EPIDEMIOLOGICAL AND CLINICAL MANIFESTATIONS OF DENGUE IN DISTRICT PESHAWAR: A MULTI-CENTER STUDY

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Abstract *Dengue is a tropical infection caused by dengue virus. The current study aimed to characterize epidemiological, laboratory markers, and clinical features of dengue disease. For this purpose data was collected from Khyber Teaching Hospital (KTH), Hayatabad Medical Complex (HMC), and Lady Reading Hospital (LRH) Peshawar. The data on clinical symptoms of patients was collected by filling out a questionnaire. The laboratory diagnosis was noted down from the Complete Blood Count Test of patients. In the present study in all 500 patients, the percentages of fever and body pain were 100% while headache was recorded in about 87% of patients. Among the laboratory diagnosis, 51% of males and 46.43% of females were recorded with normal blood pressure. Similarly, about 59% of male and 52% of female patients were recorded with platelet count below normal. In the majority of male and female patients (94.8%) the normal red blood cell level was recorded. The hemoglobin (Hb) level in most male patients (82.7%) and females (78.5%) was recorded between 14-17.5g/dl which lies in a normal range of Hb. Out of 500, most of the patients (48%) suffered from dengue infection for 7 days. The study concluded that dengue infection does not have much influence on blood pressure, white blood cell level, red blood cell level, or hemoglobin level of patients and was recorded with their normal ranges. However, the platelet level of an individual decreases with dengue infection. Moreover, the study observed that those people who spent more time outdoors had more chances to get dengue infection.*

Introduction

Dengue is a systematic viral infection transmitted among humans by *Aedes* mosquitoes (Kolimenakis *et al.,* 2021). Dengue virus (DENV) is transmitted by two epidemic vectors: *Aedes albopictus* and *Aedes aegypti* they have distributed widely across subtropical and tropical regions and spread globally with the initiation of global phenomena like international travel, poor waste management system, sewer, inadequate water supply, high rate of population growth, and urbanization (Laporta *et al.,* 2023). *Aedes aegypti* is the most competent vector of dengue virus (Terradas *et al.,* 2024), while the Asian tiger mosquito *Aedes albopictus* is a maintenance vector as it is occasionally involved with dengue transmission in Asia (Dalpadado *et al.,* 2022). Dengue is a mosquito-borne tropical and febrile illness caused by a single-stranded positive-sense RNA virus. The virus belongs to the family Flaviviridae and the genus Flavivirus. There are five strains of dengue virus (Wang *et al.,* 2022). Among these five the first four are called DENV-1, DENV-2, DENV-3, and DENV-4 (Bello *et al.,* 2024). The fifth type was reported in 2013 (Yesmin *et al.,* 2024). These serotypes can be differentiated from one another based on their antigenicity (Prommool *et al.,* 2021).

DENV is commonly called "break-bone fever" as it causes pain in joints and muscles (Balwan *et al.,* 2022). DENV disease is asymptomatic in more than 50% of cases or can exist as a flu-like disease including myalgia, headache, and rash-like other fever diseases endemic in Africa (chikungunya and malarial fever) (Mala *et al.,* 2021). Presently, there is no cure for dengue disease. The chief method of controlling the transmission of DENV is through active surveillance and monitoring of vectors (Das *et al.* 2024). Dengue is a mosquito-borne and the fastest-spreading infectious disease and has emerged as a global public health threat (Yu and Cheng, 2022). The World Health Organization (WHO) considers dengue infection among the top ten global health issues (WHO, 2019). Dengue infection has spread over 125 countries, with an annual 400 million infections and about 40,000 deaths (WHO, 2019). Dengue is a main cause of mortality and morbidity in subtropical and tropical regions comprising over 100 countries and accounts for about 70% of the total dengue burden (WHO, 2019). About 2500 million people are at risk now for dengue, and worldwide approximately 50 million new cases occur every year (WHO, 2002). The global prevalence of dengue infectivity has risen dramatically in recent decades, mostly in Southeast Asia, the Western Pacific, and America (Yang *et al.,* 2021).

The dengue virus has been endemic for several years in Pakistan due to the temperate climate (Anwar *et al.,* 2019). Many dengue outbreaks have been documented every year since 2006 along with the circulation of multiple serotypes. The main reasons behind these outbreaks are primarily the water reservoirs for power generation, rich fauna, vast agricultural land, floods, and open irrigation channels because heavy rainfall provides very appropriate sites for the breeding of mosquitoes. The activities of mosquito vectors differ to a great extent in accord with the seasonal effect in different geographical areas of Pakistan. However, the infection incidences increase after rainy seasons (Abdulsalam *et al.,* 2021). The first dengue infection case in Pakistan was recorded in Punjab in year 1982 and ever since approximately 10 outbreaks of the infection have been reported from the country (Rehman *et al.,* 2022). In 2011 a huge epidemic of the disease was reported in Punjab and till the end of November 2011 more than 50,000 cases were reported from Lahore only (Khurram *et al.,* 2011). In 2013 another major outbreak of the disease was reported in Pakistani province Khyber Pakhtunkhwa. According to the WHO report in 2013 the approximate number of cases was 8546 including 33 deaths in Swat District (WHO, 2013). The serotypes that were prevalent causing the outbreak were serotypes 1, 2, and 3 (Bakshi *et al.,* 2021). In

another research study the cases reported in Swat were about 6000, out of which 69% of patients were male (Muhammad *et al*., 2023). Random infection cases were also reported from other provinces of Pakistan. In Punjab during the year 2013, about 2165 cases of the infection were reported by different health departments, and out of the total cases; about 50% were reported alone from Rawalpindi (Muhammad *et al*., 2023). The current study aimed to check the prevalence of dengue patients and to examine laboratory and clinical symptoms of dengue patients in the district of Peshawar, Pakistan.

Materials and method

Study area

Peshawar is the sixth largest city in Pakistan, and the largest Pashtun majority city in the country (Figure.1). It is also known as the city of flowers. In the Ancient era, the city was known as Purushpura served as the capital of the Kushan Empire under the rule of Kanishka, and was home to the Kanishka stupa (Di Giacomo, 2022). Peshawar has a total area of 1257sq.km. During 1998, the population of Peshawar was 2026851 which comprised 52.55% (1065188) males and 47.44% (961663) females. The metro area population of Peshawar in 2021 was 2,273,000, a 3.18% increase from 2020. The current metro area population of Peshawar in 2022 is 2,343,000, a 3.08% increase from 2021 (Zahir *et al.,* 2023). Peshawar is a large historic city, situated in the broad valley of Peshawar in northern Pakistan with latitude and longitude coordinates are 34.025^0N and 71.56^0E respectively. It is located in the center of the province of Khyber Pakhtunkhwa (KP), close to the border with Afghanistan, and it is known as the Gates or "City of Frontier". The city lies to the west of the Bara River, a tributary of the Kabul River, near the Khyber Pass (Irfan *et al.,* 2023). It is surrounded by mountain ranges on three sides, with the fourth opening to the Punjab plains. The city is located in the generally level base of the valley, known as the Gandhara Plains (Shahzad and Begum, 2025).

2.2 Climate

The climate of Peshawar is warm and temperate. The rainfall in Peshawar is exceptional, even the driest month of the year has some level of precipitation (Alam *et al.,* 2021). The temperature averages 22.3^0C or 72.1^0F. Precipitation ranges from 817mm to 32.2 inches per year (Shabbir *et al.,* 2020). In Peshawar, the summers are long, sweltering, and clear, while winters are cold and mostly clear (Aslam *et al.,* 2024). For the year, the temperature typically varies from 38^0F to 106^0F and is rarely below 32^0F or above 112^0F (Khan *et al.,* 2023). The hot season lasts for 4

months from May to September. The cool season lasts for 3 to 4 months from December
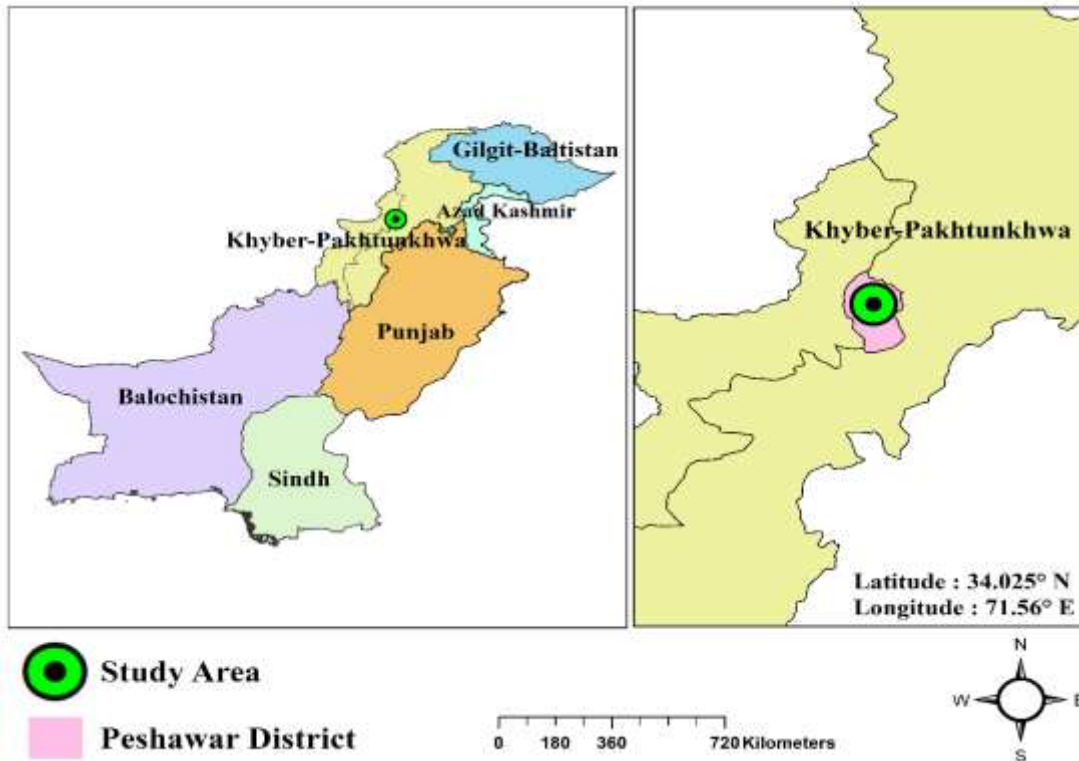
to March (Hussain *et al.,* 2024).

Figure 1. Study Area

Method of data collection and laboratory analysis

The study period of the current research was three months, from October 2021 to December 2021. The primary data was collected from dengue patients, nurses, and doctors from Khyber Teaching Hospital (KTH), Hayatabad Medical Complex (HMC), and Lady Reading Hospital (LRH) Peshawar by filling structured questionnaire. Interviews were carried out for all patients from all mentioned localities. Before conducting the survey the interviewers were trained to ensure that the questionnaires were well understood by surveyors, avoiding differences in the interpretations and definitions of the concepts used. The patients included in the current study responded to the questionnaire that covers socio-demographic characteristics such as age, gender (male and female), work, and household income which includes, low income, medium income, and high (AbuBakar *et al.,* 2025). A complete physical and history examination was performed on each patient by doctors at every outpatient site. Every doctor was provided with the same form for data collection that possessed a detailed list of symptoms and signs. The form also contained fundamental demographic data like town of residence, gender, age, and as well as day of illness onset. The information used in the current study was collected at the first visit. Using standard procedure blood samples were obtained by venipuncture from the arm. Complete blood count test (CBC tests) was performed for patients to know

and collect data on their laboratory diagnosis (Wisanuvej *et al.,* 2021).

Statistical Analysis

Infected persons with missing data on the date of illness and sex were excluded from the study. There were about 21 persons with missing information on one or more symptoms or signs and did not vary from the remaining patients for location, sex, or age, and therefore were excluded from the current study. The categorization of age was done into deciles of ≤10 years, 1-10 years, 11–20 years, 21–30 years, 31–40 years, 41–50 years, 51–60 years, and>60 years. For the graphical presentation and statistical analysis of collected data different software, such as Microsoft Excel and Statistical Package for Social Sciences (SPSS) were used. The chi-squared test was applied to study the relationship between various variables and the p-value smaller than 0.05 was considered as significant statistically.

Results

Total number of patients and prevalence

Data was collected from a total of 500 dengue patients among which 270 were male and 230 were female. The data was collected during three months October, November, and December. In October 136 male and 119 female patients were observed, in November a total of 118 male patients and 88 female patients were reported and in December total of 39 patients data was collected among which 16

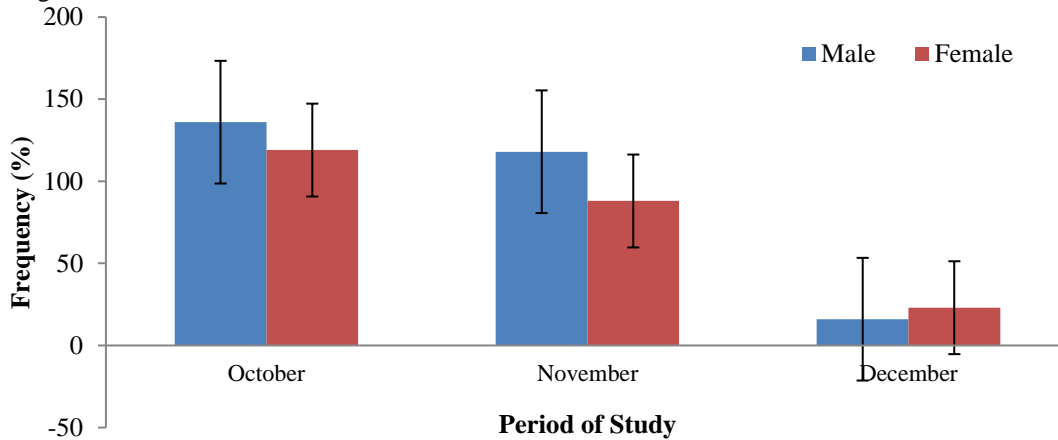were male and 23 patients were females as shown in Figure 2.

Figure 2. Frequency of patients reported in the study area

Among those 500 patients, 281 were married, and 219 patients had a joint family system. About 193 (38.6%) patients had low income, 303(60.6%) patients had medium income, and 4(2.8%) patients had high income as shown in Figure 3.
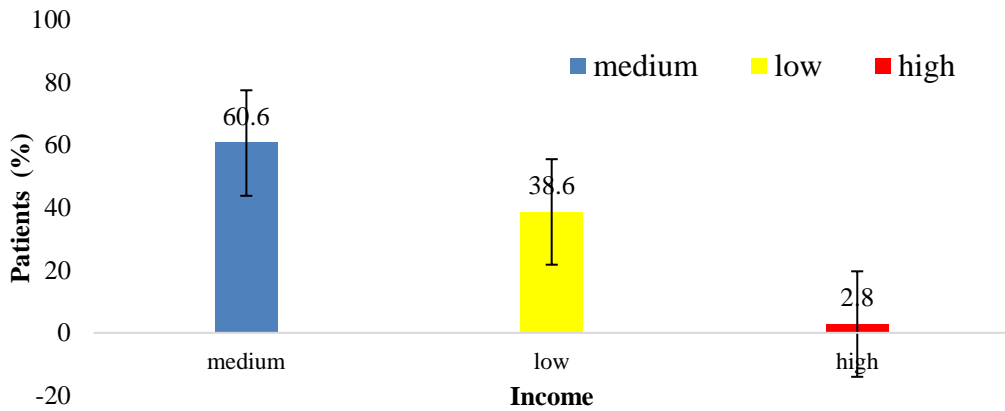
Figure 3. Patient distribution based on income

In the current study, the percentage of male patients having the age group 21-30 years had the highest percentage of infection (66.60%) followed by the age group 31-40 years (18.5%). While in females the highest percentage of infections was observed in the age group 31-40 years (47.80%), followed by the age group 41- 50 years (22.17%). The study suggested that the age range between 31-40 years has the most prominent risk for prevalence of DENV infection. While in other age groups, the percentage of infection was observed comparatively low as shown in Figure 4.
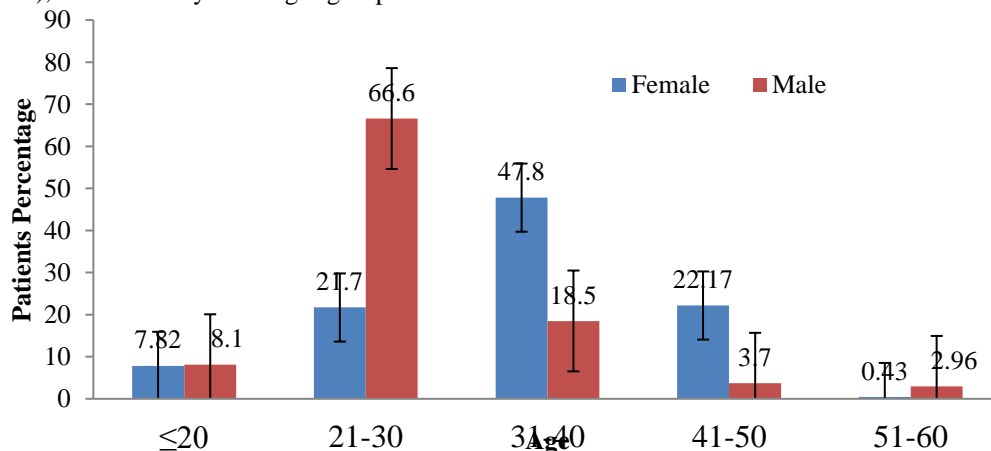
Figure 4. Age-wise distribution of dengue infection

The patients including both males and females belonged to different occupations, out of 500 patients shopkeepers were more infected (134 patients), followed by students (131patients),

and housewives (112 patients) while the rest of the patients belonging to different other occupations were comparatively less infected as shown in figure 5.
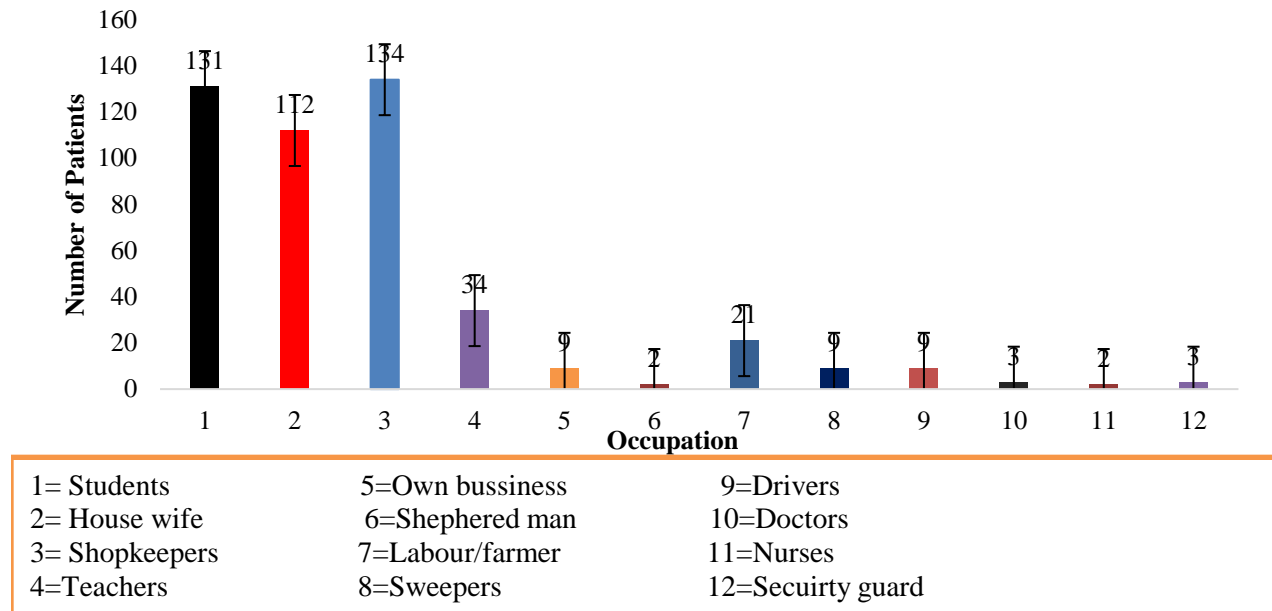

1= Students   5=Own bussiness   9=Drivers
2= House wife   6=Shephered man   10=Doctors
3= Shopkeepers   7=Labour/farmer   11=Nurses
4=Teachers   8=Sweepers   12=Secuirty guard

Figure 5. Dengue prevalence by occupation in Peshawar

Clinical manifestations of patients

Among 500 dengue patients observed, high percentage of fever, body pain, headache, vomiting and chills were observed. Comparatively the percentage of cough, throat infection, chest infection, diarrhea and sweats were low (figure.6). The different values of our results along with the average percentage of all the symptoms are given in supplementary information (Table. S1). Cough, throat infection, chest infection, diarrhea and sweating were not significant in positive cases in both females and males. The correlation of symptoms is more probable in patients with headache, body aches, fever and vomiting.
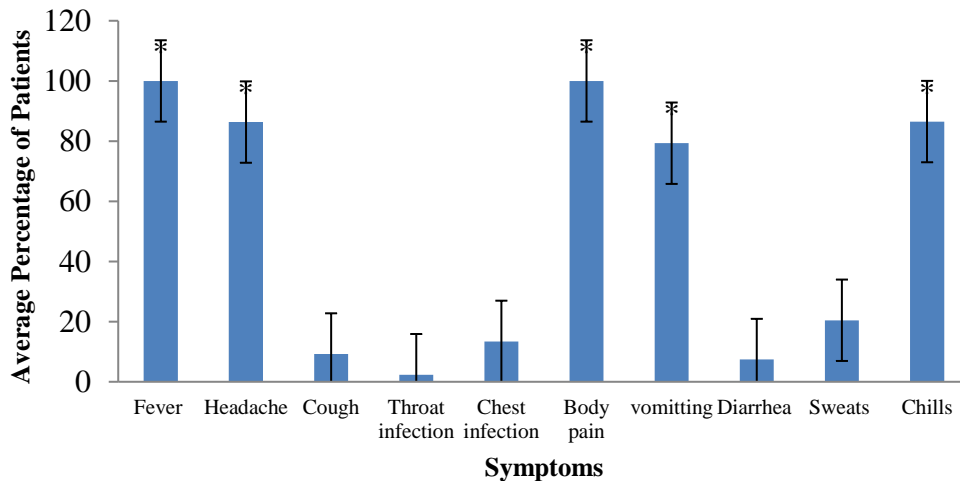

Figure. 6 The average percentage of sign and symptoms
(*; p-value=0.00)

Laboratory diagnosis of patients

In the present study, the effect of dengue infection on normal body temperature, blood pressure, red blood cell level, hemoglobin (Hb) level, white blood cell level, and platelet count were recorded. Moreover, the duration of infection was also recorded from patients. The results are obtained from the collected data of 500 patients.

Impact of Dengue on Body Temperature

In the study, the relationship of temperature with dengue infection was observed in both male and female patients. The temperature range of 102-103°F was observed in the majority of patients including both male (72.5%) and female (72.1%) patients. While 27% of males and 27.8% of females had temperatures between 100 - 101°F. Moreover, none of the patients was observed with a temperature higher than 104°F. The results for

both males and females are shown in table 1. However, further analysis of the patient's body

temperature and dengue showed a significant association (*p*=0.001).

Table. 1 Temperature impact on dengue patients

Gender		October (Male=136 and Female =136)		November (Male=118 and Female =88)		December (Male=16 and Female =23)	
Male	Temperature (°F)	No of Patients	**Per%**	No of Patients	**Per%**	No of Patients	**Per%**
	Below 100	None	0	None	0	None	0
	100 – 101	41	30	30	0.25	3	18.7
	102 – 103	96	70*	88	74.5*	13	81.2*
	104– Above	None	0	None	0	None	0
Female	Below 100	None	0	None	0	None	0
	100 - 101	32	26.8	25	28.4	7	30.4
	102 - 103	87	73.1*	63	71.5*	16	69.5*
	104– Above	None	0	None	0	None	%

(*****; p-value=0.00)

Blood pressure of patients

The effect of dengue infection on blood pressure was observed in the present study (Figure 7). For this purpose, data was collected from 500 patients including both males and females. The results obtained are given in supplementary information (Table. S2). Among the observed patients high percentage of normal blood pressure (120/80 mmHg) was observed in males (51.07%). While in females the percentage of 120/80 mmHg was (46.43%).

Patients with blood pressure below normal were comparatively less in number (males: 32.4% and females: 37.8%). Blood pressure above 120/80mmHg was seen in a very number of patients including males (17%) and females (14%). However, the results showed no significant association between blood pressure with patient frequency (*p*=0.17).
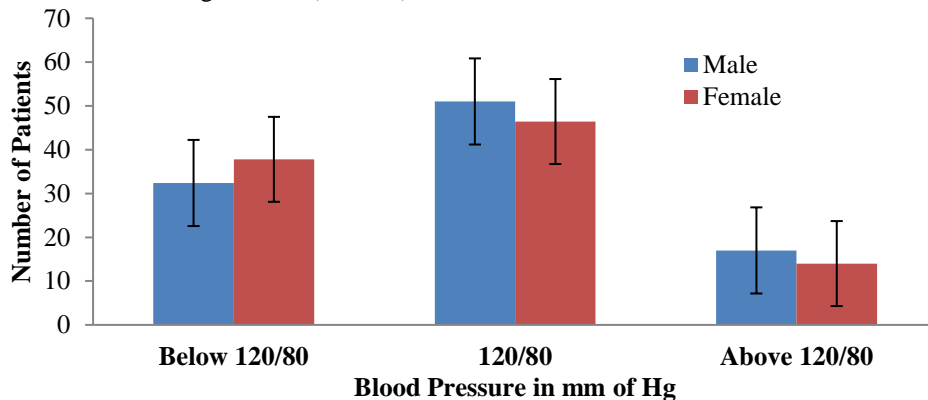

Figure 7. Effect of dengue on blood pressure of patients

Evolution of Platelets as Predictive Parameters in Dengue Infection

To find out the relation between dengue infection and platelet count the data was collected from complete blood count tests (CBC Test) of patients. In the majority of patients, the platelets count was observed below than normal range. Out of a total of 500 patients, 58.8% males and 51.7% females were observed with platelet count between 51-100

x10.e3/µl which is below than normal range (150-450 10. e3/µl). About 12.5% of males and 24.3% of females had very low platelet count i.e. between 10-50 x10.e3/µl. Approximately 15.9% of males and 15.2% of females had platelet count between 101-150 x10.e3/µl, while the rest of the patients were observed with normal platelet count (151x10.e3/µl and above). The results are shown in the tables 2.

Table 2. Effect of dengue on platelets count of patients

Gender		October (Male=136 and Female =136)		November (Male=118 and Female =88)		December (Male=16 and Female =23)	
	total patients=136	No of Patients	**%**	No of patients	**%**	No of patients	**%**
Male	10-50 x10.e3/µl	16	11.76	15	12.71	3	18.7
	51-100 x10.e3/µl	82	60.2	68	57.6	9	56.2
	100-150 x10.e3/µl	22	16.1	19	16.1	2	12.5

	151-200 x10.e3/µls	6	4.41	8	6.78	1	6.25
	201 x10.e3/µl-above	8	5.88	8	6.78	1	6.25
Female	10-50 x10.e3/µl	31	26	21	23.8	4	17
	51-100 x10.e3/µl	60	50	51	57.9	8	34.8
	101-150 x10.e3/µl	14	11.7	15	17	6	26.8
	151-200 x10.e3/µl	6	5	6	6.8	3	13
	201 x10.e3/µl -above	7	5.9	1	1.1	3	13

Red blood cell count of patients

To check the effect of dengue infection on red blood cell count the data was collected from complete blood count tests of all 500 patients based on which results were obtained which are given in the table S3 in the supplementary information file. From the results of observed dengue patients 94.8% male and 94.8% females had normal RBCs level, 3.6% males and 4.66% females had RBCs below normal while 0.73% males and 1% females had RBCs level above normal range as shown in the figure.8. However, there was no correlation between dengue and patients' red blood cell count (p = 0.095).
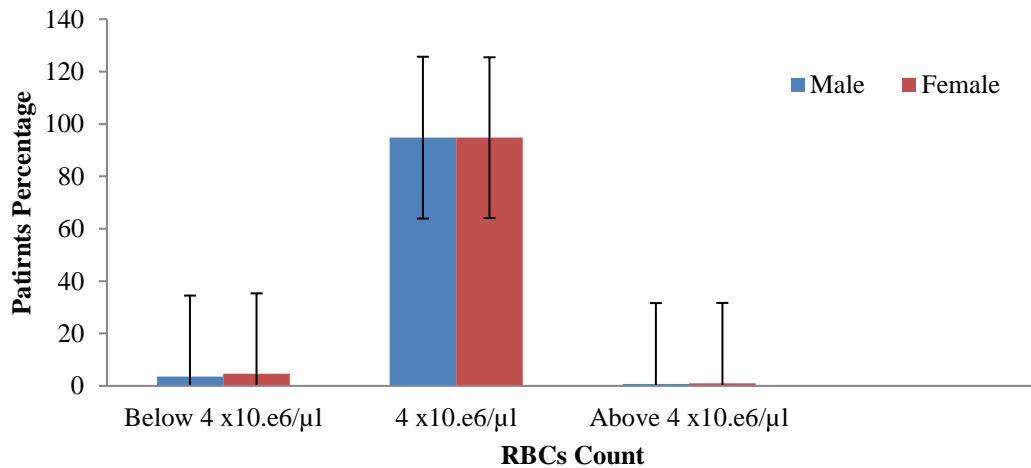

Figure. 8 Effect of dengue on RBCs count of patients

White blood cell count of patients

In this study relation of white blood cells with dengue infection was observed. For this purpose, the results were analyzed from Complete Blood Count tests of patients, the obtained results are given in table 3. From the results it was observed that the majority of patients had white blood cell levels in between the normal range (4-11x10.e3/µl). Among these 82.3% of males and 80.6% of females have WBCs level in between 4-8x10.e3/µl. About 10.93% of males and 13.83% of females had WBCs count between 8-11 x10.e3/µl. Moreover, 6.77% of male and 5.2% of female patients were observed having WBCs counts below normal while none of the patients had WBCs above normal. The results as well as the percentages are given in the tables. 3. However, there was no correlation between dengue and patients' white blood cells groups (P = 0.045).

Table 3. Effect of Dengue on WBCs count

Gender		October (Male=136 and Female =136)		November (Male=118 and Female =88)		December (Male=16 and Female =23)	
Male	total patients=136	No of patients	**%**	No of patients	**%**	No of Patients	**%**
	Below 4 x10.e3/µl	6	4.41	4	3.4	2	12.5
	4-8 x10.e3/µl	110	80.9	100	84.7	3	81.25
	9-11 x10.e3/µl	20	14.7	14	11.8	1	6.25
	12 x10.e3/µl and above	none	0.0	none	0.0	none	0.0
Female	Below 4 x10.e3/µl	3	2.5	4	4.5	2	8.7

4-8 x10.e3/µl	99	83.0	75	85.0	17	73.9
9-11 x10.e3/µl	17	14.0	9	10.2	4	17.3
12 x10.e3/µl and above	none	0.0	none	0.0	none	0.0

Hemoglobin level of patients

The effect of dengue virus infection on hemoglobin levels was observed in the present study. From the collected data of patients, results were obtained which are given in Table 4. In the majority of patients, the hemoglobin level was observed in the normal range (11.5-17.5g/dl). In 82.7% of male and 78.5% of female patients the percentage of Hb level in between 14-17.5g/dl followed by 17.2% of male and 12.67% of female patients having Hb level between 11-14g/dl. While none of the patients had Hb levels below and above the normal range. All the patients were observed with normal blood hemoglobin levels as shown in the tables. 4. However, there was no correlation between dengue and patients' hemoglobin level (P = 0.081).

Table 4. Effect of dengue on the Hemoglobin level of patients

Gender		October (Male=136 and Female =136)		November (Male=118 and Female =88)		December (Male=16 and Female =23)	
Male	total patients=136	No of patients	**%**	No of patients	**%**	No of Patients	**%**
	Below 11g/dl	None	0	none	0	none	0
	11-14g/dl	23	16.9	19	16.0	3	18.7
	15-17.5g/dl	113	83.0	99	83.9	13	81.2
	above 17.5g/dl	None	0.0	none	0.0	None	0.0
Female	Below 11g/dl	None	0.0	none	0.0	None	0.0
	11-14gS/dl	16	13.4	14	15.9	2	8.69

Distribution of Dengue Patients According to Different Duration

Out of 500 patients, 48% (240 patients) suffered from dengue for 7 days, 26.4% (132 patients) suffered for 9 days, 16% (80 patients) suffered for 5 days and the rest 9.6% (48 patients) suffered from dengue for 14 days as shown in Figure 9.
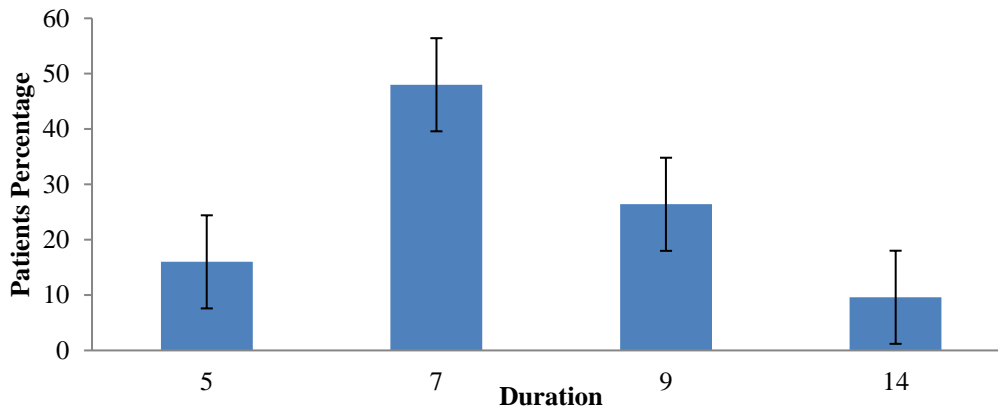

Figure 9. Distribution of dengue patients according to different durations

Hospital management and precautions for dengue patients

To check and observe the hospitals preparations regarding dengue outbreaks, the data is collected from hospital staff including doctors, nurses, technicians, and TMOs through a questionnaire to learn about hospital management and precautionary measures for dengue patients. The data was collected from Hayatabad Medical Complex (HMC), Khyber Teaching Hospital (KTH), and Lady Reading Hospital (LRH). From a total of 30 persons including males and females data was collected. According to the results obtained from this data collected from the medical staff of KTH, LRH, and HMC Peshawar, the majority of the staff members admitted that in dengue patient wards nets are used which are sprayed with mosquito killers. They admitted that the staff use gloves while treating the patients to prevent transmission to healthy people and rotation of duty of doctors, nurses, and TMOs occurs in different wards. Moreover, according to the majority of medical staff members of hospitals, there are special doctors for patient care and the hospitals are well equipped for patient care. Their answers (with percentage) to the respective questions are given in the table. S4 in the supplementary information file. The

results obtained show that hospitals were prepared for the dengue epidemic.

Distribution of Dengue Infection in Different Union Council of KPK

During this study data was collected from 500 patients who belong to different areas of Peshawar. According to this study, the highest percentage of infection was reported from union council, UC-35(18%), followed by UC-40(16%) and UC-41(16%). From UC-10 (10%)

of dengue patients were reported. Similarly, from other union councils, different number of dengue cases was reported such as UC-81(10%), UC-80(8%), UC-59(7%), UC-60(6%), and UC-10(5%). From the rest of the union councils cases of dengue were reported as shown in the figure. 10. These results obtained show that the prevalence of dengue cases was higher in UC-35, followed by UC-40 and UC-41.
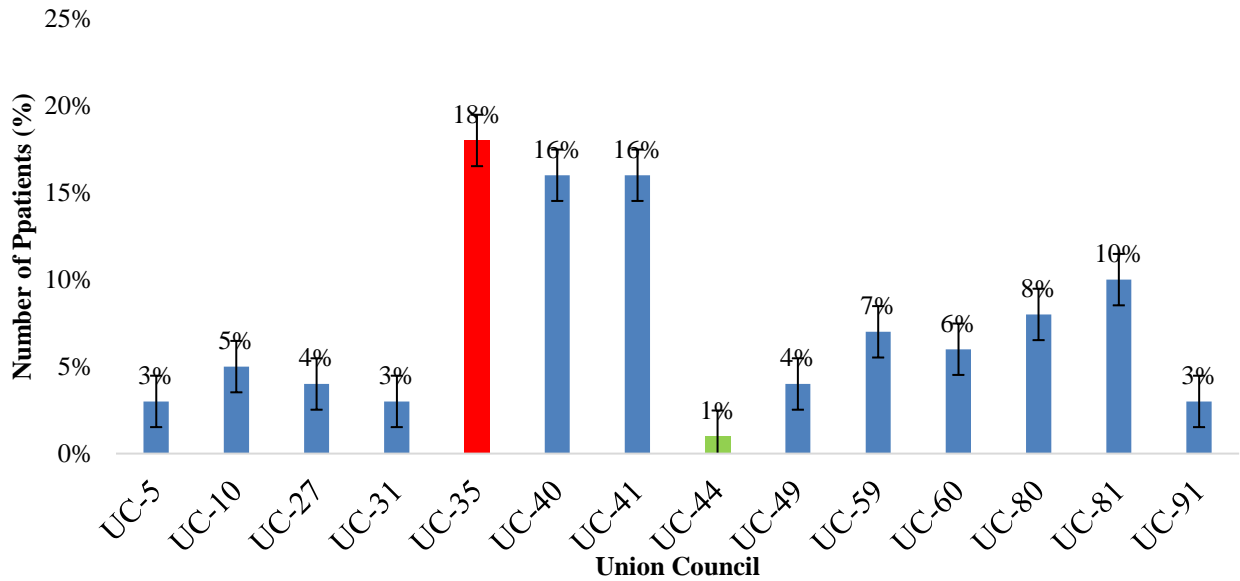

Figure 10. Distribution of dengue infection in different Union Council of KPK

Discussion

In the present study, data was collected from a total of 500 patients including 270 males and 230 females. It was carried out in 2021 in October, November and December. The patients belong to different occupations. Their clinical symptoms and laboratory diagnosis were observed. The relation between dengue infection and laboratory diagnosis such as platelets count, red blood cell level, hemoglobin level, blood pressure, and white blood cell level were observed. In this study, it is observed that the majority of the patients are shopkeepers (134 patients) followed by students (134 patients) which showed that people who spend more time outdoors are more peon to dengue as compared to those individuals who spend most of their time indoors this result is supported by the study conducted by Khan *et al. (*2023). The majority of patients (240 patients) had an infection duration of 7 days followed by 9 days (132 patients) while out of 500 patients, 48 patients were recorded with 14 days infection duration.

In 2013 different regions of Khyber Pakhtunkhwa (KPK) faced permanent epidemics of dengue fever and the cases of death were also recorded. There were three possible reasons for the greater number of

dengue cases reported from Peshawar. First Peshawar is the capital of KPK province; hence there are two governmental tertiary hospitals and a medical complex. The major health facilities are also available in this city. Second, in 2017, a dengue outbreak was reported from Peshawar; hence the larger population was affected. Third, some remote areas, especially the Northern and Southern hilly areas, may be underreported for dengue. On the other hand, our current study investigated the prevalence of dengue in Peshawar in October, November, and December. The clinical symptoms and laboratory diagnosis of patients were also observed. The data was collected from KTH, HMC, and LRH Peshawar. In this study out of 500 patients, the infection rate was higher in males (54%) than in females (46%). The highest infection rate was found in the age group 20-35 years followed by the age group 35-50 years while the patients of the age group above 60 were less affected. These results are in correlation with Prattay *et al.* (2022). In this regard, it has been concluded that adults aged 16-30 years old in KPK are in a danger zone for dengue and the risk may depend on the time spent outside (Khan *et al.,* 2023).

Moreover, some investigations performed in Singapore showed that the majority of infected

patients were male (Ong *et al.,* 2022). Simultaneously in the present study, the infection rate was found higher in males (54%) than in females (46%). The same results in six Asian countries regarding the dengue infection rate in males and females were recorded by Anker and Arima (2011), and (Ong *et al.,* 2016). One study from KPK revealed that male to female ratio of dengue cases was 2:1 (Rehman *et al.,* 2022). Similarly, in the study, the majority of patients were male (72.81%) and females (27.18%) were less infected. Maximum patients were in the age group 21-40 years (Kumar *et al.,* 2024). The comparative study documented by Tiwari *et al.* (2024, who also mentioned the same consequences of dengue infection relative to male-female patients (greater than 15 years older). The collected data and the results described in this study are compatible with those already documented in the literature (Khan *et al.,* 2022; Qureshi *et al.,* 2023; Raza *et al.,* 2014; Prattay *et al.,* 2022; Chakravarti *et al.,* 2016). According to the results the infected and hospitalized patients were observed with fever (100%), body pain (100%), vomiting (79.3%), chills (86.47%), and headache (86.6%).

The same results were observed by Sigera *et al. (*2021) where the majority of patients experienced body pain, vomiting, and drowsiness were also more common. The respective result correlates with (Tabassum *et al.,* 2023) where the patients had most of the classic symptoms of dengue fever, including fever (99.7%), chills (82.9%), and body pain (100%). The corresponding results also correlate with Hasan *et al.* (2021) among the confirmed cases males had a high percentage of infection as compared to females and the prominent age group was 21-30 years. Among them, fever was present in all patients (100%). Other common symptoms include body pain, vomiting, chills and headache. The obtained results attributed to results obtained by Khan *et al.,* (2021) where males (14.50%) had a high infection rate as compared to females (5.46%) all suspected patients had symptoms of dengue fever such as fever (97%), vomiting (57%) and abdominal pain (61%). Similarly, a high rate of infection was found in the age group of 16-30 years. According to Zohra (2024), the highest prevalence was found in the male population (69.14%) as compared to the female population (30.88%). The age group 16-30 was found to have a high percentage of infection (48.46%), followed by the age group 31-45 years having an infection rate of 25.42% while the age group above 60 years was found to be less infected (5.29%). Moreover, the platelet count of patients was seen as low.

Conclusion

The most common symptoms of dengue infection observed in the current study include high fever, body pain and headache, vomiting diarrhea, chills, dry cough, chest infection, and body sweats. The study concluded that dengue infection has not much influence on blood pressure, white blood cell level, red blood cell level, and hemoglobin level of patients and recorded with their normal ranges. However, the platelets level of an individual decreases with dengue infection as the majority of the patients under study were recorded with platelet counts of 50-100x10.e3/µl followed by 100-150 x10.e3/µl in both males and females, while 24.3% of female and 12.5% of platelets male have platelets count 10-50 x10.e3/µl these all values below normal. The normal platelets count of the healthy individual is 150 - 450 x10.e3/µl. Thus, it shows the thrombocyte level in dengue-infected persons. Moreover, in this study, it is observed that those people who spend more time outdoors have more chances of getting dengue infection as compared to those who spend most of their time indoors.

Limitation

The current study has few limitations. First, the use of a clinic-based passive surveillance system, comparing hospital-based surveillance, presumably sampled patients with less severe infections. On the contrary, comparing the home-visit-based active surveillance, the current study most probably recruited patients with more severe illnesses. Such variations in sampling techniques are not essentially a weakness, but merit attention regarding the results. However, the annual ratio of dengue hemorrhagic fever (DHF) cases to the total number of dengue cases during the study period was low extremely, most regularly numbering less than 1 in 500, according to the Pan American Health Organization. Second, our study was not designed to collect supplementary laboratory information (i.e., total protein) that can help fulfill the criteria for DHF categorization (WHO, 1997). Due to these reasons, the current study recruited only persons with dengue fever and not DHF. Finally, given the cross-sectional nature of the current study, the variations in the prevalence of symptoms and signs by DENV serotype are merely requiring additional, corollary, longitudinal research to better analyze both the temporality of DENV disease with manifestation incidence and the specificity of the relationship.

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Declarations

Conflict of Interest

The authors have declared no conflict of interest.

Declaration of Interest Statement

We declare that we have no financial and personal relationships with other people or organizations that can inappropriately influence our work.

Author's contributions

HS and KN conducted research and wrote the initial draft of manuscript. KN, KF, IUH, AU, JU and SK collected the literature and wrote the manuscript, and edited the manuscript in original. All authors have read and approved the final manuscript.

Ethics approval and consent to participate

Not applicable

Consent for Publication

Not applicable