Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

International Journal of Infectious Diseases 104 (2021) 737–738

Contents lists available at ScienceDirect

International Journal of Infectious Diseases

journal homepage: www.elsevier.com/locate/ijid

Letter to the Editor

Regarding: Masyeni S, Santoso MS, Widyaningsih PD, Wedha Asmara DG, Nainu F, Harapan H, et al. Serological cross-reaction and co-infection of dengue and COVID-19 in Asia: Experience from Indonesia. Int J Infect Dis 2020;102:152–4. https://doi.org/10.1016/j.ijid.2020.10.043

Dear Editor-in-Chief,

We congratulate the authors of the recently published article in your journal on their efforts to raise public health concern for COVID-19 and dengue detection in countries where both now co-exist.

Three cases were presented. One was described as the first report of dengue-COVID-19 co-infection based on positive results in dengue NS1 and IgM tests, dengue serotyping and detection of SARS-CoV-2 by qRT-PCR. The other two cases were diagnosed as dengue only by the same tests, but COVID-19 negative as SARS-CoV-2 qRT-PCR was negative. Sera from all three cases cross-reacted in COVID-19 rapid tests. For the first case, this was obvious as antibodies to both viruses were present.

The authors concluded that the dengue sera in the last two cases gave "false-positive" results in COVID-19 tests (since they were SARS-CoV-2 negative by qRT-PCR) and explained that this "cross-reactivity" was due to antigenic similarities between these two viruses. However, we think that an alternative and equally plausible explanation could be that both these patients were silently exposed to COVID-19 beforehand, remained asymptomatic during viraemia for about three weeks or so (Zou et al., 2020) and subsequently turned SARS-CoV-2 negative on qRT-PCR testing, due to virus clearance/low abundance (Wajnberg et al., 2020). Meanwhile, they developed COVID-19 antibodies, which are detectable for several months after infection (Ibarrondo et al., 2020). In this phase, if they contracted dengue, the reactivity in COVID-19 rapid tests was not necessarily due to "cross-reacting" dengue antibodies but could also have been due to pre-existing COVID-19 antibodies (Clarke et al., 2020). This is particularly possible for samples collected in the time frame when both diseases are co-existent in the population.

Our same argument holds for the two Singapore case reports (Yan et al., 2020), where in a reverse scenario, sera from COVID-19 RNA-positive patients showed reactivity in dengue rapid antibody tests despite being dengue PCR-negative. Singapore is highly endemic for dengue (Tan et al., 2019). Therefore, it cannot be ruled out that both elderly patients had contracted dengue in the past and had pre-existing dengue antibodies in their serum.

Nevertheless, we concur with the authors that there do appear to be antigenic similarities between SARS-CoV-2 Spike and dengue envelope, as evident from our observation that archived dengue serum samples from 2017, pre-dating the COVID-19 pandemic, cross-reacted in COVID-19 rapid antibody tests (Biswas and Sukla, 2020; Nath et al., 2020, 2021) and later independently confirmed by others (Lustig et al., 2020).

Contribution

SB drafted the letter and critically evaluated the final version. All co-authors have contributed in collecting supporting data and references; writing of the letter and in discussions to arrive at the final version.

Conflicts of interest

The authors declare that there are no conflicts of interest.

Funding

This work was supported by a grant from the Council of Scientific and Industrial Research (CSIR), India to SB. Grant number: MLP 130; CSIR Digital Surveillance Vertical for COVID-19 mitigation in India.

Ethical approval

This is a correspondence and does not contain data that require ethical approval.

Acknowledgments

SB, SR, HN and AM thank CSIR-IICB and SS thanks NIPER, Kolkata for Institutional support.

References

Biswas S, Sukla S. COVID-19 virus infection and transmission are observably less in highly dengue-endemic countries: Is pre-exposure to dengue virus protective against COVID-19 severity and mortality? Will the reverse scenario be true?. Clin Exp Investig 2020;1(2):1–5, doi:http://dx.doi.org/10.31487/j.CEI.2020.02.05.

Clarke C, Prendecki M, Dhutia A, Ali MA, Sajjad H, Shivakumar O, et al. High prevalence of asymptomatic COVID-19 infection in hemodialysis patients detected using serologic screening. J Am Soc Nephrol 2020;31:1969–75, doi: http://dx.doi.org/10.1681/ASN.2020060827.

Ibarrondo FJ, Fulcher JA, Goodman-Meza D, Elliott J, Hofmann C, Hausner MA, et al. Rapid decay of anti-SARS-CoV-2 antibodies in persons with mild Covid-19. N Engl J Med 2020;383:1085–7, doi:http://dx.doi.org/10.1056/nejmc2025179.

Lustig Y, Keler S, Kolodny R, Ben-Tal N, Atias-Varon D, Shlush E, et al. Potential antigenic cross-reactivity between SARS-CoV-2 and dengue viruses. Clin Infect Dis 2020;, doi:http://dx.doi.org/10.1093/cid/ciaa1207.

Nath H, Mallick A, Roy S, Sukla S, Basu K, De A, et al. Dengue antibodies can cross-react with SARS-CoV-2 and vice versa-antibody detection kits can give false-positive results for both viruses in regions where both COVID-19 and dengue co-exist. MedRxiv 2020;, doi:http://dx.doi.org/10.1101/2020.07.03.20145797.

http://dx.doi.org/10.1016/j.ijid.2021.01.063

Nath H, Mallick A, Roy S, Sukla S, Biswas S. Computational modelling supports that dengue virus envelope antibodies can bind to SARS-CoV-2 receptor binding sites: Is pre-exposure to dengue virus protective against COVID-19 severity?. Comput Struct Biotechnol J 2021;19:459–66, doi:http://dx.doi.org/10.1016/j.csbj.2020.12.037 ISSN 2001-0370.

Tan LK, Low SL, Sun H, Shi Y, Liu L, Lam S, et al. Force of infection and true infection rate of dengue in Singapore: implications for dengue control and management. Am J Epidemiol 2019;188:1529–38, doi:http://dx.doi.org/10.1093/aje/kwz110.

Wajnberg A, Mansour M, Leven E, Bouvier NM, Patel G, Firpo-Betancourt A, et al. Humoral response and PCR positivity in patients with COVID-19 in the New York City region, USA: an observational study. Lancet Microbe 2020;1:e283–9, doi: http://dx.doi.org/10.1016/s2666-5247(20)30120-8.

Yan G, Lee CK, Lam LTM, Yan B, Chua YX, Lim AYN, et al. Covert COVID-19 and false-positive dengue serology in Singapore. Lancet Infect Dis 2020;20:536, doi: http://dx.doi.org/10.1016/S1473-3099(20)30158-4.

Zou L, Ruan F, Huang M, Liang L, Huang H, Hong Z, et al. SARS-CoV-2 viral load in upper respiratory specimens of infected patients. N Engl J Med 2020;382:1177–9, doi:http://dx.doi.org/10.1056/nejmc2001737.

Subhajit Biswas*
Infectious Diseases & Immunology Division, CSIR-Indian Institute of Chemical Biology (CSIR-IICB), Kolkata, West Bengal, India

Soumi Sukla
National Institute of Pharmaceutical Education and Research (NIPER), Kolkata, West Bengal, India

Subrata Roy
Himadri Nath
Abinash Mallick
Infectious Diseases & Immunology Division, CSIR-Indian Institute of Chemical Biology (CSIR-IICB), Kolkata, West Bengal, India

* Corresponding author at: Infectious Diseases & Immunology Division, CSIR-Indian Institute of Chemical Biology (CSIR-IICB), 4, Raja S.C. Mullick Road, Jadavpur, Kolkata 700032, West Bengal, India.
E-mail addresses: subhajit.biswas@iicb.res.in, subhajitcam@gmail.com (S. Biswas), soumisukla@gmail.com (S. Sukla).

Received 23 November 2020