https://doi.org/10.29309/TPMJ/2022.29.05.6823

The Professional Medical Journal
www.theprofesional.com
2022, Volume, 29 Issue, 05

REVIEW ARTICLE

SARS-2 lessons learned so far from Pakistan Perspective (A Review).

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Article Citation: Fawwad A, Nangrejo R, Ahmed F, Basit A. SARS-2 lessons learned so far from Pakistan Perspective (A Review). Professional Med J 2022; 29(5):564-575. https://doi.org/10.29309/TPMJ/2022.29.05.6823

ABSTRACT… Summary: The COVID-19 outbreak started in December 2019, first from the China city, Wuhan. The rapid spread of the virus has affected the worldwide population involving 208 countries including UK, USA, Spain, Italy and Pakistan, and has been declared a global pandemic by the WHO. Strict measures have been taken globally to control the COVID-19 outbreak. With limited availability of resources, the government of Pakistan to different measures to prevent the spread, such as establishing screening and testing, isolation and quarantine facilities and training medical professionals and enforcing lockdown. Pakistan ranking 5th in the list of Populated countries and also being a developing country, requires financial aid as well as facilitation to combat the outbreak. Also overviewing the measures, proper hospital facilities are to be established and should be available in every region of the country, whereas the testing and screening facilities are required to be set as per the population of the country. The vaccines being introduced worldwide, its arrival in Pakistan and making it available for the population is also an effort made by the Government to bring back things to normal. Educating citizens and abiding by the safety rules to prevent the spread is still the area that needs to be worked upon. We have highlighted the measures and steps taken by the Pakistani government in last one year, to combat COVID-19 and to ensure the country's safety and minimize mortality.

Key Words: SARS-2, Severe Acute Respiratory Syndrome-2.

INTRODUCTION

The COVID 19 outbreak was initially considered to be the pneumonia of unknown etiology but was later regarded as Epidemic through its outbreak in Wuhan, China, in December 2019 and then spread throughout the china and globally at a very high pace.[1] Further into the outbreak, PRC and CDC collected respiratory tract samples of the infected/contaminated persons for analysis. It was observed that a new strain of Virus is responsible for the disorder.[2] The respiratory system is one of the major systems targeted by the coronavirus and been named as 2019 - nCoV by the Chinese researchers.[3,4] This virus latter named as Severe Acute Respiratory Syndrome-2 (SARS CoV-2) by Global Committee on Taxonomy of Viruses.[5] In February 11th, 2020, WHO named pneumonia as the coronavirus disease – 19.[6] On January 30th 2020, this pandemic situation is declared as the sixth public health of emergency services (SPHEC).[7] The virus outbreak is not the first, there have been previous outbreaks of MERS-CoV and SARS-CoV (Severe Acute Respiratory Syndrome Coronavirus, Middle East Respiratory Syndrome Coronavirus).[8] COVID-19 outbreak is the third that has spread worldwide affecting about 209 countries including Pakistan, having confirmed cases of 1,093,349 and mortalities of 58,620 (according to WHO). The highest positive cases being in USA following Italy and Spain.[9] Even after Italy, the death rate in Iran was higher, and it had a great impact on Pakistan's border international areas.[10] The Pakistani Health Department assisted Karachi (Sindh Province) authorities to detect the first case of COVID-19 on February 26, 2020. The same situation was declared by the Federal Ministry of Health in Islamabad on the same day.[11,12] Within fifteen days, out of 471 suspected cases, the confirmed cases began to rise to 20 cases. The number of

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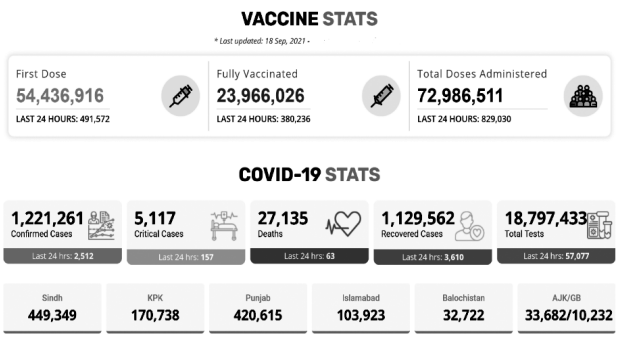
Article received on: 27/09/2021
Accepted for publication: 30/11/2021

cases were higher in Sindh province followed by Gilgit, Baltistan. Travel records from Syria, London and Iran are a common feature of many infected people. The report of positive cases is still rising and makes the situation worse.[13] Therefore, on February 12, with the assistance of the Pakistan National Health Service, the Ministry of Regulations and Coordination, the "Pakistan National Action Plan for Response and Prevention of Coronavirus Disease (COVID-19)" provides a assurance for controlling the spread of the virus and strengthening unity.[14] So far, the Pakistani government has taken a number of measures to curb the outbreak of the virus. In this review article, we focused on the different measures taken by the Pakistani government against COVID-19, such as designated hospitals, quarantine centers, testing facilities, treatment methods, public awareness, and the local community's response to the COVID-19 outbreak.



https://ncoc.gov.pk/.[15]

The Pakistani government is taking measures to fight COVID-19, aimed at providing and ensuring the country's responsibility to its citizens. Since the discovery of the first confirmed case, extreme safety measures have been taken to ensure the safety of personnel. Since all detected cases have travel history and Are a risk of spread of virus elsewhere in the country, the Pakistani government has provided COVID-19 mitigation strategies, which include early detection and tracing of contacts, social distancing, risk communication, isolation and isolation control.[16] The establishment of the relief fund took the initiative and launched the social network helpline in seven (07) languages. At the provincial level, it can be seen that the Communication Task Force supported by UNHCR compiled the International Electrotechnical Commission's materials in Dari and Pushto. The Khyber Pakhtunkhwa government in 2020 Instructions were issued from April 1 to 13 regarding the closure of operating rooms and elective surgical services in all available hospitals in the province. Pakistani Government received fund US$60 million from Central Emergency Relief Fund (CERF) for the COVID-19 global emergency response plan. Karachi city has the first drive through COVID-19 testing facility in Pakistan.[17]

The government has provided convenience by arranging the work of the hospital, which is working to respond to the COVID-19 epidemic and restore people to life. Initially in response to this situation, Islamabad has only one operational hospital, while Baluchistan has only 10 hospitals, Khyber Pakhtunkhwa has 7, Punjab has only 6 and Sindh has only 4. Gilgit Baltistan has 4, Azad Jammu and Kashmir have 3 functional hospitals.[18] Based on the availability of quality isolation wards at the federal, provincial and district levels, the admission and management of suspected and confirmed specific hospitals are approved. Institutions and hospitals handling the situation conducted a demand and availability assessment of consumables, and determined the source to ensure the availability and supply of PPE and other equipment. The infection prevention and control (IPC) team was identified and trained in the hospital, and the trained IPC leader ensured the (implementation) of IPC measures amd ensured the distribution of recent national IPC guidelines/ SOP drafts including rapid implementation; of the following:

1. Develop and distribute standard operating procedures (SOP) for waste management in hospitals and airports with proper training for all personnel responsible for waste disposal.
2. Develop disinfection and environmental purification SOP.[19]

Isolation is to isolate sick patients from uninfected people to prevent the spread of infection or pollution. Hospitals used as COVID-19 isolation wards are widely distributed in various provinces, which is a good gesture to help control the nationwide

epidemic. The distribution of regional isolation hospitals has been completed. Islamabad has a separate medical department with 10 isolation beds. In the 14 regions of Baluchistan, each region has 19 colleges that oppose COVID. There are 110 functional medical facilities in 33 districts of Uchluzhstan. 50 functional medical facilities have been established in 34 districts of Punjab. In the 4 districts of Sindh, 4 medical institutions are functioning normally. There are 21 hospitals in 10 districts of Gilgit Baltistan, 9 districts in Azad Jammu, and 15 medical institutions in Kashmir.[20]

Quarantine is to isolate and constrain the movements of individuals in a non-medical institution, who are not yet sick but may have been infected by the virus (such as COVID-19). The basic purpose is to monitor symptoms and detect cases early, in order to provide immediate treatment. Isolation camps are widely distributed in various provinces. A total of 23,557 quarantine facilities have been established in 139 districts in each province. In Islamabad, the country's capital, two quarantine facilities have begun operations. Currently, there are, 10 facilities operating in Balochistan. Similarly, 52 in Khyber Pakhtunkhwa, 6 in Punjab, 2 in Sindh, and 63 quarantine facilities in Gilgit-Baltistan are also in operation. In AJK, 4 isolation facilities are operating in various regions.[21]

In order to test for COVID-19, the best and simplest method used worldwide is PCR, and the Pakistani government also recommends the use of PCR. In different cities across the country, 15 laboratories are supplied with free PCR system facilities for testing of COVID-19. The capacity of the testing is increased from 30,000 to 280,000, and it is estimated that this capacity will be 900,000 in the next few months. Approximately 15,000 coronavirus tests have been conducted since the outbreak. The National Disaster Management Agency (NDMA) and the National Institutes of Health (NIH) have collaborated to increase the current number of coronavirus testing laboratories in different cities across the country from 15 to 50. Pakistan has also launched a nursing staff training program and laboratory staff to make up for this shortcoming. NDMA will recruit 100 laboratory technicians with expertise in molecular biology.[22]

Treatment protocols compared and contrasted

The different treatment options used for the COVID-19 and their mode of action is descried here.

Chloroquine (CQ)/Hydroxychloroquine (HCQ)

CQ and HCQ have been used for treating malaria for over 70 years. They work by suppressing the synthesis of viral proteins.[2] In vitro experiments revealed that CQ and HCQ inhibit the production of mRNA of SARS-CoV-2.[3,4] Although this may not be a proven efficacy against COVID-19, due to its varying clinically efficacy against diffrent viral strains like Ebola virus[5], Chikungunya virus[6], influenza virus[7], HIV[8] and dengue virus.[9] In France, a clinical trial consist of 36 patients of COVID-19 were divide into two groups. One group was given HCQ alone and another group received HCQ combined with azithromycin. The majority of those who received HCQ combination with azithromycin had no viral load after a week of treatment.[10] The similarity of results has been observed in another report from China. The clinical outcome of 100 COVID-19 patients treated with HCQ showed better results than that of control patients.[11] Due to the widespread belief that CQ / HCQ is effective and the tremendous pressure caused by the media on the prescription of COVID-19 patients, clinicians may choose CQ / HCQ off-label use. It is being carried out globally even in some hospitals in the United States.

However, it must be treated with caution, because the therapeutic index of CQ and HCQ is very narrow, which may lead to prolonged QT, apical torsion, arrhythmia[12], bone marrow suppression, seizures, retinopathy and myopathy. Due to the lack of evidence, it was strongly recommended that public sector health organization work closely with the government for effective cooperation to guide a unified randomized controlled trial (RCT) in order to test CQ/HCQ's potential remedial measures against COVID-19. RCT can improve the ethical use, protection and advanced medical efficacy of CQ/HCQ, if it will process according to the WHO's recommendations.[13]

Remdesivir

It shares the structural composition of adenosine and therefore works as an inhibitor of viral RNA synthesis through chain termination. Remdesivir has been shown to be effective against Ebola virus and Marburg virus[17], and has also been shown to be effective against many other RNA viruses. It has also been tested against SARS-CoV-2 because of its efficacy on SARS-CoV and MERS-CoV. Remdesivir achieved suitable results in SARS version of Ces1c (– / –) mice. When administered one day after infection, it can greatly reduce the titer of pneumovirus and improve lung function ($p < 0.0001$). The virus titer has been significantly reduced, but the mortality rate is very high when administered after few days of disease onset. It is concluded, by in vitro observation, that when the lung injury reaches its peak, decreasing the virus titer definitely does not restrain the sound immune response in mice, however, early administration of remdesivir is shown to reduce the mortality ($p= 0.0037$).[18] A case has been announced in which an infected person tested positive RT-PCR SARS-CoV-2 (on a nasopharyngeal swab) confirmed the rapid development with remdesivir in one day.[19] Due to remdesivir's preference for broad-spectrum anti-CoV, a randomized, double-blind scientific trial is conducted and is still in progress.[20] The study consisted of 308 contributors who were randomly assigned to remdesivir on placebo. Some other randomized, double-blind, placebo-controlled studies are ongoing in phase 3. The focus is on the protection and efficacy of Remdesivir on 452 hospitalized adults with severe respiratory symptoms due to SARS-CoV-2.[21] Observed in vitro, Remdesivir inhibited the prosperity of bat coronavirus and human coronavirus.[22] Some other observations have found that remdesivir and chloroquine have a strong effect on SARS-CoV2 in vitro.[23] The preliminary results of three recent randomized, placebo-controlled, double-blind phase 3 medical trials of hospitalized COVID-19 patients found that remdesivir has a shorter recovery time than placebo (11 days vs. 15 days).[24]

Azithromycin

Azithromycin is a bacteriostatic agent, a macrolide compound, which can inhibit the synthesis of bacterial protein, thereby interfering with the growth of bacteria. It is also identified that it has antiviral outcomes further to its antibacterial activity. In the light of previous research, it's been used to treat respiratory viral infections.[14] In a small range of non-random observational study with the help of Gautret et al., it's been proved that the aggregate of azithromycin and HCQ has a first rate antiviral effect in opposition to SARS-CoV-2.[10] In context with the efficacy of azithromycin as a treatment option of COVID-19 is limited. It has been under investigation that macrolide drugs alone or in combination with HCQ have strong resistance to SARS-CoV-2.[15] For this purpose a number of scientific trials are underway to check the efficacy of HCQ-azithromycin on SARS-CoV-2. An interventional scientific trial is in progress to decide the efficacy and protection of HCQ-azithromycin mixture.[16]

Lopinavir/Ritonavir

It is used to treat HIV infection by blocking the maturation of HIV virus. It works as an inhibitor of HIV type 1 protease. The bioavailability of Loplinavir is increased when combined with Ritonavir. This is due to the blocking power of this mixture against metabolic inactivation.[25] It is suggested that this combination can be taken as the monotherapy option for patients infected with HIV virus because of the higher efficacy as antiretroviral drug.[26] With other drugs (chloroquine, chlorpromazine and loperamide), it can be observed that lopinavir inhibits the replication of COVID-19 virus in in vitro model.[27] Compared with the historical control group that used only ribavirin therapy, the mixture of rofinavir/ritonavir and ribavirin inhibited acute respiratory distress on day 21 in patients with SARS accompanied by SARS-CoV infection. The rate of acute respiratory distress syndrome (ARDS) or death is lower (2.4 vs. 28.8%, $p < 0.001$).[28]

Lopinavir/ritonavir can also reduce the mortality of primates with MERS-like diseases. The mortality of the lopinavir/ritonavir treatment group at 36 h after vaccination was 0–33%, while the mortality rate of animals without treatment or mycophenolate mofetil treatment was 67%.[29]

There has been a case in which a patient with MERSCoV pneumonia treated triple antiviral therapy (lopinavir/ritonavir, ribavirin and pegylated interferon) later developed advanced renal failure, and two days after treatment the decrease of viremia was shown. Although virus shedding persists, it highlights the significance of starting ribavirin therapy as soon as possible.[30] In view of the efficacy of lopinavir/ritonavir on MERSCoV and SARS-CoV, the treatment of SARS-CoV-2 was studied. Lopinavir (but not ritonavir now) can inhibit the in vitro replication of SARS-CoV-2.[31] Lopinavir has been declared effective in the treatment of SARS-CoV-2 pneumonia in China.[32] In a study of four hospitalized patients (2 cases of mild SARS-CoV-2 pneumonia, 2 cases of severe SARS-CoV-2) were treated with lopinavir/ritonavir, uminovir and Shufeng Jiedu tablets (Chinese medicine). This study showed the complete recovery of two patients, while other cases (excessive pneumonia) showed improvement.[33] In patients with SARS-CoV-2 mild pneumonia, the use of lopinavir/ritonavir will cause the viral load to decrease from the next day, and the virus titer cannot be detected in the later stage.[34] The author emphasizes that the lower virus titer may be due to the natural route of transmission of the disease. Therefore, similar studies are needed to determine the direct antiviral effects of lopinavir/ritonavir.

Ivermectin

Ivermectin is approved drug from FDA as anti-parasitic. This drug has also shown effective against SARS-CoV-2, by inhibiting the replication of this virus.[37] The efficacy of Ivermectin against COVID-19 virus is not yet proved and needs more evaluating studies. It can be seen that its broad-spectrum antiviral activity can inhibit the replication of yellow fever virus against NS3 helicase activity, and inhibit the replication of HIV-1 and dengue virus[38,39,40] by inhibiting importinα/β. In the investigation of better drug treatment of COVID-19, ivermectin has established specific consideration. In addition, many studies have been conducted to determine the efficacy of ivermectin in many regions including the United States, India, and Egypt, and these studies have been registered in the ClinicalTrials.gov database. In Spain, SAINT scientific trials are underway to determine the efficacy of a single dose of ivermectin in low-risk, non-extreme COVID-19 patients.[41] Although ivermectin has been proved to have strong resistance to Sars-Cov-2 in vitro, only through an overdose regimen the important inhibitory consciousness be achieved within the framework of the human body. The lack of appropriate formulations that can provide improved pharmacokinetics and drug delivery, and the focus on mechanisms limits the enthusiasm for the use of ivermectin. Although systemic therapy can be used to treat patients, high-dose antiviral drugs can also cause severe and destructive reactions. Despite of good antiviral effects and the initial anti-inflammatory potential of Ivermectin, its formulation is facing severe situation, mainly because of extremely poor water solubility. Therefore, the oral bioavailability of ivermectin is still low.[42] Furthermore, its pharmacokinetic retention can be reduced by specific formulations, and diffusion changes in formulation design may affect plasma kinetics, biodistribution, and efficacy.[43]

Corticosteroids

These are the steroids hormones known to have substantial effect on inflammation and the immune system. The use of corticosteroids (glucocorticoids) is debatable since the outbreak of the COVID-19.[44] Human studies have shown that corticosteroids can effectively reduce pathological damage however; its side effect is its adverse reactions, such as acute respiratory syndrome.[45] In the study conducted in China, SARS coronavirus patients were divided into four groups based on the dosage of steroids and quinolones and it is shown that that both early and high-dose steroids and quinolones have an effective response.[36] In order to determine the efficacy of glucocorticoids in patients with severe infection of COVID-19; clinical trials are underwent.[6] However, the use of corticosteroids arises the risk acute respiratory syndrome in patients with COVID-19. Therefore, the use of corticosteroids is controversial.[46]

Interferon

Interferon is protein produced and secreted

with the help of immune system cells (such as WBCs, epithelial cells, and fibroblasts). Interferon can enhance the immune function against viruses, bacteria and antigens by activation of the immune response in infected area and its surrounding cells.[47] The literature review emphasized that interferon has been used for decades to combat the rising virus when no other remedy is available.[48] From previous studies, we can count on interferon as a powerful drug choice against SARS-CoV-2.[49] SARSCoV and MERS-CoV can disrupt the interferon signaling pathway by interfering with proteins related to interferon expression (such as Orf6 and Orf3b).[50] The in vitro sensitivity of SARS-CoV-2 to interferon is mild, which may be absolutely confident. This is because SARS-CoV-2 may also misplace those anti-interferon effects due to its truncated Orf6 and Orf3b proteins. This shows that for SARS-CoV, interferon can become a higher treatment option. Considering that the effect of interferon treatment is better when it reaches a certain amount, it can play a preventive effect. In addition, it supports the in vitro antiviral effect of interferon pretreatment.[51] A systematic trial is currently underway to determine the effectiveness of interferon alpha, ribavirin, and lopinavir/ritonavir in patients with COVID-19.[52] Since SARS-CoV-2 is more sensitive to interferon alpha than its family members (SARS-CoV and MERSCoV), it can be used as a powerful opportunistic therapy for COVID19 patients. However, it may be important to study the results of current scientific experiments in advance to confirm the exact efficacy of interferon.[49]

Tocilizumab

Tocilizumab is an inhibitor of IL-6 and shares the structural characteristics of human monoclonal antibody.[53] As mentioned earlier, IL-6 is important in the development of viral infections that subsequently lead to Acute Respiratory Disorder Syndrome (ARDS) and ultimately respiratory failure. Tocilizumab has been shown to protect patients with cytokine release storms. The common pathway of viral infection is the production of interferon-α, TNF-α, and the secretion of IL-6 and IL-12. The inflammation caused by these immune system products is a consequent of production of other types of immune system cell like CD8 + specific cytotoxic T cells. These cells works with CD4 + helper T cells to produce antigen-specific B cells which ultimately lead to the production of antibodies.[54,55] Therefore, when the body is unable to carry out a sufficient immune response to the virus and the inflammatory state persists, it will manifest as cytokine release syndrome (CRS) and multiple organ dysfunctions. The reports from China on the use of Tocilizumab in SARS-CoV-2 patients showed that clinical conditions were improved and stabilized, and inflammatory markers were reduced.[54,56] Another open trail is underway to assess the effectiveness and tolerability of tocilizumab in COVID-19 pneumonia.[54]

Convalescent Plasma Therapy (CPT)

CPT seems to have become an intervening adjuvant treatment for critical COVID-19 patients receiving other long-term scientific treatments. The concept of CPT has been used to deal with infectious diseases very early (since the 1800s). The first use of CPT can be traced back to 1892 for the treatment of diphtheria. In the past 20 years, CPT was changed to scarlet fever and whooping cough until 1970. According to reports, CPT has been used during the Spanish influenza pandemic in 1918, and its beneficial effects have been shown, but there are some complications. In addition, CPT is also used to treat viral diseases. These viral diseases include measles, mumps, argentine hemorrhagic fever, influenza, cytomegalovirus, parvovirus B19 infection and central eastern respiratory syndrome coronavirus (MERS-CoV), advanced H1N1 and H5N1 avian influenza, ebola virus and severe acute respiratory infection (SARIs) virus.[57,58] Considering the fatal results of some of these viral diseases without therapeutic intervention, the overall clinical results of CPT for viral infections are satisfactory. Recently, it was recommended in reviews that CPT may use for critically ill COVID 19 patients based on earlier reported satisfactory findings.[59,60]

According to the report (July 2020), it has been shown that CPT have substantial effects oxygenation and sequential organ failure assessment (SOFA) score. It has been shown in the report that the urge of ventilators also

reduced after CPT.[61,62] However, the study was not well-designed and patients were also given other drugs beside CPT another study showed that the comparison of CPT with other treatments in COVID-19 patients didn't yield statistically significant outcomes. This study in China involved 133 patients and the duration of 28 days.[63] Therefore, the imminent impact of CPT may not be accurately reflected in the reported results.

Considering the blood transfusion-related hazards that cannot ensure sensitivity, especially lung damage and microbial transmission. Rigorous testing should be performed to determine the efficacy of this therapy. In addition, the ratio of recovered cases to donate plasma is not satisfactory, which raises questions about the availability and accessibility of this therapy. Although some countries provide treatment for free, the attributable cost requires its rationality and sustainability to be reasonable.[64]

Vaccinations

The development of the COVID-19 vaccine is crucial for the world to return to its normal state as before the pandemic, and efforts have been made globally to protect general public from SARS-CoV-2. As of March 2021, 13 vaccines have been approved for use, and more than 90 vaccine candidates are in clinical trials.[65] It's been more than a year now in 2021, after the discovery of Covid-19 and its RNA SARS CoV2 virus-but vaccinating the adults would be enough to decrease the spread of the virus? The global spotlight is now how to offer protection and Immunity from COVID-19. Essentially, nothing can replace masking, sanitization, distancing and avoiding crowded and poorly ventilated spaces. The question still remains that is there any protection from the reinfection? It's still elusive that Anti COVID IgG antibodies don't mean protection but exposure, we don't know how long will antibodies stay or decline neither do we know if our human T cells memorize the virus when they were exposed. Herd Immunity is still elusive but still plausible and we are all looking at Vaccines now. Most vaccines use the protein sequences of the SARS Cov2 virus which cover the virus or its crown and generate an immune response. Usually protein based vaccines don't need very cold storage called "Cold Chain", while vaccines from platforms like mRNA or DNA may need colder chains right upto-70°, which can be a logistic nightmare. These m RNA platform vaccines (Pfizer, Moderna etc.) are essentially researched on in USA, UK and Europe and have obtained Emergency Use authorization (EUA) by the US FDA are now available for Pakistan. They offer upto 95 % protection, but side effects are yet not fully known.

In Pakistan, it is planned by the government that experimental Chinese vaccine will be given to at least 10,000 volunteers, particularly the doctors in charge and other frontline healthcare workers. The main 5 sites of trail were set up by Shifa international. Karachi and Lahore have two additional sites. Dr. Ejaz Khan, Chairman of the Infection Control Department at Shifa Hospital, has announced a standard for volunteers. These standards are: volunteers may have an appointment or can be walk-in but must be over 18 years old, and they should be willing to participate without any major illness and they were testing the blood to confirm that the volunteer does not have active infection as well as no antibodies for COVID and tends to be observed for more than a year. Pregnant women are not allowed to participate at this time. The members were consulted and their consent was obtained, then a blood sample was drawn and the vaccinated in the upper arm. As 15,000 people participated in the Shifa clinic trial on the 22nd September. Throughout the 12-month course, volunteers can be monitored through weekly messages and calls. Each participant receives a one-time travel and food allowance of 3,000 PKR (US$19) in one visit, and a food allowance of 5,000 PKR in the second visit. After 12 months he or she must provide second blood sample. Samples can be shipped to Dalhousie College in Canada to discover efficacy and obtain correct results within the following 12 months. If the results are meaningful, they can be provided for stage 4 (vaccine production, advertising and distribution). Pakistani officials announced that once confirmed, they expect that with the help of CanSinoBio, they can give priority to Pakistan with millions of doses of vaccine. The Chinese

vaccine is definitely one of the nine developed international vaccines that are considered safe and can be tested on 40,000 humans in multiple countries.

Pakistan government issued a list of vaccination centers across all provinces. There is an online registration process for vaccination at NCOC website. Various types of vaccines are available in Pakistan including Sputnik V, Sinovac, Sinopharm and Cansino Bio Vaccine, Moderna, Astrazeneca, Pfizer-Biontech, Pakvac.

Sputlink V Vaccine

Sputlink V vaccine is given in two doses as component I and component II. The second dose is followed by the first dose with the interval of 21 days. It is important to note that individuals who received first dose of Sputlink V vaccine should be given second dose of the same vaccine.
The composition of the dosage is as:

Component I – 1st Dose: The 0.5 ml of each dose contains Serotype 26 (Recombinant) Adenovirus particles containing SARS-COV-2 protein S gene (1.0 ± 0.5) x 1011

Component II – 2nd Dose: The 0.5 ml contains Serotype 5(Recombinant) Adenovirus particles containing SARS-COV-2 protein S gene (1.0 ± 0.5) x 1011.

Sinovac Vaccine

The vaccination manufactured by Sinovac Biotech Ltd. contains an inactivated virus as SARS-CoV-2 Virus (CZ02 strain). Two doses should be given with the interval of 28 days each vial (syringe) contains 0.5 mL of single dose containing 600S8U of inactivated SARS-CoV-2 virus as antigen.

Sinopharm and Cansino Bio Vaccine

These are the single dose vaccines. Each vial contains 0.5ml of a single dose. All of these vaccinations must be administered Intra-muscularly at Deltoid Muscle (Upper Arm), Non-dominant side.[66]

To date, 10% of the participants have had an adverse reaction to the vaccine. Those include pain at the injection site, frame pain and fever.

CONCLUSION

COVID-19 in Wuhan, China is spreading rapidly in 209 countries/regions including Pakistan. Pakistan's frontier situation is not good, because Pakistan is a densely populated country with minimal resources. Pakistan is a developing country and compared with the oppositely affected international regions (such as China, United States, United Kingdom, and Russia), its present situation is very poor to resist COVID19 outbreak. The number of hospitals and quarantine centers in Pakistan in present situation cannot meet the needs. If these clinical centers do not improve now, it will be difficult to control the spread of the virus and treat patients. Currently, the testing facility is far below the required target. Testing equipment needs to be increased by five to ten (5 to 10) times. The ratio of infection can be reduced by right decisions from the government like lockdown, closing of public places. People are also responsible for maintain social distance and wear masks. The Pakistani government hopes to be more cautious in screening passengers arriving and departing from the United States of America. It is hoped that Pakistan overcome the epidemic and severe situation caused by the COVID-19 pandemic.

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