JAMP

Original Research Article

A STUDY OF RELATION BETWEEN DENGUE SEVERITY AND NUTRITIONAL STATUS OF PATIENT

Subrahmanya Bharadwaj Mukkamala[1], Akella L N Priyanka[2], Akella L S Sivanand[3], Kotha Abhinandana Reddy[4]

[1]Specialist General Medicine, LG Hospitals, Visakhapatnam, India
[2]Specialist Pathologist, Unipath Speciality Laboratory, Visakhapatnam, India
[3]MBBS 3rd year student, Andhra Medical College, Visakhapatnam, India
[4]MBBS 2nd year student, Katuri Medical College, Guntur, India

Abstract

Background: Dengue is a fast-emerging mosquito-borne viral disease posing significant global public health challenges, particularly in Southeast Asia and India. An important factor in assessing the severity of dengue infections is nutritional condition. Malnutrition has historically been linked to weakened immunity, but because it alters immunological responses, it may provide some protection against serious consequences like DSS. **Materials and Methods:** This cross-sectional, observational study, conducted at St. Philomena's Hospital, Bangalore, from July 2023 to June 2024, examined the relationship between dengue severity and nutritional status in 100 adult patients. Nutritional status was categorized based on standard BMI and skinfold thickness cut-offs specific to Asian populations. **Result:** The study revealed that 46% of the patients were ≤30 years, with an equal gender distribution (49% male, 51% female). Dengue Hemorrhagic Fever (DHF) was the most prevalent manifestation (85%), followed by Dengue Shock Syndrome (DSS, 6%). Higher BMI and hypertension were significantly associated with increased disease severity (p=0.036 and p=0.017, respectively), while diabetes and hypothyroidism showed no such association. Bleeding manifestations were observed in 35% of patients, with gum bleeding and melena being the most common. **Conclusion:** This study highlights the critical role of early recognition, nutritional assessment, and targeted interventions for high-risk groups, particularly overweight individuals and those with comorbidities, to mitigate the disease burden.

INTRODUCTION

Dengue is a fast-emerging mosquito-borne viral disease caused by four serotypes of the arbovirus-flavivirus (Den 1 to 4). It is a major public health concern globally, with Southeast Asia and the Western Pacific Region bearing 75% of the disease burden. India is heavily affected, with dengue endemic in 16 states, including Kerala, Karnataka, and Maharashtra, where favorable climatic conditions and poor water management promote mosquito breeding.[1] Dengue symptoms range from fever, headache, and joint pain to severe manifestations like Dengue Hemorrhagic Fever (DHF) and Dengue Shock Syndrome (DSS). Early diagnosis and prompt treatment significantly reduce mortality from over 20% to less than 1%.[2]

The increasing incidence of dengue is closely linked to urbanization, population growth, and poor sanitation practices, which provide ideal conditions for the Aedes aegypti mosquito to thrive. India has seen a steady rise in cases, particularly in urban centers like Bangalore. Effective control requires robust disease and vector surveillance systems to identify outbreaks early and implement timely interventions. Integrated vector management strategies, especially during high-risk post-monsoon seasons, are essential for reducing transmission.[3]

Nutritional status plays a critical role in determining the severity of dengue infections. Malnutrition is traditionally associated with impaired immunity but may offer some protection against severe complications like DSS due to altered immune responses.[4] Conversely, obesity, linked to increased inflammation, is a significant risk factor for DHF. These contrasting effects underscore the need for detailed research on the relationship between nutritional status and dengue severity, especially in developing countries like India, where obesity and poor hygiene coexist.[5] Given the dual challenges of rising obesity and high dengue transmission rates, studying the impact of nutrition on dengue outcomes

555

International Journal of Academic Medicine and Pharmacy (www.academicmed.org)
ISSN (O): 2687-5365; ISSN (P): 2753-6556

is vital for public health planning. Understanding the influence of factors like age, sex, and comorbidities can improve disease management and inform targeted interventions.

MATERIALS AND METHODS

This study was conducted in the Department of Medicine at St. Philomena's Hospital, Bangalore, to examine the relationship between dengue severity and nutritional status. It was a cross-sectional, observational study carried out over two years, from July 2023 to June 2024. A sample of 100 patients aged 18 years and above with confirmed dengue fever was selected using simple random sampling. Patients with thrombocytopenia (<1 lakh/cu.mm) and either Dengue NS1 Antigen or Dengue IgM/IgG positivity were included, while those unwilling to participate were excluded. The sample size was calculated using the formula 4pq/d2, based on a prevalence of 7% derived from the same hospital data for years 2023–2024. Data collection involved interviews to obtain demographic information, medical history, and symptoms, followed by clinical examinations. Height, weight, and triceps skinfold thickness were measured to assess body mass index (BMI) and fat reserves. Nutritional status was categorized based on standard BMI and skinfold thickness cut-offs specific to Asian populations.

Ethical clearance was obtained from the institutional review board, and informed consent was taken from all participants. Statistical analysis was conducted using Microsoft Excel, with chi-square tests for categorical variables and mean ± SD for continuous variables. Data was visually represented using bar and pie charts. A p-value of ≤0.05 was considered statistically significant, helping to establish associations between nutritional status and dengue severity.

RESULTS

The study was conducted on all in-patients who satisfy inclusion criteria, and among 100 study subjects, most common age group affected were ≤ 30 years (46%) followed by 31-40 years (30%). Both sexes were equally affected, male 49% and female 51%. About 65% study population had no bleeding manifestations. Among patients with bleeding manifestations, most common was gum bleeding followed by melena, menorrhagia, petechial skin rash and hematemesis. 42% patients presented with dehydration and 15% had hypotension. About 64% had thrombocytopenia <50,000 cells/cu.mm. 51% patients treated with SDP and 2 patients treated with RDP. Most patients in the study had no comorbidities. In patients with comorbidities, 10% had Diabetes, 8% had hypothyroidism and 4% had hypertension. Most patients had gall bladder wall edema, mild hepatomegaly, mild ascites in abdominal ultrasonography with transaminitis. In transaminitis, SGOT was more elevated than SGPT. There was significant association found between hypertension and dengue severity. There was no association noted between dengue severity and age, gender, diabetes mellitus and hypothyroidism.

Table 1: Basic Clinical variables in the study.

Variable	Frequency	Percentage
Gender		
Male	49	49.0
Female	51	51.0
Dehydration		
Present	42	42.0
Absent	58	58.0
Hypotension		
Present	15	15.0
Absent	85	85.0
Platelet Count (in Lakh)		
≤ 10,000	5	5.0
10,000-50,000	59	59.0
>50,000	36	36.0
PCV		
≤ 40	31	31.0
>40	69	69.0

Among 100 study population with respect to BMI, 46% were normal weight, 27% were overweight, 14% obese and 13% were underweight. There was significant association between BMI and dengue severity noted. With respect to triceps skinfold thickness range, 88% were within normal range and 12% were obese. There was no association found between triceps skinfold thickness and dengue severity.

Among 100 study population, 2 patients had co-infection with Plasmodium vivax, 1 patient had Plasmodium malaria, 1 patient had Typhoid fever, 1 patient had typhus fever and 2 patients had UTI. Overall, this study reports high incidence of dengue among young people of both sexes. And dengue severity noted among patients with overweight, obese and prior comorbidities like hypertension.

Table 2: Association of Variables and nutritional status with Dengue diagnosis

Age (in Years)	DF	DHF	DSS	Expanded Dengue	P value
≤ 30	1 (2.2)	40 (87.0)	1 (2.2)	4 (8.7)	0.202
31-40	0 (0.0)	26 (86.7)	4 (13.3)	0 (0.0)	
41-50	0 (0.0)	12 (85.7)	1 (7.1)	1 (7.1)	
51-60	0 (0.0)	3 (60.0)	0 (0.0)	2 (40.0)	
>60	0 (0.0)	4 (80.0)	0 (0.0)	1 (20.0)	
BMI (kg/m²)					
< 18.5	0 (0.0)	11 (12.9)	0 (0.0)	2 (25.0)	0.036*
18-5-22.99	1 (100.0)	44 (51.8)	0 (0.0)	1 (12.5)	
23-24.99	0 (0.0)	18 (21.2)	5 (83.3)	4 (50.0)	
≥ 25	0 (0.0)	12 (14.1)	1 (16.7)	1 (12.5)	
Comorbidities					
DM	0 (0.0)	6 (60.0)	2 (20.0)	2 (20.0)	0.087
HTN	0 (0.0)	2 (50.0)	0 (0.0)	2 (50.0)	0.017*
Hypothyroidism	0 (0.0)	7 (87.5)	1 (12.5)	0 (0.0)	0.705
Mortality					0.001*
Yes	0 (0.0)	2 (97.6)	4 (66.7)	0 (0.0)	
No	1 (100.0)	83 (2.4)	2 (33.3)	8 (100.0)	
Triceps Thickness (mm)					0.966
Underweight	-	-	-	-	
Normal	1 (100.0)	75 (88.2)	5 (83.3)	7 (87.5)	
Obese	0 (0.0)	10 (11.8)	1 (16.7)	1 (12.5)	

DISCUSSION

Nearly 75% of people exposed to dengue fever live in the Asia-Pacific area, making it the most serious mosquito-borne viral disease in the world.[6] Stunting, a consequence of chronic undernutrition, was found to be protective against the development of DHF and DSS in this study. This result is in line with earlier research showing that children with DHF had a lower risk of undernutrition compared to healthy controls.[7] Evidence suggests that children with contemporaneous stunting and wasting 21 and those with stunting who are overweight suffer significant excess mortality, while the causes leading to this state of concurrence remain unclear.[8] According to our research, dengue severity was positively correlated with BMI. This result is consistent with earlier research showing a correlation between excess body weight and dengue illness severity.[9] An increasing amount of evidence indicates that immune cell activity during infection is impacted by obesity-associated increases in chronic, low-grade inflammation with excess production of leptin, interleukin-1β, interleukin-6, and tumor necrosis factor-α, as well as decreases in adiponectin (anti-inflammatory) levels.[10] The hypothesis regarding the impact of baseline malnutrition on the immunopathogenesis of DENV infection was supported by the finding that certain hematologic features linked to a severe form of dengue infection were negatively associated with stunting and favorably associated with being overweight.[11]

Several other research, in contrast to the current one, found no connection between the severity of dengue infection and malnutrition.[12,13] These contradictory results could be explained by variations in sample size, host genetics, and the operational definition of starvation among earlier research.[14] In conclusion, the current research indicates that children who are overweight and infected with dengue may be more susceptible to a severe infection. For early indications of severe dengue sickness, doctors should keep a close eye on these individuals.

CONCLUSION

This study on 100 dengue patients (2016-2018) found that obesity, overweight, and comorbidities like diabetes and hypertension increased susceptibility to severe dengue. Gender distribution was nearly equal, and early symptoms like gum bleeding and melena were key for early diagnosis. BMI showed a significant association with severity, with overweight individuals more likely to develop Dengue Shock Syndrome. Severe complications, including fluid overload and organ failure, contributed to high mortality, especially in DSS cases (66.7%). The study emphasized early recognition and rehydration, recommending larger studies for further validation.

REFERENCES

1. Murugesan A, Manoharan M. Dengue virus. In: Emerging and Reemerging Viral Pathogens. Elsevier; 2020. p. 281–359.
2. Schaefer TJ, Panda PK, Wolford RW. Dengue fever. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2025.
3. Mutheneni SR, Morse AP, Caminade C, Upadhyayula SM. Dengue burden in India: recent trends and importance of climatic parameters. Emerg Microbes Infect [Internet]. 2017;6(1):1–10. Available from: http://dx.doi.org/10.1038/emi.2017.57
4. Maneerattanasak S, Suwanbamrung C. Impact of nutritional status on the severity of dengue infection among pediatric patients in southern Thailand. Pediatr Infect Dis J [Internet]. 2020;39(12):e410–6. Available from: http://dx.doi.org/10.1097/inf.0000000000002839
5. Chen C-Y, Chiu Y-Y, Chen Y-C, Huang C-H, Wang W-H, Chen Y-H, et al. Obesity as a clinical predictor for severe manifestation of dengue: a systematic review and meta-analysis. BMC Infect Dis [Internet]. 2023;23(1). Available from: http://dx.doi.org/10.1186/s12879-023-08481-9
6. Dengue- global situation [Internet]. Who.int. [cited 2025 Jan 20]. Available from: https://www.who.int/emergencies/disease-outbreak-news/item/2023-DON498

7. Huy NT, Van Giang T, Thuy DHD, Kikuchi M, Hien TT, Zamora J, et al. Factors associated with dengue shock syndrome: a systematic review and meta-analysis. PLoS Negl Trop Dis [Internet]. 2013;7(9):e2412. Available from: http://dx.doi.org/10.1371/journal.pntd.0002412

8. Chuong C, Bates TA, Akter S, Werre SR, LeRoith T, Weger-Lucarelli J. Nutritional status impacts dengue virus infection in mice. BMC Biol [Internet]. 2020;18(1):106. Available from: http://dx.doi.org/10.1186/s12915-020-00828-x

9. Zulkipli MS, Dahlui M, Jamil N, Peramalah D, Wai HVC, Bulgiba A, et al. The association between obesity and dengue severity among pediatric patients: A systematic review and meta-analysis. PLoS Negl Trop Dis [Internet]. 2018;12(2):e0006263. Available from: http://dx.doi.org/10.1371/journal.pntd.0006263

10. Sekaran SD, Liew ZM, Yam HC, Raju CS. The association between diabetes and obesity with Dengue infections. Diabetol Metab Syndr [Internet]. 2022;14(1):101. Available from: http://dx.doi.org/10.1186/s13098-022-00870-5

11. Trang NTH, Long NP, Hue TTM, Hung LP, Trung TD, Dinh DN, et al. Association between nutritional status and dengue infection: a systematic review and meta-analysis. BMC Infect Dis [Internet]. 2016;16(1):172. Available from: http://dx.doi.org/10.1186/s12879-016-1498-y

12. Lovera D, Ledesma S, Avalos C, Amarilla S, Gonzalez N, Mezquita MJ, et al. Clinical characteristics of Dengue Shock Syndrome (DSS) in children. Int J Infect Dis [Internet]. 2014;21:221. Available from: http://dx.doi.org/10.1016/j.ijid.2014.03.882

13. Khara T, Mwangome M, Ngari M, Dolan C. Children concurrently wasted and stunted: A meta-analysis of prevalence data of children 6-59 months from 84 countries. Matern Child Nutr [Internet]. 2018;14(2):e12516. Available from: http://dx.doi.org/10.1111/mcn.12516

14. Te H, Sriburin P, Rattanamahaphoom J, Sittikul P, Hattasingh W, Chatchen S, et al. Association between nutritional status and dengue severity in Thai children and adolescents. PLoS Negl Trop Dis [Internet]. 2022;16(5):e0010398. Available from: http://dx.doi.org/10.1371/journal.pntd.0010398.

558

International Journal of Academic Medicine and Pharmacy (www.academicmed.org)
ISSN (O): 2687-5365; ISSN (P): 2753-6556