

COVID-19 seropositivity among non-medical frontline office staff from two cities in Rajasthan, India

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ABSTRACT

Aims: The indigenously developed Indian Council of Medical Research (ICMR)-NIV COVID Kavach IgG enzyme linked immunosorbent assay (ELISA) has been recommended for seroprevalence among vulnerable populations in India, which provided essential services throughout the lockdown. The staff working in the High Court was one such group. We compared anti-SARS-CoV-2 IgG seropositivity among the staff of Jodhpur and Jaipur High Courts, Rajasthan, India. **Methods:** Asymptomatic judiciary staff of Jodhpur and Jaipur benches of High Courts were enrolled after informed written consent. A questionnaire was filled and 3–5 ml venous blood was collected from participants. The ICMR-NIV COVID Kavach IgG ELISA and EUROIMMUN IgG ELISA were used for detection of Anti-SARS-CoV-2 IgG antibodies. **Results:** A total of 63 samples (41 from Jodhpur and 22 from Jaipur) were collected between 28th July to 4th August 2020. The overall anti-SARS-CoV-2 IgG seroprevalence was found to be 6.35%. Seropositivity was higher among the staff from Jaipur (13.64%) as compared to Jodhpur (2.44%). The Kavach ELISA results were in complete agreement with EUROIMMUN ELISA. The infection control measures were deemed effective. **Conclusion:** Seroprevalence among the staff of Jodhpur High Court was found to be lower than Jaipur, reflecting higher susceptibility to COVID-19 in the former. Many offices worldwide are closed till mid 2020 but need to come up with pre-emptive policies eventually. This study may help to anticipate the possible challenges when other government/private offices start functioning. The infection control practices of one workplace may help formulate guidelines for other offices.

Keywords: Anti-SARS-CoV-2 IgG ELISA, EUROIMMUN ELISA, euroimmun, kavach ELISA, seropositivity, sero-surveillance

Background

The Coronavirus disease 2019 (COVID-19) caused by Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV2), has been declared a pandemic by the World Health Organization

on 11th March 2020. There were around 113,467,303 cases and 2,550,520 COVID-19 deaths worldwide as on 1st March 2021. India ranked second with 11,096,731 confirmed cases but fourth in mortality worldwide, with 157,051 deaths.^[1]

India responded to the COVID-19 threat by a nationwide lockdown from 25th March to 31st May 2020, during which only essential services were permitted to function. The restrictions were lifted in a phased manner “Unlock 1-4” from 1st June to 30th

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September 2020. While there are many studies worldwide regarding serosurveillance health-care workers during the pandemic, there is a paucity of data among non-medical providers of essential services. The judiciary kept its offices functional throughout lockdown. Its dealings with the general public, police, and prison inmates, kept its employees at a constant risk of COVID-19 exposure.

The arid state of Rajasthan lies in western India, in the heart of the Thar desert. Its capital, Jaipur, is its largest city with a land area of 450 km², home to a population of more than 3 million. Jodhpur, the second-largest city, is located 350 km westwards, with half the land area (214 km²) and one-third the population (1 million) of Jaipur.^[2] The Rajasthan High Court has two benches: Jodhpur and Jaipur. Both remained operational throughout the lockdown. The High Court set an example of how infection control practices could be implemented in workplaces with public dealings during the COVID-19 pandemic. A majority of proceedings were made online and only limited public hearings were conducted, with a minimum workforce throughout the lockdown.^[3]

The indigenously developed Indian Council of Medical Research (ICMR)- national institute of virology (NIV) COVID Kavach IgG enzyme linked immunosorbent assay (ELISA) has been recommended by the ICMR for conducting seroprevalence among vulnerable populations in India, providing essential services throughout the lockdown period.^[4] The current study was aimed at assessing Anti-SARS-CoV-2 prevalence among the staff of both benches of the high court. Additionally, the infection control practices in the offices of the High Courts were assessed by means of a questionnaire.

Methods

This, cross-sectional, study was conducted to assess and compare the seroprevalence of anti-SARS-CoV-2 IgG antibodies among the judicial staff of Jodhpur and Jaipur High Courts. Asymptomatic individuals who were willing to provide 3–5 ml venous blood after informed written consent were included in the study. Samples were collected on two sessions of a single day from each study site, within 1 week (28th July for Jodhpur High Court and 4th August for Jaipur High Court). A structured questionnaire was filled and 3–5 ml venous blood was collected by a trained phlebotomist. The vials were labeled appropriately

and dispatched on the same day under proper cold chain (2–8°C), using iceboxes by road to the laboratory of the Department of Microbiology of a tertiary care referral hospital of Jodhpur.

After reaching the laboratory, the samples were immediately centrifuged to separate serum. The ICMR-NIV COVID Kawach ELISA was used for the qualitative detection of Anti-SARS-CoV-2 IgG antibodies. The coated microwell strips, containing the SARS CoV-2 virus whole-cell antigen were washed thrice, followed by the addition of samples and appropriate positive and negative controls. The addition of lyophilized reagent, anti-human IgG HRP to capture human IgG antibodies, was followed by the addition of chromogenic substrate (TMB/H₂O₂) and eventual cessation of the reaction by 1N H₂SO₄ stop solution. The optical density was measured at 450 nm and ELISA results calculated on MS excel using the kit algorithm, before dispatching final reports. All samples were then repeated by EUROIMMUN IgG ELISA as per manufacturer's instructions.

For discussion purposes, all the available raw data related to the cases of COVID-19 for Jaipur and Jodhpur districts were retrieved from the crowdsourced database (<https://www.covid19india.org>), which includes the reporting from state and central government agencies.^[5] The data related to the testing in India were retrieved from the ICMR.^[6]

Results

A total of 63 staff participants (41 from Jodhpur and 22 from Jaipur) were enrolled during the study period. Out of the total, 14.28% participants were females (13.6% from Jaipur and 14.6% from Jodhpur). Anti-SARS-CoV-2 IgG by Kawach ELISA was detected among one out of 41 staff in Jodhpur and three out of 22 staff in Jaipur. The Kavach ELISA results were in complete agreement with EUROIMMUN ELISA, except for one positive sample from Jaipur, missed by the latter.

The infection control practices being observed at the two high court benches are summarized in Table 1.

The participant responses to the questionnaire are summarized in Table 2. None of the participants had any history of travel outside Jodhpur using public transport like train or plane. None visited any local known hotspot areas.

Table 1: Uniform infection control measures implemented by the Rajasthan High Court benches (w.e.f 15th March 2020)

General measures	Policy for staff	Policy for visitors
Courts to function only from 2:00 to 4:00 pm	Advocates provided with detailed SOP for use of “Jitsi Meet” app and software	Mandatory screening of visitors at entry point
All court proceedings to be held via video-conferencing on “Jitsi Meet” mobile app, except very urgent cases, after due permission	Reduce staff strength by 50%, on rotation basis	Provision of hand sanitizers, mask and gloves
Arrangement of cameras, monitors and other video-conferencing aids	Staff to take mandatory leave if suffering from cough and cold	Verification through electronic signature and Aadhar authentication to limit interaction with plaintiff
Disinfection of court premises twice a day with 1% sodium hypochlorite	Staff from Hotspot areas to avoid coming for work	
Closure of all canteens	Provision of hand sanitizers, mask, gloves etc., to all court staff, advocates and litigants	
Deployment of extra security and paramedical staff		

Discussion

The government of India had strictly implemented preventive interventions like ban on cross-border movements, national-level lockdown and self-quarantine measures. Due to those interventions, there were relatively few cases and deaths in the initial phase of the pandemic.^[7] However, when the restrictions started easing, cases increased everywhere. The Rajasthan High Court was the first judicial office to resume public dealings after the lockdown in India. The findings from an office that remained operational throughout the lockdown, initially with reduced staff but later at full strength, are presented for the benefit of designing infection control measures for future office-goers. It is of special importance to primary care physicians to actively seek a history of “re-joining office” if they observe a sudden rise in COVID-19 cases.

The timeline of COVID-19-related events of the Rajasthan High Court in context of the National lockdown in India is summarized in Figure 1. When the rest of the country underwent “Unlock 1,” Rajasthan underwent an extended phase of lockdown to control rising cases.

Table 2: Participant responses to the structured questionnaire regarding risk factors for COVID-19 acquisition (from March to July 2020)

Participant responses	Jaipur (n=22)	Jodhpur (n=41)
Gender		
F	13.6%	14.6%
M	86.4%	85.4%
Suffered from cough or fever or shortness of breath	4.5%	4.9%
Contact with a laboratory confirmed case of COVID-19	4.5%	9.8%
Frequent contact with market places	27.4%	34.1%
Months of work attended		
>2 months	0.0%	4.9%
>3 months	100.0%	95.1%
Anti-SARS-CoV-2 IgG seropositivity	13.6%	2.4%

Although the offices of the High Court remained functional with 30–50% staff on rotation basis throughout the lockdown, only one case was reported among the employees during this period. This suggests that the lockdown was fruitful in Rajasthan and the infection control measures practiced by the High Court staff were effective. In contrast, the countries whose COVID-19 policy did not include a strictly enforced lockdown, had shown high population seroprevalence for Anti-SARS-CoV-2 IgG by May 2020, signifying higher exposure risk. The average seropositivity reported among the population of UK^[8] was 10.6%, Switzerland^[9] was 10.8%, Sweden^[10] was 7.3% and Spain^[11] was 5%. A recent study from Singapore proved significant risk of COVID-19 among nonhousehold and occupational contacts when they shared a vehicle with or participated in a conversation with the index case^[12] for more than 30 min.

Once the phase of “Unlock” started, free population movement subsequently led to rise in seropositivity in the Indian population, so too among the office staff. Public dealing at the High Court resumed from 29th June 2020 and almost all employees joined back. Initially, there were isolated cases reported among the staff, which led to a temporary closure of the office for a few days. Work resumed with appropriate infection control precautions.^[13] Based on the questionnaire data, a number of individuals visited public places and subsequently reported ILI symptoms once the lockdown restrictions eased.

At the end of July, the average seroprevalence among the staff of Jaipur and Jodhpur high courts was 6.35%. This is much higher than the findings of the national serosurvey (0.73% with 95% CI: 0.34–1.13) conducted by the ICMR for May–June 2020,^[13] reflecting a significant increase in population seroprevalence after Unlock, in just 1 month.

Higher seroprevalence among the staff of Jaipur as compared to Jodhpur reflects higher COVID-19 exposure in the densely populated capital city of Jaipur than the sparsely populated city of

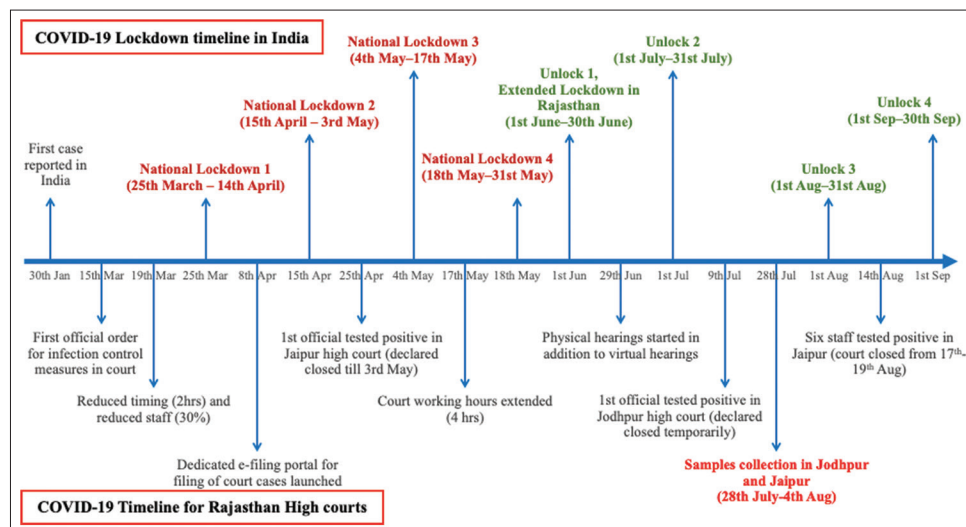


Figure 1: Timeline of COVID-19-related events at the National level and in Rajasthan High Courts

Jodhpur. This can be very well correlated with the trend of the total number of cases and testing in Jaipur and Jodhpur. The number of cases was more in Jaipur than Jodhpur till the mid of July 2020. The city of New Delhi, capital of India, which is home to around four times the population of Jaipur, reported a local seroprevalence of 29% during August 2020.^[14] This may suggest a possible correlation between COVID-19 seroprevalence and local population density.

The lower seroprevalence in Jodhpur reflected higher susceptibility to COVID-19 among them in July. The questionnaire responses of participants from Jodhpur showed greater number of individuals coming in contact with market places and laboratory proven COVID-19 cases. Eventually, Jodhpur overtook Jaipur in terms of the total number of COVID-19 cases after July 2020. Though, the number of tests conducted was more in Jodhpur throughout the pandemic, as compared to Jaipur [Figure 2].

Various countries of the world have followed different strategies for tackling the COVID-19 pandemic in order to limit cases and possibly attain herd immunity.^[15] India along with many others opted for a Lockdown, whereas Sweden targeted a strategy for rapid herd immunity. Instead of criticizing any single approach,^[16] it would be prudent to evaluate the trend of serosurveillance in each of those countries. The outcome of serosurveys depends both on the national health policies drafted by the government as well as the infection control practices of the individual. There are equally valuable lessons to be learnt from apparent failures as from perceived successes in public health approaches during the COVID-19 pandemic.

India has launched the largest and perhaps the most ambitious vaccination drive with a target of 300 million beneficiaries^[17] by August 2021. Frontline workers are being immunized first, in accordance with their higher risk of exposure. The efficacy of vaccination will be best judged by conducting such serosurveys before and after this drive, at regular intervals. Such surveys have often given priority to health-care personnels in India;^[18]

however, there is a paucity of data regarding non-health-care frontline workers.

Our study shows how local seroprevalence studies, when conducted for other frontline workers in the initial phase, can help to identify susceptible populations for priority in immunization. The trend of cases and seropositivity may be considered a learning experience, one to be used to plan timely public health interventions in future. Regular testing of symptomatic cases, timely serial serosurveys among the general population, and routine implementation of infection control practices in all workplaces is the way forward.

The COVID-19 pandemic has changed the way of life for the world and office-goers are no exception. It is time we understand the trend of events in one workplace and use it to formulate guidelines for other offices. The High Court functioned throughout lockdown so we can learn from their experiences of infection control measures and outcomes. This occupational group providing essential services probably became vulnerable due to its continuous exposure to the general population and to other vulnerable groups like police personnel and prison inmates.

Conclusion

The strict national lockdown kept cases at bay till June 2020 in India. However, once the “Unlock” began, the population seropositivity rose sharply. The comprehensive infection control practices followed by the Rajasthan High Court may serve as a model for other offices. Lower seroprevalence in Jodhpur (2.4%) as compared to Jaipur (13.6%) reflected higher susceptibility to COVID-19 in the former. As many offices are currently closed and need to come up with pre-emptive policies, this study may help to anticipate the possible challenges when other government/private offices start functioning.

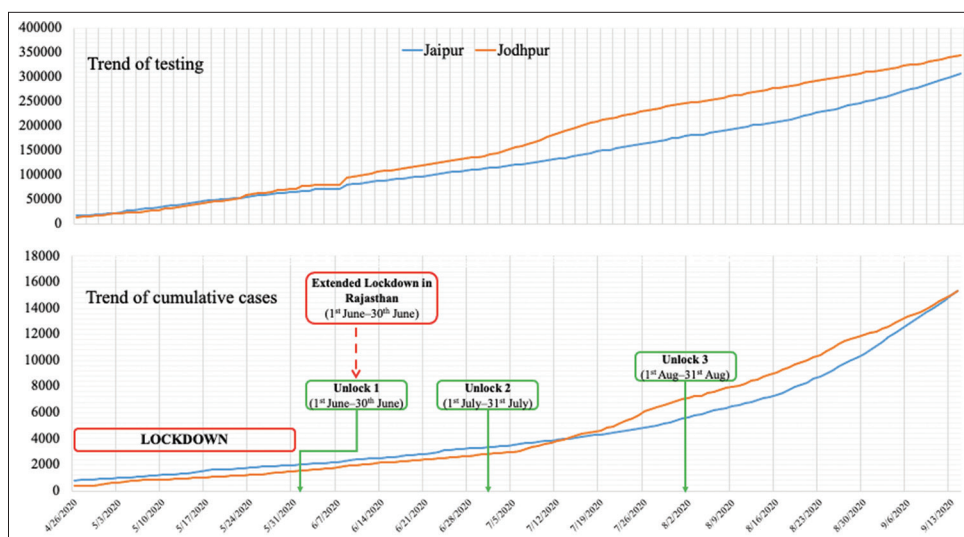


Figure 2: Trends of cases and testing in Jaipur and Jodhpur districts

Ethical approval

The study was approved by the ethical committee, AIIMS Jodhpur vide IEC approval No. AIIMS/RES/2020/4547.

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Conflicts of interest

There are no conflicts of interest.

References

1. WHO Coronavirus Disease (COVID-19) Dashboard | WHO Coronavirus Disease (COVID-19) Dashboard [Internet]. [cited 2020 Oct 1]; Available from: <https://covid19.who.int/>.
2. Rajasthan | History, Map, Culture, Capital, and Government | Britannica [Internet]. [cited 2020 Oct 15]; Available from: <https://www.britannica.com/place/Rajasthan>.
3. Rajasthan High Court [Internet]. [cited 2020 Aug 15]; Available from: <https://hcraj.nic.in/hcraj/>.
4. Indian Council of Medical Research. Press Release, "COVID KAVACH ELISA" for antibody detection for COVID-19 [Internet]. 2020. Available from: https://main.icmr.nic.in/sites/default/files/press_realease_files/ICMR_PressRelease_14052020.pdf.
5. Coronavirus in India: Latest Map and Case Count [Internet]. [cited 2020 Oct 1]; Available from: <https://www.covid19india.org>.
6. Indian Council of Medical Research, New Delhi [Internet]. [cited 2020 Sep 16]; Available from: <https://www.icmr.gov.in/>.
7. Asad A, Srivastava S, Verma MK. Evolution of COVID-19 pandemic in India. *Trans Indian Natl Acad Eng* 2020;1-8. doi: 10.1007/s41403-020-00166-y [Epub ahead of print]
8. National COVID-19 surveillance report, UK <https://www.gov.uk/government/publications/national-covid-19-surveillance-reports/sero-surveillance-of-covid-19>.
9. Stringhini S, Wisniak A, Piumatti G, Azman AS, Lauer SA, Baysson H, *et al.* Seroprevalence of anti-SARS-CoV-2 IgG antibodies in Geneva, Switzerland (SEROCoV-POP): A population-based study. *The Lancet* 2020;396:P313-9.
10. Pollán M, Pérez-Gómez B, Pastor-Barriuso R, *et al.* Prevalence of SARS-CoV-2 in Spain (ENE-COVID): A nationwide, population-based seroepidemiological study. *Lancet* 2020;396:535-44.
11. Public Health Agency of Sweden. Första resultaten från pågående undersökning av antikroppar för COVID-19-virus. [Updated 2020]. [Accessed July 7, 2020]. <https://www.folkhalsomyndigheten.se/nyheter-och-press/nyhetsarkiv/2020/maj/forsta-resultaten-fran-pagaende-undersokning-av-antikroppar-for-covid-19-virus/>.
12. Ng OT, Marimuthu K, Koh V, Pang J, Linn KZ, Sun J, *et al.* SARS-CoV-2 seroprevalence and transmission risk factors among high-risk close contacts: A retrospective cohort study. *Lancet Infect Dis* 2021;21:P333-43.
13. Murhekar MV, Bhatnagar T, Selvaraju S, Rade K, Saravanakumar V, Thangaraj JW, *et al.* Prevalence of SARS-CoV-2 infection in India: Findings from the national serosurvey, May-June 2020. *Indian J Med Res* 2020;152:48-60.
14. <https://www.thestatesman.com/india/29-delhi-population-developed-antibodies-coronavirus-shows-serological-survey-1502918483.html>.
15. Kwok KO, Lai F, Wei WI, Wong SY, Tang JW. Herd immunity—estimating the level required to halt the COVID-19 epidemics in affected countries. *J Infect* 2020;80:e32-3.
16. Orłowski EJ, Goldsmith DJ. Four months into the COVID-19 pandemic, Sweden's prized herd immunity is nowhere in sight. *J R Soc Med* 2020;113:292-8.
17. Bagechi S. The world's largest COVID-19 vaccination campaign. *Lancet Infect Dis* 2021;21:323.
18. Singhal T, Shah S, Naik R, Kazi A, Thakkar P. Prevalence of COVID-19 antibodies in healthcare workers at the peak of the pandemic in Mumbai, India: A preliminary study. *Indian J Med Microbiol* 2020;38:461-3.