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Effect of Atmospheric Carbon Dioxide on Coronavirus

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Abstract

Lockdown (maintaining the social distance) is the only way to defeat coronavirus (COVID-19) from its infection. A person can be infected by an infected person's small droplets inhalation whether the person is in indoor or outdoor. The viral content in the air can travel from one meter to tens of meter depend on density and viscosity of air and density of coronavirus. Till now nobody explain its mechanism thus it is necessary to understand and incorporation of floating and spreading mechanism of coronavirus in social distancing. The role of CO_2 to understand the origin of coronavirus, seasonal effect on coronavirus, COVID-19 infected and death persons of different countries, mechanism of floating, spreading of coronavirus in air and mechanism of infecting living objects in earth environment by coronavirus have been discussed.

Keywords: Corona virus; COVID-19; CO_2; Density; Fluidity; Atmosphere; Chemistry

Main Text

It is assumed that carbon dioxide (CO_2) has a vital role for coronavirus occurrence and increase its population i.e. reproductivity like an algae [1]. Thus it is essential to know which country emits how much CO_2 in global system. According to International Energy Agency (IEA) [2] and World Economic Forum [3] that China, USA, EU-28, India, Russia, Japan and others countries have CO_2 emission contribution 30%, 15%, 9%, 7%, 5%, 4% and 30% respectively. Thus in reality the ratio of infected people and death rate will be according to the above ratio provided that the all people of different countries have same physiological variable and the equation (CO_2 emission vs. infected people or death) is linear. By analyzing worldometer data [4] till now it is found that the results deviates from equation. This may be due to different reasons i) all the countries are not working in the same way (counting the infected people and death in different way) ii) the plot of CO_2 emission vs. infected people or death is not linear iii) the physiological condition of people in different countries are different iv) soil pH of that country (the country of basic soil and acidic soil has different affection by coronavirus) and finally v) we do not have ultimate report (the values are changing day by day). But it is clear that higher CO_2 emitted country affected more than less CO_2 emitted country.

The composition of air contain nitrogen, oxygen, carbon dioxide, water vapour etc. and their concentration (volume%) strongly varies locally [5]. Air composition, temperature, and atmospheric pressure of different countries varies with human activity, altitude etc. The density of air is about 1.28 g/L and the density (at STP) of its component namely nitrogen, oxygen

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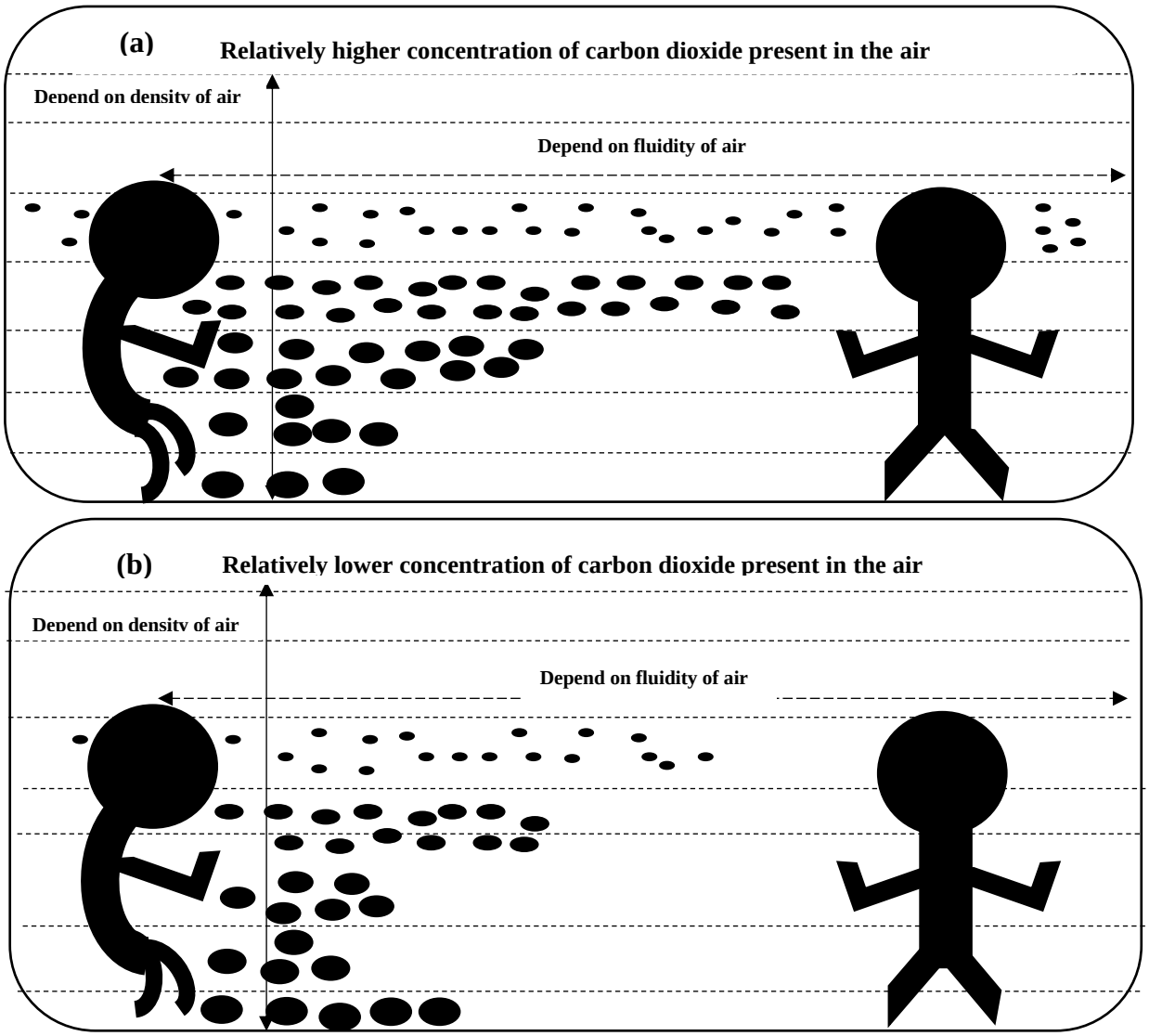
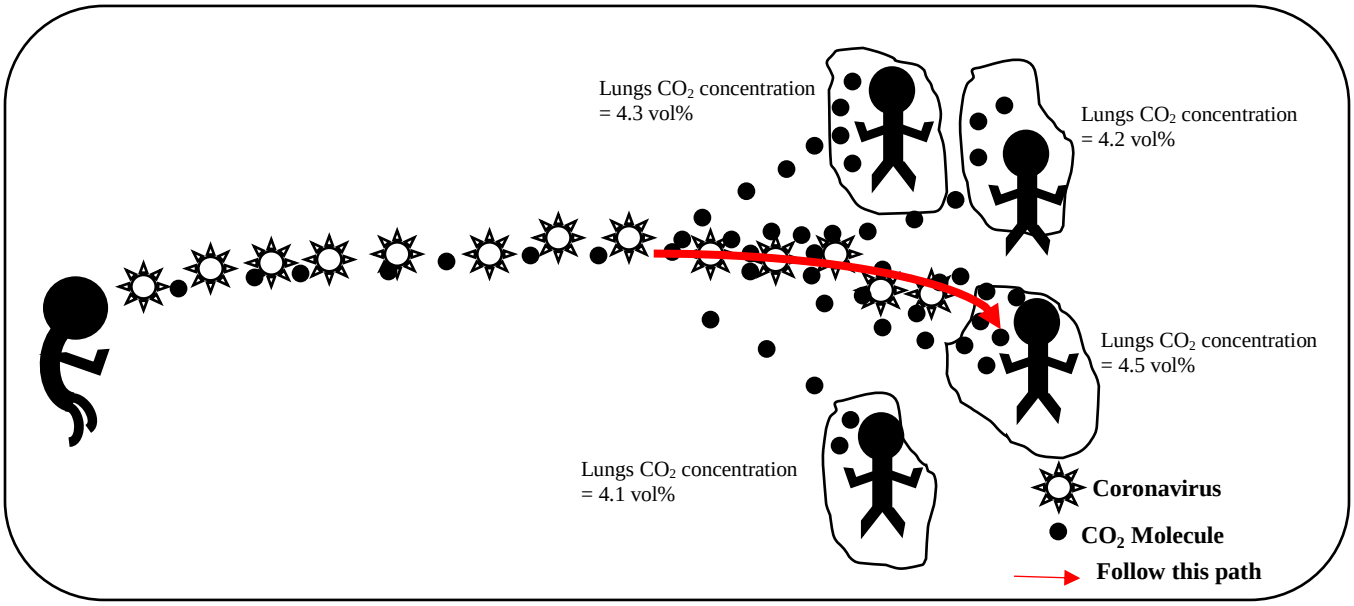
and carbon dioxide are 1.25 g/L, 1.43 g/L and 1.96 g/L respectively [6]. As CO_2 has higher density than air thus when CO_2 concentration in the air increase, air density also increases. The viscosity of air is 1.8 Pa·s × 10^{-5} Pa·s at 15℃ and it changes with temperature. With increasing temperature viscosity of air increases and fluidity (reverse of viscosity) decreases. Viscosity of nitrogen, oxygen and carbon dioxide are 1.72 Pa·s × 10^{-5} Pa·s, 1.99 Pa·s × 10^{-5} Pa·s and 1.46 Pa·s × 10^{-5} Pa·s respectively at 15℃. Now depending on the density of air, viral droplets will float in the air up to certain height and depending on the fluidity of air, viral droplets will travel up to a certain distance **(SCHEME 1)**. The mass of big droplet is higher so they fall moving of a certain distance and smaller droplets can stay in the higher layer of air. **SCHEME 1,** explains the effect of carbon dioxide concentration present in the air on viral droplets floating and spreading mechanism. As the concentration of CO_2 increases in the air, the density of air increases helps viral droplets floating to a relatively high altitude for longer time. Increase of CO_2 concentration in air increase the air fluidity which helps the viral droplets to spread more. The concentration of CO_2 in air tunes the viral droplets floating and spreading. CO_2 concentration varies in different season thus season has effect on coronavirus spreading. .



SCHEME 1. **Schematic representation of viral droplets flow in (a) relatively higher concentration of carbon dioxide present in the air and; (b) Relatively lower concentration of carbon dioxide present in the air indicating that at higher concentration of CO_2 the viral droplets travel longer distance.**

The assumption also explains why the decease is highly infectious. As per the assumption concentration of CO_2 is the driving factor for coronavirus infection. For its survival and reproduction CO_2 needed and hence coronavirus moves in a direction where there is more CO_2 and also stayed where it can consume adequate amount of CO_2. So there must be a sensor in the coronavirus which sense the concentration of CO_2 irrespective of its occurrence. The concentration of CO_2 in air and in human lungs is 0.04% and 4%-5% by volume respectively. When coronavirus exist in air (CO_2 concentration 0.04% by volume) it senses the human lungs where the CO_2 concentration is 100 times more and moved that direction. **SCHEME 2,** explains the infectious nature of coronavirus by showing the pathway of attacking. WHO mention that after attack by coronavirus, the person will show symptom in 7 days-10 days. This can be explain as the virus enter into human it follow respiratory path (because of lungs CO_2 concentration) and finally reach lungs where it increase its population. When the concentration of virus (viral loading) experience a competition for CO_2 consumption, few virus will come out from lungs (cough started) to atmosphere and ready to attack. For this procedure it will take 7-10 days.



SCHEME 2. **Schematic representation of the coronavirus infection spreading pathway from an infected person to a healthy person (assuming that all the persons standing within the CO_2 sensing ability of the Coronavirus).**

It can explain who is more prone to infected in a crowd. It is already discussed that coronavirus has a sensor for CO_2 concentration measurement. In a crowd whose (may be man, woman, high blood pressure patient, high blood sugar patient, animal, birds and any living object) lungs exhale more CO_2 (physiology use term is less immune person) virus will attack that person (assuming that all the persons standing within the sensing range of coronavirus). As concentration of CO_2 in lungs is a relative quantity means no one is immune. Let's take an example in a crowd there are 4 peoples whose CO_2 concentration in lungs are 4.5 volume%, 4.1 volume%, 4.2 volume% and 4.3 volume%. Whatever will be the body immunity, coronavirus will attack all the people in the order of lungs CO_2 concentration i.e. 4.5 volume%, 4.3 volume%, 4.2 volume% and 4.1 volume% respectively when they exposed in viral environment without personal protective equipment. Thus achievement of hard immunity is not possible. This mechanism can explain the possibility of animal, bird or any living object infection by

coronavirus and seasonal effect. It also explains the doubling rate with the help of viral unloading mechanism and not discussed here.

Dry ice is the solid form of CO_2 [7]. The use of dry ice is to preserve food [8], flash-freeze food [9-11] and laboratory biological sample [12-13]. Flash freezing is used in the food industry to quickly freeze perishable food items. Further study needed to confirm its origin. If it is created by nature (in air, water or soil) a lots of information required i.e. air pH (When CO_2 dissolved in water vapour, air becomes acidic having a pH value around 5.7), soil pH (soil environment) and water pH where the coronavirus first appears. Information about genetic material inside coronavirus (a long RNA molecule-the viral genome) i.e. structure of its and sensor properties also needed. Whatever be the corona virus origin, CO_2 and pH have important role and also environmental stability [14,15]. The author describe the three different states (Sleeping, Active and Dead) with variation of pH value in his own paper [14]. The role of environment is the most confusing when origin of a virus is trying to find out in the environment [15]. The environment mainly responsible to receive, maintain and transport aetiological agents to susceptible hosts. If nature creates coronavirus, it will not stop by infecting one or two people The process of infecting people will continue in that environment (Wuhan, China) until condition of environment is changed.. We cannot blame nature or environment for creating coronavirus but probability never zero. The Huanan seafood wholesale market in Wuhan is believed to have a vital role in the COVID-19 pandemic creation [16,17] although investigations into whether the virus originated from non-market sources are ongoing as of April 2020 [16,17]. Considering its origin from RNA matching will give a comparative result [i.e. coronavirus RNA is matched x% ($x < 100\%$) with y animal RNA matching not predict the origin. More CO_2 emitting country have high spreading rate i.e. coronavirus like high concentration CO_2 may be dry ice is perfect. Again dry ice is used to preserve flash-freeze food [9] and laboratory biological samples [13]. Thus according to this hypothesis coronavirus originates either from flash-freeze food or laboratory biological samples. Coronavirus RNA will be 100% matched if it derived in laboratory i.e. hybrid RNA [18,19]. Ding et. al. [17] described in their paper 'An Interspecies Hybrid RNA Virus Is Significantly More Virulent than Either Parental Virus' that hybrid RNA (laboratory made) is significantly more virulent. Again the probability never 100% and further study needed.

Conclusion

In conclusion on the basis of assumption (CO_2 has a vital role for coronavirus occurrence and reproductively) the origin of coronavirus, COVID-19 infected and death persons of different countries, mechanism of floating, spreading of coronavirus in air and mechanism of infecting living objects by coronavirus have been explained. The increasing concentrations of CO_2 in the atmosphere make coronavirus more infectious. Beside social distancing lockdown also decrease the atmospheric CO_2 concentration and which parameter has greater contribution for decreasing coronavirus infection is still unknown and further study needed. It is the time to establish world organization for controlling CO_2 emission and human population of all countries. If we, the peoples of world are unable to learn the impact of atmospheric CO_2 concentration in our life from COVID-19 then another extreme infectious virus will appear again and collapse human civilization.

REFERENCE

1. Piiparinen J, Barth D, Eriksen NT, et al. Microalgal CO_2 capture at extreme pH values. Algal Research. 2018;32:321-28.
2. Top 5 most polluting countries. UNHCR, World Bank and The Times of India. Acciona, 2017.
3. The most polluting countries in the world. World Economic Forum. 2017
4. COVID-19 Coronavirus pandemic. Coronavirus Cases. Worldometer.

5. Wallace JM, Peter VH. Atmospheric Science: An introductory survey. Elsevier. 2nd Edition 2009;43:5268-350.
6. Menon VJ. Density, pressure and temperature in the earth's atmosphere. Indian J Pure Ap Phy. 1990;28:49-50.
7. Dry Ice in the machine shop. Nature. 1934;134(3388):529.
8. Kaliyan N, Morey RV, Wilcke WF, et al. Applications of carbon dioxide in food and processing industries: Current status and future thrusts. Minn Mpls. 2007;2007.
9. Linde Group. Safety Advice 9. Handling and usage of dry ice. Germany: Linde Gas Division.
10. Farney T. On food: Use dry ice to chill ice cream in a jiffy. 2011
11. Manitoba Agriculture. Dry ice blast cleaning for the food processing industry. Government of Manitoba. 2017
12. Hanahan D, Jessee J, Bloom RF. Plasmid transformation of Escherichia coli and other bacteria. Method Enzymol. 2004;204:63-113
13. Collecting, preserving and shipping specimens for the diagnosis of avian influenza A(H5N1) virus infection. World Health Organization. 2006.
14. Garai A, Gorai T. Improvement of personal protection for covid-19 infection. IRJMETS. 2020;6(2):162-5.
15. Pirtle EC, Beran, GW. Virus survival in the environment. Rev sci tech Off int Epiz.1991;10(3):733-48.
16. Woo PCY, Lau SKP, Yuen K. Infectious diseases emerging from Chinese wet-markets: zoonotic origins of severe respiratory viral infections. Curr Opin Infect Dis. 2006;19(5):401–407.
17. Dilanian, Ken; Kube, Courtney. U.S. intel community examining whether coronavirus emerged accidentally from a Chinese lab. NBC News.2020
18. Thompson H. Hot spring yields hybrid genome. Biology and Biotechnology Earth environment & ecology. Nature News Blog.2012
19. Ding SW, Shi BJ, Li WX, et al. An interspecies hybrid RNA virus Is significantly more virulent than either parental virus. Proc Natl Acad Sci USA 1996;93(15):7470-74.