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PREVALENCE AND ASSOCIATED FACTORS OF DENGUE INFECTION AMONG BHILAI POPULATION: A HOSPITAL BASED CROSS SECTIONAL STUDY

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Conflicts of Interest: Nil

Abstract:

Background: Epidemiologic measures of the dengue burden such as prevalence and incidence are important for policy-making and monitoring the progress of disease control. In this study, we estimated the trend of dengue incidence and hospitalization in a secondary hospital.

Objective: The age and gender specific incidence of dengue between the periods of January 2018 to December 2018 was estimated using the prevalence and associated factors in dengue infection.

Methods: This prospective observational study was carried out in the hospital, over a period of 11 months from January 2018 to December 2018. The study included 1200 determinations of fever between 0-70 years age group. We collected epidemiological data (age and gender) and laboratory data from the hospital database of patients who attended outpatient clinics in the above period.

Results: This study demonstrated female predominance with 45:55 i.e. male: female ratio, overall above findings revealed Dengue positivity was highest in 0-9 year age group i.e. 34.95% and lowest in 60 year and above age group i.e. 5.18%.

Conclusion: The age-specific incidence of dengue decreased steadily with decreasing by age>70 years. Sero-prevalence studies with representative samples should be conducted regularly to allow better estimation of dengue burden in India.

Keywords: Dengue infection, Aedes egypti, breakbone fever, Lethargy, NS1 antigen.

INTRODUCTION:

Dengue is the most extensively spread mosquito-borne disease; endemic in more than 100 countries. The alternative name for dengue, "breakbone fever", comes from the associated muscle and joint pains. Information about dengue disease burden, its prevalence, incidence and geographic distribution is critical in planning appropriate control measures against dengue fever. Symptoms typically begin 3-14 days after infection. This may include a high fever, headache, vomiting, muscle and joint pains, and a characteristic skin rash. Recovery generally takes two to seven days.[1,2,26] In a small proportion of cases, the disease develops into the life-threatening dengue hemorrhagic fever, resulting in bleeding, low levels of blood platelets and blood plasma leakage, or into dengue shock syndrome, where dangerously low blood pressure occurs. Dengue is the most extensively spread mosquito-borne disease, transmitted by infected mosquitoes of Aedes species. Dengue infection in humans results from four dengue virus serotypes (DEN-1, DEN-2, DEN-3, and DEN-4) of Flavi virus genus. As per the WHO 1997 classification, symptomatic dengue virus

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infection has been classified into dengue fever (DF), dengue haemorrhagic fever (DHF) and dengue shock syndrome (DSS). The revised WHO classification of 2009 categorizes dengue patients according to different levels of severity as dengue without warning signs, dengue with warning signs (abdominal pain, persistent vomiting, fluid accumulation, mucosal bleeding, lethargy, liver enlargement, and increasing haematocrit with decreasing platelets) and severe dengue. Dengue fever is endemic in more than 100 countries with most cases reported from the Americas, South-East Asia and Western Pacific regions of WHO [1]. In India, dengue is endemic in almost all states and is the leading cause of hospitalization. Dengue fever had a predominant urban distribution a few decades earlier, but is now also reported from urban as well as rural areas.[1-5,24-27]

A number of tests are available to confirm the diagnosis blood transfusion frequency 50 to 528 million per year deaths ~20,000 including detecting antibodies to the virus or its RNA.[2,6,23]

A vaccine for dengue fever has been approved and is commercially available in a number of countries.[6] Other methods of prevention are by reducing mosquito habitat and limiting exposure to bites.[4] This may be done by getting rid of or covering standing water and wearing clothing that covers much of the body.[1] Treatment of acute dengue is supportive and includes giving fluid either by mouth or intravenously for mild or moderate disease.[2] For more severe cases blood transfusion may be required. About half a million people require admission to hospital a year. Paracetamol (acetaminophen) is recommended instead of nonsteroidal anti-inflammatory drugs (NSAIDs) for fever reduction and pain relief in dengue due to an increased risk of bleeding from NSAID use. Apart from eliminating the mosquitoes, work is ongoing for medication targeted directly at the virus. It is classified as a neglected tropical disease.[1,2,4,9,10,16]

Signs and symptoms: Typically, people infected with dengue virus are asymptomatic (80%) or have only mild symptoms such as an uncomplicated fever. Others have more severe illness (5%), and in a small proportion it is life-threatening. The incubation period (time between exposure and onset of symptoms) ranges from 3 to 14 days, but most often it is 4 to 7 days.[13,19-21]

Clinical course of dengue fever: Travelers returning from endemic areas are unlikely to have dengue if fever or other symptoms start more than 14 days after arriving home. Children often experience symptoms similar to those of the common cold and gastroenteritis (vomiting and diarrhea) and have a greater risk of severe complications, though initial symptoms are generally mild but include high fever.[11,14,22,23]

Clinical course: The characteristic symptoms of dengue are sudden-onset fever, headache (typically located behind the eyes), joint and muscular pain and a rash. The course of infection is divided into three phases: febrile, critical and recovery. The febrile phase involves high fever, potentially over 40°C (104 °F), and is associated with generalized pain and a headache; this usually lasts two to seven days. Nausea and vomiting may also occur. A rash occurs in 50–80% of those with symptoms in the first or second day of symptoms as flushed skin, or later in the course of illness (days 4-7 days), as a measles-like rash. A rash described as "islands of white in a sea of red" has also been observed. Some petechiae (small red spots that do not disappear when the skin is pressed, which are caused by broken capillaries) can appear at this point, as may some mild bleeding from the mucous membranes of the mouth and nose. The fever itself is classically biphasic or saddleback in nature, breaking and then returning for one or two days.[13,18,23-27]

In some people, the disease proceeds to a critical phase as fever resolves. During this period, there is leakage of plasma from the blood vessels, typically lasting one to two days.

This may result in fluid accumulation in the chest and abdominal cavity as well as depletion of fluid from the circulation and decreased blood supply to vital organs. There may also be organ dysfunction and severe bleeding, typically from the gastrointestinal tract. Shock (dengue shock syndrome) and hemorrhage (dengue hemorrhagic fever) occur in less than 5% of all cases of dengue; however those who have previously been infected with other serotypes of dengue virus ("secondary infection") are at an increased risk. This critical phase is more common in children and young adults.[8,9,20,23]

The recovery phase occurs next, with resorption of the leaked fluid into the bloodstream. This usually lasts two to three days. The improvement is often striking, and can be accompanied with severe itching and a slow heart rate. Another rash may occur with either a maculopapular or a vasculitic appearance, which is followed by peeling of the skin. During this stage, a fluid overload state may occur; if it affects the brain, it may cause a reduced level of consciousness or seizures, fatigue may last for weeks in adults. Dengue can be life-threatening in people with chronic diseases such as diabetes and asthma.[11,23,31]

A challenge in estimating the incidence of dengue is that a significant proportion of infected people are asymptomatic and these cases are not captured by passive surveillance system. As a result, symptomatic or treated cases, or cases notified to the national surveillance system underestimate disease incidence. A method to overcome this challenge is to use mathematical models that relate observed prevalence and mortality to incidence. In this study, we estimated the trend of dengue incidence in Bhilai city, Chhattisgarh; based on routine OPD data from the Department of General Medicine.

MATERIAL AND METHODS

This Prospective observational study was carried out in the Department of Medicine, Sri Shankaracharya Institute of Medical Sciences, Bhilai, Chhattisgarh, over a period of 11 months from January 2018 to December 2018. An ethical clearance was obtained from the institutional committee prior the study. The study included 800 determinations of fever between 0-70 years age group. We collected epidemiological data (age and gender) and laboratory data from the hospital database of patients who attended outpatient clinics in the above period.

1200 patients were categorized into eight age groups as 0-2 years, 2-9 years, 10-19 years, 20-29 years, 30-39 years, 40-49 years, 50-59 years and 60 years above. All clinical and laboratory findings tabulated according to age group and gender wise. Prevalence dengue positivity by prevalence of sign and symptoms as well as laboratory findings was evaluated by percentage.

RESULTS

Out of 1200 patients complaining of fever in the age group of 0-70 years and above visiting in general medicine OPD of a private medical college and hospital in Bhilai city, were studied.

Patients were divided into 0-2, 2-9, 10-19, 20-29, 30-39, 40-49, 50-59 and 60 years above age groups.

Among 487 adult males, 139 (44.98%) and among 713 adult females, 170 (55.02%) were found to be suffering from dengue infection.

Table 1 showed demographic distribution of clinical and laboratory findings. Out of 1200 patients, 456 females had generalized pain and 570 female patients had restlessness. 33 Male patients had lowest worsening abdominal pain.

Clinical findings: Fever was observed highest in 439 patients of 0-9 years and lowest 66 in 60< age group. Nausea- vomiting was highest i.e. in 145 patients of 2-9 year age group, lowest (33) in 60<year age group. Rash were observed highest (178) 10-19 yr lowest (12) 50-59 year age group. Generalized pain was highest (211) in 2-9 age group and lowest (43)

in 50-59 year group. Lethargy or restlessness was highest (399) in 2-19 age group and lowest (34) 50-59 age group. Liver enlargement was highest (76) 10-19 year and lowest (5) in 60 above age group. Mucosal bleeding was highest (57) in 10-19 year group and lowest (13) in 50 and above age group. Worsening abdominal pain was highest (78) in 10-19 year and lowest (6) in 50-59 year age group.

Laboratory findings: Low WBC count was found to be highest (168) in 10-19 year age group and lowest (45) in 50-59 year group. High haematocrit + low platelet count was seen in maximum dengue positive cases highest (69) in 0-2 year and lowest (43) in 40 years and above age group. NS1 Antigen was found to be highest (63) in 10-19yrear and lowest (43) in 60 above age group. IgM and IgG antibodies were found in almost all the patients, IgM was highest (68) in 2-9 year and lowest (10) in 60 above age group. IgG antibodies were highest (61) in 2-9 years and lowest (11) in 60 and above age group.

Table 2 showed Frequencies of dengue fever according to age group and gender.

This study demonstrated female predominance with 45:55 male: female ratio, overall above findings revealed Dengue positivity was highest in 0-9 year age group i.e. 34.95% and lowest in 60 year and above age group i.e. 5.18%.

DISCUSSION

The characteristic symptoms of dengue are sudden-onset fever, headache (typically located behind the eyes), muscle and joint pains, and a rash. The alternative name for dengue, "breakbone fever", comes from the associated muscle and joint pains. The course of infection is divided into three phases: febrile, critical and recovery.[13,18,25,28]

This study was conducted to reveal the prevalence of dengue infection in said period. Clinical and laboratory findings were studied. Rash, Generalized pain, Lethargy or restlessness, Liver enlargement, Mucosal bleeding, Worsening abdominal pain found to be common in all age groups. Above findings were similar to the study conducted by Herrera et al (2010),[15] Kakkar et al[4] in 2012 and Chakravarti et al[5] in 2012.

Other studies found different results which were conducted by Fischer et al[6] in 2010 and Pfeffer et al 2009.[7]

Laboratory findings like Low WBC count, high haematocrit ratio and depleted platelets, NS1 Antigen, IgM and IgG antibodies were found to be highest in 0-9 year age group and incidence minimized with increasing age i.e. 60 and above age.

Above findings were similar to the study conducted by Fischer et al[6] in 2010 and Pfeffer et al[7] 2009.

Prevalence of NS1 Antigen was seen in all dengue positive patients followed by IgM antibodies, lowest incidence seen in IgG antibodies.

Above findings were similar to the study conducted by Herrera et al (2010),[4] Kakkar et al in 2012 and Chakravarti et al[5] in 2012.

Other studies like were not found same results in the studies conducted by Fischer et al[6] in 2010 and Pfeffer et al[7] 2009.

NS1 Antigen and IgM antibodies were confirmative tests. This study demonstrated female predominance, male to female ratio like 45:55, Dengue positive patients were highest in 0-9 year i.e. 24% and Lowest in 60 and above age group.

Other studies like were in accordance with same results conducted by Randolph et al[8] in 2010, Indartha et al[9] in 1998 and Goncalives et al in 1997.[10]

Other studies like Anguiar et al[11] in 2015, Beebe et al[12] in 2009 and Angel et al[13] were not found same results in the studies.

Table 1: demographic distribution of clinical and laboratory findings.

Clinical and laboratory findings	Age in years								Gender	
	0-2	2-9	10-19	20-29	30-39	40-49	50-59	60<	Male	Female
Fever	157	282	214	186	111	90	94	66	487	713
Nausea and vomiting	67	145	108	78	56	34	52	33	193	380
Rash	34	78	178	52	48	41	12	23	143	323
Generalized pain	64	89	211	149	57	54	43	34	245	456
Lethargy or restlessness	116	200	199	175	63	61	34	54	332	570
Liver enlargement	57	65	76	34	43	24	21	5	145	180
Mucosal bleeding	23	36	57	23	34	19	13	32	61	176
Worsening abdominal pain	45	67	78	39	55	21	6	6	33	284
Low WBC count	56	56	168	54	65	59	45	56	101	286
High haematocrit + low platelets	69	59	50	64	48	37	41	34	112	290
NS1 Antigen	45	63	42	41	37	28	35	15	139	170
IgM	51	68	52	38	35	21	31	10	156	170
IgG	48	61	57	35	32	23	28	11	139	170

Table 2: Dermographic Frequencies of dengue fever.

Dermographic	Group	Frequency (n= 1200)			
		Dengue positive (n=309)	%	Dengue negative (n=891)	%
Age in years	0-2	45	14.56	112	12.57
	2-9	63	20.39	219	24.58
	10-19	52	16.82	162	18.18
	20-29	38	12.30	148	16.61
	30-39	32	10.35	79	8.87
	40-49	28	9.07	62	6.96
	50-59	35	11.33	59	6.62
	60<	16	5.18	50	5.61
Gender	Male	139	44.98	348	39.05
	Female	170	55.02	543	60.95

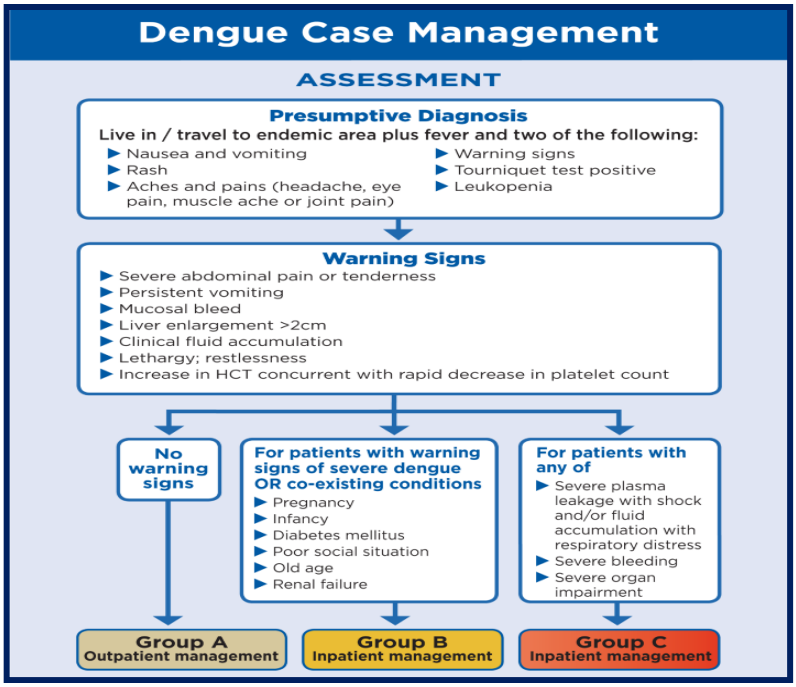

Figure 1: clinical features and management of dengue fever.

CONCLUSION

This study demonstrated female predominance with 45:55 male: female ratio, overall above findings revealed Dengue positivity was highest in 0-9 year age group i.e. 34.95% and lowest in 60 year and above age group i.e. 5.18%. In addition, this study also demonstrated the need for national surveillance programme; dengue incidence can be estimated with the use of IPM model.

A well designed seroprevalence study with representative samples should be conducted regularly in order to give better estimates of the dengue burden in India. This information is useful in monitoring the progress of national dengue epidemics and guiding future dengue control and prevention program.

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