

ORIGINAL ARTICLE

Association of Serum Albumin Levels with Severity of Illness in Patients with Dengue Fever at Margalla Institute of Health Sciences, IslamabadMuhammad Afzal¹, Zubia Hassan², Saad Afzal³, Rimsha Azhar^{4*}, Huzaifa Quershi⁵, Samra Hassan⁵**ABSTRACT****Objective:** To identify the association of serum albumin levels with the severity of illness in patients diagnosed with dengue fever**Study Design:** Cross-sectional study.**Place and Duration of Study:** The study was conducted at the Medicine Department of Margalla Institute of Health Sciences Islamabad, Pakistan from July 2022 to June, 2023.**Methods:** A total of 82 diagnosed cases of dengue fever were included in the study. All the baseline investigations were done including serum albumin at the time of diagnosis. The severity of the illness was determined on the basis of platelet counts during the first week of illness. The association of various socio-demographic factors including albumin levels was determined with the severity of illness in the study participants.**Results:** The mean age of study participants was 32.6±8.71 years with 56 (68.3%) were males and 26 (31.7%) were females. Out of 82 dengue fever patients, 61 (74.4%) had mild illness while 21 (25.6%) had severe form of dengue fever. 53 (64.6%) had normal albumin levels while 29 (35.4%) had deranged albumin levels. Pearson chi-square analysis revealed that deranged albumin levels and wide pulse pressure had statistically significant relationship with presence of severe dengue fever in our study participants (P -value <0.001).**Conclusion:** Patients with deranged albumin levels and wide pulse pressure during the course of illness were more at risk of having severe dengue fever.**Keywords:** Albumin, Association, Dengue Fever.**How to cite this:** Afzal M, Hassan Z, Afzal S, Azhar R, Quershi H, Hassan S. Association of Serum Albumin Levels with Severity of Illness in Patients with Dengue Fever at Margalla Institute of Health Sciences, Islamabad. *Life and Science*. 2024; 5(3): 350-354. doi: <http://doi.org/10.37185/LnS.1.1.495>This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International license. (<https://creativecommons.org/licenses/by-nc/4.0/>). Non-commercial uses of the work are permitted, provided the original work is properly cited.**Introduction**Pakistan had been badly hit with the dengue fever epidemic in the last few years.¹ Lower and middle-¹Department of Medicine
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Received: Oct 05, 2023; Revised: Jan 20, 2024

Accepted: Feb 26, 2024

income countries other than Pakistan have also been affected by this disease which accompanies significant mortality and morbidity.² Health care departments at various levels have been trying their level best to prevent and manage this condition but still hundreds of people die or suffer from life-threatening complications with dengue fever in almost all parts of our country.³Dengue fever is a syndromic illness manifesting in number of ways ranging from mild fever with body aches to severe hematological problems leading to multi-organ failure and even death.⁴ In a few patients, platelet count gets affected and the disease is then regarded as severe needing aggressive management in the hospital setting preferably high dependency unit with trained staff.⁵ Abnormalities of other biochemical parameters have also been well documented among patients suffering from this

potentially lethal condition.⁶

Various parameters have been used to assess the severity of illness in patients diagnosed with dengue fever. Ayaz *et al.* in their study published in 2020 tried to analyze the relationship of deranged hepatic enzymes with the severity of illness in dengue patients.⁷

The burden of dengue fever in our part of the world needs no highlighting as figures have been alarming in recent past. Qamash *et al.* in 2021 published an epidemiological study in this regard and revealed statistics from Swabi, city of Khyber Pakhtun khaw.⁸ A lot of work has been done on epidemiological statistics regarding dengue fever but limited work has been done to look for predictors of severe disease in our part of the world. We therefore planned this study with the rationale of looking for association of albumin levels and other socio-demographic factors with the severity of illness in patients diagnosed with dengue fever at our hospital in the capital city of Pakistan.

Methods

This cross-sectional study was conducted for one year at the Medicine Department, Margalla Institute of Health Sciences Islamabad, Pakistan from July 2022 to June 2023. Sample size was calculated by using the WHO sample size calculator by using population prevalence proportion of severe dengue fever as 29.7% and the margin of error as 5%.⁹ Non-probabilities consecutive sampling technique was used to gather the sample from medicine, infectious diseases, and specialized ward for dengue patients.

Inclusion Criteria: Male/female patients of both genders between age 18-60 years who were diagnosed with dengue fever were included.

Exclusion Criteria: Those labeled as having pyrexia of unknown origin or any diagnosed comorbid infection or cause of fever in addition to dengue fever were excluded from the study. Those who were on steroids or any other medications that could have affected the serum albumin levels or liver function were also the part of exclusion criteria. Diagnosed cases of any nutritional, metabolic, or hepatic disorders were not included as well.

The hospital Ethical Committee granted ethical approval for this study on dated: 14th June 2022 vide IRB letter reference number: DZ/157/22. All the

confirmed cases of dengue fever based on clinical and laboratory findings by the consultant medical specialist. Patients underwent all baseline investigations including serum albumin levels at the time of diagnosis. The normal lower limit of serum albumin levels was taken as 34 g/L.⁷ Severe dengue fever was classed as patients having dengue hemorrhagic fever or dengue shock syndrome.^{10,11} Wide pulse pressure was considered if pulse pressure was more than 25 mm of Hg.¹²

In the statistical analysis, SPSS for Windows (version 23.01) was used. Mean and Standard deviation were calculated for the age of the patients. The frequencies and percentages were calculated for gender, presence of serious illness, and patients with deranged clinical, hematological, and biochemical parameters. Factors like age, gender, deranged white cell count, and deranged albumin levels were associated with the presence of severe illness in the target population with the help of the Pearson chi-square test. The *P*-value for the chi-square test was considered significant if it was less than or equal to 0.05.

Results

After application of inclusion and exclusion criteria set at start of the study, 82 patients with confirmed diagnosis of dengue fever were included in the study. The mean age of study participants was 32.6±8.71 years. 56 (68.3%) were males while 26 (31.7%) were females. Table-1 summarizes the general characteristics of the study participants. Out of 82 dengue fever patients, 61 (74.4%) had mild illness while 21 (25.6%) had severe form of dengue fever. 53 (64.6%) had normal albumin levels while 29 (35.4%) had deranged albumin levels.

Table-2 summarizes the results of Pearson chi-square analysis. It was revealed that deranged albumin levels and wide pulse pressure had statistically significant relationship with the presence of severe dengue fever in our study participants (*P*-value<0.001).

Discussion

Deranged albumin levels had strong association with severe form of illness in patients suffering from dengue fever. Pakistan has been facing dengue fever epidemic periodically in last few years especially in months of September, October, and November.

Table-1: Demographic characteristics of the study population with dengue fever

Study Parameters	n (%)
Age (years)	
Mean \pm SD	32.6 \pm 8.71 years
Gender	
Male	56 (68.3%)
Female	26 (31.7%)
Severity of illness	
Mild	61 (74.4%)
Severe	21 (25.6%)
White cell count	
Normal	51 (62.2%)
Deranged	31 (37.8%)
Pulse pressure	
Normal	64 (78.1%)
Wide	18 (21.9%)
Albumin levels	
Normal	53 (64.6%)
Deranged	29 (35.4%)

Table-2: Association between severity of dengue fever and different studied variables

	Mild illness	Severe illness	P-value
Age			
40 year or less	44 (72.1%)	18 (85.7%)	0.193
>40 years	17 (27.9%)	03 (14.3%)	
Gender			
Male	42 (68.8%)	14 (66.7%)	0.853
Female	19 (31.2%)	07 (33.3%)	
Albumin levels			
Normal	48 (78.6%)	05 (23.8%)	<0.001
Deranged	13 (21.4%)	16 (76.2%)	
Pulse pressure			
Normal	55 (90.1%)	09 (42.8%)	<0.001
Wide	06 (9.9%)	12 (57.2%)	

Morbidity and mortality associated with this illness remain a concern for health professionals. A lot of work has been done to look for predictors of severe morbidity and mortality in these patients but still more effort is required to generate conclusive findings. We therefore planned this study with the objective to look for association of albumin levels and other socio-demographic factors with severity of illness in patients diagnosed with dengue fever at our hospital.

A study performed in 2021 on the Indian population analyzed the difference in various hematological parameters in different types of dengue fever. It was

concluded that patients with high Alanine transaminase (ALT) levels at time of presentation had more chances of developing a severe form of illness in subsequent time.¹³ Dash et al. published a large data set of 10 years regarding dengue fever in infants in 2021. They studied 395 infants and concluded that fifty-three infants had severe dengue, and 39 had shock. They also concluded that low serum albumin levels predicted the development of severe dengue in their study participants.¹⁴

A systematic review published in 2021 targeted studies done on patients in the febrile phase of dengue fever.¹⁵ Authors in this review tried to look for

the determinants of severe illness in these patients. It was concluded that platelet count, serum albumin, Aspartate aminotransferase (AST), and ALT levels were associated with severe forms of illness and should be monitored at the beginning and during the course of the febrile period in order to detect high-risk cases early. We didn't include serum ALT or AST levels or any other biochemical parameters in our analysis but generated similar findings regarding serum albumin levels.

Khetpal et al. in 2021 performed a study to look for association of C-reactive protein and hepatic markers with severe form of illness in patients managed for dengue fever.¹⁶ It was revealed in their study that both of these markers were associated with severe forms of illness in their participants and could be used to predict severity in these patients. Our results supported their findings in a sense that we in our analysis found out that patients who has deranged albumin levels and wide pulse pressure during the course of illness were more at risk of having severe dengue fever.

Liver dysfunction leading to increased interleukin levels resulting in a severe form of dengue fever was described in 2016 by Senaratne et al. They revealed that liver enzymes and IL levels may be helpful in determining the patients who may be at high risk for having a severe form of dengue fever.¹⁷ We produced similar results for albumin levels and also wide pulse pressure. More studies in the local population can refine our results.

A prospective study was published in Srilanka regarding the evaluation of biochemical and hematological changes in dengue fever and dengue hemorrhagic fever.¹⁸ They found out that deranged albumin and cholesterol levels at days 2 and 3 may predict severe illness and hemorrhagic fever in patients suffering from dengue fever. Our results supported the findings generated in Sri Lankan population as serum albumin levels predicted severe form of illness in our study participants along with wide pulse pressure.

Multiple studies^{13,14,19-23} done in past have concluded that repeated and targeted recordings of pulse pressure and albumin levels could not only be beneficial for the patient but also for the treating team in order to prioritize the high risk patients

which could develop severe form of illness.^{13,14,19-23}

Similar results have been generated by our data set.

Clinical and laboratory parameters were not studied before the diagnosis of dengue fever. This study design cannot conclude that severe illness leads to deranged albumin levels or that deranged albumin levels lead to severe dengue fever. Moreover, clinical or hematological complications were not studied and confounding factors were not controlled strictly.

Conclusion

A moderate number of patients diagnosed with dengue fever had a severe form of illness. Patients who have deranged albumin levels and wide pulse pressure during the course of illness were more at risk of having severe dengue fever.

Acknowledgment: None

Conflict of Interest: The authors declare no conflict of interest

Grant Support and Financial Disclosure: None

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Authors Contribution

MA: Idea conception, study designing, data collection, data analysis, results and interpretation
ZH: Idea conception, study designing, data collection, data analysis, results and interpretation
SA: Study designing, data collection
RA: Study designing, data analysis, results and interpretation, manuscript writing and proofreading
HQ: Data collection
SH: Manuscript writing and proofreading