Cross-Reactivity Between Zika and Dengue Virus: A Cross-Sectional Analysis in Rio Grande do Norte, Brazil

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Background:
- Preexisting DENV antibodies may have a cross-reactivity against ZIKV.
- A recent primate study suggested that prior DENV infection does not adversely impact subsequent ZIKV disease and might be protective.
- We aimed to evaluate the relation between a Dengue Fever (DF) outbreak in 2016 and the prevalence of ZIKV infection in Rio Grande do Norte (RN).
- RN is a Brazilian northeast state endemic for arboviruses.
- RN population: 3.409 million.

Method:
- Cross-sectional analysis.
- Data: provided by RN Department of Health from January 2015 to April 2017.
- We analyzed the epidemiological behavior of DF and Zika Virus Disease in RN (last three summers).

Result:
- From January to March in 2015, 2016 and 2017 there were 6,902, 34,642 and 1,677 DF suspected cases, respectively.
- The number of confirmed DF cases in 2015, 2016 and 2017 were 523, 7,599 and 204, respectively.
- Regarding ZIKV infection, the number of suspected cases of between January to April during 2016 and 2017 were 3,486 and 86, respectively.
- The number of confirmed ZIKV infection in 2016 and 2017 were 97 and 0, respectively.
- Adding up the total cases of ZIKV infection which occurred during 2015 and 2016, we obtain a total of 14,584 (8,743 + 5,841).
- 14,1584 represents less than 0.5% of the RN population.

Conclusion:
- This epidemiological evidence support our hypothesis that the DF outbreak in 2016 has contributed to the decrease of 97.53% (86/3,486) in the prevalence of ZIKV infection (suspected cases) in 2017.
- It may be explained by preexisting DENV antibodies might partially neutralize ZIKV infection through serologic cross-reactivity.
- It supports the results found on the recent primate study.
- Our findings contradict the theory (based on in vitro experiments only) that previous immunity to DENV causes an enhancement of the immunological response in individuals exposed to ZIKV.
- Given the fact of the total suspected ZIKV cases in 2015 and 2016 represent less than 0.5% of the RN population, we cannot state that there are fewer Zika cases in 2017 because the population has been previously immunized.
- These data are highly relevant from a public health standpoint given that regions which experienced ZIKV outbreak in Brazil are endemic for DF.
- This study warrants further investigation in other ZIKV/DENV endemic regions.

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