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ORIGINAL ARTICLE

Assessment of Undergraduate Medical Students Awareness of COVID-19 Pandemic

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ABSTRACT

Aim: To assess the level of knowledge and awareness of undergraduate medical students in order to determine whether the undergraduate virology course is up to standard for preparation of the COVID-19 pandemic.
Methodology: A cross-sectional study was conducted online by random-sampling method with a multi-central approach. Data was collected from 311 respondents for a time period of one month during May 2020. IRB approval was granted. Descriptive analysis was done on student demographics, their knowledge and opinions, using the research tool SPSS 24.
Results: Majority of students had factually correct knowledge about Covid-19, according to the WHO guidelines. However, there was poor knowledge regarding animal reservoirs and other diseases caused by Coronaviruses. Most students had learned about Coronaviruses from sources apart from the syllabi or course material and 93% were in agreement for wanting an improved Coronavirus module in their undergraduate virology courses.
Conclusion: Medical students have good knowledge about Coronavirus, but are lacking in some crucial topics such as sources of animal reservoir and types of diseases etc. More studies need to be conducted in order to assess whether undergraduate syllabi are sufficient for educating and training students about future possible pandemics. An efficient prospective course of action should be determined accordingly.
Keywords: Medical students, Coronaviruses, Covid-19, Pandemic, Knowledge, Awareness.

INTRODUCTION

The outbreak of novel Coronavirus (SARS-CoV-2) occurred in November 2019 from central China region of the Hubei province in the city of Wuhan[1,2]. Even though Pakistan is the neighboring country to China, the first case reported in the country was on the 26th of February, 2020 in Karachi, of a student who had returned from Iran[3]. The second case reported was in the Islamabad capital territory[4.5]. Hence, in Pakistan, the etiological transmission trend seen in majority of the reported cases was due to both, exposures in local areas as well as with those who had been exposed to the virus whilst returning from international travel.[5]

Corona viruses are zoonotic viruses which have a high frequency of recombination and mutation rates[6]. Thus, their ability to adapt to new hosts and ecological niches results in spillover to humans from animal reservoirs[6]. They are respiratory viruses commonly found in horseshoe bats, civet cats and camels which can cause respiratory tract infections that can range from mild to lethal, such as the common cold to severe diseases such as SARS or MERS and the currently ongoing pandemic of COVID-19[1,7.] The gold-standard pathological laboratory diagnosis is via a nasal swab and performing RT-PCR test, which reportedly has a sensitivity of 70%. Other modalities include going for the lesser sensitive throat swabs. Radiological investigations, like the CT- Chest are also used for confirmatory diagnosis and in order to appreciate the extent of involvement (which often happens in severe disease). In a country like Pakistan where the cost of such tests was too high to accommodate in the government healthcare budget, these could not be used for screening purposes. Hence, other screening tools like Chest X-Rays and Complete Blood Count (CBC) were often used, which were not standard according to the international guidelines but were being used in practice, based on local clinical agreement and cost-effective strategized management.

Patients may be asymptomatic, or symptomatic. Diagnostic challenges were there as clinical symptomology, mainly included non-specific viral symptoms and there was inability to distinguish classical signs. Patients reported to have dry cough, fatigue, fever, myalgias, shortness of breath, nasal congestion, runny nose, sore throat or diarrhea[8,9]. Patients presented with a wide range of symptoms but most commonly respiratory and gastrointestinal involvement was recorded. However, other organ systems being affected have also been reported.

A medical observation period of 2-14 days is recommended on the basis of data gathered about the incubation period.[10] While drug trials for treatment of COVID-19 and human-trials for the vaccine are underway, undergraduate medical students are at an increased risk due to the need to fulfill requirements of clinical aspects of their academic courses in hospital environments[11,12,13].

The syllabus for Virology is less extensive in comparison to bacteriology, with significantly fewer

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questions designated to virology in the examination structure. Viruses not endemic to Pakistan are not adequately covered or assessed in the undergraduate medical courses for Punjab. This has been more noticeable during the pandemic caused by SARS-COV-2.

General concepts of Virology such as classification, routes of transmission, incubation period, diagnosis and vaccines are taught. However, a question arises of whether they sufficiently and high-yield enough to prepare students for knowledge about pandemics such as COVID-19. This led us to assess the knowledge of medical students on Coronavirus and whether exclusion of Coronavirus from their undergraduate Virology course undermines efforts for prevention of disease. This is pertinent as current medical students are the future healthcare workers and their training reflects on future patient management.

METHODOLOGY

After ethical approval from IRB, a cross-sectional study was conducted during the period of one month of May, 2020, during which 311 respondents participated in the survey. Sample size was calculated using Sample Size Calculator with an estimated number of medical students in Pakistan (data was used from the Pakistan Medical Commission (PMC) website which cited student capacities of each individual medical college) with a confidence level of 90% and a margin of error of 10%. The sample size was calculated to be 281. Due to medical colleges being closed during the pandemic, a questionnaire was created online using Google Forms and distributed through social media. Hence, random sampling method was used, as it was done per convenience. Using a multi-central approach, the questionnaire was distributed to medical students from Punjab such as Lahore Medical &Dental College, CMH Medical College, Fatima Memorial Medical College, Allama Iqbal Medical College, King Edward Medical College and Shifa Medical College etc. Majority of the responses were received from medical students of Lahore, Pakistan. An explanatory paragraph detailing the objectives of the study was attached with the link to the form. Students from third year to final year were encouraged to fill in the questionnaire, as the topic of Virology is mainly taught in third year (therefore, first year and second year students were excluded). Responses were recorded when students opened the link and filled the mandatory questions, consensually submitting the form themselves. The questionnaire was brief and close ended to encourage students to respond and to prevent loss of interest. Questions were designed to be simple and direct, requiring minimal assistance from the researchers as the students had to fill answers individually online. A response to each question was mandatory for submission in order to prevent incomplete data. There were three categories of questions: bio-data, knowledge about Coronaviruses and COVID-19, and the student's opinions about the adequacy of their course. Only bio-data relevant to the study was asked to ensure anonymity, especially on the internet. Multiple choice questions were used to test knowledge about the type of virus, route of transmission, animal reservoirs, diseases caused, incubation period, prevention, treatment, vaccine etc. The questions were designed according to accredited sources such as the official World Health Organization website and Review of Medical Microbiology and Immunology (Levinson). Previous research conducted on similar strains from the same family of Coronavirus (MERS and SARS) has also been consulted. Students were asked to rate their satisfaction using Likert 5-point scale agreement with their Virology syllabus in context of the 2020 pandemic. Data was analyzed using SPSS 26. Data frequency and percentages were recorded in order to study the associations with trends. Chi-square test was used and a p-value less than 0.05 was considered statistically significant.

RESULTS

A total of 311 responses were received. However, a response rate could not be calculated due to the questionnaire being distributed to an unknown number of undergraduate medical students through social media. The questionnaire was targeted mainly towards students from third year, fourth year and final year as the subject of Virology is usually taught during third year in Pakistan. Majority of respondents were female, owing to the current higher female to male ratio in medical students. Majority of students were from Fourth Year and Final Year (73%) and 76.2% were from a private medical college. The average age group of respondents was 22 years old (Table 1).

Table 1: Characteristics of participants (n=311)

Characteristics	Frequency	%age
Gender		
Female	228	73.3%
Male	83	26.7%
Year of Study in M.B.B.S		
Final Year	108	34.7%
Fourth Year	119	38.3%
Third Year	84	27.0%
Type of Medical College		
Private	237	76.2%
Public	74	23.8%
Age Group		
Less Than 22	173	55.6%
22 or above	138	44.4%

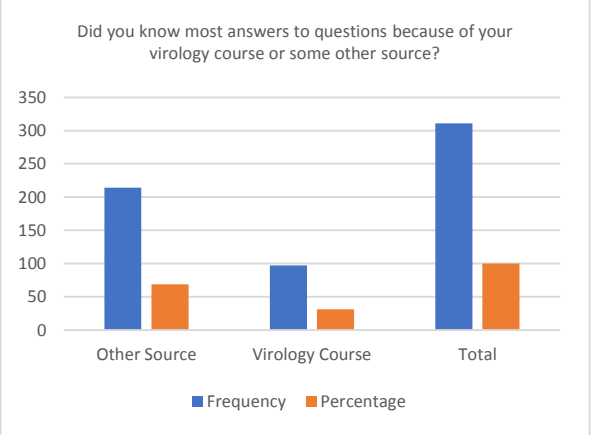
Table 2: Assessment of Knowledge regarding Coronaviruses Disease and Management (n=311)

Questions	Frequency	%age
Coronavirus is:		
A DNA Virus	14	4.5%
An RNA Virus	267	85.9%
Don't know	30	9.6%
Coronavirus causes respiratory symptoms?		
Agree	310	99.7%
Don't know	1	0.3%
Coronaviruses are found in human and animals?		
Human	37	11.9%
Animals	39	12.5%
Both	235	75.6%
Corona virus are found in Bats		
No	24	7.7%
Yes	287	92.3%
Corona virus are in camels		
No	238	76.5%
Yes	73	23.5%
Corona virus in Civet Cats		
No	235	75.6%
Yes	76	24.4%
Corona virus in Pangolin		

No	250	80.4%
Yes	61	19.6%
Common Cold can be caused by Coronaviruses?		
No	217	69.8%
Yes	94	30.2%
SARS is caused by Coronaviruses?		
No	84	27.0%
Yes	227	73.0%
MERS is caused by Coronaviruses?		
No	155	49.8%
Yes	156	50.2%
Total	311	100.0%
Covid-19 caused by Coronaviruses?		
No	34	10.9%
Yes	277	89.1%
Most common route of transmission of Coronaviruses:		
Feco-oral	5	1.6%
Respiratory Droplets	306	98.4%
Frequent hand washing for 20 seconds		
No	9	2.9%
Yes	302	97.1%
Avoid touching mouth, eyes and nose		
No	11	3.5%
Yes	300	96.5%
Cough or sneeze into elbow		
No	26	8.4%
Yes	285	91.6%
Personal Protective Equipment		
No	35	11.3%
Yes	276	88.7%
Social Distancing (1 metre/3 feet)		
No	11	3.5%
Yes	300	96.5%
In case of symptoms, call in advance before seeking medical attention		
No	65	20.9%
Yes	246	79.1%
Self-quarantine, if sick		
No	18	5.8%
Yes	293	94.2%
Incubation period of Coronavirus?		
1-14 days	286	92.0%
1-21 days	14	4.5%
1-7 days	10	3.2%
Don't know	1	0.3%
Most preferred area for sample collection:		
Don't know	11	3.5%
Laryngopharynx	11	3.5%
Nasopharynx	240	77.2%
Oropharynx	49	15.8%
Lab diagnosis of Coronavirus is done by:		
Culture	21	6.8%
Don't know	11	3.5%
RT-PCR	279	89.7%
Supportive Care is the Treatment for COVID-19;		
No	70	22.5%
Yes	241	77.5%
Symptomatic Treatment is the Treatment for COVID-19		
No	44	14.1%
Yes	267	85.9%
Anti-viral chemotherapy is the Treatment for COVID-19		
No	236	75.9%
Yes	75	24.1%
Is there a vaccine for Coronavirus?		
Don't know	7	2.3%
No	301	96.8%
Yes	3	1.0%

Most students answered questions correctly (75% and above) as shown in Table 2. More than 75% of students seemed to have extremely poor knowledge of coronavirus reservoirs in camels (which was the main source in MERS), civet cats or pangolins. More than half of students were unaware that coronaviruses can cause the common cold (70% incorrect responses) and MERS (50% incorrect responses). 60% of students said that they had studied corona viruses during their Virology course despite the topic not being a part of the syllabus set by the University of Health Sciences (UHS). Nearly half the students (44.7%) claimed that they had not studied Polymerase Chain Reaction (PCR) Testing in general virology. Of the respondents, 58.2% agreed that studying general virology helped them understand the characteristics of COVID-19. However, a significant percentage (30.5%) chose to remain neutral. 42.7% of respondents disagreed when asked, if their virology course prepared them adequately for the COVID-19 pandemic (34.4% chose to remain neutral for this question). 93.6% of respondents agreed when asked if coronavirus should be included as a topic in undergraduate medical syllabus. Most students (68.8%) said that they knew most of the answers to the questions due to sources apart from their Virology syllabus (Figure 1).

Figure 1: Source of Knowledge of Medical Students (n=311)



No statistical significance was found for the difference of answers between males and females, except for knowledge regarding the incubation period, with a higher percentage of females (94.3%) answering correctly, as compared to males. There was no significant difference between students of public or private colleges in questions about knowledge.

However, there was a statistically significant response (p value <0.05) regarding whether routes of transmission, incubation periods and PCR were taught to medical students in the virology syllabus taught in college. The difference in knowledge levels regarding coronavirus' incubation period, laboratory diagnosis and the presence of coronavirus in bats and pangolins between third, fourth and final year was statistically significant. When asked whether students had studied coronavirus and preventative measures for COVID-19 in their virology course, the response was statistically significant. A statistical significance was found for the difference in responses

between males and females when asked if their Virology course prepared them adequately for the COVID-19 pandemic, whether coronavirus should be included in the virology syllabus and from what source did they learn about coronaviruses. Statistical significance was found in the difference in responses for final year to third year when asked if studying general virology helped them understand the characteristics of COVID-19 and if their Virology course prepared them adequately for the COVID-19 pandemic (Table 3).

Table 3: Feedback Questions regarding Virology Coarse (n=311)

Feedback Questions	Frequency	%age
Did you study Coronavirus in your undergraduate Virology course?		
Don't know	8	2.6%
No	116	37.3%
Yes	187	60.1%
Did you study Routes of Transmission in your Virology course?		
No	35	11.3%
Yes	276	88.7%
Did you study Incubation Period in your Virology course?		
No	74	23.8%
Yes	237	76.2%
Did you study Preventive Measures in your Virology course?		
No	97	31.2%
Yes	214	68.8%
Did you study PCR in your Virology course?		
No	139	44.7%
Yes	172	55.3%
Studying General Virology helped you understand the characteristics of COVID-19:		
Agree	141	45.3%
Disagree	23	7.4%
Neutral	95	30.5%
Strongly agree	40	12.9%
Strongly disagree	12	3.9%
Your Virology course prepared you adequately for the COVID-19 pandemic:		
Agree	62	19.9%
Disagree	89	28.6%
Neutral	107	34.4%
Strongly Agree	9	2.9%
Strongly Disagree	44	14.1%
Due to the COVID-19 pandemic, Coronavirus should be included in the undergraduate syllabus:		
Agree	121	38.9%
Disagree	1	0.3%
Neutral	14	4.5%
Strongly Agree	170	54.7%
Strongly Disagree	5	1.6%

DISCUSSION

To the best of our knowledge at the time of publication, no previous study has been done to correlate the knowledge of medical students in Pakistan about coronaviruses in relation to their undergraduate syllabus. Comparisons have been made with previous studies about the knowledge of Health-Care workers about MERS in Saudi Arabia and Pakistan[16,17].

The study shows that exclusion of the topic of Coronavirus from undergraduate Virology course may have resulted in a vast majority of future doctors of Pakistan being unaware of the common animal reservoirs of coronavirus (e.g. camels) which are found in significant numbers across Pakistan as well as in countries in the Middle East (which are frequented by the Pakistani population). Subpar knowledge about animal reservoirs and different diseases caused by coronaviruses may lead to future medical graduates making delayed diagnosis and poorly identifying the causative agents. Pakistani medical students being unaware of Middle Eastern Respiratory Syndrome (MERS) is also a cause for concern as Pakistanis are frequent travelers to Middle Eastern countries, especially as pilgrims for Hajj each year. The knowledge and awareness of students needs to be improved. This is not only a part of their academic yield but also helps to inculcate preventive measures. Epidemic such as MERS or the more recent COVID-19 pandemic can have a significant impact on how daily life can be disrupted in Pakistan. It would be pertinent to have knowledge about coronavirus for future doctors to diagnose and manage viral illnesses.

Further investigations may be necessary and efforts may be made to review course material to include the viruses which were overlooked and underrepresented, especially viruses (such as coronaviruses) that have the ability to potentiate an epidemic/pandemic in Pakistan, given the local and international travel. Most students reported that they learned about coronavirus from sources other than their undergraduate syllabus, which may indicate that medical colleges in Pakistan may not be fully equipped to teach students how to deal with real world practical experiences such as the current pandemic by excluding certain topics. Medical students were also relied upon during the pandemic to guide the public and assist the overburdened healthcare system in educating the general public by guiding them through telemedicine/telehealth and social media campaigns. If students are lacking in holistic knowledge about the topic, it may result in misguidance of the general public and possible additional problems for the current health-care system in Pakistan. There was no statistical significance in difference in knowledge between males and females except knowledge of incubation period, which was answered correctly by a higher percentage of female students. Statistical significance in the difference between public and private medical colleges in terms of teaching important topics of general virology like routes of transmission, incubation period and types of testing (like PCR test); may suggest inadequate coverage of course material or poor knowledge of students despite inclusion in syllabus. Preventative measures are important in controlling pandemics. According to student responses, courses seem to be lacking when it comes to teaching them. Students seem to favor inclusion of coronavirus in the undergraduate virology course according to their responses and medical colleges should address their concerns accordingly. Students seem to have good knowledge about coronavirus due to their general knowledge about the pandemic, which is not specifically derived from their course material. This could possibly explain why students are well aware of methods of prevention of COVID-19, but not aware of other diseases caused by coronavirus or animal reservoirs. Poor knowledge about the source of the virus was in line with a study in Saudi Arabia about health-care workers knowledge about MERS[16]. Gender was not significant in terms of knowledge about coronavirus, in contrast to studies about MERS in Saudi Arabia, possibly due to traditions and norms in Pakistan being different to Saudi Arabia[16,18].

Limitations: Results of the study may be subject to change due to increased awareness about coronavirus as the pandemic progressed. Trends of the questions answered by the students varied; at the beginning of the data collection period as compared to the end. This could be because new information was revealed on weekly basis during the first phase of the pandemic. Responses were few and far in between due to social isolation, lack of access, which may result in poor representation of students from public colleges, especially male students. Students also answered questionnaires socially isolated from researchers, which may result in inaccurate responses due to students answering questions using online sources. Despite the limitations of the study, it seems to be a doorway to reflecting on course materials and the level to which they prepare medical students of Pakistan for medical crises such as pandemics.

CONCLUSION

With the emergence of new coronavirus strains, medical students seem to be dissatisfied with their undergraduate courses in terms of their preparedness for the ongoing pandemic. Improvements need to be made in the syllabi for medical undergraduate professional university examinations in order to address their concerns. Revision of the medical curriculum and remodeling of teaching methods for students of both, public and private sector medical colleges is advised. Students lack in basic critical concepts pertaining to viral illnesses which make them inadequately prepared to tackle disease outbreaks. Interventions at medical school level will further ensure the effectiveness of healthcare systems.

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