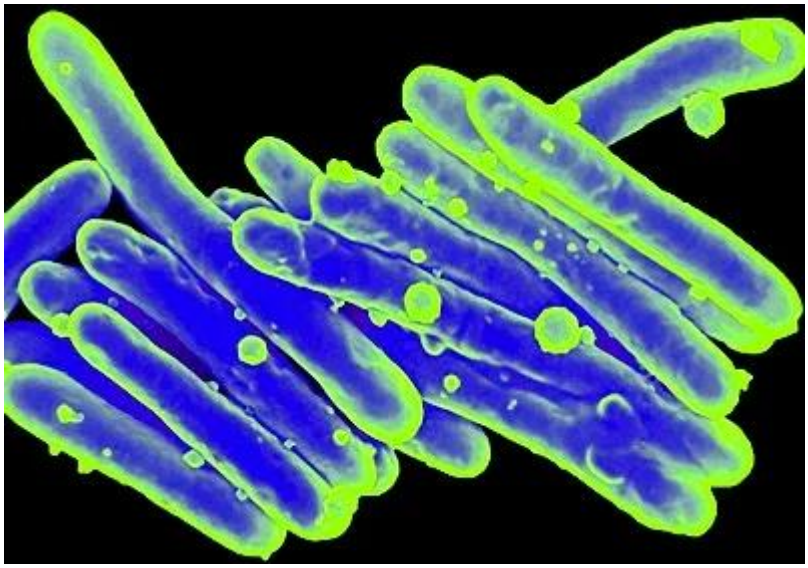
BNT162b2 (Pfizer- BioNTech) and mRNA 1273 (Moderna) vaccines were the first messenger RNA (mRNA)-based vaccines ever approved. In both vaccines (mRNA-1273 and BNT162b2), a mRNA sequence determines the structure and assembly of the immunogen, the SARS-CoV-2 spike (S) glycoprotein. The authors from the United Kingdom conducted this retrospective study to determine the vaccination status of all individuals diagnosed with leprosy who attended the Leprosy Clinic in 2021. In addition, they investigated whether any individual had developed leprosy or had a new leprosy reaction within 12 weeks of receiving the COVID-19 vaccine. The research team also presented two cases that met the criteria for new leprosy adverse events associated with COVID-19 vaccination.

Since 1954, there have been no reports of an individual acquiring leprosy in the United Kingdom. However, individuals who have migrated from or lived for extended periods in countries with endemic leprosy continue to be diagnosed.

Leprosy is caused by *Mycobacterium leprae*. The clinical presentation depends on the immune response of the infected person. Tuberculoid and borderline tuberculoid leprosy is characterized by *a* Th1-type immune response with granuloma formation in the presence of CD4+ T-cells and few or no bacteria identifiable in tissues. A high bacterial load, poor granuloma formation, and a predominance of CD8+ T-cells are characteristics of lepromatous leprosy.

Individuals diagnosed with leprosy can develop immune-mediated complications known as leprosy reactions. There are two types of auto-immune responses, type 1 (T1R) and type 2 (T2R). T1R is a delayed hypersensitivity reaction to antigens of *Mycobacterium leprae,* characterized by edema, inflammation in pre-existing leprosy skin lesions and nerves, pain, and loss of function. T2R or erythema nodosum leprosum is a multisystem complication characterized by painful cutaneous nodules, fever, arthralgia, arthritis, and neuritis. The initiation of muti-drug therapy, infections, stress, trauma, pregnancy, and vaccination may trigger leprosy reactions. Recently, researchers have reported the adverse effects in patients diagnosed with leprosy associated with COVID-19 vaccination.



Mycobacterium Leprae

About the study

The authors conducted this retrospective cohort study in individuals diagnosed with leprosy who attended in 2021 the Leprosy Clinic at the Hospital for Tropical Diseases, London, a national referral center in the UK for tropical and infectious diseases. They also examined whether any of these individuals had developed leprosy or experienced a new leprosy reaction within the 12 weeks following the COVID-19 vaccination.

A leprosy-associated adverse event was defined as the onset of leprosy or a leprosy reaction, and/or neuritis, within 12 weeks following the administration of a COVID-19 vaccine in an individual with no previous history of leprosy or a leprosy reaction and/or neuritis, and who had not received treatment for leprosy within 12 weeks.

Results

In the year 2021, the clinic attended 52 individuals with leprosy of whom 5 were newly diagnosed. Most patients (71%, 37 individuals) were male, and the median age was 48.5 years old (range 27–85 years). Almost all individuals with leprosy who attended the clinic in 2021 were vaccinated (98%, 49 individuals). One individual had declined vaccination.

Out of 52 leprosy patients, 44.2% (23 individuals) were diagnosed with lepromatous leprosy, 17.3% (9 individuals) with borderline lepromatous leprosy, 1.9% (1 patient) with tuberculoid

leprosy, 26.9% (14 individuals) with borderline tuberculoid leprosy, 1.9% (1 patient) with borderline leprosy, and 3.8% (2 patients) with pure neural leprosy.

21 individuals (40.3%) were treated with a systemic immunosuppressant drug for leprosy reactions.

The case reports

The authors also presented two cases that met the criteria for a new leprosy adverse events associated with COVID-19 vaccination. The authors noted that they have published six articles on 14 individuals of both genders with leprosy adverse events associated with COVID-19 vaccination from both, leprosy endemic and non-endemic settings. Ten of the 14 individuals experienced a leprosy adverse event after the first, three after the second, and one after the third COVID-19 vaccination.

Case 1

A man aged 80 years who had been living in the UK for 49 years was diagnosed with borderline tuberculoid leprosy one week after the second dose of the BNT162b2 COVID-19 vaccine. The disease was manifested with red skin lesions, reduced sensation, and thickened peripheral nerves. The diagnosis was confirmed by skin biopsy showing peri-neural and peri-adnexal granulomatous inflammation with infiltration and destruction of dermal nerves.

Anti-microbial therapy improved the skin lesions and nerve thickening within eight weeks. After 12 months, there was no recurrence of plaques or nerve signs.

Case 2

A man aged 27 years developed red plaques and tender thickened nerves consistent with a leprosy T1R 56 days after receiving the BNT162b2 COVID-19 vaccine. Three months earlier, he was vaccinated with two doses of the CoronaVac vaccine. A skin biopsy supported the diagnosis, showing non-necrotizing destructive granulomatous neuritis, edema, and epidermal findings consistent with a T1R. The skin lesions and tender nerves improved with prednisolone therapy and there was no recurrence after 12 months.

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