

REVIEW

PUBLIC AWARENESS INFORMATION ON HUMAN VIRUSES AND CORONAVIRUS (COVID-19): I. CHARACTERISTICS AND PROTECTION

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ABSTRACT

This research can be considered as simple awareness information for the people with limited education in Egypt as well as the world in addition to specialists. It also allows decision makers in the World Health Organization and other countries to devise appropriate strategies to respond to any epidemic such as the Coronavirus and others that may arise in the future. This article has dealt with a simple definition of viruses and then focus on the characteristics of human viruses in a simplified manner, whether their ability to enter the family of the host, how to influence it, the concept of the incubation period, the role of the immune system in the long of this period, and the prevalence of an epidemic including viruses. This is in addition to the symptoms of coronavirus infection, and prevention methods. Finally, the study pays an attention on the most nutrition system and factors that positively affect the immune system and its strengthening in a way that allows humans to confront viral infection.

Keywords: Viruses, coronavirus infection, symptoms, incubation period, immune system, nutrition, controlling strategies.

I. Public awareness information on human viruses

What is virus? It well known that virus is a word meaning "poison" in Latin, which was given by the scientist Martinus Beijerinck in a year 1902. The virus is a microscopic particle that is never visible, and multiplies by increasing in number, such as copying papers with any number of an original. Virus is obligate parasite, meaning that it is active only within living cells of its hosts. It cannot reproduce like other microorganisms (Bacteria and fungi) because it does not contain a cellular structure (cell wall- cytoplasm, nucleus, ... etc).The virus can be called a microbe because it does not see with the naked eye nor with light microscopy like fungi and bacteria, but only a picture of its shape can be seen via electron microscopy. Virus is characterized by its simple structure, which is a nucleoprotein (Coat protein protecting one nucleic acid, RNA or DNA into a core).

Is the virus affected by antibiotics? Viruses are not affected by any antibiotic, and the reason is that it does not have a cellular composition and organs as mentioned above, therefore, viruses are never considered among the microorganisms such as bacteria, fungi, algae and protozoa.

Does the virus penetrate the human cell? Virus does not have the ability to penetrate cells, like bacteria and fungi, and this is why rubbing the nose and eye with an unclean hand helps the human viruses to adsorb on the surface of the human cell, making it easier to enter.

How viruses settle inside the cell? Human viruses always prefer a member of the body to others, for example: the eight hepatitis viruses do not multiply except in the liver, but they can be detected in the blood. Human viruses have receptors in the cell without identifying them, the virus becomes like a non-cell in the cell and breaks it and the cell benefits from it, but if it finds it, it becomes the most dangerous creature on the human being.

How stable are human viruses? In general, most human viruses have envelope (Spikes), and it is the reason to get rid of them by soapy water, and DNA-viruses are more stable than RNA-viruses. Human viruses have an incubation (latent) period that the virus spends within the body, despite knowing these receptors, and the period is determined by the strength of the body's immune system. For example: hepatitis viruses such as HCV can survive inside the body for 10-30 years without any effect on the human being.

What are the antigenicity activities of human viruses? Viruses have antigenic activities, that is, if they inoculated into the blood of human, animal or birds and are identified as foreign bodies, the body produces specialized antibodies that can be used to detect the viruses or immunize individuals with it as a vaccine. The virus can be killed or weakened, and people can be injected with it as a vaccine, so it will have specialized antibodies against it human longevity which makes the person resistant to any future infection of this virus.

Regarding hepatitis viruses effective and prolonged antiserum specific to DNA-viruses could be produced and used as vaccines, such as hepatitis B virus (HBV). On the contrary viruses containing RNA have mutations that form new strains at close intervals, and this makes it difficult to produce long-term vaccines or inoculum such as hepatitis C virus (HCV). If a person becomes infected with any virus naturally, his body overcomes it and is cured, it will not be affected by any new infection from this virus in the future, as the immune cells in the body have risen with a complete scan of the active sites (epitopes) that are present in their protein cover and have anticodes (paratops) responsible for the production of antibodies to this virus at any time, surrounds it, stops its activity and does not affect it Human.

There are two types of antibodies, the 1st is polyclonal antibodies (PABs) that form against all the active sites on the surface of the viral coat protein, and the 2nd are monoclonal antibodies (MAbs), which is produced against only one active site. Viruses belonging to the same family can find a single active site present in all members of this family and could be used to detect any virus that belongs to this family and this is what called universal MAbs. On the level of single virus strains, a specialized MAbs for these strains could be found.

What is the role of the Egyptian government in treating hepatitis viruses? Countries of the world, including Egypt, treat the HCV and do not treat the most dangerous HBV, due to its ease of transmission, as HBV is a fluid-borne virus, including blood, while the HCV is blood-borne virus, *i.e.*, it is transmitted only through blood, and HBV also makes the liver reach the stage of chronic cancer faster than the HCV. Now, the Egyptian state imposes immunization for all births from the first day with HBV in any hospital and for free. This will find in Egypt in the future a generation that does not suffer from diseases of hepatitis and will change the map of the spread of cancer in Egypt. Instead of it occupying the first rank in the numbers of people infected with HCV and cancer will occupy late positions, especially since drinking alcohol is forbidden in Egypt.

When do viruses or epidemic spread? For any pathogen, including viruses, that causes a disease, its spread and concentration, usually starts with a low concentration, then increases for a while, then reaches the highest concentration (peak) and fixes a period in which it decreases and reaches the low concentration again. Knowing this for any pathogen can be drawn scenarios for dealing with, prev-

enting and controlling the pathogen. Viruses have favored seasons during the year that is active in them and seasons when they are less. It is the customs of the Egyptians that they say summer flu is more dangerous than winter flu.

What is virus protection? It worth to mention that the prevention of viruses is more important than treating them, in other words that succeeding in preventing the virus from reaching individuals is more important than treating them, and this is what countries seek in the pandemic of the coronavirus now.

Ways to strengthen the immune system: To strength your immune system you have to carry out most of these points: 1) living in a well-ventilated area with high oxygen content, 2) sitting in the sun during the day for period around 30 minutes, 3) bathing with warm water daily, 4) smiling, not chuckling, 5) Avoid stress, anxiety, stress, negative thinking, sadness and depression, as they weaken the immune system aggressively, exposing you to any simple microbe, 6) Half-hour exercise for adults is a quick "walk" and an hour for adults, 7) Honesty in the conversation strengthens the immune system because it is part of positive thinking, 8) Honesty and good character strengthens the immune system by making the person free from stress and enjoying calm self, and 9) Refrain from smoking, especially hookah.

Good nutrition and its relationship to the immune system: Before knowing the types of food that strengthens the immune system, we would like to note that it should be done with special medical advice for people with chronic diseases.

To strengthen and stimulate your immune system, you should try to follow these advices:

1. Have your children eaten four colors in their meals?
2. Eating lamb strengthens the immune system.
3. Eating chicken and fish does not adversely affect the immune system.
4. Eat guava because it has a very high level of antioxidants and one has the equivalent of one kilogram of orange.
5. Eating what is dicotyledonous foods such as legumes (beans etc) strengthens the immune system very well.
6. Eating colored fruits and vegetables strengthens the immune system and everything that becomes dark is better
7. Drink approximately 3-4 liters of water per day.
8. Drinking a daily cup of coffee regulates the heart rate of healthy people with a high percentage of antioxidants.
9. Drink warm lemons.

The most important types of foods that strengthen your immune system include:

- Red pepper contains twice the amount of Vitamin C.
- Broccoli is rich in vitamins and minerals, and it is a storehouse of vitamins "A", "C" and "E", and antioxidants that it is recommended to eat it half cooked or raw.
- Garlic is raw in the morning because it contains substances that help lower blood pressure and slow atherosclerosis.
- Ginger helps reduce sore throat and lowers cholesterol.
- Spinach is rich in vitamin C, which is full of many antioxidants and beta-carotene.
- Regular yogurt is a source of vitamin D, which helps regulate the functioning of the immune system.
- Almonds are rich in fat-soluble vitamin E.
- Green and black tea is full of "flavonoids", which are a type of antioxidant.
- Berries and parchment figs.
- Strawberry, plum, dark chocolate, fig, olive oil, black pepper, salad in general, cauliflower and cabbage.

II: Coronavirus (Covid-19): Coronavirus is called by this name because its shape is like a crown and classified as a member of Coronaviridae, which is characterized by its spherical shape and a diameter ranging between 150-160 nm and their contain of single strand RNA as shown in **Fig.1**.

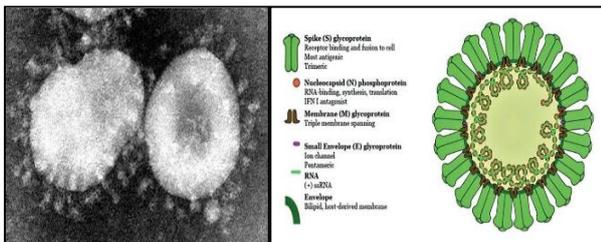


Figure 1: Electron micrograph shows the morphology of coronavirus, characterized by spikes as a crown (<https://en.wikipedia.org/wiki/Coronavirus> and Dr. Ian M Mackay, Ph.D., Kannan et al., 2020).

Coronavirus is an evolution of the severe acute respiratory syndrome (SARS) virus that appeared in 2002 and they belong to the same family Coronaviridae, and it infects the respiratory system. The virus is transmitted by droplets when a sick person sneezes for one meter, then droplets fall to the ground to weigh heavily and then meet contaminated surfaces. The duration of the virus remaining active on surfaces does not exceed 24 hours, and the duration varies according to the nature of the surface on which it is located.

Symptoms of coronavirus infection are representing in dry cough-febrile flu-high body temperature $\geq 38^{\circ}\text{C}$ - sore throat-false congestion-general fatigue-headache-tightness and difficulty breathing. Coronavirus has an incubation period of staying in the body ranging between 14 days (minimum) and 21 days (maximum), and its symptoms begin to be developed after 2-3 days from infection in the coronavirus-positive person. Do not suspect that you are infected with the coronavirus unless you start the febrile stage and then shortness and difficulty breathing, but the rest of the previous symptoms are similar to the symptoms of influenza virus. The activity and ability of the virus to spread and become infected is affected if the air temperature rises above 26°C . It is worthy to notice to that high temperature does not kill the virus, but it reduces the degree of both of its vitality and ability to cause infection.

Given the nature of the infection with the Coronavirus, it was reported that about 80-83% of the infected patients may recover without any treatment and 14-17% of the patients need treatment and their samples can be transferred from positive to negative, while 3.0% of infected people have reached the stage of shortness and difficulty breathing and need artificial respiration devices and they are dying. The length of the coronavirus spread curve ranges from 12 to 14 weeks, as the virus begins to escalate even for five weeks, and then peaks in the sixth and seventh weeks, and then begins to decline for another five weeks. Therefore, if we succeed in controlling it and reaching the lowest prevalence in these two peak weeks, the community will survive. If the community fails, the virus can restore its life cycle again for once as shown in **Fig. 2**.

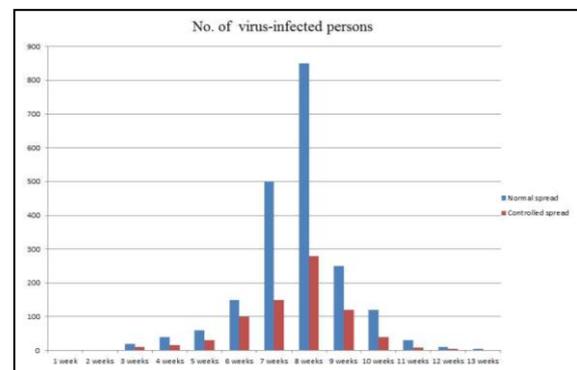


Figure 2: Differences between coronavirus spread without following precautionary measures and controlled spread with following precautionary measures.

One of the studies conducted in China is that the presence of the coronavirus has been proven in the digestive system, as it has been proven in the

stool of some patients, but no effect has been proven on the digestive system itself, as we have already mentioned that it will not replicate or be dangerous except in the respiratory system.

Coronavirus prevention tools: Coronavirus prevention tools can be summarized as follows:

1. Carefully implement the directives of the Ministry of Health and the decisions taken by the government in all countries.
2. Lack of presence in large gatherings, and the most important of them are to maintain social distance, at a distance of at least a meter, wherever you go or stay at home, and not to go out except for the most urgent necessity.
3. Avoid crowding and mixing between individuals and maintain a distance of one meter between people in the queues.
4. When sneezing, put the sleeve on the hand or use a handkerchief, then dispose of it.
5. The need not to touch the nose and eyes with unclean hands in order not to help the virus enter the cell through the skin openings.
6. Gargle with warm saline solution (water with warm salt) 3-4 times a day, clearing the throat of the virus.
7. Healthy people do not wear masks unless they take care of people suspected of being infected with the coronavirus and are effective after washing your hands with soapy water or disinfecting them with an alcohol antiseptic.
9. Cleansing public places and transportation continuously daily during the night.
10. Do not use air conditioning at home and withstand heat, as it will not spread or increase virulence.
11. Not to mix with animals close to the ground.
12. Strengthening the body's immune system and using a healthy diet that includes different types of vegetables and fruits, especially dark ones.

How do you deal with your home and family?

If you enter your home, you should do the following: a) Press the belly button, then wipe it with a tissue and dispose of it directly, as well as lock the doors, b) After you lay down peace to your family, do not greet them, but enter the bathroom, wash your hands, face, and head, then do whatever you want in your home, and c) Everything in the house should be cleaned with an alcohol disinfectant or with soapy water daily.

People susceptible to coronavirus infection:

Persons susceptible to infection with coronavirus are:

1. Children immunized against measles may not be infected with the coronavirus.
2. Unvaccinated children can be infected, but to a lesser extent than young adults, and they are still susceptible to infection.
3. Young people (Youth) are less likely to be infected with the coronavirus, but they are susceptible to infection.
4. The elderly, especially between 50-70 years old and over are the most susceptible to infection and affected by the virus. Therefore, the Egyptian Ministry of Health stated that 90-95% of the deaths are the elderly.

It has been found that a little number of recovering coronavirus may be infected again; however, no such cases were registered in Egypt until early April 2020. Also, the person who naturally recovered and does not show symptoms of the virus can be considered a source of infection during the incubation period of the virus (14-21 days).

Medicines that may help in treatment of corona-virus:

Medicines should be taken with medical advice especially for those with chronic diseases. Certain medications that treat malaria, AIDS and tuberculosis are under trial and they may not be taken without medical advice. The inoculum or the specialized vaccine for this virus will not be obtained until after approximately 10-12 months.

Conclusion and Recommendation: From all countries of the world the sera of people who were infected with coronavirus must be preserved and recovered as well as samples from serum to deceased people for use in the study and comparison of the efficacy of the inoculum or vaccine produced. Home commitment can be recommended to reduce the prevalence of the coronavirus.

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