The study duration was from January 2016 to December 2020.

How to cite this article: Nimonkar R, Ahmed S, Thombre R, Pardal MP, Yadav A, Teli P. Rising trend of dengue in urban areas: A challenge. J Family Med Prim Care 2022;11:6416-9.

The topography of the region is plain, with a heterogenous population. Door-to-door surveillance for dengue fever was carried out. The study was carried out in several wards of an urban area in India. The study was carried out from January 2016 to December 2020.

Inclusion criteria

Data pertaining to cases of dengue which were positive for the non-structural protein1 (NS1) antigen on enzyme-linked immunosorbent assay (ELISA) test were included for our study.

Exclusion criteria

Data pertaining to cases which were negative for the NS1 antigen on ELISA test were excluded from our study.

Data pertaining to dengue fever cases during the study period in the area of study were obtained. The data were collected for both the out-patient department and hospital admission cases of dengue, which were positive for the non-structural protein1 (NS) antigen ELISA test. Because data were collected only in the form of numerical values, they did not contain any patient-related information, namely, name, age, sex, occupation, place of residence, family income, and so on. Hence, patient consent was not taken. However, ethical clearance from the instituitional ethical committee was obtained prior to commencement of the study.

Standard statistical tools such as Chi square for the linear trend were utilised for data analysis. SPSS ver 20 and MS Excel 2010 were used for data entry and analysis.

Results

Our study has certain inherent strengths. First, the data collected are authentic, including routine reporting and door-to-door surveillance. Second, we have data for 5 years which are sufficient enough to study the trend of the disease. A total of 607 confirmed dengue cases have been reported from the study area.

Data on the number of cases of dengue in the area of study during the period from 2016 to 2020 are tabulated in Table 1. During the study period, we observed a significantly increasing trend in the incidence of dengue (Chi square for linear trend = 217.54; $P = 0$) [Figure 1]. Data on disease burden/mortality attributable to dengue as a proportion of all consultations/deaths in the study area are presented in Table 2.

Table 1: Morbidity amongst the local population because of dengue for the period 2016–2020

Year	No. of Dengue cases	Population	Incidence (per 100)
2016	145	20557	0.71
2017	107	20427	0.52
2018	093	20386	0.46
2019	242	20477	1.18
2020	020	20405	0.10

The workers observed that during the 5-year study period, dengue accounted for 1.84% to 29.84% of all consultations, a generally significantly increasing trend in burden of dengue as a disease, measured as a proportion of all consultations (Chi square for linear trend = 14302.72; $P = 0$) [Figure 2]. Mortality attributable to dengue ranged from 0.00% to 0.24%. Mortality attributable to dengue measured as a ratio of deaths because of dengue and deaths because of all causes also shows a generally increasing trend with a slight decrease in 2018 (Chi square for linear trend = 371.24; $P = 0$) [Figure 3].

Discussion

We observed a significantly increasing trend in the incidence of dengue (Chi square for linear trend = 217.54; $P = 0$). We also observed that during the 5-year study period, dengue

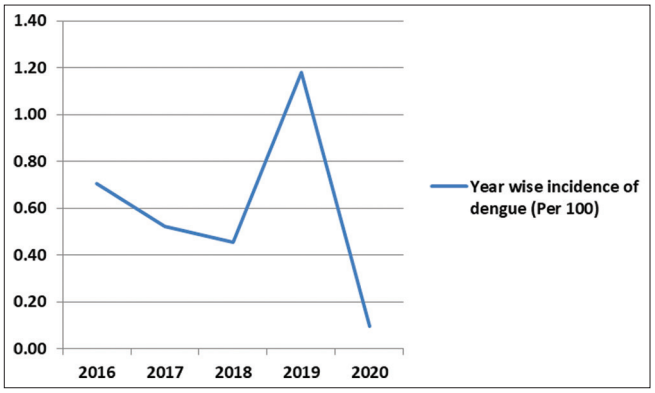

Figure 1: Trend of dengue during the period of study (incidence per 100)

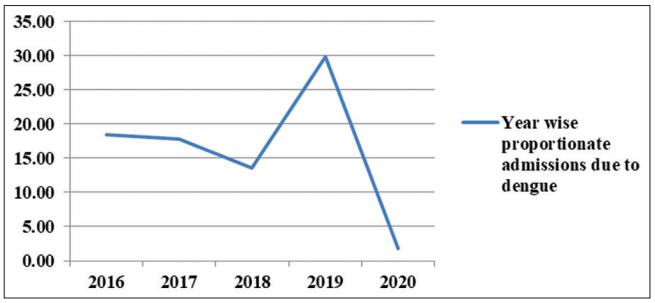

Figure 2: Disease burden attributable to dengue as a proportion of all consultations also during the period of study

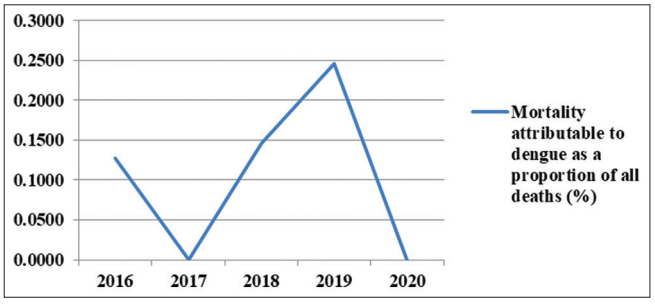

Figure 3: Mortality attributable to dengue as a proportion of all deaths during the period of study

Table 2: Data on disease burden/mortality attributable to dengue as a proportion of all consultations/deaths amongst the local population for the period 2016–2020

Year	Total consultations (All causes)	No. of Dengue cases	Disease burden attributable to dengue (%)	Total Deaths (All causes)	Deaths attributable to dengue	Mortality attributable to dengue as a proportion of all consultations (%)
2016	0786	145	18.45	25	1	4.0000
2017	0602	107	17.77	14	0	0.0000
2018	0685	093	13.58	17	1	5.8824
2019	0811	242	29.84	36	2	5.5556
2020	1085	020	1.84	28	0	0.0000

accounted for 1.84% to 29.84% of all consultations, a generally significantly increasing trend in burden of dengue as a disease, measured as a proportion of all consultations (Chi square for linear trend = 14302.72; $P = 0$). Mortality attributable to dengue measured as a ratio of deaths because of dengue and deaths because of all causes also shows a generally increasing trend with a slight decrease in 2018 (Chi square for linear trend = 371.24; $P = 0$).

Worldwide, several workers have reported dengue as a re-emerging major public health problem.[5-7] An increasing trend of dengue haemorrhagic fever was reported by Harapan H *et al.*[8] in Indonesia based on data of the last 50 years. Cyclic incidence rates peak once every 6–8 years. However, the approximately 50% reduction in case fatality rate has been reported in each decade. A decadal increasing trend of dengue has also been reported by Maula AW *et al.*[9] Gubler DJ also reported resurging and emerging dengue fever in 1998.[10] Analysis of national dengue surveillance data was performed from 1990 to 2014 by Lai *et al.* Based on their findings, prompt action is required to be taken to prevent dengue, which experiences large and frequent cycles of epidemic dengue from occurring in China.[11]

A 30-fold increase in the incidence of dengue in the past 50 years has been reported by Hsu JC *et al.* The trend in dengue prevalence by geographical region and population characteristics was assessed by Hsu JC *et al.*[12] In Thailand, an increase in the annual trend of dengue fever from 2003 to 2015 has been reported by Bekoe C *et al.*[13]

Abdulsalam FI *et al.* in their study in Thailand observed that the highest number of recorded cases of dengue occurred in the years 2002 and 2010, whereas the lowest number of cases occurred in 2004 and 2006. There seems to be a 2–3 year epidemic cycle in the number of recorded cases at the national level. Incidence of dengue cases in Thailand peaked in the 1997 and 1998, recording about 167.2 and 211.4 cases per 100,000, respectively. The incidence decreased to 40.3 and 30.2 per 100,000 in 1999 and 2000, respectively, and again rose in the years 2001 and 2002 to 225.4 and 168 per 100,000, respectively.[14]

The sudden dip in the number of cases in the year 2020 in our study could be attributed to non-diagnosis/non-reporting of cases because of the lockdown on account of the coronavirus disease 2019 pandemic. From the results of our study, we infer that there is a statistically significant increasing burden of dengue fever, with dengue fever as a proportion of all consultations and mortality attributable to dengue during the period from January 2016 to December 2020.

The primary care physician, when he comes across a case of fever whom he suspects to be dengue, can advise the patient regarding suitable preventive measures for dengue for the individual and his family members. The physician can advise the patient to report to the nearest health care facility at the earliest and get the requisite investigations carried out to confirm or rule out dengue fever.

There are also limitations in our study. We used a retrospective cohort study design for our study. We focused on reported cases of dengue, so the data collected are representative of only confirmed cases of dengue. A low level of reporting, poor disease surveillance, a low case fatality rate, and inconsistent comparative analyses make the true incidence and impact of dengue likely to be significantly higher than that currently reported.

Recommendations

Our study is one of the pioneering works in analyzing the trend of dengue fever in India. However, we recommend that further studies on analysing the trend of dengue fever in urban areas across various states of India be carried out. The results of these studies can subsequently be utilised to form a mathematical model which will help to predict the incidence of dengue fever. Such studies will also enable us to identify the "hot spots", that is, areas which have a higher incidence or an increasing trend. Thus, preventive measures can be focused towards these "hot spots" to have a better preventive strategy.

Conclusion

A significantly increasing trend of dengue fever in urban areas has been depicted by the workers. The percentage of consultations attributable to dengue and mortality attributable to dengue also show an increasing trend over the past 5 years. This is a major challenge to public health.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Kunwar R, Prakash R. Dengue outbreak in a large military station: Have we learnt any lesson? Med J Armed Forces India 2015;71:11-4.
2. Minhas S, Singh PMP. Dengue fever: A re-emerging disease. Int J Community Med Public Health 2020;7. doi: 10.18203/2394-6040.ijcmph 20201997.
3. Guzman MG, Gubler DJ, Izquierdo A, Martinez E, Halstead SB. Dengue infection. Nat Rev Dis Primers 2016;2:16055.
4. Mutucumarana CP, Bodinayake CK, Nagahawatte A, Devasiri V, Kurukulasooriya R, Anuradha T, *et al.* Geospatial analysis of dengue emergence in rural areas in the Southern Province of Sri Lanka. Trans R Soc Trop Med Hyg 2020;114:408-14.
5. Mustafa MS, Rastogi V, Jain S, Gupta V. Discovery of fifth serotype of dengue virus (DENV-5): A new public health dilemma in dengue control. Med J Armed Forces India 2015;71:67-70.
6. Chumpu R, Khamsemanan N, Nattee C. The association between dengue incidences and provincial-level weather variables in Thailand from 2001 to 2014. PLoS One 2019;14:e0226945.
7. Singh PMP, Minhas S. Dengue in urban areas: Is there a cause for alarm? Int J Curr Med Pharm Res 2020;6:5183-5.
8. Harapan H, Michie A, Mudatsir M, Sasmono RT, Imrie A. Epidemiology of dengue hemorrhagic fever in Indonesia: Analysis of five decades data from the National Disease Surveillance. BMC Res Notes 2019;12:350.
9. Maula AW, Fuad A, Utarini A. Ten-years trend of dengue research in Indonesia and South-east Asian countries: A bibliometric analysis. Glob Health Action 2018;11:1504398.
10. Gubler DJ. Dengue and dengue hemorrhagic fever. Clin Microbiol Rev 1998;11:480-96.
11. Ooi EE. The re-emergence of dengue in China. BMC Med 2015;13:99.
12. Hsu JC, Hsieh CL, Lu CY. Trend and geographic analysis of the prevalence of dengue in Taiwan, 2010-2015. Int J Infect Dis 2017;54:43-9.
13. Bekoe C, Pansombut T, Riyapan P, Kakchapati S, Phon-On A. Modeling the geographic consequence and pattern of dengue fever transmission in Thailand. J Res Health Sci 2017;17:e00378.
14. Abdulsalam FI, Yimthiang S, La-Up A, Ditthakit P, Cheewinsiriwat P, Jawjit W. Association between climate variables and dengue incidence in Nakhon Si Thammarat Province, Thailand. Geospat Health 2021;16: doi: 10.4081/gh.2021.1012.