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Original Research Article

A novel intervention altering disease course in children with dengue: an observational study

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ABSTRACT

Background: Dengue fever has emerged as a global public health problem in recent decade, clinical spectrum of disease ranges from mild fever to life threatening dengue shock syndrome. The disease is characterized by thrombocytopenia, hypoalbuminemia and increased capillary permeability leading to third space fluid loss viz ascites, pleural effusion pericardial effusion. This study aims to show that therapeutic intervention (viz albumin transfusion under supervised diuretic cover) during onset of critical phase significantly reduces progression of disease, morbidity and mortality.
Methods: In this observational study enrolled confirmed dengue cases, requiring hospitalization. Basic lab parameters viz complete blood count, liver functions, renal functions, C-reactive proteins, chest X-ray were obtained. Pre requisites prior to albumin infusion were; urine output >0.8 ml/kg/hour, normal renal functions and no shock/hypotension.
Results: We found improved outcomes using this intervention in dengue patients early identification of onset of critical phase and intervening during that phase significantly reduced the morbidity/mortality. Out of remaining 78 cases, 24 children developed critical phase, they were managed and transfused albumin infusion under diuretic cover. None of children who received albumin transfusion had mortality.
Conclusions: Early identification of onset of critical phase and intervening during that phase significantly reduced the morbidity/mortality as well duration of ICU/hospital stay. We believe albumin transfusion under supervised diuretic cover, also preventing development of major life-threatening complications viz dengue shock syndrome.

Keywords: Dengue fever, Albumin transfusion, Dengue shock syndrome

INTRODUCTION

Dengue fever contributes to a high disease burden and mortality across tropical and subtropical regions of south east Asia, Africa, Westren Pacific and America.[1] It is one of the common vector born disease, and the most rapidly spreading mosquito born viral disease in the world. It is caused by dengue virus which is single standard RNA virus (Flavi-virus family) from genus.[2,3] Dengue virus comprises five serotypes DENV-1, DENV-2, DENV-3, DENV-4 and DENV-5. The vector for this disease is *Aedes aegypti* mosquito.[4-6] Dengue infection is frequently confused with other febrile illness unless diagnosed early. Patient may land up in dengue shock syndrome which may lead to death, particularly in children.[4,7-9]

Aim and objectives

This study aimed at early therapeutic intervention (viz albumin transfusion under supervised diuretic cover)

during onset of critical phase, which showed significant impact in early recovery, reduced hospital stay, morbidity and mortality by preventing disease sequences, dangerous life-threatening complications including financial benefit for patients.

METHODS

Study design, location and duration

The current study was a cross-sectional study conducted at Sarvodaya Institute, located in Faridabad, Haryana, for a duration of four years from September 2017 to September 2021. Enrolled cases were children having confirmed dengue disease (infection), requiring hospitalization.

Selection criteria and procedure

Diagnosis of dengue infection was based on: NS1 (Ag) positivity and/or dengue IgM Ab (+ve). Enrolled cases were children having confirmed dengue disease (infection), requiring hospitalization were included. Dengue cases who did not need hospitalization managed on OPD basis were not included in this study. NS1 (Ag) is envelop protein present in early phase of infection, whereas dengue IgM Ab appears at day 3-5 of dengue infection.[10] Basic lab parameters viz complete blood count, liver functions, renal functions, C-reactive proteins, chest X-ray were obtained. Pre requisites prior to albumin infusion were; urine output >0.8 ml/kg/hour, normal renal functions and no shock/hypotension. Children who entered in critical phase were identified clinically, they developed severe abdominal pain, respiratory difficulty, required oxygen support, onset of peri orbital puffiness, edema, confirmed by rise in hematocrit, detection of third space fluid loss (ascites, pleural effusion, peri cardial effusion), low serum albumin, worsening of thrombocytopenia. These children were then given 20% albumin infusion (1 gm/kg with ceiling dose of 20 gm) under diuretic cover (furosemide in dose of 1 mg/kg). Studies were done previously about albumin infusion in Dengue children after developing complication but here early identification of onset of critical phase and intervening during that phase before developing complications it significantly reduced the morbidity/mortality. Enrolled cases were children having confirmed dengue disease (infection) taken as sample size in last four years as above mentioned. Descriptive statistics was analyzed with SPSS version 28.0 software. Data are expressed/presented as frequencies and percentages.

Ethical approval information was received.

RESULTS

Total 80 confirmed cases of dengue were admitted in span of 4 years from September 2017 to September 2021. Age group 3 months to 14 years. Of these 80 dengue patients, 2 children were admitted directly to PICU as they had hypotension/established critical phase, they were fluid resuscitated, none required Ionotropic support subsequently given albumin infusion. Out of remaining 78 cases, 24 children developed critical phase, they were subsequently transferred to PICU where they were managed and were transfused albumin infusion under diuretic cover. Off these 26 (above cases 2+24) children, 13 required oxygen support, 7 children NPO2, 6 children on Bi-PAP Support, 15 children had abdominal pain with moderate ascites, 7 children had bleed viz petechiae, epistaxis requiring platelet transfusion, none of them had internal bleed viz CNS/abdominal bleed (Table 1).

Table 1: Clinical presentation at onset of critical phase.

Clinical presentation at onset of critical phase	N	%
Abdominal pain	15	57
Respiratory distress	13	50
Ascites	15	57
Bleeding	07	26
Hypotension/shock	02	07

Total 12 children had ICU stay of 1 day, 12 children needed ICU for 2 days, 2 children had ICU stay for 5 days and demographic data of patients mentioned in (Table 2 and 3). 17 Children received 1 unit of albumin transfusion, 06 children received 2 units albumin transfusion, 03 children received 3 units albumin transfusion.

Table 2: Duration of ICU stay.

Duration of ICU stay (days)	N	%
1	12	46
2	12	46
5	5	19

Table 3: Demographic data of patients.

Parameters	N	%
Age group		
1 month to 1 year	1	3.8
1 year to 5 years	3	11.5
6 years to 10 years	14	53.8
11 years to 15 years	8	30.7
Gender		
Females	12	46.1
Males	14	53.8

Post-transfusion it was noticed that breathing difficulty improved, pain abdomen subsided, oxygen support was tapered early, urine output normalized. As can be seen duration of ICU stay significantly reduced as compared to standard fluid (crystolloid) therapy. One child who developed AKI (acute kidney injury) couldn't be given albumin transfusion later succumbed to illness. None of

children who received albumin transfusion had mortality. Children who had obesity (BMI>25) had greater severity of disease and required prolonged ICU stay.

DISCUSSION

Dengue fever is usually a self-resolving viral infection However, few patients develop what is called as critical phase where, there is leakage of plasma owing to Increase capillary permeability. It is in these patients where morbidity and mortality are high. The capillary leak leads to accumulation of fluid in third spaces viz peritoneum/pleura/pericardium, leading to hemo-concutration/hypovolemia, there by leading to death.[11] According to literature, albumin parameter is an early indicator of plasma leakage and useful prognostic marker.[12,13] In our study 26 patients who had low albumin levels (<3 average 2.8) were infused with albumin (20%) under supervised diuretic (loop diuretic furosemide in dose of 1 mg/kg) cover, at the time of critical phase onset. This study results showed early recovered, less duration of hospital stays (especially in ICU), without morbidity and mortality along with financial benefit for patients.

On reviewing literatures, low serum albumin had been found as an early indicator of plasma leakage, the loss of albumin because of increased capillary permeability leads to drop in capillary osmotic pressure there by leading to third spacing. Therefore, early detection of onset of critical phase and timely infusion of albumin with diuretic, shows to be protection against morbidity/mortality, reduced ICU-stay duration.

Limitations

Limitation of current study was that it was an observational study conducted without control group.

CONCLUSION

As evidenced from above discussion early identification of onset of critical phase and intervening during that phase significantly reduced the morbidity/mortality as well duration of ICU/hospital Stay. We believe albumin transfusion under supervised diuretic cover, drastically reduces the need for ICU stay, also preventing development of major life-threatening complications viz dengue shock syndrome.

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REFERENCES

1. Tantawichien T. Dengue fever and dengue hemorrhagic fever in adolescents and adults. Pediatr Int Child Health. 2012;32(1):22-7.
2. World health organization: a global brief on vector-borne diseases. Available at: https://www.who.int/. Accessed on 20 December 2021.
3. Special programme for research and training in tropical diseases. Dengue hemorrhagic fever: diagnosis, treatment, prevention and control. Available at: https://www.who.int/. Accessed on 20 December 2021.
4. Low JG, Ong A, Tolfvenstam T, Lai YL, Ng LC, Leo YS, et al. Decision tree algorithms predict the diagnosis and outcome of dengue fever in the early phase of illness. PLoS Negl Trop Dis. 2008;2(3):e196.
5. Normile D. Tropical medicine. Surprising new dengue virus throws a spanner in disease control efforts. Science. 2013;342(6157):415.
6. Dwivedi VD, Tripathi IP, Tripathi RC, Bharadwaj S, Mishra SK. Genomics, proteomics and evolution of dengue virus. Brief Function Genomics. 2017;16(4):217-27.
7. Manock SR, Jacobsen KH, de Bravo NB, Russell KL, Negrete M, Olson JG, et al. Etiology of acute undifferentiated febrile illness in the Amazon basin of Ecuador. Am J Trop Med Hyg. 2009;81(1):146-51.
8. Huy R, Buchy P, Conan A, Ngan C, Ong S, Ali R, et al. National dengue surveillance in Cambodia 1980-2008: epidemiological and virological trends and the impact of vector control. Bull World Health Organ. 2010;88(9):650-7.
9. Sam SS, Omar SF, Teoh BT, Abd-Jamil J, AbuBakar S. Review of dengue hemorrhagic fever fatal cases seen among adults: a retrospective study. PLoS Negl Trop Dis. 2013;7(5):e2194.
10. Blacksell SD. Commercial dengue rapid diagnostic tests for point-of-care application: recent evaluations and future needs? J Biomed Biotechnol. 2012;2012:151967.
11. Singla M, Kar M, Sethi T, Kabra SK, Lodha R, Chandele A, et al. Immune response to dengue virus infection in pediatric patients in New Delhi, India-Association of Viremia, inflammatory mediators and monocytes with disease severity. PLoS Negl Trop Dis. 2016;10(3):e0004497.
12. Thyegaraj A. Dengue. Int J Adv Med. 2020;2(5):814-6.
13. Jagadish KK, Jain P, Manjunath VG, Umesh L. Hepatic Involvement in dengue fever in children Ironian J Pediatr. 2012;22(2):231-6.

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