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Seroprevalence of Middle East Respiratory Syndrome Coronavirus (MERS-Cov) Infection among Healthy and High Risk Individuals in Qatar

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Abstract : Background: Since its first isolation in September 2012, Middle East respiratory syndrome coronavirus (MERS-CoV) has diffused across 27 countries infecting more than two thousand individuals with a high case fatality rate. MERS-CoV–specific antibodies are widely found in Dromedary camel along with viral shedding of similar viruses detected in human at same region, suggesting that MERS epidemiology may be central role by camel. Interestingly, MERS-CoV has also been also reported to be asymptomatic or to cause influenza-like mild illnesses. Therefore, in a country like Qatar (bordered Saudi Arabia), where camels are widely spread, serological surveys are important to explore the role of camels in MERS-CoV transmission. However, widespread strategic serological surveillances of MERS-CoV among populations, particularly in endemic country, are infrequent. In the absence of clear epidemiological view, cross-sectional MERS antibody surveillances in human populations are of global concern. Method: We performed a comparative serological screening of 4719 healthy blood donors, 135 baseline case contacts (high risk individual), and four MERS confirmed patients (by PCR) for the presence of anti-MERS IgG. Initially, samples were screened using Euroimmune anti- MERS-CoV IgG ELISA kit, the only commercial kit available in the market and recommended by the CDC as a screening kit. To confirm ELISA test results, farther serological testing was performed for all borderline and positive samples using two assays; the anti MERS-CoV IgG and IgM Euroimmune indirect immunofluorescent test (IIFT) and pseudoviral particle neutralizing assay (PPNA). Additionally, to test cross reactivity of anti-MERS-CoV antibody with other family members of coronavirus, borderline and positive samples were tested for the presence of the of IgG antibody of the following viruses; SARS, HCoV-229E, HKU1 using the Euroimmune IIFT for SARS and HCoV-229E and ELISA for HKU1. Results: In all of 4858 screened 15 samples [10 donors (0.21%, 10/4719), 1 case contact (0.77 %, 1/130), 3 patients (75%, 3/4)] anti-MERS IgG reactive/borderline samples were seen in ELISA. However, only 7 (0.14%) of them gave positive with in IIFT and only 3 (0.06%) was confirmed by the specific anti-MERS PPNA. One of the interesting findings was, a donor, who was selected in the control group as a negative anti-MERS IgG ELISA, yield reactive for anti-MERS IgM IIFT and was confirmed with the PPNA. Further, our preliminary results showed that there was a strong cross reactivity between anti- MERS-COV IgG with both HCoV-229E or anti-HKU1 IgG, yet, no cross reactivity of SARS were found. Conclusions: Our findings suggest that MERS-CoV is not heavily circulated among the population of Qatar and this is also indicated by low number of confirmed cases (only 18) since 2012. Additionally, the presence of antibody of other pathogenic human coronavirus may cause false positive results of both ELISA and IIFT, which stress the need for more evaluation studies for the available serological assays. Conclusion: this study provides an insight about the epidemiological view for MERS-CoV in Qatar population. It also provides a performance evaluation for the available serologic tests for MERS-CoV in a view of serologic status to other human coronaviruses.

Keywords : seroprevalence, MERS-CoV, healthy individuals, Qatar
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