COVID-19 (SARS-CoV-2) pandemic: fears, facts and preventive measures

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Abstract

The aim of this review is to give a synopsis on the coronavirus disease 2019 (COVID-19) pandemic, with major focus on the preventive measures. Ever since the influenza pandemic of 1918, and the second world war of (1939-1945), the world has not been faced with a common problem in recent memory like the COVID-19 pandemic. The unprecedented COVID-19 pandemic is caused by infection with a viral pathogen, the nascent severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), and is characterized by respiratory failure in severe cases. The communicability period of COVID-19 varies, but it is usually between 2-14 days, and the major signs and symptoms of COVID-19 are high temperature (fever), severe and consistent cough, and serious breathing problems in severe cases, however, complications result in the serious inflammation of the lungs, and organ malfunction occurs in patients with comorbidities and health conditions especially diabetes, heart disease and obesity. With high virulence and contagious nature of SARS-CoV-2, over 11.4 million confirmed cases and over 533,780 deaths have occurred as a result of COVID-19 globally, with over 6.1 million recoveries as of 6th July 2020. Presently, there is no known cure for COVID-19, however, remdesivir has been approved for emergency use for the treatment of COVID-19 patients by the Food and Drug Administration, a United States federal regulatory body (FDA), while various clinical trial treatments and vaccines are being tried globally. The world is faced with containing the spread of the infection, and this review revealed that thorough hand washing with antiseptic soap and running water and usage of alcohol hand sanitizer, frequent surfaces cleaning, strict adherence to social distancing, regular respiratory hygiene, wearing of protective face masks, frequent testing, self-isolation, quarantine and rigorous contact tracing will help to prevent further spread, and control the transmission of the viral pathogen. It is however strongly recommended that only the strict compliance to the mitigative and preventive measures provided above will yield the desired results in the prevention, management and control of the COVID-19 pandemic.

Keywords COVID-19 pandemic, SARS-CoV-2, mitigation, prevention, control measures.

Introduction

The name “coronavirus” was first mentioned in the scientific world in the year 1968, and by 1975, it was recognized by the International Committee on the Taxonomy of Viruses (ICTV).¹ Coronaviruses causes different diseases that

infect different animals and humans over the years, thereby making humans and animals as

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reservoir species. Importantly, coronaviruses diseases can be characterized by of respiratory failure in complicated cases of infection in humans, while central nervous system and gastrointestinal problems might arise in severe cases as a result of neural tropism, and presence in the feces has also been shown in certain cases.^{2,3} Furthermore, current evidence suggests that with many factors, atypical symptoms such as delirium, falls, generalized weakness, malaise, functional decline, and conjunctivitis, anorexia, increased sputum production, dizziness, headache, rhinorrhea, chest pain, hemoptysis, diarrhea, nausea, vomiting, abdominal pain, nasal congestion, and anosmia, tachypnea, unexplained tachycardia, or hypotension may be the suggestive presenting clinical presentation of coronavirus disease 2019 (COVID-19) in older adults.^{4,6} Presently, the world is faced with a novel pandemic called COVID-19, which is initiated by infection with the nascent severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). At first, COVID-19 began in China, but presently, it has spread very fast, and the infection has reached different territories and regions of the world, which is causing fear, health, psychological, and socio-economic problems among the world's population.⁷ On a daily basis, confirmed COVID-19 cases and death tolls from the infection are soaring at unimaginable numbers globally.^{7,9} The world is faced with containing and controlling the massive spread of the infection; consequently, the aim of this review is to provide detailed explanation on the facts, fears, and appropriate preventive measures against COVID-19.

Sources of reviewed literature

A thorough literature review was sought from February-July 2020 in PubMed databases and various health agencies such as the World Health Organization (WHO), the Center for Diseases Control and Prevention (CDC), the European Centre for Diseases Prevention and Control and the Nigeria Center for Diseases Control (NCDC) documents on the title of discourse. The keywords used as search terms were COVID-19, SARS-CoV-2, pandemic, fears, facts and preventive measures, and studies included in this

review are: clinical trials, meta-analyses, randomized controlled trials, systematic and review articles. Furthermore, professionals in the field of Health Education and promotion, and infectious diseases experts are part of the authors that made up the team that contributed to the write-up of this review.

Facts about the COVID-19 pandemic

The unprecedented COVID-19 pandemic in the world is a viral infection caused by the coronavirus SARS-CoV-2, and is characterized by respiratory failure in complicated cases and in the late stages of the infection.¹⁰ COVID-19 was first detected in China, a country in East Asia, in late December of 2019, and with the rampaging nature of SARS-CoV-2, COVID-19 was promptly declared a public health emergency of international concern by the WHO in late January 2020, and a pandemic in March 2020.^{11,12} With the daily changes in infection statistics, over 11.4 million confirmed cases and over 533,780 deaths have occurred as a result of COVID-19 globally, with over 6.1 million recoveries as of 6th July 2020.¹³ The SARS-CoV-2 is the causative virus of COVID-19, and it is similar to the bat, pangolin and SARS coronaviruses.^{14,15} SARS-CoV-2 is transmitted through close contact at distances below approximately 1-2 meters (usually 3 to 6 feet) with infected humans via saliva and liquid products from a patient, and through a patient's sneezes, talks and coughs.^{14,16} Furthermore, if uncovered, the force of sneezes and coughs from patients with COVID-19 can propel the SARS-CoV-2 to a further distance of below approximately 4.5-8.2 meters (15-27 feet); this is a major risk for infection transmission.^{17,18} In addition, SARS-CoV-2 might be transmitted from air droplets of patients breathings, talks and sneezes, however, there is not strong evidence to substantiate that SARS-CoV-2 is airborne.^{14,19} Also, humans can be infected with SARS-CoV-2 when contaminated hands or contaminated substances touch the eyes, nose and mouth, because SARS-CoV-2 can be found on any surfaces for at least three days.¹⁹ SARS-CoV-2 is a virulent pathogen and highly contagious, as the contagiousity is maximal in the first few days of a patient's manifestation of signs

and symptoms, and the transmission of SARS-CoV-2 could also occur when there are no apparent signs or symptoms of infection (asymptomatic) and specifically, one-two days prior to symptom onset, as a single patient can possibly transmit the infection to two or more individuals, as this was evident in some transmission cases in European countries.²⁰ The communicability period of COVID-19 varies, but it is usually between 2-14 days.²¹

The major signs and symptoms from COVID-19 are high temperature (fever), consistent cough, and respiratory failure in severe cases, however, complications result in the serious inflammation of the lungs, and organ malfunction occurs in patients with comorbidities and health conditions especially diabetes, heart disease and obesity.¹⁴ Presently, there is no known cure for COVID-19, however, remdesivir (GS-5734), a viral RNA-dependent RNA polymerase (RdRP) inhibitor that can be adopted to treat a variety of RNA virus infections, is expected to be an effective treatment for COVID-19, and on May 1st 2020, the United States of America (USA) Food and Drug Administration (FDA) approved the Emergency Use Authorization (EUA) for remdesivir to treat patients with COVID-19.²² Furthermore, various clinical trials for treatment options such as HIV protease inhibitors lopinavir/ritonavir, broad-range antiviral drugs umifenovir and favipiravir in addition to antiviral phytochemicals accessible until now, and various vaccines are being experimented in a solidarity group trial globally for the treatment and management of patients with COVID-19, while the WHO expects the first interim reports from the COVID-19 solidarity group drug trials not earlier than 19th July 2020, although, a probable vaccines availability timeline is not definitive.^{14,23}

²⁵ With early diagnosis of COVID-19 and treatment, there are high recovery rates, however, deaths may occur due to late diagnosis and the late onset of treatment, and it is between 6-41 days of the manifestation of signs and symptoms without any treatment, with 14 days being the most occurrence of deaths.²⁶ The COVID-19 preventive measures include hand hygiene, respiratory hygiene, self-isolation and social

distancing; other preventive measures are discussed extensively in the later stages of this review.¹⁴ Furthermore, a movement restriction, specific hours curfews, quarantines measures, following standard safety work place measures, and facility closures are workable COVID-19 mitigative methods.¹⁴

Fears about the COVID-19 pandemic

Ever since the influenza pandemic of 1918 and the second world war (1939-1945), the world has not been faced with a common problem in recent memory like the COVID-19 pandemic. Unprecedented in nature, over 10.4 million diagnosed cases and over 510,000 deaths have occurred as a result of COVID-19 globally, with the USA having the record number of confirmed infection case load followed by Brazil as of 1st July 2020.¹³ In the 21st century, and with massive technological and medical advancement, the world is finding it hard to bring the COVID-19 pandemic under control, as the SARS-CoV-2 does not discriminate the developed countries from the underdeveloped countries, the rich from the poor, and the educated from the uneducated. Presently, at the time of this writing, the majority of the world's population is under partial lockdown and some form of restrictions, and countries globally are grappling to find solutions to the world's common problem (the COVID-19 pandemic). The adverse impact of the COVID-19 pandemic is felt on all facets of human life, but the effect is more on the healthcare system, and the older populations with records of higher rates in morbidity and mortality cases.⁶ For instance, in Nigeria, over 40 health personnel have been placed on isolation due to contact with COVID-19 patients, while over 4,000 health personnel have confirmed COVID-19 cases in Spain, and over 60 medical personnel have died as a result of COVID-19 in Italy.²⁷ Furthermore, the current COVID-19 pandemic is causing serious fears through social and economic gaps as a result of cessation of substantial amount of movements, cancellation of sporting, religious and cultural events, and stoppages to some production of goods and services. Presently, in over 193 countries, education is affected.²⁸ Also, wrong information

about the pandemic is spreading via the web, and hate speech towards citizens of the Asia continent have occurred.²⁹ On the economic front, over 195 million jobs have been lost globally, over 5 million Chinese have lost their jobs, and over 10 million Americans are out of job, with unemployment rates predicted to increase massively this year.^{30,31} Likewise, over 20 million people in India are unemployed due to partial lockdown, over 44% of citizens in Canada are out of job, and over 900,000 people from Spain have lost their job, while massive job losses have also occurred in France and Britain, and manufacturing and production have been massively affected in Germany.³² There is also a risk of over 20 million job losses in the Africa continent.³³

The SARS-CoV-2 belongs to the group of RNA viruses, which indicates that mutation of the virus might be possible, but does not appear to have widely occurred.³⁴ However, over the course of this pandemic, SARS-CoV-2 replication in the USA, Spain, Italy, Brazil and France are similar to the one in Wuhan, China where the pandemic started.^{35,36} Importantly, SARS-CoV-2 replication might not affect the efficacy of a probable COVID-19 drug or vaccine, as vaccines produced for rubella, mumps and measles over four decades ago are still effective in the prevention of those viruses, even though they belong to the RNA viruses group as the SARS-CoV-2.³⁴

COVID-19 pandemic in Nigeria hitherto

On 27th February and 9th March 2020, Nigeria recorded the first and second cases of COVID-19 respectively; the first case was an imported infection, while the second case was via a contact with the index case.^{14,37} As a result of the sharp transmission rate of COVID-19 in China and many other countries globally, on 31st January 2020, the Nigerian authority constituted the COVID-19 mitigation team, which coincided with the WHO naming Nigeria as one of the probable hotspots for the transmission of COVID-19 in the Africa continent.³⁸ Being the most populous West African nation, the cases of COVID-19 have been steady, but continuous. The healthcare strategies adopted by the country

in handling the COVID-19 pandemic have been testing, keeping and treating of confirmed patients in isolation centers across all the affected states, and contact tracing. Furthermore, the Federal Government and relevant health agencies, for example the NCDC and the Federal Ministry of Health have put up various COVID-19 preventive measures in place. Such measures include travel restrictions, nationwide curfews, closure of schools, the mandatory use of face masks in the public, mandatory provision of hand washing facilities and sanitizers and temperature checks in all public spaces, physical distancing of 2 meters between people, controlled access to markets and locations of economic activities, and prohibition of non-essential interstate travel, except for essential goods and services. The specific problems encountered by Nigeria in facing the COVID-19 pandemic include, but are not limited to the none adherence of the public to preventive guidelines such as the compulsory use of face masks and social distancing in open spaces which was generated by COVID-19 misinformation and superstitious beliefs circulating among the public, inadequate health infrastructure and personnel, for example inadequate hospital facilities and medical staff, low test materials, limited personal protective equipments (PPE), and shortages of isolation centers due to the rising number of infection cases in specific states of the federation, such as the situations in Lagos, Edo, Rivers and Oyo states.

As of 6th of July 2020, over 28,711 confirmed cases of COVID-19 have been documented, over 11,665 patients have fully recovered, and over 645 deaths have been recorded in Nigeria, with infection cases only third to South Africa and Egypt respectively on the continent, although infection statistics are further predicted to increase in the coming weeks.³⁹ With the aforementioned statistics, the Nigeria battle against the containment of COVID-19 is impressive, however, limited daily testing is only being carried out, as there might be many asymptomatic carriers of SARS-CoV-2, which is a major risk for explosive community transmission.¹⁴ Presently, the national emergency of level 3 has been activated in the continued

battle of COVID-19 in Nigeria, the highest of such for any infectious disease in the African country.³⁹

Preventive measures against COVID-19

As the world races against time in finding a vaccine and a standard cure for COVID-19, prevention for now is the only mitigation method to subdue the spread of infection globally.¹⁴ The COVID-19 mitigative measures include majorly hand hygiene, respiratory hygiene, self-isolation and social distancing by the general public^{14,40} (Figure 1).

Hand washing

A thorough hand washing helps to abate the spread of COVID-19 as this method helps to eliminate SARS-CoV-2 and other germs on the hands.¹⁴ Individuals ought to completely wash

their hands with antiseptic soap and clean running water for the duration of over 20 seconds before consumption of any food and after blowing the nose, coughing, or sneezing to ensure that the hands are clean of germs and also to kill off the SARS-CoV-2. To ensure high efficacy, after hand washing, alcohol-based gel (sanitizer) ought to be used to rub the hands as it is applied in Nigeria; however, in the absence of clean water and antiseptic soap, only alcohol-based hand rub can be used. Furthermore, dirty hands ought not to touch any part of the face as this may mistakenly convey the SARS-CoV-2 and other germs.⁴⁰

Frequent surface cleaning

SARS-CoV-2 has been confirmed to remain on surfaces for several days; hence, infected surfaces may be a major transmission route. The

Figure 1. Diagram representation of mitigative measures for the prevention and control of COVID-19

decontamination of infected surfaces is highly effective through the use of chemical solutions such as ethanol (62-71% quantity), isopropanol (50-100% quantity), sodium hypochlorite (0.1% quantity), hydrogen peroxide (0.5% quantity), and povidone-iodine (0.2-7.5% quantity).^{41,42} If cases of COVID-19 are confirmed in a particular place or location, it is advised that all areas and surfaces are thoroughly decontaminated to ensure that SARS-CoV-2 is eliminated in order to prevent the wide spread of community transmission. Furthermore, all handy machineries, equipment, and materials used or handled by a patient with COVID-19 ought to be decontaminated to kill off germs and SARS-CoV-2 before being handled by other people.^{41,42}

Strict adherence to social distancing

Any form of reduced contact between people is termed as social distancing. There are usually two types of social distancing: public and individual social distancing. Public social distancing comprises a set of various measures put in place to ensure that large gatherings of people are prohibited during the COVID-19 pandemic. Such measures include: quarantines, travel bans, closure of schools, closure of work places, closures of stadiums, markets, theatres and shopping malls. Individual social distancing comprises measures put in place by individuals to reduce contact with other people. Such measures include: avoidance of unnecessary travels, sit-at-home, avoiding crowded places, avoiding handshakes and hugging, etc.⁴³ Presently, many health authorities in nations globally are advising public and individual social distancing to abate the spread of COVID-19. For instance, Germany, the USA, Italy, Nigeria, Spain, the United Kingdom, France, and many other countries have put up various social distancing measures in their respective countries.⁴⁴ Importantly, social distancing would only be effective as a mitigation measure against the spread of COVID-19 if strictly enforced and strictly followed by the public. Furthermore, elderly people, especially those with underlying medical conditions ought to adhere strictly to all social distancing measures in COVID-19 pandemic hotspot areas.¹⁴

Respiratory hygiene

Respiratory hygiene refers to measures taken by individuals to reduce the rate of transmission of highly infectious respiratory diseases like influenza, Middle East respiratory syndrome (MERS), and the present COVID-19. Respiratory hygiene measures include: proper covering of the mouth with a tissue paper or a handkerchief when coughing and sneezing, immediate proper disposal of used tissue paper and handkerchief after coughing and sneezing, and covering of the mouth and nose with a bent elbow when coughing and sneezing in the absence of handkerchief and a tissue paper, after which the hands and elbow ought to be completely washed with an antiseptic soap and clean running water.¹⁴

Wearing of protective face masks

Face masks are protective materials used to cover the nose and the mouth in order to prevent the spread of highly infectious respiratory diseases like influenza, MERS, and COVID-19. SARS-CoV-2 is primarily transmitted by droplet and contact routes. For instance, droplet transmission is through bigger respiratory particles, usually above 5 µm in diameter, which are subject to gravitational forces; these droplets and particles tend to travel no more than 1 meter, hence, a 2 meters limit on contact is recommended to prevent transmission.⁴⁵ Importantly, face mask usage is strongly advised for patients infected with COVID-19 to reduce the transmission of SARS-CoV-2 through sneezes, coughs, and talks.⁴⁶ Also, wearing of masks by uninfected individuals can help reduce the rate and chances of touching the face with infected and unwashed hands, and prevent inhaling SARS-CoV-2 under certain conditions in COVID-19 hotspot areas.⁴⁶ Furthermore, wearing a mask is strongly advised for the health personnel treating COVID-19 patients.⁴⁷ Hence, the proper use of PPE will diminish the risk of SARS-CoV-2 transmission. Importantly, any PPE ought to be matched to the potential mode of viral transmission: contact, droplet or airborne.⁴⁵ Furthermore, overuse of PPE is a form of misuse, and the misuse of PPE depletes limited stocks, leads to avoidable shortages and increases risk of

SARS-CoV-2 infection to staff.⁴⁵ As precautionary measures, many countries such as Nigeria, China, Hong Kong, Thailand, Czech Republic, Slovakia, Vietnam, Austria, Israel, Taiwan, Panama, Japan, South Korea, Malaysia, and Singapore have encouraged their citizens to wear masks that will cover the nose and the mouth when going to public places.⁴⁸

Testing, self-isolation, quarantine and contact tracing

A quick testing is imperative for the early diagnosis of COVID-19 among the public for early treatment, to subside condition worsening, and to avert the further spread of SARS-CoV-2 to other people, and in the community at large. For higher prevention strategy, rapid COVID-19 testing ought to be scaled up across all nations of the world, especially in COVID-19 hotspot zones. Self-isolation is the process of keeping oneself away from public contact in order to reduce the spread of highly contagious infections. Self-isolation is advised for individuals with confirmed COVID-19, and also for individuals who have traveled to COVID-19 hotspot areas.⁴⁹ Furthermore, self-isolation is necessary for individuals who have come into contact with COVID-19 patients, for individuals who are expecting their test results and for individuals who have had contact with people who have returned from COVID-19 hotspot areas. Also, self-quarantine is advised for elderly people and the entire people in COVID-19 hotspot areas.⁵⁰ For instance, some countries have mandated a self-isolation, or quarantine for the duration of 14 days for incoming travelers, while some countries have also mandated a compulsory COVID-19 testing for incoming travelers at the respective entry points with the aims to reduce transmission rates and prevent a second wave of mass transmission. Also, rigorous contact tracing ought to be performed to identify individuals who might have come into contact with confirmed COVID-19 patients in order to further reduce the spread of infection.¹⁴ Generally, after contacts have been identified, some countries recommend self-isolation, or quarantine for the duration of 14 days, or testing of contacts, and different recommendations have been in place

during different steps of containment or mitigation of the COVID-19 pandemic.

The practicability of COVID-19 preventive measures in Africa

As the COVID-19 pandemic lingers on, African countries are doing substantially well in containing the spread of the SARS-CoV-2 hitherto, as evident by the lower numbers of infection cases in terms of mortality and morbidity compared to other regions of the world. However, all hands should still be on deck and preventive measures should be ensured as infectious disease experts are warning that the continent has not yet reached the peak stage of the pandemic. With the upsurge of COVID-19 cases in some countries in the continent over the last few days, now is the time for more engagement in preventive measures against SARS-CoV-2, highlighted in this review. The practicability of the suggested COVID-19 preventive measures in Africa varies among countries according to conditions and environments in the respective countries. However, generally, the continent is faced with some pertinent common problems which may hinder the effective prevention of COVID-19. For example, most of the African countries have limited access to potable clean water, which may affect hand hygiene, unavailability of household cleansing chemicals, which may affect the frequent cleaning and disinfection of surfaces, higher poverty levels, which may affect the strict adherence to social distancing, shortages of face masks, which may affect respiratory hygiene and the wearing of face masks in public spaces, and lower expertise and technology, which may affect the COVID-19 testing, isolation capacities, quarantine and efficient contact tracing. Also, misinformation and superstitious beliefs about COVID-19 circulating in villages and communities is causing negligence on the part of the public to adhere to COVID-19 preventive measures. In light of the aforementioned, where possible, the improvisations of preventive methods should be made, and palliative measures should be set up for the people to prevent the spread of SARS-CoV-2. Furthermore, major world health agencies and organizations such as

the WHO, CDC, United Nations (UN), etc, should assist the continent in viable data and information sharing, and funds to prevent the full outbreak of COVID-19 in Africa, which could be catastrophic.

Recommendations

For the general public, the following are further recommended for the prevention of COVID-19:

1. Consistently wash your hands with an antiseptic soap and clean running water for the duration of more than 20 seconds or apply an alcohol-based sanitizer to rub the hands in order to eliminate SARS-CoV-2 or any other pathogens within minutes. Also, under no condition should a sanitizer be swallowed or injected into the body.
2. Always ensure a minimum of 2 meters, an equivalent of 6 feet spaces when with others, or in open spaces to avoid breathing in the SARS-CoV-2 droplets and other infectious agents.
3. Always refrain from high gathering places to guarantee physical distancing.
4. Always avoid any form of hand contact to the nose, eyes and mouth to avoid infecting them with SARS-CoV-2 and other germs.
5. Stay indoors when sick with cough, fever and breathing problems to avoid infecting others with SARS-CoV-2, and immediately call the appropriate health authorities for medical treatment.
6. Always ensure proper respiratory hygiene. For example, cough and sneeze in a tissue paper or a handkerchief and discard appropriately afterwards. In the absence of a tissue paper or a handkerchief, sneeze and cough in a folded elbow, and immediately wash the hands thoroughly with antiseptic soap and clean running water for the duration of more than 20 seconds.
7. Always use a face mask that covers the mouth and the nose if there is the need to go out, to avoid contracting or infecting others with SARS-CoV-2 and other infections.

Consistently keep up-to-date with COVID-19 recent information from reliable sources, for example the WHO, CDC, and national and local health agencies.

Conclusions

The unprecedented COVID-19 pandemic is a viral infection caused by the highly virulent viral pathogen SARS-CoV-2, and is characterized by respiratory failure in complicated cases and in the late stages of infection. With the high virulence and contagious nature of SARS-CoV-2, over 11.4 million confirmed cases and over 533,780 deaths have occurred as a result of COVID-19 globally, with over 6.1 million recoveries as of 6th of July 2020. Presently, the world is faced with containing and controlling the spread of the infection, and this conspectus highlighted that thorough hand washing with antiseptic soap and running water, the usage of alcohol hand sanitizer, the frequent cleaning of surfaces, the strict adherence to social distancing, respiratory hygiene, the wearing of face masks in public domains, quick testing, self-isolation, quarantine and rigorous contact tracing will help to prevent the spread, and control the transmission of COVID-19. It is however strongly advised that only the strict compliance to the mitigative and preventive measures described above will yield the desired results in the prevention, management and control of the COVID-19 pandemic.

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