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AWARENESS, ATTITUDES, AND BEHAVIORS REGARDING SEASONAL INFLUENZA PREVENTION AND VACCINATION AMONG MEDICAL AND SOCIAL SCIENCES STUDENTS STUDYING AT PUNJAB UNIVERSITY IN LAHORE, PAKISTAN

Saima Arshad[1], Muhammad Aqeel[*2], Professor Rubeena Zakar[*3]

[1]*Department of Public Health, The Islamia University of Bahawalpur*
[*2]*Department of Public Health, Sarhad institute of Allied Health Sciences, Sarhad University Peshawar*
[*3]*Institute of social and Cultural studies, Department of Public Health, University of Punjab, Lahore Pakistan*

[1]saima.arshad@iub.edu.pk, [*2]muhammadaqeel3050@gmail.com, [*3]rubeena499@hotmail.com

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Corresponding Author: *
Muhammad Aqeel
Professor Rubeena Zakar

Abstract

Seasonal influenza is a contagious infection of the respiratory tract caused by Influenza viruses. Influenza remains sporadic throughout the year, but from early October to late winters, it becomes an epidemic. Universities, colleges, and schools are places at increased risk of an influenza outbreak. The purpose of this study is to assess students' knowledge of influenza, influenza prevention, and vaccination to prevent future epidemics or pandemics. For this purpose, a cross-sectional study was conducted by using a researcher-administered survey to collect data during February-March 2020 from 358 medical as well as non-medical or social sciences students studying at the Punjab University in Lahore, Pakistan.

Descriptive analysis was conducted to assess students' knowledge of influenza, influenza vaccination, and influenza prevention. Results revealed that, the majority of the respondents was male (52.8%) and had age group 21-25 (76.3%) years. We found adequate knowledge among students, with the exception of the dissemination of knowledge about the cause, systemic symptoms and availability of influenza vaccine in Pakistan, which was adequate but less than other aspects of influenza awareness and relatively low among non-medical or social science students. Chi-square test showed a significant association between knowledge of the cause of influenza, its symptoms, associated mortality, preventive measures and the availability of influenza vaccine in Pakistan with the respondent's study discipline. Awareness of the above-mentioned aspects was higher among medical or health-sciences students.

In addition, the Mann-Whitney U test was performed to assess student's behavior in relation to taking preventive measures. A p-value of 0.05 was considered statistically significant. The results showed that behaviors such as washing hands more regularly, using the elbow to cough, and sneezing were significantly higher among medical or biological students. While, other more rigorous preventive measures, such as using hand sanitizers, covering the mouth and maintaining social distance, were equally common among students across all academic disciplines. Negligence was observed in the entire study population with regard to seasonal influenza vaccination. The majority of the population

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(88%) agrees that influenza is a mild illness and does not require vaccination. The Mann-Whitney U test revealed that this behavior was more common among medical or health sciences students. Other negative behaviors observed include needle fear, parental or relative refusal to vaccinate, and too busy to get a flu shot. These results indicate that there is an urgent need for frequent awareness-raising programs at universities, specifically targeting non-medical or social science students, to control the growing burden of influenza.

INTRODUCTION

Influenza is a respiratory tract infection caused by influenza virus (CHA, YOO, KIM, WIE, & SHIN, 2005). An infectious disease is an illness that can be transmitted from person to person through direct or indirect contact and is caused by disease-causing microorganisms such as bacteria, viruses, fungi, and parasites. But in most cases, these infectious agents only affect susceptible hosts, such as immuno-compromised people, children, the elderly and pregnant women. Under optimal conditions, disease symptoms may not appear until the host's immune system is functioning properly. An infectious disease occurs when the host's immune system is compromised or an infection causing agent suppressed the immune system (Enna & Bylund, 2008).

Influenza viruses usually infect the upper respiratory tract, but can sometimes also infect the lower respiratory tract. Comparatively, Influenza is a large virus that primarily affects the upper and lower respiratory tract. Influenza-associated Viraemia is rare (Aiello et al., 2010)). Influenza virus has two main types or strains, influenza A and Influenza B. These are accountable for sporadic outbreaks in humans.

These are encased viruses that consists of eight negative chain RNA segments that encode 9 structural and 2 nonstructural proteins (Influenza A virus) or 10 structural and 1 nonstructural protein (Influenza B virus). The influenza A virus is surrounded by a host cell membrane, where two external proteins, hemagglutinin (HA) and neuraminidase (NA), are responsible for the virus to enter the host cell. These viruses and viral particles then become targets for B-cell or humoral immunity (Nelson, 2007).

Seasonal influenza viruses are actively circulated during yearly epidemics (primarily in temperate climates during the winter months), while new antigenic strains occasionally appear as pandemic viruses. Seasonal influenza relates to an influenza outbreak usually occurring every winter in both the North and South poles and the tropical regions throughout the year. Influenza outbreaks occur each year as the influenza virus undergoes a persistent but relatively minor genetic change called antigenic drift (Bedford et al., 2015).In a temperate climate, cases and intensity of influenza infections increased during the winter season. In these areas, it is believed that the disease exists at a lower level throughout the year, but there is a noticeable seasonal increase, usually in the winter months(Petrova & Russell, 2018). Local outbreaks start abruptly, reached its highest frequency after 2-3 weeks, and remain for 5-10 weeks. In most cases, seasonal flu outbreaks are thought to occur in China and spread from here. New strains of the influenza virus may be the cause of rare but destructive pandemics, one of the most famous of which was the 1918 pandemics, which killed massive people.

The main changes in surface proteins that characterize virus strains are directly linked with these pandemics. More often, the influenza virus also causes epidemics or large outbreaks (Petrova & Russell, 2018). These epidemic Infectious Diseases (EIDs) pose a significant burden on the global economy and public health. It is assumed that their appearance is largely due to socio-economic and environmental factors(Omoleke et al., 2018).

Influenza A has a stronger effect on human health relative to influenza B due to rapid mutation in their genetic makeup and host heterogeneity. Swine flu is also a common infection of the respiratory tract in pigs globally caused by Influenza viruses of type A. Predominantly subcategories of Influenza A virus are H1N1, H1N2, H2N1, H3N1, H3N2, and H2N3. A novel H1N1, Swine-Origin Influenza Virus (S-OIV), was first detected in mid-April 2009. The virus spread rapidly in humans, and the subsequent global epidemic has already proven to be the main cause of

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illness and death in humans. The virus tends to be quickly transmitted to humans.

Swine Influenza can affect the human population of all age groups cause moderate to severe disease. Particularly at high risk of getting swine flu are the people who are in close contact with swine. Until recently, influenza epidemiology has been limited to resource-rich countries. On June 11, 2009, the World Health Organization confirmed an H1N1 pandemic as over 70 nations registered 30,000 cases of H1N1 infection(Rewar, Mirdha, & Rewar, 2015).

The first incident of pandemic influenza A (H1N1) was reported in 2009. It's been circulating since then, resulting in substantial illness and deaths. Between January 2009 and February 2016, 1950 (12%) samples were positive for influenza A from 16,024 tested samples. Pandemic Influenza A (H1N1) was the dominant subtype of the virus throughout the pandemic era (2009-2010), with 366 out of 808 (45%) confirmed positive cases. A total of 1078 out of 1911 (56%) cases were positive for influenza A (H1N1) pdm09 with co-circulation in the post-pandemic period (2011-2016). According to the genetic makeup, there are two main classes of pandemic influenza A (H1N1) viruses: pandemic class 7 (2011) and post-pandemic class 6B (2015) (Badar et al., 2020).

In general, the symptoms of influenza (H1N1) Pdm09 or swine flu in humans are similar to those of flu or flu-like illness. Reported symptoms: fever, cough, sore throat, rhinorrhea, body pain, headache, loss of appetite, weight loss, fatigue, diarrhea, abdominal pain, and shortness of breath in cases of advanced lower respiratory illnesses. The symptoms of seasonal flu differ from swine flu in that it has no gastrointestinal symptoms and the severity of symptoms is less than that of swine flu. Diarrhea in patients with swine flu is watery, without mucous or blood (Wiwanitkit & Throat, 2009). The H1N1 virus in 2009 did not belong to zoonotic swine flu, since it is transmitted not from pigs to humans, but from person to person by airborne droplets. Among the most common causes of death from swine flu is respiratory failure. Other fatal complications are sepsis or septic shock due to pneumonia, seizures, and brain damage due to high temperature, electrolyte imbalance, and renal failure (Hire, Derle, & Technology, 2018). Treatment for swine flu is mostly supportive and includes bed rest, increased fluid intake, and symptomatic treatment for coughs, fever, and muscle pain. Therapeutic management includes the potential use of antiviral drugs for the symptomatic patient with the influenza virus (Mukherjee, Sen, Nakate, & Moitra, 2015).

The influenza virus is transmitted from symptomatic or asymptomatic infected people to others in the population or community, usually in the form of aerosols but can also be transmitted by hand contact and by touching contaminated surfaces. The chance of transmitting the virus is increased by living in crowded and congested places. The transmission is also facilitated by a large number of people in enclosed spaces at home, in classrooms and industrial premises as well as on public transport.

Various preventive measures are effective against influenza infection including regular hand washing; using alcohol-based hand sanitizers, social distancing, and avoiding crowded places (Castilla et al., 2013). Along with taking these preventive measures getting the seasonal flu vaccine annually is the best way to prevent the flu. The epidemiological picture reflects a change in the antigenic properties of influenza viruses. Its transmission depends on many factors, including the probability of virus propagation and population vulnerability (Schmidt, 2015). It can cause mild or severe infection and can often prove fatal. Influenza is basically recognized as viral infection that leads to respiratory disease, but study of the clinical literature indicate that influenza is also significantly correlated with several clinical syndromes that affect other organs outside the respiratory tract. Viral myocarditis and viral encephalitis were the most common complications associated with influenza infection. In order to determine the massive burden of influenza infection and to support individual organ treatment, awareness of these extra pulmonary complications is crucial(Sellers, Hagan, Hayden, Fischer, & viruses, 2017).

Objectives of the study

Keeping in view the above-mentioned facts and importance of Influenza vaccination, the present study is designed with the following objective.

- To assess the awareness, knowledge attitudes and practices toward Influenza, its prevention and vaccination among medical and non-medical university students.

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Methodology

Study Design

A cross-sectional survey was conducted at Punjab University Lahore to assess students' knowledge of influenza, transmission and prevention, and student attitudes and practices towards influenza vaccination. This cross-sectional survey was conducted among students of non-medical, medical, or health sciences disciplines.

Study Area

This survey was conducted at Punjab University Lahore, Punjab Pakistan. According to the census of 2017, the total population of district Lahore was 11,126,285. According to the latest statistics, the campus has a total student population of 45,678.

Sampling Strategy

Study Population

The population of the study was 5,372 currently enrolled undergraduate and master students from medical/health sciences and non-medical disciplines at the University of Punjab, Lahore Pakistan. The medical, health, or life sciences disciplines were biochemistry, Microbiology, clinical psychology, doctor of pharmacy, physical education, botany, zoology, and chemistry. The non-medical disciplines were sociology, economics, mathematics, physics, Islamic studies, statistics, and English.

The reason for choosing Punjab University to assess student's attitudes and behavior towards influenza and influenza vaccination is that it has a higher number of currently enrolled students compared to other Public and Private Universities. Besides one of the oldest research university in Punjab, Pakistan, it attracts students from all over Pakistan. Exploring this cultural diversity of Punjab University students could also help researchers better understand student behavior regarding influenza vaccination in Pakistan for future research

Sampling Technique

In this study, a convenient sampling technique was used to recruit participants. Resource constraints such as time and unavailability of a sampling frame prevented the researcher from using probability sampling.

Inclusion Criteria

An inclusion criterion is currently enrolled undergraduate and postgraduate students in medical / health sciences and non-medical disciplines at Punjab University in Lahore, Pakistan.

Exclusion Criteria

- An exclusion criterion is currently enrolled in undergraduate and postgraduate students who were not enrolled in the above mentioned medical/health sciences and non-medical disciplines.
- Students who were not willing to participate

Data Collection and Sample Distribution

This study employed a researcher-administered survey to collect data. A questionnaire consists of 39 close-ended questions was designed after extensive literature review and presented to each student with his/her consent to get socio-demographic data and to collect responses on the knowledge of influenza, transmission and prevention, and student attitudes and practices towards influenza vaccination. In the period from February 2, 2020, to March 2, 2020, a questionnaire was distributed among students of medical and non-medical disciplines to collect data. A total of 358 students were surveyed across both disciplines, and an equal number of data collection questionnaires were distributed to medical and non-medical students. Overall, 70% of students returned the questionnaire, based on the discipline of the participants, and regardless of gender, the collected data were divided into 2 equal groups of 179 students in each group (n = 358).

Data Collection Instrument

A researcher-administered survey was used to collect data from the target participants. This survey is based on primary data; the data has been collected through a survey. The questionnaire consisted of seven sections, the first section containing four questions about demographic information: respondent's age, gender, household income, and study discipline. The second section contained eight questions regarding students' awareness of influenza and influenza vaccination, and the answers to six of the eight questions were recorded using a binary scale of "Yes" or "NO. "Yes" was encoded as "1" and "No" was encoded as 2 for data analysis. The third and fourth

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sections consisted of thirteen questions related to students' knowledge of the transmission of influenza and its prevention. The fifth section has eight questions about student behavior concerning influenza prevention, the sixth section has ten questions about student behavior regarding influenza vaccination using a Likert scale of 3-points from 1 agree to 3 disagree, and the seventh section has two questions about student's attitudes towards flu vaccine using the Likert scale of 3-points from 1 agree to 3 disagree. The adequacy of the content of the instrument was measured using the Bartlett sphericity test. The Kaiser-Meyer-Olkin (KMO) sample adequacy score is an effective method for assessing the adequacy of the content. In this study, the Kaiser-Meyer-Olkin (KMO) was 0.723, higher than the commonly recommended value of 0.60. The chi-square value ($X2 = 2249.87$) and Bartlett's test of sphericity also showed a significant value ($df = 595$, $P < 0.001$). These statistics showed that the EFA assumptions were met, so the content of the instrument was satisfactory to meet the study specification.

Ethical consideration

Before the start of the data collection, consent for data collection was obtained from the relevant authorities of each department. The informed consent of the participants was obtained orally. The researcher herself answered all the doubts and questions of the participants. Participation in the research was completely voluntary. Confidentiality and privacy of the personal information of the participants was maintained by the researcher. Data from each participant was obtained after the participant was assured that he/she completely understood the aim of the research.

Statistical Analysis

Sample Size

Socio-demographic characteristic of Respondents

By using the formula stated in the Thrusfield (2007), the sample size was determined at 50% expected prevalence, 95% confidence level, and 5% marginal error.

n = 1 .962 X Pexp (1 - Pexp)/ d2

n = 1 .962 X 0.50 (1 – 0.50)/ 0.052

n = 3.8416 X 0.50 (0.5)/ 0.0025

n= 385

Where:

n = required sample size

Pexp = expected prevalence

d = desired absolute precision

As per the above-mentioned formula, data from 385 students should be collected from the study area.

Statistical Analysis

This study employed non-parametric statistical techniques due to the non-normality and nominal nature of data. Socio-demographic information and respondent's knowledge of influenza, transmission, prevention, and influenza vaccination have been summarized using descriptive statistics frequencies, percentages, and graphs. Cross tabulation has been used to explore the association between categorical variables and significance values for chi-square statistics have been reported. The Mann-Whitney U test was performed to assess the distribution of student influenza prevention behaviors and the distribution of student influenza behavior and attitudes across both study disciplines. Associations were considered significant at a p-value of <0.05 in all the analyses. Data were analyzed using the SPSS software version20.

Results

This chapter presents the findings of the statistical analysis of the data of research respondents.

Table 1: Demographic information of respondents expressed as frequencies and percentages (N=358)

Demographics	N (%)
Gender	
Male	189(52.8%)
Female	169(47.2%)
Age	

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18-20 years	25(7.0%)
21-25 years	273(76.3%)
26-30 years	48(13.4%)
31-35 years	12(3.4%)
Household Income	
<15,000 PKR	45(12.6%)
15,000-24,999 PKR	88(24.6%)
25,000-39,999 PKR	87(24.3%)
40,000-59,999 PKR	80(22.3%)
>60,000 PKR	58(16.2%)
Discipline	
Medical or health sciences	179(50%)
Non-medical	179(50%)

We selected a sample of 358 students, of whom 179 were from medicine, health sciences, or biology, and 179 were from non-medical disciplines. The majority of the respondents was male and had age group 21-25 years. Demographics of the study participants are described in Table1.

Students' knowledge of influenza and influenza vaccination

Table 2: Frequencies and percentages for assessing knowledge of influenza and influenza vaccination among study participants

Item	Medical or Health sciences (N=179)	Non-medical (N=179)	Total N=358
Have you ever heard of influenza before?			
Yes	176(98.32%)	173 (96.64%)	349 (97.48%)
No	3(1.67%)	6 (3.35%)	9 (2.51%)
Have you ever been sick with flu?			
Yes	154 (86.03%)	156 (87.15%)	310 (86.59%)
No	25 (13.96%)	23 (12.84%)	48 (13.40%)
Have you ever been hospitalized from influenza?			
Yes	3 (1.67%)	9 (5.02%)	12 (3.35%)
No	176 (50.9%)	170 (49.1%)	346(96.64%)
What is the cause of influenza?			
Virus	136 (75.97%)	114 (63.68%)	250 (69.83%)
Bacteria	23 (12.84%)	35 (19.55%)	58 (16.20%)
Algae/fungi	6 (3.35%)	19 (10.61%)	25 (6.9%)
Dust	14 (7.821%)	11 (6.145%)	25 (6.9%)
What are the symptoms of flu?			
Runny Nose	55 (30.72%)	83 (46.36%)	138 (38.5%)
Fever	15 (8.37%)	15 (8.37%)	30 (8.37%)
Body aches	1 (0.558%)	1(0.558%)	2 (0.55)
Sore throat	4 (2.23%)	7 (3.91%)	11 (3.07%)
All	114(63.68%)	63 (35.19%)	177 (49.44%)

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Can flu cause death?			
Yes	49(27.37%)	33(18.43%)	82 (22.90%)
No	130(72.62%)	146(81.56%)	276(77.09%)
Have you ever heard about flu vaccine?			
Yes	135 (75.41%)	130 (72.62%)	265 (74.02%)
No	44 (24.58%)	49 (27.37%)	93 (25.97%)
Do you know influenza vaccine available in Pakistan?			
Yes	113 (63.1%)	81 (45.3%)	194 (54.1%)
No	66 (36.87%)	98 (54.74%)	164 (45.81%)

Frequencies and percentages for assessing knowledge of influenza and influenza vaccination among study participants of both disciplines are described in table 2. The knowledge of influenza was approximately equally distributed among the students of both disciplines (p= 0.311). The results of the survey showed that 87% of the study participants had a history of influenza. However, only a small fraction of the study population had a history of hospitalization for influenza. The population in our survey was well aware of the exact cause of influenza, as (69.83%, n = 250 out of 358) reported that the virus was the causative agent, among them (75.97%, n = 136/ 179) from medical or health sciences disciplines and (63.68, n = 114 /179) students were from non-medical disciplines, 58 (16.20%) indicated bacteria and 6.9% indicated dust and algae/fungi are the causes of the flu. The most common reported symptom was rhinorrhea or runny nose (38.5%, 138/358). While the majority study population (49.44% n = 177/358) believed that all the symptoms i.e. runny nose, fever, body aches, and sore throat are the symptoms of flu, among these respondents mainly (63.68%, n = 114/179) were belonged to the discipline of medical, health or biological sciences. Body ache was the least common flu symptom at 0.55%, according to the survey participants. Most of the participants were aware of influenza vaccination (74.2%, n = 256/358), while knowledge of the availability of influenza vaccination in Pakistan was low, but when we see this according to the study disciplines of respondents it was markedly high among medical, health and biology students (63.1%) as compared to non-medical students (22.6%). Of the 22.90% of students who considered the flu a fatal illness, the majority were medical, health, and biological students.

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Table 3: Percentages for assessing knowledge of influenza transmission and its prevention (N= Frequency and 358)

Item	Medical or Health sciences (N=179)	Non-Medical (N=179)	Total (N=358)
Transmission of influenza through coughing and sneezing			
Yes	166 (92.7%)	159 (88.9%)	325 (90.8%)
No	13 (7.3%)	20 (11.2%)	33 (9.22%)
Transmission through close contact with the infected person			
Yes	156 (87.2%)	150 (87.2%)	306 (85.5%)
No	23 (12.9%)	29 (16.3%)	52 (14.5%)
Influenza can transmit by touching mouth and eyes with contaminated hands			
Yes	120 (67.03%)	107 (59.8%)	227 (63.5%)
No	59(32.9%)	72 (40.2%)	131 (36.5%)
Do you know how to protect yourself from influenza?			
By using Paracetamol	3 (1.67%)	4 (2.23%)	7 (1.96%)
By using antibiotics	39 (21.8%)	67 (37.5%)	106 (29.7%)
By taking precautions and seasonal influenza vaccine	102 (56.9%)	57 (31.9%)	159 (44.4%)
No need for any medicine and preventive measures	35 (19.6%)	51 (28.5%)	86 (24.02%)

Table 3 describes the awareness of study participants about influenza transmission and prevention. Responses were recorded on the routes and sources of transmission of influenza infection. Most of the students (90.8%) knew that the flu could be transmitted to close contacts through coughing or sneezing, while (63.5%, n = 306/358) believed that it could also be transmitted by touching mouth and eyes with contaminated hands. This knowledge was predominantly higher among students who belonged to medical, health sciences or biological disciplines. The percentages are detailed in Table 3.

In assessing knowledge of influenza prevention (44.4%, n = 159/358), students reported that taking precautions and getting seasonal flu vaccinations is the best way to prevent seasonal flu and swine flu, of which 56.9% were from medical disciplines and 31.9% belonged to others.

29.7% believed that antibiotics can prevent influenza, and 24.2% answered that there is no need for any medications or preventive measures.

Students' knowledge of influenza, flu vaccination and prevention

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Table 4: Knowledge of influenza, its vaccine, and prevention associated with the student's academic discipline (N=358)

Statement	value	Study Discipline
knowledge about the cause of influenza	11.539	0.009
knowledge about the symptoms of influenza	37.866	0.000
knowledge about the mortality from influenza	4.049	0.044
knowledge about influenza vaccine	0.363	0.547
knowledge about the availability of influenza vaccine in Pakistan	11.522	0.001
knowledge about the transmission of influenza through coughing or sneezing	1.636	0.201
knowledge about the transmission of influenza by direct /close contact with the infected person	0.810	0.368
knowledge about the transmission of influenza by touching mouth and eyes with the contaminated hands	2.035	0.154
knowledge about taking preventive measures against influenza infection	23.252	0.000

Chi-square test was applied, p-value<0.05 was considered statistically significant.

The chi-square test was performed on categorical variables that included knowledge about the cause of influenza, its symptoms, associated mortality, routes and sources of transmission, preventive measures, and knowledge about influenza vaccination and its availability in Pakistan. The chi-square test is commonly used to test the relationship between categorical variables. At a significance level of 0.05, a significant association was found between knowledge of the cause of influenza, its symptoms, associated mortality, preventive measures and the availability of influenza vaccine in Pakistan with the respondent's study discipline, as well as significance values are mentioned in Table 4. At the same time, no association was observed between knowledge about the transmission of influenza and the academic discipline of the respondent.

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Student's behaviors towards adopting preventing measures against Influenza

Table 5: Student's behaviors towards adopting preventing measures against Influenza

Statement	Agree	Neutral	Disagree	p-value
Washed hands regularly	295 (82.4%)	37(10.3%)	26 (7.3%)	0.035
Regular and frequent use of hand sanitizers	205(57.3%)	73(20.4%)	80 (2.3%)	0.854
Always covered mouth and nose when coughing and sneezing	339(94.7%)	14(3.9%)	5(1.4%)	0.846
Always coughed or sneezed into elbow	314(87.7%)	20 (5.6%)	24(6.7%)	0.024
Took social distancing measures	337(94.1%)	18(5.0%)	3(0.8%)	0.479
Avoided places where many people are gathered together	329(91.9%)	21(5.9%)	8(2.2%)	0.592
Talked to a health care provider about taking preventive measures	306(85.5%)	50(14.0%)	2(0.6%)	1.000
Thought of using antiviral drugs to prevent influenza	90(25.1%)	190(53.1%)	78(21.8%)	0.632

Mann-Whitney U test was applied, p-value < 0.05 was considered significant, grouping variable respndent's study discipline

A total of 358 respondents were approached for this survey. In order to explore the student's behavior towards adopting preventive measures against influenza responses against three items were recorded on the Likert Scale and the Mann-Whitney U test was performed. P-values are described in table 5.

According to the Table 5, the majority of the study participants, approximately 83% of the respondents, agreed that frequent hand washing can protect against influenza infection. However, the Mann-Whitney U test at level of significance = 0.05 indicated that, on average, flu-prevention behavior associated with more frequent hand-washing can protect against influenza, in medical or health sciences students (Mean rank= 187.16, n= 179) was significantly higher than in non-medical students (Mean rank= 171.84, n=179), U= 1469.500, P= 0.035 which is considered statistically significant.

Similarly, 88% respondents agreed that they used elbow for coughing and sneezing. The distribution of preventive behavior using the elbow for coughing and sneezing was also not the same among medical and non-medical students. The Mann-Whitney U test at significance level = 0.05 showed that, on average, the distribution of preventive behavior regarding the use of elbow for coughing and sneezing among medical or health sciences students (Mean rank = 186.52, n= 179) was significantly higher than students of non-medical specialties (Mean rank =172.48, n=179), U= 14,763.500, p= 0.024 which is considered statistically significant.

While 57% of respondents agreed that they use hand sanitizers more often, 95% cover their mouth and nose when coughing and sneezing, and took social distancing measures. At the same time, 92% of respondents avoid unnecessary visits to crowded places, and 25% said they consider the use of antiviral drugs to prevent influenza. In contrast to the influenza distribution behavior associated with frequent hand washing and using the elbow to cough and sneeze, the Mann-Whitney test at a significance level of 0.05 showed that, on average, the distribution of other above mentioned influenza preventive behaviors was approximately the same among medical or health sciences students and non- medical students. Details of percentages are graphically presented in Figure 1.

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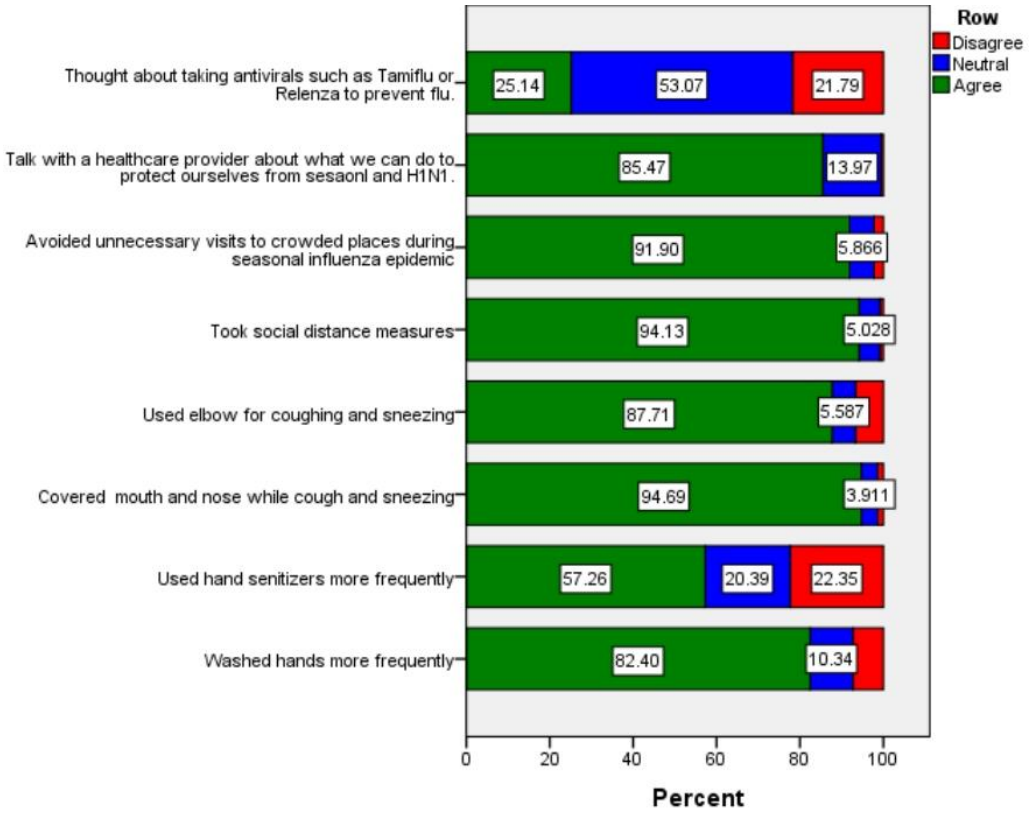

Figure 1: Graph showing percentages of Student's behaviors towards adopting preventing measures against Influenza

Student's attitudes towards Routine vaccination

Table 6: Student's attitude towards Routine vaccination

Statement	Agree	Neutral	Disagree	p-value
The vaccines that are recommended by health care providers are safe	315(88.0%)	36(10.1%)	7(1.96%)	0.627
Immunization is important to keep me healthy	312(87.2%)	36(10.1%)	10(2.7%)	0.005

In order to examine the students' attitude towards Routine vaccination, responses against three items were recorded on Likert scale. The results of the Mann-Whitney U test revealed a significant association between the belief that immunization is important for my health with the respondent's academic discipline, as the distribution of this attitude was significantly higher among medical or health sciences students (Mean Rank = 187. 44, n = 179) than non-medical students (Mean Rank = 170.61, n = 179) U = 14 429 500, p = 0.005, and 87.2% of students agreed with this statement among the studied population. In addition, 88% of students consider the vaccines recommended by healthcare providers safe; the results showed that the same attitude was observed among medical, health sciences students, and others; details are described in Table 6.

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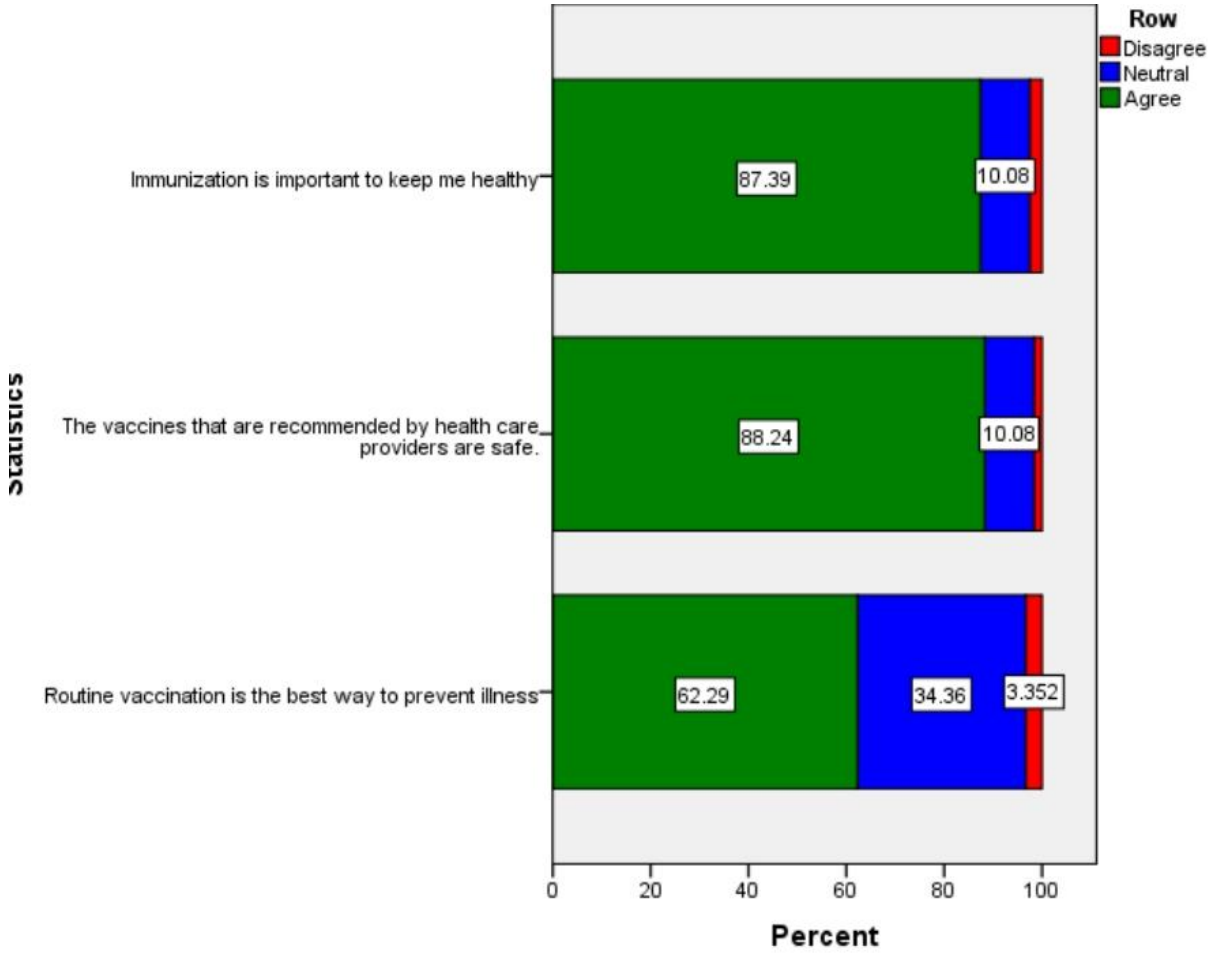

Figure 2: Graph showing percentages of Student's attitude towards Routine vaccination

Student's behaviors towards influenza vaccination

Table 7: Student's behaviors towards seasonal influenza vaccination N=358

Statement	Agree	Neutral	Disagree	p-value
Influenza is a mild disease and does not need vaccination	255(71.2%)	48(13.4%)	55(15.4%)	0.000
Flu vaccination provides protection from flu	298(83.2%)	53(14.8%)	7(2.0%)	0.368
I don't believe that the vaccine is effective	118(33.0%)	54(15.1%)	186(52.0%)	0.121
Individuals who have chronic respiratory disease should get an influenza vaccine	293(81.8%)	49(13.7%)	16(4.5%)	0.660
I had a bad experience with a previous vaccine	97(27.1%)	36(10.1%)	225(62.8%)	0.974
It is inconvenient to get an influenza vaccination	94(26.3%)	72(20.1%)	192(53.6%)	0.125
I am afraid of needles	253(70.7%)	19(5.3%)	86(24.0%)	0.001
Parents or relatives said not to be vaccinated	80(22.3%)	27(7.5%)	251(70.1%)	0.395

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I do not want to be vaccinated due to ethical or religious objections	58(16.2%)	28(7.8%)	272(76.0%)	0.428
I am too busy to get myself vaccinated against influenza	85(23.7%)	10.6 (38.0%)	235(56.6%)	0.233

Mann-Whitney U test was applied, p-value <0.05 was considered statistically significant, grouping variable participant's study discipline

Likewise, to examine the students' behavior regarding influenza vaccination responses against three items were recorded on the Likert scale and the Mann-Whitney U test was performed. The details of results are described in Table 7. According to the results, most of the study participants, approximately 82% of respondents, consider that influenza is a mild illness and does not need vaccination. However, the Mann-Whitney U test at significance level = 0.05 showed that, on average, the distribution of knowledge about influenza vaccination associated with influenza is a mild illness and does not need vaccination, was significantly higher among medical or health sciences students (Mean rank = 196.20, n=179) than non-medical students (Mean Rank = 162.80, n= 179), U= 13,031.500, P= 0.000 two tailed which is considered statistically significant.

Most members of the study group, more than 80%, agreed that influenza vaccination provides protection against influenza and that people with chronic respiratory infections should be vaccinated against seasonal flu, 70% of respondents reported a fear of needles, 33% did not think the vaccine is effective, 27% reported previous bad experiences and said they were uncomfortable getting the flu shot, 23% said they were too busy to get the flu vaccine.

Among the study population, 22% of respondents had a parent or relative role in refusing to get vaccinated against influenza, and only a small fraction of 16% reported they did not want to get vaccinated because of ethical or religious objections. Among all of these aforementioned behaviors, the distribution of influenza vaccination behaviors is similar across the surveyed discipline categories of respondents, with the exception of the distribution of fear of needles behavior, which is not the same between medical (Mean rank= 164.96, n= 179) and non-medical (Mean rank= 194.04, n= 179), U =13418, .500, P= 0.001 students among the survey population.

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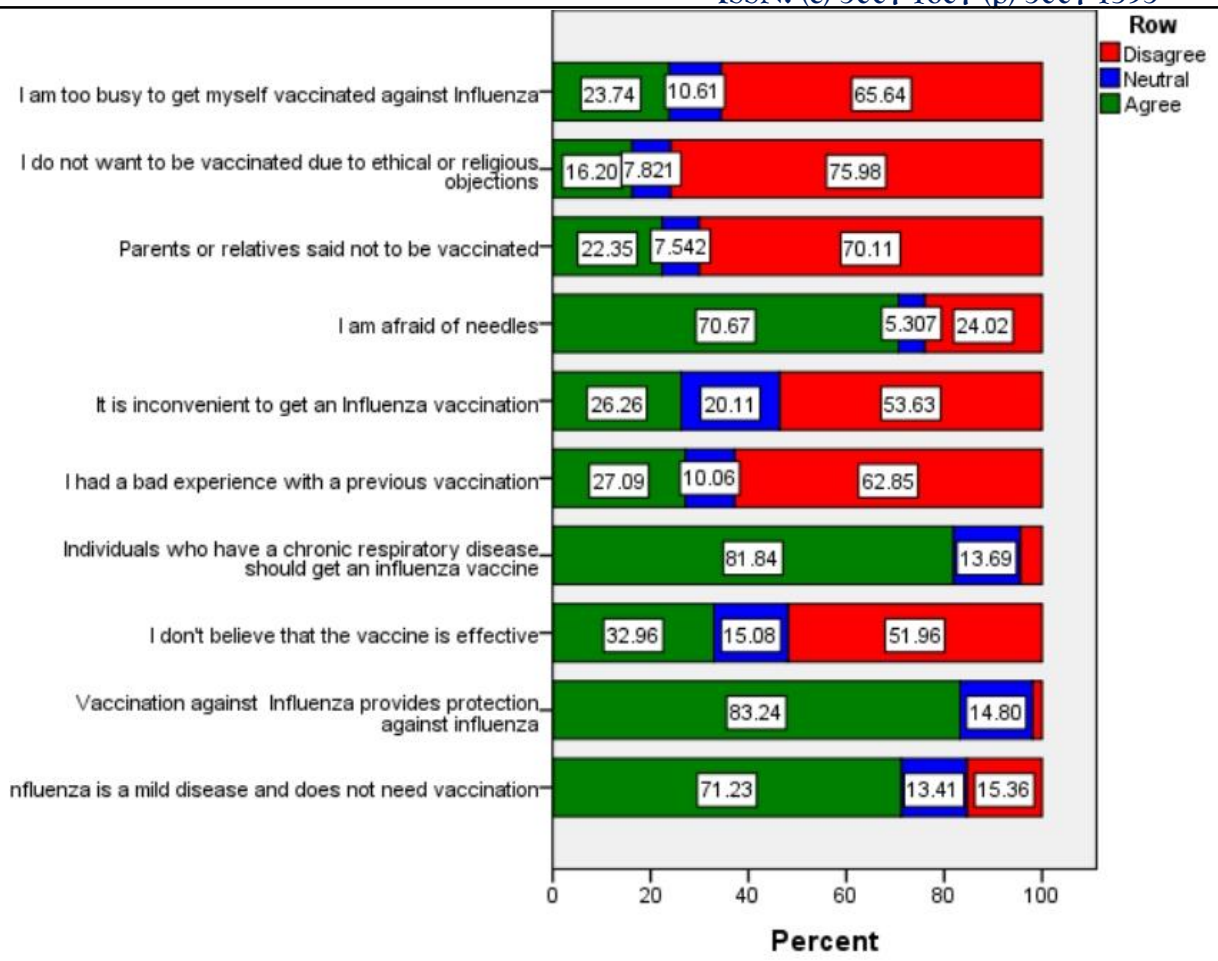

Figure 3: Graph is showing percentages of Student's behaviors towards seasonal influenza vaccination N=358

Discussion

This study explains the knowledge about influenza, its prevention, as well as attitudes, behaviors, and perception towards influenza vaccination among medical or health sciences and non-medical students at Punjab University in Lahore, Pakistan.

Students' knowledge of influenza and influenza vaccination

The results of this study indicate that the study population was much aware of the influenza infection. The study also found that awareness of influenza infection is roughly the same among medical or health sciences students, as well as non-medical students. However, the entire population was less aware of the systemic symptoms of influenza, as the percentage was below 50%. And it was approximately 35% in non-medical or humanitarian students. It was also found that the knowledge about the causative agent of influenza was also poor among non-medical or Humanities students as compared to medical or health sciences students in this current study population.

General awareness and knowledge of influenza and influenza vaccination were quite satisfactory in this current study, whereas it was rather low in many previous studies. Perhaps this recent rise in awareness among the population studied is the result of the current COVID-19 pandemic.

Abalkhail et al. (2017) found poor awareness of influenza and influenza vaccination at a Saudi Arabia University Hospital among medical students. A handful of studies were found on the awareness of university students about influenza and influenza vaccination. According to the results of a nationwide

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study of awareness and perception of seasonal influenza vaccination among university students, it was found that only 55% of the total study population correctly answered the questions about the cause of influenza, while in our study, the percentage of the correct answer to the cause of seasonal flu was about 70% (medical) 63% (non-medical or humanities). Although our study population showed better awareness of the cause of influenza, it is still lower among non-medical or humanitarian students as 63% of students answered the correct cause (Rábano-Blanco, Domínguez-Martís, Mosteiro-Miguéns, Freire-Garabal, & Novío, 2019).

Bukhsh et al. (2019) further reported that students were also unaware of all systemic flu symptoms from both health sciences and non-health sciences disciplines, as the runny nose was the most reported symptom and the headache was the least reported symptom. This finding is also consistent with our study, where overall awareness of systemic symptoms of influenza was low and runny nose was the second most common symptom. Similarly, Seale, Mak, Razee, and Macintyre (2012) showed that students knew about the transmission of influenza but were not aware of the concepts of an epidemic, pandemic, and the direct and indirect mechanism of transmission of influenza infection from one infected person to another. The same study also found a reasonable level of knowledge about common flu symptoms among study participants, but this study did not investigate systemic flu symptoms. These results of the current study are consistent with the results of these previous researches.

Student's attitude and behaviors towards influenza vaccination

Seasonal influenza infection places an enormous health burden on the population each year. In this respect, seasonal influenza vaccination is the most effective way to reduce the annual burden of illness and death due to seasonal influenza infection. Initially, strategies are designed to reach high-risk populations, especially older populations, but in recent years, policies and strategies have been developed to reach a wider population. It was recently developed in conjunction with the recommendations of Universal Vaccination in the United States. According to it, seasonal influenza vaccination is mandatory for everyone over 6 months of age (Aiello et al., 2010).

We also studied the attitude of students to routine vaccinations. Overall, there was a positive attitude towards routine vaccinations, and 87% of the students in our study group agreed that routine vaccinations were essential for their health. However, this attitude was comparatively more common among medical or health sciences students. Our study population also showed a positive attitude towards vaccine safety, with 88% of students confident in the safety of a vaccine recommended by healthcare providers, and this attitude was equally prevalent among the students of all study disciplines.

In addition to attitudes towards routine vaccination, we observed the behaviors of medical and non-medical students with regard to influenza vaccination, as well as factors that influence student's behavior or their decision to get vaccinated against influenza. The behaviors we studied in our study: the flu is a mild illness and does not require vaccination, the flu vaccine provides protection against the flu, I do not believe the vaccine is effective, people with chronic respiratory infections should get the flu vaccine, I had a bad previous vaccination experience, I am afraid of needles, my parents or relatives said not to be vaccinated(Taddio et al., 2012), I don't want to get vaccinated because of ethical or religious objections, It is inconvenient to get an influenza vaccination, and I'm too busy forcing myself to get vaccinated. Generally, Knowledge and awareness of health are essential elements for taking certain precautions; however, some studies have reported a poor relationship between knowledge and behavior. Adopting preventive behaviors on a massive scale against a particular disease or infection can prevent future epidemics and pandemics, especially in densely populated areas(Opel, Sonne, & Mello, 2018).

When we analyzed the student's behavior concerning seasonal influenza vaccination, we found that negligence was predominant in the entire study population. The majority of the population (88%) agrees that influenza is a mild illness and does not require vaccination.

However, this behavior was more pronounced in medical or health sciences students. This behavior may be correlated with a perception of a lower risk of death from influenza, as only 22% of students in the

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entire study population believe that influenza infection can cause death. Despite this negative attitude towards the annual flu shot, 80% of the study population believes in the effectiveness of the flu vaccine. They believe that mass flu shots will minimize the incidence of influenza, mortality, absence from work, and improve annual productivity.

A study titled Seasonal Influenza and Vaccine Coverage reported consistent results with the current study and showed an overall low level of seasonal influenza vaccination coverage among high-risk populations in the United States and Europe. The Netherlands was the only country that met the WHO criteria for influenza vaccination among the target group, i.e. the elderly (Aiello et al., 2010). We can define vaccination coverage as the specific number or proportion of specific people living in a specific area who were vaccinated at a specific time. Several other factors are also important in determining influenza vaccination coverage, such as the effectiveness of the vaccine, the timeliness of its administration, according to the local seasonal conditions (Healy et al., 2018).

Similarly, another cross-sectional study of seasonal influenza vaccination, awareness, and associated barriers was conducted at a university hospital among medical students in Saudi Arabia, showed consistent results with the current research. The results of the study showed that the awareness of university students about seasonal influenza and influenza vaccination is low. According to the results of this study, the vaccination rate among medical students against influenza in 2015 was 20.7% (Abalkhail et al., 2017). The results of this study are consistent with our study in which students were aware of influenza vaccination. However, the overall percentage of students who knew about vaccine availability in Pakistan was low. Among the students who knew about the availability of the influenza vaccine in Pakistan, most were medical students.

Likewise, Hussain and his colleagues found that medical students were less anxious about contracting the seasonal and H1N1 flu, similar behavior was observed in our study, where medical students exhibited less sensitivity or poor perception of the risk of contracting the flu(Hussain, Hussain, & Hussain, 2012). Similarly, another cross-sectional study of the relationship and barriers to the spread of seasonal influenza vaccination among Public Health students at the University of Southern California found that the influenza vaccination rate as low as 43%(Rogers, Bahr, & Benjamin, 2018).

Correspondigly, Merril et al. (2010) also reported consistent results with our research study on the prevalence of influenza vaccination and its associated factors that influence the influenza vaccination coverage rate among the students at Brigham Young University. The study found that vaccination prevalence among students was low and was potentially dependent on the student's academic discipline, the estimated severity of illness associated with influenza infection, place of work or residence, and source of information.

Tuohetamu et al. (2017) cite results similar to the current study, their study showing low vaccination coverage among medical students in Northwest China. Reported vaccination rates for participants in the previous three years were 4.1%, 9.2%, and 6.1% respectively. Similarly, another research study of the attitudes of medical students towards influenza vaccination showed consistent results with our study and found that preclinical medical students had significant knowledge gaps and negative attitudes towards influenza vaccination (Lehmann, Ruiter, Wicker, Chapman, & Kok, 2015). Likewise, a previous study of seasonal and pandemic influenza vaccination coverage among health care workers in Greek showed that only 27% of health care workers were willing to be vaccinated (Poland, Tosh, & Jacobson, 2005). Similarly, in a survey of 527 health workers at a Spanish University hospital, vaccination coverage was only 16.5% (Vírseda et al., 2010).

Student's Negative behaviors associated with influenza vaccination

In addition to reckless behavior regarding seasonal influenza vaccination, several other notable negative behaviors were also observed in this current study population. These were marked fair of needles (70.7% participants reported that they are afraid of needles), followed by side effects from previous vaccinations, inconveniences with influenza vaccinations, and parents or relatives opposed to the decision to get the flu vaccine.

A research study on the attitudes of medical students towards influenza vaccination and the associated

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factors that influence the decision of getting influenza vaccination among pre-clinical medical students showed consistent results with this current study. Results of this study showed that factors such as the absence of a specific risk factor, belief it is a mild illness, fear of side effects, belief that it does not provide adequate protection, fear of needles, any medical contradiction, and the misconception that this flu vaccine could cause the flu were the factors which were influencing the decision of up taking influenza vaccination among the studied pre-clinical medical students (Lehmann et al., 2015).

Similarly, Bonaccorsi et al. (2013) revealed that the misconceptions and negative attitudes prevailed among students who disagreed with the seasonal flu vaccine. These behaviors and attitudes towards influenza vaccination were; it can cause the flu, it has side effects, and I have no risk factors for getting the flu. The results of this study are also consistent with the results of our study. Likewise, a systematic literature review was conducted on factors associated with seasonal influenza vaccination in adults. According to this review, potential factors associated with influenza vaccination in adults were perceptions of vaccine efficacy, perceptions of vaccine safety, perception of side effects, advice from a physician, healthcare professional, or relative, and access to the free influenza vaccine(Yeung, Lam, & Coker, 2016).

In contrast to current study of student's behavior and attitudes towards seasonal influenza vaccination, a study of knowledge, attitudes, and practices of influenza vaccination among Australian medical students found a generally positive attitude towards seasonal influenza vaccination. The results of this study showed that 53.8% of students recently received a flu vaccine. This study further examined the factors that influenced the decision to get vaccinated against influenza. Among these factors, the most common motivator was self-defense, and the most common obstacle was an inconvenience (Walker, Newall, & Heywood, 2016). These Improved attitudes and practices regarding influenza vaccination in Europe and the United States are due to a higher level of public awareness, seasonal epidemic policies, and easy access to influenza vaccine at the lowest cost as compared to Pakistan.

Students' knowledge and behavior regarding influenza prevention

Our study further examined the student's perceptions of preventive measures and across both disciplines. Here 60% of medical or health sciences students believed that adopting preventive measures is the best way to prevent seasonally and swine flu, while a small percentage (31%) of students in other disciplines considered it the best option. This knowledge gap in non-medical or humanities students may be due to less study of biology and health-related programs.

When we analyzed the results of student's behavior in taking preventive measures against influenza, we found generally positive behavior. However, preventive measures such as frequent hand washing and using the elbow for coughing and sneezing were more prominent among medical or health sciences students than among non-medical or humanitarian students. At the same time, reported responses for the adoption of other rigorous preventive measures, such as using hand sanitizers, covering the mouth and nose when coughing and sneezing, talking to a health care provider about taking preventive measures, and taking social distancing measures, were approximately the same and prevalent among students across all academic disciplines. There is very little research on the risk perception of seasonal influenza and influenza prevention, while there is a lot of research on risk perception and prevention against 2009H1N1 influenza and COVID-19

The results of this current study regarding student's perceptions and behavior in relation to taking preventive measures are consistent with that of SteelFisher et al. (2015). In a multi-ethnic study, they found that people from all minority groups take preventive hygiene measures against seasonal and H1N1 infection, such as frequent hand washing and talking to a doctor, with the exception of some ethnic groups that did not support social distancing behaviors. For example, to avoid visiting places where many people gather. However in our research study students also showed positive behavior in adopting social distancing measures. Similarly, back in 2012, the University of New South Wales (UNSW) in Sydney, Australia, conducted a study of knowledge, attitudes, and practices towards seasonal and pandemic influenza, showed consistent result with the current research. The results of the study revealed that

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students were confident in taking non-pharmaceutical preventive measures, such as frequent hand washing, covering their mouth and nose when coughing and sneezing, and avoided to visit sick people to prevent the spread of influenza infection. However, in general, students were not in favor of using face masks and maintaining social distance. The percentage of students who used a face mask and maintained social distance was very low during the current influenza season. Most of the study participants considered the use of the face mask inconvenient, uncomfortable, cause of embarrassment, and social stigma (Seale, Mak, Razee, & MacIntyre, 2012).

Contrary to our results, Hussain and his colleague found that medical students were not supportive of taking a few preventive measures such as self-isolation on getting infected and the use of the face mask. This study did not examine the awareness, attitudes, and behaviors towards seasonal and pandemic influenza vaccine among study participants(Hussain et al., 2012).

In contrary to the findings of the current study, the results of an online survey study which was conducted on the attitudes and intended behavior of University staff and students towards pandemic influenza (H1N1) 2009, showed that only 20% of the survey participants adopted simple hygienic preventive behaviors such as frequent hand washing and the use of face masks in response to the pandemic influenza H1N1. However, most of the respondents were reluctant to using face masks in public. While 80% of the participants did not change their lifestyle, their willingness to receive the pandemic flu vaccine was closely related to the history of seasonal flu vaccinations (Van, McLaws, Crimmins, MacIntyre, & Seale, 2010). The results of this study are not consistent with our research, as the student's behaviors towards taking preventive measures are suboptimal among the studied population. Improved knowledge and behavior of our study population regarding influenza infection may be related to student's academic discipline, university, social and digital media awareness campaigns about the COVID-19 pandemic.

A randomized interventional trial of simple non-pharmaceutical preventive measures, such as frequent hand washing and the use of a face mask, was conducted in the lobby of the University of Michigan among 1,437 young adults. The aim of this interventional study is to evaluate the effectiveness of preventing the spread of influenza infection during the influenza season. The results of the interventional trial showed a significant reduction in the prevalence of influenza-like illness in the intervention group (hand hygiene and face mask group) compared to the control group (Aiello *et al.*, 2010). Based on the results of this interventional trial, we can conclude that studying student's behavior in relation to influenza and influenza vaccination will provide evidence that will assist in the design and implementation of preventive measures and strategies among university students.

Knowledge and behavior regarding the use of the correct treatment and prevention method

The current study found that when assessing knowledge of influenza prevention, 29.7% of the study population believed in the misconception that antibiotics could prevent influenza, and 24.2% said no medication or preventive measures were required to prevent influenza.

The results of this study are consistent with those of Buksh et al. (2020), in which 47% of students reported that antibiotics are useful for treating and preventing influenza. We also found uniform results in a descriptive cross-sectional study of knowledge, attitudes, and awareness of antibiotic use and resistance among nursing students of 18 years or older in Spain (Rábano-Blanco et al., 2019). In a similar fashion, a cross-sectional study of knowledge, attitudes, and behavior regarding antibiotic use among high school students in Thai revealed weak knowledge of antibiotic use, as over 75% of students believed in misconceptions about the use of antibiotics in the upper respiratory tract (URI) infections; and the use of antibiotics for common cold and flu (Saengcharoen, Lerkiatbundit, & Kaewmang, 2012).

A survey entitled, "Reducing the use of antibiotics for influenza," found that the use and prescription of antibiotics for patients with influenza-like illness doubled the frequency of infections. Inappropriate and unnecessary antibiotic prescriptions for influenza and associated pneumonia and bronchitis must be controlled by encouraging and introducing the more rigorous diagnostic method to prevent and treat

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influenza. The most reliable diagnostic test for diagnosing influenza is RT-PCR. This study showed that the use of antiviral drugs, in particular neuraminidase inhibitors, is a potential prophylactic and therapeutic way to prevent and treat influenza. Previous research data also showed similar findings. The resistance of viruses to neuraminidase inhibitors is weak compared to the resistance of bacteria to antibiotics. In addition, the high specificity of antiviral or neuraminidase inhibitors for viruses means they do not exert selective pressure on any other organism. The mass adoption of these practices can have a significant impact on antimicrobial use and resistance(Lee & Hurt, 2018).

According to the Centers for Disease Control and Prevention, antibiotics are ineffective against infection or preventing the flu. Using antibiotics during the flu can cause mild to severe life-threatening side effects such as rashes, antibiotic-resistant infections, and Clostridium defficile infection, which can cause severe diarrhea, leading to intestinal perforation and death (Union, 2012).

While 25.1% of those polled in the current study agreed with the statement that antiviral drugs help to prevent the flu. According to the results of the current study, this knowledge and behavior were equally present among medical or health sciences students and students of non-medical or humanitarian majors. From the current survey, it appears that the population participating in the current study has poor knowledge about the correct method of treatment and prevention of influenza. Awareness about prophylaxis and preventive methods is necessary especially for those who are in close contact with infected individuals.

The outcomes of this current study are also compatible with SteelFisher et al. (2015). They also found poor preventive behavior regarding the use of prescription or purchased antiviral drugs against influenza infection across the entire study population. Although, according to the National Institute for Health and Care Excellence, antiviral drugs are recommended for the treatment of high-risk groups such as the elderly, children, pregnant women with underlying medical conditions, and people with a weak immune system to reduce the likelihood of associated complications (SteelFisher, Blendon, Bekheit, & Lubell, 2010).

Limitations of the Study

The current study has several limitations that need to be considered when interpreting the results of the study.

Lack of sufficient resources and problems associated with more advanced and complex sampling methods prevented the researcher from using these methods. In addition, a limitation of the use of convenience sampling is that the students participating in the study were likely more interested in vaccination and had a greater awareness of influenza infection, which could lead to an overestimation of awareness about influenza and influenza vaccination non-participants. The downside of using convenient sampling is that it can lead to under or over representation of the population. Because of the reasons why some people choose to participate and some do not, this can lead to bias in the results(Bukhsh et al., 2018).

Using self-reported data is another constraint, which increases the likelihood of bias in conclusions. Because students may feel they were expected to respond positively to influenza awareness, preventive measures, and influenza vaccination. Another limitation is that the present study reflects the influenza awareness, as well as student's behaviors attitudes and practices towards influenza prevention and vaccination among single university students. In contrast, the strength of this research rests on the fact that it would be the first seasonal influenza study that explored all aspects and information about influenza and influenza vaccination among students at the Punjab University Lahore, Pakistan.

Further research is needed to examine student's perceptions and knowledge about the effectiveness of influenza vaccination, as well as evaluation of the obstacles that hinder students from getting influenza vaccination. This can be done using blended research methods or by including open-ended questions in the survey as the survey of the current study was consist of quantitative data in the form of close ended questions.

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Conclusion and Recommendations

In this chapter, we will discuss the impacts of the findings and give helpful suggestions.

During data collection and analysis, we found that the current study population was well aware of the term "influenza" and observed knowledge about influenza was approximate, as was the case for medical or health sciences and non-medical or humanitarian students. However, knowledge of the exact cause and symptoms of influenza, especially the systemic symptoms of seasonal flu, was more prevalent among medical or health sciences students than the non-medical and students of other discipline.

In connection with the above, some proposals are made that should be applied by the university administration to effectively combat influenza in order to promote awareness and to develop herd immunity in university students. To make the target population of the current study more sensitive towards the awareness and vaccination against influenza, the curriculum may include on the recent surveillance data and measures to prevent the seasonal, HIN1 and other upper respiratory tract infections. Awareness about influenza and influenza vaccination can be disseminated to students through frequent seminars on the relevant programs in various educational institutions. The seminar can provide various trainings and activities for the prevention of influenza. These activities can include how to wash your hands properly, how to make and use a quality hand sanitizer, and maintain social distance.

The results show that a significant proportion of the current survey population considers antibiotics to be a cure for influenza. It is recommended that the necessary awareness and knowledge of treatment options be provided to medical students, health and biology professionals as they can play a role of messengers among the population to inform them.

In addition, the Department of Education may include information on the appropriate use of antibiotics in the curriculum of university students, as in this study, 29.7% of students reported using antibiotics for seasonal flu.

However, despite good awareness, only 22.9% of students in the current population believe that the flu can cause death. These results recommend that there is a need to give awareness on the influenza associated complications and comorbidities.

Sufficient knowledge was found in relation to influenza prevention (medical =90.8%) and (non-medical =63.5%). It is easy to understand that knowledge about prevention is particularly low among non-medical students. In our studies, we observed that flu preventative behaviors, for example, washing your hands regularly and coughing and sneezing in the elbow, are more pronounced among medical or health sciences students than among non-medical or other students.

The findings of the present study further indicated that fewer participants were reluctant to get the flu vaccine due to religious beliefs. While the fear of side effects and fear of needles was quite common. Here are suggestions to overcome these issues. To raise awareness and facilitate access to influenza vaccination, it is recommended to give awareness about the benefits of vaccination. The influenza vaccination program should be included in the expanded immunization program.

It is also necessary to mobilize healthcare workers and to encourage them to promote the influenza vaccination program at universities. The government may consider using non-injectable vaccines to increase vaccination coverage. Similarly, stakeholders such as religious scholars of different sects of Muslims and different religions living in Pakistan should be treated confidentially and given the necessary knowledge about vaccination as they have an impact on the population and to overcome the issue of not getting vaccinated due to religious beliefs.

The public is concerned about the cost of influenza vaccine, and it is assumed that for better results and to reduce the overall economic burden of health on a country, governments should implement policies to provide free vaccination facilities.

Vaccination should be available at the university hospital to make it accessible to students and to increase vaccination coverage.

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