

Proposal for constituent for a Low Cost COVID-19 Vaccine

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Abstract

The main cause of human diseases is infectious viruses which is a critical issue for the protection of public health. Despite the advancement made in booster and medication improvement, numerous viruses need preventive antibodies and proficient antiviral treatments, which are frequently attacked by the age of viral break mutants. In this manner, recognizing novel antiviral medications is essential and characteristic items are excellent source for such innovations. The aim of this article to provide the ingredients which can enhance the immunity and save body from harmful virus i.e. SARS- CoV- 2 and these constituents can be used for the development of vaccine.

Keywords: Corona virus, SARS- CoV-2, Mushroom, Providone, Stearic acid.

I. INTRODUCTION

In December 2019, a novel coronavirus come well-known in Wuhan, China, related initially to animal-to-human transmission in neighbourhood wet markets. In this manner, human-to-human transmission of the virus started, resulting in widespread respiratory illness in Wuhan. The corona virus cases at that point spread worldwide (more than 20 other nations) [1]. As of Feb 3, 2020, 2019-nCoV has caused 362 deaths out of 17 391 confirmed cases reported to WHO [2]. As of May 2020, COVID-19 due to the SARS CoV2 coronavirus has infected greater than 600,000 people globally (confirmed cases) and almost 30,000 deaths. On 12 January 2020, the World Health Organization (WHO) tentatively named this new virus as the 2019 novel coronavirus (2019- nCoV). On 30 January 2020, WHO declared the 2019- nCoV epidemic a public health emergency of international concern. On 11 February 2020, the WHO officially named the virus SARS-CoV-2 and the syndrome was named COVID-19, or coronavirus disease 2019 (COVID- 19) [3]. On the same day, the corona virus study group of the International Committee on Taxonomy of Viruses named 2019- nCoV as severe acute respiratory syndrome coronavirus 2 (SARS- CoV- 2). On 23 February 2020, there were 77 041 confirmed cases

of SARS- CoV- 2 infection in China. The number of infections has exceeded that of the SARS outbreak in China in 2002 [4,5]. COVID-19 is characterized by severe respiratory illness and significant mortality, especially among individuals over the age of 60 years and in those with underlying chronic conditions such as diabetes and hypertension. Some patients have experienced brain inflammation or even stroke. According to other reports, **COVID-19** patients have suffered from **Guillain – Barre** syndrome, a neurological disorder where the immune system mistakenly attacks nerve cells, resulting in muscle weakness and eventual paralysis. However, concerns about safety are important when considering new therapy. For this brief overview, we rely significantly on the information made publicly available on websites such as Johnson & Johnson, Novavax, Moderna etc. At least a dozen COVID-19 candidate vaccines are under development using different technology platforms with an emphasis on speed, maximizing safety and avoiding vaccine-induced immune-pathology. Our immune system consists of a complex collection of cells, process, and chemicals that constantly defends our body against invading pathogens, including viruses, toxins, and bacteria. Vaccines recommend a high level of protein expression and long-term stability, and induce

strong immune responses. Here, we provide ingredients for the formulation of vaccine strategies which makes fight back COVID-19 pandemic. We believe that these ingredients will boost the immunity power and protect body from COVID-19 disease. Formation of vaccine by using these ingredients will kill maximum harmful bacteria/viruses which are present in our body and resultant diseases like fever, pain in body will be end.

II. INGREDIENTS

1. Vitamin C
2. Vitamin D
3. Zinc
4. Medicinal mushroom
5. Povidone
6. Stearic acid
7. Purified talc
8. Potassium sorbate
9. Maize starch

1. Vitamin C.

Vitamin C is perhaps the most popular supplement taken to protect against infection due to its important role in immune health. This vitamin supports the function of various immune cells and enhances their ability to protect against infection. It's also necessary for cellular death, which helps keep our immune system healthy by cleaning out old cells and replacing them with new ones. It is functions as a powerful antioxidant, protecting against oxidative stress, which occurs with the accumulation of reactive molecules known as free radicals. Oxidative stress can negatively affect immune health and is linked to humorous diseases. A large review of 29 studies in 11,306 people demonstrated that regularly supplementing with Vitamin C at an average dose of 1-2 grams per day reduced the duration of colds by 8% in adults and 14% in children. Interestingly, the review also demonstrated that regularly taking vitamin C supplements reduced common cold occurrence in individuals under high physical stress, including marathon runners and soldiers, by up to 50%. Additionally, high dose intravenous Vitamin C treatment has been shown to significantly improve symptoms in people with severe infections, including sepsis and acute respiratory distress syndrome (ARDS) resulting from viral infections. The results confirm that vitamin C supplements may significantly affect immune health.

2. Vitamin D

The Seneca study showed a mean serum Vitamin D of 26 n mol/L in Spain, 28 n mol/L in

Italy and 45 n mol/L in the Nordic countries, in older people. Sever deficiency is defined as a serum 25 (OH) D lower than 30 n mol/L. In Switzerland, mean Vitamin D levels are 23 nmol/L in nursing homes and in Italy 76% of women over 70 years of age have been found to have circulating levels below 30 n mol/L. These are countries with high no. Of case of COVID-19 and the aging people is the group with the highest risk for morbidity and mortality with SARS-CoV-2. The most vulnerable group of population for COVID-19 is also the one that has the most deficits in Vitamin D.

3. Zinc

Zinc is a mineral that's commonly added to supplements and other healthcare products like lozenges that are meant to boost our immune system. This is because Zinc is essential for immune system function. It is needed for immune cell development and communication and plays an important role in inflammatory response. A deficiency in this nutrient significantly affects our immune system's ability to function properly, resulting in an increased risk of infection and disease. Zinc deficiency affects around 2 billion people world-wide and is very common in older adults. In fact, upto 30% of older adults are considered deficient in this nutrient. In a 2019 study in 64 hospitalized children with acute lower respiratory tract infections (ALRIs), taking 30 mg of zinc per day decreased the total duration of infection and the duration of the hospital stay by an average of 2 days, compared with a placebo group. Taking zinc long term is typically safe for healthy adults, as long as the daily dose is under the set upper limit of 40 mg of elements Zinc.

4. Mushroom

Medicinal mushroom has been used since ancient times to prevent and treat infection and disease. Many types of medicinal mushrooms have been studied for their immune boosting potential [6-7]. Over 270 recognized species of medicinal mushroom are known to have immune-enhancing properties. Some research demonstrates that supplementing with specific types of medicinal mushrooms may enhance immune health in several ways, as well as reduce symptoms of certain conditions, including asthma and lung infections. For example, a study in mice with tuberculosis a serious bacterial disease, found that treatment with **Cordyceps** significantly reduced bacterial load in the lungs, enhanced immune response, and reduced inflammation. **Turkey Tail** is another medicinal mushroom that has powerful effects on immune health. Research in humans indicates that turkey tail may enhance immune response.

5. Povidone

Povidone (polyvinylpyrrolidone, PVP) is used in the pharmaceutical industry as a synthetic polymer vehicle for dispersing and suspending drugs. It also acts as disintegrant and tablet binder. It appears as white to off-white hygroscopic powder in its pure form and is readily soluble in water. Povidone has the molecular formula of $(C_6H_9NO)_n$. Povidone formulations are widely used in the pharmaceutical industry due to their ability to dissolve in both water and oil solvents. Povidone-Iodine is well-tolerated and has been shown to have little to no effect on mucociliary clearance, olfaction, or thyroid function if iodine holidays are taken. Povidone-iodine is often used to prevent surgical incision infections. Povidone has also been used as blood volume expander and as an antibacterial in dental procedures. Chlorhexidine-alcohol is also used topically as a pre-operative surgical antiseptic and has been shown in one study to have slightly better antimicrobial activity. In 2006, treatment of SARS-CoV with PVP-I products for 2 min reduced the virus infectivity from 1.17×10^6 TCID₅₀/ml to below the detectable level [8-9]. The use of PVP-Iodine as antiseptic for the maintenance of oral health prevention and treatment of oropharyngeal infections, but there is a noted discordance between the evidence base and translation into clinical practice [10]. Kirk-Bayley reported the protocol intra-nasal and oral application of PVP-I for both patients and healthcare workers during the current COVID-19 pandemic to facilitate limit the spread of SARS-CoV-2 from patients to healthcare workers and vice versa [11].

6. Stearic acid

Stearic acid, also known as n-octadecanoic acid ($C_{18}H_{36}O_2$), is a saturated, wax like, fatty acid commonly used in the production of pharmaceutical tablets and capsules. It is made by extraction from animal or vegetable fats and oil. In pharmaceutical dosage forms, Stearic acid is used as an emulsifying agent, solubilizing agent, tablet and capsule lubricant. It is also commonly found in lotions detergent, soups, and shampoos, and is a natural component of butter and Shea butter. Stearic acid use as an inactive ingredient must be approved by the FDA.

7. Purified talc

The name talc is referred as talc's white color. Talc is a hydrous magnesium silicate having a chemical composition of $Mg_3Si_4O_{10}(OH)_2$ or $H_2Mg_3(SiO_3)_4$. Small amounts of Al or Ti can substitute for Si and Fe, while Mg can be substituted

with Mn and Al, also a very small amounts of Ca can substitute for Mg. When Mg is substituted with greater amount of Fe the mineral is known as minnesotaite and when an Al substitute for Mg the mineral is known as pyrophyllite. Talc is usually green, white, gray, brown or colourless, insoluble in water and slightly soluble in dilute mineral acids. The percentage of talc used in the design of various dosage forms varies. It fulfills all the criteria of the glidant and diluent. For decades, it has been used as a pharmaceutical aid (dusting powder), an excipient and filler for pills, tablets and for dusting tablet molds. It is also used as an anti caking agent and lubricant in tablet making. Moreover, it has been included in the food and Drug Administration (FDA) inactive ingredients guide and in the non-parenteral medicines licensed in the UK. In vitro studies show that talc possesses the least adsorption capacity as compared to the adsorbents like kaolin, activated charcoal, magnesium trisilicate etc. The Glidant activity of the talc is dependent upon particle size compatibility between the talc and the other powders in the formulation. As the talc particle size decreases its surface area increases as lubricant efficiency in plastic deforming binders/fillers increases but, even the smallest grade talc is not as effective as magnesium stearate. Very large talc aggregates greatly improve powder flow but may create problems in the formation of tablets at all. The disintegration behavior of direct compression tablet formulation is improved in the presence of talc, which is independent of particle size. In combination with magnesium stearate talc restores disintegration and dissolution properties impaired by magnesium stearate. Talc around 2.5 microns in size gives the best performance in tableting. Talc particles having size range 2 to 3 microns can be used as both lubricant and glidant.

8. Potassium sorbate

Potassium sorbate is a chemical additive. It's widely used as a preservative in foods, drinks, and personal care products. It is an odorless and tasteless salt synthetically produced from sorbic acid and potassium hydroxide. Potassium sorbate helps in prolonger the shelf life of foods by stopping the growth of mold, yeast, and fungi. It was discovered in the 1850s by the French, who derived it from berries of the mountain ash tree. Its safety and uses as a preservative have been researched for the last fifty years. The U. S. Food and Drug Administration (FDA) recognize it as generally safe when used appropriately. You'll find potassium sorbate on the list of ingredients for many common foods. It's a popular preservative because it's effective and doesn't change the qualities of a product, such as

taste, smell, or appearance. It's also water – soluble, and it works at room temperature. Potassium sorbate is used as an antimicrobial and preservative in personal care. Regulatory agencies such as the FDA, the United Nation Food and Agriculture organisation, and the European Food Safety Authority (EFSA) have determined that potassium sorbate is generally regarded as safe, abbreviated as GRAS. When you eat potassium sorbate as a food additive, it passes through your system harmlessly as water and carbon dioxide. It does not accumulate in our body. In 2015, the EFSA reviewed potassium sorbate and two other food additives. If set a temporary acceptable daily intake of 3 mg per kg of body weight per kg of body weight per day. This limit is in response to questions about reproductive and developmental toxicity from animal research. Rats were fed 300 mg per day with no observed bad effects. For added safety, the EFSA set a standard that was 100 times lower. The maximum acceptable daily intake for humans is 25 milligrams per kilogram (mg per kg) of body weight per day. For an adult of 150 pounds, this comes to 1,750 mg per day.

9. Maize starch

Corn starch is a natural starch product that is derived from the corn kernel. It is a white to slightly yellowish fine powder commonly used in the food and pharmaceutical industries.

In the pharmaceutical industry it is used as disintegrate and binder [13-14]. Disintegrates enable tablets and capsules to break down into smaller fragments so, that the drug can be released for absorption. Corn starch is on the generally recognized as safe food substances list published by the FDA.

III. CONCLUSION

On the basis of literature found that ingredients such as Vitamin C, D, Zinc, Povidone, mushroom, stearic acid, Purified talc, Potassium sorbate, Maize starch form the immunity vaccine for COVID-19.

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