

VACCINATION ATTITUDE AMONG HEALTHCARE WORKERS AT THE EARLY PHASE OF COVID-19 IN MALAYSIA

Sikap Tenaga Kesehatan Terhadap Vaksinasi Pada Fase Awal COVID-19 di Malaysia

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Abstract

Background: Healthcare workers' (HCWs) vaccination hesitancy during a pandemic can be problematic for the health system as these workers need to be fully vaccinated.

Aims: This study aimed to determine the level of attitude vaccine hesitancy and its associated factors among HCW at the beginning of the COVID-19 pandemic.

Methods: A cross-sectional study was conducted among randomly selected HCWs of a tertiary hospital in the state of Selangor, Malaysia, using an online questionnaire. The questions were designed to collect information on HCWs' sociodemographic and health status, and attitude towards vaccination. Higher scores for the four scales on attitude towards vaccination denote a higher level of vaccine hesitancy.

Results: Of the 380 respondents (98% response rate), the overall score depicted low vaccine hesitancy despite the scores being slightly higher on worrying over unforeseen future effects, and concerns about commercial profiteering. Women demonstrated a lower preference for natural immunity compared to men.

Conclusion: In the context of this study, vaccine hesitancy among HCWs was low, which indicate good attitude towards vaccine. However, concerns on unforeseen future effects and commercial profiteering need to be addressed; and health education and promotion activities on the male workers in terms of preference for natural immunity need to be enhanced.

Keywords: attitude, COVID-19, healthcare workers, vaccine hesitancy

Abstrak

Latar Belakang: Keraguan terhadap vaksin oleh petugas kesehatan (HCW) selama pandemi dapat menjadi masalah bagi sistem kesehatan karena petugas tersebut perlu divaksinasi secara lengkap.

Tujuan: Penelitian ini bertujuan untuk mengetahui tingkat sikap keragu-raguan vaksin dan faktor-faktor terkaitnya pada petugas kesehatan saat awal pandemi COVID-19.

Metode: Sebuah studi cross-sectional dilakukan pada petugas kesehatan yang dipilih secara acak dari sebuah rumah sakit tersier di negara bagian Selangor, Malaysia. Pengambilan data menggunakan kuesioner online. Pertanyaannya adalah tentang karakteristik sosiodemografi dan status kesehatan saat ini pada empat subskala tentang sikap terhadap vaksinasi dengan skor skala yang lebih tinggi menunjukkan tingkat keragu-raguan vaksin yang lebih tinggi.

Hasil: Dari 380 responden (tingkat respons 98%), nilai keseluruhan menunjukkan keragu-raguan vaksin yang rendah, meskipun nilainya sedikit lebih tinggi karena mengkhawatirkan efek masa depan yang tidak terduga, dan kekhawatiran tentang keuntungan komersial. Perempuan memiliki preferensi kekebalan alami yang lebih rendah dibandingkan dengan laki-laki.

Kesimpulan: Dalam konteks penelitian ini, keragu-raguan vaksin di kalangan petugas kesehatan rendah, mengindikasikan sikap yang baik terhadap vaksin. Namun, kekhawatiran tentang efek masa depan yang tak terduga dan keuntungan komersial perlu penanganan yang lebih, selain meningkatkan pendidikan kesehatan dan kegiatan promosi pada pekerja laki-laki dalam hal preferensi untuk kekebalan alami.

Kata kunci: COVID-19, keragu-raguan vaksin, petugas kesehatan, sikap



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Introduction

One of the strategies in curbing the COVID-19 pandemic was vaccination against the SARS CoV-2 virus. However, during the initial stages of COVID-19 vaccine distribution, there were reports of some HCWs expressing hesitancy towards getting vaccinated. A review article found that in 2020, 22.51% out of 76,471 HCWs worldwide reported COVID-19 vaccination hesitancy (Biswas *et al.*, 2021). Across several systematic reviews, the acceptance rates of vaccines among HCWs were observed to fluctuate between 27.7% and 78.1%, with the primary concerns centered around safety issues and potential side effects (Sallam, 2021).

Certain vaccine-related concerns (safety and effectiveness), the need for additional data or knowledge, anti-vaccine sentiments, and a lack of institutional trust are some of the drivers of vaccine reluctance (Wallace, 2020). In addition, factors such as the rapid development of the vaccines, concerns about potential side effects, and the novelty of the disease contributed to COVID-19 vaccine hesitancy (Pogue *et al.*, 2020).

Negative attitudes among HCWs can lead to lower vaccination coverage within the healthcare workforce itself. This not only puts individual HCWs at risk but also hinders the creation of a resilient and protected healthcare environment. Moreover, unvaccinated HCWs may serve as vectors for the transmission of infectious diseases, potentially exposing vulnerable patients to preventable illnesses.

Studies depict that recommendations by healthcare providers are associated with lower odds for COVID-19 vaccination hesitancy (Fu *et al.*, 2022; Verger *et al.*, 2021; Desveaux *et al.*, 2021). Nevertheless, if HCWs continue to remain hesitant towards this important preventive measure, it is unlikely that they would recommend these vaccines to the general public and ensure mass vaccinations with the available COVID-19 vaccines. Negative attitudes toward vaccination among HCWs can erode public trust in vaccines and the healthcare system more broadly, leading to

decreased vaccine uptake in the community.

In Malaysia, COVID-19 vaccination was provided free of charge to citizens and non-citizens beginning February 2021, and government aimed to inoculate at least 80% of Malaysia's population by the following year.

Given the novelty of the pandemic, guidelines for Malaysia's COVID-19 immunization program were developed at the early stages of the pandemic with the available data at that time, and the initial strategy of the National COVID-19 Immunization Program was to vaccinate frontliners, especially in the healthcare industry.

Between February and April of 2021, 500,000 persons were the focus of the first immunization phase. This phase was centered on two key groups of frontliners: Group 1 consisted of frontliners from the public and private healthcare sectors, whereas Group 2 consisted of frontliners from critical services, defense, and security.

As HCWs are at increased risk of exposure due to the nature of their work, and therefore achieving high vaccination rates in this group is critical. They are also the most trusted advisors; improving knowledge and confidence in vaccines have been shown to increase willingness to recommend vaccines and influence their patient's decision. Thus, understanding vaccine acceptance and hesitancy among HCW is necessary.

The objective of this study was to determine the attitude on vaccine hesitancy among HCWs of a tertiary hospital in Malaysia at the early phase of a pandemic and determine the associated factors.

Method

This was a cross-sectional study, conducted in a 400-bedded tertiary level hospital located in a highly populated district in the state of Selangor. The hospital consists of about 1,500 HCWs who were eligible for the vaccine against COVID-19 in the first phase of the National COVID-19 Immunization Program.

The study population was all HCWs employed in this hospital during the data collection period. The sampling frame comprised the HCW names obtained from the hospital administration.

Simple random sampling technique was used based on random number generator. The required sample size was calculated using OpenEpi software version 3.0. The assumed proportion of HCWs with COVID-19 vaccine hesitancy was set at 50%, considering the absence of available literature on this specific population at the time the study was conducted. The minimum sample size was 384, with a 95% confidence interval and an absolute precision of 5%. To account for potential non-response rate of 40%, the final sample size was adjusted to 615 (De Koning *et al.*, 2021). All clinical and non-clinical staff members of the hospital were eligible respondents, while medical students and staff members who were on leave during the study period were excluded.

Respondents were contacted via email, as there were restrictions for physical interaction. The use of online questionnaire was preferred as it was conveniently accessible even via their mobile phones, anywhere and at any time of the day. Upon the HCW's voluntary consent to participate in the study, a hyperlink in the e-mail provided access to the online Information and Consent Form (ICF). Following the participant's affirmative consent, the individual progressed to completing the questionnaire. Subsequently, participant responses were securely stored in the researcher's cloud-based storage system. Ample time of two weeks was given to the respondents to answer the questions, after which gentle reminders were sent for them to complete the questionnaire.

The questionnaire consisted of questions on sociodemographic characteristics, as well as attitude (vaccine hesitancy) towards COVID-19 vaccination. The questions on attitude towards vaccination were adapted from Vaccination Attitudes Examination (VAX) Scale (Martin and Petrie, 2017) At the time of writing, the VAX Scale had been cited by 140 different publications according to Google Scholar

and had been translated into several languages (Huza, 2020; Yildiz, Gungormus and Dayapoglu, 2021; Bruno *et al.*, 2022). The VAX Scale has four subscales, with three items for each. The first subscale is "Mistrust of Vaccine Benefit", the second is "Worries about Unforeseen Future Effects", the third is "Concerns about Commercial Profiteering", and the fourth is "Preference for Natural Immunity". Each of the item in this VAX Scale is assessed using a 5-point Likert-like scale (1) = strongly disagree and (5) = strongly agree. Scale and subscale scores are created by averaging the relevant. Higher scores indicate stronger anti-vaccination attitudes (Espejo, Checa, Martín-Carbonell, 2022; Martin and Petrie, 2017).

The initial version of the questionnaire was in English and was subjected to back-to-back translation into Bahasa Malaysia by local language experts. Face validity was conducted among postgraduate medical students, while subject matter experts (Public Health) performed content validity. The reliability of the questionnaire was also evaluated in the form of internal consistency, among postgraduate medical students, and HCWs of two private hospitals. Cronbach alpha value was 0.7, after minor corrections were made based on the face validity assessment and pre-testing the questionnaire.

All relevant data were analysed using computer software Statistical Package for Social Sciences (SPSS) version 27. Independent t-test was used to compare between two means, while one-way Analysis of Variance (One-way ANOVA) was used to compare means between more than two means of normally distributed data. Kruskal-Wallis test was employed to compare means when the data was not normally distributed. Linear regression was conducted to determine the predictors of vaccine hesitancy.

This study was part of a larger study funded by the Ministry of Higher Education Malaysia's research grant (Fundamental Research Grant Scheme (FRGS) entitled *The Determination of Knowledge, Attitude and Practice (KAP), Genetic Factors Using Transcriptomics Analysis and Potential Use*

of Pre-Corneal Tear Film as the Non-Invasive Screening Method”.

Result and Discussion

Of the 700 questionnaires distributed via email, a total of 380 completed questionnaires were returned (98% of minimum sample size required)

As shown in Table 1, the majority of the respondents were in the younger age groups, where 189 (49.7%) were aged between 30 and 39 years, followed by 140 (36%) of them aged 20-29 years, with the median age being 31 years (IQR 7, range 21-58 years old). Most of them were females (76.1%), Malay ethnicity (90.5%), and had education level higher than high school (92.9%) and worked in the clinical service at the hospital (69.7%). In terms of health status, 87.1% had not suffered from COVID-19 and 79.7% did not have any underlying chronic diseases.

As shown in Table 2., the overall vaccine hesitancy score based on the VAX scale was normally distributed (skewness 0.432, kurtosis 0.354) and the mean score was 2.73 (SD 0.626).

The distribution of scores for the subscale “mistrust of vaccine benefit” and “concerns about commercial profiteering” were skewed, hence the results are reported as median (IQR) as shown in

Table 2. Meanwhile, the scores for the subscales, “worries over unforeseen future effect” and “preference for natural immunity” were normally distributed, hence reported as mean (SD).

The average scores for subscales 2 and 3 were either equal to or greater 3.0, indicating slightly higher hesitancy in these scales (worries over unforeseen future effects, concerns about commercial profiteering) compared to the remaining two. The distribution of scores for each question for each subscale is summarized in Table 2.

The factors associated with each subscale were determined. Given that the scores for subscales 1 and 3 were skewed and the dependent variables were categorical, the Kruskal-Wallis test was conducted. While for subscales 2 and 4, independent samples t-test was conducted. ANOVA was performed for the dependent variable that was normally distributed and having more than two categories of independent variables.

The results revealed that age was significantly associated with subscale 1, “mistrust of vaccine benefit”, while education level was significantly associated with subscale 4, “preference for natural immunity.” As for the other subscales and factors, there was no statistically significant association (Table 3).

Table 1. Socio-demographic distribution of the respondents (n = 380)

Socio-demographic factors		Frequency (f)	Percentage (%)
Age (years)	20-29	140	36.8
	30-39	189	49.7
	40-49	38	10.0
	≥50	13	3.4
Gender	Male	91	23.9
	Female	289	76.1
Ethnicity	Malay	344	90.5
	Chinese	11	2.9
	Indian	14	3.7
	Others	11	2.9
Highest education	Lower education (High school)	27	7.1
	Higher education (Higher than high school)	353	92.9
Occupation	Clinical	265	
	Non-clinical	12	
	Clinical Support	102	
Ever had COVID-19 infection	Yes		
	No	331	87.1
Health status	No underlying chronic disease	303	79.7
	Have underlying chronic disease	77	20.3

Table 2. Distribution of scores for each question for each subscale.

Subscale	No.	Question	1		2		3		4		5		Mean (SD)	Median (IQR)
			Strongly Disagree	n (%)	Disagree	n (%)	Neutral	n (%)	Agree	n (%)	Strongly Agree	n (%)		
(1) Mistrust of vaccine benefit	1.	By getting the COVID-19 vaccine I can protect the people who I live and work with from getting COVID-19.	258(67.9)	87(22.9)	20(5.3)	12(3.2)	3(0.8)						1.00 (1.00)	
	2.	Being fully vaccinated with the COVID-19 vaccine makes me feel safer when handling COVID-19 patients.	206(54.2)	124(32.6)	44(11.6)	5(1.3)	1(0.3)						1.00 (1.00)	
	3.	I feel more protected against COVID-19 after completing my vaccination against COVID-19	225(59.2)	115(30.3)	36(9.5)	2(0.5)	2(0.5)						1.00 (1.00)	
(2) Worries over unforeseen future effects	4.	Although the COVID-19 vaccines appear to be safe, there may be problems that we haven't discovered yet.	3(0.8)	10(2.6)	103(27.1)	133(35.9)	131(34.5)						4.00 (0.891)	
	5.	COVID-19 vaccines can cause unexpected problems in children.	0(0)	4(1.1)	14(3.7)	64(16.8)	298(78.4)						3.73 (1.007)	
(3) Concerns about commercial profiteering	6.	I worry about the unforeseen effects of the COVID-19 vaccines in the future	13(33.)	40(10.5)	128(33.7)	111(29.2)	88(23.2)						3.58 (1.081)	
	7.	COVID-19 vaccines make a lot of money for pharmaceutical companies but do not do much for regular people	62(18.3)	76(20.0)	13(35.3)	56(1.7)	52(13.7)						3.00 (2.00)	
(4) Preference for natural immunity	8.	Authorities promote vaccinations for financial gain, not for people's health	185(8.7)	88(23.2)	80(21.1)	14(3.7)	13(3.4)						2.00 (2.00)	
	9.	Vaccination programs are a big scam.	262(68.9)	74(19.5)	30(7.9)	9(2.4)	5(1.3)						1.00 (1.00)	
	10.	Natural immunity lasts longer than vaccination.	84(22.1)	83(21.8)	132(3.7)	47(12.4)	3(8.9)						2.64 (1.208)	
(4) Preference for natural immunity	11.	Natural exposure to viruses and germs gives the safest protection.	111(29.2)	92(24.2)	112(29.5)	36(9.5)	29(7.6)						2.42 (1.216)	
	12.	Being exposed to diseases naturally is safer for the immune system than being exposed through vaccination.	113(29.7)	105(27.6)	106(27.9)	33(8.7)	23(6.1)						2.34 (1.166)	

Table 3: Factors associated with vaccine hesitancy subscales.

Variable	N	Mistrust of vaccine benefit			Worries over unforeseen future effects			Concerns about commercial profiteering			Preference for natural immunity			
		Mean of Ranks	Statistic	p	t	df	p	t	Statistic	p	t	df	p	
Age (years)	< 32	215	175.43	10.454 [†]	0.001	0.600 [§]	378	0.549	185.82	0.914 [†]	0.339	-0.486 [§]	378	0.627
	≥ 32	165	210.13					195.59						
Gender	Male	91	205.30	2.436 [†]	0.119	0.281 [§]	378	0.779	193.21	0.074 [†]	0.786	1.850 [§]	378	0.065
	Female	289	185.84					189.65						
Race	Malay	344	191.05	0.381 [†]	0.537	1.662 [§]	378	0.97	191.34	0.565 [†]	0.452	0.952 [§]	378	0.175
	Non-Malay	36	179.73					176.86						
Education level	Lower	26	210.81	1.070 [†]	0.301	-0.699 [§]	378	0.485	199.08	0.173 [†]	0.677	2.533 [§]	378	0.012
	Higher	354	189.01					189.87						
Occupation	Clinical	265		0.365 [†]	0.694	0.282 [†]	0.755			1.214 [†]	0.298	0.955 [†]	0.386	
	Non-clinical	12												
Ever infected	Yes	45	200.74	0.498 [†]	0.480	0.072 [§]	378	0.943	214.34	2.448 [†]	0.118	-1.721 [§]	378	0.086
	No	335	189.12					187.30						
NCD	Has NCD	68	193.49	0.069 [†]	0.793	-2.430 [§]	378	0.016	191.50	0.007 [†]	0.933	0.551 [§]	378	0.582
	No NCD	312	189.85					190.28						

Note: † = Kruskal-Wallis; ‡ = One way ANOVA; § = Independent t-test

Linear regression was conducted for the overall VAX scale and each of the subscales. All regression models are not statistically significant except for subscale 4 (Preference for natural immunity; $R^2=0.039$, $F(7, 370) = 2.172$, $p=0.03$). In the model for subscale 4, the model estimates were as follows for female gender ($B = -10$, $p < 0.05$). In other words, a statistically significant negative relationship was observed between being women (compared to men) and the preference for natural immunity.

Discussion

This study aimed to determine the level of vaccination hesitancy towards COVID-19 vaccine among HCWs at a hospital in Malaysia. Using the VAX scale, the overall vaccination hesitancy level among the study population was low, which is consistent with other studies (Nomhwange *et al.*, 2022). The subscales of the VAX scale had slightly higher scores, thereby reflecting higher hesitancy in terms of worrying over unforeseen future effects, and concerns about commercial profiteering. However, these results were not statistically significant.

Worry about unforeseen future consequences is understandable given that the COVID-19 vaccine is a novel vaccination with no prior information on its efficacy or potential risks based on global and actual data. Similar findings were reported in many countries worldwide (Rezaeipour, 2021, Phillips *et al.*, 2022, Taylor *et al.*, 2020). Although the vaccines have undergone stage 4 clinical trial prior to being approved for use, the long-term effects of the vaccines were unknown.

Concerns about commercial profiteering is also an understandable as demonstrated in several other studies (Gallant *et al.*, 2021, Zimmerman *et al.*, 2023). This was due to the possibility that vaccine producers might raise prices as a result of the increasing demand and limited availability of the vaccines. The fear of corporate profiting has also been linked to conspiracy theories, such as claiming that COVID-19 was invented so that vaccine producers could produce large quantities of the vaccine and sell them for a profit.

The regression analyses depicted that none of the models were statistically significant except for subscale 4 (Preference for natural immunity). In the model for subscale 4, gender (being female) recorded a negative value. This suggested that women, on average, have a lower preference for natural immunity compared to men. In the context of this study, it was not clear why this is so.

However, other studies found that as a general trend, women often demonstrate a proactive approach in seeking healthcare services and engaging in preventive measures (Lim, Lim, Tong, Sivasampu, 2019). In a multicounty study conducted by prominent researchers, it was determined that women exhibit a higher likelihood of perceiving COVID-19 as a highly serious health issue. Additionally, they are more inclined to support and adhere to restrictive public policy measures compared to men. (Todorovic and Verheyden, 2022). Nonetheless, other studies have shown mixed results with regards to vaccination and gender (Nassiri-Ansari *et al.*, 2022,) Zintel *et al.*, 2022).

Several factors could have contributed to this low vaccine hesitancy among healthcare workers. For example, HCWs often have access to accurate and up-to-date information about vaccines and their benefits. Once they receive reliable information, their concerns may be alleviated, leading them to opt for vaccination. Secondly, HCWs have a responsibility to protect themselves, their patients, and the community from preventable diseases. As they gain a better understanding of the potential consequences of not being vaccinated, they may choose to prioritize public health and get vaccinated. Third, colleagues and peers who are vaccinated can have a positive influence on those who are hesitant. Seeing others in the healthcare field getting vaccinated can help dispel myths and misconceptions (Toth-Manikowski *et al.*, 2022). Fourth, strong leadership from healthcare institutions and organizations can encourage HCWs to get vaccinated. Institutions often implement policies or campaigns that promote vaccination among their staff (Elliott *et al.*,

2022). In addition, the perceived risks of vaccination might be initially overestimated. As more information becomes available and the actual risks of vaccination are put into context, individuals may adjust their risk perceptions. Additionally, HCWs who witness outbreaks of vaccine-preventable diseases in their workplaces or communities can have a firsthand understanding of the importance of vaccination in preventing such outbreaks (Rief, 2021).

Nonetheless, this study has some limitations. The sample was taken at the early stage of the pandemic. Information about COVID-19 was rapidly evolving, and healthcare guidelines were frequently updated. Hence, the findings are limited to this time period. As attitude towards vaccines have been shown to change over time, ideally repeated studies should be done to better observe the evolution of this attitude throughout the course of the pandemic. Secondly, the variables included in this study were limited to basic sociodemography and health status. These limitations may impact the generalizability of the findings.

Longitudinal studies with repeated observation of the same groups to analyze changes on the attitude towards vaccines over time, is recommended in the case of future novel pandemics. Researchers should also explore cultural and religious factors relating to negative attitudes towards new vaccines.

Nevertheless, although our study focused on the early phase of the COVID-19 pandemic, the novelty lies in capturing the initial sentiments and factors influencing vaccine hesitancy among healthcare workers in a tertiary hospital at a crucial time, when vaccination campaigns were just beginning.

Conclusion

In conclusion, this study revealed that vaccine hesitancy among HCWs at a tertiary hospital in Malaysia was in general low, indicating good attitude and high acceptance of the vaccine, and women have a lower preference for natural immunity compared to men. Concerns on

unforeseen future effects and commercial profiteering need to be addressed; and health education and promotion activities on the male workers in terms of preference for natural immunity need to be enhanced.

Abbreviations

ICF: Information and Consent Form;
VAX: Vaccination Attitudes Examination;
SPSS: Statistical Package for Social Sciences; KAP: Knowledge, Attitude and Practice; HCWs: Health Care Workers; MOHE : Ministry of Higher Education; FRGS: Malaysia's Fundamental Research Grant Scheme;

Declarations

Ethics Approval and Consent Participant

Ethical approvals were obtained from the Ethics Committee for Research Involving Human Subject (JKEUPM-2021-197), from the university where the researchers are affiliated and the hospital where the study was conducted (UPM/HPUPM/800-8 PENYELIDIKAN KLINIKAL). Informed consent was obtained from the HCWs who were invited to participate in this study. No personal identifying information were collected. All data will be disposed of according to current guidelines.

Conflict of Interest

The authors declare there is no conflict of interest in this study.

Availability of Data and Materials

Contact the researchers. Data and material research can be provided upon request.

Authors' Contribution

Handling manuscript and data collection: AM, LAA, NMT, CYQ, and MA. Review and improvement: MMI and AM. All authors participated in the manuscript's preparation and agreed on the final version.

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