

Coronavirus Pandemic

Missed takes towards a pandemic of COVID-19? A systematic literature review of Coronavirus related diseases in Pakistan

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Abstract

Pakistan is also seeing the profound effect of the outbreak of COVID-19, which demands an urgent investigation of literature and further scientific investigation for cure and prevention. This study has employed the systematic approach for searching the literature from the recently compiled database of researches namely COVID-19 Open Research Dataset (CORD-19) and related diseases. The literature on Pakistan has shown the evidence of human-to-human and animal-to-human transmission of viruses, the presence of antibodies of MERS-CoV in camels, and careless attitude towards preventive measures of such respiratory diseases. There is a lot of gap in the literature regarding coronaviruses and their antibodies creating herd immunity for another coronavirus and COVID-19. In particular to Pakistan, and in general, for other developing countries, a weak health-care system coupled with the trembling economy has many implications of COVID-19 which should be carefully thought-out to combat the spread.

Key words: Coronavirus; COVID-19; Pakistan; MERS-CoV; SARS.

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Introduction

Ensuring public health safety has become the utmost priority for the governments and policy-making institutions across the globe and in Pakistan as well. Pakistan is geographically located between two epicenters of the Novel Coronavirus outbreak i.e. China and Iran [1]. Especially after the widespread transmission of COVID-19 in more than 190 countries, big pharmaceutical companies, research institutions, and individual researchers are working in many dimensions related to this particular disease. COVID-19 is an infectious disease that brings lethal consequences to the respiratory system or in other words, it is a variant of the flu.

This infectious agent belongs to the family of Coronaviruses, which also consists of MERS and SARS as well. In late November 2019, the first patient of COVID-19 was identified in Wuhan, China, and the rest is history. The severity of the magnitude can be understood, as within three months World Health Organization (WHO) changed the status of COVID-19 from endemic to a pandemic. As of 11th May 2020, there are 4,006,257 confirmed cases of COVID-19 along with 278,892 confirmed deaths according to

situation report (no. 112) of World Bank across all the regions of the world [2].

Pakistan is already declared as the riskiest place to be born by UNICEF [3]. In particular to COVID-19 spread in Pakistan, as of 11th May 2020, there are 30,941 confirmed cases of COVID-19, out of which bigger chunk belongs to the densely populated province of Punjab (11,568 cases), followed by 11,480 cases in Sindh, 500 cases in Khyber Pakhtunkhwa, 211 cases in Gilgit Baltistan, 2017 cases in Balochistan, 679 cases in Islamabad, and 86 cases in AJK [4]. The profound effect of COVID-19 is already at the doorstep of Pakistan as the Government has not waived off the lockdown completely. The health-care provision in Pakistan is not good, and public sector hospitals are unable to take the complete burden of communicable and non-communicable disease patients. In particular, the health-care provision in Pakistan is a mix which is mainly for government officials, and the rest of the people rely on out of pocket medical spending mainly provided by the private sector [5]. Under such circumstances, this research is an effort to scientifically and systematically analyze the COVID-19 related literature which will help people around the world to identify the relevant research gaps, and in particular, to

Pakistan, it helps not only facilitate the future research but it will also help in the policymaking as well. For example, it could certainly help the Ministry of Science and Technology to decide in which area of research about COVID-19 they need to relocate more funds for further research. Internationally, every country struck by COVID-19 is important as if it fails to fight then it will remain a threat to the world for exportation of the disease.

Methods

Study design

Literature was collected through a systematic way using meta-analyses (PRISMA) guidelines.

Search strategy and selection of studies

The White House and research groups around the world developed an open database (CORD-19) which essentially includes research articles about COVID-19 and related diseases from all the other databases including the World Health Organization.

The White House and research groups have made the database COVID-19 Open Research Dataset (CORD-19) which contains more than 45,000 articles on COVID-19, coronaviruses, and related diseases from all databases including the World Health Organization [6]. This research article database provides interesting insights in particular to the evolution of COVID-19

related diseases and this was made public after mid-March 2020. This dataset was made available for researchers for research after mid-March 2020. This was a joint effort initiated by Chan Zuckerberg Initiative, Microsoft Research, National Library of Medicine, and Georgetown University’s Center for Security and Emerging Technology. In this study, we used 45,827 articles in the database and this database contains articles from 41,685 distinct journals. The articles are majorly indexed on Elsevier, WHO, PMC, Biorix, Medrix. Some of the important articles belong to PubMed, WHO COVID-19 database, and Microsoft Academic.

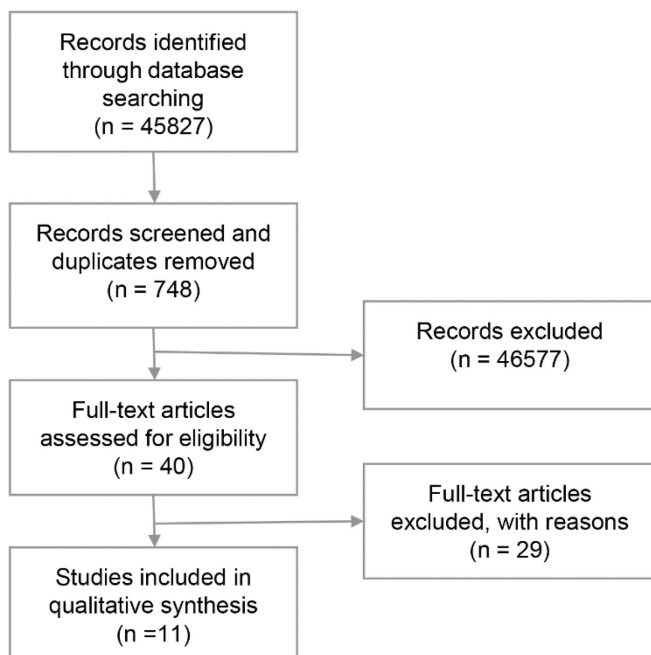
Therefore, this is a comprehensive database, which saves time of going to different platforms and doing the search individually by using keywords as well to make articles available for research. Since we observe the exponential growth of COVID-19 in Pakistan so we picked up the relevant literature which helps us identify and understand the research advancement in the country. We reviewed titles and abstracts and screened the records. Only those articles, which were on coronavirus and respiratory diseases, were retained for the synthesis of this study. Figure 1 shows the screening of studies following the PRISM guidelines.

Results

We had a database of 45,827 articles from COVID-19 Open Research Dataset (CORD-19). We reviewed the titles and abstracts and retained 40 articles on Pakistan. Our focus for this study was coronavirus and other respiratory diseases, thus, excluded the studies on Pakistan on other infectious diseases in Pakistan for example dengue. Only journal articles were used in the synthesis of this literature. (Table 1).

Our findings ascertained that there are quite a few studies about the Coronavirus family and its implications related to Pakistan. Researchers so far analyzed the transmission mechanism such as it could be spread from travelers, especially bigger congregations can become a hotspot for the outbreak. In the context of religious gatherings, their findings were recently validated as pilgrims from Saudi Arabia, and Iran is identified as a primary source of transmission in Pakistan. The literature included in synthesis has one study on the animal to human transmission is analyzed, another study showcases all the literature about personal protective equipment and we have only one study linked with the behavioral implications of medical personals related to transmission rate in the health-care workers.

Figure 1. Flow diagram of search strategy. The figure summarizes the systematic methodology following PRISMA strategy by Moher *et al.* [21].



In this regard, Khan [7] briefly summarized the emerging picture of a respiratory virus, which resulted in six fatalities in different parts of the world. He performed the sequence analysis to determine it was a novel coronavirus belonging to the same family as Severe Acute Respiratory Syndrome (SARS) and Middle East Region Respiratory Syndrome (MERS). He argued that the index case about the virus, was living in the UK has a travel history to Pakistan. He established the novel virus is lethal but the human-to-

human transmission was limited. Thereafter, he also argued about the common conditions, which mainly include fever, cough, and shortness of breath. However, more severe conditions include progressive pneumonia and in some of the instances, it would further escalate into renal failure.

The studies have shown the potential importation of the coronaviruses through gatherings and traveling. In this regard, Khan, Sears [7] analyzed the transmission rate about one of the viruses from the corona family.

Table 1. Studies on Coronavirus and respiratory diseases in the context of Pakistan.

Author and year	Study Design	Participants	Disease focus	Main Findings
Khan, G., 2013 [7]	Descriptive study using sequence analysis of events	Laboratory confirmed cases	SARS-CoV (novel coronavirus)	Not all patients developed pneumonia and human-to-human transmission was low.
Khan <i>et al.</i> , 2013 [8]	Cross sectional study	2012 worldwide flight itinerary data	MERS-CoV	16.8 M travelers flew on commercial flights out of Saudi Arabia between June and November 2012 and 7.8% flew to Pakistan. Countries where people returned from Saudi Arabia have potential of importation of disease.
Saqib <i>et al.</i> , 2017 [9]	Cross sectional study	Serum samples of dromedary camels from Punjab, Pakistan	MERS-CoV	Human living in Punjab also have potential exposure to the disease similar to risks in Africa and the Peninsula.
Zohaib <i>et al.</i> , 2018 [10]	Cross sectional study	Serum samples of humans and camels was taken from Punjab, Pakistan	MERS-CoV	MERS-CoV antibody as found positive in camels and neutralizing antibody was not found in humans.
Zheng <i>et al.</i> , 2019 [11]	Cross sectional study	Serum samples of humans	MERS-CoV	12% humans were found seropositive for the disease.
Chughtai <i>et al.</i> , 2015 [12]	Cross sectional study	Cross sectional survey was conducted in China, Pakistan and Vietnam	SARS and other respiratory diseases	There was inconsistent recommendations of the type of products (respirators, masks) across three countries
Simpson <i>et al.</i> , 2015 [13]	Cross sectional study	Retrospective cohort study was conducted in Scotland across different ethnicities	Lower respiratory tract infections	Risk ratio of lower respiratory infection is higher in Pakistanis living in Scotland
Aziz <i>et al.</i> , 2016 [14]	Cross sectional study	Children less than 5 years of age in Pakistan	Respiratory infections	Upon testing, several corona viruses types were found positive in children
Rahman <i>et al.</i> , 2017 [15]	Cross sectional study	Semi-structured interviews were conducted from Hajjis from four different countries (Pakistan, Bangladesh, New Zealand and Myanmar)	Respiratory infections	Risk to infections is present in mass gatherings as there is weakness in enforcement of law in both custodian country and country of origin
Chughtai <i>et al.</i> , 2020 [16]	Qualitative study	Systematic literature review	Respiratory infections	The use of personal protective equipment to protect from respiratory diseases was low which was mainly due to unavailability and lack of training.
Hussain <i>et al.</i> , 2012 [17]	Cross sectional study	Questionnaire based survey was conducted among medical students of Isra University, Karachi, Pakistan	H1N1 influenza	Students have sufficient knowledge of the H1N1 pandemic but lack understanding of key elements for protection.

They analyzed the flight itinerary data for all parts of the world and historic pilgrim data. They predicted the population exiting Saudi Arabia and the broader Middle East region to determine MERS-CoV vulnerability as travelers might import the lethal virus with them. They further incorporated the public-health care status and response into their analysis to determine the capacity and timely detection of the MERS. Simpson, Steiner [8] brought another important dimension to an analysis by considering the ethnic group identity and lower respiratory tract infections. They conducted a retrospective cohort study by considering 4.65 million people from the census data of 2001 and 2010 from Scotland. They found that amongst the men, adjusted risk ratios for lower respiratory tract infection hospitalization were higher in Pakistani groups in comparison to White British and Chinese people. In the context of women, results were mostly comparable to those in men, although higher adjusted risk ratios were found among women of the other South Asians. A study documented the factors, which can help combat the public health risk. They utilized the semi-structured questionnaire among Hajjis from four different countries, which include Bangladesh, Pakistan, Myanmar, and New Zealand. Their findings ascertained that strategic planning, implementation of laws by both custodian country and country of origin is the need the hour to prevent any outbreak pertaining to public health [9]. In a letter to the editor, Ahmad, Khan [10] argued that there is a pressing need to develop a pandemic response policy in Pakistan. Lastly, in a letter to the editor by Qureshi, Saleem [11] they highlighted implications for travelers to Pakistan in the context of COVID-19. They suggested that trading routes should be monitored to combat the COVID-19 spread and a massive awareness campaign should be initiated to educate people as a preventive measure.

Few studies found the transmission of coronaviruses. Saqib, Sieberg [12] tested 565 serum samples of the dromedary, which they obtained from 348 female and 217 male animals by using a convenience sampling strategy in 9 districts of Punjab, eastern Pakistan, during 2012–2015. They find the conclusive evidence of 39.5% specific neutralizing antibodies out of the total sample, documenting the significant expansion of the enzootic range of MERS-CoV to Asia. Zheng, Hassan [13] argued a high population of camel handlers in Saudi Arabia is seropositive, thus, camel handlers should also be analyzed in Pakistan. They found that 12 out of 100 camel handlers and people from their family in Pakistan, a country with extensive camel MERS-CoV

infection, were seropositive, representing that MERS-CoV infection of these populations' spreads beyond the Arabian Peninsula. Another study confirmed the presence of antibodies for MERS-CoV in camels [14]. It remained unanswered whether these antibodies for MERS-CoV can produce herd immunity against other coronaviruses.

Chughtai, Khan [15] performed a systematic literature review on personal protective equipment (PPE) in Pakistan. They analyzed those studies which contain protective material that is used as protection against respiratory infections in Pakistan. Their findings from the literature evaluation ascertained that there is a dire need for higher PPE usage among the health-care worker and these PPE should not be reused. They recommended large multimethod studies on PPE use to formulate national infection-control guidelines. Hussain, Hussain [16] documented the perception of medical students about the H1N1 virus which also belongs to the family of respiratory viruses. They argued on the need that educational institutions such as universities should enforce the medical students to stick tight to the prescribed protocols regarding the H1N1 pandemic. They concluded excessive contact with colleagues and patients would eventually translate into the unintentional transmission of H1N1. Thus, their work substantially helps them to understand and control the transmission of this (H1N1) respiratory virus from the health-care institutions since the doctors are always at the forefront to fight against such pandemics.

The literature suggests that Pakistan has seen endemics of H1N1, MERS-CoV, and SARS but there is a noteworthy research gap concerning the scientific discovery and scientific approaches to control these viral endemics. For example, investigating the role of antibodies produced in response to MERS, which could be used as a potential treatment against other coronaviruses, is widely missing in the empirical literature. Another potential gap is the existence and role of herd immunity in the people against such viral diseases.

Conclusions

Researchers have investigated the transmission phenomenon mainly from two different perspectives which include animal-to-human transmission and human-to-human transmission. Meanwhile, few consolidated pieces of literature can help to formulate policies and protective plans. The current ongoing lockdown has restricted the human-to-human transmission. The behavior for using masks and other protective material was weak in history as well due to

lack of availability and training. The literature showed the risk of importation of coronaviruses through flights but Pakistan ignored the fact and imported Corona from China, Iran, and Saudi Arabia. The behavior for using masks and other protective material was weak in history as well due to lack of availability and training. As of March 23rd, masks and ventilators were ordered to protect doctors [17]. The research question still prevails on the economic losses by COVID-19. Being a low-income country, having poverty and lower literacy rate, if Pakistan succeeds in fighting with the disease, will it be able to handle the economic slowdown due to lockdowns. Although, COVID-19 is still new, but the world has already starting to realize the profound psychosocial implications of this pandemic. At the intersection of these implications there exist a large literature gap that is yet to be covered.

This outbreak of COVID-19 coupled with the overall health system and economic issues has put the governments to test. For instance, many countries across Europe, Asia, and America are on standstill due to enforced lock-down because of the exponential growth of COVID-19 related cases. In particular to Pakistan, and in general, for other developing countries, a weak health-care system coupled with the trembling economy has many implications of COVID-19 which should be carefully thought-out to combat spread. This sort of situation provokes the need for careful assessment of COVID-19 related research in the context of Pakistan and in general to developing countries to come up with efficient and effective health and economic policy. This study can certainly facilitate the researchers to identify the consolidated work and gap in that particular area, in addition to this, it can further help in policy-making, for instance, helping in the resource allocation which may facilitate in curtailing and combating the negative outcomes.

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