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Brief overview of Coronavirus

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Abstract

A worldwide health emergency, the coronavirus illness (COVID-19) is having a profound effect on economies, society, and healthcare systems. The virus, which causes the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was initially discovered in Wuhan, China, towards the end of 2019. It can cause everything from minor respiratory problems to severe pneumonia, and it frequently kills people, especially in vulnerable groups. Since respiratory droplets are the main way that the virus spreads, social distance and immunization are crucial protective measures. The epidemic has brought to light the shortcomings in public health infrastructures and the need for quick and open information sharing, underscoring the need for a coordinated worldwide response to infectious illnesses. The socioeconomic impact of COVID-19 is demonstrated by the disruptions to everyday routines, high rates of unemployment, and demands placed on healthcare services. Travel bans and quarantines have accelerated the trends in online learning, telemedicine, and remote work while also posing challenges to certain industries and aggravating social inequality. The quick thinking of the scientific community has been essential in comprehending the virus, producing diagnostic instruments, and designing vaccines. The situation highlights the need for improved global collaboration, strong healthcare systems, and efficient pandemic response plans.

Keywords

COVID-19, SARS-CoV-2, Preventive measures, socioeconomic impact, Global health preparedness

Introduction

The first human coronavirus was characterized in 1960 and is responsible for the upper respiratory tract infection in children. At least 5 new human coronaviruses have been identified, including the severe acute respiratory coronavirus, since 2003 [1]. In late December 2019, the first pneumonia case was reported in Wuhan, China. A few days later, the causative agent of this pneumonia was identified as coronavirus. This causative virus has been temporarily titled severe acute syndrome coronavirus. Now this virus is spreading all over the world. The current exploration of human coronaviruses, including the coronavirus causing SARS, shows that the family Coronaviridae protects more people than was previously assumed. All these human coronaviruses are responsible for respiratory illness. The genomic replication and transcription of coronavirus take place at cytoplasmic membranes [2].

Coronavirus infects infants rarely but is most common in people over 65 with comorbidities including hypertension and diabetes. Coronavirus disease 2019 has become a widespread disease globally. COVID-19 directly damages the liver and also infects the nervous system. The first case of coronavirus occurred in Wuhan. According to the World Health Organization, 78 630 cases and 2747 deaths occurred in China. Coronavirus spread to 46 other countries and 3664 cases were reported by 27 February 2020. Human-to-human is the transmission mode of coronavirus. Droplet and close contact is the major route of coronavirus. 95% of patients show symptoms within 12.5 days of contact. So a 14-day medical observation and quarantine are required for exposed and close contact persons.

There is no accurate and rapid detection method for coronavirus, therefore coronavirus is spreading all over the world and everyone facing a threatening scenario. However, on 30 January 2020, the World Health Organization (WHO) proclaimed “COVID-19” (coronavirus disease 2019) as the biggest hazard under “public health emergency of global concern,” as 250000-260000 deaths worldwide and across 3-3.5 million positive cases occurred by this virus. We can use the virus detection method to detect and analyze this threatening virus. Nucleic acid profiling is also used to detect viruses, which is very useful for detecting pathogens in confirmed COVID patients. Genomic sequence analysis and point-of-care diagnosis have become popular and are used for

detecting the specific antibodies IgM and IgG related to COVID. Upper and lower respiratory tracts, WBCs, and serum specimens are suitable for diagnosing and identifying the virus. Coronavirus patients are treated in a single room until the diagnosis is confirmed. Symptomatic treatment is preferred for coronavirus patients. Antiviral drugs can reduce viral infections, including ribavirin, ganciclovir, ritonavir, and lopinavir. Remdesivir is an effective treatment for coronavirus patients.

Antibiotics can be used for common pathogens and atypical pathogens. For secondary bacterial infection, medication is required according to the result of bacterial culture and drug sensitivity. Arbidol can be used for coronavirus and it has a direct antiviral effect on SARS-CoV-2 in cell culture. SARS-CoV-2 infection can be treated by Chinese herbal medicine formulae. Due to the coronavirus disease, international society is laboring with health and economic repercussions. This article is very helpful in exploring and explaining the Science behind the stresses of ailment. Effective hand hygiene, glove usage, environmental decontamination, and social distancing suggestions should be pursued to govern this novel disease [3].

The high burden of infections can be lessened by adequate interventions and vaccines. For public health administrations public vaccine disinclination is a pressing issue [4]. In 2019, the severe acute respiratory syndrome coronavirus 2 (SARS-COV-2) was revealed. The whole world is performing vigorously to overwhelm and supervise the coronavirus disease 2019 (COVID-19) pandemic. The evolution of antimicrobial resistance is essential to be formulated for the great effects of these outbursts. Improper and too extensive use of antibiotics, biocides, and disinfectants during this pandemic may boost fateful impacts on antibiotic stewardship programs and AMR control all around the world.

The use of antibiotics solely or in combination with antiviral agents or other prescriptions for the remedy of secondary bacterial disorders. COVID-19 patients may be considered a significant aspect that negatively impacts the host immune response by disrupting mitochondrial function and effects. Outrageous use of antimicrobials and too extensively hygiene also need to be handled during these outbreaks due to their effects on AMR, public health, and the environment [5].

Review literature

Outbreak of coronavirus:

Sharifi & Khavarian-Garmsi, [6] talked about the first outbreak of coronavirus, on December 31, 2019, China's health authority warned the World Health Organization (WHO) of several cases of pneumonia of unidentified etiology in Wuhan city in Hubei province in central China. Since December 8, 2019, the cases have been reported. A disastrous coronavirus was recognized from a swab sample of the patient on January, 7. This pathogen is also called severe acute respiratory syndrome coronavirus 2(SARS-CoV-2) and the disease name is called coronavirus disease 2019 (COVID-19). 7736 confirmed cases had been recorded and 12 117 doubted cases were registered on 30, January in China and 82 verified cases had been registered in 18 other countries. Lotfi et al, [7] talked about the outbreak of coronavirus that coronaviruses are genus coronavirus and included in the coronaviridae.

These are pleomorphic RNA viruses and are crown-shape viruses. Coronaviruses are present in both humans and animals so these are called zoonotic pathogens. The respiratory system, gastrointestinal, hepatic, and neurologic systems can be infected by this virus. Shanbehzadeh et al, [8] talked about an outbreak of coronavirus in 15 million people were affected by this pandemic and 600,000 deaths occurred in 210 countries. These are positive-stranded RNA non-segmented RNA viruses. Human health can be damaged more by this virus and it directly infects the respiratory system, and immune systems, exacerbating the underlying medical conditions, and ultimately systematic failure, and death. Tens of thousands have been and millions of people forced to stay in limited space due to coronavirus. Woods et al, [9] talked about an outbreak of COVS has four genera such as alphaCoV, betaCoV, gammaCoV, and deltaCoV. Mammals can be affected by alphaCoVs and betaCoVs other animals such as birds, fishes and only a few mammals can be affected by gammaCoVs and deltaCoVs.

Epidemiology of coronavirus

Kakodkar et al, [10] take a look at the epidemiology of coronaviruses there are a total of 304, of which 900 cases were reported of which 94, 793 cases were recovered 13, and 887 died on March

21. According to this report, the case fertility rate (CFR) is 12 percent. For this systematic review, and pooled analysis was observed. From database and hand searches, suitable studies were observed on March 2, 2020. Clinical (including laboratory and radiological) and epidemiological (including demographic) characteristics of confirmed COVID-19 cases data were extracted and combined by simple pooling. There were 644 studies in total, 69 studies (involving 48, 926 patients) were retained for the investigation. There were 49.16 years old age patients were added. Total male patients were 51.46% and non-smokers were 52.32%.

Hypertension (50.82%) and diabetes (20.89%) were the most recurring comorbidities watched over. Fever (83.21%), cough (61.74%), and myalgia or tiredness (30.22%) were the most typical manifestation. Modified levels of blood and biochemical parameters were monitored in proportion to the patients. 78.50% of patients had bilateral lung involvement, and 5.86% showed no CT spottings denotative of viral pneumonia. The most typical complexity registered was acute respiratory distress syndrome (28.36%), acute cardiac injury (7.89%), and acute kidney injury (7.60%). Clinical and epidemiological aspects of COVID-19 patients were mostly heterogeneous and non-specific. This is the most extensive statement of the characteristics of the COVID-19 patients to date. This study was significant for improving our interpretation of the spectrum and influence of this novel disease.

Symptoms and incubation period for coronavirus

Nobel et al, [11] conclude that coronavirus disease is a contagious disease because of its high fertility rate. Fever, cough, and shortness of breath are common symptoms of coronavirus, gastrointestinal symptoms are progressively documented among patients with COVID-19. Coronavirus is a case-control study designating gastrointestinal symptomatology including diarrhea and nausea/ vomiting. Inomata et al, [12] narrated that Nasal congestion and ocular symptoms such as conjunctivitis are also symptoms of coronavirus disease. Angiotensin I-converting enzyme is used to encrypt a viral entry-associated gene for SARS-COV-2 that is expressed in corneal epithelial cells and conjunctival tissue, as well as in the bronchial and pharyngeal mucosa. High throughput sequencing or real-time reverse transcriptase-polymerase chain reaction (RT-PCR) shows positive tests for coronavirus for which nasal and pharyngeal swab

specimens were used. Lauer et al, [13] stated that the incubation period for coronavirus is finite. Different analysis shows different incubation period for coronavirus. One analysis shows 6.4 days with a range of 2.1 to 11.1 days incubation period which is based on 88 confirmed cases in Chinese provinces outside Wuhan. Another analysis shows 5 days with a range of 2 to 14 days median incubation period outside Wuhan.

These approximations are generally reliable with estimations from 10 confirmed cases in China (mean incubation period, 5.2 days and from clinical reports of a familiar cluster of COVID-19 in which symptom commencement happened 3 to 6 days after expected exposure in Wuhan. SARS (mean, 5 days; range, 2 to 14 days), MERS (mean, 5 to 7 days; range, 2 to 14 days), and non-SARS human coronavirus (mean, 3 days; range, 2 to 5 days) are included in this estimation of the incubation period of coronavirus. Xin et al, [14] demonstrated that the time delay between infection and the inception of illness of an infectious disease is designated by the incubation period. Due to the functionality of the host immune system, the dose of introduction to a virus, and the difference in the pathogen transmission path, the incubation period can vary from one individual to another.

Diagnosis of coronavirus disease

Demonstrated that Virus detection based on culture is a significant instrument for virus pathogenesis research, during the COVID-19 pandemic, but the culture cycle is too lengthy, so it is not appropriate for the quick recognition of viruses related to acute contagious diseases. For suspected and confirmed COVID-19 patient's nucleic acid tests can swiftly and sympathetically recognize pathogens. Individuals with a positive chest CT scan might show negative results for SARS-CoV-2 when tested using reverse-transcriptase polymerase chain reaction [15]. Genetic variation in RNA viruses, and differences in primers, probes, and target sequence can lessen detection performance and false negative results occur. By a point-of-care test nasopharyngeal samples that contained weak viral RNA were recognized as negative. Therefore, the explication of nucleic acid tests must be cautious, and negative results cannot be eliminated.

A happening outbreak and retrospective assessment of the attack rate or extent of an epidemic can be investigated by serological surveys [16]. Said that emerging viruses can be recognized by

genomic sequencing. Molecular diagnostic testing has played an important role in the detection of coronavirus disease. Nucleic acid amplification tests (NAATs) are also much needed for severe acute respiratory syndrome coronavirus (SARS-CoV-2). To understand the biology of the disease identification and quantification of SARS-CoV-2 throughout the disorder is very crucial. SARS-CoV-2 is a positive-sense RNA virus enveloped with a genome comprising approximately 30,000 Nucleotides and 15 genes [17]. Narrated that detecting severe acute respiratory syndrome coronavirus requires the use of laboratory-based diagnostic methods, encircling both virological and serological tests. Real-time reverse transcription-polymerase chain reaction can identify SARS-CoV-2 by targeting various genes, including open reading frame-1 antibodies, envelope protein, nucleocapsid protein, RNA-dependent RNA polymerase, and the N1, N2, and N3 target genes. Diagnosing coronavirus disease 2019 through serological methods is straightforward and does not demand complex techniques or equipment, making it well-matched for rapid detection and extensive screening [18].

Preventive measures for coronavirus

Facchin et al, [19] demonstrated that in the present situation, it is essential to adopt measures that efficiently alleviate the risk of infection for the proper management of diseases. Many preventive measures have been suggested for public health, comprising practices such as maintaining hand and respiratory hygiene, along with safe food handling, to diminish the risk and transmission of SARS-CoV-2. Given the current scenario, it is vital to recommend preventive therapeutic measures that can efficiently diminish the hazard of COVID-19 infection until the evolution of a vaccine or other antiviral agents. Throughout numerous cultures internationally, plants contributed as traditional medicines for centuries, providing cures for various chronic infections, including viral diseases.

Campos et al, [20] discussed that there's an ongoing deliberation about the efficacy of preventive measures in lessening infection spread among healthcare providers, despite their suggested use. Despite clear recommendations promoting the use of personal protective equipment during aerosol-generating procedures for COVID-19 patients, the significance of surgical masks, regular sanitization, and maintaining safe distances is frequently underrated. Rafeemanesh et al, [21]

narrated that to reduce the threat of virus transmission, it is vital to identify the importance of polluted surfaces as a potential route of infection. Strict hand hygiene, involving thorough rinsing with soap and water for 20-30 seconds, is necessary before and after any dental procedures. Alternatively, alcohol hand sanitizers with a minimum 70% concentration can be used for at least 20 seconds, unless hands are soiled. Additionally, it is important to wash hands before and after donning or removing procedure gloves, thereby improving overall infection control measures during dental practices.

When coughing or sneezing, it is suggested to employ the elbow to cover the mouth and nose, discard used tissues properly, and wash hands afterward. Preventing the transmission of coronaviruses (CoVs) involves strategically blocking their transmission routes, particularly through the mouth and nose. As a crucial measure, effective personal protection devices against CoV nanoscale aerosols have gained significant attention. While N95 and N98 masks offer protection against 300 nm aerosols, the concern arises with smaller aerosols, as airborne viruses could potentially reach the respiratory system, causing infection. Given the nanoscale size of CoVs, numerous research groups are actively working on developing nano filter masks to specifically thwart the transmission of CoV aerosols smaller than 300 nm.

Strategies for control of infection

He et al, [22] discussed that administrative controls play a vital part in precluding and governing infectious diseases. Employers should disperse practical hygiene messages through various means like flyers, posters, pamphlets, and orientation meetings, following suggestions from healthcare and occupational medicine professionals. Strategies such as teleworking, lessened work hours, or momentary closure can help limit personnel in the workplace. Regular cleaning, disinfection, and the use of disposable means are necessary. Additionally, it's important to evade in-person events like ceremonies and conferences. While personal protective equipment (PPE) is typically the final resort for workplace threat control, the quick transmission and high contagiousness of the new coronavirus require an extensive strategy. It is suggested to hire a combination of substitution, engineering controls, administrative measures, and PPE in the workplace. Seeking recommendations from professionals, including environmental and occupational health experts, is vital in implementing influential control strategies.

Clinical trials for the treatment of coronavirus disease

Sanders et al, [23] discussed that researchers reveal a perceptive concern in reported clinical trials, particularly those concentrated on anti-viral, anti-inflammatory, or immunomodulation remedies. The initial anti-viral trial employing Lopinavir/Ritonavir has surprisingly fulfilled its calculated sample size of 160 cases. Lopinavir/Ritonavir has illustrated effectiveness against coronavirus, as previously recognized in clinical cases related to SARS. Current clinical trials are in progress, desiring to examine the efficacy of Remdesivir, with a considerable target sample size of 760 patients. Remdesivir, functioning as an adenosine analog, causes early termination of viral replications by incorporating it into developing viral RNA chains. Its efficacy expands to various RNA viruses, including SARS-CoV and MERS-CoV, making it a promising antiviral drug. Many anti-viral agents are experiencing evaluation in registered clinical trials in China.

Using existing drugs in a novel strategy to treat coronavirus is significant and might offer a quick path to finding a useful remedy. Ibrahim et al, [24] demonstrated that as of April 2, 2020, an examination of clinical trials utilizing search terms like COVID, coronavirus, or SARS-CoV-2 uncovered a total of 291 actively ongoing trials exclusively centered on COVID-19. Notably, within this cohort, 109 trials specifically focused on pharmacological treatment in adults, consisting of 82 interventional studies and 29 placebo-controlled trials. To elaborate on the specifics, this distribution encompassed 11 phase 4 trials, 36 phase 3 trials, 36 phase 2 trials, and 4 phase 1 trials. Additionally, 22 trials either lacked categorization by phase or were deemed not applicable to such classification.

Management of infection

Liu et al, [25] discussed that respiratory support desires to retain adequate oxygenation and ventilation, inhibiting degradation in the patient's respiratory status. If the primary cause of respiratory distress cannot be swiftly handled, supplying respiratory support, including potential mechanical ventilation, is vital to avoid complete respiratory failure. Regular observation of respiration is necessary, as it is associated with treatment outcomes. Selected patients undergoing

hypoxemic respiratory collapse may help from involvement like high-flow nasal oxygen or external ventilation.

Declared that the primary approach in treating viral pneumonia, particularly in the absence of inaugurated antiviral drugs, is chiefly validating. In COVID-19, the pivotal symptoms dealt with are fever and unproductive cough. Paracetamol is suggested as the primary antipyretic, while guaifenesin is the best antitussive. Patients with severe respiratory discomfort may acquire supplemental oxygen at 5 L/min, desiring a target oxygen saturation (SaO2) of ≥92-

95% in pregnant women and ≥90% in others. Difficulties such as septic shock and acute kidney injury (AKI) should be handled with sepsis methodology and renal replacement therapy (RRT) respectively. Observing renal function tests and fluid balance helps recognize patients appropriate for RRT.

Importance of coronavirus Disease

The article talks about Coronavirus Disease 2019 (COVID-19) resulting from severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which has impacted over 20 million people internationally, resulting in more than 700,000 deaths and being proclaimed a pandemic. SARS-CoV-2 is the seventh coronavirus impacting humans, with symptoms including fever, cough, diarrhea, and vomiting. The virus is mainly disseminated through respiratory secretions, such as sneezing and coughing. Examination includes X-ray or computed tomography scans and molecular diagnostic techniques like polymerase chain reaction. Presently, there are no practical therapeutics for SARS-CoV-2, and prevailing antiviral therapies desire to lessen respiratory problems by reducing viral load.

The article presents a comprehensive update on clinical factors, including methods for dissemination control, examination, remedy, and the pathological process of SARS-CoV-2 diseases. The COVID-19 outburst, originally recognized with pneumonia in Wuhan, China, in December 2019, has now been disseminated to over 200 countries and regions worldwide. A vital goal in dealing with these outbursts is to lessen the case fatality rate. Our results reveal that the fatality rate for COVID-19 in provinces outside Hubei, China, was 0.82% (121 out of 14,708 cases), extremely lower than the 6.62% (4,512 out of 68,128 cases) noticed in Hubei province ($p < 0.0001$). The preliminary cause behind the lower fatality rate seems to be the quick surveillance of patients

in other provinces, emphasizing the importance of timely patient care in alleviating the fatality rate of COVID-19.

Discussion

In the last 20 years, East Asia and the Middle East have caught sight of noteworthy disease outbreaks related to coronaviruses (CoVs). The commencement of severe acute respiratory syndrome (SARS) in 2002 and Middle East respiratory syndrome (MERS) in 2012 pointed out considerable circumstances. More recently, a new coronavirus, severe acute respiratory syndrome Coronavirus 2 (SARS-CoV-2), responsible for the outbreak of coronavirus disease 2019 (COVID-19), emerged in late 2019. This novel virus has become an international health hazard, leading to an underway pandemic across many countries and regions. In supervising a swiftly disseminating disease without a remedy or vaccine, the most significant method for restriction includes early detection and isolation of patients. Detecting and identifying individuals utilizing testing kits play a vital role, especially in the case of highly hazardous outbreaks such as COVID-19. Especially, countries like Korea and Germany performed considerable testing at the commencement of the COVID-19 outbreak, resulting in comparatively lower death rates. This underlines the essential role of early testing in alleviating the dissemination of COVID-19.

Vaccination stands as the most pledging route for preventing SARS, with live attenuated vaccines verifying effectiveness against intense diseases caused by porcine and avian coronaviruses. Given the virus's ability to obtain a high concentration in cell culture, formulating a similar live attenuated vaccine for SARS-CoV looks like feasible. However, a warning is authenticated in vaccine development, as certain vaccines for feline coronavirus have shown damaging consequences, such as antibody-dependent improvement of disease upon succeeding infection with the wild-type virus.

The employment of a SARS vaccine would mainly target the safety of high-risk individuals, including healthcare workers, in regions where the virus is widespread. Remarkably, due to SARS's short incubation period, the vaccine would need to be issued precautionarily, and its effectiveness might be restricted in precluding disease post-exposure to a SARS patient. In certain regions, the SARS epidemic seems to be rising beyond control. Expected soon are new tests scheduled to swiftly recognize individuals with SARS in its early stages.

These tests are anticipated to play a vital role in directing quarantine decisions and deploying public health measures to contain the infection's spread. However, there is a growing culmination that bringing the epidemic under control may require the development of drugs and vaccines. The process of creating effective drugs and vaccines for SARS is likely to be extended. The global community will apprehensively examine the race between the intensifying spread of the SARS epidemic and the development of drugs and vaccines with the potential to restrain its effect.

Conclusion

The global struggle to formulate vaccines for SARS-CoV-2 is in progress, with clinical trials taking place worldwide. While there is a longing that existing antivirals like remdesivir and lopinavir-ritonavir could play a role in COVID-19 treatment, trial results thus far have not been motivating. Although COVID-19 is typically revealed as a mild respiratory illness, cytokine activation in some cases results in complex situations such as sepsis and acute respiratory distress syndrome, resulting in morbidity and mortality. The investigation of immunomodulatory treatments and biologics is actively in progress as potential therapeutics for COVID-19. On the other hand, the utilization of steroidal and nonsteroidal anti-inflammatory drugs (NSAIDs) has been prevented due to worries about their negative effects. Over the past two decades, coronaviruses have provoked important global epidemics and outbreaks, emphasizing the constant challenge for modern medicine to keep pace with these developing hazards. Presently, there are no pharmaceutical products verified to be always secure and useful in treating COVID-19. Amid the continuous global pandemic, research groups worldwide are actively involved in formulating treatments to lessen the impact of the disease and diminish morbidity and mortality rates.

In the broader scope, the ultimate goal is to develop a vaccine that can hinder future infections and outbreaks. However, the development and global-scale production of an effective vaccine may proceed over several years. Further, there is anticipation regarding the need to vaccinate newborns and individuals who have already got well from COVID-19. The significance of such a vaccine in defending individuals against future infections of this novel coronavirus remains unknown. Despite the absence of a confirmed safe and effective treatment, the considerable number of clinical trials commenced since the start of the epidemic is notably outstanding. The incorporation of advanced genomics and computer science technologies, including machine learning, complex

Molecular dynamics, and artificial intelligence, holds promise for recognizing potential treatments. Through coordinated struggles across global research communities, there is positivity that a useful treatment or vaccine for COVID-19 could develop soon. This pandemic underscores the need for increased awareness among governments and pharmaceutical companies regarding supported funding for research in this field. Simultaneously, there is a call to evaluate the suitability and preparedness of healthcare systems and infrastructures in addressing future pandemics.

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