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EPIDEMIOLOGICAL STATUS OF DENGUE FEVER IN DERA ISMAIL KHAN KHYBER PAKHTUNKHWA, PAKISTAN

Original Research

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ABSTRACT

Background: Dengue fever, induced by the dengue virus, is a tropical ailment that ranks among the most lethal vector-borne illnesses. The hot and humid summers in Pakistan facilitate the proliferation of vectors that are responsible for transmitting viral and parasitic diseases. In spite of the proactive strategies implemented by the appropriate authorities, Pakistan has been grappling with an escalating dengue crisis for the last twenty years. DHF represents a serious manifestation of dengue infection, associated with considerable morbidity and mortality rates. Timely recognition of severe dengue infections can decrease morbidity and mortality rates.

Methodology: The retrospective study was carried out from May to October during the years 2019 to 2023. The primary aim of this research is to assess issues associated with dengue virus fever infection in the Dera Ismail Khan district. The dengue patient arrived at MMMT Hospital in Dera Ismail Khan from a different locality inside D.I. Khan. The patient was placed in an entirely distinct ward, with full consideration given to dengue patients by the hospital personnel. The patients with reservations were assessed utilizing the DENV method. A total of 488 patients tested positive for the dengue virus, with a higher proportion of males at 443 (90.77%) compared to females at 45 (9.22%), indicating a lower impact on the latter group. The incidence of DENV in the age group of 16 to 35 years was 76.84%. The current study indicates that dengue fever infection peaked in October (45%) as a result of the post-monsoon rainy season. Moreover, 43% of patients exhibited platelet counts over 100,000 per cubic millimeter, which may pose significant health risks.

Conclusion: According to the current study Dera Ismail Khan district, Khyber Pakhtunkhwa KP, Pakistan, is at significant risk of disease and mortality due to dengue fever. The most affected age range is 16 to 35 years. Males are more afflicted than females, with a 2:1 ratio among the entire dengue fever infected population. Fever and myalgia are the most prevalent symptoms among all documented cases of dengue infection. Failure to adhere to preventative measures against the dengue epidemic may lead to a concerning trajectory in the future. Second, in order to prevent dengue outbreaks in the future, the administration of Khyber Pakhtunkhwa had to have improved plans for preventing dengue infection in neighboring districts and provincial towns.

Keywords: D.I. Khan, NS1, IgG, IgM, Dengue, Outbreak 2019.

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INTRODUCTION

The Spanish term "dengue" implies "fastidious." It was first mentioned in 1789 and comes from the term "dinga," which implies an ill of spirit. The dengue virus, an enveloped positive single-stranded RNA virus that is a member of the family and genus Flavivirus, is the cause of dengue fever (Ul-Rahman *et al.,* 2024). This group also encompasses hepatitis C virus, West Nile virus, and yellow fever virus. These viruses are highly dangerous and can inflict significant harm on human health (Kanwal[1] et al., 2023). Dengue is a leading cause of hospitalization, with an estimated 500,000 individuals infected with severe dengue requiring medical attention, predominantly affecting children. The annual mortality rate stands at 2.5% (Hushmandi *et al.,* 2024). The Aedes genus of mosquitoes is recognized for transmitting dengue disease, with the three predominant species being Aedes aegypti, Aedes albopictus, and Aedes polynesians.

A. aegypti, the primary vector, predominantly breeds in containers and has diurnal biting behaviour, inhabiting tropical and subtropical regions (Fernández-Salas et al., 2015). They primarily repose indoors in living rooms and bedrooms, exhibiting activity throughout twilight and daybreak. This enhances human-vector interaction and complicates the management of disease transmission (Bowman et al., 2016). *A. albopictus* and *A. polynesiensis* act as vectors depending on their geographic distribution (Dávalos-Becerril et al., 2019). Africa, the Middle East, Europe, and the Americas are now home to A. albopictus, which was once only found in South East Asia, the Western Pacific islands, and the Indian Ocean. This increases the likelihood of epidemics of arboviral diseases in these countries.

In rural areas of Southeast Asian and Pacific Island dengue-endemic countries, A. albopictus serves as a dengue maintenance vector. Except in places like parts of China, the Seychelles, Japan, and Hawaii where A. aegypti is not present, A. albopictus is not an urban vector of dengue (Roy and Bhattacharjee, 2021).

The eggs of Aedes mosquitoes demonstrate impressive durability, enabling them to survive prolonged phases of dryness. The inadequate management of waste and the lack of effective wastewater drainage systems lead to increased mosquito populations. Significant increases in mosquito larval populations are recorded during and after the rainy season. This results in post-monsoon dengue outbreaks in various countries throughout South and Southeast Asia (Ferreira-de-Lima and Lima-Camara, 2018). Increased temperature and humidity diminish the duration of virus replication in female mosquitoes.

When an infected human bites an adult female mosquito, dengue viruses enter the insect and get access to multiple tissues. Viruses found in infected mosquitos' salivary glands are transmitted to humans during the following blood meal. Infected mosquitoes require a longer blood meal, increasing A. aegypti's efficiency as a dengue virus vector. There is evidence of both male-to-female and transovarial sexual transmission. This enables the virus to pass on its genes to subsequent generations even when no vertebral hosts are present, such as during an interepidemic (Frasca et al., 2024).

Dengue fever is severe and affects children, babies, and adults, yet it has a low fatality rate. Dengue symptoms normally appear after 10-14 days of incubation following a mosquito bite and can continue for up to 2-7 days. If a high fever of greater than 40°C/104°F continues and is accompanied by chills during the febrile phase, which typically start on day 4 to 7 and stay for three to seven days, dengue should be diagnosed (Piedrahita et al., 2018). Fever is defined by a sudden onset and high-grade temperature exceeding 38.5°C, accompanied by migraine, retro-orbital pain, myalgias, and arthralgias. Fevers, skin rashes, nausea, and vomiting (along with other signs and symptoms). Fifty percent of patients experience lymphadenopathy, hepatomegaly, and maculopapular rash; the latter is more common during the early stages of Dengue infection and usually appears two to five days after the fever starts. Respiratory symptoms can manifest as a cough, nasal congestion, and a sore throat. Furthermore, leukopenia, thrombocytopenia, and transaminitis may be observed (Mohsina et al., 2022).

In between epidemics, condensation has caused more severe dengue cases in Pakistan (Riaz *et al.,* 2024). The National Institute of Health (NIH) Islamabad has documented the incidence of cases in Pakistan for the years 2017, 2018, 2019, and 2020, recording figures of 22,938, over 3,200, 24,547, and 3,442, respectively. In 2020, just 1,153 occurrences were documented within a same timeframe. As of the conclusion of November 2021, a total of 48,906 cases have been registered across the nation. As of the conclusion of November 2022, a total of 75,450 cases had been documented in Pakistan, with the highest incidence occurring in KPK. From November 2021 to December 2021, a total of 16,388 cases were reported (Daniyal et al., 2020). Dengue fever affects around 3.9 billion people annually and is common in 128 countries, mostly in poor nations such as Pakistan. This research identifies DENV-2 as the primary serotype that has been both pandemic and dominant in Pakistan from 1985 to 1994. Like previous viral epidemics, the developing coronavirus pandemic also reduced dengue infections in 2020. The rapid and substantial rise of dengue in Pakistan is

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attributable to several factors, including overcrowding, rapid urbanization, travel, Insufficient vector control in endemic regions, along with inadequate healthcare and management systems. Additional research and investigation are necessary to create antiviral treatments or vaccines that confer serotype-specific protective immunity.

This study concentrates on the Dera Ismail Khan district of KPK, which has received insufficient attention during outbreaks. This study aimed to investigate disease severity, clinical features, laboratory findings, and outcomes in serologically confirmed cases of dengue fever during the recent epidemic.

MATERIALS AND METHODS

Study Area Description

District D.I. Khan is a notable city within the Khyber Pakhtunkhwa province of Pakistan, celebrated for its aesthetic appeal. The district of D.I. Khan is situated at a latitude of 31.8224° N and a longitude of 70.8940° E. The region is bordered to the east by the districts of Dera Ghazi Khan and Muzaffargarh, to the north by Bannu District, while the Sulaiman Range lies to the south, and South Waziristan is situated to the west. The census data for the Dera Ismail Khan district indicates a population of 1,900,000 as recorded in 2023, according to Google.

Compilation of Clinical Data

The dengue fever data was obtained from the District Health Office in Dera Ismail Khan. A dengue fever patient exhibiting minimal signs and symptoms was recorded and admitted to the designated dengue patient ward. All dengue-infected patients were meticulously evaluated for epistaxis, diarrhea, abdominal discomfort, vomiting, and hepatomegaly. The research assessed liver function, platelet count, and dengue detection using several diagnostic tests, including anti-dengue antibodies NS1, IgG, and IgM.

Assessment Tools for Dengue Fever Diagnosis

The BIOLINE dengue NS1 Ag + Ab Combo Test (Standard Diagnostic INC, Korea) was utilized for the diagnosis of dengue fever. Fundamental procedures of the examination: The BIOLINE Dengue NS 1 Ag+Ab Combo Test is a fast assay intended to simultaneously detect and distinguish the antibodies IgG and IgM against the dengue virus in human plasma, serum, or whole blood. A Dengue NS1 Ag kit window is marked with two pre-coated lines: T for the NS1 Ag test line and C for the control line. The top side control line is intended to limit the sample within the device, while the test line is offered for sample addition. The two lines in the window remain invisible until the sample is added. All three specimen types (plasma, serum, or whole blood) can be utilized for identifying the Dengue viral antigen NS1, as well as IgG and IgM, with high sensitivity and specificity.

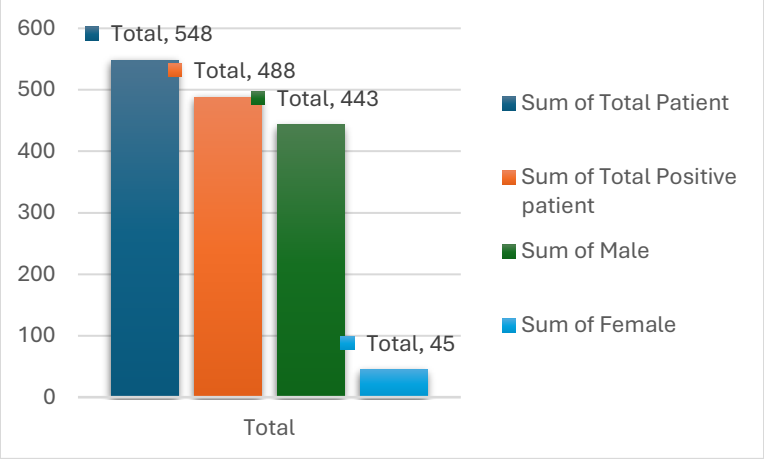
RESULT

A total 548 suspected patient was visited to Mufti Mahmood Teaching & Memorial Hospital Dera Ismail Khan for Dengue haemorrhagic fever from different areas with different symptom from May 2019 to October 2024, The pathology section of the hospital documented a total of 488 positive dengue cases. The highest frequency was seen in males, with 443 (90.77%) compared to females, with 45 (9.22%) as show in table No.1.

Table 1. Illustrates the prevalence of dengue Fever

Total Patient	All-positive patient	Male	Female
548	488(89.05%)	443(90.77%)	45(9.22%)

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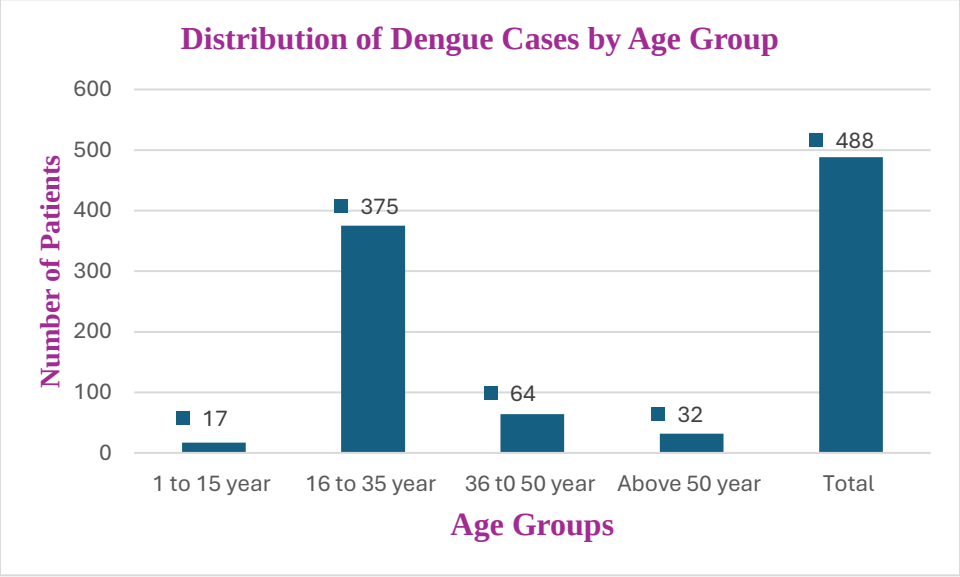
Distribution of Dengue Cases by Age Group

Patients infected with dengue were categorized into four groups: 1-15, 16-35, 36-50, and 50 and above. The highest rate of dengue fever was observed in age group 16 to 35 with 375 patients (76.84%), followed by 36-50, 64 patients (13.11%) 50 onward with 32 (6. 55%) and 1 to 15 with 17 (3.48%).

Table No. 2 presents the age-wise weightage

Age Group	No. of Patient	Percentage
1 to 15 year	17	3.48%
16 to 35 year	375	76.84%
36 t0 50 year	64	13.11 %
Above 50 year	32	6.55%
Total	488	100

Figure.2 Distribution of Dengue Cases by Age Group



Clinical feature of dengue fever Patient

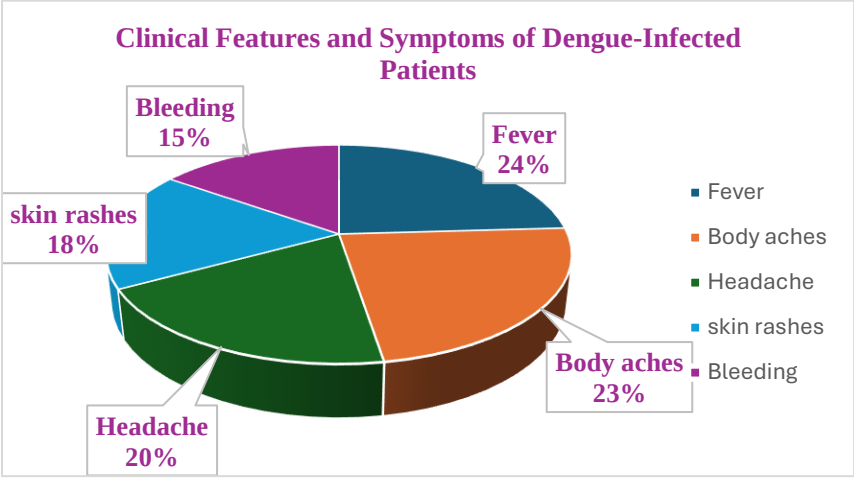
The dengue fever patient was found to have a variety of signs and symptoms, including fever, body pains, headache, skin rashes, and bleeding. As shown in Table 3.

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Table 3: Clinical Features and Symptoms of Dengue-Infected Patients

S. No	Signs and symptoms	%
1	Fever	98%
2	Body aches	95%
3	Headache	80%
4	skin rashes	72%
5	Bleeding	62%

Figure 3. Clinical Features and Symptoms of Dengue-Infected Patients



Statistical Analysis of the Dengue Infection Rates by Month

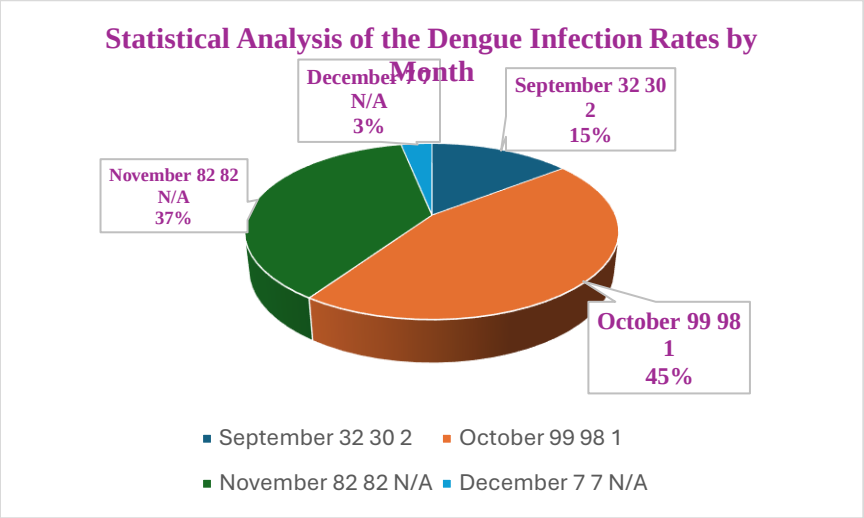
There have also been reports of dengue outbreaks from May 2019 to December 2023. For the months of September and October, the rate of spread was quite high, reaching 30.52% and 41.04% respectively, with November coming in second with 20%. As shown in table No. 4, the month of December has been reported to have the lowest spreading rate, which is 8.42% total as show in table No.4

Table 4: Statistical Analysis of the Dengue Infection Rates by Month

Months	Total positive case	Male Positive	Female Positive	Percentage
September	32	30	2	14.54%
October	99	98	1	45%
November	82	82	N/A	37.27%
December	07	07	N/A	3.18%

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Figure 4. Statistical Analysis of the Dengue Infection Rates by Month



Evaluation of platelet function in dengue-positive individuals: In the positive patient group, 43% (211) exhibited platelet counts within the range of 1,000,000 to 2,000,000/cmm, while 30.73% (150) patients fell within this same range. Additionally, 15% of patients had counts between 2,000,000 and 3,000,000/cmm, followed by 7.1% with counts ranging from 3,000,000 to 4,000,000/cmm, and 2.4% exceeding 4,000,000/cmm, as detailed in Table No. 6.

Table 6 Platelets count status of dengue positive patient

No of Platelets	Total Patients	Percentage
< 1000000cmm	210	43%
1000000-2000000/ccm	150	30.73
2000000-3000000/ccm	75	15%
3000000-4000000/ccm	35	7.1%
> 400000/ccm	12	2.4%

DISCUSSION

The first dengue virus infection pandemic in Pakistan was recorded in the Lahore district of the Punjab province in 1982 (Humayoun et al., 2010).World Health Organization Since 2013, numerous outbreaks have been identified in Khyber Pakhtunkhwa (KP), Sindh, and Baluchistan provinces of Pakistan. However, there has been insufficient focus on establishing a comprehensive laboratory-based surveillance program to assess the burden of circulating viral serotypes. Such a program could enhance the primary efforts in disease monitoring and control. Due to inadequate consideration, two significant DENV outbreaks occurred in 2011 and 2013 in various districts of Pakistan, specifically in Khyber Pakhtunkhwa's Swat and Mansehra districts, as well as in Lahore and surrounding areas of Punjab. In our study, a higher prevalence was observed, with 14.50% (69) positive cases in males compared to 5.46% (26) positive cases in females, as illustrated in Table No. 1. In our investigation, positive dengue cases were categorized into four groups based on age. According to table No.1, our study indicated a greater prevalence of 14.50 (69) positive cases in males compared to 5.46% (26), positive cases in females. According to their age, our study's positive dengue cases were split into four categories (Chaudhry et al., 2017).

In this study, positive dengue cases were classified into four age-based groups. The age group exhibiting the highest prevalence is 16 to 35, comprising 375 cases (76.84%). The subsequent age group, 36 to 50 years, comprises 64 cases (13.11%), while the group above 50years accounts for 32 cases (6.5%). The lowest number of cases is observed in the 1 to 15 age group, which has 17 cases (3.84%). The findings are linked to the 2017 KPK study, which identified 45% of positive cases in the 16-30 age cohort (Faheem Anwar et al., 2019).

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The results are linked with the 2017 KPK research, which found 45% positive cases in the 16-30 age range. Furthermore, Gadhwal *et al*. believe that most dengue fever infections are observed in young persons. Other study results in KP revealed that males are more impacted than females (Abdullah *et al.*, 2019).

CONCLUSION

According to the current study Dera Ismail Khan district, KP, Pakistan, is at significant risk of disease and mortality due to dengue fever. The most affected age range is 16 to 35 years. Males are more afflicted than females, with a 2:1 ratio among the entire dengue fever infected population. Fever and myalgia are the most prevalent symptoms among all documented cases of dengue infection. Failure to adhere to preventative measures against the dengue epidemic may lead to a concerning trajectory in the future. Second, in order to prevent dengue outbreaks in the future, the administration of Khyber Pakhtunkhwa had to have improved plans for preventing dengue infection in neighboring districts and provincial towns.

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Conflicts of Interest: None of the authors have any conflicts of interest relevant to what is written.

REFRENCES

Abdullah, S. A., M. Salman, M. Din, K. Khan, M. Ahmad, F. H. Khan, and M. Arif. 2019. Dengue outbreaks in Khyber Pakhtunkhwa (KPK), Pakistan in 2017: an integrated disease surveillance and response system (IDSRS)-based report. Pol J Microbiol 68(1):115.

Bowman, L. R., S. Donegan, and P. J. McCall. 2016. Is dengue vector control deficient in effectiveness or evidence?: Systematic review and meta-analysis. PLoS neglected tropical diseases 10(3):e0004551.

Chaudhry, M., S. Ahmad, H. B. Rashid, and I. Uddin. 2017. Dengue epidemic in postconflict swat district, Khyber Pakhtunkhwa, Pakistan, 2013. The American journal of tropical medicine and hygiene 96(4):899.

Daniyal, M., R. O. Ogundokun, K. Abid, M. D. Khan, and O. E. Ogundokun. 2020. Predictive modeling of COVID-19 death cases in Pakistan. Infectious Disease Modelling 5:897-904.

Dávalos-Becerril, E., F. Correa-Morales, C. González-Acosta, R. Santos-Luna, J. Peralta-Rodríguez, C. Pérez-Rentería, J. Ordoñez-Álvarez, H. Huerta, M. Carmona-Perez, and J. A. Díaz-Quiñonez. 2019. Urban and semi-urban mosquitoes of Mexico City: A risk for endemic mosquito-borne disease transmission. PLoS One 14(3):e0212987.

Faheem Anwar, F. A., S. A. Sohail Ahmad, M. H. Mohammad Haroon, I.-u.-H. Ihtesham-ul-Haq, H. U. Khan, J. K. Jawad Khan, S. U. Sabih Ullah, and I. A. Shah. 2019. Dengue virus epidemics: a recent report of 2017 from district Mardan, Khyber Pakhtunkhwa province, Pakistan.

Fernández-Salas, I., R. Danis-Lozano, M. Casas-Martínez, A. Ulloa, J. G. Bond, C. F. Marina, T. Lopez-Ordóñez, A. Elizondo-Quiroga, J. A. Torres-Monzón, and E. E. Díaz-González. 2015. Historical inability to control Aedes aegypti as a main contributor of fast dispersal of chikungunya outbreaks in Latin America. Antiviral Research 124:30-42.

Ferreira-de-Lima, V. H., and T. N. Lima-Camara. 2018. Natural vertical transmission of dengue virus in Aedes aegypti and Aedes albopictus: a systematic review. Parasites & vectors 11:1-8.

Frasca, F., L. Sorrentino, M. Fracella, A. D'Auria, E. Coratti, L. Maddaloni, G. Bugani, M. Gentile, A. Pierangeli, and G. d'Ettorre. 2024. An update on the entomology, virology, pathogenesis, and epidemiology status of West Nile and Dengue viruses in Europe (2018–2023). Tropical Medicine and Infectious Disease 9(7)

Humayoun, M. A., T. Waseem, A. A. Jawa, M. S. Hashmi, and J. Akram. 2010. Multiple dengue serotypes and high frequency of dengue hemorrhagic fever at two tertiary care hospitals in Lahore during the 2008 dengue virus outbreak in Punjab, Pakistan. International Journal of Infectious Diseases 14:e54-e59.

Hushmandi, K., S. H. Saadat, S. Bokaie, H. Akbarein, S. Daneshi, M. Najafi, and N. Esfandiari. 2024. An Overview of Dengue Fever. Archives of Advances in Biosciences 15(1)

Kanwal[1], N., A. Batool[1], S. Aziz, A. Amraiz, M. Akram, A. Karim, and L. Ali. 2023. Identification and Molecular Characterization of NS1 and NS2 Genes of Dengue Virus from two mini outbreaks (2022-2023) in Pakistan.

Mohsina, F., I. Faheem, M. Mohammad, S. Tabassum, S. Tarkash, I. Shah, and A. Patil. 2022. Prevalence, pathogenesis and identification of clinical risk factors associated with dengue virus (DENV). Indo Global Journal of Pharmaceutical Sciences 12:189-196.

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Piedrahita, L. D., I. Y. Agudelo Salas, K. Marin, A. I. Trujillo, J. E. Osorio, S. O. Arboleda-Sanchez, and B. N. Restrepo. 2018. Risk factors associated with dengue transmission and spatial distribution of high seroprevalence in schoolchildren from the urban area of Medellin, Colombia. Canadian Journal of Infectious Diseases and Medical Microbiology 2018(1):2308095.

Riaz, M., S. N. B. Harun, T. H. Mallhi, Y. H. Khan, M. H. Butt, A. Husain, M. M. Khan, and A. H. Khan. 2024. Evaluation of clinical and laboratory characteristics of dengue viral infection and risk factors of dengue hemorrhagic fever: a multi-center retrospective analysis. BMC Infectious Diseases 24(1):500.

Roy, S. K., and S. Bhattacharjee. 2021. Dengue virus: epidemiology, biology, and disease aetiology. Canadian journal of microbiology 67(10):687-702.

Ul-Rahman, A., M. Z. Shabbir, M. Rasheed, N. Shafi, K. AbdulRazaq, H. Ramzan, R. Mehmood, and J. A. Khan. 2024. Comparative genomics and evolutionary analysis of dengue virus strains circulating in Pakistan. Virus Genes:1-18.

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