Awareness and perception of seasonal influenza (Flu) among health science and non-health science university students in Pakistan: A nationwide survey

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Abstract: Seasonal influenza is a highly contagious viral respiratory disorder. Prior knowledge of flu among general community is of paramount importance in order to mitigate its growing burden. In a pandemic, young adults are more likely to be infected increasing the potential for universities to be explosive disease outbreak centers. In this context, current study aims to assess the knowledge and perception of flu among university students from health sciences (HS) and non-HS background. Questionnaire-based cross sectional (August-December 2015) study was conducted among students of 65 universities across Pakistan. The students willing to participate were requested to fill out the self-administered questionnaire and responses were recorded and descriptively analyzed by SPSS. A total of 1694 students (age: 21.12 ± 2.13 years), 95% which belonged to age group 18-25 years, participated in the current study. Most of the participants (91.7%) had suffered from influenza during their life but only 55.7% correctly answered virus as causative agent of flu, while majority of participants, primarily from non-HS disciplines were not aware of flu cause. Very few participants (8.1%) believed that flu can cause death. About 20% students, mainly from non-HS disciplines reported that antibiotic can kill viruses. Similarly, 47.1% respondents agreed on the effectiveness of antibiotic in flu. A large proportion of study population preferred self-medication for influenza. Only 20.1% students were aware of influenza vaccine while majority of students (79.9%) from both disciplines reported that there is no such vaccine. Awareness and health literacy regarding seasonal influenza is poor among university students, especially from non-HS disciplines. These findings necessitate dire need to appropriately structured awareness programs in educational institutes to curb the growing burden of influenza.

Keywords: Influenza, antibiotics, self-medication, *Haemophillus influenza,* flu, Pakistan, students, universities.

INTRODUCTION

Influenza, more commonly referred as "flu", is a highly contagious viral infection affecting people of all ages and occurs in late fall, winter and early spring (Control *et al.*, 2013; Healy *et al.*, 2017). The spectrum of illness ranges from mild self-limiting disease to serious infection, and at times can lead to death, particularly in high risk individuals (Taubenberger *et al.*, 2008). Of all three types of influenza viruses, type A has a significant role in generating any epidemic or pandemic state resulting from faster evolution and a considerably varied host range (Team, 2009). Spanish flu (H1N1 influenza virus) pandemic in 1918 caused substantial mortality worldwide, including 6,75,000 deaths alone in the USA (Johnson *et al.*, 2002). In 2009, an entirely new strain of influenza A virus (H1N1), resulting from reassortment of various flu viruses, appeared in Mexico (Scalera *et al.*, 2009). The virus A (H1N1) has now been dominated all commonly prevailed seasonal influenza viruses (Smith *et al.*, 2009). The 2009 (H1N1) pandemic infected nearly 43 to 89 million people with 8,870-18,300 deaths and caused multiple regional outbreaks in different countries including Pakistan (Shrestha *et al.*, 2011). As compared to seasonal influenza, the pandemic viruses typically infect healthy individual with young or geriatric age and those with comorbidities (LaRussa, 2011). World Health Organization (WHO) has declared influenza A viruses subtypes H1N1/H3N2, influenza B, and the novel A/(H1N1) pdm09 as the most circulating viruses around the globe. In temperate climates, the disease occurs usually in the winter (Hannoun, 2013).

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Influenza is a least appreciated problem around the globe and it might be attributed to the self-limited nature of the disease. However, in few cases infection may cause severe illness with fatal outcomes (Hanshaoworakul *et al.*, 2009). Pneumonia is a most dreadful complication of influenza and is substantially associated with influenza related mortalities, even after the alleviation of symptoms. However, in such cases pneumonia is considered as a cause of death, not influenza (Rothberg *et al.*, 2008). It might be a possible reason that Centers for Disease Control and prevention (CDC) do not provide accurate estimation of deaths caused by influenza. The management of influenza is supportive and most of the cases are treated with antibiotics (Wright *et al.*, 2009). The misuse of antibiotics for viral infections carries substantial risk of antimicrobial resistance (Wright *et al.*, 2009; Muras *et al.*, 2013). The use of antibiotics as self-medication for upper respiratory tract infections has commonly been observed worldwide including United States (US) and Europe (Kardas *et al.*, 2005; Céspedes *et al.*, 2006). In developing countries, the antimicrobial resistance has reached to an alarming level that might be attributed to over the counter use of antibiotics (Céspedes *et al.*, 2006; Ayukekbong *et al.*, 2017). The irrational use of antibiotics is not only associated with drug-resistance super bugs but also portends serious adverse events. A study conducted in USA reported that approximately 19.3% of all emergency department visits were attributed to the antibiotics-related adverse events (Shehab *et al.*, 2008).

Pakistan is a south Asian country with tropical to temperate climate and population of over 197 million. The influenza viruses are prevalent across the country and affect all age groups (Badar *et al.*, 2013; Khalil *et al.*, 2017). The menace of influenza is not much different in Pakistan where acute respiratory tract infections are one of the leading causes of deaths in children aged below five years (20-30% child deaths) (Khan *et al.*, 2004). Moreover, flu is a major contributing factor to the self-medication in Pakistan (Zafar *et al.*, 2008; Nazir *et al.*, 2017). If people are provided with accurate and accessible information from health authorities about the disease and appropriate responses and are made aware that the consequences of not complying with those recommendations are likely to dire, they are more likely to comply with health directives, and in turn, play a key role in stemming spread of the pandemic. Higher education institutions (HEIs) with their large concentrations of young people have the potential to become serious outbreak centers (Abalkhail *et al.*, 2017). CDC urges educational activities in HEIs to curb the growing burden of influenza (Control *et al.*, 2009). In this context, current study was aimed to evaluate the knowledge and perception of university students towards influenza.

MATERIALS AND METHODS

Study population and location

Current questionnaire-based cross sectional (August 2015 - December 2015) study was conducted among students of public and private sector universities across Pakistan. Study population includes students from both health sciences (HS) and non-health sciences (non-HS) disciplines. HS disciplines were medicine, pharmacy and dentistry, while non-HS disciplines were arts, social science and engineering.

Questionnaire and data collection

A validated questionnaire was used to collect information on i) socio-demographic characteristics such as gender, age, education, and occupation, ii) general knowledge of etiology, mode of transmission and clinical presentation of disease and iii) trends of disease management and awareness of preventive vaccine. Well-trained data collectors explained the purpose of the study to the target population and respondents who agreed to participate were asked to self-complete the questionnaire after taking informed consent. Respondents were encouraged to read "instructions for respondents" carefully. After completing the questionnaire, the respondents were requested to ensure completeness of responses. The study flow diagram (schematic diagram) is described in fig. 1.

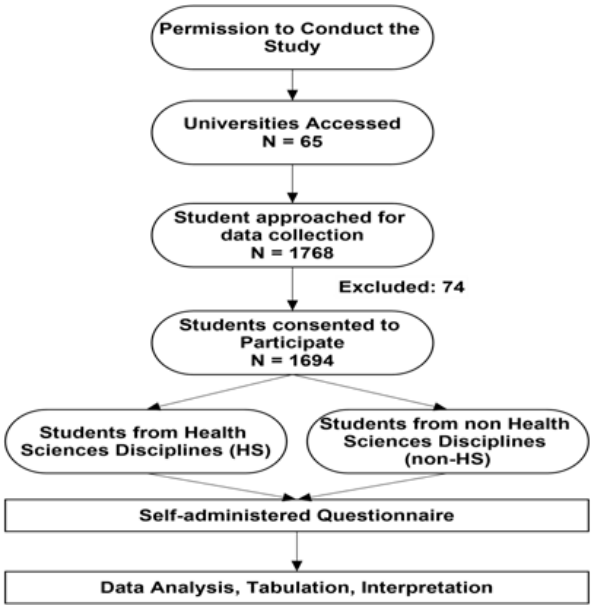

Fig. 1: Study Flow Diagram (Study Schematic Diagram)

Ethical approval

Permission to conduct the study was obtained from Rector Office, Abasyn University, Khyber Pakhtoon Khawa, Pakistan (Reg. # AU2015/345R/0021).

STATISTICAL ANALYSIS

The data were analyzed using SPSS version 20. Descriptive statistics were used to describe demographics and response of study participants. The categorical

Table 1: Demographic information of respondents

Demographics	Total respondents = 1694 N (%)
Gender	
Male	991 (58.5%)
Female	703 (41.5%)
Age	
18-20 years	708 (41.8%)
21- 25 years	935 (55.2%)
26- 30 years	46 (2.7%)
31- 35 years	4 (0.3%)
Discipline	
Health Sciences (HS)	399 (23.6%)
Arts, Social Science and Engineering (Non-HS)	1295 (76.4%)

Data are presented as frequency and proportion (%), where percentages were calculated from total respondents (n=1694)

variables were presented using counts and proportions (%). Pearson's Chi-square test ($\chi 2$ test) was administered to test the significance. All statistical inferences were considered significant at $p < 0.05$.

RESULTS

Out of 1768 students from 65 universities, 1694 agreed to participate in the current study, yielding the response rate of 95.8%. The mean age of participants was 21.12 ± 2.13 years with male preponderance (58.5%, n = 991/1694). Almost 95% respondents belonged to age group 18 to 25 years (table 1). The study population comprised primarily of students from non- HS disciplines (76.4%). The basic demographic information of participants is demonstrated in table 1.

Table 2 shows knowledge and awareness of flu among study participants, where majority of population (91.7%, n=1553/1694) had history of flu episodes. However, medical care for flu was sought by 36.5% students and most of them were from non-HS disciplines. Approximately half of the participants (55.7%, n= 943/1694) correctly reported the virus as a cause of flu while 33% (n=559/1694) students referred bacteria, fungus and dust as causative agents. Moreover, 192 (11.3%) students were not aware of the cause of flu. It is important to note that most of the students who incorrectly reported the causative agent belonged to Non-HS disciplines. Most of the students (82.3%) responded flu as contagious infection and those who did not consider it contagious (17.2%) were from non-HS disciplines. Since duration of flu varies from person to person, it is not categorized into correct and incorrect answers. Majority of the study population reported duration of flu from 4 to 6 days (38.5%), followed by 1 to 3 days (31.9%) and 7 to 10 days (20.4%). About 9% students responded that they don't know about duration of flu and most of them were from non-HS disciplines. Of 8% students who believed that flu is a fatal disease, major proportion belonged to HS discipline.

The most commonly reported symptom of flu was stuffy nose (73.3%), sneezing (53.4%), sore throat/cough (46.2%), fever (39.7%), fatigue/weakness (37.2%), body aches (26.2%) and headache (17%). The students from HS disciplines responded runny nose as common symptom followed by fatigue/weakness, sneezing, fever, body aches, sore throat/cough and headache. Majority of participants from non-HS disciplines reported runny nose as common symptom followed by sore throat/cough, sneezing, fever, fatigue/weakness, body aches and headache. Taken together, all the students considered runny/stuffy nose as the most common and headache as a less common symptom of flu.

Table 3 describes the opinion of study participants regarding flu management. Most of the students (80%) believed that antibiotics can kill bacteria only while 20%, majority of which were from non-HS disciplines, responded that they could kill viruses only. Nearly half of the study participants (47.1%) reported that antibiotic can cure flu and this response was substantially higher among non-HS students. About one third (31.6%) of study population opined that pain killers could treat flu and unexpectedly the major proportion of these students was from HS disciplines (n= 160/399, 40.1%). About 71% students responded that cough syrups cannot treat flu and response rate was almost equivalent between HS and non-HS disciplines. Similarly, only 10% participants, of which majority were from HS disciplines, responded antihistamines as effective treatment of flu. While evaluating medical-care seeking behavior of flu, more than half of the study participants (52.5%) agreed that people should visit doctor. However, only 36.5% students visit doctor for flu management. Alarmingly, very few students (20.1%) were aware of flu vaccination and 79.9% responded that there is no vaccine available for flu. Of those who were aware of vaccines, none of the student had vaccination from last five years. This response was almost similar between HS and non-HS students. When the students were asked about the criteria of selection of flu regimen, most of them (28.3%) reported that they

Table 2: Assessment of General knowledge about flu among study participants

Item	Total N = 1694	HS N = 399	Non-HS N = 1295
Have you ever suffered with flu?			
Yes	1553 (91.7%)	386 (96.7%)	1167 (90.1%)
No	141 (8.3%)	13 (3.3%)	128 (9.9%)
What is the cause of flu?			
Virus	943 (55.7%)	305 (76.4%)	638 (49.3%)
Correct answer	*943 (55.7%)*	*305 (76.4%)*	*638 (49.3%)*
Bacteria	242 (14.3%)	38 (9.5%)	204 (15.8%)
Fungus	22 (1.3%)	11 (2.8%)	11 (0.8%)
Dust	295 (17.4%)	39 (9.8%)	256 (19.8%)
Incorrect answer	*559 (33%)*	*88 (22.1)*	*471 (36.4%)*
Don't Know	192 (11.3%)	6 (1.5%)	186 (14.4%)
Flu is contagious infectious?			
Yes	1403 (82.8%)	372 (93.2%)	1031 (79.6%)
No	291 (17.2%)	27 (6.8%)	264 (20.4%)
Can flu cause death?			
Yes	146 (8.1%)	98 (24.6%)	48 (3.7%)
No	1548 (91.4%)	301 (75.4%)	1247 (96.3%)
How long does flu last?			
1-3 days	540 (31.9%)	104 (26.1%)	436 (33.7%)
4-6 days	653 (38.5%)	157 (39.3%)	496 (38.7%)
7-10 days	345 (20.4%)	121 (30.3%)	224 (17.3%)
Don't know	156 (9.2%)	17 (4.3%)	139 (10.7%)
What are the symptoms of flu?			
Fever	672 (39.7%)	172 (43.1%)	500 (38.6%)
Headache	228 (17%)	94 (23.6%)	194 (15%)
Runny or Stuffy nose	1242 (73.3%)	331 (83%)	911 (70.3%)
Body aches	443 (26.2%)	160 (40.1%)	283 (21.9%)
Fatigue & weakness	630 (37.2%)	251 (62.9%)	379 (29.3%)
Sore throat & Cough	782 (46.2%)	104 (26.1%)	678 (52.4%)
Sneezing	905 (53.4%)	249 (62.4%)	656 (50.7%)

Data were presented as frequency (proportion) Abbreviations: HS: health sciences, Non-HS: non health sciences

choose regimen themselves and this practice was more common among students from HS disciplines. Consulting community pharmacist for flu management was 16.7% and this response was not much differs between HS and non-HS students. Taking opinion from family members (24.1%) and following previous prescriptions (23.7%) were other major sources of flu regimen and were most common among non-HS students. On the other hand, very few students, majority of which were from non-HS disciplines, reported internet (1.4%) and friend`s opinions (5.7%) for regimen selection.

Lastly, students were asked about the usefulness of over-the-counter (OTC) products for flu. About 34% (n = 578/1694) participants reported that OTCs are useful for flu, while 76% students denied their usefulness. Those who agreed with the effectiveness of OTCs (n = 578), reported COFCOL (n=235), COLDREX (n=149), JOSHANDA (n=116) and KOFNIL (n=78) as useful products for the flu management. Details of these formulations are given in table 4.

DISCUSSION

Since universities are the major source of health awareness for both students and general community; these institutes must ensure the balance between academic learning and health education that could be further translated into reduced disease burden. Current study evaluates knowledge and perception of students towards flu and its management from 65 universities across Pakistan. To the best of our knowledge, this is the first nationwide survey among students from both HS and non-HS disciplines.

Despite university level education, current study reported unsatisfactory knowledge of flu among participants, particularly in students from non-HS disciplines. It is worthwhile to mention that not only non-HS students but also some HS students were not aware of factual causative agent of flu. However, majority of the students were aware that flu is a contagious illness and these findings are consistent with the previous reports (Herman

Table 3: Respondents' opinion about the management of the flu

Statement	Total N=1694	HS N=399	Non-HS N=1295
Antibiotics can kill?			
Bacteria	1355 (80%)	381 (95.5%)	974 (75.2%)
Virus	339 (20%)	18 (4.5%)	321 (24.8%)
Antibiotics can cure flu?			
Yes	798 (47.1%)	111 (27.8%)	687 (53.1%)
No	896 (52.9%)	288 (72.2%)	608 (46.9%)
Flu can be treated with Pain Killers			
Yes	535 (31.6%)	160 (40.1%)	375 (29%)
No	1159 (59.4%)	239 (59.9%)	920 (71%)
Flu can be treated with Cough Syrups			
Yes	488 (28.1%)	99 (24.8%)	389 (30%)
No	1206 (71.2%)	300 (75.2%)	906 (70%)
Flu can be treated with Antihistamines			
Yes	172 (10.2%)	123 (30.8%)	49 (3.8%)
No	1522 (89.8%)	276 (69.2%)	1246 (9.2%)
Do you visit Doctor for Flu treatment?			
Yes	618 (36.5%)	78 (19.5%)	540 (41.7%)
No	1076 (63.5%)	321 (80.5%)	755 (58.6%)
Do you feel that people should go to the doctor for flu?			
Yes	890 (52.5%)	170 (42.6%)	720 (55.6%)
No	804 (47.5%)	229 (57.4%)	575 (44.4%)
Are you familiar that there is a vaccination for flu?			
Yes	341 (20.1%)	87 (21.8%)	254 (19.6%)
No	1353 (79.9%)	312 (78.2%)	1041 (80.4%)
How do you select the regimen for flu treatment?			
My own choice	480 (28.3%)	192 (48.1%)	288 (22.2%)
Ask the community pharmacist	283 (16.7%)	55 (13.8%)	228 (17.6%)
Take opinion of family members	409 (24.1%)	60 (15%)	349 (26.9%)
Previous doctor's prescription	401 (23.7%)	86 (21.6%)	315 (24.3%)
By surfing from internet	24 (1.4%)	2 (0.5%)	22 (1.7%)
Opinion of friends	97 (5.7%)	4 (1%)	93 (7.2%)

Data were presented as frequency (proportion) Abbreviations: HS: health sciences, Non-HS: non health sciences

Table 4: Formulation preferred by study participants for the management of Flu

Products	Ingredients
COFCOL ®	Chlorphenireamin, Dextromethorphin, Paracetamol, Phenylpropanolamine
COLDREX ®	Chlorphenireamin, Dextromethorphin, Paracetamol, Pseudoephedrine
COFNIL ®	Salbutamol, Bromhexine Hydrochloride, Guaifenesin
JOSHANDA ®	A herbal product having seven herbs, originated from Unani Tibb System of Medicine

et al., 2007; Wang *et al.*, 2018). The better understanding of cause and nature of flu among HS students as compared to non-HS might be attributed to their field of study, but still large proportion of students from HS disciplines lack adequate disease knowledge. Moreover, we observed a mix response on the duration of the flu that might be based on personal experiences of the participants. The students who opted don't know option for the cause and duration of the flu; were mostly from the non-HS disciplines. Influenza may portend fatal outcomes, especially in young and elderly population (Herman *et al.*, 2007). Alarmingly, few students were aware that flu may associate with death while most of them, particular those from non-HS disciplines, do not believe that seasonal influenza can cause death. These results indicate that students, especially from non-HS disciplines, lack basic information of flu and warrant dire need to implement educational programs in educational institutes.

Though most of the students correctly reported that antibiotics are used for bacterial infection, but still 47% agreed that antibiotics are beneficial for the treatment of flu and it might be attributed to the reason that

approximately half of the study participants were not sure about the causative agent of flu. Since antibiotics lack promising effects on viruses, they should not be prescribed for flu management. However, National Institute of Health and Care Excellence (NICE) recommends the use of antiviral medications for treating high risk patients (elderly, pregnant, those with comorbidities and weak immune system) to minimize the risk of potential complications (Cooper *et al.*, 2003). It must be noted that the use of antivirals in such cases is primarily intended to halt the viral replication, not for the cure of disease. The use of antibiotics in flu may cause adverse events and contribute to the antibiotic resistance; therefore their use should be discouraged in both general population and healthcare professionals. Few students, mainly from HS disciplines, believed that pain killers, antitussives and antihistamines can treat flu. These findings indicate that knowledge of flu management is insufficient among students from HS and non-HS disciplines.

Although, more than half of study participants suggested to visit doctor for flu management, but only 36% students seek consultancy and this behavior was more common among non-HS students. Most of the HS students were not inclined to take appointment for the flu treatment which may attribute to their field of study. Moreover, the pattern of self-medication was explicitly observed in the current study where most the students, primarily from HS disciplines, preferred their own choice to select flu regimen. Students from non-HS disciplines were more inclined to follow pharmacist, previous prescriptions and family opinion than student from HS disciplines. These results demonstrate the self-medication for flu among university students, particularly those with HS background, and are in concordance with the previous studies in Pakistan where 65% students and 79% of rural population preferred self-medication to treat flu (Zafar *et al.*, 2008; Haseeb *et al.*, 2016).

Centers for Disease Control and Prevention (CDC) recommends annual vaccination for all individuals of 6 months and older as the best way to reduce the chances of contracting the flu (Grohskopf *et al.*, 2015). Despite these recommendations, vaccination rates among students remain low, hovering between 8 and 39% (Poehling *et al.*, 2012; Nichol *et al.*, 2008; Bednarczyk *et al.*, 2015). Surprisingly, majority of students from both HS and non-HS disciplines were not aware of influenza vaccine. Of those who were aware, no one was vaccinated during the last five years. The lack of information is one of the major contributing factors for not getting vaccinated as suggested by Akan and colleagues (Akan *et al.*, 2010). Moreover, an effective vaccination program and well-coordinated preventive activities is the mainstay in slowing the virus transmission, particularly during the waves of influenza (Michaelis *et al.*, 2009). In the scenario of high prevalence, the public information and outreach are as important as the availability of medication and well-organized public health systems. Such unawareness in majority of HS and non HS students is a serious concern for healthcare providers and policy makers because the keystone of influenza prevention is vaccination (Kilbourne, 2006). In educational institutes influenza virus circulates rapidly through constant exposure in close quarters like common living spaces, classrooms, shared restrooms, and through social activities. On average, college students who get the flu experience up to eight or more days of illness along with increased rates of healthcare use, school absenteeism, and impaired academic performance (Nichol *et al.*, 2008). Since students, living in high-touch areas and juggling overloaded schedules, are largely unaware of their vulnerability to the illness, therefore we urge institutes to design and implement on-campus vaccination program. We believe most of the university students and staff will be agreed to vaccinate if need of vaccination is appropriately addressed to them. Since current study lack information on attitude of students towards vaccination, we suggest future studies to investigate the behavior of students toward influenza vaccine.

Health education in the modern world aims to provide the individual with the information, skills and motivation necessary to make intelligent decisions concerning lifestyle and personal health behavior. Therefore, university based community ridden campaigns are crucial for promoting the disease awareness like seasonal flu among students. We also recommend starting the periodic awareness seminars addressing the issues of vaccination, preventive measures and disease management in all educational institutes.

Study strengths and limitations

Most of the previous studies have primarily focused on pandemic influenza among students (Akan *et al.*, 2010; Van *et al.*, 2010; Herman *et al.*, 2007), but literature illustrating the knowledge of seasonal flu is currently lacking. To the best of our knowledge, this is the first study to assess awareness and perceptions toward seasonal flu among university students from HS and Non-HS. Moreover, heterogeneous study population and comparatively large sample size are some other strengths of this study. The participants were recruited from all big universities across four provinces of Pakistan; therefore the results of present survey can be generalized at national level. The present study is limited by the cross-sectional design that precludes the identification of any causal relationships, even though associations between the variables and reverse cause-effect relationships may exist.

CONCLUSIONS

The findings of the current study demonstrate unsatisfactory knowledge about flu among university

students, where most of them were unaware of influenza vaccine. Moreover, this study also underscores the flu self-management among participants which promote self-medication or antibacterial resistance in Pakistan. These findings accentuate the need of multidimensional approaches to educate the university students regarding seasonal influenza with emphasis on vaccination. Moreover, clinical studies on efficacy and safety of flu vaccination are of utmost importance. Government and health institutes must initiate influenza awareness seminars to attract attention of students on this important public health disease.

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