Seropositivity to Dengue and Associated Risk Factors among Acute Febrile Patients in Arba Minch Districts, Southern Ethiopia

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Key words: Febrile Illness, Dengue Virus, Sero-Prevalence, Immuno Fluorescence.

Background:

Dengue is a rapidly emerging arthropod-borne viral infection, which causes a considerable illness and death worldwide. It is, an ancient disease known with different names: Exotic Dengue, Mediterranean Dengue, West Africa Dengue, Twelve Day Fever and Congolese Red Fever, is an emerging infection. However, little is known regarding the epidemiology of dengue virus infection in Ethiopia where other mosquito-borne diseases are common. While all other flavi viruses are zoonotic, DENV that cause most human disease maintain the anthroponotic cycle and they exclusively utilize humans as reservoir and amplification hosts. Infection activate protective immunity but confers only limited and short - term protection against subsequent infection by the other serotypes. The clinical features of dengue infection are mimic many other diseases, therefore can be easily misinterpreted. In addition, a dengue patient may have a co-infection with another pathogen; therefore laboratories test may provide quick and reliable diagnosis. Yet, data from diverse geographical settings in Ethiopia on the prevalence of dengue virus infection hardly exist.

Thus, this study aimed to assess the prevalence of dengue virus exposure and its associated risk factors among acute febrile patients in Arba minch districts in Southern Ethiopia, which would be of paramount importance to inform decision makers, service providers and other concerned bodies for possible interventions. This could contribute to the build-up of national data base to estimate the burden of the disease and its implications to the health system. The data generated from this study can also be used as baseline data for further studies on individual, social and environmental risk-modeling for informed decision making for control planning.

Methods:

A cross-sectional study was conducted at Arba Minch districts in selected health centers from May to August, 2016. Six hundred eighty one consecutive acute febrile patients', 37.5°C axillary temperature at initial evaluation and less than 7 days of onset of symptoms, at the outpatient departments of Lante, Shele and Birbir Health Facilities were recruited.

Pretested structured questionnaires were used to capture data on clinical signs and symptoms, socio-demographic and risk factors. About 5 ml of venous blood was collected aseptically from each study participant. Blood specimens were left undisturbed for 30-60 minutes until clot was formed, and then centrifuged for 5 minutes at 2500-3000rpm at room temperature and sera were transported from study site using liquid nitrogen and stored in -80 freezers until screened for anti-dengue IgG and IgM using indirect immunofluorescence test (IIFT) (EUROIMMUN, Lübeck, Germany). The Laboratory testing was carried out according to the directions of the manufacturers and all tests were run against the positive and negative controls.

All data collected with questionnaires and laboratory investigations were double entered in REDCap (8.0.3.@2018, Vanderbilt University), to control error and the cleaned data was analyzed using SPSS version-20 (Armonk, NY: IBM Corp). Study findings were explained in words and tables. Descriptive analysis was carried out using Frequencies and proportions to summarize socio-demographic and other factors. Bivariate analysis was carried out to determine measure of association (odds ratio) between dependent and independent variables. Factors that were found to be significantly associated with prevalence of dengue virus, at P-value less than or equal to 0.25 were entered in multivariate logistic regression to identify significant factors associated with the prevalence of dengue virus and estimate the magnitude of the adjusted odds ratio for each significant factor while controlling for confounding factors. Associations between dependent and independent variables were assessed and its strength was described using odds ratios and 95% confidence intervals. P-value less than 0.05 were interpreted as statistically significant.

Results:

A total of 529, acute febrile cases were included in the study. Participants within the age group 15 - 30 years accounted 47.45%, followed by age group between 31-45 years 19.86%. Of the study participants, 39.9% had only primary school level education, 29.0% had secondary and higher grade completed and 31.1% had no formal education. Most study participants (86.8%) were rural residents. In this study, 25.1% (133/529) patients were serologically positive for dengue IgG antibody and 8.1% (43/529) for anti-IgM, Out of 133 dengue infected patients approached during the study period, Men accounted for 26.9% and female 23.8%. The distribution of positive cases by age showed participants older than 60 years had more exposure to dengue virus 35.3%, followed by those in the age range 20 – 39 years 25%. Further, the prevalence of dengue virus among rural residents and in those who had a secondary school level education was 28.6% and 30.4%, respectively. In bivariate analysis, candidate variables like: Ear symptoms, Diarrhea, high body temperature and constitutional symptoms, also occupation like employee, student and age group between 31-45 years and age group > 45 years are selected. To avoid the possible confounding variables that found to have association with the dengue virus at P-value of 0.25 by bivariate were entered into multivariate logistic regression. Of all considered variables only constitutional symptoms remain significant (AOR = 1.818, 95% CI 1.073-3.080; p < 0.044); of 112 who had constitutional symptoms and positive 10.0% had only acute fever, 7.5% had acute fever and fatigue, 19.4% had fever and loss of appetite, 31.3% had fever, fatigue and loss of appetite, and 1.7% had acute fever, loss of appetite and night sweeting.

Conclusion:

The high IgM prevalence detected indicate the probability of active transmission with a potential of public health significance that calls for a proactive follow up of the communities in the study area to forecast and avert the risk. However, clinical diagnosis of febrile patients is a common practice in most parts of health care system of Ethiopia. Therefore, efforts should be made to develop improved, proactive, laboratory-based diagnosis systems that can forecast impending dengue fever. This will alert the public to take action and physicians to diagnose and properly treat dengue fever cases.

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