**Int. J Med. Pharm. Res.** (P-ISSN: 2958-3675 | E-ISSN: 2958-3683)
**Available on**: https://ijmpr.in/
DOI:

International Journal
of Medical and
Pharmaceutical Research

ORIGINAL ARTICLE OPEN ACCESS

# Assess The Severity of Dengue Infection By Using C Reactive Protein Levels

**Aradhya A Shetty[1*]; Balachandra A Shetty[2]**

[1] Junior Resident, Department of General Medicine, Aj institute of Medical Sciences and Research Centre, Mangalore, Karnataka, India
[2] Professor and Head of the Department of General Medicine, Aj institute of Medical Sciences and Research Centre, Mangalore, Karnataka, India

OPEN ACCESS

**Corresponding Author**
**Aradhya A Shetty**
Junior Resident, Department of General Medicine, Aj institute of Medical Sciences and Research Centre, Mangalore, Karnataka, India

*Received: 10-04-2024*
*Accepted: 02-05-2024*
*Available online: 15-05-2024*



**A B S T R A C T**

*Background:* An extremely endemic tropical infectious disease that is rapidly spreading over the globe is dengue fever. Chronic inflammation has been connected to diabetes mellitus. The purpose of the current study was to examine the severity of dengue infection in populations with and without diabetes.
*Methods:* 48 patients with dengue infection—24 with diabetes and 24 without—were the subjects of a prospective observational research. The research entailed gathering information on dengue patients, including biochemical tests, medical histories, and demographics.
*Results:* Dengue-infected individuals with diabetes showed greater CRP{interquartile range(21.5-43),median of 35}vs non diabetic {interquartile range(4-34.5),median of 5}
*Conclusion:* In conclusion the results indicate greater levels of CRP in diabetics than non diabetics hence increase in morbidity and mortality

**Key Words**: *Dengue, severity, diabetes, C reactive protein.*

## INTRODUCTION

Dengue is a virus that is carried by arthropods and is primarily found in tropical regions. This disease has continued to spread around the world as a result of increased industrialization and globalization.[1]Dengue fever, dengue hemorrhagic fever, and dengue shock syndrome are all included in the illness spectrum.[2].An increase in the body's inflammatory response, as seen by an increase in inflammatory markers like CRP, is a characteristic of dengue. Therefore, it can have a disastrous impact on people who have diabetes. It is well known that hyperglycemia damages the endothelium, which activates T cells and causes them to release tumor necrosis factor and gamma interferon. Compared to people without diabetes, diabetics are more likely to bleed because they have weaker blood vessels. Diabetes is also known to weaken the immune system by reducing phagocytosis and chemotaxis.[3]

## 2. Materials and methods

### *2.1. Study design*

Between June and September of 2023, patients from a tertiary care hospital in south India were recruited for this hospital-based case control research. According to the Declaration of Helsinki principle, the study was carried out. In this study, 48 patients with a diagnosis of dengue fever were included; 24 of these patients had diabetes, while the remaining 24 did not.

### *2.2. Participants*

Patients between the ages of 15 and 65, those with a confirmed diagnosis of dengue fever, and those with or without diabetes for the previous five years were the eligibility requirements for enrollment. The following were the exclusion criteria: Patients with autoimmune diseases, chronic infections, neoplasia, haematological abnormalities, and pregnant

women were not allowed to participate in the study. We collected the following data for each patient in the case record form: height, weight, age, gender, and medical history (including diabetes and duration). On the first day, these patients had blood samples obtained. The following tests: serum albumin, total protein, globulin, glycated haemoglobin (HbA1c for diabetic patients exclusively), total bilirubin, direct bilirubin, AST, and ALT. Blood samples were obtained and centrifuged to produce serum for the detection of inflammatory biomarkers such as using an ELISA test kit and laboratory investigations.

*2.3. Ethical approval statement*

The study was aimed to assess the severity of dengue infection in diabetics and non diabetics of south india by assessing C Reactive Protein levels. The study has been approved by the institutional ethical committee AJ Institute Of Medical Sciences & Research Centre approval number: EC/NEW/INST/2020/741 and was performed in accordance with the declaration of Helsinki and the code of Good Clinical practice.

*2.4. Statistical analysis*

All data was expressed as interquartile range and median. Stastically analysis of the data will be performed using SPSS 20.0 using mean, standard deviation, frequency and percentage. The variables were compared using the student *t*-test between diabetic and non-diabetic patients. The MannWhitney *U* test was used to compare the difference in CRP between both the groups. A value of $p < 0.05$ was considered statistically significant.

**Table 1**

| | DM | | NDM | | | | |
|---|---|---|---|---|---|---|---|
| | **Median** | **IQR** | **Median** | **IQR** | **U value** | **p value** | |
| **HBA1C** | **7.05** | **(6.7-9.1)** | | | | | |
| **RBS** | **229.50** | **(110-308.5)** | **99.00** | **(88.5-108)** | **56.5** | **0.000** | |
| **DB** | **0.75** | **(0.55-0.95)** | **0.80** | **(0.6-0.9)** | **275.5** | **0.795** | |
| **AST** | **55.00** | **(44.5-98)** | **43.50** | **(37.5-51.5)** | **180.5** | **0.026** | **Significant** |
| **ALT** | **56.00** | **(44.5-85.5)** | **45.00** | **(34-51)** | **203.5** | **0.081** | |
| **ALK** | **102.00** | **(88.5-116.5)** | **88.00** | **(79.5-107.5)** | **213** | **0.122** | |
| **ALB** | **4.05** | **(4-4.2)** | **4.05** | **(4-4.2)** | **270.5** | **0.713** | |
| **CRP** | **35.00** | **(21.5-43)** | **5.00** | **(4-34.5)** | **158** | **0.007** | **Significant** |
| **PLATELET** | **102000.00** | **(79100-184115)** | **175500.00** | **(154000-221000)** | **155.5** | **0.006** | **Significant** |
| **TC** | **4450.00** | **(3484-5600)** | **5400.00** | **(4539-7595)** | **194.5** | **0.054** | |

**Table 2**

| | | DM | | | Chi square | p value |
|---|---|---|---|---|---|---|
| | | **N** | **Y** | **Total** | | |
| **FEVER** | **Y** | **24(100%)** | **24(100%)** | **48(100%)** | | |
| **Total** | | **24(100%)** | **24(100%)** | **48(100%)** | | |

**Table 3**

| **Myalgia** | **DM** | | **Total** | **Chi Square** | **P value** |
|---|---|---|---|---|---|
| | **N** | **Y** | | | |
| **N** | **8(33.3%)** | **2(8.3%)** | **10(20.8%)** | | |
| **Y** | **16(66.7%)** | **22(91.7%)** | **38(79.2%)** | | |
| **Total** | **24(100%)** | **24(100%)** | **48(100%)** | **4.547** | **0.033** |

**Table 4**

| **Bleeding** | | **DM** | | **Total** | **Chi square** | **P value** |
|---|---|---|---|---|---|---|
| | | **N** | **Y** | | | |
| | **N** | **21(87.5%)** | **19(79.2%)** | **40(83.3%)** | | |
| | **Y** | **3(12.5%)** | **5(20.8%)** | **8(16.7%)** | **0.6** | **0.439** |
| **Total** | | **24(100%)** | **24(100%)** | **48(100%)** | | |

**Table 5**

| | | DM | | Total | Chi square | p value |
|---|---|---|---|---|---|---|
| | | N | Y | | | |
| **Vomiting** | **N** | **18(75%)** | **15(62.5%)** | **33(68.8%)** | **0.873** | **0.35** |
| | **Y** | **6(25%)** | **9(37.5%)** | **15(31.3%)** | | |
| **Total** | | **24(100%)** | **24(100%)** | **48(100%)** | | |

**Table 6**

| | | DM | | Total | Chi square | p value |
|---|---|---|---|---|---|---|
| | | N | Y | | | |
| **Petechiae** | **N** | **18(75%)** | **14(58.3%)** | **32(66.7%)** | **1.5** | **0.221** |
| | **Y** | **6(25%)** | **10(41.7%)** | **16(33.3%)** | | |
| **Total** | | **24(100%)** | **24(100%)** | **48(100%)** | | |

**Table 7**

| | | DM | | Total | Chi Square | p value |
|---|---|---|---|---|---|---|
| | | N | Y | | | |
| **Gender** | **F** | **5(20.8%)** | **11(45.8%)** | **16(33.3%)** | **3.375** | **0.066** |
| | **M** | **19(79.2%)** | **13(54.2%)** | **32(66.7%)** | | |
| **Total** | | **24(100%)** | **24(100%)** | **48(100%)** | | |

**Results**

The study population (n = 48) was selected based on its sociodemographics, symptoms, type of bleeding, and laboratory features. Of these, 24 individuals had dengue with diabetes and 24 individuals had dengue without diabetes. The bleeding sites, which comprised petecheia, malena, and epistaxis, were also evaluated; $p>0.05$ indicates that there is no statistically significant difference between the study groups.

The clinical characteristics such as bleeding, abdominal pain, vomiting, gender not statistically significant as $p>0.05$.Myalgia is stastically significant with ($p \leq 0.05$). Labarotory parameters such as AST, TP (total protein), CRP, Platelets is stastically significant with ($p \leq 0.05$). TB (total bilirubin), ALT, Alkalinephosphatase, Albumin, Globulin, Total count not stastically significant $p>0.05$. C reactive protein was found to be more in subjects suffering with dengue and diabetes as compared to those with dengue without diabetes and were also found to statistically significant ($p \leq 0.05$).

**Discussion**

Dengue fever and diabetes are becoming more commonworldwide. Determining the connection between dengue and diabetes mellitus is crucial, though.[4] Furthermore, people with uncontrolled or poorly controlled diabetes may experience higher rates of morbidity and mortality from dengue than from those without the disease [5]

In the current investigation, diabetic patients exhibited a higher proportion of elevated inflammatory markers and decreased platelet counts, indicating a potential risk factor for more severe dengue infection.[6] It is currently unclear what pathophysiology underlies diabetes's ability to produce Dengue Haemorrhagic Fever (DHF), despite the fact that numerous studies have shown that the disease can impair endothelium and immune function[7].

Adult dengue patients with diabetes were more likely to develop DHF, according to a retrospective case control analysis conducted by Pang et al. in a prior study [8]. In 2006, Chen and colleagues showed that elevated serum levels of inflammatory markers (IL-6, IL-10, and CRP) were positively linked with the severity of the disease, suggesting that diabetes may be a risk factor for death in adult DHF patients [9]

According to Singh et al., those with diabetes who had dengue infection had higher levels of CRP, IL-8, Endocan, and Perfusion Index than people without the disease[3]

Raj et al. conducted a case control study over a 12-month period and found that, regardless of the severity of other symptoms like thrombocytopenia, hyperglycemia is associated with a worse outcome in diabetic dengue patients.[10] The increasing prevalence of diabetes and dengue fever worldwide highlights the need for additional study in this field. Verifying dengue infection and identifying its effects in diabetics as soon as possible are urgent priorities.

.[3]This study also shows that patients with diabetes had significantly higher serum levels of the inflammatory marker CRP than did people without diabetes.

**CONCLUSION**

Dengue fever has been a growing concern all over the world and the cases of diabetes mellitus is increasing worldwide especially in the Asian population.Hence studies corelating the severity of dengue infection with glycemic control have gained importance over the years.This study has showen that patients with dengue and diabetes had greater severity of symptoms like myalgia and also increased inflammatory markers like CRP.

**Consent:** Not applicable
**Conflict of Interest:** Nil

## REFERENCES


1. S. Bhatt, P.W. Gething, O.J. Brady, J.P. Messina, A.W. Farlow, Moyes Clet al, The global distribution and burden of dengue, Nature (Lond.) (7446) (2013) 504–507.
2. Latt, K. Z., Poovorawan, K., Sriboonvorakul, N., Pan-ngum, W., Townamchai,N.,&Muangnoicharoen, S. (2020). Diabetes mellitus as a prognostic factor for dengue severity: Retrospective study from Hospital for Tropical Diseases, Bangkok. *Clinical Infection in Practice*, *7-8*, 100028. https://doi.org/10.1016/j.clinpr.2020.100028
3. Singh, R., Goyal, S., Aggarwal, N., Mehta, S., Kumari, P., Singh, V., Chopra, H., & Emran, T. B. (2022). Study on dengue severity in diabetic and non-diabetic population of tertiary care hospital by assessing inflammatory indicators. *Annals of Medicine and Surgery*, *82*, 104710.https://doi.org/10.1016/j.amsu.2022.104710
4. J. Pang, A. Salim, V.J. Lee, M.L. Hibberd, K.S. Chia, Y.S. Leo, D.C. Lye, Diabetes with hypertension as risk factors for adult dengue hemorrhagic fever in a predominantly dengue serotype2 epidemic: a case control study, PLoSNegl. Trop. Dis. 6 (2012) e1641.
5. Lee, I.-K., Hsieh, C.-J., Lee, C.-T., & Liu, J.-W. (2020). Diabetic patients suffering dengue are at risk for development of dengue shock syndrome/severe dengue: Emphasizing the impacts of co-existing comorbidity(ies) and glycemic control on dengue severity. *Journal of Microbiology,Immunologyand Infection*, *53*(1), 69–78. https://doi.org/10.1016/j.jmii.2017.12.005
6. W.A. Hsueh, C.J. Lyon, M.J. Quinones, Insulin resistance and the endothelium, Am. J. Med. 117 (2004) 109–117.
7. P. Dandona, A. Alijada, A. Chaudhuri, P. Mohanty, Endothelial dysfunction, inflammation and diabetes, Rev. Endocr. Metab. Disord. 5 (2004) 189–197. predominantly dengue serotype 2 epidemic: a case control study, PLoSNegl. Trop. Dis. 6 (2012) e1641.
8. J. Pang, A. Salim, V.J. Lee, M.L. Hibberd, K.S. Chia, Y.S. Leo, D.C. Lye, Diabetes with hypertension as risk factors for adult dengue hemorrhagic fever in a predominantly dengue serotype 2 epidemic: a case control study, PLoSNegl. Trop. Dis. 6 (2012) e1641.
9. L.C. Chen, H.Y. Lei, C.C. Liu, S.C. Shiesh, S.H. Chen, H.S. Liu, Y.S. Lin, S.T. Wang, H.W. Shyu, T.M. Yeh, Correlation of serum levels of macrophage migration inhibitory factor with disease severity and clinical outcome in dengue patients, Am. J. Trop. Med. Hyg. 74 (1) (2006 Jan 1) 142–147.
10. Raj S, Kk M, Rajan GV. PROGNOSTIC SIGNIFICANCE OF POLYSEROSITIS.