AN EPIDEMIOLOGICAL SURVEY ABOUT THE INFECTIONS CAUSED BY DENGUE IN THE PERSPECTIVE OF HEMATOLOGICAL, CLINICAL AND DEMOGRAPHIC RISK FACTORS

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Abstract:

Objective: *Our research determines the patients in terms of their clinical, demographic and hematological factors of dengue infection risk specifically in the rural communities of lower classes in 2016-17 outbreaks in Karachi.*

Methods: *We conducted research for the data collection of clinical and epidemiological nature for the infection of dengue in the less privileged communities. The outcomes of Dengue fever, Dengue Shock syndrome and Dengue hemorrhagic fever were verified through IgM and IgG anti bodies detected through Enzyme-linked immunosorbent assays (ELISAs) method which was based on the WHO criterion. A total of 350 patients were selected through random cluster sampling method. Research was continued after ethical approval and consent of the participants. SPSS-21 was used for the data analysis. Chi-Square was applied for the categorical variables determinations.*

Results: *In the total research sample 105 participants (30%) were rural affected cases, dengue fever was observed in 58 participants (16.6%), 30 patients (8.6%) were observed with dengue hemorrhagic fever and remaining 17 participants (4.9%) suffered from dengue shock syndrome. In the course of treatment 12 participants died, every case presented the manifestations of cutaneous and fever. Significance presence was observed in the severe pain, married and educated cases with a p-value of (0.001).*

Conclusion: *Thirty percent cases of dengue infection were noticed in the survey while visiting the endemic areas. Associated factors of risk were severe pain, five-year education, unmarried and female cases. Patients also presented febrile illness with clinical features and hematological observations about the dengue fever.*

Keywords: *Dengue fever, Clinical Pattern, Dengue Hemorrhagic Fever, Epidemiology, Community and Surveillance.*

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INTRODUCTION:

Dengue infection is becoming global healthcare issue of the present time. Epidemiological research studies present an irregular epidemic outbreak and four viruses desynchronized dynamics of serotype [1]. Dengue is a risk for the fort percent of the global population (WHO) [2]. According to Beatty, dengue fever threats as major issue in the sub-tropical and tropical areas [3]. The main responsible of this outbreak is *Aedes aegytpi* and in the Pakistani outbreaks responsibility goes to the four serotypes of dengue [4]. Dengue virus spectrum in the human ranges from mild to severe such as unapparent to febrile considered fatal [5]. Diagnosed cases were presented dengue fever and severe features of dengue fever, dengue hemorrhagic fever & dengue shock syndrome [6]. According to Young HM, vector mosquito *Aedes aegytpi* is affected by humidity and temperature in the various seasons. In the worldwide scenario specially in the under developed countries hot climate is responsible for the dengue spread such as arbo virus of dengue mosquito. Various research studies also show the dengue infections common in the children (13.45%), specifically in the low resource countries like Pakistan and India [7]. Our research determines the patients in terms of their clinical, demographic and hematological factors of dengue infection risk specifically in the rural communities of lower classes in 2016-17 outbreaks in Karachi.

PATIENTS AND METHODS:

Our research was active survey for the determination of patients in terms of their clinical, demographic and hematological factors of dengue infection risk specifically in the rural communities of lower classes in the 2016-17 outbreaks in Karachi (Gadap). The outcomes of Dengue fever, Dengue Shock syndrome and Dengue hemorrhagic fever were verified through IgM and IgG anti bodies detected through Enzyme-linked immunosorbent assays (ELISAs) method which was based on the WHO criterion. A total of 350 patients were selected through random cluster sampling method. We included febrile illness cases of varying duration with 2 or more features such as retro orbital pain, headache, arthralgia, petechia/rashes, hemorrhagic features & leucopenia. In the densely populated area dengue incidence was observed as (72%) [8]. The significance and confidence of the research sample was respectively 5 and 95 percent with study power as 80%. Approval and institution and consent of the participant was taken before the commencement of the research. Blood samples were taken in the duration of 2 – 15 days for the identification of febrile illness in the

participants including clinical features of muscular pain, headache, rashes and joint pain. Positive dengue was taken as immune globulin IgM (40 units) or IG g 100. RNA extracting for Reverse Transcriptase Polymerase chain reaction was also carried out in few of the cases. The cases of DHF/DSS were managed at tertiary healthcare facility. There were 105 seropositive cases analyzed in the specialized units for the dengue infection. We also analyzed clinical, demographic & hematological data for the determination of the risk factors related to the dengue seropositive infections. Data entry and analysis was made on SPSS-21. Age, height, weight and per month income of the patients was shown in mean and SD and frequency, percentage was shown for the educational level, ethnicity and gender. Qualitative variables were compared through Chi-Square test; educational level and age stratification was done through stratification.

RESULTS:

In the total sample population 105 cases (30%) presented dengue infections in rural setting, 58 cases (16.6%) were of DF, 30 cases (8.6%) were of DHF & remaining 17 cases (4.9%) presented DS. Table-I shows systematic analysis about the symptoms. Day four and five samples reflected low isolation, serology and illness. Therefore, serological diagnosis time of IgG and IgM in our research was important for an in-time diagnosis. DF diagnosis in community relies on the early DF diagnosis for the reduction of the mortality rate. It is recommended that early diagnosis is very important as 12 cases were dead in the course of research. Every dengue infection presented cutaneous and fever. DM cases of female were 25.7% in the total strength of 54% percent and few other features have been reflected in Table-II. Less number of patients were observed in the married male group as 91 cases (44.8%) among positive IgM cases in comparison to the 112 females (52.2%) married cases. Higher incidence of male married cases was observed as 105 cases (41.7%) when compared to the female unmarried 16 cases (18.6%) at p-value as (< 0.0001). Major manifestations were febrile illness, severe headache, thrombocytopenia, rash, vomiting, nausea, rigors and chills. Related clinical observations also noticed the incidences of 59% myalgia, 68.8% headache, 45% bleeding, 45% pharyngitis, 25.8% retro orbital pain, 46.8% headaches, 76.7% vomiting and 39.5% abdominal pain. In the positive dengue cases we observed 9% hepatosplenomegaly, 18% Splenomegaly and 8% lymphadenopathy. Mean hemoglobin was observed as (11.23 ± 2.5) mg, mean TLC was observed as (4.12 ± 2.35), mean platelets count during hospital

admission was (41.69 ± 35.65), when treatment began mean platelets count was (2.66 ± 4.44) and after recovery mean platelets were (119.25 ± 551.4). No previous history was observed in 178 cases (35.6%) about febrile illnesses. Febrile illness was observed with antimalarial drugs treatment in the dengue infection diagnosed cases. Significant risk factors for IgM positive were observed in 112 female cases (52.2%) with a p-value of (< 0.001) in comparison to the 91 male cases (44.8%). Significant educational level was observed in 91 cases (44.8%) those completed five-year education at their credit. Severe pain was observed in 108 cases (53.2%) at a p-value of (< 0.001) (Table-III). IgM association with illness duration in the sample population is also shown in the Figure-I.

DISCUSSION:

The population of the research was living in congested areas with limited water supply and poor sanitation, which makes the water storage mandatory. Urbanization was the major reason behind the incidence of dengue infection and subsequent vector control activities. Our research observed major manifestations were febrile illness, severe headache, thrombocytopenia, rash, vomiting, nausea, rigors and chills. Related clinical observations also noticed the incidences of 59% myalgia, 68.8% headache, 45% bleeding, 45% pharyngitis, 25.8% retro orbital pain, 46.8% headaches, 76.7% vomiting and 39.5% abdominal pain and febrile illness in 97.7% cases. Secondary dengue infection also presented higher IgG levels [16], secondary response of serology was observed in nine percent patients. DHF/DSS cases presented higher incidence of mortality as 35 cases (10%) which required close observation of the patients. Immediate DHF and late DSS complications were related with the mortality rate [17]. An early diagnosis of the serology was possible because of the support of the local government.

Table 1. Types of samples and intervals since onset of symptoms in the study population

S No	Type of sample	Interval since onset of symptoms
1	Acute - phase	sample Taken on or *before day 5 after onset of symptom
2	Convulse scent - phase	G or more days after beginning after symptoms

**Table 2. Demographic Characteristics of Dengue infections in Patients of Gadap Town, Karachi**

S No	Demographic Characteristics	Number	Percentage
Age (Years) Mean ±SD	42.74±14.9		
Gender	Male	161	46
	Female	189	54
Ethnicity	Balochi	63	18
	Sindhi	140	40
	Urdu	21	60
	Pathan	126	36
	Others	63	18
Income Per Month	6000	187	53.4
	6001 - 10000	82	23.4
	10001 - 20000	58	16.6
	20001 - 300000	23	6.6
Occupation	Employed	203	58
	House wives	147	42

Educational level	No	63	18
	5 - Years	140	40
	8 - Years	56	16
	14 - Years	35	10
	16 - Years	56	16
Socioeconomic status	Upper Middle	115	32.86
	Lower middle	89	25.43
	Poor	90	25.71
	Very Poor	56	16
Comorbidities	Cardiovascular diseases	29	8.3
	Tuberculosis	27	7.7
	Hypertension	135	38.6
	Diabetes	90	25.7
	No comorbidity	69	19.7
IgM Antibodies	Positive	105	30
	Negative	184	52.6
	Equivocal	61	17.4

Demographic Characteristics
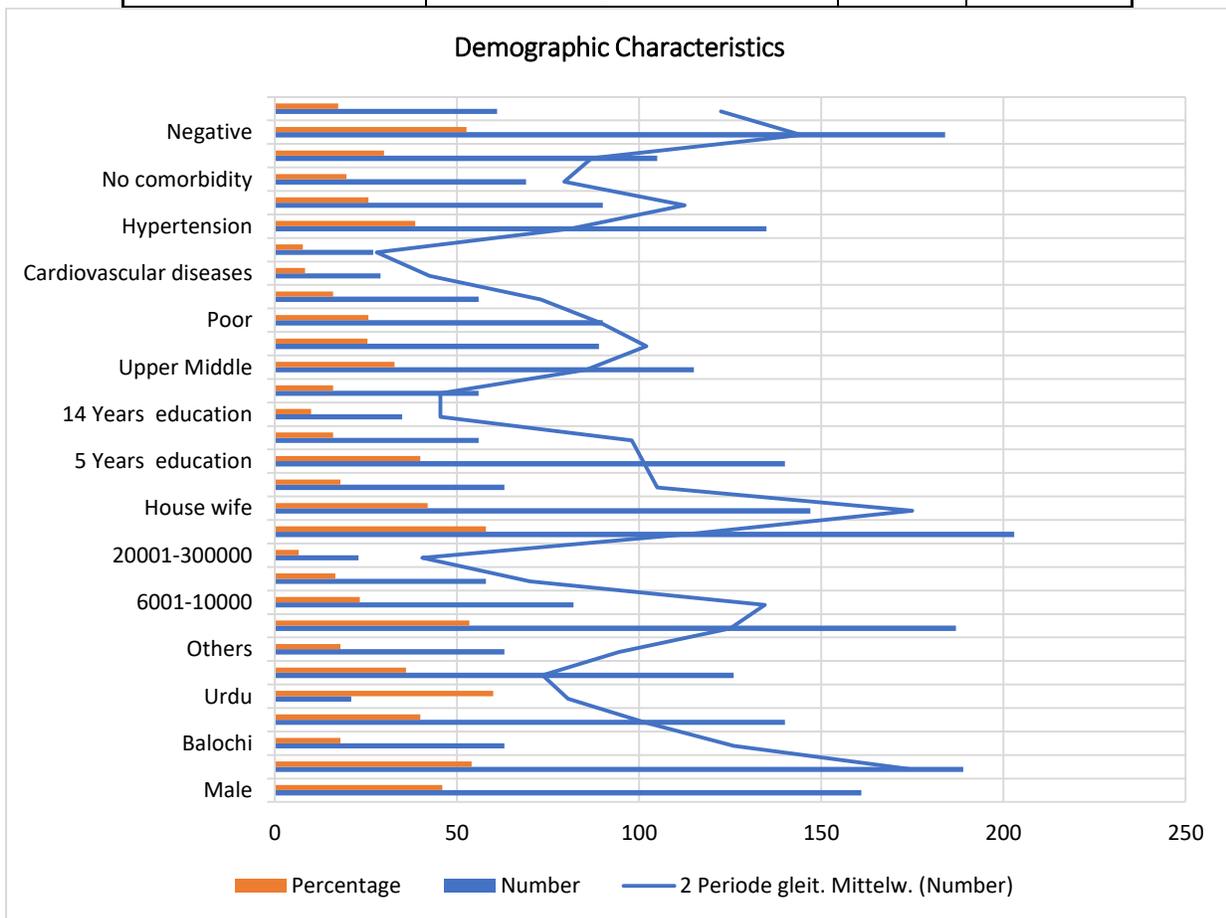
Table 3. Association of IgM reports and dengue infections in Gadap Town, Karachi

Characteristics	Detail	IgM Levels Number=350						p-value
		Positive		Negative		Equivocal		
		N	%	N	%	N	%	
Gender	Male	91	44.8	70	81.4	0	0	<.0001*
	Female	112	52.2	16	18.6	61	100	
Marital status	Married	91	44.8	70	81.4	0	0	<.0001*
	Unmarried	105	41.7	16	18.6	39	63.9	
	Widow/Divorced	7	3.4	0	0	22	36.1	
Educational level	No	28	13.8	21	24.4	14	23	<.0001*
	5 Years	91	44.8	28	32.6	21	34.4	
	8 Years	14	6.9	21	24.4	21	24.4	
	14 Years	28	13.8	7	8	0	0	
	16 Years	42	20.7	9	10.5	5	8.2	
Pain	Mild	95	95	33	38.4	0	0	<.0001*
	Moderate	0	0	53	61.6	61	100	
	Severe	108	53.2	0	0	0	0	
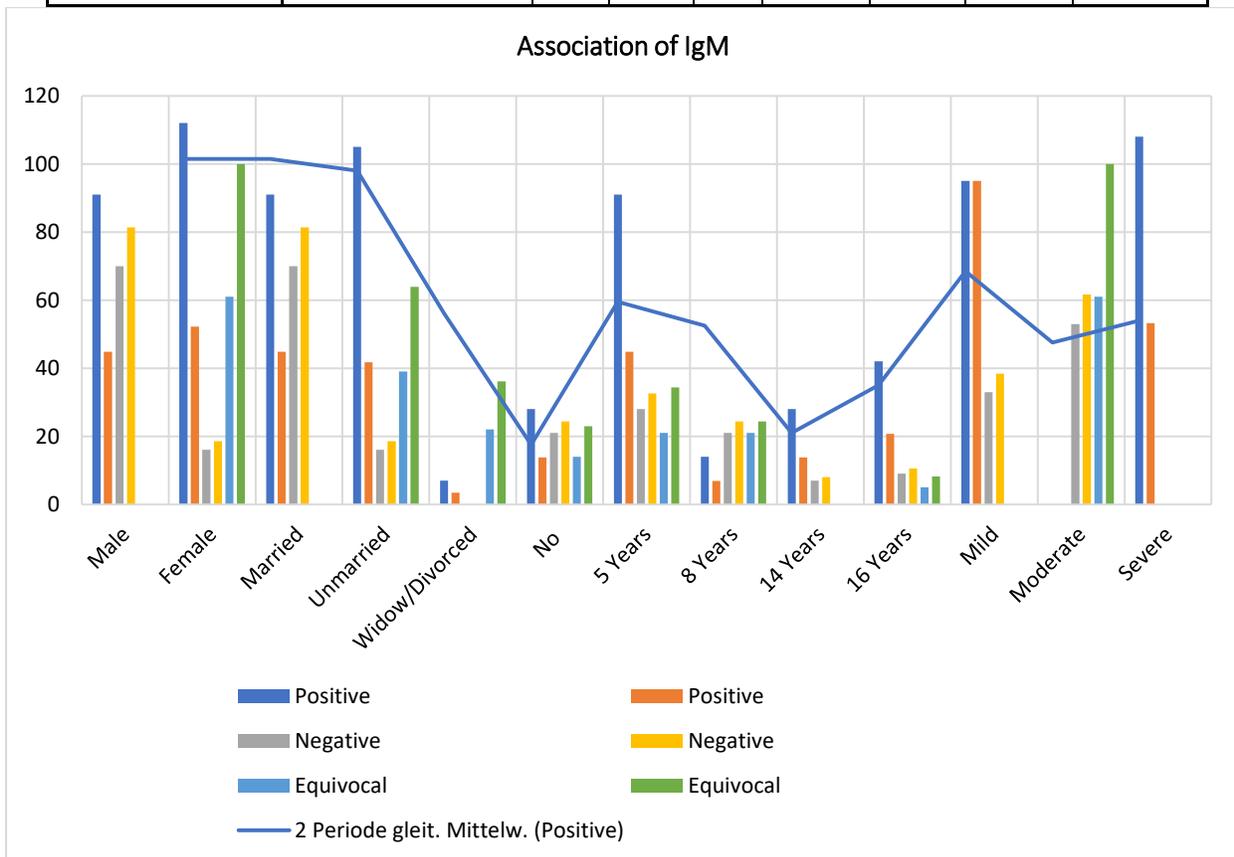
As dengue is affecting sub-tropical and tropical regions so it targeted semi-urban and urban Karachi [10]. Dengue is at increase in the global perspective. Every year increase as estimated by WHO is 50 – 100 million over the world and further distribution is as; 250,000 – 500,000 DHF and every year death rate as 24,000. Pakistan faces special dengue pattern in the low resource urban population for the DF, DSS and DHF clinical investigations. One week is required for the sample processing, three days are required for the PCR approximation. Our research observed major manifestations were febrile illness, severe headache, thrombocytopenia, rash, vomiting, nausea, rigors and chills in the incidence of dengue infection [11]. First sample for the laboratory diagnosis was taken in the acute period of disease and second after the symptoms onset at 6th day. ELISA method confirmed dengue infection which was observed thirty percent. There was significant relation of five-year education, severe pain, females and unmarried in the target community. A holistic approach is required for the *Aedes aegytpi* eradication in the Karachi. Vaccination is required as other strategies have been failed, vaccine is to treat four serotypes so it needs to be tetravalent. Dengue prevention may also be sustained through communication and mobilization to control and prevent dengue infection [12].

CONCLUSION:

In the total research sample 105 participants (30%) were rural affected cases, dengue fever was observed in 58 participants (16.6%), 30 patients (8.6%) were observed with dengue hemorrhagic fever and remaining 17 participants (4.9%) suffered from dengue shock syndrome. In the course of treatment 12 participants died, every case presented the manifestations of cutaneous and fever. Significance presence was observed in the severe pain, married and educated cases with a p-value of (0.001). Thirty percent cases of dengue infection were noticed in the survey while visiting the endemic areas. Associated factors of risk were severe pain, five-year education, unmarried and female cases. Patients also presented febrile illness with clinical features and hematological observations about the dengue fever.

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