

Commentary: An experimental theatre for vaccines—Bombay in the time of plague

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The letter by Dr Nusservanji H. Choksy, (the Chief Medical Officer, Arthur Road Hospital) to the *Lancet* (Professor Lustig's plague serum)¹ was written in the middle of a major plague epidemic in the city of Bombay, in western India. The Bombay plague has been seen as a watershed in the history of epidemics in modern India. David Arnold has described the plague and the subsequent interventionist sanitary measures undertaken by the colonial government as an 'assault on the body'.² The preoccupation with the sanitary measures undertaken has, however, overlooked the massive scale of experiments with vaccines that were simultaneously conducted in Bombay, to which Choksy's letter refers.

In September 1896, plague broke out in the Mandvi region of Bombay and soon spread to other parts,

killing thousands of people. The colonial authorities not only introduced strict and often unpopular sanitary measures, but also encouraged vaccination campaigns among the residents. Bombay soon became an important experimental site for various plague vaccines. At the time of the outbreak, there were several competing vaccines available for treating plague. The city of Bombay, with its massive and diverse population, jails, hospitals and slums provided an ideal site for experimenting with these various vaccines and serums. Several European bacteriologists visited Bombay with their vaccines. These included Alexandre Yersin and A. Lustig (Professor of Pathology, Royal University of Florence). Lustig came to Bombay in 1897 with his preventive serum prepared by injecting horses with nucleo-albumen

derived from masses of plague germs treated with certain chemicals by experiment on small animals. His serum was put to human tests for the first time in Bombay and he found the operations to be 'completely satisfactory in every regard'.³ The experiments between 1896 and 1900 with various vaccines in Bombay were conducted by the Indian doctor, Choksy. He conducted experiments with vaccines by Yersin-Roux, Haffkine and Lustig along with those by Terni, Tavel, Palthauf, Vital Brazil and a Japanese one developed by Shibasaburo Kitasato. He found Lustig's curative serum to be the most effective; it was initially tried in six serious cases and the results were 'exceedingly satisfactory' as all six cases recovered. Following these initial success, Choksy became a major advocate of Lustig's method.⁴

The letter in question,¹ written by Choksy, was in response to the criticism he faced from London for adopting a selective experimental method in the trial of Lustig's serum. In a report in the *Lancet*, a correspondent had pointed out that the selective method adopted in Bombay, where patients at an advanced stage of the disease and those with mild cases were excluded, made it 'impossible to place in the returns notwithstanding that the mortality under the serum treatment is reported to have been five times less than that of cases treated without it'.⁵ Choksy's response highlights two issues; first, the claim for legitimacy for an experimental method adopted in a city where plague was raging, and second, the validity of scientific experiments being conducted in the colony, often in the face of scepticism from Europe.

What was the nature of this selective process adopted by Choksy in Bombay? Lustig's vaccine was a curative serum, which needed to be tested on plague patients. Choksy first rejected all those patients who were diagnosed to have 'hardly any probability of benefiting by the serum treatment'. The convalescent and semi-convalescent cases were further eliminated, as well as those in whom the illness had already lasted for 6 days (the latter were excluded since experience had shown that patients who were alive on the 6th day were either too far advanced for treatment or were just beginning to improve spontaneously). According to him, the reasons for such exclusions were 'obvious to all experimenters'. The aim was 'to eliminate all disturbing factors that tend to vitiate the final results'. In other words, Choksy had sought to convert Bombay into an experimental laboratory. From his experience of treating plague in Bombay the above two cases were found to be such 'disturbing factors' and thus excluded. The advanced cases were found to be beyond the reach of all possible human help, and in the case of the latter the 'battle... had been already fought and won outside the hospital.' According to him such a method indicated the value of the serum method in the 'really acute' cases, which were 'fit for treatment'.¹

Choksy later described this as a 'rational system of treatment' necessary for the extensive trial of different varieties of vaccines.⁴ In the letter to the *Lancet*, he asked for time and faith in the experiments being conducted in Bombay, to 'let those best conversant with the subject to work out, quietly and undisturbed, their destiny until they reach their goal, which has but one and only aim in view—viz., the lessening of human suffering and the saving of human life'.¹ Choksy's method was later approved by Professor C.J. Martin, of the Lister Institute (and member of Committee for Plague Investigation in India).

Two important points are evident from Choksy's response; first, the extensive vaccinations in Bombay were not just for curative or prophylactic purposes, they were also for trials of vaccines. Bombay had become an experimental theatre. Secondly, from the striking language used by Choksy it is evident that although he wished to conduct his experiments in Bombay 'quietly and undisturbed' he also sought for legitimacy for his experimental method from London. Whereas Bombay was the experimental theatre, scientific opinion in and sanction from England about its modes and methods remained fundamental. He began by criticizing the *Lancet's* correspondent for posing to be the 'sole arbiter' of the destiny of serum therapy, describing his criticism of the experimental method adopted in Bombay as a product of 'unjust and unfair prejudice'. He presented his letter to the *Lancet* as an evidence in a trial of truth to provide the 'plain and unvarnished facts' of his experiments and offer the readers of *Lancet* 'the truth, the whole truth, and nothing but the truth'. Choksy also claimed that the experiments in Bombay had 'proved' that Lustig's serum treatment was the 'only treatment that can in any way appreciably reduce the high mortality of plague'.¹

As an epilogue to these events, trials of vaccines (both prophylactic and curative) continued in Bombay and even became popular. By 1900 around 7000 people came forward every week in Bombay alone to be vaccinated. Vaccination was introduced in other parts of the country, including the Punjab and Hyderabad. In Punjab around 200 000 were inoculated in the first 2 weeks. However, in November 1902, in the village of Mulkowal (Punjab) 19 people vaccinated with Haffkines' vaccine, developed tetanus and died. The incident effectively ended the plague vaccination campaign in India.

Conflict of interest: None declared.

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