Systemic Review

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ASSESSMENT OF THE EFFECTIVENESS OF DIFFERENT PREVENTIVE MEASURES ON PREVALENCE OF COVID-19 OUTBREAK: A SYSTEMATIC REVIEW

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ABSTRACT

Objectives: Identify the global control measures declared by various countries against the deadly novel coronavirus (COVID-19) outbreak and their effectiveness in reducing transmission of the current outbreak of novel coronavirus COVID-19. Wuhan, China, to provide an overview of efficacy.
Methods: Information on the effectiveness and validation of various control measures to prevent the spread of COVID-19 using an extensive review of the Centers for Disease Control and Prevention (CDC, USA) website, Google Scholar, and PubMed literature.
Results: Adherence to social distancing, school closures, and travel restrictions were so high that some control measures had a huge impact on reducing the spread of COVID-19, while others had little or no effect on reducing infection.
Conclusions: It concluded that awareness of the COVID-19 epidemic and adherence to control measures were crucial in eradicating such infections. Future research should explore ways to increase compliance with control measures in different countries to prevent the spread of infection.

Keywords: Social isolation, school closure, COVID-19 outbreak, preventive measures, quarantine, systematic review

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INTRODUCTION

The continuous 2019-2020 widespread coronavirus illness 2019 (COVID-19), caused by the Extreme Intense Respiratory Disorder Coronavirus 2 (SARS-CoV-2), started in December 2019 in Wuhan, the capital of Hubei territory and quickly spread to the rest of Hubei and all other areas in China. By mid-to-late Walk 2020, the primary episode had been, to a great extent, killed inside terrain China after producing more than 81,000 cases (1,2).

The World Health Organization has urged all governments and public health organizations to base their decisions on factual information (2–4). However, in the early stages of an outbreak like the acute respiratory illness (ARD) caused by the 2019-nCoV virus, data and information are limited, and no vaccine or antiviral treatment is available. Several mathematical models and simulation applications have been employed to tackle this challenge of predicting disease spread and evaluating possible interventions and risks (5). According to the outcomes of the models, plausible social and epidemiological tactics can be recommended to prevent or manage emerging diseases with pandemic potential efficiently (6).

It is well known that, without compelling and opportune intercessions, long-distance travel frequently carries the infection worldwide within weeks or months of the beginning of an episode, causing genuine ailment. Pronounce a worldwide open well-being crisis (7–10).

While the specific strategies national health systems employ to combat COVID-19 will likely differ from country to country, they share some fundamental approaches. As suggested by Ferguson et al. (8), in the absence of a vaccine, mitigation measures may involve isolating patients and their families at home, as well as implementing social distancing measures for different age groups, such as elderly individuals aged 75 and older, Individuals who have weakened immune systems or other vulnerable groups, such as older adults, are at higher risk of contracting infectious diseases. Repressive policies require extending case isolation and home isolation with social distancing measures from the general public. This social distancing is often implemented by closing schools and universities.

Initially, some strategies to reduce interference were very effective when combined, while others were less successful due to logistical challenges and low adoption rates. The success of these strategies was often influenced by certain factors that were specific to the countries concerned. For instance, as per the Imperial University COVID-19 Response Team, a hybrid approach of mitigation and containment measures carried out for three to five months could reduce the most significant healthcare demands by two-thirds and lower the death rate by fifty percent (8). This study aimed to

illustrate the most effective control measures to eliminate COVID-19.

MATERIAL AND METHODS

The present study included quantitative studies to estimate the efficacy of the implemented preventive measures and isolation practices in controlling COVID-19 infection rates. Various research engines, including Google Scholar and PubMed, were used for systematic search from December 2019 up to 20th May 2020 using different syntaxes and terms related to "SARS," "severe acute respiratory syndrome," "Coronavirus," "Coronavirus Infections," " Quarantine", "COVID-19 ", "2019-nCoV" and "preventive measures." CDC and websites were also used to elaborate information related to the control measures applied to limit the spread of COVID-19 infection using different search terms such as "quarantine, "COVID-19 outbreak," and "infection control." The server of preprint articles (medRxiv) was also searched using" COVID-19," SARS," "Quarantine" "and Infection control. All articles discussing the efficacy of control measures in preventing the spreading of COVID-19 in English language in the previously mentioned duration were enrolled in the current study. Comments, commentaries, opinion pieces, systematic reviews, and studies that addressed other viruses were excluded. Any article written in a language other than English Language was excluded. Also, articles concerning COVID-19 but, reporting topics other than preventive measures were not included in our study. Bias was avoided through our study via a randomized collection of articles according to the previously mentioned inclusion and exclusion criteria from different databases.

RESULTS

1. Study selection and characteristics

The relevant published articles which were retrieved by searching through Google Scholar and PubMed databases in addition to WHO and CDC websites, were approximately 50 articles then about five articles were excluded since some of them were personal views or comments despite their fruitful contents; other comments were far from the major topic of control measures. Some of the excluded articles were invited commentaries. Interestingly, some articles were found not to be peer-reviewed, but they are available since the copyright holder for the preprint is the author/funder, who has granted medRxiv a license to display the preprint in perpetuity available under a CC-BY-NC-ND 4.0 International license, were included (11). A total of 45 published articles are relevant and included in the current overview. In general, relevant articles indicate that the most effective control measures to prevent the spread and transmission of COVID-19 include:

Case isolation, social isolation, school closures, timely information sharing, travel restrictions.

2. Social distancing and Case isolation

The UK presently characterizes near contact inside 2 meters for 15 minutes over the final two weeks identified (12). Beneath this definition, the follow-up burden can be broad, but having an expansive number of unfollowed help cases may not be conceivable. Unwrapping the contact

definition (since it requires longer contact lengths) diminishes this burden, but the hazard of undetected cases gets more articulated (13). The effect of social segregation and case segregation on communicable illnesses has been surveyed by numerous contemplations (11,14–21). Longer timescales permit the defilement of tertiary cases, speeding up consequent treatment. Furthermore, contacts being followed can successfully screen and disconnect defilement or pose a danger to others. They ought to be confined so as not to allow contact following and have the potential to control COVID-19 (and other close-contact pathogens), but the extreme triumph will lie in the speed and possibility of containing suspect contacts (13).

The effectiveness of segregation and contact tracing in curbing disease outbreaks in regions with low transmission was assessed using a numerical model (22,23). The outbreak can be controlled by improving the adequacy of contact-tracing efforts, accelerating the identification of cases, and promptly isolating individuals after symptom onset. The effectiveness of contact tracing and quarantine as a control strategy for countries vulnerable to imported cases has been highlighted (22,23). Two relief strategies have caught immediate attention: (i) case examination and (ii) school closures (SC) along with case examination. Adopting the case segregation method, which is not associated with SC, can lead to a delay of more than a week at the epidemic's peak. Additionally, this approach can bring down the severity of the outbreak at its peak by approximately 24% and reduce its prevalence by 22%. Case isolation alone is ineffective for epidemic suppression as the overall attack rate is significantly reduced.

The epidemic's duration has been shortened, and its peak has been lowered to a certain extent due to the adoption of physical distancing measures. The effectiveness of physical distancing in reducing the transmissibility and incubation period of COVID-19 should come as no surprise, considering the available information on these aspects (24,25). The interventions should not be lifted prematurely or abruptly as it may result in an earlier secondary peak. However, by gradually relaxing the interventions, the peak can be flattened (14). The adequacy of social separation on plague control is still beneath scholastic talk. The comes about of virtual tests shift. A few investigations recommended social separating is successful, beneath the condition of early enactment and long-lasting execution of combined measures (15) strict execution (16,17) and suddenly embraced (26); a few concluded the viability was gentle (18); a few contended that direct social separating can decline the malady result (16,17), but real-world thinks about are uncommon.

It has been reported that a radical increase in the identification and isolation of currently undocumented infections would be needed to control COVID-19 fully (27).

3. School closures: SC

Despite including school closures in the segregation approach, no substantial decrease

was observed in the overall rate of COVID-19 transmission.

The delay in the peaks of both frequency and predominance, which is approximately 15 days, can be attributed to the slower development rate of the total rate. However, the sizes of these peaks remain constant. According to recent findings, the closure of educational institutions may offer a potential solution to offsetting approximately 10% of the need for social distancing compliance. Nevertheless, it is important to acknowledge that the successful implementation of this approach in conjunction with a 70% adherence to social distancing and school closures may require a considerably longer period for the combined procedure. Additionally, it may be considered illogical to pursue such a course of action (28). The prompt execution of social distancing measures has proven to be highly effective in swiftly containing the outbreak (19,20). Based on our current findings, it appears that there is a continuous transmission of the disease in the region. This highlights the urgency of implementing a diverse range of social distancing measures to promptly contain the outbreak in Korea. It is imperative to reduce the morbidity and mortality impact of the disease and curtail the number of case exportations to other nations (21).

4. Timely sharing of information

The fast spread of COVID-19 in mainland China and other countries near and far is partly due to the urgency of the situation and the inadequate risk assessment associated with the limited scope of the virus in China (29).

Collaboration between organizations and governments

The organization between regulatory workplaces and exterior organizations, such as the CDC and WHO, can be essential in controlling the transmission of torment by effectively communicating perils and sharing open prosperity information. This was outlined by the fast movement taken amid the MERS scene in South Korea in 2015. The Chinese Benefit of Prosperity revealed the genetic sequencing of the COVID-19 disease after 8 days of restriction (29,30). Engaging the open to get fitting cautious measures is noteworthy in rapidly controlling the spread of the defilement amid the torment, and information campaigns play a basic portion in fulfilling this objective. In a fast-changing circumstance such as the COVID-19 scene, campaigns like these can allow imperative upgrades to keep people taught. Without correct information, solidify and rumors can spread quickly (3,31).

5. Travel Restrictions

Analyzing the COVID-19 outbreak and modeling the effect evaluation of travel limitations may help national and worldwide specialists arrange open well-being reactions. By 23 January 2020, the plague had spread from Wuhan to other cities in territory China. The travel isolation around Wuhan, as it was, marginally moderated the spread of the scourge to other parts of territory China. This is steady with another think about the spread of the SARS-CoV-2 infection in territory China (32,33). The demonstration

recommends that whereas the travel boycott in Wuhan was at first successful in lessening the importation of universal cases, the number of cases watched outside the territory of China has fallen to 2 due to cases happening elsewhere. It appears to be an increment once more after ~3 weeks. Additionally, extra travel limitations for up to 90% of activity have, as it were, an unassuming impact unless combined with open wellbeing intercessions and behavioral changes that essentially diminish the transmissibility of the infection (34). Additionally, since January 23, 2020, despite the execution of strict travel limitations to and from terrain China, expansive numbers of individuals uncovered to SARS-CoV-2 have remained undetected universally. Going forward, it is anticipated that travel confinements to ranges influenced by COVID-19 will have, as it were, a minor effect and intercessions to diminish transmission will have the most noteworthy advantage in containing the scourge (35). Moreover, his COVID-19 contaminations in Wuhan may have declined in line with the presentation of travel confinements in late January 2020. Sometimes, recently, these control measures, as more cases arrive in Wuhan and other universal areas with comparative transmission potential, numerous transmission chains are not set up, to begin with, and in the long run, modern episodes (36). Be that as it may, the coexistence of travel and declining contamination rates makes a much more noteworthy synergistic impact, apparent in both the abating plague action in the territory of China and the number of globally imported cases (35,37).

6. Prevention of zoonotic transmission

The exact components that drove the rise of COVID-19 are still covered in the puzzle, but it is broadly acknowledged that the infection was passed on to people from sullied live creatures, including snakes and civet cats. Zoonotic transmission is the implies by which all three-beta coronaviruses were made. The hazard of transmission of SARS and MERS from creatures to people was expanded by near contact with contaminated creatures. Bats, comparable to those included in the SARS episode, are, as of now, accepted to be the suspected source. The Huanan fish showcase is the central point of the tribulation, and it is additionally accepted that SARS may have started from comparative markets. This closeness may show the requirement for the closure of these markets in China. China incorporates a wealthy history of live-animal markets that are profoundly established in its communities. Therefore, it appears far-fetched that these markets will be closed down forever, indeed in spite of the fact that it is the foremost successful way to avoid another flare-up of zoonotic defilement, the Chinese Center for Illness Control and Expectation (CCDCP) should closely oversee the re-opening of these markets. It is vital to actualize suitable measures to guarantee adherence to wellbeing and cleanliness conventions that constrain the interaction between live creatures and people. Checking these markets may be vital in anticipating the transmission of zoonotic infections. The US Center for Disease Control and Evasion has compared the trouble level of works out to that of novel flu diseases. Both include zoonotic transmission from contaminated creatures to

people. The MERS infection is accepted to have started from dromedary camels, whereas bats are the likely source of the SARS infection. It is still questionable whether the zoonotic COVID-19 infection was transmitted from a tainted civet cat, feathered creature, or other animal at the Huanan fish showcase (29,38).

7. Wearing Masks

Masks are in high demand to prevent transmission of this virus (39). Medical masks help prevent direct contact with respiratory droplets from infected (symptomatic) patients. On the other hand, improper use of masks can increase the risk of infection. There is an increased risk of transmission from asymptomatic people through infected surfaces, especially if masks are used incorrectly. This is because people wearing masks touch their mask (straps or face to adjust mask) and parts of their mouth/face more often than people not wearing masks. Frequent contact between the mouth and any part of the face increases the chances of transmitting the virus through the respiratory tract when the hands come in contact with contaminated surfaces (stores, health centers, etc.). (shopping, on the bus, or in other public places) or shaking hands with someone who does not have symptoms. Therefore, care should be taken to avoid frequent touching of the face, especially the mouth, nose, and eyes (whether a mask is worn or not)(40) procedures are more effective in controlling the spread and ensuring safety.

8. Hand Washing and Hygiene:

The most important thing is regular hand washing. This is a simple but very effective procedure. Washing your hands after each visit to an open area can prevent infections (actually on dirty surfaces) from being transmitted or rotting. Includes covering the mouth and nose while poking or gasping to avoid spreading if in the early stages of COVID-19 (41).

DISCUSSION

Key findings

In the absence of accessibility to crisis pharmaceuticals or total treatment for COVID-19, anticipating the spread of SARS-CoV-2 infection and the direction of contamination is the prime step in controlling this scourge of illness. Due to the speedy bounce concerning the entire number of affirmed SARS-CoV-2 tainted people, as well as influencing a few nations in a brief time interval, the WHO assigned it beneath a high-risk category. Few reports have said the plausibility of likely widespread dangers and dangers with the blossom. They linger in quickly expanding cases of COVID-19, disturbing us to put exceptionally tall endeavors to check the spread of this broadly circulating virus among the world populace by taking after fitting avoidance and control measures in conjunction with defining worldwide arrangements and adjusted techniques with future viewpoints (29,42–47). These control measures to disturb the chain of the episode transmission included taking after appropriate contamination control hones such as case segregation, following of contacts, social separating, individual cleanliness, data exchanging, and travel limitation.

Case isolation and social distancing are critical limiting steps to control the spread of the virus in healthcare settings and the community. Moreover, the isolation and the application of quarantine strategy of infected and suspected people by Chinese authorities and other governments showed remarkable effectiveness in interrupting the infection transmission (46,48).

Also, since the exact origin of the virus is still debated, with conflicting assumptions that it is linked to a bat or a snake, avoiding consumption or contact with these animals became warranted (38,48).

Trading information through integrated media campaigns regarding the disease, infection transmission, and the associated symptoms is crucial. Also, personal hygiene and wearing facemasks should be enforced as well (49,50).

Globally, locking down highly epidemic areas has had a remarkable influence on controlling the spread of COVID-19 worldwide. Temperature scanning at airports is mandatory to identify and isolate suspected cases. Furthermore, continuous scientific research is critical to identify the virus and its origin for better control properly and to provide evidence for the efficacy of containment practices for such outbreaks (50).

CONCLUSION

The previously mentioned control measures were very effective in preventing the spreading of such epidemic infectious diseases (COVID-19). However, compliance with these control measures is very critical. One observation is that improper following of the measures has already led to an expansion in the number of contaminated patients and, along these lines, increased the number of passings, as in Italy. In spite of the fact that a resurgence of the infection is conceivable once these intercessions terminate, we accept that this ponder may encourage a convenient arranging of viable intervention strategies. Further studies comparing the prevalence of COVID-19 in the presence and absence of such preventive control measures will be essential in the future.

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