ORIGINAL ARTICLE

The level of knowledge and acceptance towards the COVID-19 vaccine among the community in Johor Bahru, Johor

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ABSTRACT

Introduction: Several necessary initiatives have been made to create a readily available vaccine against the Coronavirus Disease 2019 (COVID-19) worldwide pandemic. However, the vaccination program's success is dependent on the population's willingness as well as their knowledge of vaccination. Hence, the present study aimed to assess the level of knowledge and acceptance towards the COVID-19 vaccine among the community in Johor Bahru, Johor.

Materials and Methods: A cross-sectional study was conducted using an online survey between February and May 2022, with 423 respondents. The questionnaire consisted of socio-demographic, assessment of knowledge level and acceptance level towards COVID-19 vaccine. The descriptive analysis and non-parametric tests were employed to investigate the study outline objectives.

Results: Of all 423 participants, 293 (69.3%) of the participants had a high level of knowledge about the COVID-19 vaccine (median knowledge score 6; IQR = 3), and 239 (56.5%) were reported to have a low level of vaccine acceptance (median acceptance scores 4; IQR=2). The knowledge level towards the COVID-19 vaccine was significantly associated with the vaccine acceptance level (p<0.001).

Conclusion: The community's level of knowledge towards COVID-19 vaccine was high; however, the vaccine acceptance was low.

KEYWORDS:
COVID-19 vaccine, knowledge, acceptance, community

INTRODUCTION

Coronavirus Disease 2019 (COVID-19) is the official name assigned for the infection caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) which was formerly known as the 2019 novel coronavirus (2019-nCoV).[1] COVID-19 has evolved for four months from its initial appearance in China, and it has quickly spread to other countries worldwide, posing a global threat. COVID-19 was officially labelled a pandemic by the World Health Organization (WHO) on March 11, 2020, with over 118 000 verified cases and over 4000 deaths.[2] Considering the unexpected fast spreading of COVID-19 globally, vaccine development is also progressing quickly to curb the pandemic as vaccines have previously been found to be the most effective way to combat the quickly spreading of infectious diseases as seen in the eradication of smallpox and Ebola.[3] Vaccination can build herd immunity in communities, reducing the prevalence of the disease, preventing transmission, and diminishing the social and financial burden due to the disease. Furthermore, the pandemic can be effectively controlled, additional waves of infection can be avoided, and periodic outbreaks can be contained with very high vaccine uptake which eventually eradicates the disease.[4] The establishment of the National COVID-19 Immunisation Programme or also known as PICK was the Malaysian government initiative to administer the COVID-19 vaccine for free for Malaysian since February 2021. However, community acceptance towards the COVID-19 vaccine was poorly understood and has become a primary concern. Many factors influence people's decision to get vaccinated and one of the factors was their level of knowledge. Therefore, this study aimed to determine the level of knowledge and acceptance towards the COVID-19 vaccine among the community in Johor Bahru (JB) as JB is an urban city with the highest number of COVID-19 cases among districts in Johor as of 8 August 2021.[5] The findings may provide descriptive data that will assist the government and the Ministry of Health in developing effective strategies to increase vaccine uptake, which will eventually lead to herd immunity against COVID-19 in the JB community.

MATERIALS AND METHODS

Sample collection

A cross-sectional, online population web-based survey was conducted from February 2022 to May 2022. The community from JB were selected by using non-probability sampling which was convenience sampling method. Those who were voluntarily willing to participate in the study were recruited.

The inclusion criteria included participants must be aged 18 years old and above, must be born or lived in JB for at least 8 years and must be able to read and understand Malay or English languages plus, provide informed consent to participate in this study. Conversely, the exclusion criteria for this study included foreigners who stayed in JB or have permanent residence status and who were mentally or seriously ill at the time of the study. The target sample size was determined by using the same sample size in similar studies as claimed by Israel,[6] which was in a study by Gallè et

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al.,[7] the author was using a ±5% sampling error and a confidence level of 95%. The formula for the sample size is as follows:

$$n = \frac{(z^2\ pq)}{e^2}$$

Where,
n=sample size
z=1.96 (95% or 0.5) confidence level
p= 50% or 0.5 estimated prevalence
q=1-p
e=5% or 0.05 precision level

Hence,

$$n = \frac{1.96^2\ (0.5)\ (1-0.5)}{0.05^2}$$

$$n = \frac{3.8416(0.25)}{0.05^2}$$

$$n = \frac{0.9604}{0.05^2}$$

Therefore, a total of 423 participants were recruited in the target population after getting approval from The Ethics Committee, Faculty Research Ethics Committee (FREC), Universiti Teknologi Mara (UiTM). The questionnaire consisted of three sections which were collected and adapted from previous studies. The first section was adapted from[8,9] where the participants were required to complete their socio-demographic information (age, gender, marital status, occupation, monthly income in Ringgit Malaysia (RM), educational attainment, the existence of COVID-19 and lastly, risk perceived to be infected with COVID-19).

The second section comprised 15 questions related to participants' knowledge about the COVID-19 vaccine that was adapted from Gallè et al.[7] which included the components in the available COVID-19 vaccine, the doses needed, the effectiveness of the influenza vaccine, the functions of the COVID-19 vaccine (questions 4 to 8), the population needed to be vaccinated (questions 9 to 11), the effect of COVID-19 vaccines (questions 12 and 13), the importance of COVID-19 vaccination and lastly, the sources of information about COVID-19 vaccination. Participants were given multiple answers to choose for questions 1, 2, and 15 and "yes" or "no" response options to the remaining questions. One point was allocated if a correct response to a question was recorded while 0 points were allocated for an incorrect response.

Lastly, for the third section of the questionnaire participants were asked five questions related to acceptance towards the COVID-19 vaccine including their confidence and willingness to get vaccinated (questions 1 to 3), the effect after vaccination and lastly, the willingness to pay for the COVID-19 vaccine.[10] The participants were given simple "yes", "no", "I don't know" or "no opinion" response options to these questions and one point indicated a "yes" response while 0 points indicated for "no", I don't know", or "no opinion".

The questionnaire was completed online using Google Form, an online survey tool where it is a free service from Google and a shareable link will be generated[11] and then disseminated via researchers' personal networks, community leaders, and social media influencer between February 2022 and May 2022. Two main online platforms that were used in distributing this survey were WhatsApp and social media such as Twitter, Facebook, and Instagram.

Participation was voluntary and the participants were granted informed consent before answering the questionnaire.

Data Analysis
All analyses were performed by using software IBM Statistical Package for Social Sciences (SPSS) version 28.0 for Windows (IBM Corp., Armonk, NY, USA). For this study, histogram with normality curve and Kolmogorov-Smirnov test were conducted to check for the data normality. Since the data was skewed, non-parametric tests were utilized. Frequency, percentage, median and Interquartile Range (IQR) were performed in the descriptive analysis. The knowledge level was expressed as a total maximum point ranging from 0 to 11 while the acceptance level ranged from 0 to 5. The median and IQR were calculated for knowledge and acceptance scores.

In addition, Chi-Square analysis and Fisher-Freeman-Halton Exact Test analyses were used to evaluate the possible association between the demographic characteristics with the level of knowledge, and the level of acceptance. Besides, the relationship between the level of knowledge with the acceptance level was also assessed. In particular, the knowledge level was indicated as the number of correct answers lower than median value = 0 = poor, whereas equal or higher than median value = 1 = high, while the acceptance level was indicated as a score lower than median value = 0 = low, whereas equal or higher than median value = 1 = high. The significance level of $\alpha < 0.05$ was assumed.

Ethics Approval and Informed Consent
We obtained approval from the Ethics Committee, Faculty Research Ethics Committee (FREC), Universiti Teknologi Mara (UiTM), with approval reference number: FERC/FSK/MR/2021/0013.

RESULTS

Demographic Characteristics of Respondents
A total of 423 responses were received during the survey period. Table I summarises their demographic characteristics of the respondents. More than half of the respondents (270, 63.8%) were among those aged 18 to 29 years old while those aged 60 years and above were the minority (11, 2.6%). Two-thirds of the respondents were female (280, 66.2%) and majority of them were single (303, 71.6%). The respondents were from different occupational sectors, including students (140, 33.1%), services (53, 12.5%), education (47, 11.1%), and others (46, 10.9%). The remaining occupations such as medical and health (31, 7.3%), management and administrative (28, 6.6%), unemployed (28, 6.6%), construction (18, 4.3%), pensioner (12, 2.8%), security and defence (11, 2.6%), and industrial and manufacturing (9, 2.1%) contributed to the minority of the group.

Table I: Socio-demographic characteristics among the participants (N = 423)

Socio-demographic characteristics	n	(%)
Age (year)		
18-29	270	63.8
30-39	67	15.8
40-49	45	10.6
50-59	30	7.1
≥60	11	2.6
Gender		
Male	143	33.8
Female	280	66.2
Marital status		
Single	303	71.6
Married	105	24.8
Divorced	8	1.9
Widow/Widower	7	1.7
Occupation		
Medical & Health	31	7.3
Education	47	11.1
Security & Defence	11	2.6
Industrial & Manufacturing	9	2.1
Construction	18	4.3
Management & Administrative	28	6.6
Services	53	12.5
Student	140	33.1
Pensioner	12	2.8
Unemployed	28	6.6
Others	46	10.9
Monthly income (RM)		
<1200	171	40.4
1201–4000	167	39.5
4001–8000	34	8.0
>8000	51	12.1
Educational attainment		
Junior/senior school graduated	128	30.3
Diploma graduated	122	28.8
University graduated/post-graduated	173	40.9
Have heard about COVID-19?		
Yes	423	100.0
No	0	0.0
Perceived risk to be infected with COVID-19 (%)		
0	39	9.2
10–20	118	27.9
30–40	119	28.1
50–60	83	19.6
>60	64	15.1

Overall, almost half of the respondents (171, 40.4%) were among those with the lowest income in the group of <RM1200, followed by RM1201–4000 (167, 39.5%), >RM8000 (51, 12.1%), and RM4001–8000 (34, 8.0%). All the respondents had heard about COVID-19 and almost half of them (173, 40.9%) were university- or post-graduated, followed by junior- or senior school-graduated (128, 30.3%), and diploma-graduated (122, 28.8%). A few of the participants (39, 9.2%) believed that they had a 0% risk to be infected with SARS-CoV-2 while 237 (56%) of the respondents were convinced that they had a moderate risk of being infected in the category of 10–20% and 30–40%. Only 64 (15.1%) of them were deemed to have more than 60% of risk being infected with COVID-19.

Knowledge About the COVID-19 Vaccine among the Re-spondents
With the accessibility of the COVID-19 vaccines, 302 participants (71.4%) did not know that the vaccine contained the genetic information to produce the viral antigen spike, however, approximately 308 (72.8%) acknowledge the two doses that had to be administered to them. Overall, approximately 229 (54.1%) accurately answered that the influenza vaccine cannot prevent COVID-19, and almost 70% correctly answered that the COVID-19 vaccines were effective in protecting them, and do not act upon human deoxyribonucleic acid (DNA) modification. Plus, 331 (78.3%) participants believed that the COVID-19 vaccine may reduce COVID-19 symptoms. Conversely, more than half (215, 50.8%) of the participants believe that the COVID-19 vaccines cause the disease and those who had been vaccinated do not need other prevention measures, such as facial masks (246, 58.2%). Next, 281 (66.4%) agreed that not only health personnel and the elderly should be administered the COVID-19 vaccines but, 298 (70.4%) believed that herd immunity will be achieved through the immunization of these latter populations.

Table II: The association between demographic variables and knowledge level towards the COVID-19 vaccine among the respondents (N = 423)

Variables	Knowledge Level		χ2 Statistic(df)	p-value
	High n (%)	Low n (%)		
Age (year)			25.26(4)	< 0.001[a]
18–29	208 (77.0)	62 (23.0)		
30–39	35(52.2)	32 (47.8)		
40–49	26 (57.8)	19 (42.2)		
50–59	20 (66.7)	10 (33.3)		
≥60	4 (36.4)	7 (63.6)		
Gender			8.45(1)	0.004[a]
Male	86 (60.1)	57 (39.9)		
Female	207 (73.9)	73 (26.1)		
Marital status			14.80b	0.001[b]
Single	225 (74.3)	78 (25.7)		
Married	61 (58.1)	44 (41.9)		
Divorced	5(62.5)	3(37.5)		
Widow/Widower	2(28.6)	5(71.4)		
Occupation			21.39(10)	0.019[a]
Medical & Health	19 (61.3)	12 (38.7)		
Education	36 (76.6)	11 (23.4)		
Security & Defence	4(36.4)	7(63.6)		
Industrial & Manufacturing	5(55.6)	4(44.4)		
Construction	11 (61.1)	7(38.9)		
Management & Administrative	22 (78.6)	6(21.4)		
Services	33(62.3)	20(37.7)		
Student	98(70.0)	42(30.0)		
Pensioner	5(41.7)	7(58.3)		
Unemployed	21(75.0)	7(25.0)		
Others	39(84.8)	7(15.2)		
Monthly income (RM)			2.20(3)	0.533[a]
<1200	121(70.8)	50(29.2)		
1201–4000	116(69.5)	51(30.5)		
4001–8000	25(73.5)	9(26.5)		
>8000	31(60.8)	20(39.2)		
Educational attainment			14.67(2)	< 0.001[a]
Junior/senior school graduated	76(59.4)	52(40.6)		
Diploma graduated	80(65.6)	42(34.4)		
University graduated/post-graduated	137(79.2)	36(20.8)		
Perceived risk to be infected with COVID-19 (%)			28.07(4)	< 0.001[a]
0	36(92.3)	3(7.7)		
10–20	65(55.1)	53(44.9)		
30–40	94(79.0)	25(21.0)		
50–60	52(62.7)	31(37.3)		
>60	46(71.9)	18(28.1)		

[a] Pearson Chi-Square
[b] Fisher-Freeman-Halton Exact Test
Significant at p-value < 0.05 are indicated in bold

Finally, most of the participants (354, 83.7%) agreed that all the Johor Bahru populations need to be vaccinated and 256 (60.5%) thought that the COVID-19 vaccines were compulsory to protect against COVID-19 infection. The median of correct answers for the survey participants was 6 (IQR = 3), and this made up to 293 (69.3%) of the respondents have high knowledge about the COVID-19 vaccine while the remaining of respondents had low knowledge as shown in Fig.1. Half of the respondents (223, 52.7%) reckoned that the COVID-19 vaccines might cause some health problems yet, 293 (69.3%) considered that the vaccination did not negatively impact their privacy. Social media was reported as the main source of the information with a percentage of 43.5% followed by healthcare personnel (26.5%), mass media (22.9%), and YouTube or similar web channel (7.1%).

Association between the Level of Knowledge and the Level of Acceptance Towards COVID-19 Vaccine

Table IV shows the significant association between knowledge level and acceptance level towards the COVID-19 vaccine. The relation between these variables was statistically significant, χ^2 (1, N = 423) = 31.62, p<0.001.

DISCUSSION

The COVID-19 pandemic is continuously ravaging the people's health and livelihoods as well as the social and global economic situation,[12] prompting the rapid development of vaccines. However, a previous study reported that the vaccine acceptance was dependent on the level of knowledge about the COVID-19 vaccine.[13] A cross-sectional study was conducted using an online questionnaire between

Table III: The association between the demographic factors and the acceptance level towards the COVID-19 vaccine among the respondents (N = 423)

Variables	Acceptance Level		χ2 Statistic(df)	p-value
	High n (%)	Low n (%)		
Age (year)			10.768(4)	0.029[a]
18 – 29	164(60.7)	106(39.3)		
30 – 39	32(47.8)	35(52.2)		
40 – 49	25(55.6)	20(44.4)		
50 – 59	16(53.3)	14(46.7)		
60 and above	2(18.2)	9(81.8)		
Gender			0.27(1)	0.869[a]
Male	80(55.9)	63(44.1)		
Female	159(56.8)	121(43.2)		
Marital status			10.62[b]	0.011[b]
Single	182(60.1)	121(39.9)		
Married	54(51.4)	51(48.6)		
Divorced	2(25.0)	6(75.0)		
Widow/Widower	1(14.3)	6(85.7)		
Occupation			17.52(10)	0.064[a]
Medical & Health	14(45.2)	17(54.8)		
Education	31(66.0)	16(34.0)		
Security & Defence	7(63.6)	4(36.4)		
Industrial & Manufacturing	5(55.6)	4(44.4)		
Construction	11(61.1)	7(38.9)		
Management & Administrative	16(57.1)	12(42.9)		
Services	27(50.9)	26(49.1)		
Student	91(65.0)	49(35.0)		
Pensioner	3(25.0)	9(75.0)		
Unemployed	11(39.3)	17(60.7)		
Others	23(50.0)	23(50.0)		
Monthly income (RM)			6.27(3)	0.099[a]
0 – 1200	99(57.9)	72(42.1)		
1201 – 4000	91(54.5)	76(45.5)		
4001 – 8000	25(73.5)	9(26.5)		
More than 8000	24(47.1)	27(52.9)		
Educational attainment			31.56(2)	< 0.001[a]
Junior/senior school graduated	47(36.7)	81(63.3)		
Diploma graduated	73(59.8)	49(40.2)		
University graduated/post-graduated	119(68.8)	54(31.2)		
Perceived risk to be infected with COVID-19 (%)			9.15(4)	0.057[a]
0	23(59.0)	16(41.0)		
10 – 20	65(55.1)	53(44.9)		
30 – 40	76(63.9)	43(36.1)		
50 – 60	36(43.4)	47(56.6)		
More than 60	39(60.9)	25(39.1)		

[a] Pearson Chi-Square
[b] Fisher-Freeman-Halton Exact Test
Significant at p-value < 0.05 are indicated in bold

Table IV: The associationbetween the knowledge level and the acceptance level towards COVID-19 vaccine among the respondents (N = 423)

Variables	Acceptance Level		χ2 Statistic(df)	p-value
	Low n (%)	High n (%)		
Knowledge Level			31.62(1)	< 0.001
Low	83(63.8)	47(36.2)		
High	101(34.5)	192(65.5)		

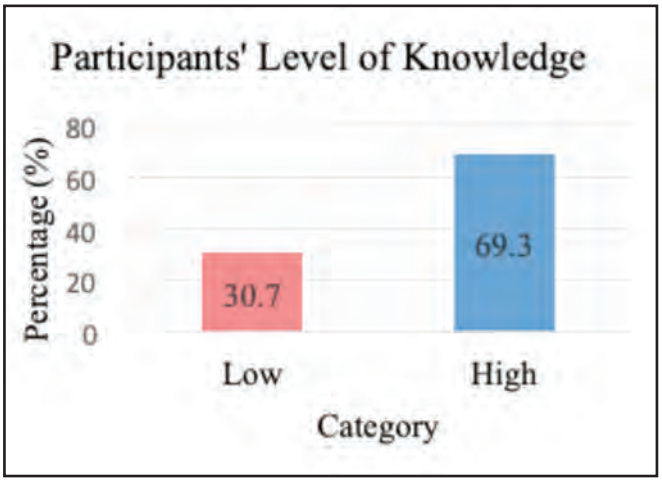

Fig. 1: Participants' Level of Knowledge About COVID-19 Vaccine

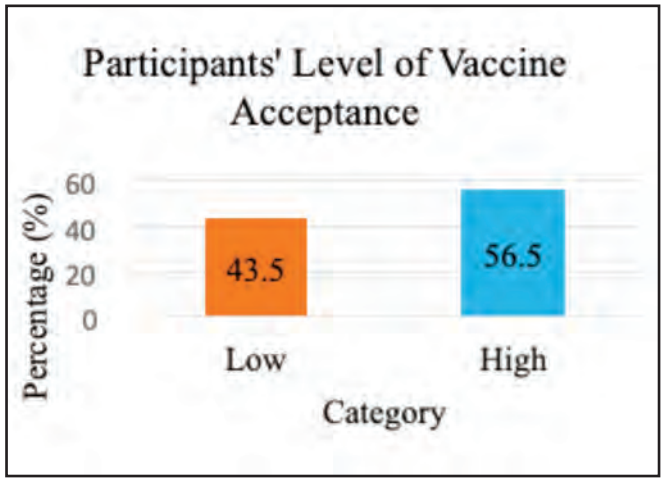

Fig. 2: Participants' Level of Acceptance Towards COVID-19 Vaccine

February and May 2022, with 423 respondents. This current study aimed to determine the level of knowledge and acceptance towards the COVID-19 vaccine among the community in JB, Johor.

In measuring the level of knowledge about the COVID-19 vaccine, this study revealed that 293 (69.3%) respondents had high knowledge about the COVID-19 vaccine which is in line with previous studies in Bangladesh (70.5% and 84.0%) respectively.[14,15] However, different findings were reported in an earlier study among the Malaysians revealed that more than half of the respondents (62.0%) had inadequate knowledge of the COVID-19 vaccine.[16] The high level of knowledge about the COVID-19 vaccine among the JB population could be attributed to the current issue that is being discussed among the community as a major issue, making more people aware of it.

In addition, Johor Bahru is an urban city hence, news and published articles about COVID-19 vaccines have been circulating easily on social media which may have contributed to the higher level of knowledge among the community. Only a few respondents acquired the information via mass media. This might be due to social media has been gaining more popularity than traditional mass media. Due to that, the mass media is now adjusting to fit into social media platforms as verified health information disseminated in social media provides quick and essential knowledge.[17] Oppositely, an overabundance of information about the COVID-19 vaccine and pandemic can cause misinformation and spread fake news.[18] which might contribute to the 30.7% of the respondents that have low knowledge about the COVID-19 vaccine.

Surprisingly, findings also revealed that 239 (56.5%) of the respondents were willing to be vaccinated against SARS-CoV-2 which the vaccine acceptance rate from this study is considerably low but, higher than previous studies from Palestine (55.1%), and from Pakistan (53.0%).[19,20] Conversely, the acceptance rate is quite higher in the United Kingdom (UK) (64.0%),[21] and in Malaysia (83.3%).[9] The disparate findings might cause by the current study conducted when the vaccine was first rolled out and there was negative feedback about the side effects of one of the available vaccines in JB, particularly the AstraZeneca vaccine,[22] which contributed to the lower vaccine acceptance. Besides, the weaknesses of healthcare administration to encourage the COVID-19 vaccination among the community in JB might be one of the key attributes to the lower vaccine coverage, albeit 290 (68.6%) believed that the COVID-19 vaccines were effective against the SARS-CoV-2.

Moreover, this study demonstrated that there is a significant relationship and correlation between the knowledge level and the acceptance level towards COVID-19 vaccines. Even though the relationship is weak as stated in a previous study,[23] the level of knowledge might influence the people's decision to get vaccinated as the level of vaccine acceptance might increase if the level of knowledge increases. These findings are aligned with recent studies[14] and in Bangladesh.[15] Other studies also support that the vaccine acceptance level is affected by the knowledge level about the COVID-19 vaccine.[24,25]

Additionally, this research also found that the higher knowledge level was significantly related to socio-demographic characteristics, in particular, age, gender, marital status, occupation, education level and perceived risk to be infected with COVID-19, except for monthly income as shown in Table III. This finding is similar to the previous study by Gallè et al.,[7] among undergraduate students in Italy. In contrast, only higher education level and higher income were significantly associated among Malaysians.[16] This discrepancy may be due to different periods when the survey was disseminated and different population samples. Nevertheless, the previous studies showed that the higher knowledge level among the population might be due to higher education level which increases the level of knowledge. However, individuals with higher educational level also shown a higher likelihood of COVID-19 vaccine reluctance, and this issue needs to be given greater attention. Besides, the findings also revealed that lower age group,

marital status, and higher education level were significantly related to acceptance rate. These findings were almost similar to the previous study among Malaysian by Syed Alwi et al.,[9] who also agreed that lower age and marital status were significantly associated with vaccine acceptance except for education level. Conversely, Mohamed et al.,[16] reported that higher education level was significantly related to the intention to get vaccinated. The difference between the current study and the previous studies might be due to diverse socio-demographic characteristics among the participants in the study. Although different characteristics of socio-demographic might contribute to the COVID-19 vaccine uptake, it is noted that higher or lower education might influence the acceptance rate.

On the other hand, previous findings unveiled that vaccine acceptance highly depends on the vaccine's effectiveness as published in previous studies by Harapan et al.,[8] in Indonesia, and Elhadi et al.,[26] in Libya. The contrary between the current finding and these findings might be due to the different objectives and methodology of the studies. Plus, the availability of the current vaccines that had been purchased and rolled out in their respective countries and the availability of the health service infrastructure may be the potential cause. Nonetheless, prior research among Malaysian parents found that lack of information affected their choice regarding Human papillomavirus (HPV) vaccination for their children.[27] The prior study in Malaysia confirmed that the lack of information regarding the vaccine was due to poor knowledge about the vaccine which consequently influenced vaccine acceptance. Also, Abebe et al.,[13] agree that the acceptance of the COVID-19 vaccine is highly related to people's knowledge about the COVID-19 vaccine.

This study can motivate different organizations by providing accurate information regarding the COVID-19 vaccine using appropriate techniques thus, resulting in a greater awareness of the vaccine as well as an increase in community vaccine acceptance. Nevertheless, this current study has some limitations. One of the main limitations is the distribution of the participants might not reflect the actual population since the internet-savvy young adults made up the majority of responders, eventually subject to participation bias. Further study should include participants from diverse backgrounds and locations. Since the COVID-19 vaccines are made available and the vaccination coverage is now a primary concern for the country to achieve herd immunity, continuous health education should be given to promote comprehension and dispel any misunderstandings or false information regarding the vaccine which eventually increases the knowledge level as well as the vaccine coverage.

CONCLUSION

The community's level of knowledge was high; however the vaccine acceptance was low, Furthermore, the level of knowledge about the COVID-19 vaccine was positively related to the level of acceptance of the COVID-19 vaccine. Although the community's knowledge about the COVID-19 vaccine was high, a collaborative effort between the government and various organizations should be planned to increase the community's confidence and acceptance of the COVID-19 vaccine. Different organizations, particularly policymakers and the media, should act against irresponsible individuals who may spread rumours about the COVID-19 vaccine, leading to misinformation and lowering public acceptance of the vaccine.

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CONFLICT OF INTEREST

The authors declare that they have no competing interests.

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REFERENCES

1. World Health Organization (WHO). Naming the coronavirus disease (COVID-19) and the virus that causes it. 2020 Available at: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/naming-the-coronavirus-disease-(covid-2019)-and-the-virus-that-causes-it 23/05/2021
2. World Health Organization (WHO). Coronavirus Disease 2019 (COVID-19) Situation Report - 51. 202a. Availabel at: https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200311-sitrep-51-covid-19.pdf?sfvrsn=1ba62e57_10 06/06/2021
3. Doherty M, Buchy P, Standaert B, Giaquinto C, Prado-Cohrs D. Vaccine impact: Benefits for human health. Vaccine 2016; 34(52): 6707-14.
4. Khuroo MS, Khuroo M, Khuroo MS, Sofi AA, Khuroo NS. COVID-19 Vaccines: A Race Against Time in the Middle of Death and Devastation! J Clin Exp Hepatol 2020; 10(6): 610-21.
5. Ministry of Health. Kemaskini Negeri COVIC-19 di Malaysia COVID-19 MALAYSIA. (2021). Available at: https://covid-19.moh.gov.my/terkini-negeri/2021/08/kemaskini-negeri-covid-di-malaysia-sehingga-08082021\
6. Israel GD. Determination of sample size. Malaysian Journal of Medical Sciences. 1992; 10(2): 84-6.
7. Gallè F, Sabella EA, Roma P, De Giglio O, Caggiano G, Tafuri S, et al. Knowledge and Acceptance of COVID-19 Vaccination among Undergraduate Students from Central and Southern Italy. Vaccines (Basel). 2021; 9(6): 638.
8. Harapan H, Wagner AL, Yufika A, Winardi W, Anwar S, Gan AK, et al. Acceptance of a COVID-19 Vaccine in Southeast Asia: A Cross-Sectional Study in Indonesia. Front Public Health 2020; 8: 381.
9. Syed Alwi SAR, Rafidah E, Zurraini A, Juslina O, Brohi IB, Lukas S. A survey on COVID-19 vaccine acceptance and concern among Malaysians. BMC Public Health 2021; 21(1): 1129.
10. Robinson ED, Wilson P, Eleki BJ, Wonodi W. Knowledge, acceptance, and hesitancy of COVID-19 vaccine among health care workers in Nigeria. MGM Journal of Medical Sciences 2021; 8(2): 102-10.
11. Kim DG, Park C. Gender differences in the effectiveness of google forms in class. Journal of Instructional Pedagogies 2012; 7.

12. García LY, Cerda AA. Contingent assessment of the COVID-19 vaccine. Vaccine 2020; 38(34): 5424-9.
13. Abebe H, Shitu S, Mose A. Understanding of COVID-19 vaccine knowledge, attitude, acceptance, and determinates of COVID-19 vaccine acceptance among adult population in ethiopia. Infect Drug Resist 2021; 14: 2015-5.
14. Hossain E, Rana J, Islam S, Khan A, Chakrobortty S, Ema NS, et al. COVID-19 vaccine-taking hesitancy among Bangladeshi people: knowledge, perceptions and attitude perspective. Hum Vaccin Immunother 2021; 17(11): 4028-37.
15. Mahmud S, Mohsin M, Khan IA, Mian AU, Zaman MA. Knowledge, beliefs, attitudes and perceived risk about COVID-19 vaccine and determinants of COVID-19 vaccine acceptance in Bangladesh. PLoS One 2021; 16(9): e0257096.
16. Mohamed NA, Solehan HM, Mohd Rani MD, Ithnin M, Che Isahak CI. Knowledge, acceptance and perception on COVID-19 vaccine among Malaysians: A web-based survey. PLoS One 2021; 16(8): e0256110
17. Chan AKM, Nickson CP, Rudolph JW, Lee A, Joynt GM. Social media for rapid knowledge dissemination: early experience from the COVID-19 pandemic. Anaesthesia 2020; 75(12): 1579-82.
18. Tasnim S, Hossain MM, Mazumder H. Impact of Rumors and Misinformation on COVID-19 in Social Media. J Prev Med Public Health 2020; 53(3): 171-4.
19. Al-Kafarna M, Matar SG, Almadhoon HW, Almaghary BK, Zaazouee MS, Elrashedy AA, et al. Public knowledge, attitude, and acceptance toward COVID-19 vaccines in Palestine: a cross-sectional study. BMC Public Health 2022; 22(1): 529.
20. Chaudhary FA, Ahmad B, Khalid MD, Fazal A, Javaid MM, Butt DQ. Factors influencing COVID-19 vaccine hesitancy and acceptance among the Pakistani population. Hum Vaccin Immunother 2021; 17(10): 3365-70.
21. Sherman SM, Smith LE, Sim J, Amlôt R, Cutts M, Dasch H, et al. COVID-19 vaccination intention in the UK: results from the COVID-19 vaccination acceptability study (CoVAccS), a nationally representative cross-sectional survey. Hum Vaccin Immunother 2021; 17(6): 1612-21.
22. Ariff I. The AstraZeneca vaccine: What you need to know. Free Malaysia Today (FMT). (2021). https://www.freemalaysiatoday.com/category/nation/2021/05/07/the-astrazeneca-vaccine-what-you-need-to-know 25/7/2022
23. Schober P, Boer C, Schwarte LA. Correlation coefficients: appropriate use and interpretation. Anesth Analg 2018; 126(5): 1763-8.
24. Al-Mansour K, Alyahya S, AbuGazalah F, Alabdulkareem K. Factors Affecting COVID-19 Vaccination among the General Population in Saudi Arabia. Healthcare (Basel) 2021; 9(9): 1218.
25. Tsang SJ. Predicting COVID-19 vaccine hesitancy in Hong Kong: Vaccine knowledge, risks from coronavirus, and risks and benefits of vaccination. Vaccine: X 2022; 11: 100164.
26. Elhadi M, Alsoufi A, Alhadi A, Hmeida A, Alshareea E, Dokali M, et al. Knowledge, attitude, and acceptance of healthcare workers and the public regarding the COVID-19 vaccine: a cross-sectional study. BMC Public Health 2021; 21(1): 955.
27. Mohd Sopian M, Shaaban J, Mohd Yusoff SS, Wan Mohamad WMZ. Knowledge, Decision-Making and Acceptance of Human Papilloma Virus Vaccination among Parents of Primary School Students in Kota Bharu, Kelantan, Malaysia. Asian Pac J Cancer Prev 2018; 19(6): 1509-14.