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ORIGINAL ARTICLE

Demographic, Clinical and Hematological Parameters of Patients with Severe and Non Severe Dengue Infection

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ABSTRACT

Background: There has been a remarkable rise in the worldwide frequency of dengue in recent decades owing to the ineffectiveness of existing management methods including vaccinations and pesticides.

Objective: To assess the demographic, clinical and hematological parameters of patients infected with severe and non severe dengue

Methodology: This cross sectional study was carried out at the Medicine department, Khalifa Gul Nawaz Teaching Hospital, Bannu Medical College Bannu from May 2022 to October 2022. All the data like demographic, clinical and data related to hematological parameters was recorded on pre-designed Performa. The data was analyzed using SPSS 23.

Results: In the current study, totally 180 patients were enrolled. The patients were categorized into NSDI and SD1 group. There were 96 (67.8%) males and 46 (32.4%) females' patients in NSDI group while there were 28 (73.7%) males and 10 (26.3%) females in SD1 group. Fever was observed in 138 (97.2%) patients in NSDI group and 38 (100%) patients in SDI group. Platelet transfusion was needed in 55 (38.7%) patients in NSDI group while it was needed in 26 (68.4%) patients in SDI group. The mean ±SD Platelet Count x $10^3 mm^3$ was 39 ±52.5 in NSDI group and 31.5±67.6 in SDI group. The mean ±SD Lowest Platelet Count x 10^3 mm^3 was 28±42 and 21.5± 17 in NSDI group and SDI group respectively. The mean ±SD HCT % was 40.8± 6.7 in NSDI group and 36.0± 12.1 in SDI group. The mean ±SD Leukocytes Count x 10^3 mm^3 was 4400±5425 and 8050±9350 in NSDI group and SDI group respectively.

Conclusion: The key to treating and predicting dengue as severe and non-severe cases is to be aware of clinical aspects as well as test results such hematological parameters.

Keywords: Demographic, clinical and hematological parameters, severe and non severe dengue infection

INTRODUCTION

The virus that causes dengue is often found in tropical and subtropical areas. DENV-1, DENV-2, DENV-3, and DENV-4 are its four distinct strains; they are all members of the Flaviviridae family [1]. The disease is spread by bites from female Aedes aegypti or Aedes albopictus mosquitoes that have already been infected by biting a dengue virus carrier [1]. Annually, over 390 million individuals are infected worldwide, with a 1% fatality rate, and 70% of cases are primarily in Asia [2].

The first dengue fever epidemic was officially documented in Pakistan in 1994. The yearly epidemic tendency and sudden increase of cases, though, were first seen in November 2005 [3, 4]. Pakistan has recorded a staggering number of dengue illnesses since 2010, with 2020 accounting for 47,120 laboratory - confirmed cases including 75 fatalities [5]. According to data compiled as of November 25th, 2021, there have been 48,906 confirmed cases of Dengue, with 183 fatalities [6]. This terrible mosquito-borne illness has become endemic in Pakistan, meaning that it is constantly spreading across the country, with the maximum frequency occurring immediately after the monsoons [4].

Dengue patients may exhibit symptoms such as fever, which may persist anywhere from 5 days to a week. Headache, retro-orbital discomfort, myalgia, arthralgia and severe fatigue lasting days to weeks are all prevalent. The type and intensity of the illness will determine the appearance of other symptoms like rash, gastrointestinal issues like nausea or vomiting, and respiratory tract problems like cough, sore throat, and nasal congestion [7]. Leucopenia, thrombocytopenia, and increasing hematocrit are characteristics of peripheral blood parameters [8]. Many studies have been published on the dengue infection but based on literature very limited research has been carried out on the clinical, demographic and hematological parameters between severe and non-severe dengue infections. This study was therefore carried out to assess the demographic, clinical and hematological parameters of patients infected with severe and non severe dengue.

MATERIALS AND METHODS

The current study was cross sectional, carried out at the department of Medicine, Khalifa Gul Nawaz Teaching Hospital, Bannu Medical College Bannu. The study duration was six months from May 2022 to October 2022. The overall sample size was 180 on the basis of WHO sample size calculator. The patients were categorized into NSDI and SD1 group. The inclusion criteria were all the patients of either gender and all ages diagnosed on ICT for dengue NS1 and willing to participate in our study. The criteria for exclusion were all the suspected patients with negative results on ICT and patients not willing to take part in our study. The study was approved from the ethical committee and informed consent was signed from all the patients enrolled in our study. Blood samples were taken aseptically from all the patients and sent to the hospital diagnostic laboratory for the determination of hematological parameters. All the data like demographic, clinical and data related to hematological parameters was recorded on pre-designed Performa. The data was analyzed using SPSS 23. Mean ± S.D were calculated for numeric variables like age and hematological parameters. Frequency and percentage were calculated for qualitative variables like gender and other demographic details.

RESULTS

In the current study, totally 180 patients were enrolled. The patients were categorized into NSDI and SD1 group. There were 96 (67.8%) males and 46 (32.4%) females' patients in NSDI group while there were 28 (73.7%) males and 10 (26.3%) females in SD1 group. In NSDI group 32 (22.5%) patients were <18 years old and 110 (77.5%) patients were ≥18 years old while in SD1 group 04 (10.5%) patients were <18 years old and 34 (89.5%) patients were ≥18 years old. The other demographic characteristics of both the groups are given in Table 1. (Table 1)

Comorbidities may be diabetes mellitus, coronary artery disease, hypertension and asthma.

Coinfections may be malaria, pulmonary tuberculosis, lower respiratory tract infection, hepatitis B and filariasis.

Table 1: Demographic characteristics of Non Severe and Severe Dengue patients

Socio Demographic Variables	NSDI n=142	SDI n=38	Total n=180	P-value
Residency Rural Urban	 69 (47.9%) 74 (52.1%)	 16 (42.1%) 22 (57.9%)	 84 (46.7%) 96 (53.3%)	 0.33
Age <18 years ≥18 years	 32 (22.5%) 110 (77.5%)	 04 (10.5%) 34 (89.5%)	 36 (20.0%) 144 (80.0%)	 0.07
Gender Male Female	 96 (67.8%) 46 (32.4%)	 28 (73.7%) 10 (26.3%)	 124 (68.9%) 56 (31.1%)	 0.31
Duration of illness in days 3-5 days 6-8 Days >8 days	 104 (73.2%) 38 (26.8%) 00	 08 (21.8%) 28 (73.7%) 02 (5.3%)	 112 (92.2%) 66 (36.7%) 02 (1.1%)	 < 0.001
Comorbadities[1] Yes No	 40 (28.2%) 102 (71.8%)	 20 (52.6%) 18 (47.4%)	 60 (33.3%) 120 (66.7%)	 0.005
Co infections[2] Yes No	 00 142 (100%)	 04 (10.5%) 34 (89.5%)	 04 (02.2%) 176 (97.8%)	 0.002

Based on clinical parameters, fever was observed in 138 (97.2%) patients in NSDI group and 38 (100%) patients in SDI group. Headache was observed in 114 (80.3%) patients in NSDI group while it was observed in 26 (68.4%) patients in SDI group. Platelet transfusion was needed in 55 (38.7%) patients in NSDI group while it was needed in 26 (68.4%) patients in SDI group. Mucosal bleeding was observed in 22 (15.5%) patients in NSDI group while it was observed in 10 (26.3%) patients in SDI group. The other clinical features of patients in both the groups are given in table 2.

Table 2: Comparison of clinical parameters of non severe and severe dengue infection groups

Clinical Parameters	NSDI n= 142	SDI n=38	Total n= 180	p-value
Fever	138 (97.2%)	38 (100%)	176 (97.8%)	0.38
Headache	114 (80.3%)	26 (68.4%)	140 (77.8%)	0.005
Vomitting	64 (45.1%)	25 (65.8%)	89 (49.4%)	0.02
Diarrhea	17 (12.0%)	03 (07.9%)	20 (11.1%)	0.35
Abdominal distention	10 (07.1%)	10 (26.3%)	20 (11.1%)	0.002
Retro-orbital pain	46 (32.4%)	06 (15.8%)	52 (28.9%)	0.032
Conjuntival conjestion	08 (05.6%)	06 (15.8%)	14 (07.8%)	0.04
Chest pain	06 (04.2%)	03 (07.9%)	09 (05.0%)	0.29
Crepitation on chest oscultation	12 (08.5%)	13 (34.2%)	25 (13.9%)	0.001
Hepatomegaly	08 (5.6%)	05 (13.2)	13 (07.2%)	0.11
Platelet transfusion	55 (38.7%)	26 (68.4%)	81 (45.0%)	0.001
Mucosal bleeding	22 (15.5%)	10 (26.3%)	32 (17.8%)	0.10

P is significant at >0.05

Table 3: Comparison of hematological parameters of non severe and sever dengue infection groups

Hematological Parameters	NSDI (n=142) Mean±SD	SDI (n=38) Mean±SD	Total (n=180) Mean±SD	p-value
Hemoglobin g/dL	13.52±1.9	12.1±2.5	13.1±2.4	0.003
Platelet Count x $10^3 mm^3$	39 ±52.5	31.5±67.6	36± 76.4	0.05
Lowest Platelet Count x 10^3 mm^3	28±42	21.5± 17	25±84.0	0.007
HCT %	40.8± 6.7	36.0± 12.1	40.2±7.7	0.004
Leukocytes Count x 10^3 mm^3	4400±5425	8050±9350	4700±9982	0.0001

Based on comparison of hematological parameters, the mean ±SD Hemoglobin g/dL was 13.52±1.9 and 12.1±2.5 in NSDI group and SDI group respectively. The mean ±SD Platelet Count x $10^3 mm^3$ was 39 ±52.5 in NSDI group and 31.5±67.6 in SDI group. The mean ±SD Lowest Platelet Count x 10^3 mm^3 was 28±42 and 21.5± 17 in NSDI group and SDI group respectively. The mean ±SD HCT % was 40.8± 6.7 in NSDI group and 36.0± 12.1 in SDI group. The mean ±SD Leukocytes Count x 10^3 mm^3 was 4400±5425 and 8050±9350 in NSDI group and SDI group respectively. (Table 3)

DISCUSSION

There has been a remarkable rise in the worldwide frequency of dengue in recent decades owing to the ineffectiveness of existing management methods including vaccinations and pesticides [9, 10]. Early diagnosis and appropriate medical care are so crucial. Since dengue is a relatively new condition, it is essential for patient management to be knowledgeable about both its clinical manifestations and laboratory testing [11, 12]. Therefore, the focus of this research was on compiling the baseline data on the demographics, clinical symptoms, and hematological profile of dengue patients in our setting. The collected data is essential for the effective treatment of dengue patients. Many studies have been published on the dengue infection but based on literature very limited research has been carried out on the clinical, demographic and hematological parameters between severe and non-severe dengue infections.

In the current study, totally 150 patients were enrolled. The patients were categorized into NSDI and SD1 group. There were 67.8% males and 32.4% females' patients in NSDI group while there were 73.7% males and 26.3% females in SD1 group. In NSDI group 22.5% patients were <18 years old and 77.5% patients were ≥18 years old while in SD1 group 10.5% patients were <18 years old and 89.5% patients were ≥18 years old. In our study dengue fever, both severe and non-severe, were observed in were observed in male's patients as compared to female's patients. These findings are in accordance with the previous study who reported more cases of dengue infection in males as compared to females [13]. Another study carried out by HOSSAIN MZ et al. reported more cases of dengue infection in males as compared to females [8]. Another study carried out by Jaiswal N et al. reported that dengue infection occurs more in females as compared to males which in concordance to our findings [14]. The socio-cultural context of that area may have contributed to these inconsistent results. A rise in outdoor activities and more mobility in Pakistan may account for the male preponderance. Similar to a research by E. Khan and M. Kisat et al., who reported that the average age was 24 years in 2007, the majority of the investigation population was younger [15]. The Dengue virus, however, may infect people of any age, based on the contact.

In our study, based on clinical parameters, fever was observed in 97.2% patients in NSDI group and 100% patients in SDI group. Headache was observed in 80.3% patients in NSDI group while it was observed in 68.4% patients in SDI group. Platelet transfusion was needed in 38.7% patients in NSDI group while it was needed in 68.4% patients in SDI group. Mucosal bleeding was observed in 15.5% patients in NSDI group while it was observed in 26.3% patients in SDI group. Additionally, it agrees with research conducted in India and Sri Lanka [16, 17]. The most common clinical manifestations in this research were headache in 81.4% patients, myalgia in 62.3%, and nausea in 62.3% and vomiting in 62.3% patients. Apart from fever, these three symptoms have been listed as the most prevalent both by national and international researchers [13, 17].

In our study, based on comparison of hematological parameters, the mean ±SD Hemoglobin g/dL was 13.52±1.9 and 12.1±2.5 in NSDI group and SDI group respectively. The mean ±SD Platelet Count x $10^3 mm^3$ was 39 ±52.5 in NSDI group and 31.5±67.6 in SDI group. The mean ±SD Lowest Platelet Count x 10^3 mm^3 was 28±42 and 21.5± 17 in NSDI group and SDI group respectively. The mean ±SD HCT % was 40.8± 6.7 in NSDI group and 36.0± 12.1 in SDI group. The mean ±SD Leukocytes Count x 10^3 mm^3 was 4400±5425 and 8050±9350 in NSDI group and SDI group respectively.

Biochemically, DF is characterized by a decrease in white blood cells (leucopenia) because infection directly suppresses bone marrow [18]. Similar findings to our study were reported by another previous study [19]. The most prevalent diagnostic test

for DF is thrombocytopenia. This research supports this assertion as well. Similar results were also reported in other studies [17, 20]. This research also showed a link between severe dengue and a declining platelet count. Plasma leakage may be predicted by the presence of a low platelet count and an elevated hematocrit.

CONCLUSION

The key to treating and predicting dengue as severe and non-severe cases is to be aware of clinical aspects as well as test results such hematological parameters. In this research, individuals with dengue fever were more likely to present with headaches and myalgia than other symptoms. The most frequent results were leucopenia, anemia, and thrombocytopenia. Therefore, these results should warn medical professionals to the risk of dengue infection in the research location.

REFERENCES

1. Islam Z, Mohanan P, Bilal W, Hashmi T, Rahmat Z, Abdi I, et al. Dengue virus cases surge amidst COVID-19 in Pakistan: challenges, efforts and recommendations. Infection and drug resistance. 2022;15:367.
2. Rigau-Pérez JG. Severe dengue: the need for new case definitions. The Lancet infectious diseases. 2006;6(5):297-302.
3. Vatandoost H, Hanafi-Bojd AA, Asgarian TS, Vatandoost H, Nikpoor F. Status of Resistant of Dengue, Yellow Fever, Chikungunya, Zika Vectors to different Insecticides in Eastern Mediterranean Region (EMRO) and Indian Subcontinent. Biomedical Journal of Scientific & Technical Research. 2021;35(2):27398-402.
4. Jahan F. Dengue fever (DF) in Pakistan. Asia Pac Fam Med. 2011;10(1):1-4.
5. Rana MS, Usman M, Alam MM, Ikram A, Salman M. Overlapping clinical manifestations of COVID-19 with endemic infectious diseases in Pakistan: A looming threat of multiple lethal combinations. Infection Ecology & Epidemiology. 2021;11(1):1873494.
6. Buliva E, Elhakim M, Tran Minh NN, Elkholy A, Mala P, Abubakar A, et al. Emerging and reemerging diseases in the World Health Organization (WHO) Eastern Mediterranean Region—progress, challenges, and WHO initiatives. Frontiers in public health. 2017:276.
7. Ahmad MH, Ibrahim MI, Mohamed Z, Ismail N, Abdullah MA, Shueb RH, et al. The sensitivity, specificity and accuracy of warning signs in predicting severe dengue, the severe dengue prevalence and its associated factors. Int J Environ Res Public Health. 2018;15(9):2018.
8. Hossain MZ, Sultana N, Sweety AA, Mahmud R, Khan MMH, Rahman MF, et al. The Predictors of the Severity of Dengue Fever: A Cross-Sectional Study in a Tertiary Care Center of Bangladesh. Journal of Dhaka Medical College. 2020;29(1):77-82.
9. Kyle JL, Harris E. Global spread and persistence of dengue. Annu Rev Microbiol. 2008;62(1):71-92.
10. Organization WH. Global strategy for dengue prevention and control 2012-2020. 2012.
11. Woyessa AB, Mengesha M, Kassa W, Kifle E, Wondabeku M, Girmay A, et al. The first acute febrile illness investigation associated with dengue fever in Ethiopia, 2013: a descriptive analysis. The Ethiopian Journal of Health Development. 2014;28(3).
12. Ahmed YM, Salah AA. Epidemiology of dengue fever in Ethiopian Somali region: retrospective health facility based study. Cent Afr J Public Health. 2016;2(2):51-6.
13. Ahsan MR, Hussain M, Hoque SA, Mridha AA, Makbul S. Dengue Fever: Clinical Characteristics of A Tertiary Care Hospital Study. Bangladesh Journal of Child Health. 2020;44(1):30-3.
14. Jaiswal NK, Chaudhary S, Chaudhary N. Clinico-Laboratory Observations and Outcome of Dengue Infection In a Tertiary Care Hospital of Western Nepal: An Observational Cross-Sectional Study. Journal of Universal College of Medical Sciences. 2017;5(2):3-7.
15. Khan E, Kisat M, Khan N, Nasir A, Ayub S, Hasan R. Demographic and clinical features of dengue fever in Pakistan from 2003–2007: a retrospective cross-sectional study. PLoS One. 2010;5(9):e12505.
16. Bandyopadhyay D, Chattaraj S, Hajra A, Mukhopadhyay S, Ganesan V. A study on spectrum of hepatobiliary dysfunctions and pattern of liver involvement in dengue infection. Journal of clinical and diagnostic research: JCDR. 2016;10(5):OC21.
17. Jayadas T, Kumanan T, Arasaratnam V, Gajapathy K, Surendran SN. The clinical profile, hematological parameters and liver transaminases of dengue NS1 Ag positive patients admitted to Jaffna Teaching Hospital, Sri Lanka. BMC Res Notes. 2019;12(1):1-5.
18. Noisakran S, Onlamoon N, Hsiao H-M, Clark KB, Villinger F, Ansari AA, et al. Infection of bone marrow cells by dengue virus in vivo. Exp Hematol. 2012;40(3):250-9. e4.
19. Daniel R, Philip AZ. A study of clinical profile of dengue fever in Kollam, Kerala, India. 2005.
20. Goweda R, Faisal A. A STUDY OF CLINICAL FEATURES AND LABORATORY PROFILE OF DENGUE FEVER IN OUTPATIENT SETTING. Malaysian Journal of Public Health Medicine. 2020;20(2):94-100.