ijmr_1671_21_R3_C

Indian J Med Res Epub ahead of print
DOI: 10.4103/ijmr.ijmr_1671_21

Quick Response Code:

Correspondence

COVID-19 vaccine effectiveness in preventing deaths among high-risk groups in Tamil Nadu, India

Sir,

India rolled out COVID-19 vaccination with ChAdOx1 (Oxford AstraZeneca's vaccine manufactured by Serum Institute of India Limited, Pune) and BBV152 (Bharat Biotech Limited, Hyderabad) on January 16, 2021[1]. Healthcare and frontline workers were prioritized for vaccination in the first phase. The vaccination was further extended to other high-risk groups including individuals aged >60 yr and those aged >45 yr with comorbidities (since March 1, 2021), and all individuals aged >45 yr (April 1, 2021)[2]. Since May 1, 2021, COVID-19 vaccination has been extended to all individuals aged between 18-44 yr[2]. By May 20, 2021, >140 million individuals received one and 40 million individuals received two vaccine doses[3].

India started to witness the second wave of COVID-19 since February 2021, with increasing number of cases reported in all States, including Tamil Nadu[4]. Information regarding the real world effectiveness of COVID-19 vaccines, especially for severe disease is currently unavailable in India, although a few studies have been initiated recently. Such data would also be useful for addressing the issue of vaccine hesitancy.

The Tamil Nadu Police department has been documenting vaccination of its workforce (as aggregate numbers with 0, 1 and 2 doses), and COVID-19 deaths during the second wave along with details of the date of hospitalization and vaccination (as a line-list). In the present study, these data (personal communication) were used to estimate the incidence of deaths due to COVID-19 among vaccinated and unvaccinated police personnel. The incidence of mortality among vaccinated and unvaccinated individuals were compared to calculate the relative risk of mortality associated with COVID-19 vaccination, along with 95 per cent confidence interval (CI) using OpenEpi software (*https://www.openepi.com/Menu/OE_Menu.htm*). The effectiveness of vaccination in preventing COVID-19 deaths was estimated using 1- Relative Risk formula[5].

There are 117,524 police personnel working with Department of Police in Tamil Nadu. Between February 1, 2021 and May 14, 2021, 32,792 received one dose, 67,673 received two-doses while the 17,059 did not receive any vaccine dose (Table). Thirty-one COVID-19 deaths were reported among these police personnel between April 13, 2021 and May 14, 2021 (median age: 52 yr, range: 34–58, 29 males). Of these 31 COVID-19 deaths, four had taken two doses of the vaccine, seven had taken one dose and the rest 20 were unvaccinated. The incidence of COVID-19 deaths among the vaccinated with zero, one and two doses were 1.17, 0.21 and 0.06 per 1000 police personnel respectively. Compared to unvaccinated individuals, the relative risk of COVID-19 deaths among those receiving one and two doses were 0.18 (95% CI: 0.08-0.43) and 0.05 (95% CI: 0.02-0.15) respectively. The vaccine effectiveness in preventing COVID-19 deaths with one and two doses was 82 per cent (95% CI: 57 - 92%) and 95 per cent (95% CI: 85 – 98%) respectively (Table).

The published results of phase-3 clinical trial of Oxford AstraZeneca vaccine indicated efficacy of 97.5 per cent (lower bound of one-sided 97.5% CI: 72.2%) against hospitalization[6]. Observational studies conducted in different countries also indicated high effectiveness of the vaccine in preventing severe outcomes[7,8]. The interim results of BBV152 trial indicate high efficacy against preventing symptomatic disease[9]. A cohort study conducted among healthcare workers from a tertiary care hospital in Tamil Nadu

Table. Vaccine effectiveness in preventing COVID-19 deaths, Tamil Nadu, India

COVID-19 vaccine doses	Number of police personnel (n=117,524)	Number of COVID-19 deaths among police personnel	Incidence of COVID-19 deaths (per 1000)	Relative risk (95% CI)	Vaccine effectiveness (95% CI)
0	17,059	20	1.17	1.00	-
1	32,792	7	0.21	0.18 (0.08-0.43)	82 (57-92)
2	67,673	4	0.06	0.05 (0.02-0.154)	95 (85-98)

CI, confidence interval

indicated a strong protective effect of two doses of vaccines against hospitalization (77%, 95% CI: 68-84), the need for oxygen therapy (92%, 95% CI: 74-97) and need for ICU care (94%, 95% CI: 73-99)[10]. The results of our analyses are consistent with the published studies showing effectiveness against severe disease[7,8,10].

The analysis, however, has certain limitations as potential confounders including age, comorbidities and previous exposure to COVID-19 infection could not be adjusted for, as the vaccination details were collected as aggregated numbers. Also the effectiveness could not be estimated separately for each vaccine.

In conclusion, our analysis indicated COVID-19 vaccination, even with single dose, was effective in preventing deaths. It is necessary to increase coverage of COVID-19 vaccines, regardless of the type of vaccines, to reduce mortality in current as well as future waves of COVID-19 epidemic.

***Acknowledgment*:** Authors thank the Tamil Nadu Police department, Government of Tamil Nadu, for sharing the data on police personnel for analysis in this study.

***Financial support & sponsorship*:** None.

***Conflicts of Interest*:** None.

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