Dengue Infection in Children: Clinical Profile and Outcome in Dhaka City

Kamrunnaher Shultana¹, A. Z. M. Motiur Rahman², Abdullah Al Baki², Md. Shohidul Islam Khan², Bishwajit Deb², Dhiman Chowdhury³, A. B. M. Rezaul Karim Mir⁴, Fariha Sabrina¹, Shadia Zaman¹, Md. Mozammel Haque², *

¹Department of Pediatrics and PICU, Square Hospitals Ltd., Dhaka, Bangladesh
²Department of Pediatrics, 250 Bedded Hospital, Moulivibazar, Bangladesh
³Department of Pediatrics, Chattogram Medical College Hospital, Chattogram, Bangladesh
⁴Department of Medicine, 250 Bedded Hospital, Moulivibazar, Bangladesh

Email address: dinab_d2010@yahoo.com(K. Shultana), aznumotir.rahman@gmail.com(A. Z. M. M. Rahman), abdullahalbaki09@gmail.com(A. Al Baki), dsrkhan94@gmail.com(Md. S. I. Khan), pinku.doctor@gmail.com(B. Deb), dhimanchow@gmail.com(D. Chowdhury), mirreza51@yahoo.com(A. B. M. R. K. Mir), fariharima017@gmail.com(F. Sabrina), sadiazaman1984@gmail.com(S. Zaman), mmhaque16mc@yahoo.com(Md. M. Haque)

*Corresponding author

To cite this article:
Kamrunnaher Shultana, A. Z. M Motiur Rahman, Abdullah Al Baki, Md. Shohidul Islam Khan, Bishwajit Deb, Dhiman Chowdhury, A. B. M Rezaul Karim Mir, Fariha Sabrina, Shadia Zaman, Md. Mozammel Haque. Dengue Infection in Children: Clinical Profile and Outcome in Dhaka City. American Journal of Pediatrics. Vol. 5, No. 3, 2019, pp. 111-115. doi: 10.11648/j.ajp.20190503.16

Received: June 21, 2019; Accepted: July 15, 2019; Published: July 31, 2019

Abstract: Dengue is a self-limiting acute mosquito born disease caused by Dengue virus. Dengue infections may be asymptomatic or can result in a wide spectrum of disease severity ranging from an influenza-like illness (Dengue fever) to the life-threatening Dengue hemorrhagic fever (DHF)/Dengue shock syndrome (DSS). We aimed to analyze the variation in clinical spectrum, outcome and possible risk factors for fatality among Dengue infected children. This was an observational study carried out over a period of one year involving 89 children up to 15 years of age. Upon clinical suspicion Dengue was confirmed by NS 1 antigen and/or Dengue antibody IgM, IgG. Positive Dengue cases were enrolled & interviewed and the information obtained related to the risk factors, clinical presentation, pattern of Dengue infection and outcome were documented in the pre-structured questionnaire. Among the 89 studied children the highest percentage (51.68%) was between 0-5 year and male female ratio was 1.2: 1. Mosquito net was not used by (74.15%) children and there was source of stagnant water in/near the house of (13.48%) children. Fever was present in (100%), rash in (48.31%), nausea/vomiting in (37.07%), headache in (12.35%), myalgia/arthritis/backache (13.48%), retro orbital pain (1.12%) and abdominal pain in (23.59%) patient. Epistaxis was the commonest (70%) form of bleeding. CNS involvement was in the form of restlessness/irritability (19.10%), altered sensorium (2.24%) and convulsion. Pleural effusion was commoner than ascites; (25.84%) and (12.35%) respectively. Among the enrolled children Dengue fever was (74.15%), Dengue hemorrhagic fever (6.74%) and Dengue shock syndrome (19.10%). Two patients died out of 17 from Dengue shock syndrome which was (11.76%). World Health Organization (WHO) guideline based management should be applied in assessing and managing Dengue cases to reduce mortality rate. Public awareness should be widened to prevent Dengue.

Keywords: Dengue, Infection, Hemorrhage, Shock

1. Introduction

Dengue fever is one of the most common arboviral infections in human. Dengue is a self-limiting acute mosquito born disease characterized by fever, headache, muscle & joint pain, rash, nausea & vomiting [1]. These infections may be asymptomatic or may lead to (a) “classical” Dengue fever (DF), or (b) Dengue hemorrhagic fever (DHF) without shock,
Dengue infections can result in a wide spectrum of disease severity ranging from an influenza-like illness (DF) to the life-threatening Dengue hemorrhagic fever (DHF)/Dengue shock syndrome (DSS) [3]. Infection with one serotype of DENV provides lifelong immunity to that serotype, but results only in partial and transient protection against subsequent infection by the other three serotypes [3]. It is possible for a person to be infected as many as four times, once with each serotype [3]. It is well documented that sequential infection with different DENV serotypes increases the risk of developing DHF [3]. Ninety percent of DHF occur in children less than 15 years of age [3]. There is currently no specific treatment for DENV infection [3] although several potential vaccines are in development; therefore, the only method of preventing transmission is vector control [2]. In 2012, Dengue ranks as the most important mosquito-borne disease in the world. Outbreaks exert a huge burden on populations, health systems, and economies [5]. In 2009, the World Health Organization (WHO) revised the classification system for Dengue, defining two major entities – Dengue and severe Dengue [6]. The new classification also encompasses a set of ‘warning signs’ intended to help clinicians identify patients likely to develop complications during the critical phase of the illness [6]. In this study, we analyzed the variation in clinical features, outcome and possible risk factors for fatality among Dengue infected children.

2. Materials and Methods

This was an observational study carried out including patients of the prefixed private chambers in Dhaka city involving 89 children of both sex up to 15 years of age for a period of one year from January to December 2018. Children who came to the private chamber for consultation and diagnosed as Dengue cases were enrolled in this survey. Stable patients were treated outdoor basis and those required admission were admitted in clinics or hospitals according to their own choice. In children with high degree clinical suspicion of Dengue infection NS 1 antigen (who came within first 48 hours of fever) and/or Dengue antibody IgM, IgG (who came after five days of fever) were performed. Positive Dengue cases were taken written informed consent & interviewed on the risk factors of Dengue infection. Data related to patient’s demography, risk factors, clinical presentation, pattern of Dengue infection and outcome were documented on the pre-structured questionnaire. Co-relation between the risk factors and mortality was also observed. All enrolled patients were treated according to the standard management protocol of national Dengue guideline (published in collaboration with WHO and Ministry of Health and Family welfare (MOHFW, Bangladesh). This was a study based on private consultation chamber and hence institutional ethical approval was not necessary. Written informed consent was taken from the individual patient prior to enrollment.

3. Results

In Table 1, among the 89 studied children, (51.68%) were between 0-5 years, (31.46%) between 6-10 years and (16.85%) between 11-15 years of age. Male participants comprised of (55%) and male female ratio was 1.2: 1. Children up to 2 years of age were (23.59%) among which weight for length between (3rd – 97th) percentile was (66.66%) and >97th percentile was (33.33%). BMI was measured in (76.40%) children >2 years of age among which BMI ≥95th percentile was (42.64%) and <5th Percentile was (11.76%). Most of the studied children (84.26%) lived above the ground floor and mosquito net was not used by (74.15%) of the total. There was source of stagnant water in/near the house of (13.48%) children. Only (1.12%) of the studied children had previous history of Dengue infection and (6.74%) had affected family member.

| Clinical Profile | Number (%) |
|------------------|------------|
| **Age**          |            |
| 0-5 year         | 46 (51.68%)|
| 6-10 year        | 28 (31.46%)|
| 11-15 year       | 15 (16.85%)|
| **Sex**          |            |
| Male             | 49 (55%)   |
| Female           | 40 (45%)   |
| **M:F**          | 1.2: 1     |
| **Nutritional Status** |   |
| <2 year (Weight for Length) | 21 (23.59%) |
| 3rd – 97th Percentile | 14 (66.66%) |
| >97th Percentile  | 7 (33.33%) |
| >2 year (BMI)    | 68 (76.40%)|
| <5th Percentile (Under Weight) | 8 (11.76%)           |
| 5th – 85th Percentile (Healthy Weight) | 21 (30.88%) |
| 85th – 95th Percentile (Over Weight) | 10 (14.70%) |
| ≥95th Percentile (Obese) | 29 (42.64%) |
| **Housing**      |            |
| Ground Floor     | 14 (15.73%)|
| Above Ground Floor | 75 (84.26%) |
| **Mosquito Net** |            |
| Used             | 23 (25.84%)|
| Not Used         | 66 (74.15%)|
| **Source of Stagnant Water** |   |
| Yes              | 12 (13.48%)|
| No               | 77 (86.51%)|
Table 2 showing the clinical manifestations of the studied children. Fever was present in (100%) children where (66.29%) had high grade (101°-105° F) fever. Rash was present in (48.31%) and nausea/vomiting in (37.07%) patient. Pain in the form of headache was present in (12.35%), myalgia/arthritis/backache (13.48%), retro orbital pain (1.12%) and abdominal pain in (23.59%) patient. Bleeding was present in (11.23%) affected children where epistaxis was more frequent (70%) than gum and gastrointestinal (GI) bleeding. Seventeen (19.10%) children were found to have restlessness/irritability. Serositis in the form of pleural effusion and ascites was present in (25.84%) and (12.35%) children respectively. Sixteen (17.97%) patients presented with abdominal tenderness and (19.10%) with hepatomegaly. Only (4.49%) patient had positive tourniquet test.

Table 3 showing the types of Dengue infection and outcome (n=89) where Dengue fever was (74.15%), Dengue hemorrhagic fever was (6.74%) and Dengue shock syndrome was (19.10%) respectively. There was no death from Dengue fever or Dengue hemorrhagic fever. Two patients died out of 17 from Dengue shock syndrome which was (11.76%). Correlation between patient’s nutritional status and mortality was shown in Table 4. Number of patient having BMI ≥95th percentile was 29 among which 2 patients died (6.89%).

4. Discussion

In this study there was a distinct higher incidence observed among the younger age group (0-5 years) accounting for (51.68%) of the total cases with a male preponderance and the male to female ratio was 1.2: 1. In a study by Choudhury [7] the commonest age group was above 10 years with male predominance and male to female ratio was 2:1. Similarly, male predominance was observed in other studies like Agarwal et al [8], Narayana et al [9] and Gomber et al [10]. All patients in this study were from urban area which was also noticed in a study by Srinivasan [11] though WHO has reported shift of Dengue to rural areas. A seasonal pattern was observed in this study and the highest incidence was recorded in the monsoon (May-August) and the postmonsoon (September-December) seasons during the one year study period. Wongkoon S et al [12] have also described the seasonal pattern of Dengue, mostly in the rainy season due to abundance of mosquito breeding in the season. In a case control study in Thailand [13], the primary Dengue infection was noticed in (9.5%) and (11.4%) in case and control group respectively, whereas in this study, (98.87%) cases having no previous history of Dengue infection.

Fever was noted among (100%) patients. Rash and vomiting were the next common symptoms followed by abdominal pain representing (48.31%), (37.07%) and (23.59%) respectively. Agarwal et al [8] in their study in Delhi showed fever, abdominal pain and vomiting as the commonest symptoms. In one more study by Wang et al [14], vomiting (60.5%) and abdominal pain (32.5%) were the commonest presenting symptoms in Dengue infected children. Headache was seen in (12.35%) studied children whereas about (28.8%) observed in Narayanan et al [9], (77%) in Kalyanarooj et al [15] and (22%) in Ratagiri et al [16] studies. In our study myalgia was found in (13.48%) cases whereas in a study [1] in India (16.3%) cases had myalgia. Malena and epistaxis were the most common bleeding manifestation noted in study by Srivastava [17] and...
Ahmed et al [18] which was similar to this study. In another study by Ratageri et al [16] the common bleeding manifestations were GI bleeding (22%) and petechiae (18%).

Hemant [4] showed respiratory distress in four patients (6.1%) [n=65] whereas we observed this symptom in four (4.49%) patients [n=89]. CNS involvement was seen in eight patients (4.3%) [n=185] in a study [19] whereas we found total two patients (2.24%) with altered sensorium, seventeen patients (19.10%) with restlessness or irritability and three (25%) with convulsion [n=85]. Dengue encephalopathy should always be considered in a child presenting with neurological symptoms in endemic areas [19]. A study by Shubhankar Mishra [20] detected (25.77%) cases having pleural effusion which is quite similar (25.84%) to our study. Hepatomegaly and ascites was seen in (19.10%) and (12.35%) cases respectively whereas other studies [19] showed hepatomegaly in (86.9%), ascites (93.4%), pleural effusion (82.6%) and facial puffiness in (84.7%) study population. Setiwan et al [21] and Mehdi SA et al [22] noted (95%) and (60%) ascites in severe Dengue and (34%) and (17.7%) in mild Dengue cases respectively.

In a study by Mishra [20] tourniquet test was found to be negative in majority of the cases whereas studies in other countries especially Southeast Asian countries reported tourniquet test positivity as the commonest bleeding manifestation [20]. In this study tourniquet test was positive in (4.49%) cases. In another study in Bangladesh [10] tourniquet test was positive in (32%) cases. Low proportion of positive tourniquet test in Indian studies may be due to the darker skin color in Indian children [20]. But in a study in Brazil [11] test was positive in (81.8%) cases.

Ratageri et al [16] found DF in (18%), DHF in (60%) and DSS in (22%) cases. Jasmin [23] reported in India (90%) cases of DF, (10%) DHF and no case of DSS. In a study in Bangladesh [5], (40.7%) found to have DF and (27.8%) DHF. Whereas, we observed sixty six (74.15%) DF, six (6.74%) DHF and seventeen (19.10%) DSS.

In India, Choudhury [7] and Mishra [20] showed (10%) and (1.03%) mortality respectively in their study due to intractable shock. Another study in Bangladesh [5] reported (6%) mortality due to DHF. Shewale [24] in his study reported (21.4%) mortality in severe Dengue group than Dengue group with one or more warning signs (1.4%). We observed two (11.76%) deaths due to DSS (n=17) and both were obese. A review article by MohdSyis [25] revealed obesity to be a risk factor for dengue severity among children whereas an Indonesian study [16] found no association between body weight and dengue severity.

5. Conclusion

It was observed that Dengue, a febrile illness, had wide spectrum of clinical presentation in children ranging from flue like illness to life threatening hemorrhage and shock. Classical Dengue fever (DF) was most prevalent in the pediatric population and the outcome was favorable. Mortality was related to the development of shock in Dengue infected children (DSS). In this study, two patient died of Dengue shock syndrome who were obese (BMI >95th percentile), this observation has become a matter of future research to see whether there is any temporal relationship between obesity and mortality in Dengue affected children. High index of clinical suspicion, early diagnosis and prompt initiation of fluid therapy remain the most important aspect in treating Dengue patients. WHO guideline based management should be applied in assessing and managing Dengue cases to reduce mortality rate. Above all public awareness should be widened and all measures should be taken to prevent Dengue fever. Large scale multi-center study is recommended to delineate the co-relation between obesity and mortality in Dengue affected children in a greater depth.

References

[1] Shah MY, Naqash MM, Goel RK, Galhan D, Kumar S, Chhabra V, et al. Clinical profile of dengue fever infection in patients admitted in tertiary care centre Agroha, Hisar, Haryana, India. Int J of Res M Sci 2016; 4 (6): 2146-149.

[2] Srinivasa K, Ajay J, Manjunath GA. Clinical profile and outcome of dengue among hospitalized children - a single centre prospective study. J PediatrRes 2017; 4 (02): 145-50.

[3] Rao M, Aparna A, Jyothi RC. Clinical profile and outcome of dengue infections in children. IOSR 2016; 15 (2): 07-13.

[4] Jain H. Clinical profile and outcome of dengue fever in hospitalized children of South Rajasthan, India. Int J ContempPaediatr 2016; 3 (2): 546-49.

[5] Alam ABM, Sadat S, Swapan Z, Ahmed A. Clinical profile of dengue fever in children. BJCH 2009; 33 (2): 55-58.

[6] Yacoub S, Wills B. Predicting outcome from dengue. BMCMedicine 2014; 12: 147-57.

[7] Choudhury J, Mohanty D, Routray SS. Clinical profile and outcome of dengue fever and dengue hemorrhagic fever in pediatric age group. Int J ContempPaediatr 2016; 3 (2): 442-44.

[8] Agarwal A, Chandra J, Anjea S, Patwari AK, Dutta AK. An epidemic of dengue hemorrhagic fever and dengue shock syndrome in children in Delhi. Indian Pediatr 1998; 35 (8): 727-29.

[9] Narayanan M, Aravind MA, Thilothammal N, Prema R, Sargunam CS, Rammurty N. Dengue fever epidemic in Chennai-a study of clinical profile and outcome. Indian Pediatr 2002; 39 (11): 1027-33.

[10] Gomber S, Ramachandran VG, Kumar S, Agarwal KN, Gupta P, Gupta P, et al. Hematological observations as diagnostic markers in dengue hemorrhagic fever –a reappraisal. Indian Paediatri 2001; 38: 477-81.

[11] Srinivasa S, Tanveer N, Chaitthanya CN. Clinical profile and ultrasoundographic findings in children with dengue fever. CurePediatr Res 2014; 18 (2): 87-90.

[12] Wongkoon S, Jaroensutasinee M, Jaroensutasinee K. Distribution, seasonal variation and dengue transmission prediction in Sisaket, Thailand. Indian J Med Res 2013; 138 (3): 347-53.
[13] Pichainarong N, Mongkalangoon N, Kalayanarooj S, Chaveepojnkamjorn W. Relationship between body size and severity of dengue hemorrhagic fever among children aged 0-14 years. Southeast Asian J Trop Med Public Health 2006; 37 (2): 283-88.

[14] Wang CC, Lee IK, Su MC, Lin HI, Huang YC, Liu SF, et al. Differences in clinical and laboratory characteristics and disease severity between children and adults with dengue virus infection in Taiwan, 2002. Trans R Soc Trop Med Hyg 2009; 103 (9): 871-77.

[15] Kalayanarooj S, Chansiriwongs V, Nimmanitya S. Dengue patients at the Children's Hospital, Bangkok: 1995–1999. Review Dengue Bulletin 2002; 26: 33–43.

[16] Ratageri VH, Shepur TA, Wari PK, Chavan SC, Mujahid IB, Yergolkar PN. Clinical profile and outcome of dengue fever cases. Indian J Pediatr 2005; 72 (8): 705-06.

[17] Srivastava VK, Suri S, Bhasin A, Srivastava L, Bharadwaj M. An epidemic of dengue hemorrhagic fever and dengue shock syndrome in Delhi: a clinical study. Ann Trop Paediatr 1990; 10 (4): 329-34.

[18] Ahmed S, Arif F, Yahya Y, Rehman A, Abbas K, Ashraf S, Akram DS. Dengue fever outbreak in Karachi 2006- a study of profile and outcome of children under 15 years of age. J Pak Med Assoc 2008; 58 (1): 4-8.

[19] Srinivasa K, Ajay J, Manjunath GA. Clinical profile and outcome of dengue among hospitalized children- a single centre prospective study. J PediatrRes 2017; 4 (2): 145-50.

[20] Mishra S, Ramanathan R, Agarwalla SK. Clinical profile of dengue fever in children: A study from southern odisha. India. Scientifica 2016; Article ID 6391594.

[21] Setiawan MW, Samsi TK, Wulur H, Sugianto D, Pool TN. Dengue hemorrhagic fever: ultrasound as an aid to predict the severity of the disease. PediatrRadiol 1998; 28 (1): 1-4.

[22] Mehdi SA, Mahais HA, Bhukhari H, Aslam S. Grey scale trans-abdominothoracic ultrasonography in evaluation of dengue hemorrhagic fever. APMC 2012; 6: 32-6.

[23] Jasmin RO, Bhavesh RK, Umed VP, Kshama D, Gajera DV, Thakra, ADJ. Clinico-hematological profile and outcome of dengue fever cases admitted in 2014 at tertiary care hospital, Rajkot, Gujarat. Natl J Community Med 2017; 8 (6): 320-23.

[24] Shewale NS. Clinical profile and outcome of children admitted for dengue with warning signs and severe dengue. MedPulse International Journal of Pediatrics 2017; 3 (1): 23-27.

[25] 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. PLoSNegl Trop Dis 2018; 12 (2): e 0006263.