



ACCEPTANCE OF VACCINATION AGAINST COVID-19: A DESCRIPTIVE STUDY ON KNOWLEDGE, ATTITUDES AND PRACTICES AMONG ADULTS RECEIVING IN- AND OUT-PATIENT HEALTH SERVICES AT NATIONAL HOSPITAL COLOMBO

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Abstract: -

Introduction: Vaccination is the most effective method of eradicating the Covid 19 infection. Hence, assessment of knowledge, attitudes and practices regarding Covid 19 vaccination in public is important.

Methodology: Study was a descriptive, cross-sectional study which was conducted at medical clinics and wards at National Hospital Sri Lanka with an interviewer-administered questionnaire.

Results: Number of participants were 390, 43.8% were in the 15-35 age group and 64% were males. 80.3% are from the western province and 74.4% are from urban areas. Hypertension was the commonest comorbidity (46.4%). History of Covid 19 infection was 38.7% and 82.1% of those had a mild disease and the rest had a moderate illness. Covid 19 infection in close contact was 96.9%. Percentages of patients who never had alcohol, cigarettes or illicit drugs were 48.5%, 75.1% and 86.4% respectively. The total vaccinated percentage was 85.6% while 36.4% had both vaccines. Only 51.8% selected vaccination as the most important preventive strategy to end the epidemic. Attitudes on vaccination were mixed. Male gender, presence of comorbidities and history of Covid 19 infection were significantly associated with better vaccination acceptance. Females, urban dwellers and people with no comorbidities tend to have more vaccination missed opportunities and thus hesitancy. Substance abuse and comorbidities are associated with severe Covid-19 disease outcome.

No association between education level and choosing vaccination as the best preventive method.

Conclusion: The level of knowledge and attitudes on Covid 19 vaccination is average. People have to be encouraged more to vaccinate themselves.

Keywords: COVID-19, Vaccination Acceptance, Knowledge, Attitudes and Practices (KAP), Vaccine Hesitancy, National Hospital of Sri Lanka, Comorbidities.



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Introduction

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the newly emerged coronavirus which was first reported in Wuhan, the capital city of Hubei province China has infected more than 218 million people worldwide resulting in over 4.5 million deaths as of August 2021 (1). The virus primarily infects the respiratory system causing a collection of symptoms of fever, malaise, cough, rhinorrhea, shortness of breath as well as diarrhoea and loss of taste and smell (2). SARS-CoV-2 is responsible for a variety of clinical manifestations in any system of the body. In addition to the clinical impact of SARS-CoV-2 which bears a mortality rate of 3.4% estimated by the World Health Organization (WHO) as of March 3, 2021 (3), the socio-economic impact it has created is also immense. Starting from Wuhan this novel coronavirus soon spread worldwide infecting more than 114 countries by early 2020 and the WHO declared this a pandemic on 11 March 2020 (4).

The first case of COVID-19 in Sri Lanka reported on 27th January 2020, was a Chinese tourist who arrived in the country 2 weeks prior, who with the onset of symptoms was admitted to the National Institute of Infectious Diseases (6). By that time the infection had spread to 11 countries worldwide. By early March 2020, the first Sri Lankan case of COVID-19 was reported and the country experienced the first wave of infection during this period. Subsequently, the country faced the 2nd wave in the latter part of November 2020, the 3rd wave after May 2021, following the Sinhala-Hindu new year and currently with the emergence of the delta variant, the country is at risk of a fourth wave. As of September 2021, the total number of cases was approximately half a million and the number of deaths passed over 9000.

The Sri Lankan government in collaboration with the WHO responded to the pandemic with the initiation of the recommended strategies through establishing a 'task force against COVID-19', comprising the health sector, police, tri-forces, local governments, other relevant government and private sectors soon joined hands with volunteers and donors. Initial responses were, to impose island-wide curfew which later changed to a lockdown under quarantine law by closing down shops, schools, most routine institutes and workplaces; the travel ban from selected countries (e.g.: South Korea, Italy, and Iran); special holiday declarations to ban public events; and enforcement of the law to ensure the wearing of face masks, hand washing and social distance. Along with these measures and by expanding the treatment centres, establishing the quarantine centres and active contact tracing the country was capable of controlling the first wave successfully.

As the world saw that vaccination would be the key to ending the pandemic, most of the respective bodies had fast-tracked the usual pace of development of vaccines which brought a revolutionary new era of vaccines(5). As a result, around nine vaccine-development technological platforms created nearly 19 types of vaccines currently in use and over 300 vaccine types in different phases of development(6). The COVID-19 Vaccines Global Access (COVAX) Facility of the WHO was established in the hope of bringing nations together, regardless of their income level, to ensure the procurement and equitable distribution of COVID-19 vaccines(7,8). Sri Lanka faced a large-scale economic struggle with the long-lasting lockdown and the restrictions on local/international trades. The mass-scale vaccination seemed to be the final resolution. Sri Lanka in the past has controlled most

vaccine-preventable diseases through the Expanded program of immunization (EPI) that was introduced in 1978 with a near 100% coverage, resulting in a rapid decline of incidences of diseases like polio, measles, diphtheria, pertussis, tetanus, and rubella over those years. Therefore, the country is equipped with a strong preventive health sector, through the government's free health care system with the additional contribution by the private hospitals and general practitioners. All this enabled a health care delivery system that can reach even the grass-roots level(9).

Thus, on 22 January 2021, Sri Lanka's National Medical Regulatory Authority announced that it had approved the first vaccine against COVID-19, the Oxford–Astra-Zeneca vaccine (9). Thus the vaccination program commenced with vaccinating the frontline workers which later expanded to the general public island-wide, with over 12 million vaccinated for the first dose covering more than half the population as of September 2021. So far 5 vaccines have been approved, one RNA vaccine (Pfizer), two non-replicating viral vector- vaccines (Covishield and Sputnik V) and two inactivated viral vaccines (Sinopharm and Sinovac-for emergency use)(10)

The sole purpose of vaccination is not only individual protection but also to provide adequate immunity to the community to prevent the transmission of the disease. A vaccination percentage of 55–82 is estimated to provide herd immunity against SARS-CoV-2 to control community transmission(11). Successful vaccination depends largely on vaccination acceptance by the public. Vaccine hesitancy is one threat against vaccine acceptance, in fact, the WHO listed this among the 'Ten threats to global health in 2019'. This threat is even greater in 2020-2021 with the outbreak of the deadly COVID-19 pandemic.

Literature Review

SARS-CoV-2 is contagious in humans and the modes of transmission are believed to be via droplets, aerosol and airborne. The virus has been isolated in other human excreta such as stools and semen as well. Indirect contact via contaminated surfaces is one other possible cause of infection as the virus is believed to remain viable on plastic and stainless steel for up to three days(12). The average number of secondary cases that one primary case will generate in a given population (basic reproduction number-R0) for COVID-19 is estimated to be 4 (13).

The early spread of the virus was halted with social distance, hand washing, wearing of masks and other preventive health care strategies. But with time these strategies fell gradually and with the new mutations the disease prevention became even more challenging and vaccination seems to be the final solution against the pandemic. Vaccination of the whole community is a complex process and involves various sectors of the country. The final steps of this process involve vaccine delivery and vaccine acceptance. Vaccine acceptance is determined by a variety of factors such as socio-economic variants, knowledge, attitudes, epidemiological conditions and medical background of patients.

With the initiation of the vaccination against COVID-19, studies were conducted worldwide at different phases of the vaccination. The early studies mainly focused on the perception of the community of the vaccination, and later the barriers against vaccination were assessed. The pace of vaccination among countries all over the world show a similar pattern where an S-

shaped curve is observed indicating the vaccine hesitancy at the beginning and also a significant fall of vaccination rate towards the latter part of vaccination as well (14). The same pattern is observed in Sri Lanka as well. So, assessment of the vaccine acceptance among the vaccinated population would be invaluable for future use.

Previous studies have been conducted to assess the acceptance of new vaccines against emerging and re-emerging infectious diseases in southeast Asia, such as dengue (15), Zika (16,17), and Ebola (16).

Several local studies to acknowledge the acceptance of vaccines against COVID-19 have been conducted. Initially, some online studies were conducted island-wide before commencing the vaccination program to look at the likelihood of accepting vaccination (18). A survey done in early 2021, revealed that 86% of Sri Lankans wish to receive the vaccine and the most negative factors for non-acceptance were concerns of allergies and side effects(19).

Some studies in other parts of the world were able to expose some main reasons for vaccine hesitancy such as mistrust of the government (20); belief that natural immunity is better than vaccination (20,21) and Anti-Vaxxers Wage Campaigns Against COVID-19 vaccines. Such factors are further supported by anti-vaxxers who highlight some anecdotal "cause-and-effect" such as erroneously linking a person's untimely demise to a recent COVID-19 vaccine that was given or the "Big lie" conspiracy theories that allege the vaccine can cause all manner of major side effects, from infertility to permanent alteration of the genetics (22).

Other studies conducted among the vaccinated population on determinants of vaccine acceptance revealed strong associations of vaccine acceptance with elderly age, medical comorbidities, foreign travel and characteristics of the vaccine such as lower side effect profile, higher efficacy and lower cost (or free of charge)(23).

The factors that affect the acceptance of vaccination in a population are highly variable and change with time. So studies are needed from time to time during a pandemic to recognize these changing patterns. For instance, in the United States, the earlier surveys revealed a satisfactory acceptance of the vaccination, but the willingness to be vaccinated against COVID-19 have declined rapidly during the pandemic and reached a point where half of the Americans being undecided or unwilling regarding vaccination by the end of 2020(24)(25). For vaccine hesitancy, social media and the internet have shown to play a significant impact as well(26) as in contrast to traditional media, social media and wide access to the internet are mostly unsupervised and misinformation can easily be flooded.

This study intends to assess the vaccination status of the target population, describe the socio-economic status and explore the knowledge, attitudes and factors for vaccine acceptance. By analyzing the data, the objectives are to explore the associations of the socio-economic factors, the knowledge and attitudes of the vaccination program with the vaccine acceptance. By demonstrating how socioeconomic factors influence the vaccination status, different target populations can be addressed with appropriate strategies. In addition, the assessment of knowledge and attitude would aid in revealing the deficits of the

knowledge and exploring the popular misinformation and its sources.

Sri Lanka is currently at a remarkable pace of vaccination with already surpassing half the population. A successful vaccination program is not solely understood by the availability of vaccines and a delivery system but also requires motivation and acceptance by the public. Identification of determinants of vaccine acceptance is of utmost importance, especially when the country is at a near-total vaccine coverage as this will help with overcoming the barriers of vaccination, to promote vaccination among other age groups, to empower a sustained vaccination program, to support booster-dose/annual vaccination program and to utilize the data in other vaccination programs. The assessment of information and the sources of information is one other area in the study. This invariable would reveal the misinformation and negative attitudes towards vaccination as well. The observation on how information affects knowledge and attitude and the final outcome will be looked at in the study and these results can be applied in various other setups and scenarios. Thus revealing the attitudes and knowledge on vaccination of the public and identifying the determinants of vaccine acceptance is a pertinent need to achieve current and future health care challenges. This information can be utilized by the health care workers who, as trusted advisors, decision-makers on vaccination program and providers of credible information on vaccines to improve different levels of the health care infrastructure.

Objectives

Primary Objective

To evaluate the knowledge and attitudes towards vaccination against COVID-19 and to identify determinants for vaccine acceptance among patients at medical clinics and medical wards 43/47A, National Hospital, Colombo.

Secondary objectives

1. To assess the knowledge and attitudes about vaccination against COVID-19
2. To describe the current vaccination status against COVID-19
3. To identify barriers against vaccination within individuals
4. To determine the socio-demographic predictors of vaccination deterrence or acceptance

Methodology

Study area and period

An institution-based descriptive cross-sectional study was conducted from September to December 2021 at medical clinics and medical wards (wards 43 and 47A) at the National Hospital of Sri Lanka, Colombo.

Source and study population

All patients admitting to medical wards- 43 and 47A and those attending to medical clinics of these relevant wards within the study period was the source of population.

Inclusion criteria

All patients over 18 years of age with (even single dose) or without prior vaccination against COVID-19 admitting to the above medical wards and those attending to the respective medical clinics of these wards with or without a long-term follow-up at the hospital during the study period will be included.

Exclusion criteria

Patients with severe illness, intellectual deficits, communication disabilities and those under prison or custody were excluded from the study.

Sampling procedure and sample size

Patients that get admitted to wards-43 and 47 A and those attending the clinics of the respective wards were included in the study using a sequential sampling process. A sample of 390 patients were included in the study.

Data collection and procedure

The questionnaire was pre-tested in an appropriate setting before commencing the study.

As the first step, the information sheet was given to all participants and after an adequate explanation of the aims and purpose of our research, we obtain their informed written consent for participation. The interviewer-administered structured questionnaires were used for data gathering. Identifiable data was not collected. The interview was conducted in a separate place in the clinic that did not disturb the routine hospital work schedule. The questionnaire consisted of parts A, B and C. Part A collected demographic details, part B on comorbidities, part C about knowledge, attitude and practice of vaccination. Most of the questions were closed-ended questions with given categories of answers which required selecting one answer. The 'other' option was included in appropriate sections for additional responses. This was feasible for the participants and time-saving so did minimal interruption for the ward work and ensured participant's constant interest.

Demographic details in the study sample

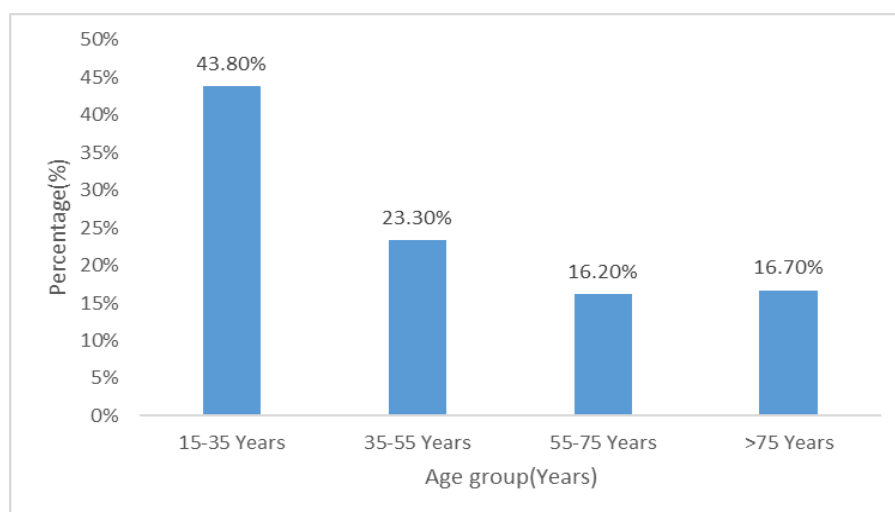


Figure 01: Age distribution

Data analysis

Data entered via MS Excel manually and was analyzed by IBM SPSS version 20 (statistical package for social sciences). The vaccination status, background chronic medical conditions were described using frequency tables. Knowledge and attitude were also be analyzed using descriptive statistical methods. Statistical significance is defined as a P value of less than 0.05. Binary logistic regression was used to measure odds ratios with a 95 percent confidence interval to analyze the relationship between outcomes (knowledge, attitudes, practices) and determinants (socio-demographic variables and the background medical conditions) etc.

Dissemination of results

A detailed report was prepared and will be forwarded to the Deputy Director-General Health, National Hospital Colombo. Findings will also be presented in scientific forums and published in a peer-reviewed journal. The findings will help with overcoming the barriers of vaccination, to promote vaccination among other age groups, empowering a sustained vaccination program, to support booster-dose/annual vaccination programs and to utilize the data in other vaccination programs.

Ethical consideration

Ethical clearance was taken from the 'Ethics Review Committee' of the National hospital, Colombo on 27.10.2021. The Director of the National Hospital, the consultants in charge of wards 43 and 47-A, and the nursing sisters in charge were requested their approval to gather patient-related data ensuring minimal interruption to everyday operations.

Results

This chapter describes in detail the data analysis of the study on knowledge and attitudes toward vaccination against COVID-19, as well as the identification of predictors of vaccine acceptability among patients at medical clinics and medical wards. The chapter discusses the sample's demographic and socioeconomic features, related comorbidities, history of COVID 19 infection and treatment, knowledge, attitude, and immunization practices. The overall number of participants was 390.

The above column chart displays the age distribution among the study sample. Where there were 171(43.8%) participants between the age of 15 to 35 years, making them the majority, while there

were 91(23.3%) between the age of 35 to 55 years, 63(16.2%) between 55 to 75 years, and 65(16.7%) more than 75 years.

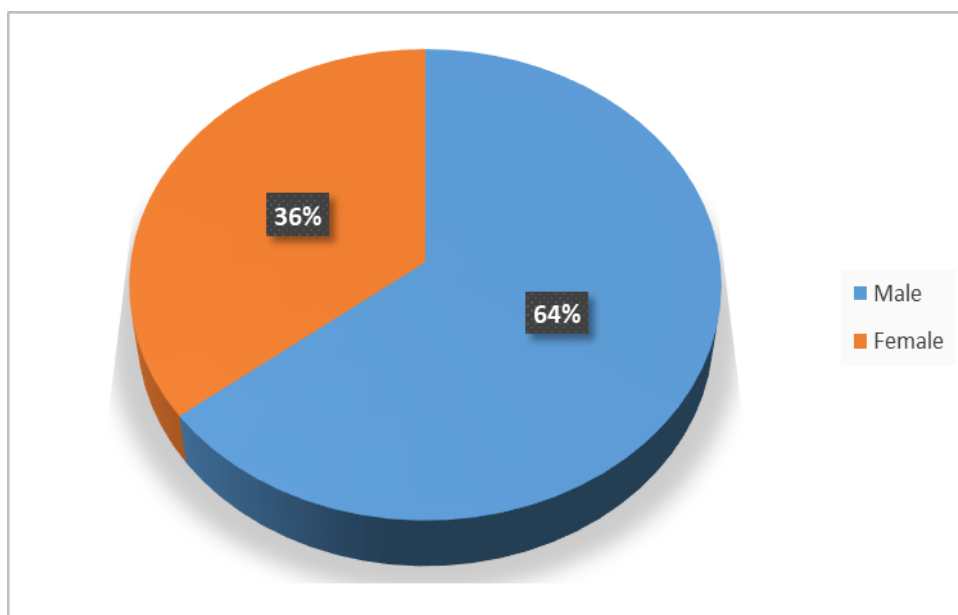


Figure 02: Gender distribution

The pie chart above depicts the gender distribution of the study sample. The study sample was predominately male 251(64%), with females accounting for the remainder 139(36%).

Table 01: Demographic factors

Variable	Frequency (%)
Marital status	
Married	224(57.4)
Unmarried	162(41.5)
Divorced	4(1.0)
Ethnicity	
Sinhalese	270(69.2)
Tamils	65(16.7)
Muslims	55(14.1)

Different demographic factors and their frequencies obtained from the study sample for each are listed in the table above. Among the participants, the majority were married 224(57.4%), while

162(41.5%) were unmarried, and 4(1%) were divorced. There were 270(69.2%) Sinhalese, 65(16.7%) were Muslims, and 55(14.1%) were Tamils.

Table 02: Details on Residence

Variable	Frequency (%)
Area of residence: Province	
Western	313(80.3)
Southern	41(10.5)
Eastern	6(1.5)
North	1(0.3)
Central	19(4.9)
Uva	10(2.6)
Residential sector	
Urban	290(74.4)
Rural	88(22.6)
Estate	12(3.1)
Other members at the residence	
Parents	345(88.5)
Children	213(54.6)
Siblings	145(37.2)
Other	9(2.3)

Among the study sample majority were residents of urban areas 290(74.4%), while 88(22.6%) were from rural areas and 12(3.1%) were from estates. There were 313(80.3%) from the Western province making them the majority, while 41(10.5%) were from

the Southern province. The frequencies obtained for the participants from central, Uva, eastern and northern provinces were 19(4.9%), 10(2.6%), 6(1.5%), and 1(0.3%) respectively.

Socioeconomic level

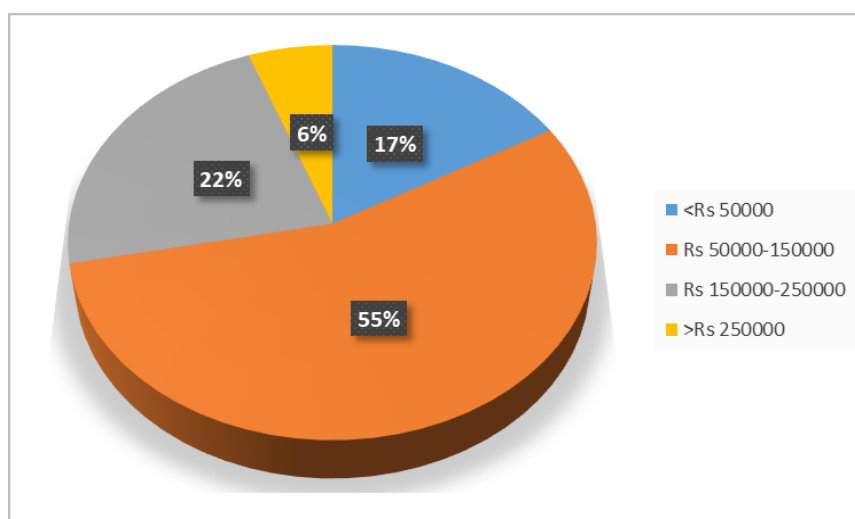


Figure 03: Distribution of Monthly household income (in LKR)

The pie chart above depicts the frequencies derived for various monthly income ranges. Most patients earned between Rs 50,000 to Rs 150,000 per month 215(55%). There were 88(22%) patients with an income between Rs 150,000 to 250,000 per month. And

there were 65(17%) patients with an income of less than Rs 50,000 per month and 22(6%) with an income of more than Rs 250,000 per month.

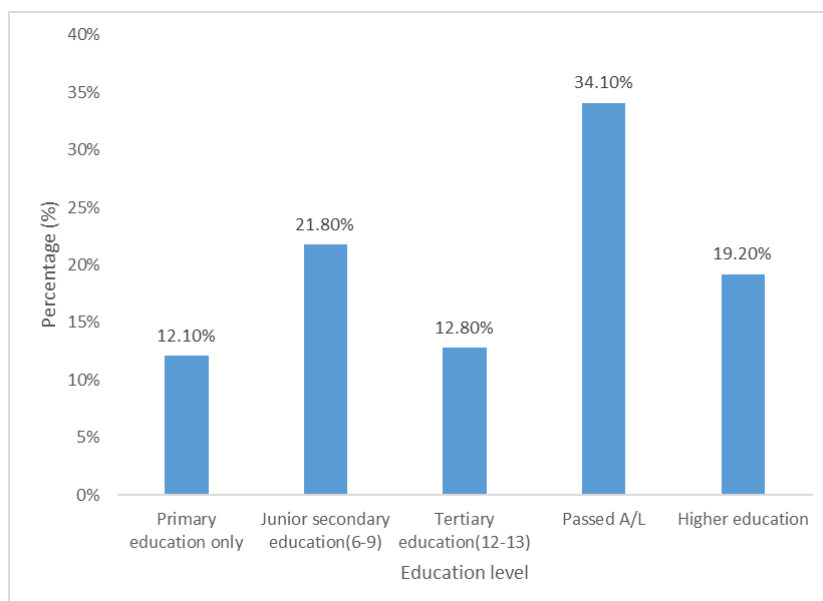


Figure 04: The distribution of education levels

The percentage distribution of education levels among the study sample is given in the bar chart above. Among the patients, there were 133(34.1%) patients who had passed the Advanced level, making them the majority. While 85(21.8%) had obtained junior

secondary education (grade 6 to 9), 75(19.2%) had achieved higher education, 50(12.80%) had tertiary education (grade12 to 13), and 47(12.1%) had primary level education.

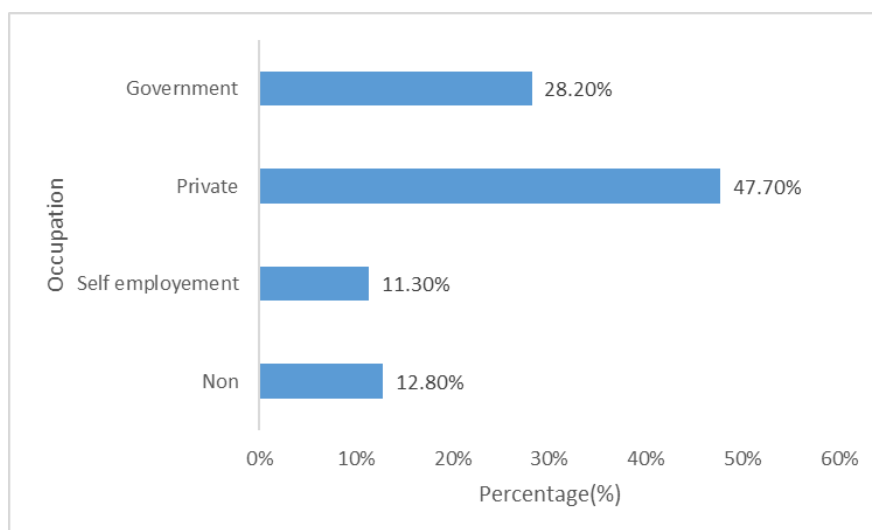


Figure 05: Distribution of Occupation

Data on the Occupational status of the study sample is given in the bar chart above. Where the majority 186(47.7%) were employed in the private sector, followed by 110(28.2%) of the participants

being employed in the government sector. There were 44(11.3%) participants who were self-employed and 50(12.8%) were unemployed.

Table 03: Comorbidities

Comorbidities	Frequency (%)
Diabetes mellitus	53(13.6)
Hypertension	181(46.4)
Ischemic heart disease	56(14.4)
Chronic kidney disease	44(11.3)
Dyslipidaemia	165(42.3)
Chronic rheumatological conditions	3(0.8)
Cancers	3(0.8)
Obesity	44(11.3)
Bronchial asthma	124(31.8)
Other	85(21.8)

The obtained frequencies for the various non-communicable comorbidities are listed in the table above. Among the patients 53(13.6%) were Diabetic, and 181(46.4%) were Hypertensive. Obesity was observed in 44(11.3%) patients. For patients with a history of chronic kidney disease, a frequency of 44(11.3%) was obtained, whereas 56(14.4%) of them had a history of ischemic heart disease and 165(42%) had Dyslipidaemia. Patients with a

history of chronic rheumatological conditions and cancers had an equivalent frequency of 3(0.8%), and a frequency of 124(31.8%) was obtained for patients with Bronchial asthma. There were 85(21.8%) who had other comorbidities, where 78 (92% of the "Other comorbidities" category) of them had atopic and allergic rhinitis.

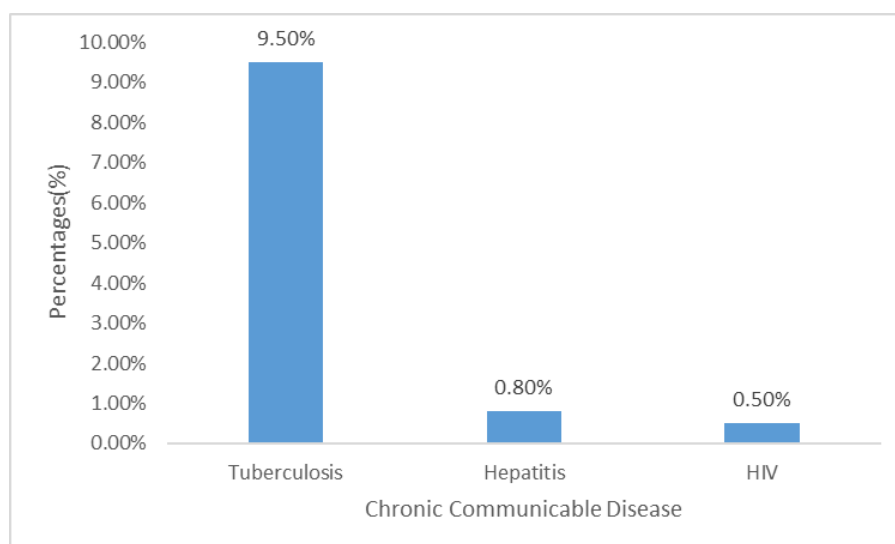


Figure 06: Distribution of Chronic communicable diseases

Among the sample, there were 37(9.5%) with a history of TB, 3(0.8%) with a history of Chronic Hepatitis, and 2(0.5%) with a

history of HIV. These data are displayed in percentages in the column chart above.

Table 04: History of COVID-19 infection

Variable	Frequency (%)
History of contracting Covid 19 infection	
Yes	151(38.7)
No	239(61.3)
Where was treated	
Home	15(9.9)
Tertiary/IDH	53(35.1)
Base Hospital	65(43.0)
Intermediate center	18(11.9)
Duration of hospital stay	
< 1 week	86(57.0)
1 week-2 week	65(43.0)
Severity	
Mild	124(82.1)
Moderate	27(17.9)

IDH - Infectious Disease Hospital

There were 151 patients (38.7%) with a history of COVID 19 contraction. The majority of them 65(43%) were treated at base hospitals, 53(35.1%) at tertiary hospitals or the Infectious Disease Hospital, 18(11.9%) in intermediate centers, and 15(9.9%) at

home. Among those admitted to the hospital, 86 (57%) required a stay of less than a week, while 65 (43%) required a stay of one to two weeks. While 124 (82.1%) had mild symptoms, 27 (17.9%) reported significant moderate symptoms.

Table 05: History of COVID 19 infection of close associate

Variable	Frequency (%)
History of COVID infection in a close associate	
Yes	378(96.9)
No	12(3.1)
Type of close associate	
Family Member	194(49.7)

Friend	200(51.3)
Neighbor	169(43.3)
Severity	
Mild	281(82.6)
Moderate	54(15.9)
Severe	5(1.5)
Outcome	
Fully recovered	328(86.8)
Recovered with complication	47(12.4)
Death	3(0.8)

There were 378(96.9%) participants who had close associates with COVID 19 infection, with 194(49.7%) being family members, 200(51.3%) being friends, and 169(43.3%) being neighbors. For mild, moderate, and severe illness severity, the frequencies found

were 281(82.6%), 54(15.9%), and 5(1.5%), respectively. As a result, 328(86.8%) stated that their relevant close associate had fully recovered, 47(12.4%) stated they recovered with complications, and 3(0.8%) stated they died.

Table 06: Drug and allergic history

Variable	Frequency (%)
History of immunosuppressive treatment	
Yes	6(1.5)
No	384(98.5)
History of allergies	
Drugs	103(26.4)
Foods	200(51.3)
Contacts	22(5.6)

Only 6 (1.5%) of the patients had a history of immunosuppressive therapy. In addition, 225 (57.7%) of the subjects were allergic to various substances.

Table 07: Details on substance abuse

Variable	Frequency (%)
Alcohol	
Never	189(48.5)
Current	
Occasional	95(24.42)
< 1/4 bottle a week	76(19.53)
> 1/4 bottle a week	15(3.85)
Stopped	
> 1 year	15(3.85)
Smoking	
Never	293(75.1)
Current	
pack years <1	6(5.66)
pack years 1-5	6(5.66)
pack years >5	9(8.49)
Stopped	
< 1month	9(8.49)
> 1 year	76(71.69)
Illicit drugs	
Never	337(86.4)
Current	15(3.84)
Stopped	
>1 year	38(9.76)

Among the patients 189(48.5%) had never consumed alcohol, 95(24.42%) drank occasionally, and there were 15(3.85%) who stopped drinking more than a year ago.

Among the patients 293(75.1%) had never smoked, while 9(8.49%) had quit in less than a month and 76(89.4%) had quit more than a year ago. Among those who smoked, 9(8.49%) smoked more than 5 pack years whereas those who smoked less

than one pack year and between 1 to 5 pack years had equal frequency of 6 (5.66%).

There were 337(86.4%) participants who have never used illicit drugs, while 38(9.76%) had ceased using and 15(3.84%) are actively using.

Knowledge, attitude and practice of vaccination

Knowledge

Table 08: Distribution of Knowledge

Variable	Frequency (%)
Preventive strategy that is most important to end the pandemic	
Vaccination	202(51.8)
Social distance	38(9.7)
Hand washing	6(1.5)
Wearing mask	56(14.4)
Immunity boosting food and lifestyle	47(12.1)
Steam inhalation	41(10.5)
Knowledge of the notable side effects of the vaccine	
Thrombosis	160(41.0)
Myocarditis	115(29.5)
Fever	362(92.8)
Headache/body aches	347(89.0)
Pain/swelling at site	374(95.9)
Neurological manifestations	180(46.2)

While the majority of participants 202(51.8%) agreed that vaccination is the most important preventive strategy for ending the pandemic, 56(14.4%) agreed on mask use, 47(12.1%) on immunity boosting food and lifestyle, 41(10.5%) agreed on steam inhalation, 38(9.7%) agreed on social distancing, and 6(1.5%) agreed on hand washing.

When the participants were tested on their knowledge of the vaccination's prominent side effects, 160(41.0%) believed that the

vaccination would induce thrombosis, 374(95.9%) believed that the vaccination would cause localized pain/swelling, while 347(89.0%) believed that the vaccination would cause headache or body aches, and 362(92.8%) believed that the vaccination would cause fever. There were 115(29.5%) participants who believed that the vaccination would cause myocarditis, and 180(46.2%) believed that the vaccination would cause neurological symptoms.

Table 09: Attitudes

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Vaccination will aggravate the virus	147(37.7)	43(11.0)	123(31.5)	71(18.2)	6(1.5)
Long term side effects	6(1.5)	50(12.8)	125(32.1)	150(38.5)	59(15.1)
Needle related worries (Such as transmission of diseases)	0(0.0)	75(19.2)	44(11.3)	162(41.5)	109(27.9)
Money wastage	91(23.3)	70(17.9)	126(32.3)	103(26.4)	0(0.0)
Part of a large-scale conspiracy	106(27.2)	149(38.2)	50(12.8)	85(21.8)	0(0.0)
Harmful to body	80(20.5)	69(17.7)	74(19.0)	129(33.1)	38(9.7)

There were 147(37.7%) participants who strongly disagreed that the vaccination will aggravate the virus. Whereas 150(38.5%) strongly agreed on the fact that vaccination will result in long-term side effects. There were 162(41.5%) and 109(27.9%) who respectively agreed and strongly agreed that vaccines have needle-related worries, such as transmission of diseases via the needle. Even though 103(26.4%) agreed that vaccination is a waste of

money, there were 91(23.3%) and 70(17.9%) participants who respectively strongly disagreed and disagreed. Among the participants, 85(21.8%) believed that vaccination was a part of a large-scale conspiracy. The frequencies obtained for the ones who agreed and strongly agreed that vaccination is harmful to the body were 129(33.1%) and 38(9.7%) respectively.

Table 10: Details on vaccination

Variable	Frequency (%)
Vaccination status	
Yes	334(85.6)
No	56(14.4)
Type of dose	
1st dose	334(85.6)
2nd dose	142(36.4)
Booster	0(0.0)
Vaccine type	
AstraZeneca	122(31.3)
Sinopharm	191(49.0)
Pfizer	9(2.3)
Sputnik V	12(3.1)
Immediate motivation for vaccination	

Personal protection	119(35.6)
Family pressure	80(24.0)
Advised- Peer/Doctor/Media	44(13.2)
Social responsibility	15(4.5)
Workplace Policy	44(13.2)
Foreign travel	32(9.6)
Vaccination status - Not taken	56(14.4)
Deferred	24(42)
Active immunosuppression	12(50.0)
Recent medical deterioration-MI	6(25.0)
Pregnancy	3(12.5)
Active immunosuppression and Malignancy	3(12.5)

Among the participants 334(85.6%) had got their vaccines (at least first dose) against COVID 19. Among the immunized, 192 (49.2%) received only their first dosage, while 142 (36.4%) received both doses. None of them had received their booster shot. Frequencies obtained for each type of vaccine are 191(49.0%), 122(31.3%), 12(3.1%), and 9(2.3%) for Sinopharm, AstraZeneca, Sputnik V, and Pfizer respectively. The immediate motivation for the vaccination for 119(35.6%) was their concern for their own personal protection, whereas 80 patients (24.0%) had been administered the vaccine owing to family pressure. Advice from peers, doctors, or the media caused 44(13.2%) of them to receive the vaccine, while a similar number of participants were forced to obtain the vaccine due to work place policies. Because they had to

travel abroad, 32 (9.6%) of them received the vaccine. There were 15 (4.5%) of those who received the vaccine because they believed it was a social responsibility.

Out of 390 participants 56 (14.4%) did not receive any vaccinations. Among those who did not receive the vaccine 24(42%) were deferred vaccination for various reasons, out of which 12 (50.0%) were on active immunosuppression, 3 (12.5%) were on active immunosuppression with a history of malignancy, 6 (25.0%) had a recent medical deterioration (such as a history of MI), and 3 (12.5%) were pregnant.

Details of side effects of vaccination

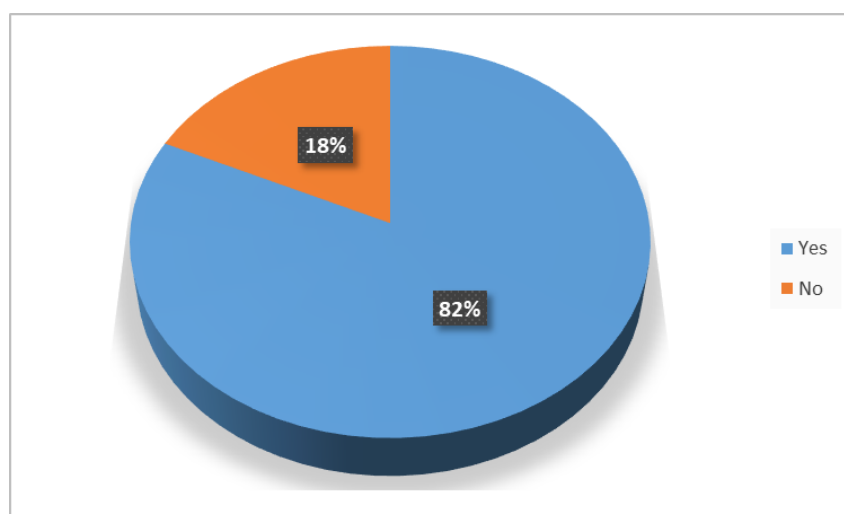


Figure 07: Distribution of side effects

The above pie chart represents the distribution of side effects. While 272(82%) had experienced side effects from vaccination, the remaining 62(18%) hadn't.

Table 11: Side effects of vaccine

Side effects	Vaccine type			
	AstraZeneca	Sinopharm	Pfizer	Sputnik V
Pain at site				
Mild	122(100.0)	94(49.2)	9(100.0)	12(100.0)
Moderate	0(0.0)	38(19.9)	0(0.0)	0(0.0)
Severe	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Syncope	0(0.0)	35(18.3)	0(0.0)	0(0.0)
mild fever, chills, rigors, nausea	69(56)	85(44.5)	3(33.3)	0(0.0)

Mild pain was reported by 122(100%) who took AstraZeneca, 94(49.2%) who took Sinopharm, 9(100%) participants who took Pfizer, and 12(100%) participants who took Sputnik V. Among those who received Sinopharm 38(19.9%) experienced moderate

pain at the site of injection, while 35(18.3%) experienced syncope. Mild fever, chills and rigor and nausea was reported in 69(56%), 85(44.5%), and 3(33.3%) of those who received AstraZeneca, Sinopharm, and Pfizer respectively.

Table 12: vaccination-related complications in known

Variable	Frequency (%)
History of covid vaccination-related complications in a known person	
Yes	381(97.7)
No	9(2.3)
If yes in whom	
Spouse	118(30.3)
Child	27(6.9)
Parents	252(64.6)
Friends	166(42.6)
Relatives	170(43.6)
Neighbour	216(55.4)

Of the participants 381(97.7%) stated that there was vaccination related complication in known individuals. Among those known were 252(64.6%) were parents, 216(55.4%) were neighbors,

170(43.6%) were relatives, 166(42.6%) were friends, 118(30.3%) were spouse and 27(6.9%) were children.

Table 13: Details on missed vaccination

Variable	Frequency (%)
Missed prior opportunities for vaccination	
Yes	302(77.4)
No	88(22.6)
How many missed	
1 to 3	255(84.4)
3 to 5	47(15.6)
Reason for not getting vaccinated when it was available for the first time.	
Fear of side effects	200(51.3)
Thought COVID-19 was not a serious illness	167(42.8)
Uninterested	24(6.2)
Religious reasons	35(9.0)
Unavailability	160(41.0)
Thought not important	36(9.2)
No faith in vaccines	103(26.4)
Fear of alleged rumors of vaccination	121(31.0)
Deferred for a medical reason	21(5.4)

There were 302(77.4%) participants in the study sample who missed prior opportunities for vaccination, with 255(84.4%) missing 1 to 3 doses and 47(15.6%) missing 3 to 5 doses. Among the reasons for not getting vaccinated when the vaccine was first available, 200(51.3%) stated that it was due to the fear of side effects, 167(42.8%) missed it thinking that COVID 19 was not a

serious illness, 121(31%) did not take because of the fear of alleged rumors on vaccination, while 103(26.4%) had no faith in vaccines, 36(9.2%) had thought that it's not important, 35(9%) had missed due to religious reasons, 24(6.2%) had no interest in taking the vaccine, 21(5.4%) deferred for medical reasons and 160(41%) missed due to unavailability.

Table 14: Association between demographic factors and Vaccination status

Demographic factors	Vaccination status		P Value
	Yes (N=334)	No (N=56)	
Age			
15-35 years	159(93.0)	12(7.0)	—
35-55 years	91(100.0)	0(0.0)	
55-75 years	19(30.2)	44(69.8)	
>75 years	65(100.0)	0(0.0)	
Gender			
Male	242(96.4)	9(3.6)	<0.001
Female	92(66.2)	47(33.8)	
Marital status			
Married	176(78.6)	48(21.4)	-
Unmarried	156(96.3)	6(3.7)	
Divorced	2(50.0)	2(50.0)	
Residential section			
Urban	240(82.8)	50(17.2)	-
Rural	82(93.2)	6(6.8)	
Estate	12(100.0)	0(0.0)	
Income			
Rs <50000	56(86.2)	9(13.8)	
Rs 50000-150000	171(79.5)	44(20.5)	
Rs 150000-250000	85(96.6)	3(3.4)	

Rs >250000	22(100.0)	0(0.0)	
Education level			
Primary education	47(100.0)	0(0.0)	-
Junior secondary education	76(89.4)	9(10.6)	
Tertiary education	12(24.0)	38(76.0)	
Passed A/L	133(100.0)	0(0.0)	
Higher education	66(88.0)	9(12.0)	
Comorbidities			
Yes	252(75.4)	53(94.6)	0.001*
No	82(24.6)	3(5.4)	
Previous covid infection			
Yes	328(86.8)	6(50.0)	<0.001
No	50(13.2)	6(50.0)	
Attitudes (Strongly agree)	109(32.6)	9(16.1)	0.013
Vaccination side effect			
Yes	269(82.0)	0(0.0)	-
No	59(18.0)	0(0.0)	

*Fisher's exact value

Majority 159(93.0%) from the age 15-35 category are vaccinated. While in age 35-55 category (91) and age >75 category (65) all participants have been vaccinated. In age 55-75 category majority 44(69.8%) has not been vaccinated.

There is a significant association between gender and vaccination status. Majority of male participants 242(96.4%) and female participants 92(66.2%) have been vaccinated.

Of the participants who had previous Covid infection 328(86.8%) have got vaccinated and there is a significant association between previous Covid infection and vaccination status.

There were 109 participants (32.6%) who got vaccinated with positive attitudes for vaccination but there was no significant association between positive attitudes for vaccination and vaccination status (P=0.013).

Table 15: Association between demographic factors and vaccination missed opportunities

Demographic factors	vaccination missed opportunities		P Value
	Yes (N=334)	No (N=56)	
Age			
15-35 years	156(91.2)	15(8.8)	-
35-55 years	27(29.7)	64(70.3)	
55-75 years	63(100.0)	0(0.0)	
>75 years	56(86.2)	9(13.8)	
Gender			
Male	163(64.9)	88(35.1)	<0.001
Female	139(100.0)	0(0.0)	
Marital status			
Married	172(76.8)	52(23.2)	-
Unmarried	127(78.4)	35(21.6)	
Divorced	3(75.0)	1(25.0)	
Residential section			
Urban	263(90.7)	27(9.3)	<0.001
Rural	33(37.5)	55(62.5)	
Estate	6(50.0)	6(50.0)	
Income			
Rs <50000	27(41.5)	38(58.5)	-
Rs 50000-150000	180(83.7)	35(16.3)	
Rs 150000-250000	88(100.0)	0(0.0)	
Rs >250000	7(31.8)	15(68.2)	
Education level			
Primary education	12(25.5)	35(74.5)	-
Junior secondary education	59(69.4)	26(30.6)	
Tertiary education	47(94.0)	3(6.0)	
Passed A/L	115(86.5)	18(13.5)	
Higher education	69(92.0)	6(8.0)	
Comorbidities			
Yes	258(85.4)	47(53.4)	<0.001*
No	44(14.6)	41(46.6)	

Previous covid infection			
Yes	290(76.7)	83(23.3)	0.076*
No	12(4.0)	0(0.0)	
Attitude (Strongly agree)	80(26.5)	38(43.2)	0.003

*Fisher's exact value

In the age 15-35 category the majority of participants 156(91.2%) had missed vaccination opportunities while it is 100% (63) in the age 55-75 category.

Majority (64.9%) of male participants (163) and all of the female participants (139) have missed opportunities for vaccination. There is a statistically significant association between the vaccination missed opportunities and the gender.

Association between the vaccination missed opportunities and the residential section is statically significant. Most (90.7%) of the urban participants (263) have missed opportunities for vaccination, while 62.5% (55) rural residents have not. Equal numbers of estate residents have missed and not missed opportunities for vaccination.

Table 16: Association between covid infection severity and Risk factors

Factors	Severity		P Value
	Mild	Moderate	
	(N=124)	(N=27)	
Comorbidities			
Yes	118(95.2)	21(77.8)	0.002
No	6(4.8)	6(22.2)	
Smoking			
Yes	74(59.7)	27(100.0)	<0.001*
No	50(40.3)	0(0.0)	
Alcohol			
Yes	42(33.3)	0(0.0)	<0.001*
No	82(66.1)	27(100.0)	

Of the participants who had mild Covid infection, the majority (95.2%) were having comorbidities. There was no statistically significant association between Covid infection severity and comorbidities. (P=0.002)

59.7% (74) of mild Covid infected participants and 100% (27) of moderate Covid infected participants were smoking. There is a

significant association between smoking and the covid infection severity.

33.3% (42) participants with mild infection were consuming alcohol while 66.1% (82) were not consuming alcohol. 100% (27) of participants with moderate infection were not consuming alcohol. There is a statistically significant relationship between alcohol consumption and the severity of Covid infection.

Table 17: Association between Immediate motivation for vaccination between history of covid infection and covid in close contacts

Factors	Immediate motivation for vaccination					
	Personal protection (N=119)	Family pressure (N=80)	Doctor (N=44)	Social responsibility (N=15)	Workplace policy (N=44)	Foreign travel (N=32)
History of covid infection in a close association						
Yes	119(100.0)	74(92.5)	44(100.0)	15(100.0)	44(100.0)	32(100.0)
No	0(0.0)	6(7.5)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Close contacts						
Family member	41(34.5)	65(81.3)	44(100.0)	9(60.0)	0(0.0)	26(81.3)
Friend	100(84.0)	15(18.8)	0(0.0)	6(40.0)	38(86.4)	0(0.0)
Neighbour	75(63.0)	6(7.5)	44(100.0)	6(40.0)	6(13.6)	32(100.0)

Personal protection was the immediate reason for receiving the vaccine in 35.6% (119) people whereas 24% (74) have received it due to family pressure. Similar percentages of people (13.2%) have received vaccines as they were advised by Peer/Doctor/Media or

due to policy at the workplace (44). Social responsibility and foreign travel were the reasons in 4.5% and 9.6% of patients respectively.

Table 18: Association between Education level and most important preventive methods- as vaccination

Education level	Vaccination status		P Value
	Vaccination (N=202)	Non vaccination (N=188)	
Primary education	0(0.0)	47(25.0)	-
Junior secondary education	0(0.0)	85(45.2)	
Tertiary education	15(7.4)	35(18.6)	
Passed A/L	118(58.4)	15(8.0)	
Higher education	69(34.2)	6(3.2)	

Of the participants who did not vaccinate, 25% and 45.2% were having only primary education and junior secondary education respectively.

Majority (58.4%) of the people (118) who got vaccinated had passed A/L whereas 34.2% (69) had higher education.

Discussion

Covid 19 was declared as a global pandemic by the World Health

Organization in March, 2020 due to its widespread throughout the world and the number of deaths caused by the infection(27). Several vaccines were developed for the control of the disease and those vaccines have shown that they are effective in disease control as well as reducing complications. However due to several matters, hesitancy to receive the vaccination is also observed in many communities and it has a huge negative impact on disease control(28). This study was done to evaluate the knowledge, attitudes and practices regarding acceptance of Covid 19

vaccination in a group of patients in Sri Lanka.

The sample consisted of 390 patients who were treated as in or out patients at National Hospital, Sri Lanka. Majority (43.8%) of the sample was in the 15-35 age category while 23.3% were in the 35-55 age category. Percentages of patients in the 55-75 age group and patients above 65 years were 16.2% and 16.7% respectively. Nearly 2/3 of the sample consisted of males. More than half (57.4%) of the sample were married and the majority (69.2%) were Sinhalese. Tamils and Muslims percentages in the sample were 16.7% and 14.1% respectively.

Western province was the residential province for 80.3% of patients while 10.5% patients were from Southern province. About 3/4 of them were from urban areas, 22.6% from rural areas and 3.1% from estates. Parents, children, siblings were the other members in the residence in 88.5%, 54.6% and 37.2% patients respectively. Monthly household income in 55% of the sample was between Rs 50,000 to Rs 150,000 and 22% have earned between Rs 150,000 to 250,000 monthly. There were 34.1% of patients who had passed Advanced levels and 19.2% had achieved higher education. Primary level education, junior secondary education and tertiary education were completed by 12.1%, 21.8% and 12.8% respectively. Majority (47.7%) of the sample were working in the private sector, 28.2% were in the government sector, 11.3% were self-employed and 12.8% were unemployed.

Hypertension was the most prevalent comorbidity in the sample (46.4%) and dyslipidemia (42.3%), bronchial asthma (31.8%), ischemic heart disease (14.4%), diabetes (13.6%), chronic kidney disease (11.3%) and obesity (11.3%) were the other common comorbidities found. There were 9.5% patients with a history of tuberculosis, 0.8% with a history of chronic hepatitis and 0.5 % with HIV.

Majority of the sample did not have a history of Covid 19 infection and only 38.7% were previously diagnosed with the infection. Treatments for Covid 19 were given at Base hospitals for 43.0%, tertiary care centres/IDH for 35.1%, intermediate centres for 11.9% and home for 9.9% patients. Duration of hospital stay was less than 7 days in 57.0% patients. Above findings could be expected as the majority (82.1%) of the infected patients had a mild disease and the rest had a moderate disease. A history of Covid 19 infection in a close associate was found in 96.9% patients and in 51.3%, the close associate was a friend. In 49.7% and in 43.3% the close associate was a family member or a neighbour respectively.

Only 1.5% of the sample had a history of immunosuppressive therapy. There is an increased risk for associated complications and deaths due to Covid 19 in patients who were previously treated with immunosuppressive therapy(29). History of any kind of allergy was present in 57.7% patients, 26.4% of them had drug allergies, 51.3% had food allergies and 5.6% had contact allergies. Up until now, no deaths due to anaphylaxis following Covid 19 vaccination was reported and researches suggest even people who are allergic to the components of vaccines could be safely vaccinated by doing prior skin tests for polyethylene glycol, a common allergen in Covid 19 vaccines and close observation following vaccination. However, frequent reporting of allergic reactions following Covid 19 vaccination have reduced the acceptance of vaccines especially in patients with allergic history(30,31).

There were 24.42% occasional drinkers in the sample and 48.5% had never taken alcohol. Out of the sample, 19.53% consumed less than 1/4 bottle of alcohol per week and only 3.85% of them used more than 1/4 bottle per week. Frequency of patients who have stopped drinking alcohol 1 year ago is 3.85%. Regarding the smoking history, 75.1% of patients have never smoked. Among the study participants, 5.66% had less than 1 pack years, 5.66% had 1-5 pack years and 8.49% had more than 5 pack years. Among the patients who have stopped smoking, 8.49% have stopped less than 1 month ago and 71.9% have stopped more than 1 year ago. Illicit drugs have been never used by 86.4% of patients and 3.84% are currently using them. Frequency of patients who have stopped using illicit drugs 1 year ago is 9.76%.

Patients with alcohol and other substance abuse are more prone to develop abnormalities in cardiovascular and respiratory systems. Hence, those people are more vulnerable for acquiring the Covid 19 infection as well as to face more dreadful complications following the infection. Abnormalities in the brain due to substance abuse can be worsened due to the brain involvement by the Covid 19(32). Results from a meta-analysis have confirmed that patients with a smoking history have a higher probability to develop more severe Covid 19 infection. Smoking has an effect on stimulating angiotensin converting enzyme 2 which is an enzyme that enhances the entry of viruses inside the cells(33). However, the majority of the present sample were not on alcohol, illicit drugs or tobacco smoking which could be one of the reasons for less severe symptoms in the patients of the sample.

Little more than half of the sample (51.8%) have selected vaccination as the most important strategy in prevention of Covid 19 in terms of ending the pandemic. Social distance, hand washing, wearing masks, immunity boosting food and lifestyle and steam inhalation were selected by 9.7%, 1.5%, 14.4%, 12.1% and 10.5% respectively. An Ethiopian study which was done to assess knowledge and attitudes regarding Covid 19 vaccine has described 83.3% of people were aware about the effectiveness of Covid 19 vaccine in the prevention of disease(34). However, the above study did not compare the knowledge on the most effective preventive method among several preventive measures.

Majority were aware about common side effects following vaccination such as pain/swelling at site (95.9%), fever (92.8%) and headache/body aches (89.0%). Neurological manifestations by 46.2%, thrombosis by 41% and myocarditis by 29.5% were selected as side effects of vaccination. Fever, fatigue and body aches are the commonest side effects following the Oxford-AstraZeneca vaccine. Anaphylaxis was reported following Pfizer, Moderna and Johnson and Johnson vaccination. Vaccine induced prothrombotic immune thrombocytopenia is a recognized side effect following Oxford- AstraZeneca vaccine. The link between vaccination and occurrence of neurological manifestations is yet to be confirmed (35,36,37,38). All patients who received vaccination in the present sample have experienced pain at the injection site with all four vaccine types. Mild fever, chills, rigours and nausea were experienced by 56% with AstraZeneca, 44.5% with Sinopharm and 33.3% with Pfizer. Syncope was experienced by 18.3% of people who received the Sinopharm vaccine. A total of 97.7% of study participants had a known person with a vaccine related complication.

When assessing the attitudes towards Covid 19 vaccine, 37.7% of

them strongly disagreed and 11% disagreed on the statement; “vaccination will aggravate the virus”. A total of 18.2% agreed and 1.5% of them strongly agreed on the statement. “Vaccination will cause long term side effects” is believed strongly by 15.1% and 38.5% agreed on the statement. A total of 27.9% strongly agree, 41.5% agree and 19.2% disagree that vaccination will cause needle related issues such as transmission of diseases. With the statement “vaccination is a money wastage”, 23.3% strongly disagreed, 17.9% disagreed, 32.3% were neutral and 26.4% agreed. A total of 27.2% of them strongly disagreed on the statement that “vaccination is a part of a large scale of conspiracy”, 38.2% disagreed, 12.2% were neutral and 21.8% agreed. With the statement, “vaccination is harmful for the body”, 20.5% strongly disagreed, 17.7% disagreed, 19.0% were neutral, 33.1% agreed and 9.7% strongly agreed. According to an Ethiopian study, 44.7% of participants had an overall positive attitude towards the Covid 19 vaccination. Only around one fourth of the participants of the same study had believed the vaccination is safe(34). Differences in social and cultural beliefs and level of public awareness regarding vaccination in different communities and countries may be the reason for the differences in attitudes in different studies.

Around 85.6% of the participants in the present sample had received the at least a single dose vaccination. Out of them 49.2% had only the first dose and the second dose was taken by 36.4%. None of them had received the booster dose. In the United States, nearly 70% of adults have received at least 1 dose of Covid 19 vaccination(39). A meta-analysis done with 56 articles has concluded that there is a Covid 19 vaccine hesitancy globally in 25% people(40). Vaccination acceptance rates in our sample is higher compared to world statistics. Majority of people have received Sinopharm (49%), 31.3% have received AstraZeneca, 3.1% have received Sputnik V and 2.3% have received Pfizer.

Personal protection was the immediate reason for receiving the vaccine in 35.6% people whereas 24% have received it due to family pressure. Similar percentages of people (13.2%) have received vaccines as they were advised by Peer/Doctor/Media or due to policy at the workplace. Social responsibility and foreign travel were the reasons in 4.5% and 9.6% of patients respectively. Among those who did not receive the vaccine, 50.0% were on active immunosuppression, 12.5% were on active immunosuppression with a history of malignancy, 25.0% had a recent medical deterioration (such as a history of MI), and 12.5% were pregnant.

More than ¾ of the sample (77.4%) had missed prior opportunities of vaccination and 84.4% of them had missed 1-3 opportunities. Fear of side effects (by 51.3%), thought Covid 19 is not a serious illness (by 42.8%), uninterested (by 6.2%), religious reasons (by 9%), unavailability (by 41%), thought not important (by 9.2%), no faith in vaccines (by 26.4%), fear of alleged rumours of vaccination (by 31%) and deferred for a medical reason (by 5.4%) were chosen as reasons for missing opportunities for the vaccination. According to a meta-analysis most given reasons for missing the Covid 19 vaccine were generally being against vaccines, safety issues as the vaccine was developed with a rush, Covid 19 is harmless and vaccine is not required, not believing that the vaccine is efficacious and believing they are already immunized(41).

Statistically significant association was found between vaccination status and gender, presence of comorbidities and previously

infected with Covid 19. No association was found between vaccination status and age, marital status, residential area, income, educational level and knowing vaccination side effects. Similar to present study, women being more hesitant to receive the vaccine was found in other studies as well(42). Younger people and people with lower education levels have more vaccine hesitancy(43). It is interesting that previous infection with Covid 19 has acted as a stimulant to take the vaccine in the participants of the present sample.

Statistically significant association is found between vaccination missed opportunities with female gender, residential area and presence of comorbidities. Even though, vaccination programs were conducted frequently in urban areas compared to rural areas, many from urban areas had missed vaccination opportunities. Higher population density in urban areas may be one of the reasons for this finding.

According to the present study smoking and alcohol consumption are associated with the severity of the Covid 19 illness but not the presence of comorbidities. Old age and the presence of comorbidities were associated with worse Covid-19 outcome in many other studies(44). People who smoke have a higher risk for progression of Covid 19 complication compared to people who have never smoked(45). However, some studies have failed to show a significant association between Covid 19 severity with smoking, alcohol consumption and betel chewing(46).

Current study did not find an association between the motivation for Covid 19 vaccination and a history of Covid 19 infection in a close contact. Significant association was not found between the level of education and choosing vaccination as the most effective preventive method against Covid-19 pandemic. According to some studies, higher level of education is a determinant of increased knowledge on Covid-19 and its preventive strategies (47). While an Indian study has revealed that the majority of people who are willing to receive Covid 19 vaccination had an education level less than high school, revealing that effective awareness programs can impact on vaccine acceptance despite lower level of education amongst the receivers. It is suggested that easy access to information on undesirable effects of vaccination through different media platforms create vaccine hesitancy even among the educated people (48).

Limitations

If a larger sample was recruited, more generalized information would have been gathered. Hospitalized participants do not directly represent the general public and there is always a bias on the information provided as the data gathering was done by healthcare providers. We have noticed a deficiency of information in literature to compare with some areas of our study.

Conclusions

The level of knowledge and attitudes on Covid 19 vaccination is average. This Sri Lankan sample has a higher rate of Covid-19 vaccination acceptance compared to global statistics. There is a statistically significant association between vaccination status with gender, presence of comorbidities and previous Covid-19 infection. A statistically significant association is found between previous vaccination missed opportunities with female gender, residential area and presence of comorbidities. History of substance abuse has a significant association with the severity of Covid-19 disease. No

association was found between the level of education and knowledge on efficacy of vaccination.

Recommendations

Relevant authorities assisted by health care workers should pay more attention in increasing the awareness to improve the vaccination acceptance of the country and to tackle the myths and misinformation related to vaccination. More attention must be given for the population with higher vaccine hesitancy such as females, younger, those without previous Covid-19 and those without comorbidities. The public must be encouraged to abstain from alcohol consumption and smoking as both result in detrimental outcome in Covid-19 infection.

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