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Research Article

CHANGING TRENDS OF THE SERO-PREVALENCE OF DENGUE IN LUDHIANA, PUNJAB OVER THE LAST 12 YEARS

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ABSTRACT
Dengue with its severe complications has become a growing global health issue over the last decade, enveloping hitherto untouched areas of the world. In view of the increasing prevalence of dengue being reported from different parts of our country, a study was undertaken to ascertain the seroprevalence of dengue as reported from our tertiary care hospital over the last 12 years. Serum samples obtained from febrile patients was tested for the prevalence of Dengue IgM antibodies by the PanBio Dengue IgM Capture Elisa and the prevalence over the last twelve years was retrospectively analysed. The highest positivity rate was seen in the year 2005 with a rate of 77.51 % followed by the year 2013 where the positivity rate was 48.54 %.The highest number of samples was however obtained in the year 2011 where 1953 suspected febrile cases were tested for dengue antibodies of which 38.81% tested positive. The overall prevalence over the last twelve years was found to be 37%. A post monsoon seasonal predilection was also observed with maximum cases being obtained in the month of October. Dengue as a disease is spreading its tentacles all over the world with increasing prevalence being reported from all over the world with a seasonal predilection during the post monsoon months.

Keywords: *Dengue, Seroprevalence*

INTRODUCTION
Dengue has become a disease to be reckoned with in the last decade with increasing prevalence being reported from different parts of the world, including non-endemic areas. A number of factors have been implicated for this innocuous rise in prevalence of this viral disease such as the human population growth, increased travel and inefficient vector control, unplanned urbanization as well as increased movement of people Wilder-Smith and Gubler (2008). Also, the vector mosquito *Aedes aegyptii* is thought to be more widely dispersed now placing the human population at a higher risk of infection with one or more of the four dengue viruses Halstead (2008).

Another factor that has been studied more recently is the temperature related increase in seasonal transmission of dengue. Studies have also examined the potential added risk of transmission of dengue posed by global warming using computer based simulator analysis linking temperature output with dengue vectorial capacity Patz *et al.,* (1998).

Since this disease has become a permanent factor to be considered as a differential diagnosis in cases of Pyrexia of Unknown Origin in this part of the country post monsoon as well as posing to become a yearly epidemic threat, it was considered worthwhile to study the seroprevalence of dengue as observed in our hospital and to study any seasonal predilection which can be observed during the last decade.

Aim: To study the seroprevalence of dengue from 2002 to 2013 as observed in our hospital.

MATERIALS AND METHODS
Study Design: Retrospective observational study

The prevalence of Dengue was estimated by studying the presence of Dengue IgM antibodies in the sera of suspected patients by the PanBio Dengue IgM Capture Elisa (Inverness medical Innovations Australia Pty Ltd). This test has a sensitivity and specificity of 94.7% and 100% respectively with chances of cross-reactivity reported with rheumatoid factor and West Nile virus. Samples received during the study period

were tabulated to assess yearly prevalence and positivity rate and month wise assessment was also done to look for any monthly predeliction of the disease.

RESULTS

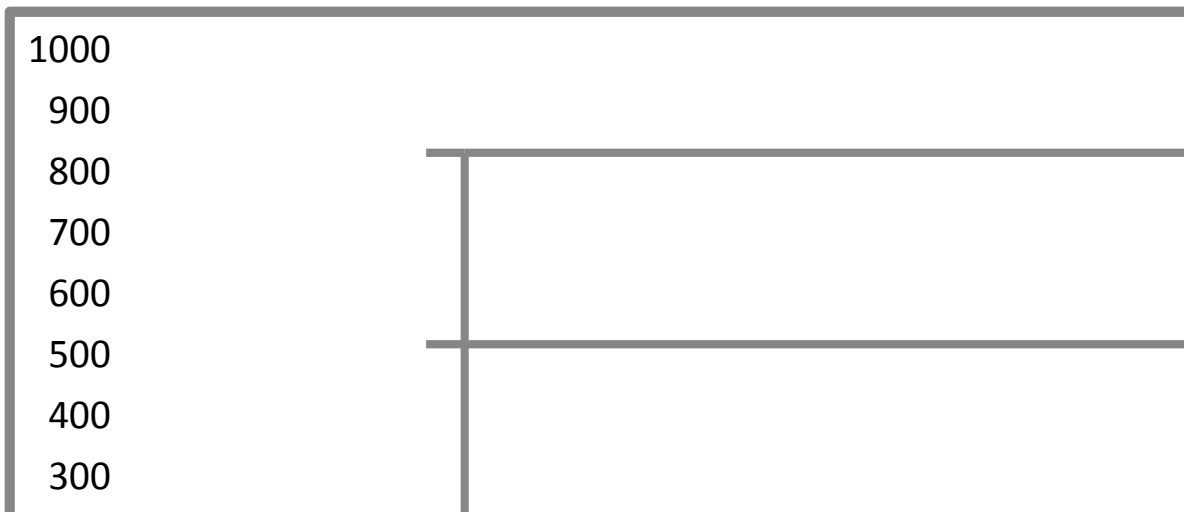
Seroconversion of IgM or IgG antibodies is the standard for serologically confirming a dengue infection as facilities that allow viral culture and detection of viral genome may not always be available. The number of samples tested for dengue antibodies and positivity rate obtained during each year in the last decade is depicted in Table 1.

Table 1: Seroprevalence of dengue over the last twelve years

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total samples tested	103	858	38	129	1060	17	1691	110	1512	1953	542	653
Positive samples	28	302	5	100	145	6	734	38	706	758	91	317
Positive percentage	27.18	35.19	13.15	77.51	13.67	35.29	43.4	34.54	46.69	38.81	16.78	48.54

The highest number of samples for suspected dengue was obtained in the year 2011 and the highest positive percentage was seen in the year 2005 though the number of samples received during this year was quite less. The average prevalence from the year 2008 to 2013 has been 40.92% with the highest prevalence being recorded in the year 2013 where 317 out of 653 samples tested positive for Dengue IgM antibodies.

The prevalence trend of dengue in Ludhiana over the last twelve years as shown from the statistics from suspected cases during that time period in our hospital shows an average of 37.27 % over the last twelve years. Seasonal predilection is also demonstrated in Graph 1 with most cases appearing post monsoon and peaking during the month of October when temperature is favourable for the propogation of the vector.



Graph 1: Month-Wise Distribution of Suspected Dengue Cases

DISCUSSION

Dengue is the most important arthropod-borne viral disease of public health significance. The global prevalence of dengue has grown dramatically in recent years with more than 50 million new infections being projected annually Chakravarti *et al.,* (2012). This flavi virus is divided into four serotypes and is

found in large areas of the tropics and sub-tropics and can cause a spectrum of clinical manifestations ranging from inapparent to fatal hemmorhagic disease. Classic dengue or break bone fever is characterized by the sudden onset of fever, intense headache, myalgias, arthralgia and rash. Dengue Hemorrhagic Fever and Dengue Shock Syndrome are severe complications often associated with a second serotype infection and studies have proven that several of these syndromes are conditioned by both age and immunological status Sierra *et al.,* (2007).

The prevalence rate of 37.27% is slightly higher than other studies which have shown a prevalence of around 30.15% in Delhi during 2002 to 2008 and a prevalence of 31.3% from a study in Central India Chakravarti *et al.,* (2012); Ukey *et al.,* (2010). Till the year 2009 the prevalence showed a resurgence once every few years. The highest prevalence percentage during this time was actually in 2005 but ironically the number of samples tested during this period was comparatively low and hence cannot be deemed significant. Following a dip in the number of samples in 2009, there was a resurgence of cases in 2010 and 2011 with a comparatively high positive percentage. Also from year 2007 positive percentage has also averaged around 35.92% following which a dip in numbers was seen in the year 2012.

According to these prevalence trends, dengue has transformed into more of an endemic disease smouldering in this part of the country rearing its head every year when the climatic conditions favour the spread of the vector and assumes epidemic proportions once every few years. Epidemiological studies have also indicated the continuous circulation of all four serotypes in the national capital with a new serotype replacing the previous one regularly resulting in epidemics Chakravarti *et al.,* (2012). Over the last 30 years or so, the dengue virus has also spread its tentacles over large parts of the world and is now circulating in Asia, Africa and the Americas Sierra *et al.,* (2007).

Since this is an arthropod borne disease, vector-control should be the main stay of action for prevention of this disease but measures taken are often found to be ineffective, insufficient or both. In the absence of an effective vaccine for dengue fever, the prevention and control of the disease depends mainly upon the epidemiological surveillance and implementation of effective vector control measures which should include use of larvicides and adulticide space sprays along with environmental management methods TDR/WHO (2009).

With only supportive treatment being available for the management of dengue and the known fact that complications such as Dengue Hemorrhagic fever and Dengue Shock syndrome are more common in secondary infections, endemic locations may thus be at a higher risk of secondary complications if transmission intensity increases Patz *et al.,* (1998), Sierra *et al.,* (2007). Hence it is imperative that a multi-pronged approach should be urgently initiated with due stress laid on virological and serological studies of dengue outbreaks as well as appropriate epidemiological studies undertaken in order to control the high morbidity and mortality associated with this potentially deadly disease.

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