ORIGINAL ARTICLE

COVID-19: Perspective and Practice of Urban Population of Pakistan

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ABSTRACT

Objective: To understand the level of awareness and practices in urban population of Pakistan towards the deadly outbreak of COVID-19 and SARS-CoV-2 in Pakistan

Methodology: A descriptive, cross-sectional online study was conducted amongst the people of Pakistan in the month of July, 2020 by non-probability, convenience sampling technique. The questionnaire was filled by people aged 20-60 years, both male and female, employed or unemployed, married or single regardless of their occupation and residing in Karachi, Pakistan.

Results: A total of 600 participants filled the questionnaire. Majority of respondents were in the range of 20-30 years, with 477(79.50%) responses. Mean KAP score was found to be 18.59± 2.455. Among these, 74.2% of the population were known to have 'Good KAP', 24% of the population had 'Fair KAP' and 1.9% of the population had 'Poor KAP'.

Conclusions: Knowledge related to COVID-19 was found to be fair, whereas attitude and practice towards the pandemic was good. Although, many of the knowledge questions were answered rightly by the respondents, still there were some misconceptions related to face masks, gloves, and high-risk people for the disease.

Key words: Awareness, Behaviour, Pneumonia, RNA Viruses, SARS Virus, COVID-19.

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INTRODUCTION

Health authorities of China identified many pneumonia cases of unknown cause in the city of Wuhan, Hubei province in December 2019[1]. Signs and symptoms of this disease included reduced or normal white blood cells, pyrexia, dry cough, radiological signs of acute respiratory distress, rare gastrointestinal symptoms, failure to resolve on 3 to 5 days of treatment with an antibiotic, and lymphopenia[1,2]. These cases were seen particularly in the Hunan seafood wholesale market located in Wuhan, Hubei province of China. Nevertheless, in January, the atypical viral disease spread to many provinces such as Hunan, Zhejiang, Henan, Guangdong, Hubei and others, including cities like Shanghai and Beijing; leaving thousands of people infected[2]. The WHO tentatively titled this newly emerged virus as 2019 Novel Coronavirus (2019-nCoV) on 12 January 2020. At the daybreak of 30 January 2020, the 2019-nCoV was declared a Public Health Emergency of International Concern by the WHO. The WHO officially named the disease caused by 2019-nCoV, as Coronavirus disease 2019 (COVID-19) on 11 February 2020. On the same day, the virus that caused this disease was named by Coronavirus Study Group (CGS) of International Committee on Taxonomy of Viruses (ICTV) as "SARS-CoV-2". The virus was named as SARS-CoV-2 because it was found to be closely linked to Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV)[3].This outbreak was proclaimed as a pandemic by WHO as the countries all over the world grappled with an upsurge in the number of confirmed cases. According to the situation report of WHO released on 15 August 2020, the total number of cases all over the world were 21,026,758[4].

The Corona Viruses (CoVs) belong to the Coronaviridae family, the subfamily of Orthocoronavirinae and order Nidovirales. CoVs are classified into four genera: Alpha Coronavirus (alpha CoV), Beta Coronavirus (betaCoV), Delta Coronavirus (deltaCoV), and Gamma Coronavirus (gamma CoV). The genera Beta Coronavirus is further divided into five sub-

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genera/lineages. CoV presents like a 'crown' under the Electron microscope (Coronam is the Latin term for crown) because of the presence of spike glycoproteins on the envelope[5]. These are single-stranded, positive-sense RNA viruses. They are infective in a wide number of hosts and cause diseases ranging from flu to severe lethal illness.

The history of Coronavirus goes back to 2003, having a suspicious aetiology of pneumonia when it emerged from South-East China mostly in Guangdong province. This was called SARS Coronavirus satisfying Koch's postulate[6]. This virus had a mortality rate of 10%-15%[7,8]. A similar outbreak of Coronavirus was seen in 2012 in the Middle East, and it possessed identical characteristics as the outbreak in 2003[9]. The disease caused by Coronavirus in 2012 was called MERS. Dromedary camel was an intermediary host in MERS, with a mortality rate of 37%[7]. Both SARS and MERS, most of the times non-specific, shared similar initial symptoms, including respiratory symptoms and fever. The staff of the hospital that were unprotected and in contact with droplets of infected patients, developed nosocomial infections[8,10].

The first case of COVID-19 in Pakistan was reported on 26 February, 2020. However, there were 288,047 confirmed COVID-19 cases and 6,162 total deaths due to COVID-19 in Pakistan according to the WHO as updated on 15 August, 2020[11]. The Government of Pakistan had imposed incomplete lockdown with total closure of non-essential services, restaurants, shops, and air travel for months. Academic institutions across the country had also been closed.The Higher Education Commission issued guidelines for online education to compensate for the loss of education because the closure of institutions as well[12].

After the appearance of the Coronavirus in China, the people of Pakistan had meager knowledge about it. When it travelled to Pakistan, then the people realized the seriousness of the issue and the Government of Pakistan started awareness campaigns as well[13]. Pre-emptive measures have been adopted by the Government to curb the rapid spread of the ongoing COVID-19 epidemic in Pakistan. Currently, Pakistan has comparatively lower incidence of Coronavirus cases than other countries[14].

Surveying the Knowlege, Attitude, and Practice of people provides an appropriate way to assess ongoing programmes and to discover compelling strategies and tactics for positive demeanor change[15]. The purpose of this study is to estimate the level of awareness, in the people of Pakistan regarding Coronavirus in the ongoing situation of COVID-19 pandemic. We also aimed to assess the attitude and practices by people of an urban city of Pakistan towards the pandemic. This study will result in better patient healthcare outcomes in future by identifying the gaps and deficiencies in the knowledge of people regarding coronavirus disease, counseling them for improving their attitude and practices towards pandemic. We can also direct our healthcare services and campaigns for further improvement.

METHODOLOGY

A descriptive, cross-sectional study was conducted amongst the people of Pakistan in the month of July 2020. Ethical approval was obtained from Ethical Review Board of Ziauddin University with the Reference code of 2280620ADOM. The study was conducted in the period of strict lockdown in the country which is why it was impractical to execute it as a community-based sampling. Keeping this in mind, it was determined that most of the data should be collected online. Non-probability, convenience sampling technique was used for sampling. A well-formulated, close-ended questionnaire was designed on Google Forms and Microsoft Word. Participants were approached through social media platforms like Facebook,Whatsapp, Instagram, and Email. The hard copy was circulated to the people who were met in person. The questionnaire included a proper consent statement which notified individuals about the anonymity of the data and agreement for their voluntary participation.

The questionnaire was filled by people aged 20-60 years, both male and female, employed or unemployed, married or single, regardless of their occupation and residing in Karachi, Pakistan. On the contrary, People who were below 20 years of age and aged more than 60 years, less qualified than Higher Secondary Education, and those who were not residents of Karachi, were excluded from this study.

The questionnaire was partially adopted from a study conducted in Saudia Arabia[16]. The demographic variables included age, gender, marital status, education, occupation and employment status. A score of '0' was given to the wrong answers and a score of '1' was given to the right answers in the Knowledge section. The total knowledge score bracket was from 0 to 11. The internal consistency of the questionnaire was measured and the Cron Bach alpha for knowledge questions was found to be 0.704 which was acceptable. A pilot study was first performed on 30 individuals to assess the reliability and understanding of the questionnaire by people which showed that major modifications were not required.

The attitude of the respondents was measured by Likert scale. A score of '1' representing "Disagree" through '3' representing "Agree" was used. In practice questions, a score of '2' had been given to answers of "Yes", '1' was given to answers of "Sometimes" whereas "0" was given to answers "No".

Descriptive statistics like frequency and percentages were analyzed for the all the categorical variables. The responses were converted into Knowledge scores, Attitude, and Practice scores along with KAP scores which were analyzed for mean and standard deviation. Responses for Knowledge, Attitude, and Practice questions were analyzed for frequency, percentage, and 95% confidence interval. The Knowledge score, Attitude and Practices scores, and KAP score were compared with different independent variables by using Chi-square test. Pearson-correlation was used to measure the strength of the association between Knowledge, Attitude, and Practice score.Data entry and analysis were done using Statistical Package for Social Sciences (SPSS) version 24.0 (SPSS, Inc., Chicago, IL, USA). $P<0.05$ was set as the statistical significance level.

The awareness level of the participants was assessed by their responses in the Knowledge section (Table 2). Majority of the respondents 532 (88.70%) were aware that the disease was caused by a virus. Upon questioning if Coronavirus caused the disease before 2019 as well; less than half, 278 (46.30%) of the respondents answered that it did not cause disease before. Most of the respondents, 581 (96.80%) were aware of the mode of transmission and said it spread through direct contact that is person to person. Almost all of them, 561 (93.50%) were aware of the signs and symptoms of the disease. Majority, 540 (90%) were aware of the incubation period of the virus that was 2-14 days. More than half of the respondents, 428 (71.30%) said that the only treatment available was to treat the symptoms. More than half, 365 (60.80%) of the respondents said that surgical/N95 facemask should be worn by everyone and at all times. More than half, 435 (72.50%) of the respondents said gloves were necessary in preventing the disease (Table 2).

Table 1: Demographic Characteristics of the Respondents and Their KAP Scores

Characteristics	Sub group	Frequency	Percentage (%)	KAP Scores (P-value)
Age	20-30	477	79.5%	0.169
	31-41	102	17.0%	
	42-52	19	3.2%	
	53-60	2	0.3%	
Gender	Female	341	56.8%	0.003
	Male	259	43.2%	
Marital status	Single	400	66.70%	0.037
	Married	200	33.30%	
Employment status	Employed	330	55.0%	0.288
	Unemployed	270	45.0%	
Highest level of education	Higher secondary school (college)	73	12.0%	<0.001
	University (Bachelors)	376	62.70%	
	University (Masters)	151	25.20%	

RESULTS

A total of 600 respondents were included in this study forming a response rate of 100%.Their age bracket was from 20-60 years (Table 1). Most of the respondents fell in the bracket of 20-30 years, 477 (79.50%) respondents (Table 1). Among the sample, the mean age of the respondents was 21.4±0.496 years. Out of 600 respondents, 259 (43.2%) were male. Majority of the respondents were students, 278 (46.3%).

Upon the assessment of the attitude of people towards COVID-19, majority of the respondents, 494 (82.30%) agreed that people should avoid leaving their homes during the pandemic while, 84 (14.0%) disagreed. Majority, 521 (86.8%) had views that the Government should isolate the infected paients while 50 (8.30%) disagreed (Table 3).

Table 2: Responses to the Knowledge Questions Regarding COVID-19

S.No	Questions	Options	Frequency (N)	95% CI	Percentage (%)
1.	Did Coronavirus cause disease before 2019 as well?	Yes	193	1.84-1.95	32.20%
		No	278		46.30%
		May be	129		21.50%
2.	How is the disease spread?	It is spread by droplets after sneezing/ touching and shaking hands.	581	1.04-1.12	96.80%
		It is spread by food/water contamination.	2		0.30%
		It is spread through faeces.	4		0.70%
		I don't know.	13		2.20%
3.	What are the signs and symptoms of the disease?	Same as seasonal flu (fever, cough, sore throat, muscle ache etc.)	561	1.09-1.18	93.50%
		Could lead to sudden death	15		2.50%
		Nausea, vomiting, diarrhea	4		0.70%
		Don't know	20		3.30%
4.	Who should wear the Surgical/N95 facemask?	Everyone and at all times	365	1.44-1.56	60.80%
		Healthcare professionals	177		29.50%
		People who are more anxious about the disease	51		8.5%
		Don't know	7		1.20%
5.	Are gloves necessary in the prevention of this disease?	Yes	435	1.35-1.47	72.50%
		No	83		13.80%
		Don't know	82		13.70%
6.	How long does it take to see the symptoms of the disease after exposure to virus?	Immediately	26	2.02-2.10	4.30%
		2-14 days	540		90.0%
		1 month	6		1.0%
		Don't know	28		4.7%
7.	Is there a treatment for the disease?	Treating the symptoms only	428	1.32-1.42	71.30%
		No definite treatment	123		20.50%
		Don't know	49		8.2%
8.	What kind of hand sanitizer should be used?	Non-alcoholic hand sanitizer	50	2.17-2.27	8.30%
		Hand sanitizer with 60% or greater than 60% alcohol	368		61.30%
		Any kind of hand sanitizer	182		30.30%

Table 3: Questions Related to Attitude and Practice of Respondents Towards COVID-19

S.No	Questions	Options	Frequency(n)	95% CI	Percentage(%)
1.	The government should isolate infected patients in hospital.	Disagree	50	2.74-2.83	8.30%
		Neutral	29		4.80%
		Agree	521		86.80%
2.	We should avoid leaving our homes nowadays.	Disagree	84	2.63-2.74	14.0%
		Neutral	22		3.70%
		Agree	494		82.30%
3.	I wash hands often.	Yes	552	1.10-1.17	92.0%
		Sometimes	33		5.50%
		No	15		2.50%
4.	I cover my nose and mouth with a tissue when coughing or sneezing.	Yes	552	1.18-1.29	87.0%
		Sometimes	63		10.50%
		No	15		2.50%
5.	I use face mask to cover my nose and mouth in crowded places.	Yes	518	1.17-1.26	86.30%
		Sometimes	49		8.20%
		No	33		5.50%

To evaluate the practice of the general population in these conditions, questions like how often they washed their hands, if they covered their nose and mouth with tissue when coughing or sneezing, and if they used face mask to cover their nose and mouth in crowded places, were asked. Majority of the respondents, 552 (92.0%) said that they washed their hands often, 552 (87.0%) answered that they covered their nose and mouth with tissue when coughing or sneezing and 518 (86.30%) said that they used face masks to cover their nose and mouth in crowded places (Table 3).

There were 11 Knowledge questions, 2 Attitude questions and 3 Practice questions in the questionnaire. The mean knowledge score was 7.58±1.719, indicating 68.90% (7.56/11*100)correct rate in the Knowledge section. The cut-off point (median) and mode for Knowledge score has been determined to be 8. Mean attitude and practice score was found to be 11.02±1.498. The cut-off point and mode for Attitude and Practice score was determined to be 12. The highest possible KAP score was 23. The mean KAP score had been 18.59± 2.455. The cut-off point and mode for KAP score was determined to be 19.

Results indicated that 74.2% of the population were known to have "Good KAP", 24% of the population had "Fair KAP" and 1.9% of the population had "Poor KAP" (Figure 1).

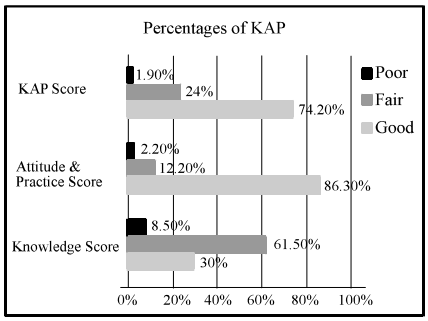

Figure 1: Percentage Distribution of KAP Categorized as Good, Fair and Poor

When Pearson correlation was applied, it was seen that Knowledge with Attitude and Practice score, Knowledge with KAP score, and Attitude, and Practice with KAP score were significantly related (<0.001). The co-relation of Knowledge with Attitude and Practice score was found to be (r=0.16), Knowledge with KAP score was (r=0.798) and Attitude and Practice with KAP score was (r =0.722).

The t-test was performed to compare the differences between the two grouped independent variables (Gender, age, employment status, and marital status) with KAP scores, wheras ANOVA test was done to compare the independent variables having multiple choices (Highest level of education and occuupation) with KAP scores.

DISCUSSION

Present study indicated some serious misconceptions of people regarding Coronavirus disease when the questions like, if Coronavirus caused disease before 2019 as well, who should use surgical/N-95 face mask, if gloves were necessary were asked (Table 2). The closely related values of mean, mode, and median indicated symmetrical distribution of the data.

The Knowledge score obtained by most of the respondents was found to be Fair (Figure 1). According to literature from China, less awareness and meager risk assessment had been the two reasons for accelerated spread of COVID-19 in China and to nearby areas. Partnerships of governmental and international agencies like WHO can be beneficial in fighting against the spread of disease by circulating public health information and discussing the risk as seen from the quick response to the outbreak of MERS in 2015 in South Korea[18].

The accepted mode of transmission of this disease is known to be inhalation of infectious aerosol[17]. A study conducted by Khurshid Z et.al, showed that 631 (97%) of the respondents answered that they were aware of the mode of transmission of the disease[19]. When the participants of this study were questioned regarding the mode of transmission of the disease, 581 (96.80%) of the respondents answered correctly that it was transmitted through droplets after sneezing/touching and shaking hands (Table 2).

As stated by WHO, the incubation time of the virus is 5-6 days on average but it can take up to 14 days[20]. A recent KAP study conducted in Pakistan related to COVID-19 amongst healthcare workers had indicated 77.2% of correct responses from respondents on the question of incubation period of the disease[21]. In this study, when respondents were asked about incubation period of virus, 90% (540) of the respondents answered it correct that was 2-14 days (Table 2).

The specimens used for testing of COVID-19 include nasal secretions, sputum, blood, and bronchoalveolar lavage (BAL). Enzyme Linked Immunosorbent Assay (ELISA) and Western Blots are the serological tests whereas Real Time-PCR (RT-PCR) and Northern Blot Hybridization are the molecular tests being employed on the specimens to detect COVID-19. The viral antigens present in the specimen are detected by Direct Immune Fluorescent Assay (IFA)[22].

When Pearson correlation was applied, it was seen that Knowledge with Attitude and Practice score, Knowledge with KAP score, and Attitude and Practice with KAP score were significantly related (<0.001) and there was a positive (direct) association among all. Weak relationship was found for Knowledge with Attitude and Practice score (r =0.13) whereas a strong relationship was found for Knowledge with KAP score and Attitude and Practice with KAP score (r =0.70). A KAP study related to respiratory tract infections, conducted among Hajj and Umrah pilgrims of Malaysia also indicated a weak correlation between Knowledge with Attitude and Practice score[23].

When demographics were compared with KAP scores, gender, education, and marital status were found to have significant association (Table 1). Similar findings were observed in KAP studies related to respiratory tract infections in Malaysia and COVID-19 in China[17,23]. However, the recent KAP study conducted in Pakistan amongst healthcare workers showed that their profession and awareness were interlinked. Moreover, it was seen that physicians were more aware of the signs amd symptoms of the disease[24].

In present study, Attitude and Practice score, as well as KAP score attained by most of the respondents, was found to be Good (Figure 1). This was contrary to the study conducted in Pakistan amongst healthcare professionals according to which the awareness of respondents was good but there was a need for improvement in terms of practice measures for healthcare professionals when dealing with COVID-19 patients[24].

Upon asking various practice questions related to COVID-19, the majority of respondents responded positively (Table 3). According to CDC, the only way to protect ourselves from the virus was to wash our hands frequently, staying at home, covering our mouth and nose with a mask in crowded areas, covering coughs and sneezes, maintaining proper cleanliness, and disinfection of surfaces[25]. The WHO advises to use non-medical mask such as cloth mask for general public in crowded areas and medical mask like surgical mask for healthcare providers[26].

This study will help in identifying the gaps and deficiencies in the knowledge of people regarding the disease as well as misconceptions, which will be addressed in future by healthcare agencies and educationists. Help of media can also be taken in improving the understanding of concepts. By knowing the attitude and practices of people, we can also direct healthcare services and help counselors to play their role better. More studies should be conducted with the aim of exploring the views and practices of people, especially in rural areas, together with creating awareness among them regarding this critical issue. Practices of people should be monitored from time to time so that we do not face an upsurge in the number of cases again. Strict rules and policies should be applied to shrink the scope of the disease in Pakistan.

CONCLUSION

Knowledge about health topics are the main cause of a negative or a positive attitude towards a health phenomenon. COVID-19 has changed everyone's lives drastically and has led us to follow practices which people never took seriously like washing hands frequently. In the present study, Knowledge of the population related to COVID-19 had been found to be fair, whereas Attitude and Practice towards this pandemic had been good. Results indicated that people were well aware of the disease and taking this disease seriously. This may be the reason for decrease in the number of new cases in the country.

Authors' contributions: AD: Contributions in concept, design, data collection, data analysis, drafting the manuscript and final approval of the manuscript, galley proofing. She was a major contributor of the study and corresponding author. TK: Contributions in data collection, revising the article. TA: Interpretation of the data, revised the manuscript critically, final approval of the manuscript.

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References

1. Lake MA. What we know so far: COVID-19 current clinical knowledge and research. Clin Med. 2020; 20(2):124-127. doi: 10.7861/clinmed.2019-coron.
2. Yi CW, Ching SC, Yu JC. The outbreak of COVID-19: An overview. J Chin Med Assoc.2020;83(3):217-220. doi:10.1097/JCMA.0000000000000270.
3. World Health Organization. Naming the coronavirus disease (COVID-19) and the virus that causes it. 2020. URL https://www. who. int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/naming-the-coronavirus-disease-(covid-2019)-and-the-virus-that-causes-it. 2020.
4. World Health Organization. Coronavirus disease 2019 (COVID-19): situation report,208. 2020. https: //www. who.int/docs/default-source/coronaviruse/situation-reports/20200815-covid-19-sitrep-208. pdf? sfvrsn = 9dc4e959_2

5. Cascella M, Rajnik M, Cuomo A, Dulebohn SC, Di Napoli R. Features, Evaluation and Treatment Coronavirus (COVID-19). In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2020.
6. Fouchier RA, Kuiken T, Schutten M, Van Amerongen G, Van Doornum GJ, Van Den Hoogen BG,et.al. Koch's postulates fulfilled for SARS virus. Nature. 2003; 423 (6937):240. doi: 10.1038/423240a.
7. Perlman S. Another Decade, Another Coronavirus. N Engl J Med. 2020;382(8):760-762. doi: 10.1056/ NEJMe 2001126.
8. Peiris JS, Chu CM, Cheng VC, Chan KS, Hung IF, Poon LL, et.al. Clinical progression and viral load in a community outbreak of coronavirus-associated SARS pneumonia: a prospective study. Lancet. 2003; 361 (9371):1767-72. doi: 10.1016/s0140-6736(03)13412-5.
9. Zaki AM, Van Boheemen S, Bestebroer TM, Osterhaus AD, Fouchier RA. Isolation of a novel coronavirus from a man with pneumonia in Saudi Arabia. N Eng J Med. 2012;367(19):1814-20.
10. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, Zhang et.al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet. 2020; 395 (10223):497-506.
11. World Health Organization. Coronavirus disease 2019 (ý COVID-19)ý: situation report, 208.
12. Sethi BA, Sethi A, Ali S, Aamir HS. Impact of Coronavirus disease (COVID-19) pandemic on health professionals. Pak J Med Sci. 2020;36(COVID19-S4).
13. Government of Pakistan, Muslims aid, & UNICEF. Corona Virus Public Awareness Campaign - Pakistan. 2020, March 22. Retrieved , 2020.
14. Pakistan reports lowest COVID-19 cases since May [Internet]. Aa.com.tr. 2020 [cited 11 August 2020]. Available from: https://www.aa.com.tr/en/asia-pacific/pakistan-reports-lowest-covid-19-cases-since-may/1928087
15. Zhong BL, Luo W, Li HM, Zhang QQ, Liu XG, Li WT,et.al. Knowledge, attitudes, and practices towards COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak: a quick online cross-sectional survey. Int J Biol Sci. 2020;16(10):1745.
16. Almutairi KM, Al Helih EM, Moussa M, Boshaiqah AE, SalehAlajilan A, Vinluan JM, et.al. Awareness, attitudes, and practices related to coronavirus pandemic among public in Saudi Arabia. Fam Community Health. 2015;38(4):332-40. doi: 10.1097/FCH. 0000 0 0 0 0 0 0 0000082.
17. Read JM, Bridgen JR, Cummings DA, Ho A, Jewell CP. Novel coronavirus 2019-nCoV: early estimation of epidemiological parameters and epidemic predictions. MedRxiv. 2020.doi: https://doi.org/10. 1101/ 2020. 01. 23.20018549.
18. Kim K, Andrew SA, Jung K. Public Health Network Structure and Collaboration Effectiveness during the 2015 MERS outbreak in South Korea: an institutional collective action framework. Int J Environ Res Public Health. 2017;14(9):1064.
19. Khurshid Z, Asiri FY, Al Wadaani H. Human saliva: Non-invasive fluid for detecting novel corona virus (2019-nCoV). Int J Environ Res Public Health. 2020; 17(7):2225.
20. World Health Organization. Corona virus disease 2019 (COVID-19): situation report, 73.
21. Ahmed N, Shakoor M, Vohra F, Abduljabbar T, Mariam Q, Rehman MA. Knowledge, Awareness and Practice of Health care Professionals amid SARS-CoV-2, Corona Virus Disease Outbreak. Pak J Med Sci. 2020; 36(COVID19-S4).
22. Kannan S, Ali PS, Sheeza A, Hemalatha K. COVID-19 (Novel Corona virus 2019)-recent trends. Eur Rev Med Pharmacol Sci. 2020;24(4):2006-11.
23. Dauda Goni M, Hasan H, Naing NN, Wan-Arfah N, ZeinyDeris Z, Nor Arifin W,et.al. Assessment of knowledge, attitude and practice towards prevention of respiratory tract infections among Hajj and Umrah pilgrims from Malaysia in 2018. Int J Environ Res Public Health. 2019;16(22):4569.
24. Khan S, Khan M, Maqsood K, Hussain T, Zeeshan M. Is Pakistan prepared for the COVID-19 epidemic? A questionnaire-based survey. J Med Virol. 2020;92(7): 824-832. doi: 10.1002/jmv.25814.
25. Centers for Disease control and Prevention. (2020, July). How to Protect Yourself & Others. Retrieved August 02, 2020, from https://www.cdc.gov/coronavirus /2019-ncov/prevent-getting-sick/prevention.html
26. World Health Organization. Advice on the use of masks in the context of COVID-19: interim guidance, 5 June 2020. World Health Org. 2020.