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Comparison of Side Effects between Different Brands of COVID-19 Vaccines among Malaysia Adult Population.

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Abstract

In January 2020, COVID-19 was declared a public health emergency of international concern that targets the human respiratory system and engulfs the entire world into a pandemic lifestyle. Following that, the Malaysian government implemented a Movement Control Order (MCO) as an immediate preventive measure to break the chain of infection. To overcome the issue, scientists have developed new specialised vaccines to curb the spread and reduce the likelihood of severe effects from the infection in people taking it. In Malaysia, several brands of vaccines are available, and vaccine-receivers are reported to experience side effects after the vaccination and varying degrees of severity of pain. A cross-sectional survey was performed using a self-administered anonymous online questionnaire from February to June 2022. The questionnaire was distributed to Malaysian citizens who are 18 years old and above, and the results were evaluated using descriptive analysis and the Chi-Square Test. The result was analysed using SPSS to show the socio-demographics of respondents, the severity of side effects from different brands of vaccines, and the association between gender, age, and type of brands of vaccines. Most of the respondents who received Pfizer-BioNTech had severe side effects compared to the other brands of vaccines. There was also a significant association between gender, age, severity level, and type of brands of vaccines.

Keywords: *brands, COVID-19, Malaysia, side effects, vaccine.*

Introduction

The coronavirus disease 2019 (COVID-19) is a newly discovered viral infection caused by a novel coronavirus (severe acute respiratory syndrome coronavirus 2, SARS-CoV-2) that mainly targets the human respiratory system (Shah, et al., 2020) [1]. This virus strain was first discovered in Wuhan, China, in December 2019. In January 2020, COVID-19 was declared a public health emergency of international concern (Information for Healthcare Professionals about COVID-19, 2020) [2]. The Malaysian government has taken immediate preventive measures to control the pandemic by restricting public movement in and out of a particular area by implementing Movement Control Order (MCO), Conditional Movement Control Order (CMCO), Recovery Movement Control Order (RCMO), Enhanced Movement Control Order (EMCO), Targeted Enhanced Movement Control Order (TEMCO) and Administrative Enhanced Movement Control Order (AEMCO) in a staggered manner, which started since 18 March 2020 till date [3,4]. This is one of the ways to help the Malaysian Ministry of Health's (MoH) efforts to contain the virus and prevent the further spread of infection [5].

Malaysia announced its first sporadic incidence of COVID-19 on 12 March 2020, in which the infected person had not travelled to an affected region nor had contact with an infected person [6]. A religious event in Sri Petaling was also linked to the originally sporadic occurrence in Malaysia [7]. This event has contributed to Malaysia's biggest COVID-19 infection cluster, triggering local transmission across all states. On 16 March 2020, the number of positive cases reached 553, prompting Malaysia's Prime Minister to issue a Movement Control Order (MCO). On top of that, the government has also prohibited individuals from travelling to inter-states or COVID-19-affected areas [8].

Malaysia recorded zero locally transmitted cases within its borders in the last 24 hours for the first time on 1 July 2020, since the first reported case on 26 February 2020. However, in early October 2020, Malaysia entered the third wave of the COVID-19 outbreak after months of low reported daily cases from July to September [9]. On October 8, the number of confirmed cases was 14,368 at the commencement of the third wave [10]. The third wave impacted Sabah the most after the Sabah state election took place on 26 September 2020, when people returned to Peninsular Malaysia from high-risk regions in Sabah [7].

The COVID-19 cases in Malaysia keep rising, with the highest number recorded on 17 February 2022, with 27,831 cases since the pandemic started [11]. According to the MoH, as of July 22, the complete genomic surveillance has detected 392 cases related to three variants of concern (VOCs), namely 205 Beta cases, 173 Delta cases, and 14 Alpha cases. The Delta variant was reported to have the highest transmission rate and the ability to infect severely compared to the other variants [12]. In August 2020, a new Lambda variant was detected in Peru and was identified in 29 different countries. It is also reported that the Lambda variant is more infectious and resistant to human antibodies and able to reduce the SARS-CoV-2 vaccine effectiveness [13,14].

At the early stage of the pandemic, there was no COVID-19 vaccination or any other specific therapy for the infection authorised for human use; hence, hydroxychloroquine, along with several steroids, was prescribed in Malaysia as the first-line treatment for patients with stage 2-5 of COVID-19infection [15]. Twelve months after the beginning of the COVID-19 pandemic, the United States Food and Drug Administration (FDA) granted the first emergency use authorisation (EUA) for a vaccine to prevent COVID-19 in people aged 16 and above [16].

Vaccination for all people living in Malaysia is urgent to achieve herd immunity and curb the COVID-19 pandemic. A previous randomised controlled study in the adult population found that the SARS-CoV-2 vaccines significantly reduced the risk of symptomatic COVID-19 [17]. The

National COVID-19 Immunisation Programme (PICK) has been developed in Malaysia, led by the coordinating minister for the National COVID-19 Immunisation Programme, in order to speed up the vaccination process. Under PICK, the vaccines will be provided free to all Malaysian and non-Malaysian citizens. In February 2021, Malaysia was able to secure 66.7 million doses of COVID-19 vaccines via the COVAX (the vaccines pillar that has access to COVID-19 tools (ACT) accelerator) facility and advance purchases from five vaccine manufacturers in which only Pfizer-BioNTech vaccine has obtained conditional approval from the Malaysia Drug Control Authority (DCA) and the National Pharmaceutical Regulatory Agency (NPRA) [18]. Moreover, the COVID-19 Immunisation Task Force (CITF) was also established by the Malaysian government which helps in planning, implementing, and monitoring the supply and distribution of vaccines, vaccination enrolment, preparation of vaccine storage centres and vaccination centres, reporting of vaccination key performance indicators (KPIs) as well as risk management throughout the implementation of the National COVID-19 Immunisation Programme.

There are eight different COVID-19 vaccines available in Malaysia, namely Comirnaty® (Pfizer BioNTech), CoronaVac® (Sinovac), ChAdOx1S (Oxford AstraZeneca), Ad26.COV2S®-Recombinant (Janssen), Moderna vaccine (RNA-mRNA-1273), Sinopharm BBIP vaccine (BBIP-CorV), Covaxin vaccine (BBV152), and ConvideciaTM (CanSino Bio). Vaccines have been proven effective and relatively safe, but the development of important but rare side effects needs to be considered before administration [19]. As for now, four vaccine brands are given to Malaysians under PICK: Comirnaty (Pfizer BioNTech), CoronaVac (Sinovac), CanSino, and AstraZeneca. Another brand, Johnson & Johnson or Janssen, has received approval on a conditional basis [20].

Several side effects were reported from the COVID-19 vaccines, either from the first, second, or third dose, such as headache, lethargy, fever, pain and swelling at the injection site, tachycardia, and diarrhoea [21]. However, there is a lack of information on the degree of side effects severity among various brands of COVID-19 vaccine on different age groups and gender. It is speculated that other people react differently towards their vaccination, and the side effects vary, not only from the brands but also to the demographic characteristics of the recipients. Therefore, this present study aims to investigate the side effects of different COVID-19 vaccine brands with varying groups of ages and genders among the general population in Malaysia.

Methodology

This cross-sectional study was conducted among 410 Malaysian adults from February to June 2022. The sample size for this study was calculated by using Raosoft® calculator. The confidence interval was set at 95% with a margin error of 0.05 and a response distribution of 50%. The convenience non-probability sampling technique was used to collect the sample for this study. Participants of this study were selected based on who met all the inclusion criteria; adults 18 years old and above, who received at least two doses of the COVID-19 vaccine, and citizens of Malaysia. Respondents who were illiterate and could not comprehend English or Malay language were excluded from this study. Following an increasing trend in COVID-19 cases in Malaysia, data was collected using an online technique rather than a physical one since it is a safer and more practical method. The online questionnaire was circulated among Malaysian citizens utilising a variety of social media platforms, including WhatsApp (groups and private messages), Facebook and Instagram. A uniform explanation of the survey questionnaire was provided, along with a link to a Google Form and a contact number in case respondents have any questions—the questionnaire comprised three sections. Section A consists of sociodemographic data of the respondents (age, gender, course, and year of

study), which were used to assess respondents' general health status. Section B was adapted with slight modification from a study done by Hatmal et al. (2021) [22], which consists of questions related to the side effects reported following vaccination, such as types of side effects experienced, the severity of the side effects, and how soon the side effects appear post COVID-19 vaccine injection. The questionnaires were in English and Malay languages. The study's findings were analysed using IBM Statistical Package for the Social Sciences (SPSS) for Windows version 22.0 software. Descriptive statistics were performed for the collected data and presented as frequency and percentages. The severity of side effects among different age groups and genders of the Malaysian population who received three doses of COVID-19 vaccination were analysed using the Chi-square test. A *p*-value of <0.05 was considered statistically significant.

Results

The majority (*n*=301, 73.4%) of the students were in the age group between 18 to 29 years old, followed by 38 (9.3%) at 50 – 59 years old, 36 (8.8%) at 40 – 49 years old, and 35 (8.5%) in the 30 – 39 years old age category. Exactly 279 (68%) female and 131 (32%) male respondents participated in this study. Most respondents (*n*=384, 93.7%) were not working as healthcare workers, and only 26 (6.3%) respondents worked in healthcare. It was found that 376 (91.7%) out of 410 respondents did not suffer from any chronic disease. Only 34 respondents (8.3%) reported having chronic disease(s). From this circle of people, 10 (2.4%) are suffering from hypertension, 14 (3.4%) with asthma, 5 (1.2%) are having diabetes mellitus type 1 and 2, 2 (0.5%) with cancer, 1 (0.2%) is having gastric, 1 (0.2%) with autoimmune diseases, 1 (0.2%) under a cardiovascular disease, 1 (0.2%) suffers lung disease and 1 (0.2%) was under neuropathy. There were a few groups that suffered from more than one disease at a time, and seven respondents (1.7%) were suffering from diabetes mellitus and hypertension, 1 (0.2%) reported having asthma and allergic, 1 (0.2%) also in the group who suffered from hypertension and cancer diseases, 1 (0.2%) was suffering from hypertension and cardiovascular diseases, and lastly 1 (0.2%) with diabetes mellitus and cancer. One respondent reported having diabetes mellitus, hypertension, and asthma. The majority (*n*=357, 87.1%) of the respondents were non-smokers, and 65 (15.9%) respondents had an allergy to some foods and medicines (Table 1).

The majority (*n*=323, 78.8%) of the respondents have received all the vaccines (first and second dose), including the booster dose, and only 87 (21.2%) received only the first two doses (without the third dose). Referring to Table 2, most (*n*=248, 60.5%) of respondents received the Pfizer-BioNTech vaccine, followed by Sinovac 117 (28.5%) and AstraZeneca/Oxford 45 (11.0%). The majority of the Malaysian adult population received three brands of vaccines. For the third dose, the majority (*n*=291, 71.0%) of the respondents received the Pfizer-BioNTech vaccine, followed by 32 (7.8%) that received the AstraZeneca/Oxford vaccine and 15 (3.7%) received the Sinovac vaccine. The remaining (*n*=87, 21.2%) respondents have/did not receive their third dose yet (Table 2).

Findings from this study have found that 198 (48.3%) respondents reported mild symptoms after the first dose of vaccination, followed by 169 (41.2%) respondents with no symptoms at all and 35 (85%) respondents with moderate and severe symptoms. With the second dosage, 174 (42.4%) respondents reported no symptoms, and 182 (44.4%) reported mild symptoms. Only 10 (2.4%) had severe problems, while 44 reported moderate symptoms (10.7%). For the third dose, during the study, 70 (17.1%) respondents had not yet gotten their booster immunisation, while 117 (28.5%) reported no symptoms at all. There were 138 (33.7%) respondents who reported mild symptoms, 74 (18.0%) who reported moderate symptoms, and only 11 (2.7%) who reported severe symptoms (Table 3).

The side effects commonly experienced by the respondents include fever, pain or swelling at the injection site, tiredness, fatigue, headache, and dizziness. It was found that some respondents experienced more than one side effect, and only a few experienced only one side effect. In addition, 101 (24.6%) respondents reported no side effects following the first dose, while 117 (28.5%) respondents did not experience side effects after the second dose. Meanwhile, 125 (30.5%) respondents reported no side effects following the third vaccination dose. Regarding the result, most respondents experienced no symptoms from the first until the third vaccine, and the total number was higher than the other symptoms (Appendix 1). The majority (*n*=153, 37.6 %) of the respondents reported that symptoms following the first dose lasted one to three days. Meanwhile, 114 (27.8%) respondents said that the effects lasted less than one day, while 99 (24.1%) reported no symptoms. During the second dosage, 147 (35.9%) respondents experienced side effects within one to three days post-vaccination, followed by 116 (28.3%) respondents who did not experience any adverse effects. Approximately 100 (24.3%) respondents reported experiencing side effects in less than one day. The third dosage yielded the same results as the prior dose, with 151 (36.8%) respondents experiencing symptoms from one to three days. Many respondents had not yet received the booster, so the number of respondents with no symptoms was high (*n*=116, 28.3 %), while 82 (20.0%) of them experienced symptoms for less than one day (Table 4).

The severity of side effects experienced by the respondents was determined by using a scale from 0 to 10. Each scale has their own severity starting from 0=no pain, 1=minimal, 2=mild, 3=uncomfortable, 4=moderate, 5=distracting, 6=distressing, 7=unmanageable, 8=intense, 9=severe and 10=unable to move. Regarding the rating of the severity of the side effects for the first dose, the majority (*n*=82, 20.0%) of the respondents chose the 0-scale of the severity followed by scale-1 (*n*=70, 17.1%). 60 (14.6%) of the respondents rated scale-3 of severity, and only a few (*n*=6, 1.5%) rated for 10-scale. 5 (1.2%) respondents rated for scale-9. For the second vaccination, the majority (*n*=119, 29.0%) of the respondents chose scale-1 severity of the side effects experienced, followed by scale-2 severity with 72 (17.6%) respondents. Only 3 (0.7%) respondents rated 10-scale for the severity of side effects. Lastly, for the third dose, the majority (*n*=122 (29.8%) of the respondents rated for 1-scale, followed by 53 (12.9%) respondents who rated for scale-2 and 55 (13.4%) rated for scale-3 (Table 5).

There was a significant association between age and gender with the severity of the side effects of the vaccines. 119 (41 males and 83 females) and 122 (39 males and 83 females) respondents who had received the second and third doses, respectively reported less severe side effects. 6 (3 males and 3 females) respondents experienced the most severe side effects following the first immunisation, while 8 (five males and three females) respondents reported the same severity level after getting their third injection. It was also found that most of the respondents who were injected with the Pfizer-BioNTech vaccine experienced the most severe side effects compared with the two other brands of vaccines (AstraZeneca/Oxford and Sinovac) (Table 5).

Discussion

In this study, the respondents reported several side effects following their first, second, and third COVID-19 vaccination doses. Respondents' most common adverse effects of COVID-19 vaccines were fever, pain or swelling at the injection site, sleepiness and exhaustion, stiffness in joints and muscles, and headache. Similar findings were reported in a study by Hatmal et al. in 2021[22], which found that the most common adverse effects were tiredness or fatigue, followed by pain or swelling at the injection site. Other adverse effects, such as chills, abnormal heartbeats, nausea, and vomiting, were infrequently reported by respondents. Female respondents and those who received the Pfizer-BioNTech vaccine

reported considerably more side effects than males and those who received other brands. These findings were similar in terms of gender to a study by Omeish et al. (2021) [23]. However, they reported significantly higher side effects in respondents who received AstraZeneca vaccination.

Next, in addition to comparing symptoms reported after the first dose of vaccination to those reported after the second dose based on the three types of different vaccines, the results revealed that the severity of the side effects was greater after respondents received the second injection compared to the first, particularly in those who received Pfizer-BioNTech vaccine. This outcome was likewise comparable to that of the study by Omeish et al. (2021) [23], although they reported a greater effect following the second injection in the AstraZeneca vaccine as well.

Conclusion

Local adverse effects such as fatigue or tiredness, swelling or pain at the injection site, and headache were the most common side effects for the three types of vaccinations, Pfizer-BioNTech, AstraZeneca, and Sinovac. Furthermore, most of the respondents experienced no negative effects. The most severe adverse effects observed were in individuals who received Pfizer-BioNTech immunisation as compared to Sinovac and AstraZeneca. The effects were more noticeable in females than in men, and the second injection was the most severe compared to the first and third doses. Finally, all reported symptoms were under control and may be treated with a minimal recovery period.

Limitation of Study

This study faced some challenges that limited its scope and validity. One of the main challenges was the timing of the study, which coincided with the COVID-19 pandemic. This made it difficult to conduct face-to-face interviews, and instead, an online survey questionnaire was used. However, this method might have introduced some errors and biases, as some respondents might not have answered the questions carefully or honestly. Another challenge was the age distribution of the respondents, as most of them were young social media users below 35 years old. This resulted in an uneven representation of different age groups in the sample.

Conflict of Interest

The authors declare no conflict of interest.

Table 1. Sociodemographic profiles of the respondents (*n*=410)

Characteristics	Demographic characteristics	Frequency (*n*)	Percentage (%)
Gender	Male	131	32.0
	Female	279	68.0
Age (y)	18-29	301	73.4
	30-39	35	8.5
	40-49	36	8.8
	50-59	38	9.3
Healthcare worker	No	384	93.7
	Yes	26	6.3
Chronic disease	Yes	34	8.3
	No	376	91.7
Types of chronic disease	Asthma	14	3.4
	Hypertension	10	2.4
	Cancer	2	0.5
	Diabetes Mellitus	5	1.2
	Neuropathy	1	0.2
	Autoimmune disease	1	0.2
	Cardiovascular disease	1	0.2
	Lung diseases	1	0.2
	Stroke & Gastric	1	0.2
	Asthma & Allergic	1	0.2
	Hypertension & Cancer	1	0.2
	Hypertension & Cardiovascular diseases	1	0.2
	Diabetes Mellitus & Hypertension	1	0.2
	Diabetes Mellitus & Cancer		
	Diabetes Mellitus,	1	0.2
	Hypertension & Asthma	1	0.2
Smoker	Yes	53	12.9
	No	357	87.1
Allergy on foods and medicine	Yes	65	15.9
	No	345	84.1

Table 2. Vaccination status and brand(s) received.

Characteristics	Details	Frequency (*n*)	Percentage (%)
Dose of vaccines	1st & 2nd	87	21.2
	1st, 2nd & 3rd	323	78.8
Brands of vaccine for 1st & 2nd vaccination	Pfizer-BioNtech	248	60.5
	Sinovac	117	28.5
	AstraZeneca/Oxford	45	11.0
Brands of vaccine for 3rd dose	Pfizer-BioNtech	291	60.5
	Sinovac	15	28.5
	AstraZeneca/Oxford	32	11.0
	Not received yet	72	17.6

Table 3. Severity of symptoms post first, second and third dose vaccination.

Characteristics	Details	Frequency (*n*)	Percentage (%)
Symptoms of 1st Dose	No symptoms	169	14.2
	Mild	198	48.3
	Moderate	35	8.5
	Severe	8	2.0
Symptoms of 2nd Dose	No symptoms	174	42.4
	Mild	182	44.4
	Moderate	44	10.7
	Severe	10	2.4
Symptoms of 3rd dose	No symptoms	117	28.5
	Mild	138	33.7
	Moderate	74	18.0
	Severe	11	2.7
	Not received yet	72	17.1

Table 4. Duration of the effects after the first, second and third dose

	Hours	Frequency (*n*)	Percentage (%)
First dose	13 to 16 hours	24	5.9
	17 to 20 hours	7	1.7
	21 to 24 hours	11	2.7
	5 to 8 hours	109	26.5
	9 to 12 hours	49	12.0
	Up to 4 hours	96	23.4
	More than 24 hours	13	3.2
	Not appear.	101	24.6
	TOTAL	**410**	**100.0**
Second dose	13 to 16 hours	24	5.9
	17 to 20 hours	8	2.0
	21 to 24 hours	10	2.4
	5 to 8 hours	96	23.4
	9 to 12 hours	57	13.9
	Up to 4 hours	84	20.5
	More than 24 hours	16	3.9
	Not appear.	115	28.0
	TOTAL	**410**	**100.0**
Third dose	13 to 16 hours	22	5.4
	17 to 20 hours	6	1.5
	21 to 24 hours	14	3.4
	5 to 8 hours	87	21.2
	9 to 12 hours	64	15.6
	Up to 4 hours	69	16.8
	More than 24 hours	31	7.6
	Not appear.	117	28.5
	TOTAL	**410**	**100.0**

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