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Abstract

Background: Data are scarce on differences in the rates of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) reinfection after the first infection.

Aims: We examined nationwide data on SARS-CoV-2 reinfection in Kuwait according to four-time windows to reinfection: 29–45 days, 46–60 days, 61–90 days, and ≥ 91 days.

Methods: This was a population-level retrospective cohort study conducted between 31 March 2020 and 31 March 2021. We reviewed evidence of second positive RT-PCR test results for those who had previously recovered from COVID-19 and tested negative.

Results: Reinfection rates were: 0.52% for reinfection window 29–45 days, 0.36% for 45–60 days, 0.29% for 61–90 days, and 0.20% for ≥ 91 days. The mean age (standard deviation [SD]) of individuals with the shortest reinfection time interval (29–45 days) was significantly older than the mean age of all other groups – 43.3 years (SD 17.5) compared with: 39.0 years (SD 16.5), $P = 0.037$ for 46–60-day interval; 38.3 years (SD 16.5), $P = 0.002$ for 61–90-day interval; and 39.2 years (SD 14.4), $P = 0.001$ for ≥ 91-days interval.

Conclusion: SARS-CoV-2 reinfection was uncommon among this adult population. Older age was associated with a shorter time to reinfection.

Keywords: SARS-CoV-2; COVID-19; reinfection, adults, Kuwait.

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Introduction

Since the emergence of coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), in central China in December 2019 (1), studies have examined different time windows to define reinfection, namely 0.05) when compared by reinfection time interval (29–45 days, 46–60 days, 61–90 days and ≥ 91 days).

The only difference was observed in patients' age. When compared using the t-test, the mean age of patients with the shortest reinfection time interval (29–45 days) was significantly older than the mean age of all other groups of patients: $P = 0.037$ compared with 46–60-day interval; $P = 0.002$ compared with 61–90-day interval; and $P = 0.001$ compared with ≥ 91-day interval.

Discussion

Our study is comparable with previous studies for reinfection rates at different time windows. Our results on sex and age differences are in line with some studies (3–5), partly in line with others (6) and contrary to other studies (7,8). Our data are consistent with another nationwide study in Mexico that used a 28-day window for reinfection with 100 000 PCR-confirmed cases (7). The authors reported a 0.21% reinfection rate which was higher among healthcare workers and immunosuppressed or renal patients, and lower among those with mild primary disease. However, unlike our findings, higher rates of reinfection were found among younger people with no sex differences.

Another nationwide study in Denmark, which included 4 million individuals (69% of the population), compared the first and second waves of SARS-CoV-2 infection – before June 2020 versus September–December 2020 (3). The authors reported that the reinfection rate was 0.65% during the second wave with an estimated protection of 80.5%. However, this protection rate fell to 47.1% in persons aged ≥ 65 years with no sex differences.

A study in Qatar using a 45-day window and 133 266 PCR-positive patients aged 15–57 years found a reinfection rate of 0.18%, with higher rates in males (9). A United States study using a 45-day window and 13 603 PCR-positive patients detected a 0.2% reinfection rate with significantly higher rates in females but not in persons aged ≥ 65 years (6).

Two Italian studies that used a 90-day window for reinfection detected a reinfection rate of 0.31% (4) and 0.33% (5), with older age being a risk factor for reinfection. A study in Pakistan using a similar 90-day window for reinfection and 142 787 PCR-positive patients detected a 0.22% reinfection rate, with higher rates in males and people younger than 45 years (8).

This nationwide study included the largest number of previously positive COVID-19 patients in Middle East countries. At the time of our study, vaccination, which started in December 2020,

had not yet had a substantial effect on SARS-CoV-2 infection. To the best of our knowledge, this is the first study on a large population comparing rates of reinfection at different time windows for reinfection.

Our study has certain limitations: data on clinical severity of the disease in relation to PCR positivity were not available and we did not consider the effect of vaccination on reinfection. However, our study showed that SARS-CoV-2 reinfection is generally uncommon in an adult population. Further studies are needed, using genomic sequencing surveillance.

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Competing interests: None declared.

Étude des taux de réinfection par le SARS-CoV-2 à l'échelle nationale chez les adultes au Koweït

Résumé

Contexte : Les données sur les différences de taux de réinfection par le coronavirus 2 du syndrome respiratoire aigu sévère (SARS-CoV-2) après la première infection sont rares.

Objectifs : Nous avons examiné les données nationales concernant la réinfection par le SARS-CoV-2 au Koweït selon quatre intervalles de temps avant la réinfection : 29-45 jours, 46-60 jours, 61-90 jours et 91 jours ou plus.

Méthodes : Il s'agissait d'une étude de cohorte rétrospective menée au niveau de la population entre le 31 mars 2020 et le 31 mars 2021. Nous avons examiné les données relatives aux deuxièmes résultats positifs au test RT-PCR pour les personnes qui avaient précédemment guéri de la COVID-19 et qui avaient été testées négatives.

Résultats : Les taux de réinfection étaient les suivants : 0,52 % pour l'intervalle de temps avant la réinfection de 29 à 45 jours, 0,36 % pour 45 à 60 jours, 0,29 % pour 61 à 90 jours et 0,20 % pour 91 jours ou plus. L'âge moyen (écart type [ET]) des personnes présentant l'intervalle de

temps entre deux infections le plus court (29-45 jours) était significativement plus élevé que celui observé dans tous les autres groupes – 43,3 ans (ET : 17,5) par rapport à 39,0 ans (ET : 16,5), p = 0,037 pour l'intervalle de 46 à 60 jours ; 38,3 ans (ET : 16,5), p = 0,002 pour l'intervalle de 61 à 90 jours ; et 39,2 ans (ET : 14,4), p = 0,001 pour l'intervalle de 91 jours ou plus.

Conclusion : La réinfection par le SARS-CoV-2 était rare dans cette population adulte. Un âge plus avancé était associé à un délai de réinfection plus court.

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References

1. Hu B, Guo H, Zhou P, Shi ZL. Characteristics of SARS-CoV-2 and COVID-19. Nat Rev Microbiol. 2021;19(3):141–54. https://doi.org/10.1038/s41579-020-00459-7
2. Investigative criteria for suspected cases of SARSCoV-2 reinfection (ICR) [Internet]. Atalanta, GA: Centers for Disease Control and Prevention; 2020 (https://www.cdc.gov/coronavirus/2019-ncov/php/invest-criteria.html).
3. Hansen CH, Michlmayr D, Gubbels SM, Mølbak K, Ethelberg S. Assessment of protection against reinfection with SARS-CoV-2 among 4 million PCR-tested individuals in Denmark in 2020: a population-level observational study. Lancet. 2021;397(10280):1204–12. https://doi.org/10.1016/S0140-6736(21)00575-4
4. Vitale J, Mumoli N, Clerici P, De Paschale M, Evangelista I, Cei M, et al. Assessment of SARS-CoV-2 reinfection 1 year after primary infection in a population in Lombardy, Italy. JAMA Intern Med. 2021;181(10):1407–8. https://doi.org/10.1001/jamainternmed.2021.2959
5. Flacco ME, Acuti Martellucci C, Soldato G, Carota R, Fazii P, Caponetti A, et al. Rate of reinfections after SARS-CoV-2 primary infection in the population of an Italian province: a cohort study. J Public Health (Oxf). 2021 Sep 8: fdab346. https://doi.org/10.1093/pubmed/fdab346
6. Kobayashi T, Ortiz ME, Imborek KL, Alsuhaibani M, Holley SA, Trannel A, et al. Suspected COVID-19 reinfections at a tertiary care center, Iowa, 2020. Open Forum Infect Dis. 2021;8(7):ofab188. https://doi.org/10.1093/ofid/ofab188
7. Murillo-Zamora E, Trujillo X, Huerta M, Ríos-Silva M, Aguilar-Sollano F, Mendoza-Cano O. Symptomatic SARS-COV-2 reinfection: healthcare workers and immunosuppressed individuals at high risk. BMC Infect Dis. 2021;21(1):923. https://doi.org/10.1186/s12879-021-06643-1
8. Ahmad HA, Khan H, Shahzad M, Haq ZU, Harakeh S, Yousafzai YM. Suspected reinfections of SARS-COV-2 in Khyber Pakhtunkhwa, Pakistan – analysis of province-wide testing database. J Infect. 2021;84(2):248–88. https://doi.org/10.1016/j.jinf.2021.https://doi.org/10.005
9. Abu-Raddad LJ, Chemaitelly H, Malek JA, Ahmed AA, Mohamoud YA, Younuskunju S, et al. Assessment of the risk of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) reinfection in an intense reexposure setting. Clin Infect Dis. 2021;73(7):e1830–40. https://doi.org/10.1093/cid/ciaa1846