A retrospective analysis of dengue fever case management and frequency of co-morbidities associated with deaths

Muhammad Arif Nadeem Saqib1*, Ibrar Rafique1, Saira Bashir2 and Arsalan Ahmad Salam3

Abstract

Background: Dengue epidemic in Lahore (2011) resulted in hundreds of deaths and affected thousands. As most of the studies were focused on its diagnosis and treatment, scanty data is available on associated diseases/ co-morbidities in these patients that could have contributed to a higher mortality. There were no local guidelines available on recording, reporting and management of these co-morbidities. The objective of this study was to analyze the initial presentations of dengue cases and to estimate the frequency of co-morbidities in dengue patients.

Methods: Data of 556 dengue cases was retrieved from 2 major public sector tertiary-care hospitals for patients who were admitted during 2011 epidemic and a case record analysis was done. Data was retrieved from patient’s information reports which included demography, signs and symptoms and the laboratory investigations. In addition verbal autopsy of deceased cases was also done from their relatives using standardized WHO verbal autopsy form after making modifications as per needed.

Results: Of 556 cases studied, 390 (70%) were males. The mean age was 36 years and 30% of the cases were between 20-29 years. Average duration of the hospital stay was 6 days. Out of the total, 435 (78%) were dengue fever (DF) cases followed by dengue hemorrhagic fever (DHF) in 95 (17%) and dengue shock syndrome (DSS) in 26 (4%) cases. A total of 40 cases died and among them 17 were diagnosed with DSS, 13 DF and 10 DHF. Further the verbal autopsy from relatives of deceased cases showed 29 (60%) deceased had co-morbid diseases which included hypertension, diabetes etc. DSS was common in patients who had hypertension (27) either alone or associated with other illnesses.

Conclusions: Co-morbidities with dengue infection were seen in 60% deceased cases indicating the reasons for high dengue related complications and death.

Keywords: Dengue, Co-morbid, Hypertension
of developing dengue hemorrhagic fever [8]. Likewise higher frequency of complications is reported in dengue patients suffering from hepatitis [9-11].

Verbal autopsy is an indirect method of determining cause of death based on interviews with the caretakers of deceased individuals and has been widely used to collect information on cause specific mortality [12]. In addition to gathering information on cause of death, verbal autopsy is also important for investigating outbreaks due to infectious diseases [13]. Many countries use verbal autopsy methods on large scale to assess cause of death in a population [14,15]. The present study was proposed to analyze the initial symptoms of dengue fever and to determine the frequency of co-morbidities in deceased cases.

**Methods**

This was a retrospective, cross-sectional study and was conducted in the community of Lahore and hospital records of two tertiary care hospitals i.e. King Edward Medical University, Lahore (Mayo Hospital) and Fatima Jinnah Medical College, Lahore (Ganga Ram Hospital). Complete medical record of all dengue cases which included signs and symptoms, method of diagnosis, management, duration of stay and clinical outcome was retrieved from patient’s information reports. The diagnosis of patients into DF, DHF and DSS was taken from their case record and analyzed accordingly.

The relatives of deceased were interviewed using WHO verbal autopsy guidelines (Additional file 1). Verbal autopsy questionnaire were pre-tested by interviewing attendants of fewer cases and modified as per needs. All interviews were done by trained interviewers in local language i.e. Urdu. A written informed consent was taken from relative of deceased who were attendants of patient during the hospital stay (father, brother, sister or others). Demographic, epidemiological, co-morbidity and other details were obtained from the relatives. A sample size of 60 deceased was calculated for Lahore, however verbal autopsy of 48 deceased cases was done (40 were those whom addresses were retrieved from the records of the selected 02 hospitals while 08 were included during field interviews). These 08 cases were admitted in any other hospitals of Lahore and died. The ethical clearance was taken from Institutional ethic committee of Pakistan Medical Research Council.

**Statistical analysis**

Data collected was double entered in, cleared and coded using Excel sheet (Window 2007) and analysis was done using SPSS 16.0. Chi-square test was used to compare the categorical variables and p ≤ 0.05 was considered statistically significant.

**Table 1 Dengue serology of DF, DHF and DSS cases**

| Test      | DF (n = 435) | DHF (n = 95) | DSS (n = 26) |
|-----------|--------------|--------------|--------------|
| IgG       | 48           | 22           | 2            |
| IgM       | 85           | 40           | 4            |
| IgG + M   | 302          | 33           | 20           |

**Table 2 Pattern of clinical presentation on day 1 of dengue cases**

| Symptoms      | DF (n = 435) | DHF (n = 95) | DSS (n = 26) |
|---------------|--------------|--------------|--------------|
| Fever         | 435 (100%)   | 93 (97%)     | 26 (100%)    |
| Bleeding      | 64 (15%)     | 56 (59%)     | **26 (72%)** |
| Headache      | 326 (75%)    | 24 (25%)     | **24 (92%)** |
| Vomit         | 323 (74%)    | 33 (33%)     | **25 (96%)** |
| Abdominal pain| 310 (71%)    | 35 (36%)     | **25 (96%)** |
| Rash          | 127 (29%)    | 24 (25%)     | **25 (58%)** |

(***p < 0.05).
A rise in HCT was seen at 3rd week in DF patients which turned to normal. However there was a consistent pattern of HCT in DHF patients. The data of DSS could not be compared as majority of them died and 05 records was not available.

The level of liver enzyme (ALT and AST) was deranged in DF and DHF cases. There was difference in level of ALT of DF cases from DHF at 3rd day of disease but this was not significant.
Verbal autopsy from relatives of 48 deceased was done. The average age of deceased was 43 years and 22 were unmarried. Of the 48 diseased cases, 29 (60%) were suffering from co-morbidities along with dengue infection. About 20 deceased patients had hypertension either alone or along with any other illness and majority of them suffered from DSS. Similarly diabetes and hepatitis B or C was also another major risk of developing DSS.

The clinical signs and symptoms reported by deceased attendants were: fever experienced by all patients followed by chill and vigour in 36, headache and breathlessness in 35, abdominal pain in 33, mental confusion in 35 and unconsciousness in 34 cases. Similarly chest pain was complained by 32 patients and this was sudden in onset in 12 and gradual in 9 while 11 had severe chest pain. Bleeding from nose, mouth and anus were consistent to previous reports [17,6,26,27].

There were few potential limitations in the study. Firstly, this was a retrospective analysis of available records, therefore many important information were incomplete. Secondly, data of verbal autopsies was based on the memory of deceased attendants so they might have not recalled properly.

Conclusions
In conclusion, majority of deaths in 2011 epidemics might have been averted with better management of cases especially of those having co-morbidities.

Future strategies
This is recommended that efforts should be done to formulate strategies for disease management especially for screening the co-morbidities and capacity building of physicians in both public and private sector hospitals to cope with such epidemics in future and to avert deaths.

Additional file

Competing interest
The authors have no competing interest.

Authors’ contributions
MANS conceived the study, organized, interpreted the data and wrote the manuscript IR wrote the project as well as the final report and supported in data analysis and its interpretation. SB and AAS retrieved the data and interviewed the attendants of the deceased patients. All authors read and approved the final manuscript.

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Author details
1. Pakistan Medical Research Council (PMRC), Head Office, Shahrah-e-Jamhuriat, G-5/2, Islamabad, Pakistan. 2. Pakistan Medical Research Council (PMRC) Research Centre, Fatima Jinnah Medical College, Lahore, Pakistan. 3. Pakistan Medical Research Council (PMRC) Research Centre, King Edward Medical University, Lahore, Pakistan.

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Page 5 of 5

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