Research Article

Infodemics: Use of Peer Reviewed and Non-Peer Reviewed Information by Post Graduate Trainee Doctors for COVID-19 Pandemic in Pakistan.

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Abstract

Background: Reliable and peer reviewed information is of immense importance for preventive, diagnostic and curative solutions and efforts should be done to minimize inaccurate infodemics among post graduate trainee doctors.

Objective: The aim of the study was to access the use of Peer Reviewed and Non-Peer Reviewed Information by post graduate trainee doctors for COVID-19 Pandemic in Pakistan.

Methods: The study was analytical cross sectional in design and was conducted in 3193 post graduate trainee doctors employing Electronic Logbook (elog) system of College of Physicians and Surgeons, Pakistan. An online survey included demographic characteristics, year of training, specialty and sources of information used for COVID-19 pandemic.

Results: Total 3193 study participants from all provinces of Pakistan were included with mean age of 28.68 years. Majority of participants (58.66%) used both peer reviewed and non-peer reviewed information source for getting updated guidelines and information about COVID-19. According to bivariate analysis results, significant differences were revealed between the source of information and the age ($p < 0.001$), province ($p < 0.001$) and gender ($p < 0.002$). Multivariate logistic regression results showed that the age less than 30 years (AOR = 1.311, 95% (CI: 0.800, 2.146), working in Khyber Pakhtunkhwa province (AOR = 1.549, 95% (CI: 1.210-1.982) and female gender(AOR = 1.551, 95% (CI: 1.303, 1.847). was significantly associated with increased use of social media for getting information.

Conclusion: Use of non-peer reviewed information for COVID-19 pandemic by postgraduate trainee doctors is common.

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Key Words: Infodemics, COVID-19, health informatics, social media, telemedicine.

Introduction

COVID-19 is an ongoing pandemic which originally started from China and subsequently spread around the globe at an alarming and unprecedented rate. As on 25th September, 2020, this global pandemic has infected 32 million people worldwide. The most common symptom is respiratory illness whereas some unlucky patients are prone to develop complications. The spectrum of disease is very vast.[1,2] As

this is a new disease, clinical research is still ongoing to develop vaccination for the virus. However, given the extent and fast rate of spread of this pandemic, the whole world, including doctors and scientists were taken by surprise and caught unprepared when the pandemic spread. In the wake of fast transmission of virus and absence of any clinical treatment protocols, misinformation regarding treatment and causes of this virus spread throughout the world.[2,3]

Known as widespread misinformation and myths, infodemics is one of the key obstacles in the path of providing the right health care to patients in need. Health care providers have been victim of myths and false information.[4] Infodemic is an emerging issue in case of this pandemic. It occurs when there is an excess of information which includes both true and false information. Infodemics in COVID has made it difficult even for doctors and paramedics to get reliable information. The director general of World Health Organization (WHO) showed concern that this pandemic of humanity is accompanied with infodemics.[5,6]

There are broadly two main type of sources by which health care providers obtain information. The first is the peer reviewed information and the second is the non-peer reviewed information. Peer reviewed information includes standard books, journals and educational websites such as CDC and WHO. Non peer reviewed information is obtained from social media, television and radio. It is difficult to eliminate infodemics but it can be minimized and managed. Minimizing it will help the health care professionals to get the right information.[7,8]

False claims through social media and other sources are of great concern. A study done in Italy showed that internet was the fastest and common sources for getting information related to health. In Pakistan it is difficult to deal with infodemics as there is a very few peer reviewed material available for trainings. Previously infodemics affected polio and vaccination campaigns and polio drops were falsely declared as family planning drops and refused by public at large.[8,9] False treatments and other information about COVID-19 have circulated on social media including Facebook and WhatsApp messages in our country. The result of using this inaccurate treatment in health settings can be devastating. Pakistan has been the victim of infodemics during COVID pandemic. Health care providers have an important role to get information and recommendations from a reliable source.[8,10]

The objective of the study was to access the use of social media as source of information by post graduate trainee doctors for COVID-19 Pandemic in Pakistan. This study will enable us to highlight the issue of infodemics among health care providers in our country. Moreover the peer reviewed information from this part of world is less. It is the need of hour to increase the peer reviewed information. This will help the health care professionals to get reliable information for diagnosing, treatment and management of health problems.

Methods

This analytical cross sectional study was conducted among post graduate trainee doctors through Electronic logbook (e-log) system of College of Physicians and Surgeons, Pakistan from 15th April 2020 to 30th June 2020. Post graduate trainee doctors who were currently enrolled in training program and directly involved in COVID-19 hospital duties were included in the study.

A pretested comprehensive semi structured questionaire was administered online through Google forms with a link rooted on the log book of trainee doctors. Participation was essentially voluntary. The questionaire contained demographic variables of participants and questions regarding preferable sources of information for latest updates of COVID-19. The primary outcome measure was to determine the source of information including peer reviewed articles published in journals, e-books, and scientific websites and non-peer reviewed information including social media, television, radio and newspapers for diagnosis and management by post graduate trainee doctors for COVID-19 Pandemic in Pakistan.

Data was entered and analyzed by SPSS (Statistical Package for Social Sciences) version 26. Descriptive statistics were used to report proportion, mean and Standard deviations. Chi-square test and multinominal logistic regression analysis were employed for analysis. Factors showing significant association (p value < 0.05) with outcome variable in bi-variate analysis were further entered in multivariate analysis to report adjusted odds ratio and 95% confidence intervals after eviction of confounding variables.

The Institutional review board of King Edward Medical University via letter No. 299/RC/KEMU provided ethical endorsement of the study. The study was conducted after obtaining informed consent from respondents who were assured about data confidentiality.

Results:

Of the total 3193 study participants, 1721(53.9%) were male and 1472 (46.1%) were female postgraduate trainee doctors with mean age of 28.68 ± 3.109 years (range 23-52 years). Most of the study participants were unmarried 2329(72.9%), in first and second year of their training 2141(67.1%). More than 70 percent of the study participants were from the medicine and allied specialties 2258(70.71%).About 62.4 percent of the study participants were from the private medical institutions of Pakistan 1993 (62.41%) Table 1.

Table 1: *Socio-demographic characteristics of Study Participants (N = 3193)*

Variables		Participants, n(%)
Age mean(SD)		28.68± 3.109 years
Province	Azad Kashmir	43(1.3)
	Balochistan	62(1.9)
	Khyber Pakhtunkhwa	866(27.1)
	Punjab	1512(47.4)
	Sindh	710(22.2)
Institute	Private	1993(62.41)
	Government	1200(37.58)
Specialties	Medicine and Allied	2258(70.717)
	Surgery and Allied	851(26.65)
	Basic Medical sciences	57(1.78)
	Dentistry	27(84.55)
Gender	Male	1721(53.9)
	Female	1472(46.1)
Marital status	Married	864(27.1)
	Unmarried	2329(72.9)
Training Year	1 & 2 year	2141(67.1)
	3 & 4 year	1052(32.9)

In this study, 28.94% of study participants used social media, television, radio and newspapers while 12.40% of study participants used journals, e-books, and scientific websites. Majority of participants (58.66%) used both peer reviewed and non-peer reviewed information source for get updated guidelines and information about COVID-19. Bivariate chi-square analysis was applied between sociodemographic characteristics and source of information for COVID-19 pandemic. According to bivariate chi-

square analysis results, significant differences were observed between the age, province, gender (p-value < 0.05) Table 2. Age less than 30 years, working at Khyber Pakhtunkhwa and female gender were associated with increased use of non-peer reviewed information.

Table 2: *Factors associated with sources of information in COVID-19 (N = 3193)*

Variables	Non-Peer Reviewed Information (Social media, television, radio and newspapers) N (%)	Peer Reviewed Information (Journals, e-books, and scientific websites) N (%)	Source of information Both N (%)	Total N (%)	Chi-square analysis	p-value
Age (years)						
Less than 30	795(86.0)	322(81.3)	1477(78.9)	2594(81.2)	20.940	**0.001**
More than 30	129(14.0)	74(18.7)	396(21.1)	599(18.8)		
Province						
Azad Kashmir	15(1.6)	1(0.3)	27(1.4)	43(1.3)	36.979	**0.001**
Balochistan	18(1.9)	9(2.3)	35(1.9)	62(1.9)		
Khyber Pakhtunkhwa	303(32.8)	78(19.7)	485(25.9)	866(27.1)		
Punjab	407(44.0)	196(49.5)	909(48.5)	1512(47.4)		
Sindh	181(19.6)	112(28.3)	417(22.3)	710(22.2)		
Gender						
Male	453(49.0)	221(55.8)	1047(55.9)	1721(53.9)	12.428	**0.002**
Female	471(51.0)	175(44.2)	826(44.1)	1472(46.1)		
Marital status						
Married	226(24.5)	104(26.3)	534(28.5)	864(27.1)	5.291	0.071
Single	698(75.5)	292(73.7)	1339(71.5)	2329(72.9)		
Training Year						
1 & 2 year	636(19.9)	258(8.08)	1247(39.01)	2141(67.05)	5.406	0.493
3 & 4 year	288(9.01)	138(4.32)	626(19.94)	1052(32.94)		

The variables that were significant in bivariate chi-square analysis (p-value < 0.05) were entered in the multivariate multinomial logistic regression analysis. The multinomial logistic regression was used to analyze the factor associated with the three categories including peer reviewed articles (journals, e-books, and scientific websites), non-peer reviewed information (social media, television, radio and newspapers) and both (peer reviewed and non-peer reviewed). The reference category for outcome variable was "use of both peer reviewed and non-peer reviewed sources of COVID-19 information" and each of other two categories of source of information was compared to this reference group. The First column of the Table 3 represents the outcome of "non-peer reviewed information" compared to "use of both sources

of COVID-19 information". The results showed that the age less than 30 years is more likely to increase the likelihood of use of non-peer reviewed information (AOR = 1.311, 95% (CI: 0.800, 2.146). Working in Khyber Pakhtunkhwa province (AOR = 1.549, 95% (CI: 1.210-1.982) and female gender (AOR = 1.551, 95% (CI: 1.303, 1.847) was significantly associated use of non-peer reviewed source of information.

The second column of Table 3 represents the outcome of "peer reviewed source of information" compared to "both (peer reviewed and non-peer reviewed)". The results showed that the age less than 30 years (AOR = 0.814, 95% (CI: 0.430-1.537) and female gender (AOR = 0.906, 95% (CI: 0.720-1.141) is less likely to increase the likelihood of use of peer reviewed information.

Table 3: *Multinomial logistic regression model identifying factors associated with use of media and social media, websites and journals in post graduate trainee doctors (N=3193)*

Variables	Source of information (non-peer reviewed)	Source of information (non-peer reviewed)	Source of information (Peer reviewed)	Source of information (Peer reviewed)
	AOR	95%CI	AOR	95%CI
Age (years)				
Less than 30	1.311	0.800-2.146	0.814	0.430-1.537
More than 30	Reference	Reference	Reference	Reference
Province				
Azad Kashmir	1.123	0.566-2.228	0.115	0.015-0.864
Balochistan	1.118	0.603-2.075	0.874	0.403-1.894
Khyber Pakhtunkhwa	1.549	1.210-1.982*	0.551	0.015-0.864
Punjab	1.101	0.884-1.372	0.806	0.618-1.052
Sindh	Reference	Reference	Reference	Reference
Gender				
Female	1.551	1.303-1.847*	0.906	0.720-1.141
Male	Reference	Reference	Reference	Reference

AOR Adjusted Odds Ratio, 95% CI Confidence Interval. * $p < 0.05$. Pearson = 0.183. Deviance = 0.119.

Discussion:

The purpose of the study was to assess the use of peer reviewed and non-peer reviewed as source of information by post graduate trainees for Covid-19 pandemic in Pakistan. Globally, the COVID 19 pandemic is presently affecting more than 250 countries due to which it is a greatest public health concern. To control COVID 19 many preventive strategies and guidelines have been proposed which shifted the commonly used print or peer reviewed media to social media. Social media (WhatsApp, Facebook, Instagram and twitter) were used for getting information about COVID 19 awareness, prevention, diagnosis and treatment. This caused misinformation affecting public at large.[11] Health care professionals were also victims. As they are frontline warriors in this pandemic; misinformation can lead to mismanagement and misdiagnosis. World health Organization has already recognized this issue and to address it they have disseminated dedicated WhatsApp numbers and groups in various languages.[12] Therefore, authentic information must be used widely in post-graduate training institutions to address this issue.

Rising access towards social media in addition to cell phones with an internet connection has responsible for producing exponential information epidemic or info-demic[11]. It has reported that about 23%-26% of YouTube videos regarding CoVID-19 were involved

in disseminating misinformation like false cures, anti-vaccination propaganda and conspiracy theories which intensifies malpractices[12]. This wrong information about COVID-19 is being produced in numerous forms, for example conspiracy theories which express the virus being produced in a laboratory for utilizing it as a biological weapon[11,14]. In the present study, 58.56% participants used all sources of information like media and social-media, journals and websites. This finding is consistent with the previous studies which showed that social media like WhatsApp, Facebook, Twitter, Instagram and telegram were most preferred ways for getting information by health care providers.[13,14] This may be due to the fact that the majority of the health care providers thought social media to be beneficial and an effective way of time engaging during their long and tough duty hours in the hospital.

The results showed that the age less than 30 years is more likely to increase the likelihood of use non-peer reviewed information as a source of information.[14] This may be due to fact that young health care professionals have better access and adaptation to social media. Moreover they are well equipped with latest gadgets. Doctors of older age group prefer using books and websites as source of reliable information. In our study working in Khyber Pakhtunkhwa province is more likely to increase the likelihood of use of non-peer reviewed information by the health-care postgraduate trainees.[15,16] Sharing of misinformation leads to decrease in quality of health care and malpractices. This may be due to fact that literacy rate of KPK is lower than the county's average literacy rate (56% of KPK and 65% in Pakistan) and there are barriers due to language as Pushto is not widely understood in Pakistan.[14,9] The regression analysis of the study indicates that being a female is significantly associated with the use of use non-peer reviewed information during COVID-19 pandemic. This may be due to restriction on mobility and more indoor activities of females as compared to males.[14,15]

In the twenty first century, social media has become a rapid source of information and can be well-run quickly. However, during the current COVID-19 pandemic, social media has become most valuable and accessible communication tool for an accurate and rapid estimation of progression of the up to date condition of disease within communities.[16,17] If the usage of social media becomes more correct or scientific then the it can give an extremely efficient and comprehensible way of evaluating the facts and figures of COVID-19 pandemic epidemic both locally and at an international level. In the current study, participants appeared to consider the social media as having numerous helpful dimensions for example: enabling them to improve efficiency, productivity and a more efficient patient care.[18,19] Though, ethical concerns such as confidentiality and privacy have been discussed and have to be seriously taken into concern. Privacy Policies and guidelines related to the patients privacy must be formulated by the research teams in combination with their particular institutional review boards to maintain transmit of potentially identifying data.[20,21,22]

The limitations of this study are that it is an online survey; cause-effect relation cannot be established and data were only collected from post graduate trainees of CPSP Pakistan. In conclusion, the findings of this study suggest that non-peer reviewed information by health care providers is high. Misinformation can result in disastrous results. Efforts should be done to minimize infodemics in health care professsionals.

Conclusion:

Use of non-peer reviewed information for COVID-19 pandemic by postgraduate trainee doctors is common. Efforts should be done to minimize inaccurate infodemics among post graduate trainee doctors.

Footnotes

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Contributors All authors contributed to the manuscript. All were involved in the design of the study. ST&SA helped in conception and design of the research, acquisition analysis of data, interpretation writing the manuscript, till final approval and

submission. HM helped in study design acquisition and analysis of data, writing and review of the manuscript and final approval. MN helped in study design, acquisition and analysis of data writing and review of the manuscript and final approval. K J helped in study design, acquisition and analysis of data writing and review of the manuscript and final approval.

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