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A combination-based approach to COVID-19 symptom severity management

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Abstract

The recent outbreak and spread of the COVID-19 virus infection across the world has seen a massive global system-wide shutdown of human social and economic activity. Both developed and developing nations have been forced to contain and isolate their citizens as much as possible. However, the continuous rising cases in both categories of nations, especially those with poor or nonexistent testing facilities and healthcare systems pose a hidden danger. The seemingly lack of and access to a truly global concerted research effort in both temporary but effective symptom mitigation may lead to more deaths in infected cases. We propose that a fusion of both technological and home-grown solutions can be utilized effectively to manage symptoms. This would add to the preventive methods of social distancing, isolation, quarantine and frequent hand washing to halt the impact of the disease. We also hope to spur further research in such drug/non-drug combination therapy-based methods with emphasis on effectiveness based on quality of nutrient sources.

Keywords: coronavirus; fevers; pneumonia; nutrients; sauna baths; physical exercise

1. Introduction

Coronaviruses (CoVs) are the cause of the majority of common colds and flu in children and adults [1]. The four common ones are the 229E, OC43, NL63 and HKU1 [1]. COVID-19 is the common name for the novel SARS-CoV-2 virus (2019-nCoV) [1]. The virus originated in Wuhan, China, in December 2019 and has rapidly spread across the country and currently the world [2]. The virus can cause mild to severe respiratory illness similar to Middle East respiratory syndrome (MERS) and severe acute respiratory syndrome (SARS) [1]. It is less

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pathogenic than SARS-CoV and MERS-CoV and is the third coronavirus involved in inter-species transmission and infection of humans in 20 years [1]. The genome sequence of 2019-nCoV is very similar to that of bat SARS-like CoVZXC21 and human SARS-CoV [1]. It also utilizes the same cell entry receptor protein ACE2 as SARS-CoV to bind to human cells [1]. This receptor protein is available in large quantities in the epithelia of human lung and small intestine [1]. Thus, the infection sites are the upper respiratory and gastrointestinal tracts [1].

2. Background

Methods of COVID-19 infection include person to person transmission via respiratory droplets, physical contact with persons or contaminated surfaces and fomites [1]. Symptoms include fever, cough and shortness of breath [1], chills, sore throat, cold, dizziness, chest tightness, body soreness, headache, dyspnea, fatigue, running nose, and muscle aches [3]. The effects of the virus appear to be more severe and fatal in infected patients with underlying grave health conditions and compromised or embattled immune systems [1]. Asymptomatic incubation period for infected humans is about one (1) to fourteen (14) days [1].

2.1 Current experimental drugs and treatments

There is currently no approved proven specific vaccine, treatment or cure for people with COVID-19 [1]. However, some trials are underway employing a variety of drugs and compounds. Remdesivir™ is an antiviral treatment developed by Gilead Sciences Inc. in the United States [4]. It has been administered to patients suffering from Ebola virus disease, MERS and SARS [4]. Additionally, an experimental vaccine designated mRNA-1273™ was developed by NIAID scientists and Moderna, Inc. also in the United States [5]. Current clinical trials are

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ongoing in the United States and China and are exclusively focused on severe cases of COVID-19 [4] [5]. Furthermore, Chloroquine and HIV drugs have been reported to help some patients recover though more results and tests are required [6]. Chloroquine has been used as an anti-malarial since the 1940s and its modern form is a synthetic version of quinine [6]. The quinine is found in the bark of the *Cinchona* plant and was used as an herbal remedy for fever by indigenous Peruvians four hundred years earlier [6]. Clinical trials are currently being carried out to assess general efficacy [6].

2.2 Existing natural and home treatments

Though some of the afore-mentioned drugs appear as hopeful candidates in the treatment of COVID-19, they do or may come with serious side effects [6]. Thus, it may be useful to consider other less dangerous and more natural treatments to help with symptoms as trials continue. Some of the methods proposed here have been used to treat common colds and flu, fevers and pneumonia, etc. These include hot steam baths, a diet rich in fruits, vegetables, natural (hot) water, fish oils rich in vitamin C and flavonoids among other beneficial compounds. These can also be coupled with moderate physical exercise.

Vitamin C has been found to possess some anti-viral properties and help reduce oxidative stress that gives rise to inflammations [7] [8]. The study by [9] had doubts on the ability of vitamin C to prevent the common cold in the general population. However, they noted the effects on reduction of the duration and severity of colds in addition to its low cost and relative safety [9]. The researchers also acknowledged more improvements for children than for adults [9]. Most successful results are anecdotal for patients with potentially fatal respiratory system collapse due

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to influenza A infection [7]. Another study found that vitamin C halved the number of colds in tested physically fit people, though it did not prevent colds overall [8]. Also, constant periodic intake of vitamin C reduced the duration of colds [10], though its role is still not understood [8]. The study also led to conclusion that the previous negative findings of earlier studies may be attributed to the low dosage of vitamin C [8] [10]. Other controlled trials in the study led to prevention of pneumonia or improved conditions for pneumonia and tetanus patients [8]. Though the sample size is a limitation of the study, such outcomes warrant further investigation [8]. Ultimately, the researchers are clear that vitamin C reduces the duration and symptoms of the common cold.

Furthermore, the sources of Vitamin C should be taken into account even as anecdotal evidence show that citrus or orange fruits help reduce eliminate most symptoms of malaria and other fevers. Additionally, citrus fruits such as oranges help reduce cough severity in both adults and children. This could be because of additional numerous beneficial bioactive compounds are abundant in natural citrus fruits and juices [11]. Thus, their antioxidant function and benefits are due to not just vitamin C but also from other phytochemicals, especially flavonoids [11] [12]. Additionally, vitamin C is lost during the juice processing and packaging stages for artificial sources [11] [12]. Furthermore, vitamin C in packaged fruit juice is more stable with longer shelf-life when stored in metal or glass containers, than in plastic bottles [11]. Therefore, natural sources of vitamin C should be considered [12]. This was anecdotally verified when taking vitamin C supplements, packaged fruit juices compared with actual fruits. This area requires further extensive clinical study and investigation to ascertain the role of these sources of vitamin C in patients with fevers and colds.

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Studies have also shown that hot steam baths can help minimize risk of pneumonia [13], which is one of the severe outcomes of COVID-19. Hot steam baths help minimize oxidative stress, which is a well-known pathogenic mechanism that forms the basis of pneumonia and other inflammatory lung diseases [13] [14]. Thus, such baths enhance ventilation and lung function with reduction in pulmonary congestion on the airways and lung tissue [13] [14]. Also, such baths are not harmful and are widely used [13]. Furthermore, effects can be amplified by adding substances such as eucalyptus oil for faster relief.

Moreover, research has also shown that moderate physical exercise may boost the immune system, reducing susceptibility to respiratory tract infections [15] and fever. Exercise regimes can be tailored for the elderly and those with cardiovascular problems to reduce risk of complications.

3. Proposed symptom alleviation and treatment model

It is important to state that we are not proposing a cure for the novel coronavirus but a palliative model of treatment. This would help to reduce the severity and effects of the disease of those who have tested positive, or are asymptomatic and are receiving treatment by certified medical professionals. Current prevention methods such as social distancing and quarantine are effective at reducing spread. However, they are based on assumptions of availability of robust, functional nation-wide power supply, internet, mobile and broadband communication and information networks, life support systems, viable and advanced economic activity, sufficient medical personnel, effective testing kits and a functioning health care system. Additionally, a responsive federal and state government structure with clearly defined emergency and public health policy

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in place are also assumed. These are the preserve of developed nations and are virtually non-existent in developing or undeveloped countries.

It is the belief that there will not be a single source solution or approach to solve this global problem but a multi-faceted methodology. This would range from high level, advanced technological solutions to local home-grown proven and effective traditional methods of treatment. Thus, the proposed approach works on both individual and community as well state and federal levels. Also, it would help to provide alternatives in an atmosphere of perceived hopelessness even as health care systems of developed nations are overstretched.

The proposed scheme is given in Fig. 1. It should also be noted that this system is to be implemented prior to the exposure to and immediately after exposure to COVID-19. It is not recommended for those with severe or acute cases, which are critical. Thus, in the absence of testing to confirm one's status, such measures should go a long way in preparing the body to fight the infection.

It should also be noted that this is a generalized framework that could modified or varied depending on the needs of the individual. The model may have to be adjusted for countries where it is difficult to find and consult such medical professionals who may be in short supply. For example, where drugs and testing kits are unavailable, users can be guided on three of the four aspects. Also, some foods can be substituted using local alternatives but in moderate doses as regulated by a professional.

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Further clinical research would study and evaluate the efficacy of the combination of several of these scientifically proven home remedies with early trials of Chloroquine and HIV medicines in treatment for COVID-19. These remedies would be applied with the supervision of dieticians, nutritionists, suitably trained medical support staff and overseen by doctors in the alleviation of symptoms of COVID-19 and aid the body in shoring up its defenses.

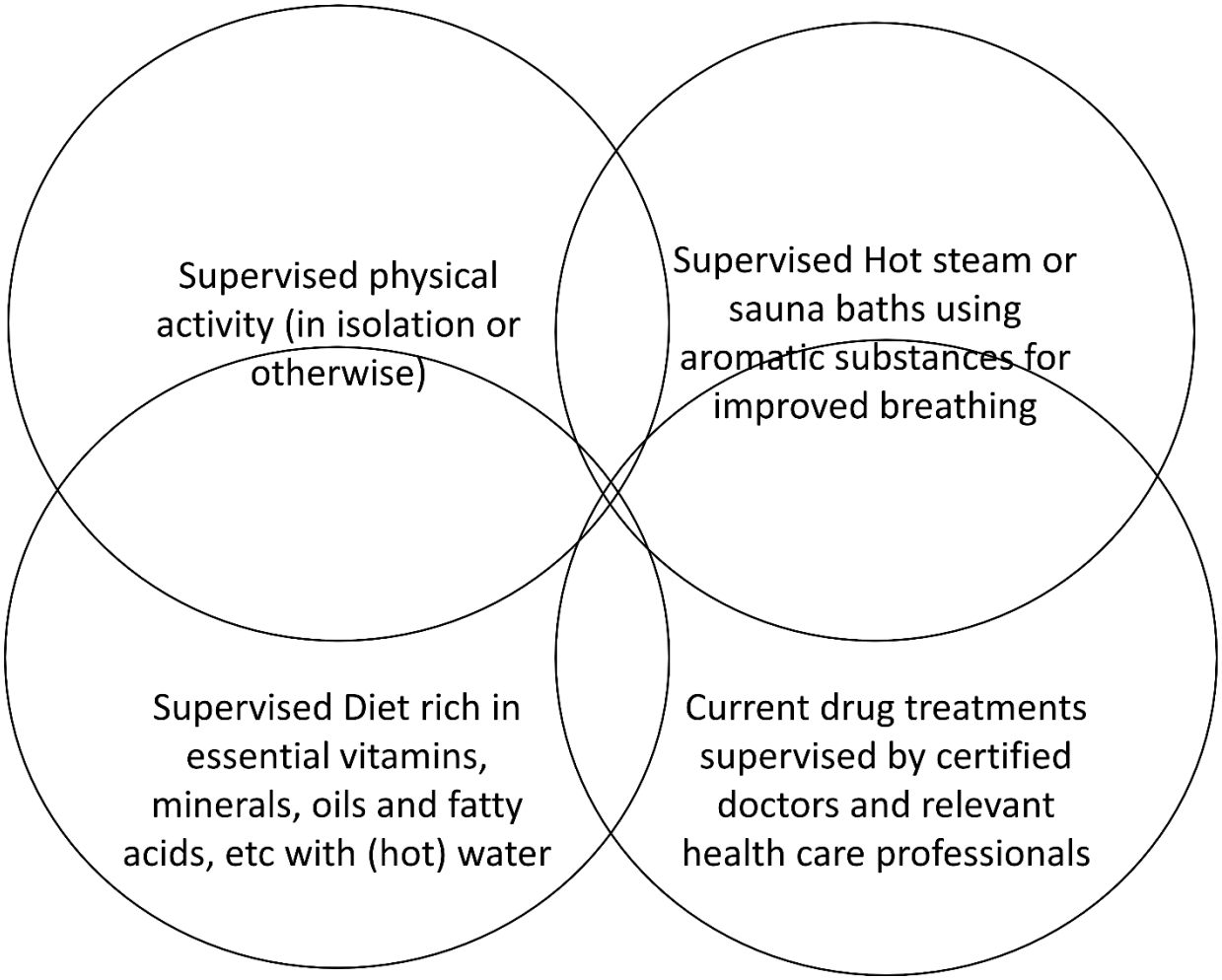

Fig. 1 Proposed multi-pronged approach to symptom management and treatment of COV-19

4. Conclusion

Based on research on various methods of alleviation of fever and cold symptoms, it is proposed that a combination of these approaches may improve outcomes in patients exposed to or suffering symptoms of COVID-19. This is based on the fact that the COVID-19 is similar to well-known viruses that caused similar outbreaks in the past with common symptoms. Also, extensive studies in nutrition, physical activity and steam therapy indicate improved lung function in patients suffering similar conditions caused by COVID-19. This system of approach will enable over-burdened healthcare professionals to assist most sufferers remotely in addition to other already existing measures for curbing the transmission and spread of the virus.

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