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Original Article

Knowledge and Attitude towards COVID-19 Vaccine Booster Dose in Vaccinated Undergraduates in Colombo District: A Cross - Sectional Survey

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Abstract

Introduction: COVID-19 vaccine booster doses are additionally recommended to broaden the immunological response towards the disease. Conversely, COVID-19 vaccine booster hesitancy was noticed among the Sri Lankan population. Therefore, this study attempted to investigate the knowledge and attitude towards booster doses of the COVID-19 vaccine.

Objectives: To determine the knowledge, attitude, and hesitancy towards booster doses of the COVID-19 vaccine among the undergraduate population in the Colombo district.

Methodology: A descriptive cross-sectional study was conducted among 385 undergraduates in the Colombo district using a convenient sampling technique. Data were collected using a pre-tested, self-administered questionnaire. SPSS version 25 was used for the analysis of the study.

Results: Among the total participants (n=385), most respondents had good knowledge (n=198, 51.4%) regarding COVID-19. However, most participants had a neutral attitude (n=156, 40.5%) toward the COVID-19 vaccine. More than half of the participants (n=204, 53%) hesitated about the booster dose. The major factor identified for booster hesitancy was the fear of the side effects (n=119, 50.2%) whilst the least factor was the belief in the ineffectiveness of the booster doses (n=15, 6.3%).

Conclusion: Most of the respondents had good knowledge regarding COVID-19. However, many participants had a neutral attitude toward the COVID-19 booster dose. One of the major reasons for booster hesitancy was the fear of side effects of the vaccine. In this regard, imparting knowledge and increasing good behavioural change toward COVID-19 booster dose is the best solution to reduce hesitancy.

Keywords: COVID-19 vaccine, Knowledge, Attitude, Booster dose, Side effects

Introduction

In the last 20 years, coronaviruses have been related to major disease outbreaks in East Asia and the Middle East. Severe Acute Respiratory Syndrome (SARS) and Middle East respiratory syndrome (MERS) were identified in 2002 and 2012, respectively (Dhama et al., 2020). The novel coronavirus (SARS-CoV-2) which caused COVID-19 was first identified in Wuhan City, Hubei Province, China, on December 2019 (Gralinski & Menachery, 2020).

Until now, several pharmaceutical companies, including Pfizer & BioNTech, Moderna, Gamaleya Scientific Institute, Novavax, AstraZeneca, Johnson and Johnson, and Sinovac have developed vaccines to prevent the spread of COVID-19 infections among the population (Ghasemiyeh et al., 2021). Short-term clinical trials of these vaccines indicated their potency for symptomatic SARS-CoV-2 infections, but substantial evidence confirms that their efficacy declines over time. Thus, vaccine boosters are additional vaccine doses that must be administered to further protect against COVID-19 disease (Moeed et al., 2022).

Less than 50% of the population in Sri Lanka has been vaccinated with a booster dose, while 74% have received at least a single dose of the vaccine (Epidemiology Unit of Sri Lanka, 2023). However, COVID-19 vaccine hesitancy has been one of the top 10 global health issues in recent years. During the initial vaccination campaigns, varying degrees of vaccine hesitancy were reported across the world, given the diverse social and behavioural influences. Fear of the side effects preconceived notions about the vaccine's ineffectiveness, and belief in natural immunity were some of the leading causes of unwillingness to receive the COVID-19 vaccine. In addition, the dissemination of inaccurate information by influential figures, social media, friends and family, instils confusion and fear regarding vaccines. In this context, to forge herd immunity and reduce COVID-19 morbidity and mortality rate, it is critical to achieve vaccination acceptance (Moeed et al., 2022).

Therefore, by considering the gap in knowledge and the scarcity of literature pertaining to this area of study, this report examined the knowledge and attitudes toward the COVID-19 vaccine and, specifically, the willingness to receive the COVID-19 booster doses.

Methodology

A descriptive cross-sectional study was conducted among 385 undergraduates in the Colombo district. The participants were allowed to voluntarily participate using convenient sampling. The minimum sample size was 384, which was calculated using Open-EPI with a 95% Confidence Interval, 50% of the distribution and a 5% margin of error (Moeed et al., 2022).

$$n = \frac{Z^2\ P\ (1-P)}{d^2}$$

n = sample size
Z = Confidence Interval of 95% (1.96)
P = 50% Distribution
d = margin of error

The questions precisely covered the respondents' basic knowledge of COVID-19 regarding its transmission, protection, and knowledge about vaccines. For the Likert scale, if "Agree" was the correct answer, then "Agree" was scored as 3 points while "Neutral" and "Disagree" were scored 2 and 1 point respectively or otherwise reverse. The score varied from 0-18 points and all individual answers were summed up for total and calculated for means. For total knowledge score calculation, a score of less than 10 was considered poor, 11-13 denoted a moderate level, and more than 14 was considered good.

The next part of the questionnaire covered the attitudes toward the COVID-19 vaccine and perception of the COVID-19 vaccine. Each correct attitude item reported was awarded a score of 1 point. The incorrect attitude item was awarded a 0 score (including "No" and "No idea"). The score varied from 0-3 points and was

classified into 3 levels; less than 1 with a negative attitude, 1-2 denoted a neutral attitude, and 2-3 was considered a positive attitude. Further, the questionnaire assessed the willingness and hesitancy of the COVID-19 booster vaccine about the acceptance of the booster vaccine, side effects from vaccines, severity of side effects, and future acceptance of booster vaccine.

To ensure the quality and reliability of the questionnaire, a pretest was conducted among 20 undergraduates. Data analysis was done in IBM Statistical Package for Social Sciences (SPSS) version 25. The Knowledge and Attitude scores regarding the COVID-19 vaccine were expressed as mean and standard deviation (SD). Ethical approval was obtained from the ERC of KIU (KIU_ERC_22_088).

Results

Socio-demographic characteristics of the population

Demographic factors are represented in Table 1. Among the 385 participants, 200 (51.9%) were female students and 185 (48.1%) were male students, where 233 (60.5%) participants were within 20 to 24 years and 375 (97.4%) were unmarried. Of the participants, 229 (59.5%) were Buddhist and 70 (18.2%) were Hindu. Participants from private universities were 221 (57.4%) while participants from government universities were 164 (42.6%).

The highest number of respondents were from the Faculty of Health Sciences (n=195, 50.6%) and the Faculty of Medicine (n=107, 27.8%). Among them most of the respondents were from 4th year (n=147, 38.2%) and 2nd year (n=145, 37.7%). The majority of the students were living in boarding places (n=144, 37.4%), followed by living with parents (n=125, 32.5%), hostels (n=112, 29.1%), and relatives' homes (n=4, 1%). Most of the undergraduates (n=93, 24.2%) had a monthly income of the family between LKR 60,000-80,000. The majority of the undergraduates (n=361, 93.8%) were not suffering from long-term illnesses.

Table 1: Demographic characteristics of study participants (n=385)

Socio-demographic data		Frequency	Percentage (%)
Gender	Male	185	48.1
	Female	200	51.9
Age	20 – 24 years	233	60.5
	25 – 30 years	152	39.5
Civil status	Married	10	2.6
	Unmarried	375	97.4
Ethnicity	Buddhist	229	59.5
	Christian	27	7.0
	Hindu	70	18.2
	Muslim	59	15.3
University category	Government university	164	42.6
	Private university	221	57.4
Study stream	Faculty of Architecture	1	0.3
	Faculty of Education	4	1.0
	Faculty of Engineering and IT	36	9.4
	Faculty of Health Sciences	195	50.6
	Faculty of Law	2	0.5
	Faculty of Management	32	8.3
	Faculty of Medicine	107	27.8
	Faculty of Natural & Physical Sciences	8	2.1
Academic year	1st Year	40	10.3
	2nd Year	145	37.7
	3rd Year	42	10.9
	4th Year	147	38.2
	5th Year	11	2.9
Accommodation method	A boarding place	144	37.4
	Own home	125	32.5
	Relation's home	4	1.0
	University hostel	112	29.1
Employment status	Full-time	34	8.8
	Part-time	57	14.8
	Training / Internship	32	8.3
	Unemployed	262	68.1
Monthly income of the family	Below LKR 40,000	61	15.8
	Between LKR 40,000-60,000	82	21.3
	Between LKR 60,000-80,000	93	24.2
	Between LKR 80,000-100,000	74	19.2
	Over LKR 100,000	75	19.5
Suffering from long-term illness	No	361	93.8
	Yes	24	6.2

Knowledge of undergraduates on COVID-19

According to Table 2, 94.5% (n=364) of the participants were aware of the spread of COVID-19 by respiratory droplets. Less than half of the participants (n=184, 47.8%) believed that COVID-19 spread through animals. Among the participants, 93.2% (n=359) were aware that personal protective equipment (PPE) protects from COVID-19 while 89.6% (n=345) of the participants were aware that asymptomatic carriers can transmit COVID-19 to others. More than half of the participants (n=208, 54.0%) had low fear related to the side effects of the COVID-19 vaccine. Less than half of the participants (n=166, 43.1%) believed that the booster dose is effective in protecting from COVID-19 while 41.3% (n=159) believed that the booster dose is safe to receive. Over one-third of the participants (n=144, 37.4%) believed that natural immunity can protect from COVID-19 while 24.4% (n=94) believed that 1st and 2nd

doses were enough to protect from COVID-19.

Table 2: Distribution of knowledge statement

Knowledge statements	Frequency	Percentage (%)
COVID-19 spreads by respiratory droplets		
Yes	364	94.5%
No	4	1.0%
No idea	17	4.4%
COVID-19 spreads through animals		
Yes	184	47.8%
No	127	33.0%
No idea	74	19.2%
PPE protects from infection		
Yes	359	93.2%
No	11	2.9%
No idea	15	3.9%
Asymptomatic act as carriers		
Yes	345	89.6%
No	12	3.1%
No idea	28	7.3%
Level of fear accompanying side effects		
High fear	52	13.5%
Low fear	208	54.0%
No fear	125	32.5%
Booster dose is effective in protecting from COVID-19		
Agree	166	43.1%
Disagree	72	18.7%
Neither agree nor disagree	147	38.2%
It is safe to receive COVID-19 booster vaccine		
Agree	159	41.3%
Disagree	77	20.0%
Neither agree nor disagree	149	38.7%
Natural immunity can protect from COVID-19		
Disagree	83	21.6%
Agree	144	37.4%
Neither disagree nor agree	158	41.0%
1st and 2nd doses are enough to protect from COVID-19		
Disagree	83	21.6%
Agree	94	24.4%
Neither disagree nor agree	208	54.0%

Thus, the mean undergraduate knowledge score was 13.32 with a standard deviation (SD) of ±2.15. Therefore, the results reflect that the majority of respondents had good knowledge (n=198, 51.4%) regarding COVID-19. A moderate knowledge level was seen among 37.4% (n=144) of respondents and 11.2% (n=43) of the respondents had poor knowledge.

Attitude level of undergraduates on COVID-19

The majority of the respondents (n=267, 69.4%) mentioned that there is a low possibility of getting infected with COVID-19 after vaccination. Most of the undergraduates (n=362, 94.0%) had a positive opinion on isolating them when infected with COVID-19. Among the participants, 57.4% (n=221) did not believe the fact that vaccination reduced the risk of COVID-19 infection while 42.6% (n=164) believed that vaccination reduced the risk of COVID-19 infection.

Thus, the mean attitude score is 1.1 (SD = 0.77). Nearly half of the respondents (n=156, 40.5%) had a neutral attitude toward COVID-19 vaccination. While 34.3% (n=132) of respondents had positive attitudes and 25.2% (n=97) had negative attitudes toward COVID-19 vaccination respectively.

Willingness to receive booster doses

Most of the participants did not receive a booster dose (n=204, 53%) while the rest of the participants received a booster dose (n=181, 47%). Whereas 11% (n=41) only received 1st dose and 42% (n=163) received 1st and 2nd doses, 46% (n=177) received 1st, 2nd, and 3rd doses, and 1% (n=4) received 1st, 2nd, 3rd, and 4th doses of COVID-19 vaccine.

Among the participants who did not receive the booster vaccine dose (n=204, 53%), 86% (n=178) mentioned they were not willing to receive a booster dose while 14% (n=28) participants were willing to receive a booster dose. Accordingly, more than half of the population had taken Sinopharm as their 1st (n=280, 72.7%) and 2nd (n=243, 63.1%) dose. The majority of the undergraduate population had taken Pfizer as the booster dose (n=139, 36.1%).

Of the participants (n=204, 53%) who did not receive the booster doses mentioned fear of side effects (n=119, 50.2%); belief that the first two doses are enough to protect from COVID-19 (n=62, 26.2%); infected with COVID-19 after vaccination (n=24, 10.1%); presence of chronic illness (n=17, 7.2%); and belief that the booster is not effective (n=15, 6.3%) as the reasons for not receiving the booster doses. Most of the respondents were not willing to receive booster doses in the future (n=237, 62%). While the rest of them were willing to receive upcoming booster doses in the future (n=148, 38%).

Discussion

COVID-19 has been a pandemic for more than three years and even people from rural areas are

aware of COVID-19 because of media and social media platforms (Sujarwoto & Maharani, 2023). A study conducted in Indonesia and Taiwan revealed a good knowledge level among the study population (Huang et al., 2023; Sujarwoto & Maharani, 2023). Similarly, in the current study, the majority of the participants had good knowledge (n=198, 51.4 %) about COVID-19 vaccination and the booster dose. This could be due to the fact that most of the participants were from the Science or Health associated departments such as Health Sciences, Medicine, Natural and Physical Sciences.

A study conducted by Alhassan et al. (2021) in Ghana found increased negative attitudes toward COVID-19 vaccine. In the current study, many participants had a neutral attitude (n=156, 40.5%) toward accepting a COVID-19 vaccine booster dose. However, several studies have found a higher proportion of positive attitudes towards COVID-19 vaccines (Hajure et al., 2021; Klugar et al., 2021; Babicki et al., 2021; Pal et al., 2021; Tahir et al., 2021).

The study revealed that 53% (n=204) of the undergraduate population were hesitant towards getting the COVID-19 vaccine despite having a good knowledge level of the COVID-19 vaccine. Interestingly, 86% (n=176) of undergraduates were not willing to receive booster doses for this population and this is a serious concern in carrying out a successful immunization program towards COVID-19.

Another survey conducted in Sri Lanka revealed a similar percentage of hesitancy towards booster doses of COVID-19 (59%) with a sample size of 601 (Dunuwila et al., 2023). Hence, in keeping with the results of this study, there seems to be a lack of acceptance of the COVID-19 vaccine and boosters especially in this population group. A study by Lazarus et al. (2021) from Algeria reflected similar hesitancy percentages and identified vaccine acceptance rates below 55% in Russia. In comparison, the literature has found that vaccine hesitancy rates range widely across populations and countries. Some reports show a higher acceptance rate for third booster doses: China (84.80%), Jordan (70%), and UAE (70.2%) (Lai et al., 2021; Al-Qerem et al., 2022; Jairoun et al., 2022).

The study revealed that most of the participants were hesitant towards booster dose due to fear of side effects (n=119, 50.2%), and belief that the first two doses are enough to protect from COVID-19 (n=62, 26.2%), as the reasons for not receiving the booster doses. A similar study in China stated that the most common reason for not accepting booster vaccination was concerns regarding the vaccine safety (21.4%), the belief that the first two doses are enough to protect from COVID-19 (14.3%), and concern about vaccine efficacy (10.2%) and side-effects (21.1%) (Lai et al., 2021). A study conducted in Jordan mentioned the reasons for booster hesitancy as; the booster dose is not effective (39.8%), the belief that the first two doses are enough to protect from COVID-19 (24.6%), while yet another proportion did not take the vaccine because of the fear of getting infected with COVID-19 after vaccination (13.1%) (Al-Qerem et al., 2022). A study by Bianchi et al. (2022) showed that the low vaccine acceptance rate in Japan, Greece, Italy, Malaysia, Brazil, and Australia was primarily due to concern about vaccine safety and side effects (Bianchi et al., 2022).

Conclusion

In conclusion, knowledge regarding COVID-19 was good despite the neutral attitude towards the COVID-19 booster vaccine within the study population. It can be concluded that fear of side effects, the belief that the first two doses are enough to protect from COVID-19 and getting infected after vaccination as the major factors influencing the reluctance to receive COVID-19 vaccine booster doses.

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Conflicts of Interests

There are no conflicts of interest.

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