



IJCRR

Section: Healthcare

Sci. Journal Impact

Factor: 6.1 (2018)

ICV: 90.90 (2018)



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Lifestyle Characteristics and Knowledge About Dengue Among Patients Hospitalised with Dengue Fever

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ABSTRACT

Background: Dengue has an alarming impact on both human health and the global and national economies.

Objective: To identify environmental conditions fostering mosquito breeding and awareness about dengue among the patients admitted to hospital with dengue fever.

Methods: Study was conducted during January and May, Five hospitals (3 -government and 2-private) were included. Patients diagnosed with DF without any complication and admitted to medical wards were included. 48 patients (16 children and 32 adults) were the study population. Standardized interview schedules were used to collect their demographic details and Socio-economic status (SES) was also assessed.

Results: Percentage of Male patients was higher among both children and adults. 70.8 and 18.6% of patients belonged to middle and high SES. Awareness about dengue symptoms was poor, Mosquito as the vector was known. A higher percentage of participants was unaware of mosquito breeding grounds. Patients from Middle and High SES had wider access to information importantly the print media, newspaper (26.5 and 33.3% Middle and High SES) and book (2.9 and 22.2% Middle and High SES). Lighting and ventilation of the house, drainage, water storage inside the house and breeding places around the house had statistically significant ($P < 0.05$) association to SES. Repellents were used by all. A window screen was used by high (44.4) and middle SES (17.6). Nearly 60% of patients from low and middle SES did not use any measure to prevent mosquito bite.

Conclusion: Intensive information programs related to causes, symptoms, seriousness of the disease and preventive measures should be telecasted for the benefit of the common man.

Key Words: Awareness, Dengue infection, environmental surroundings, Prevention, Socioeconomic status

INTRODUCTION

Dengue is caused by a virus of Flaviviridae family, there are four distinct, but closely related, serotypes of the virus identified as DENV-1, DENV-2, DENV-3 and DENV-4.¹ Dengue has been reported to be a re-emerging infectious disease that has widespread occurrence in more than 100 countries.² WHO reported a 15 fold increase in the number of dengue cases over the last two decades, from 505,430 cases in 2000 to over 2,400,138 in 2010 and 3,312,040 in 2015. The death rate increased from 960 to more than 4032 during the years 2000 to 2015, most cases occurring in children.^{1,3,4} Southeast Asia region (82/262) reported the largest number of outbreaks, followed by the Western Pacific region (72/262) and the American region (65/262), recording more

than 83.6% of outbreaks overall.⁵ Comparison of outbreaks according to countries worldwide from 1990 to 2015⁶ indicates highest numbers of the outbreak occurred (58/262) in India, followed by China (38/262) and Brazil (24/262). In 2019 globally largest number of dengue cases were reported, and for the first time, dengue transmission was recorded in Afghanistan.¹ Impact of Dengue on both human health and the global and national economies is alarming.⁷

Dengue infection is an important public health concern because of its epidemiological patterns associated with the four serotypes of the virus. DENV co-circulate within a region and many countries are hyper-endemic for all four serotypes. Infection can occur with a single strain while co-occurrence with two strains is also common. Infection with DENV2

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ISSN: 2231-2196 (Print)

ISSN: 0975-5241 (Online)

Received: 27.07.2020

Revised: 17.09.2020

Accepted: 03.11.2020

Published: 07.12.2020

or with a heterogeneous serotype DENV leads to increased case fatality rates in an epidemic.^{6,7} India has reported all four serotypes (DENV 1, 2, 3 and 4) of dengue virus since 1956 from various parts of the country.^{7,8} Also, subsequent infections (secondary infection) by other serotypes increase the risk of developing severe dengue.^{1,9,10} Lifelong immunity against that serotype is attained once the patient recovers from the infection. However, the chance of cross-immunity to other serotypes after recovery is only partial and brief. The new DENV serotype is bound with cross-reactive and non-neutralizing antibodies from the primary infection and facilitates virus entry into susceptible cells. This phenomenon is known as an antibody-dependent enhancement of infection (ADE), considered as the most rational explanation for severe dengue.¹¹

It is well established that DENV are transmitted predominantly by the mosquito vector, *Aedes aegypti* and *Aedes albopictus*.⁶ *Aedes aegypti* is a domestic species of the tropical and subtropical world, particularly in urban areas. They feed preferentially on human blood during the daytime and often multiple times during a single gonotrophic cycle, and are highly susceptible to dengue virus infection.⁷ It typically breeds in clean stagnant water in artificial containers and is, therefore, well adapted to urban life.¹⁰

Results of meta-analyses indicate, male gender and living with uncovered water container were significantly associated with dengue infection. The relatively low socioeconomic status and high population density are the ideal environment for the maintenance of mosquitoes and facilitate the transmission of DENV.^{5,11,12} Since there is no specific treatment for dengue and vaccines are still in its way for development, prevention and control of the vectors is the primary measure to reduce incidences. The current study was envisaged to identify environmental conditions fostering mosquito breeding and awareness about dengue among the patients admitted to hospital with dengue fever.

MATERIALS AND METHODS

This investigation was a part of the in-depth study carried out during months January to May. The prospective patients were identified at the time of their admission to the hospital after being diagnosed for dengue fever (DF). A total of five hospitals (3 -government and 2-private) from Mysore city- a major city from south India were included for the study. The primary purpose of the selection of subjects was to include only those diagnosed with DF without any complication and admitted to medical wards. Hence subjects included had the following symptoms: fever and general aches and pain (myalgia, headache, Retro-orbital pain), stomach problems like abdomen pain, loose motion, nausea. They were positive to IgG, IgM, NS I and platelet count more than 20,000/Cu.

mm, age 1-85yrs also those who agreed to participate in the study. Exclusion criteria included were: Age > 85 years, pregnant and lactating women, patients with DHF or any other complications. The study was approved by IHEC, University of Mysore. Forty-eight patients participated in the study, among them 16 were children (<17years) and 32 were adults.

Subjective information about the patients was obtained from the patients and their attendants (children). Previously standardized interview questionnaires were used to obtain information relating to age, gender, religion, education; employment status (in case of children, employment of parents was considered); area of living, household and surrounding characteristics especially pointing to favouring mosquito breeding. Socioeconomic status was assessed based on the following information elicited: monthly income, house ownership and size, house locality, type and number of vehicles possessed as well as education. Each variable was scored one, the sum of scores was distributed accordingly: <5 as low socio-economic status (LSES), 6-8 as middle Socioeconomic status (MSES) and >9 as high socioeconomic status (HSES). Further, awareness about dengue infection, source of information, its symptoms, cause /vector as well as practices employed to prevent mosquito bite were also obtained from the patients and their attendants (children).

RESULTS AND DISCUSSION

Subjective information of the participants is presented in table1; a total of 48 patients admitted to the medical wards of the selected hospitals formed the study population. There were 16 patients were below age 17 years and 32 were adults. Gender wise distribution of the participants indicated the predominance of male gender among both children and adults; however, the differences did not indicate statistical significance. The pattern of male predominance has been reported from other workers, they considered the higher prevalence to be due either to greater exposure of males to dengue-carrying mosquitoes or poor healthcare-seeking behaviour of males.^{13,14}

Majority of the participants belonged to Hindu religion (95.8%), except for 18.8% children all other participants both children and adults were literates. A higher percentage (46.9) of adult patients was graduates and 9.4% were postgraduates. Less than fifty per cent of adults were employed. Higher per cent of the participants were in middle SES (70.8) followed by high SES (18.6). Only 8.3% of the participants were from rural areas, hence the majority were from either urban or semi-urban localities. Reason for the lower percentage of participants from rural localities cannot be explained because care was exercised to include government hospitals (three hospitals). However,

according to WHO report, dengue is found in tropical and subtropical climates worldwide, mostly in urban and semi-urban areas¹. A markedly higher percentage of the participants practised mixed type of diet.

The present study was conducted during the five months commencing from January to end of May. Table 2 provides the details about the number of patients diagnosed with DF and admitted to hospital during the months of investigation. Availability of dengue patients was lean during January, while increased slowly by February and maximum subjects were admitted to hospitals in May. Literature provides sufficient information suggesting that dengue infection follow a seasonal pattern, with peak occurs at September and October.^{13,15} Murekhar M et al.¹³, reported positive cases ranged from 7.7 to 37.0% annually during 2014–2017 in India, and coincide with rainy and post-rainy seasons.¹⁵

We also investigated the time taken by the patients to reach out for treatment in the hospitals. It is evident from table 3 that none of the patients attended hospitals early. Majority of the patients both adults and children attended hospital between 2-5 days, while 19 and 28% children and adult patients respectively were admitted after 6 to 19 days of infection. Although dengue infection does not have any specific treatment, timely fluid replacement prevents the development of the severe condition and is reported to be lifesaving measure.^{16,17} Hence, public awareness about the importance of reaching out for medical support early is utmost crucial.

It is generally recognised that dengue can be managed effectively by community participation through creating knowledge about symptoms, causes and preventive measures. Dengue transmission at present can be prevented by vector control alone as this communicable disease cannot be prevented by vaccine.^{7,18} Knowledge related to dengue among the adult patients and attendants of children patients is presented in tables 4 to 6. Majority of the participants were unaware of dengue symptoms, while mosquito as the vector for the disease was known. Surprisingly, a higher percentage of participants was not aware of mosquito breeding grounds. Location of the residences exhibited a statistically significant association to this information at a 5% level. Participants from urban regions had a better understanding as compared to those from semi-urban or rural regions.

Source for information about dengue as mentioned by the participants is compared by socioeconomic status. It is evident from table 5 that friends, doctors and television formed the major source for information, among participants from the three socio-economic status (SES) groups. Participants from middle and high socioeconomic status appeared to have wider access to information importantly the print media such as newspaper (26.5 and 33.3% Middle and High SES) and book (2.9 and 22.2% Middle and High SES). A small per cent of the participants (8.8 and 11.1% Middle and High

SES) mentioned radio broadcasting as media for information.

Certain topographical features of house surroundings and within households have been considered as a major risk for dengue. Accordingly 'House indices' have been developed for a quick appraisal of regions endemic to dengue.¹⁹ Water clogging, increased numbers of water storage containers and improper solid waste management is reported as the major concerns for dengue.²⁰ However, additional hidden habitats for mosquito breeding such as refrigerators and other unexpected rain-dependent materials which accumulate in and around human dwellings are equally important.⁷

Topographical characteristics of the household of the participants are presented in Table 6 indicate that certain features are associated with socioeconomic status. Importantly the lighting and ventilation of the house, drainage, water storage inside the house and breeding places around the house had statistically significant association to socio-economic status. The high socioeconomic status group enjoyed better environment compared to those belonging to middle and low socioeconomic status. However, the frequency of occurrence of dengue was essentially similar.

The literature emphasises frequently the importance to adopt measures to reduce densities of dengue vectors and prevent mosquito bites. A perusal of Table 7 suggests the common methods adopted by the participants to prevent mosquito bites. Use of repellents was the most common among patients belonging to the three socio-economic status. A window screen was used by a considerable per cent of patients with high (44.4) and middle socio-economic status^{16,17}, while, bed net was used by the only high socioeconomic status group. Yet the markedly higher percentage of patients from low and middle socio-economic status did not use any measure for mosquito bite prevention. Studies have reported the effectiveness of using window curtains and domestic water container covers treated with insecticide to potentially reduce dengue transmission.²¹ Limitation of this study is the small population; the reason being the seasonality of the occurrence.

CONCLUSION

Our study has provided notable information regarding knowledge about dengue among the general population is less satisfactory, thereby practices to prevent mosquito menace are poor. The effective media for communication appears to be television, intensive education programs should be provided covering detailed information about characteristics about the vector and their control, symptoms of dengue fever and its severe forms, the importance of availing immediate medical help as well as effective measure to prevent mosquito bite.

ACKNOWLEDGEMENTS

The authors are grateful to all the patients and their attenders nurses who participated in this study. The authors also thank the hospital authorities for their cooperation.

Financial support and sponsorship: Nil

Conflicts of interest: There are no conflicts of interest.

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Table 1: General characteristic of the patients

Variables		N	%
	Age		
Children(<17)		16	33.3
Adults(>18)		32	66.6
	Gender		
Children	Male	9	56.3
	Female	7	43.8
Adults	Male	21	65.6
	Female	11	34.4

Chi sq. - 0.4; P > 0.5270 NS

Table 1: (Continued)

Variables		N	%
Religion			
Hindu		46	95.8
Muslim		1	2.1
Christian		1	2.1
Education			
Children	No- School	3	18.8
	Pre Schooler	3	18.8
	School going	10	62.4
Adults	SSLC	5	15.6
	PUC	9	28.1
	UG	15	46.9
	PG	3	9.4
Occupation			
(Adults)	Employed	15	46.9
	Unemployed	17	53.1
Socioeconomic status			
Low(<5)		5	10.4
Middle(6-8)		34	70.8
High(9-10)		9	18.6
Residential location			
Urban		27	56.3
Semi urban		17	35.4
Rural		4	8.3
Diet type			
Mixed diet		40	83.4
Vegetarian		8	16.6

Table 2: Month wise distribution of patients available from hospitals

Month of survey	Availability of patient	
	No. of Patients	%
January	2	4.2
February	8	16.6
March	11	23.0
April	13	27.1
May	14	29.2

Table 3: Onset of symptoms before admission to hospital

Patients	N	No of days (%)	
		2-5	6-19
Children	16	81.0	19.0
Adults	32	72.0	28.0

Chi.sq: Yates correction- 1.7 NS at P<0.05

Table 4: Participant’s awareness about dengue infection based on spatial distribution of residences (N=32)

Awareness about dengue infection	Location						Chi sq P<0.001
	Rural		Semi urban		Urban		
	Yes	No	Yes	No	Yes	No	
DF symptoms	0	100	35.3	64.7	55.5	44.4	70.54
Mosquitoes- cause	50.0	50.0	70.6	29.4	85.2	14.8	28.847
Breeding grounds	0	100	35.3	64.7	77.8	22.2	126.4

Table 5: Source of information relating to dengue according to SES

Source of information about dengue infection	Income groups- Socio Economic Status		
	Low-SES	Middle-SES	High-SES
N	5	34	9
Friends	60.0	41.2	55.5
Doctor	20.0	55.9	88.8
Television	40.0	64.7	88.8
Radio	-	8.8	11.1
Newspapers	-	26.5	33.3
Books	-	2.9	22.2

Table 6: Factors favouring mosquito breeding in and around households-comparison between socioeconomic status of the patient participants

Variables	Socio economic status (%)						Chi- sq. P<0.05
	Low (N=5)		Middle (N= 34)		High (N=9)		
	Yes	No	Yes	No	Yes	No	
Natural light entering the house	80.0	20.0	65.0	35.0	100	-	36.122
Good drainage system	40.0	60.0	88.0	12.0	78.0	22.0	59.615
Water clogging inside / surroundings	20.0	80.0	18.0	82.0	11.0	89.0	3.268 NS
Stored water containers	80.0	20.0	18.0	82.0	22.0	78.0	100.333
Mosquito breeding places	100.0	-	47.0	53.0	33.0	67.0	109.185
Incidences of dengue fever in the neighbourhood	20.0	80.0	12.0	88.0	22.0	78.0	0.779 NS

Table 7: Methods to prevent mosquitoes employed by care taker belonging to different SES

Income group SES	No.	Methods employed to prevent mosquito bite			
		Repellents	Window screens	Bed nets	None
Low	5	40.0	-	-	60.0
Middle	34	23.5	17.6	-	58.9
High	9	100.0	44.4	44.4	-