



# Epidemiological study of dengue fever in District Swabi, Khyber Pakhtunkhwa, Pakistan

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## Abstract

Dengue is a viral disease which is serious health concern from last few decades and the infection transmitted through mosquito bite into human. This study was conducted to carry out prevalence of dengue fever in District Swabi. A total of 196 blood sample were collected from patients with age ranges (0-80 years) having dengue fever on the basis of physical symptoms from Bacha Khan Medical Complex Swabi during August to October 2017. Serological test were performed for detection of IgM, IgG and NS1 (Non structural protein antigen of virus) against dengue. Out of total 196 confirmed dengue cases the most prone gender was male 123(62%) while 73(38%) were female. Among the age groups; 21-30 years group 62 (31.6%) was found the most predominated age group. The highly affected areas in district Swabi were Topi (40.8%) followed by Main Swabi (27%), Maneri (8.2%), Marghuz (6%), Shawa Ada (5.1%), Shah Mansoor (5.1%), Gohati (4.1%), and Chota Lahore (3.6%). Therefore, the health department should take actions by educating the public about basic cleanliness of the environment. The community should be encouraged to participate in the control of such vector based diseases/infections.

*Keywords:* dengue fever, prevalence, NS1, serological test.

## Estudo epidemiológico da dengue no distrito Swabi, Khyber Pakhtunkhwa, Paquistão

### Resumo

A dengue é uma doença viral que é um sério problema de saúde das últimas décadas e a infecção transmitida através da picada de mosquito em humanos. Este estudo foi realizado para realizar a prevalência da dengue no distrito de Swabi. Foram coletadas 196 amostras de sangue de pacientes com faixa etária (0 a 80 anos) com dengue com base nos sintomas físicos do Complexo Médico Bacha Khan de Swabi, no período de agosto a outubro de 2017. Foram realizados testes sorológicos para detecção de IgM, IgG e NS1 (antígeno proteico não estrutural do vírus) contra a dengue. Do total de 196 casos confirmados de dengue, o sexo mais propenso foi o masculino 123 (62%), enquanto 73 (38%) eram do sexo feminino. Entre as faixas etárias; A faixa etária de 21 a 30 anos 62 (31,6%) foi a faixa etária mais predominante. As áreas altamente afetadas no distrito de Swabi foram Topi (40,8%), seguidas por Main Swabi (27%), Maneri (8,2%), Marghuz (6%), Shawa Ada (5,1%), Shah Mansoor (5,1%), Gohati (4,1%) e Chota Lahore (3,6%). Portanto, o departamento de saúde deve tomar ações educando o público sobre a limpeza básica do meio ambiente. A comunidade deve ser incentivada a participar do controle de tais doenças / infecções baseadas em vetores.

*Palavras-chave:* dengue, prevalência, NS1, teste sorológico.

## 1. Introduction

Dengue is a viral disease spread through mosquito bite into human. It may be caused by any of four serotypes of dengue virus (DEN1, DEN2, DEN3, DEN4) belonging to the genus *Flavi virus* which are RNA viruses transmitted to human by *Aedes aegypti* (Munir et al., 2014; Khanani et al., 2011). Environmental changes such as climate and weather can affect the dengue virus in

which temperature is the most important climatic factor, strongly affects the survival of dengue virus. Dengue Fever appears as a febrile serious illness and presents an ample clinical condition varying from oligo-symptomatic forms to several clinical cases with bleeding and shock, which can leads to death (Ebi and Nealon, 2016; Rocha and Tauil, 2009).

The Dengue infection was spread epidemically to south, Central and North America, Africa, China and Australia in 1980, and was expected to continue in well exposed region containing *Aedes aegypti* (Monath, 1994). In the South East Asia region, the dengue cases are reported in many countries including India, Sri Lanka and Thailand (Garg et al., 2011). In the year of 2012, 44,456 cases were registered in Sri Lanka while 10,000 cases were registered in the city of Colombo (Ocwieja et al., 2014). In the year of 2000 and 2012, 5000 people were affected and 93 deaths and in year 2002 there were 6104 cases with 58 deaths were registered in Bangladesh (Rahman et al., 2002).

Dengue viral disease has caused many outbreaks in Pakistan in 1994 to 2011. In Pakistan Dengue fever first time reported in 1982 in which out of 174 patients, 12 were the affected patients (Atif et al., 2016). The symptoms of dengue fever first time seen in 1994 in Karachi, while in Khyber Pakhtunkhwa the dengue fever case was initially registered in Swat in August 2013, Dengue infection spread from one place to another through travellers. According to 2013 data, Khyber Pakhtunkhwa was on the top of dengue infected people, 3177 cases were registered (Haider and Iqbal, 2016). In Swat from August 2013 to November 2016, and 5569 patients were affected from dengue fever in which 37 patients were died (Khan et al., 2017).

During 2013 to 2015 individuals aged 16-30 year of age were the main victims of Dengue fever infection, followed by individuals between 31-45 year of age. The infection rate in males was double as compared to female, with a male to female ratio of 2:1, an observation that corresponds with previous results from studies of the Khyber Pakhtunkhwa province (Suleman et al., 2016). This epidemic disease transferred from Swat to nearby areas including the Malakand, Kohat, Mansehra districts, lower and upper Dir, Peshawar (Suleman et al., 2017) and then other districts like Mardan, Nowshera and Swabi. In Peshawar 11,685 infected people's cases were registered till to 7 November 2017 (Gubler, 1998) and 7 deaths were recorded till to 22 August according to the Dawn News. In Mardan total number of dengue patients 12 till to 25 August 2017 (Hasan Khan et al., 2013). In Nowshera 18 cases were reported till to 22 August 2017 (Shahid, 2017).

Keeping in view the current scenario of dengue fever in Khyber Pakhtunkhwa this study was conducted to find out average prevalence in different areas of Swabi and the causing factors of dengue infection.

## 2. Methods and Materials

### 2.1. Study design

Proper consent was taken before conducting this study from authorities and patients enrolled for this study, data from patients were collected through questionnaire. A total of 196 blood samples were collected from suspected dengue fever patients from Bacha Khan Medical Complex Swabi from August to October 2017, to check the prevalence of dengue fever in Swabi on the basis of serological test.

### 2.2. Identification of dengue

For Identification of Dengue virus STANDARD Q Dengue Duo test (SD Biosensor, Republic of Korea) was used, which is an immune-chromato-graphic assay for the detection of NS1 antigen and Dengue virus-specific IgM and IgG antibodies in human serum, plasma and whole blood. By detecting the NS1 antigen, not only the initial infection was detected, but also Dengue virus-specific IgM and IgG were detected at the same time. Screening test results were obtained within 15 minutes with high sensitivity and specificity. All the suspected blood samples were collected in 2 mL sterile Eppendorf tubes for the dengue identification. The entire sample tubes were carefully transferred to the centrifuge and centrifuged for 1 minute. For NS1 Antigen rapid test, 100 $\mu$ l of the test serum was put on the NS1 rapid test strip and 1 drop of NS1 buffer was added, after 15 minutes the red colour of the test line was considered as positive. For IgM, IgG Antibody test, 100 $\mu$ l of the test serum was put on IgM, IgG Antibody rapid test strip and 2 drops of IgM, IgG buffer were added, after 15 minutes the red colour of the test line was considered as positive (As per manufacturer protocol CAT No: 09DEN30A 09DEN30A)

Data analysis: Data was analysed on Microsoft excel version 2010 and data was presented in number and percentages (n %). Chi- Square ( $\chi^2$ ) and Kruskal Wallis test p-value was applied.

## 3. Results

Out of confirmed 196 dengue cases, 123 (62.8%) were male and 73 (37.2%) were female. The highly affected age group was 21-30 years, 62(31.6%) followed age group 11-20 years, 28(14.3%), 31-40 years, 27 (13.8%), 41-50 years, 26(13.3%), 51-60 years 20 (10.2%), 71-80 years, 15 (7.7%), 0-10 years and 61-70 years, 9(4.6%). The highly affected area in District Swabi was Topi 80 (40.8%) followed by Swabi 53 (27.0%), Maneri 16(8.2%), Marghuz 12(6.1%), Shawa Adda and Shah Mansoor 10 (5.1%), Gohati 8(4.1%) and Chota Lahor 7(3.6%) as shown in (Table 1)

## 4. Discussion

The data obtained in this study showed that Dengue fever in 2017 was highly prevalent in district Swabi. This study showed that the arboviral pathogen is affecting both rural and urban areas in the world (Suleman et al., 2017). The total population of district Swabi is 1,624,616 according to city population and the dengue fever affected patient ratio is 0.012%. The current study showed that the percentage of male (62.8%) is higher than female (37.2%). Similar study was conducted in district Mardan 2011, the male patient were 13 (52%) and female were 12 (48%) (Shahid, 2017). Another similar study was conducted in district Nowshera, in which affected male percentage was recorded high 16 (77%) whereas female were 5 (23%) in 2011 (TNS World, 2017; Dawn Today's Paper, 2017).

**Table 1.** Distribution of confirmed dengue virus cases Gender, Age and Area wise.

Variables	Total (n= 196)	Percentage %	Average (Mode)	p Value
Male	123	62.8	Male	0.000
Female	73	37.2		
<b>Age Group</b>				
0-10	9	4.6	Age Group (21-30)	0.000
11-20	28	14.3		
21-30	62	31.6		
31-40	27	13.8		
41-50	26	13.3		
51-60	20	10.2		
61-70	9	4.6		
71-80	15	7.7		
<b>Area</b>				
Topi	80	40.8	Topi (first) Swabi (second)	0.000
Swabi	53	27.0		
Maneri	16	8.2		
Marghuz	12	6		
Shawa Adda	10	5.1		
Shah Mansoor	10	5.1		
Gohati	8	4.1		
Chota Lahor	7	3.6		

$\chi^2$  -p Value and also kruskal wallis test p-value is same 0.000 which is highly significantly associated with each other.

Similar study was conducted in Swat in August 2013 to November 2016, 5569 patients were affected by dengue fever in which out of 5569 patients, 3834 (68.85%) were male and 1735 (31.15%) were female (WHO, 2015), which is similar to the findings of current study. Male mobility rate is higher than the female mobility rate. Because in Pakistan most of the females spend their time in homes whereas male do their jobs and travel from place to place to fulfil their needs. In the current study the highly affected age groups were 21-30 years, 62 (31.6%) and age group 11-20 years, 28 (14.3%). Similar study was conducted in the years of 2013, 2015 and 2016 where age group 16-30 years was found the most predominated age group (Suleman et al., 2017). The occurrence of dengue fever in the highly affected age group is due to the involvement of individual in activities outside their residences especially in morning and evening. In the present study, the high occurrence of dengue fever was recorded in Topi 80 (40.8%) and Swabi 53 (27.0%). In these areas, the poor sanitation system, poor water supply and drainage, inappropriate clean water storage system in living areas, improper collection and disposal of wastes contribute in the breeding of vector mosquito (WHO, 2015).

## 5. Conclusion

In this study the prevalence of dengue fever was found more in male than female. The most predominated age group was 21-30 years. Furthermore, the highly affected area in district Swabi was found Topi. Therefore, the health department should take actions by educating the public

about basic cleanliness of the environment. The community should be encouraged to participate in the control of such vector based diseases/infections.

## 6. Disclaimer

This manuscript has been prepared from BS Thesis and the abstract is accepted in International conference on Microbiology and Molecular Genetics (MMG2018) organised by University of the Punjab, Lahore Department of Microbiology and Molecular Genetics.

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