Presence of dengue fever in semi-urban areas of two health districts in Burkina Faso

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SUMMARY

The global incidence of dengue has grown dramatically in recent decades. In Burkina Faso, the last description of acute cases was back in 1982. During an annual population-based survey in Kaya and Zorgho, two semi-urban areas, febrile individuals from 0-10 years old were evaluated for malaria and dengue virus (DENV). Rapid tests were performed and additional samples on filter paper were taken from every patient with a positive result and every tenth negative, to perform reverse transcription-polymerase chain reaction (RT-PCR) assays. From 259 children (150 in Kaya and 109 in Zorgho), 52.1% were positive for malaria and 6.9% for dengue while 45.2% remained undifferentiated. The RT-PCR results show the presence of DENV2 and DENV4. These findings reveal the presence of DENV in the country and the need to conduct research and actions on non-malaria febrile diseases in the region.

BACKGROUND

- Dengue is a re-emerging infectious disease broadly distributed among tropical and subtropical countries and caused by any of the four-dengue serotypes (DENV 1-4).
- The global incidence of dengue has grown dramatically in recent decades. While dengue presence has been well known and broadly studied in South East Asia and Latin America, evidence about dengue in Africa remain very limited.
- In Burkina Faso, dengue has been neglected because febrile cases are systematically assumed as malaria cases. The last description of acute dengue cases date back from 1982, when DENV2 was documented.

MATERIALS AND METHODS

Study site: The study took place in Kaya and Zorgho, two semi-urban areas of the North Central and East-Central region of Burkina Faso, respectively. Both municipalities are under a tropical climate with one rainy season between June to September, with a rainfall peak in August, and a dry season the rest of the year.

Study design and study population. To explore the presence of dengue, a cross sectional survey was nested into the third edition of an annual panel survey. The survey covered children under 12 in September 2013.

Selection criteria: All children who had fever (axillary temperature > 37°C) at the moment of the survey or who have reported presence of fever during the week preceding the survey were recruited to participate.

Data and Sample collection: Socio-demographic data, health related status (including current symptoms), and information about health-seeking behavior were obtained through the administration of a structured questionnaire in the local language (Hembo) by trained surveys. Blood samples of every eligible child (n = 263) were obtained through finger pricks during the survey.

Rapid Diagnostics Tests (RDT) used:
- SD BIOLINE Malaria Ag Pf/Pan (ARP-22 / pLH2)*
- SD BIOLINE Dengue Duo (NS1Ag and IgG/IgM)*

RT-PCR analysis:
Finger pricks blood samples were collected in filter paper from each child with positive dengue RDT and from every tenth with a negative result. The filter paper after dried were stored individually in a Ziploc bag in a dry cool place at 4–15°C and afterwards used for RT-PCR analysis at the microbiology laboratory at the University of Caen. The DENV RNA was detected by a conventional DENV-1 nested RT-PCR protocol. The final PCR products were compared with the assay positive controls (CDC Reference DENV4/1 strain). To confirm the dengue specificity of the PCR products amplified from the samples, the PCR amplicons of the correct size were further sequenced.

Definition of febrile etiologies according to tests results:

- **MALARIA CASE**: A positive result either for Malaria Ag Pf/Pan with negative results for dengue RDT and from every tenth with a negative result. The filter paper after dried were stored individually in a Ziploc bag in a dry cool place at 4–15°C and afterwards used for RT-PCR analysis at the microbiology laboratory at the University of Caen. The DENV RNA was detected by a conventional DENV-1 nested RT-PCR protocol. The final PCR products were compared with the assay positive controls (CDC Reference DENV4/1 strain). To confirm the dengue specificity of the PCR products amplified from the samples, the PCR amplicons of the correct size were further sequenced.

RESULTS

<table>
<thead>
<tr>
<th>Total</th>
<th>Malaria</th>
<th>Dengue</th>
<th>Undifferentiated</th>
</tr>
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<tbody>
<tr>
<td>N=263</td>
<td>126</td>
<td>37</td>
<td>100</td>
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</table>

**Table 3.** Socio-demographic and clinical features of all individuals according to the fever etiologies.

(Only positives result from other Malaria Pan or Malaria Pan R rapid test.
Definite case and probable dengue case see methods section.

LIMITATIONS

- Thirty years after its last report, dengue presence has been documented in febrile children from semi-urban areas of Burkina Faso in 2013. Thus, allowing the possibility to consider DENV as one of the causes of non-malaria febrile diseases in the country.
- This is the first time DENV4 has been documented in the region and the first time that more than one serotype is reported simultaneously in Burkina Faso.
- These findings reveal the need to conduct research and actions on non-malaria febrile diseases in the region.

PUBLIC HEALTH IMPLICATIONS

- Need of an improved diagnosis for febrile patients, especially children under 5 years old.
- Improved vector control and training to the health staff.

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KEY REFERENCES


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Figure 1. Flow chart of enrollment and classification

Figure 2. Distribution of febrile etiologies across age group (n= 263)

Figure 3. Health seeking behavior of individuals according to the fever etiologies (n= 62)