

## Original Article

## Dengue Positivity rate among children visiting a tertiary care hospital of Rawalpindi

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### Abstract

**Objective:** This study aimed to determine gender-wise variation in dengue positivity rate and predilection of children towards dengue severity.

**Study Design:** A Analytical cross-sectional study was conducted.

**Place and duration of study:** A cross-sectional analytical study was done among 847 children who came to dengue OPD of Holy Family Hospital Rawalpindi during October-November 2024.

**Material and Methods:** A cross-sectional analytical study was done among 847 children who came to dengue OPD of Holy Family Hospital Rawalpindi during October-November 2024. Pediatric cases tested positive on NS1 and IgM testig were included in the study through consecutive non-probability sampling. Data was analyzed by means of SPSS version 27.0. Descriptive statistics were applied. Cases were segregated with respect to different dengue clinical syndromes. Gender-wise difference in dengue positivity rate was determined by applying chi-square test and calculating Odd's ratio along with 95% Confidence Interval (CI).  $P < 0.05$  was taken as significant.

**Results:** Out of 847 children examined and investigated in dengue OPD, 124 were dengue positive. There were 69.3% were males 30.7% were females among dengue positive children. 71% of them had Dengue Fever (DF) while 25% and 4% were diagnosed with Dengue Hemorrhagic Fever (DHF) and Dengue Shock Syndrome (DSS) respectively. Overall dengue positivity rate was 14.6% while rate among males and females was 17.1% and 11% respectively. Gender-stratified dengue positivity results revealed statistically significant difference ( $P = 0.013$ ) with Odd's ratio of 1.67 (95% CI= 1.11 – 2.51)

**Conclusion:** Male children exhibited significantly higher dengue positivity rate than female children of Rawalpindi.

**Keywords:** dengue positivity rate, tertiary care hospital, dengue fever, dengue hemorrhagic

### 1. Introduction

Dengue fever is spanning across the globe as a prime public health concern due to upsurge of its incidence in tropical and sub-tropical zones of the world.<sup>(1)</sup> Dengue is spreading exponentially than any other communicable disease and is known to encompass the earth by 400%.<sup>(2)</sup> A steep rise of about 64.4% in dengue incidence among children and adolescents has been determined from 1990 to 2021. This reflects that our youngsters have increased likelihood of being victimized by dengue associated mortality, morbidity and disability than those of elderly people.<sup>(3)</sup> A hospital-based cross-sectional survey in Myanmar revealed clinical suspicion of dengue among both pediatric and adult cases. However, one of the three suspected pediatric cases were found to be true positive.<sup>(4)</sup> Similarly, a study among children of Bangladesh

reporting to a tertiary care hospital disclosed alarmingly raised dengue positivity rate of around 65.5%.<sup>(5)</sup> South Asian countries have substantial risk of confronting with severe dengue outbreaks.<sup>6</sup> Studies from a tertiary care setting of Karachi was illustrative of overall 64.4% of dengue positivity rate.<sup>(6)</sup> Likewise, a study from Malda district of India indicated approximately 30% dengue positivity among children below 15 years of age.<sup>(7)</sup> An extensive Indian study carried out on extensive data of 2025-2022 timeframe could not specify dengue positivity specifically among children.<sup>(8)</sup> A study done among 4 months to 18 years old population of District Peshawar demonstrated deranged Liver Function Tests and raised serum creatinine although none of them

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succumbed to dengue fever. <sup>(9)</sup> Around 21,106 dengue cases were testified in Pakistan during 2023. However; this figure escalated to 28,427 cases country wide. Dengue cases of Pakistan reported during 2024 have not been segregated age-wise by WHO. <sup>(10)</sup>

Children are highly susceptible to severe dengue due to weakened immune system and hence more at risk of developing associated complications. <sup>(11)</sup> Determining the dengue positivity rate among children would remarkably affect public health planning and clinical management of the cases. Moreover, preventive measures will also be emphasized for mitigating the frequency of affected children. The present study therefore intends to determine dengue positivity rate among pediatric cases reported at a public sector tertiary care facility of Rawalpindi. Appraising dengue positivity rate among children and determining their predilection towards diverse dengue disease spectrum would enable healthcare providers to workup for recognition of disease pattern in pediatric cases. This act would considerably prove beneficial in diminishing the associated complications and fatalities by its threat prediction ahead of time.

**2. Materials & Methods**

A cross-sectional analytical study was done among 847 children who were suspected dengue cases and were brought to dengue OPD of Holy Family Hospital Rawalpindi during October-November 2024. All suspected dengue cases were subjected to dengue serology (IgM testing) and dengue NS1 antigen detection assay. Dengue positive cases were confirmed in accordance with Dengue Expert Advisory Group (DEAG) 2025 guidelines. <sup>(12)</sup> Patients were enrolled in the study through consecutive non-probability sampling. Formal permission for this research work was sought vide letter No. MS/HFH/1048. Data was analyzed by means of SPSS version 27.0. Descriptive statistics were applied. Number of children suffering from different types of dengue disease were also segregated.

World Health Organization (WHO) has emphasized the significance of Dengue positivity rate as a vital instrument for public health surveillance and to monitor disease trends in the population. It is calculated by the following formula <sup>(13)</sup>:

$$\text{Dengue Positivity Rate (\%)} =$$

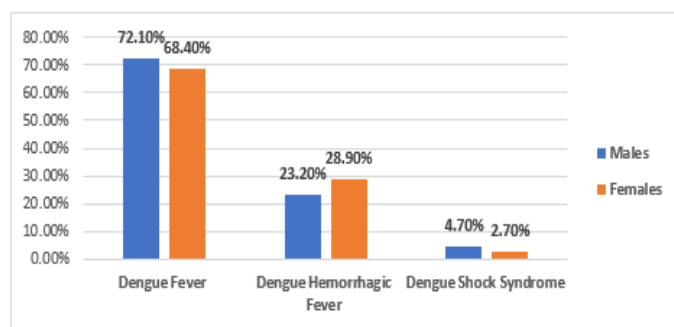
$$\frac{\text{Total number of children who tested positive for dengue}}{\text{Total number of children who tested for dengue}} \times 100$$

Gender-based variation in dengue positivity rate was statistically determined by applying chi-square test and calculating Odd's ratio along with 95% CI.  $P < 0.05$  was taken as significant.

**3. Results**

Total 847 children coming to Pediatric OPD of Holy Family Hospital Rawalpindi were suspected dengue case that were subjected to dengue serology and antigen detection test. Of the 124 dengue positive cases, about 69.3% were male children while 30.7% were females. Most (71%) were diagnosed with dengue fever as depicted below in Figure 1.

Fig 1: Gender-wise comparison of clinical spectrum among pediatric dengue cases (n = 124)



Mean age of Dengue Fever (DF), Dengue Hemorrhagic Fever (DHF) and Dengue Shock Syndrome (DSS) in our study was  $8.63 \pm 3.12$ ,  $8.54 \pm 2.46$  and  $7.2 \pm 2.86$  years respectively. Overall dengue positivity rate was 14.6% among children. Dengue positivity rate was comparatively higher among males as illustrated below in Table 1.

Overall Dengue Positivity Rate (%)	= Total number of children who tested positive for dengue / Total number of children who tested for dengue X 100
	= 124 / 847 X 100
	= 14.6 %
Dengue Positivity Rate in male children	= Total number of male children tested positive for dengue / Total number of male children tested for dengue X100
	= 86 / 502 X 100
	= 17.1 %
Dengue Positivity Rate in female children	= Total number of female children tested positive for dengue / Total number of female children tested for dengue X 100
	= 38 / 345 X 100
	= 11%

Table 1: Calculation of Overall and Gender-wise Dengue positivity rate

There was statistically significant difference between dengue-stratified dengue positivity as shown below in Table 2.

Gender	Dengue tests done	Dengue positive cases	X <sup>2</sup>	P-value	Odd' ratio (95% CI)
Males	502	86	6.12	0.013	1.67 (1.11 – 2.51)
Females	345	38			
Total	847	124			

Table2: Association between gender and dengue positivity

#### 4. Discussion

Gender stratified results pertaining to dengue positivity rate in current study are illustrative of higher rate (17.1%) among male children than those of female (11%). The overall dengue positivity rate was 14.6% as evident from Table 1. Most (69.3%) of the dengue positive cases were males. This gender-based variation was also determined to be statistically significant (P = 0.013) as shown in Table 2. Appraising the gender-wise infectivity rate is imperative to identify the gender more prone to develop infections. (14) This rate is not only useful to perceive behavioral and exposure variations among population but also is of paramount significance for predicting the outbreak and resource planning. (15) Likewise, a study done among dengue pediatric cases of Fatima Memorial Hospital Lahore revealed that 58% of infected patients were males. (16) Similarly, a study

carried out among dengue cases of Asian countries explicated increased incidence among males who were 15 years old and above. (17) Such gender-based findings were attributed to increased outdoor activities among males and hence increased probability of being bitten by Aedes mosquito. (18) Indulgence of male children in outdoor games in peri-domestic areas make them more susceptible to mosquito biting and hence development of dengue clinical syndrome. (19) Consistent with our findings, a prospective hospital-based study among 8-14 years old dengue cases emphasized increased propensity of dengue among male population. (20)

Only 29% children in our study were diagnosed as cases of severe dengue as presented in Figure 1. According to Centre for Disease Control, 1 out of every 20 dengue cases may progress to severe dengue that can be manifested as Dengue Hemorrhagic Fever (DHF) or Dengue Shock Syndrome (DSS). (21) Consistent with our findings, a cross-sectional study by Khan MAS et al among pediatric cases of Bangladesh elucidated that 71.1% were diagnosed to have dengue fever while rest of the 28.9% had severe dengue. However, young age was determined as one of the key predictors of disease severity. (22) As there are less female pediatric cases in the present study, so the female cases with severe disease are comparatively less. One of the reasons for less female dengue cases seems to be the socio-cultural diversity that results in less laboratory investigations among them and also less exposure to preventive measures. (23) The verified cases of DHF and DSS in our study were 25% and 4% respectively. Comprehensive analysis of hospital-based data of pediatric dengue cases from Sri Lanka during 2021 elucidated the confirmation of DHF and DSS among 80% and 8.6% children respectively. (24) Another cross-sectional study among pediatric dengue cases from Mayo Hospital Lahore revealed the manifestation of severe dengue among 14.3% children while 15% got treated for critical illness and 0.4% succumbed to dengue infection. (25) As dengue is endemic in South Asian territories of the globe (26), so likelihood of dengue severity and adverse outcomes are comparatively more than those of American and European countries. As our

study is based on the children visiting a single tertiary care hospital of Rawalpindi, this limits the generalizability of our results to other healthcare settings. Moreover, prospective multi-center studies carried out through probability sampling and consideration of socio-economic determinants can pave the way towards encompassing the details of pediatric dengue and its healthcare implications. Being developing regions of the world and having favorable environmental determinants for propagation of Aedes mosquito, stringent preventive measures should religiously be implemented all the year round due to epidemiological pattern of dengue infection.

### Conclusion & Recommendations

Dengue fever prevailed more among male children. There is critical need to strengthen outpatient-based surveillance for identifying the cases at initial stage and to improve the prognosis. Gender-based disparity among dengue cases emphasize the need for targeted preventive measures. Awareness campaigns at community level can also prove useful to mitigate the propensity of dengue cases among children.

### Disclosure /Conflict of interest:

Authors declare no conflict of interest.

### References:

1. Paz-Bailey G, Adams LE, Deen J, Anderson KB, Katzelnick LC. Dengue. *Lancet*. 2024 Feb 17;403(10427):667-682. [https://doi.org/10.1016/s0140-6736\(23\)02576-x](https://doi.org/10.1016/s0140-6736(23)02576-x).
2. World Health Organization. Dengue and Severe Dengue. 2024. Available at: [https://www.who.int/health-topics/dengue-and-severe-dengue#tab=tab\\_2](https://www.who.int/health-topics/dengue-and-severe-dengue#tab=tab_2).
3. Deng J, Zhang H, Wang Y, Liu Q, Du M, Yan W, et al. Global, regional, and national burden of dengue infection in children and adolescents: an analysis of the Global Burden of Disease Study 2021. *eClinicalMedicine*. 2024 Nov 19; 78: 102943. <https://doi.org/10.1016/j.eclinm.2024.102943>.
4. Lin H, Tun MMN, Zin YMW, Myint KT, Khine WK, New KM, et al. Comparison of clinical and virological features in pediatric and adult dengue cases at Insein General Hospital during Myanmar's 2022 dengue season. *Trop Med Health* 2025; 53: 13. <https://doi.org/10.1186/s41182-025-00688-7>.
5. Ghosh K, Tony SR, Islam K, Mobarak R, Alam MJ, Kamruzzaman M, et al. Epidemiology of pediatric dengue virus infection, Scenario from a tertiary level hospital in Bangladesh. *J Infect Public Health*. 2025 Apr; 18(4): 102684. <https://doi.org/10.1016/j.jiph.2025.102684>.
6. Umair M, Rehman Z, Haider SA, Ali Q, Jamal Z, Ammar M, et al. Genomic Characterization of Dengue Virus Outbreak in 2022 from Pakistan. *Vaccines* 2023; 11(1): 163. <https://doi.org/10.3390/vaccines11010163>.
7. Saha P, Saha P, Gupta SD, Chattopadhyay W, Das S. Spreading of dengue virus infection cases in Malda district of West Bengal, India during COVID-19 Pandemic situation (2020-2022): A cross-sectional study. *J Res Clin Med* 2024; 12: 37. <https://doi.org/10.34172/jrcm.34496>.
8. Sharma P, Malhotra B, Sharma H, Bhomia N, Deeba F, Kuldeep A, et al. Trends in dengue virus positivity & serotyping in Rajasthan. *Indian J Med Res* 2024; 160(5): 479-488. [https://doi.org/10.25259/ijmr\\_1343\\_23](https://doi.org/10.25259/ijmr_1343_23).
9. Gul M, Latifullah, Irshadullah, Asghar M, Rehman N, Mahnoor, et al. Clinico-Pathological Spectrum of Dengue Fever among Children in District Peshawar. *J Saidu Med Coll*. 2025;15(2):255-260. <https://doi.org/10.52206/jsmc.2025.15.2.1015>.
10. Ministry of National Health Services Regulations & Coordination. Advisory for the prevention and control of dengue fever. March 2025. Available at: <http://www.nhsr.gov.pk>.
11. UNICEF South Asia. Dengue: How to keep children safe. September 2023. Available at: <https://www.unicef.org/rosa/stories/dengue-how-keep-children-safe#:~:text=Young%20children%20and%20particularly%20infants,in%20children%20can%20be%20avoided>.
12. DEAG Guidelines, Government of Punjab 2024. Available at: [https://deag.punjab.gov.pk/download\\_links](https://deag.punjab.gov.pk/download_links).
13. World Health Organization. A toolkit for national burden estimation. 2018.

- <https://iris.who.int/server/api/core/bitstreams/215d47b2-fc74-4b93-a559-9f56f1d3f7ac/content>.
14. Anker M, Arima Y. Male-female differences in the number of reported incident dengue fever cases in six Asian countries. *Western Pac Surveill Response J* 2011 Jun 30; 2(2): 17-23. <https://doi.org/10.5365/wpsar.2011.2.1.002>.
  15. Zohra T, Din M, Ikram A, Bashir A, Jahangir H, Baloch IS, et al. Demographic and clinical features of dengue fever infection in Pakistan: a cross-sectional epidemiological study. *Trop Dis Travel Med Vaccines*. 2024 Apr 5;10(1):11. <https://doi.org/10.1186/s40794-024-00221-4>.
  16. Baiz MMI, Rauf HA, Ahmed A, Fatima A. Clinical course and outcome of patients with dengue fever, dengue hemorrhagic fever and dengue shock syndrome in a tertiary care hospital in recent endemic 2022. *Pak Postgrad Med J* 2024; 35(1): 16-21. <http://ppmj.org.pk/index.php/ppmj/article/view/651>.
  17. Anker M, Arima Y. Male-female differences in the number of reported incident dengue fever cases in six Asian countries. *Western Pac Surveill Response J*. 2011 Jun 30;2(2):17-23. <https://doi.org/10.5365/WPSAR.2011.2.1.002>.
  18. Kaplan JE, Eliason DA, Moore M, Sather GE, Schonberger LB, Cabrera-Coello L, et al. Epidemiologic investigations of dengue infection in Mexico, 1980. *Am J Epidemiol* 1983 Mar; 117(3): 335-343. <https://doi.org/10.1093/oxfordjournals.aje.a113546>.
  19. Mishra S, Ramanathan R, Agarwalla SK. Clinical profile of dengue fever in Children: A study from Southern Odisha, India. *Scientifica (Cairo)* 2016; 2016: 6391594. <https://doi.org/10.1155/2016/6391594>.
  20. Shah GS, Islam S, Das BK. Clinical and laboratory profile of dengue infection in children. *Kathmandu Univ Med J (KUMJ)*. 2006 Jan-Mar;4(1):40-43. PMID: 18603866. <https://pubmed.ncbi.nlm.nih.gov/18603866/>.
  21. CDC. Clinical Features of Dengue. May 15, 2025. <https://www.cdc.gov/dengue/hcp/clinical-signs/index.html>.
  22. Khan MAS, Al Mosabbir A, Raheem E, Ahmed A, Rouf RR, Hasan M, et al. Clinical spectrum and predictors of severity of dengue among children in 2019 outbreak: a multicenter hospital-based study in Bangladesh. *BMC Pediatr* 2021 Oct 29; 21(1): 478. <https://doi.org/10.1186/s12887-021-02947-y>.
  23. Gupta S, Teachey DT, Chen Z, Rabin KR, Dunsmore KP, Larsen EC, et al. Sex-based disparities in outcome in pediatric acute lymphoblastic leukemia: a Children's Oncology Group report. *Cancer* 2022 May 1; 128(9): 1863-1870. <https://doi.org/10.1002/cncr.34150>.
  24. Bodinayake CK, Nagahawatte AD, Devasiri V, Dahanayake NJ, Wijayarathne GB, Weerasinghe NP, et al. Outcomes among children and adults at risk of severe dengue in Sri Lanka: Opportunity for outpatient case management in countries with high disease burden. *PLoS Negl Trop Dis*. 2021 Dec 28;15(12): e0010091. <https://doi.org/10.1371/journal.pntd.0010091>.
  25. Jahangir S, Zanjani SM, Zanjani SMS, Wahid S, Amin M, Nawaz S. Clinical Profile and Outcome of Dengue Fever in Pediatric Patients: A Hospital-Based Study. *Pakistan Journal of Medical & Health Sciences* 2023; 17(12): 724. <https://doi.org/10.53350/pjmhs020231712724>.
  26. Haider N, Hasan MN, Onyango J, Billah M, Khan S, Papakonstantinou D, et al. Global dengue epidemic worsens with record 14 million cases and 9000 deaths reported in 2024. *Int J Inf Diseases* Sep 2025; 158: 107940. <https://doi.org/10.53350/pjmhs020231712724>.