

Research Article

Analysis of Trends of Fever in the Field Practice Area of a Tertiary Care Hospital, Bangalore. A Retrospective Data Review

Krithika TT*, Shyam AC, Vidusha K, Balwant SP and Chandrakala C

Raja Rajeswari Medical College and Hospital, Bangalore, India

*Corresponding author: Krithika TT, Raja Rajeswari Medical College and Hospital, Bangalore, India

Received: November 09, 2020; Accepted: November 27, 2020; Published: December 04, 2020

Abstract

Background: Fever of undetermined origin is most often caused by an unusual manifestation of a common disease and is a huge public health problem affecting most people in developing world.

Aims: To study the seasonal trend analysis of fever cases in a Rural Health Training Centre of tertiary care hospital, Bangalore, Karnataka.

Methods and Materials: A retrospective descriptive record-based analysis of fever cases was conducted in Rural Health Training Centre of tertiary care hospital, Bangalore, from January 2019 to September 2019.

The trends of fever were analysed in each village respectively by the Method Least Squares, linear equation. The data was analysed using MS Excel sheet.

Results: Study included 5114 fever cases, out of which 34% were of 18-30 years. In few villages, there was downward trend of fever and in some villages, an upward trend of fever was observed. Majority of Fever cases (2795) were observed in August 2019 (12.29%) and September 2019 (12.33%).

Conclusion: The number of fever cases showed a downward and upward trend during the study period. Implementation of health education regarding the prevention of the vector borne diseases and its burden, importance of the visiting a health care centre in case of a fever. To raise the awareness of the benefits in early diagnosis and treatment.

Keywords: Trend; Febrile illness; Fever; Karnataka

Introduction

Fever or Pyrexia is a physiological disorder in which temperature is risen above homeostasis condition. Febrile illness is the most common public health problem affecting most people in developing world. Having a fever is a sign that something out of the ordinary is going on inside the body.

Various infectious diseases are caused due to virus and bacteria, fever results from the action upon the cerebral regulating centres of substances which are released from the damaged cells and this causes elevation of the body temperature [1]. Some pathogenic microorganisms show no pyrogen.

When fever presents without localizing features, this becomes a major problem to the health care workers and the health system [2].

Therefore it is important to understand fever and febrile response as it is vital for the diagnosis, treatment and follow up of various diseases as this helps in identifying the trends timely, thus interventional strategies can be implemented accordingly.

Methods

A Descriptive study was conducted in field practice area of a tertiary care Hospital, Bangalore. Three village were under this Health Centre, Huluvnahalli, Chunchanakuppe and Kolar. After obtaining

the permissions from the concerned authorities, the records of the OPD cases was taken and a retrospective record review was conducted. Fever cases who reported to the Centre were analysed from January 2019 to September 2019. All the individuals are above 18 years of age.

A total of 10,627 visited the OPD. Out of which 5114 cases were reported of fever. The fever cases were subjected to investigations for VDRL, HbsAg, Blood smears for Malaria parasite, Widal test, Urine routine, Sputum microscopy, Platelet count. The trends were analysed in each village respectively by the linear equation. The data was analysed using MS Excel sheet. The trends of fever were analysed in each village respectively by using the Time series analysis: Method Least Squares, by using the Linear Equation.

$$(Y = a + bX).$$

The secular trend line (Y) is defined equation: $Y = a + bX$

Where Y = predicted value of the dependent variable

a = Y- axis intercept [the height of the line above origin (when X = 0, Y = a)]

b = slope of the line (the rate of change in Y for a given change in X)

When b is positive the slope is upwards, when b is negative, the

Table 1: Month wise distribution of fever cases. N=5114.

INVESTIGATIONS (N=10627 OPD cases)	VDRL(%)	HbsAg (%)	MALARIA BS (%)	WIDAL (%)	URINE ROUTINE (%)	SPUTUM (%)	PLATELET (%)
JANUARY (n=1227)	28(2%)	28(2%)	40(8%)	-	76(6%)	31(3%)	8(1%)
FEBRUARY (n=1158)	25(2%)	25(2%)	80(16%)	-	79(7%)	35(3%)	10(0.8%)
MARCH (n=1179)	40(3%)	40(3%)	40(6%)	2(0.2%)	99(8%)	30(3%)	5(0.4%)
APRIL (n=1118)	33(3%)	33(3%)	30(5%)	3(0.3%)	55(5%)	25(2%)	3(0.2%)
MAY (n=1028)	51(5%)	51(5%)	120(21%)	2(0.2%)	99(10%)	28(3%)	4(0.3%)
JUNE (n=1190)	38(3%)	38(3%)	150(27%)	5(0.4%)	78(7%)	24(2%)	8(1%)
JULY (n=1132)	56(5%)	56(5%)	110(19%)	9(0.8%)	102(9%)	28(2%)	9(0.8%)
AUGUST (n=1220)	36(3%)	36(3%)	150(24%)	5(0.4%)	88(7%)	29(2%)	10(0.8%)
SEPTEMBER (n=1375)	45(3%)	45(3%)	180(29%)	9(0.7%)	107(8%)	27(2%)	9(0.6%)

slope is downwards

X = independent variable (in this case it is time)

To estimate the constants a and b, the following two equations have to be solved simultaneously:

$$\sum Y = na + b \sum X$$

$$\sum XY = a\sum X + b\sum X^2$$

To simplify the calculations, if the midpoint of the time series is taken as origin, then the negative values in the first half of the series balance out the positive values in the second half so that $\sum X = 0$. In this case, the above two normal equations will be as follows:

$$\sum Y = na$$

$$\sum XY = b\sum X^2$$

$$\text{Since } \sum \sum Y = na$$

$$a = \frac{\sum Y}{n}$$

n

$$\text{Since, } \sum XY = b\sum X^2$$

Results

Out of total OPD cases (January to September 2019) reported at the centre 5114 were reported of fever These were further subjected for investigations. In few villages, there was a downward trend of fever (Hulluvenahalli) and in villages (Chunchanakuppe, Kolur), an upward trend of fever was observed. Majority of Fever cases (2795) were observed in August and September it was high with 12.29% and 12.33% and least in January (9.54 %).

It was observed that Malarial Blood smear test were majority done in the month of June (27%), July, August (24%), September (29%) and April (5.3%). Sputum Microscopy was done throughout the study duration. Blood test for Hepatitis-B was observed maximum in the months of March (3%), May (5%), July (5%) and February (2%).

VDRL positive cases were observed higher in July (5%) and least in February (2%). Widal positive cases were observed was high in the month of July (0.8%) and September (0.6%) and least in May (0.2%) and March (0.1%). Urine routine positive cases were observed in March (8%), May (10%), July (9%) and September (7.8%) and in January (6%). Dengue cases were seen in the month of July, August

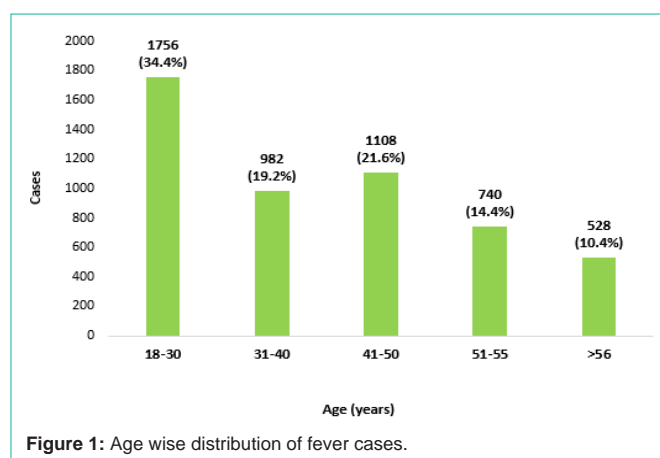


Figure 1: Age wise distribution of fever cases.

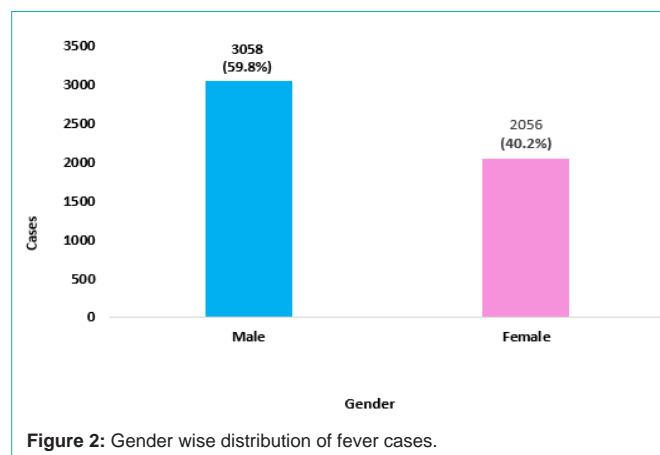


Figure 2: Gender wise distribution of fever cases.

and September with 0.8%, 0.9% and 0.6% and least observed in April with 0.2% , Table 1

In Figure 1, Age wise distribution of Fever cases depicts that majority (34.4%) of the study subjects belong to the age group of 18 to 30 years, followed by 21.6% of the study subjects belonged to age group 41 to 50 years.

In Figure 2, Gender wise Distribution of Fever cases, depicts that 59.8% are Male subjects and 40.2% are Female subjects.

Figure 3, Maximum blood smearing testing for Malaria cases were done in June and September. VDRL positive cases were observed

Table 2: Hluluvenahalli Village: showed a downward trend.

PERIOD 2019	Y	X	X ²	XY	TREND Y = a + bX
JANUARY	64	-4	16	-256	92.2
FEBRUARY	97	-3	9	-291	91.65
MARCH	109	-2	4	-218	91.1
APRIL	93	-1	1	-93	90.55
MAY	108	0	0	0	90
JUNE	94	1	1	94	89.45
JULY	91	2	4	182	88.9
AUGUST	67	3	9	201	88.35
SEPTEMBER	87	4	16	348	87.8
TOTAL	ΣY =810	ΣX=0	ΣX ² =60	ΣXY = - 33	ΣY =810

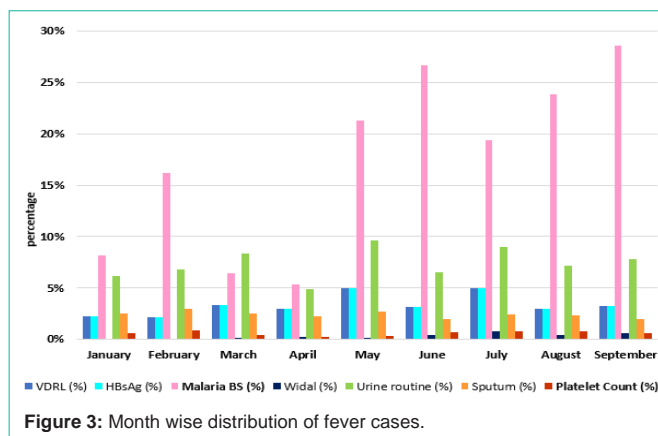


Figure 3: Month wise distribution of fever cases.

Table 3: Chunchanakuppe Village: showed a downward trend.

PERIOD 2019	Y	X	X ²	XY	TREND Y = a + bX
JANUARY	51	-4	16	-204	71.74
FEBRUARY	55	-3	9	-165	71.38
MARCH	96	-2	4	-192	70.98
APRIL	84	-1	1	-84	70.6
MAY	86	0	0	0	70.22
JUNE	83	1	1	83	69.84
JULY	58	2	4	116	69.46
AUGUST	53	3	9	159	69.08
SEPTEMBER	66	4	16	264	68.7
TOTAL	ΣY =632	ΣX=0	ΣX ² =60	ΣXY = - 23	ΣY =632

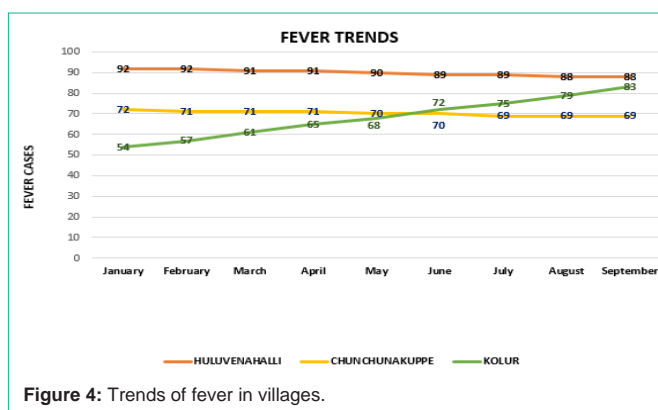


Figure 4: Trends of fever in villages.

Table 4: Kolar Village: showed an upward trend.

PERIOD 2019	Y	X	X ²	XY	TREND Y = a + bX
JANUARY	40	-4	16	-160	53.74
FEBRUARY	26	-3	9	-78	57.36
MARCH	85	-2	4	-170	60.98
APRIL	79	-1	1	-79	64.6
MAY	87	0	0	0	68.22
JUNE	90	1	1	90	71.84
JULY	77	2	4	154	75.46
AUGUST	60	3	9	180	79.08
SEPTEMBER	70	4	16	280	82.7
TOTAL	ΣY =614	ΣX=0	ΣX ² =60	ΣXY = 217	ΣY =614

of fever cases observed in Kolar (8.7% to 13.5%) from January to September 2019.

Trends in Fever

In **Table 2**,

In $Y = a + bX$

$\Sigma Y = na + b\Sigma X^2$

$\Sigma XY = a\Sigma X + b\Sigma X^2$

$a = \Sigma Y$

n

$a = \Sigma Y : 810 = 90$

n 9

$a = 90$

$b = \Sigma XY / \Sigma X^2$

$b = -33 : -0.55$

60

$b = -0.55$

Table 3, where

$Y = a + bX$

$\Sigma Y = na + b\Sigma X^2$

higher in July (5%) and least in February (2%). The HbsAg positive cases were observed in July with 4.9% and in February with 2%. Widal positive cases were observed was high in the month of July (0.8%) and September (0.6%) and least in May (0.2%) and March (0.1%). Urine routine positive cases were observed in March (8%), May (10%), July (9%) and September (7.8%) and in January (6%). Dengue cases were seen in the month of July, August and September with 0.8%, 0.9% and 0.6% and least were observed in April with 0.2%.

Fever cases from Hluluvenahalli showed downward trend from (11.4% to 10.7%) and Chunchanakuppe (11.3% to 10.9%) from January to September 2019. There was a significant Upward trend

$$\Sigma XY = a\Sigma X + b\Sigma X^2$$

$$a = \Sigma Y$$

$$n$$

$$a = \Sigma Y : 632 = 70.22$$

$$n \ 9$$

$$b = \Sigma XY / \Sigma X^2$$

$$b = -23 : -0.38$$

$$60$$

$$b = -0.38$$

Table 4, where

$$Y = a + bX$$

$$\Sigma Y = na + b\Sigma X^2$$

$$\Sigma XY = a\Sigma X + b\Sigma X^2$$

$$a = \Sigma Y/n$$

$$a = \Sigma Y : 614 = 68.22$$

$$n \ 9$$

$$a = 90$$

$$b = \Sigma XY / \Sigma X^2$$

$$b = 217 : 3.62$$

$$60$$

$$b = 3.62$$

Fever cases from Hulluvinahalli showed Downward Trend from (11.4% to 10.7%) and Chunchunakuppe (11.3% to 10.9%) from January to September 2019. There was a significant Upward trend of fever cases observed in Kolor (8.7% to 13.5%) from January to September 2019.

In **Figure 4**, The cases from Hulluvenahalli village showed downward trend from (11.4% to 10.7%). The cases from Chunchanakuppe Village showed downward trend from (11.3% to 10.9%). There was a significant Upward trend of Fever cases observed in Kolor village (8.7% to 13.5%) from January to September 2019.

Discussion

The record based data showed that out of 5114 cases with fever, majority were observed in August 2019 (12.29%) and September 2019 (12.33%). The seasonal pattern should alarm the Clinicians to consider Malaria, Dengue which are seen during monsoon season and post monsoon season. The blood smears tested were seen almost throughout the study duration. This was the same during the year 2018. A similar analysis from a health care Centre in Rajasthan showed both Dengue and Malaria follow the same seasonal pattern in two years [5].

In a Surveillance study done by Kumar A [17], et al, the incidence of malaria in India were estimated at about 4 million in the year 2015–16. The estimates were four-fold improved over the number of malaria cases reported by the National Malaria Control Programme.

The survey, during the year were estimated to be 29,341 (23,354–35,327) deaths due to malaria. They were the improved estimates over the earlier estimates and were comparable to the estimates provided by the WHO for the same period [17].

There were a greater number of male patients (59.8%) compared to that of female patients (40.2%) in the current study. Similarly in the study done by Jain D [6] also showed male patients were more than female patients. Fever being the most common presentation in the current study. A study was done by Ramesan K [7], et al, where Fever being the most common presenting symptom in the study. In the current study Gastrointestinal symptoms were seen, of which abdomen pain, nausea/vomiting were commonly observed in the study population. This was seen in a similar in a study done by Jain D [6], where gastrointestinal symptoms were more prevalent, of which abdominal pain was present in 42.5% and nausea/vomiting in 28.7% of the study population. In the present study, Dengue cases were seen in the month of July, August and September with 0.8%, 0.9% and 0.6%. A similar study done by Ashwini K [9], et al, showed that maximum Dengue cases were seen in month of August and September. Early evaluation of the febrile traveller, a high degree of suspicion of malaria [10], rapid and accurate diagnosis, and appropriate antimalarial therapy are essential for the patient's recovery. Hepatitis- B is a significant health problem and yet this disease is not know by a large number of people in India. In this study it was observed that the Hepatitis-B test was done throughout the study and maximum positive cases were seen in the month of May (5%), June (3%), and July (5%). As the disease progresses silently thereby the patient presents in advanced stage with complications developed. Early investigation and diagnosis play a vital role in the disease treatment. Vaccinations is an important step towards controlling the disease as well. A similar study done by Mele A, et al. observed in their study that universal vaccination has contributed to a decreasing Acute Hepatitis B incidence in Italy, by reducing the risk of infection in persons aged 15-24 years [18]. The hepatitis B virus also has a carrier state in the host body usually seen in childhood, predominantly by horizontal spread due to crowded living condition and poor hygiene conditions. In study done by Tandon BN, et al, the average estimated carrier rate of Hepatitis B virus (HBV) in India is 4%, with a total pool of approximately 36 million carriers [20].

The overall proportion of fever cases showed an upward and downward trends. Similar results were observed by the study done by Sharma P, et al. [3] showing the trend of fever and noted that during the monsoon and post monsoon season, there is overgrowth of scrub grass required for laying eggs of mite and transmission of scrub typhus. Thus making Scrub Typhus to be noted in the differential diagnosis during these monsoon period along with malaria and dengue.

Upward trends were observed as there were female attendance for seeking health care with fever as a chief complaint. Downward trends of fever were also observed as a result of functional awareness programs regularly held in the village and also making the health care facility accessible to the general population. Health Education programs are very important and this helps a large number of population and also creates awareness on a large scale.

The burden of various diseases (emerging and re-emerging) could

be reduced if we take measure to detect the changes in the trend through the implementation of the surveillance programs in the country. These programs have been implemented in others countries as well.

Conclusion

It was observed that the number of fever cases showed a downward and upward trend during this study period of January 2019 to September 2019.

It will also help to identify the different types and the time period of the fever trend to take proper epidemiological measures to prevent and control vector borne diseases. It is necessary to conduct further studies over a longer period of time to look for seasonal and cyclical variations in the occurrences of different cases of fever in order to institute preventive and control measures.

The health care system needs to be strengthened to study the seasonal variations of the diseases over a long period of time. This will further help the health planners to allocate the resources in the most appropriate way.

References

- González Plaza JJ, Hulak N, Zhumadilov Z, Akilzhanova A. Fever as an important resource for infectious diseases research. *Intractable & rare diseases research*. 2016; 5: 97-102.
- Crump JA, Newton PN, Baird SJ. Febrile Illness in Adolescents and Adults. In: Holmes KK, Bertozzi S, Bloom BR, et al., editors. *Major Infectious Diseases*. 3rd edn. Washington (DC): The International Bank for Reconstruction and Development / The World Bank; 2017 Nov 3. Chapter 14.
- Sharma P, Singh M, Gandhi MK. Seasonal trend of fever cases seeking health care services at a tertiary care centre- an audit of retrospective data from sub-Himalayan region. *J Evolution Med Dent Sci*. 2018; 7: 1862-1867.
- Ogoina D. Fever, fever patterns and diseases called 'fever'--a review. *Journal of infection and public health*, 2011; 4: 108-124.
- Sharma R, Ahmed S, Gupta S. Comparative evaluation of seasonal fevers in last 2 years at a tertiary care hospital in North India. *Int J Curr Microbiol App Sci*. 2014; 3: 631-634.
- Jain D, Rajput R, Pathak V, Mittal A, Jain P. Changing Trends in Clinical Presentation and Biochemical Spectrum of Dengue Fever: An Observation of a Tertiary Care Centre, *Arch Clin Infect Dis*. 2017; 12: e62221.
- Mohan DK, Shiddappa M, Dhananjaya M. A study of clinical profile of dengue fever in a tertiary care teaching hospital. *Sch J App Med Sci*. 2013; 1: 280-282
- Rachel D, Rajamohanam , Philip AZ. A study of clinical profile of dengue fever in Kollam, Kerala, India. *Dengue Bull*. 2005; 29: 197-202.
- Kumar A, Rao CR, Pandit V, Shetty S, Bammigatti C, Samarasinghe CM. Clinical manifestations and trend of dengue cases admitted in a tertiary care hospital, udupi district, karnataka. *Indian J Community Med*. 2010; 35: 386-390.
- Suh KN, Kain KC, Keystone JS. Malaria. *CMAJ: Canadian Medical Association journal = Journal de l'Association medicale canadienne*. 2004; 170: 1693-1702.
- Committee to Advise on Tropical Medicine and Travel (CATMAT). Canadian recommendations for the prevention and treatment of malaria among international travelers 2000. *Can Commun Dis Rep*. 2000; 26: 1-42
- World health organisation: the 10 leading causes of death by broad income group (2008). WHO, Geneva, 2011.
- Sulekha C, Kumar S, Philip J. Gullian-Barre syndrome following dengue fever. *Indian Pediatr*. 2004; 41: 948-952.
- Sharma R, Ahmed S, Gupta S. Comparative evaluation od seasonal fevers in last two years at a tertiary care hospital, North India. *Int J Curr Microbiol App Sci*. 2014; 3: 631-634.
- Padbidri VS, Adhikari P, Thakare JP, Ilkal MA, Joshi GD, Pereira P, et al. The 1993 epidemic of dengue fever in Mangalore, Karnataka State, India. *Southeast Asian J Trop Med Public Health*. 1995; 26: 699-704.
- World Health Organisation: the 10 leading causes of death by broad income group (2008). WHO, Geneva, 2011.
- Kumar A, Chaturvedi HK, Mohanty AK, Sharma SK, Malhotra MS, Pandey A. Surveillance based estimation of burden of malaria in India, 2015-2016. *Malaria journal*. 2020; 19: 156.
- Mele A, Tosti ME, Mariano A, Pizzuti R, Ferro A, Borini B, et al. National Surveillance System for Acute Viral Hepatitis (SEIEVA) Collaborating Group. Acute hepatitis B 14 years after the implementation of universal vaccination in Italy: areas of improvement and emerging challenges. *Clinical infectious diseases: an official publication of the Infectious Diseases Society of America*. 2008; 46: 868-875.
- Ray G. Current Scenario of Hepatitis B and Its Treatment in India. *Journal of clinical and translational hepatology*. 2017; 5: 277-296.
- Tandon BN, Acharya SK, Tandon A. Epidemiology of hepatitis B virus infection in India. *Gut*. 1996; 2: S56-S59.