Changes in Blood Pressure After Pfizer/Biontech Sars-Cov-2 Vaccination

Chin Chin Ch'ng (chngchinchin@gmail.com)
Clinical Research Centre: Institut Penyelidikan Klinikal https://orcid.org/0000-0001-9716-9061
Loke Meng Ong
Penang General Hospital: Hospital Pulau Pinang
Khar Ming Wong
Penang General Hospital: Hospital Pulau Pinang

Research Article

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Abstract

The SARS-Cov-2 (COVID-19) vaccination began in Malaysia in March 2021 among healthcare workers and other frontliners. Everyone at our hospital received the Pfizer/BioNTech mRNA vaccine. Although hypertension has not been mentioned explicitly as an adverse event, concerns were raised after some healthcare staff observed an increase in their blood pressure after the first dose. In response to that, we began collecting vital signs during second dose appointments. Vital signs were measured before, immediately after and 15-30 minutes post vaccination. We report our findings from the institution-wide effort to monitor changes in blood pressure among its staff and respond to any possible unwanted events.

Main Text

The SARS-Cov-2 (COVID-19) vaccination in Malaysia began in March 2021 among healthcare workers and frontliners. In preparation for the program, our hospital collected information on demographics, comorbidities and willingness to be vaccinated among all its healthcare and essential workers using an online survey.

Vaccination at our hospital began on March 1. Everyone received the Pfizer/BioNTech vaccine. By the end of the month, 4904 staff members had received at least one dose (1225 completed two doses distanced 21 days apart, while another 3679 had yet to receive their second dose). Although hypertension has not been mentioned explicitly as an adverse event(1), concerns were raised after some healthcare staff observed an increase in their blood pressure post vaccination.

In response to that, we began collecting vital signs during second dose appointments. Vital signs were measured three times for each staff member using automated blood pressure monitors that have been calibrated by the vendor of the machines. With the exception of emergencies where the subjects were in a supine pose, all blood pressures were measured in a seated position with the cuff on the arm that was not vaccinated.

Pre-vaccination vital signs were recorded when the staff members arrived at the vaccination site, while post-vaccination vital signs were measured immediately after vaccination and again 15-30 minutes later in a waiting room. They were allowed to leave if their vitals were stable and if they had no complaints. As there was a high load of subjects at the site, vital signs measured immediately post-vaccination were actually delayed by a few minutes. For the same reason, we could not afford to monitor for delayed or extended effects on blood pressure.

Characteristics of the subjects are shown on Table 1. Most of the subjects did not report any adverse effects from both first and second doses. Among those who experienced adverse effects, 84.5% claimed the severity was worse for the second dose. The most common adverse effects were redness, pain or swelling at the injection site, tiredness, fever, chills, headache and myalgia.

Table 1
Characteristics of subjects, n = 4906

Characteristics	
Age in years, mean (SD)	33.6 (8.3)
Females, n (%)	3074 (62.7)
Current smokers, n (%)	370 (7.5)
History of serious allergic reaction, n (%)	309 (6.3)
History of confirmed SARS-CoV-2 infection, n (%)	51 (1.0)
History of comorbidities, n (%)	
Hypertension	244 (5.0)
Diabetes mellitus	141 (2.9)
Hyperlipidaemia	18 (0.4)
Asthma	207 (4.2)
Cardiovascular disease	43 (0.9)
Baseline (pre-vaccination) blood pressure in mmHg, mean (SD)	
Systolic	130.1 (17.38)
Diastolic	80.2 (11.62)
SD standard deviation	

Mean pre-vaccination systolic and diastolic blood pressures were 130.1 (SD 17.38) mmHg and 80.2 (SD 11.62) mmHg, respectively. Both systolic and diastolic blood pressures were significantly higher among those with underlying hypertension compared with those without (SBP difference: 19.9 (95% CI 17.77, 22.0) mmHg, p<0.001; DBP difference: 8.9 (95% CI 7.58, 10.29) mmHg, p<0.001).

Compared with baseline, blood pressure was increased in more than half of the subjects immediately and 30 minutes post vaccination. The mean changes across all measures were highly significant, but the difference may not be clinically important. When we looked at those with hypertension (n = 244), paired t-tests revealed that only increases in diastolic blood pressure were significant (Table 2).

Table 2
Changes in blood pressure immediately and 15-30 minutes after vaccination compared with baseline (pre-vaccination)

Blood pressure	Immediately after vaccination compared with baseline	15-30 minutes after vaccination compared with baseline
Mean systolic change (95% CI), mmHg		
All subjects, n = 4906	2.3 (1.95, 2.66) **	1.1 (0.76, 1.48) **
Subjects with hypertension, n =244	1.4 (-0.41, 3.26)	-1.0 (-2.87, 0.91)
Subjects with cardiovascular disease, n =43	3.8 (0.28, 7.39) *	2.0 (-1.78, 5.74)
Mean diastolic change (95% CI), mmHg		
All subjects, n = 4906	2.4 (2.13, 2.68) **	2.2 (1.87, 2.43) **
Subjects with hypertension, n =244	3.1 (1.58, 4.51) **	2.2 (0.76, 3.58) **
Subjects with cardiovascular disease, n =43	1.8 (-1.21, 4.89)	2.2 (-0.80, 5.13)
SD standard deviation		

Paired t-test significance: * p <0.05, ** p <0.001

The mean increase in systolic blood pressure immediately post vaccination was significantly lower for females compared to males (1.96 (SD 12.20) vs 3.19 (SD 13.26), p = 0.001). There were no significant changes in mean blood pressure among those with history of SARS-Cov-2 infection compared with those without previous exposure to the virus.

Overall, 58 (1.02%) were admitted into the observation room either due to hypertensive urgency or complaints of giddiness. Their mean baseline systolic and diastolic blood pressures were 159.5 (SD 20.19) and 96.4 (SD 12.92), respectively. Ten (17.2%) had underlying hypertension. Eighteen (31.0%) whose complications did not improve were transferred to the Emergency Department for further monitoring and treatment as necessary.

Our findings extend similar occurrences that have been reported previously in several European countries to the Asian population(2–5). A recent paper by Bouhanick et al. has suggested a possible increased risk of hypertension with the Pfizer/BioNTech vaccine(6).

Our findings indicated a general increase in blood pressure in more than half of the subjects however, only a small fraction reacted symptomatically. Several mechanisms for hypertension have been

suggested involving interactions between components of the vaccine and the renin-angiotensin system however they remain hypothetical and causality is yet to be established(3, 6). We did not have the manpower to monitor our staff members over a longer term. Thus, it may be in the interest of future studies to observe for extended effects of the vaccine on blood pressure.

In our subjects, history of hypertension or other comorbidities were voluntarily reported and there may be cases where hypertension had been undiagnosed. We also could not rule out pain, stress or other emotional triggers on changes in blood pressure.

Overall, the increases were relatively small and may not prevail over the benefits offered by vaccination. Nevertheless, on the safety side, monitoring of blood pressure and other related symptoms may be warranted to prevent any unexpected serious events.

Declarations

Ethics approval and consent to participate

Approval and waiver of informed consent was obtained from the Medical Research and Ethics Committee (MREC) Malaysia (Ref: 21-02036-YOX (2)).

Consent for publication

Not applicable

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request and permission from the hospital.

Competing interests

The authors declare no competing interests.

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None

Authors' contributions

LMO conceptualized the study and acquired the data. KMW did the ground work and acquired the data. CCC cleaned and analysed the data and interpreted the results. CCC was a major contributor in writing the manuscript. LMO and KMW reviewed the article. All authors read and approved the final article.

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