Production of cheap hand sanitizer with herbal ingredients

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Abstract. Novel Corona Virus has spread to 188 countries around the world which made the people infected, facing moderate respiratory illness. Currently one of the major strategies to deal with COVID-19 and reduce community transmission of infections is the frequent use of hand sanitizers. However, a large section of common mass is unable to buy them due to higher price. Therefore, an approach has been presented here to produce cheaper sanitizers with easily available herbal ingredients like Aloe Vera gel, boiled water, surgical spirit, Glycerine etc. The estimated making cost of 100 ml of sanitizer was 16 rupees. The mass production of this sanitizer can be very effective for large scale use of sanitizers by common people.

Keywords: COVID, Sanitizer, Herbal, Spirit

1. Introduction

In December, 2019, some unidentified, viral pneumonia cases were reported at Wuhan in China. After the laboratory test of the respiratory samples, it is declared that the viral pneumonia is caused by Novel Corona Virus [2]. After the analysis of their history, these patients were epidemiologically associated to a seafood and wet animal wholesale market in Wuhan, China [4]. World Health Organization (WHO) named the disease COVID 19 and International Committee of Taxonomy named the virus Severe Acute Respiratory Corona Virus 2 (SARC COV 2) [2]. Coronaviruses are single-stranded RNA viruses with a diameter of 80–120 nm. Coronaviruses belong to the genus Coronavirus. Corona virus is pleomorphic RNA viruses having crown-shape peplomers with 80-160 nm in size [1]. There are four types: α-coronavirus, β-coronavirus, δ-coronavirus and γ – coronovirus. SARS-CoV-2 is a β-coronavirus [2]. Bats are considered to be main source of spreading SARS-CoV-2 to human body and it is thought that pangolins and snakes are also the hosts. A study from Peking University was showed that SARS-CoV-2 infection is caused by snakes, but a later study showed that there was no evidence that snakes are the hosts of SARS-CoV-2 [2]. It is one of the major pathogens that targets respiratory system. Its transmission occurs into respiratory system through droplets spread by coughing or sneezing. Researchers have found experimentally that SARS-CoV-2 is present in samples of stool, gastrointestinal tract, saliva and urine. SARS-CoV-2 was also detected in the tears and conjunctival secretions of patients with COVID-19 [2]. The corona effected people has to be stayed in isolated room for 14 days. This period depends upon the age and immunity power of the patients. It is shorter for less than 70 years old people [4]. The first cases were reported in December 2019. From December 18, 2019 to December 29, 2019, five patients were hospitalized with respiratory problem. By January 2, 2020, 41 admitted hospital patients had been identified as...
having laboratory-confirmed COVID-19 infection with diabetes, hypertension, and cardiovascular disease. China National Health Commission reported that the first 17 deaths up to January 22, 2020, 90 other cases have also been reported from a number of countries included Taiwan, Thailand, Vietnam, Malaysia, Nepal, Sri Lanka, Cambodia, Japan, Singapore, Republic of Korea, United Arab Emirates, United States, The Philippines, India, Australia, Canada, Finland, France, and Germany [4]. After that, the number of infected people were increased exponentially in all over the world and by 31st August 2020, the total confirmed cases were 25334339. Total 16669974 people were recovered and number of dead people were 848084 [23]. About 80 groups around the world are researching for vaccines and some are now entering clinical trials. Various strategies are taken to reduce only the transmission of virus through person to person. One of the most important strategy to reduce transmission is hand sanitation by the use of hand Sanitizer. In the present situation, demand and selling rate of sanitizer are very high. The production rate of sanitizer cannot compete with selling rate. Therefore, an approach has been presented here to produce cheaper Sanitizer with easily available ingredients. This sanitizer can be produced within half an hour. Its production rate can compete with demand in market. All level of people in society can also buy this product measurements.

2. Background of study
D. Sawai reviewed about Aloe vera and She showed a report that aloe vera is very much active against herp simplex virus type-1 and 2, influenza virus, pseudorabies virus etc. [10]. E.V Christaki et al. investigated about the biological components and applications of aloe vera and concluded that aloe vera can be treated as an antibacterial effect [8]. V.K Chandegara et al. showed about aloe vera components, various extraction process and handling methods [9]. Mandankumund et al. demonstrated a comparison between Alcohol and non-Alcohol based sanitizer and concluded that Alcohol based Sanitizer is more effective than non-Alcohol based sanitizer [7]. E. M Yaun et al. studied to observe bactericidal potential of a formulated Guava hand sanitizer gel [5]. H.A Rothan et al. reviewed about symptoms of COVID 19 disease and transmission, epidemiology, pathogenesis, phylogenetic analysis of corona virus. He also showed some direction to control the spread of virus [1]. Lischeng Wang et al. described SARS-COV2 spreading background, genetic structure of corona virus, mode of transmission, diagnosis & treatment of SARS COV2, prevention of COVID 19, so that public can recognize and deal with the SARS-COV 2 [2]. A.R sahin et al. reviewed the way of treatment, prevention of early stage of COVID 19 & also described the sources & mode of transmission, pathogenesis of corona virus [3].

The ingredients selected for making the Alcohol based hand sanitizer and amount of those ingredients are shown in table 1.

3. Material and Methods:
The ingredients selected for making the Alcohol based hand sanitizer and amount of those ingredients are shown in table 1.

| Material       | Amount    |
|----------------|-----------|
| Surgical spirit| 70 ml.    |
| Glycerine      | 7 ml.     |
| Aloe vera pulp | 20 gm.    |
| Guava leaf     | 10 leaves.|
| Dettol         | 1 ml.     |

Aloe vera leaves and 10 pieces of Guava leaves are collected & washed thoroughly to remove the unwanted particle and dust. The Aloe vera leaves are cut into half and inner pulps are separated from leaves by knife. The pulps were grinded in grinder machine and then put the gel into separate bowl. Washed Guava leaves were
added in water and water was boiled with Guava leaves until it is reached a syrupy. Then syrup was strained to remove dust. In a 100 ml bottle, at first, the bottle was filled 70 ml with surgical spirit. Then 7 ml of Glycerin is added and mixed thoroughly. In the mixture, 20 ml Aloe vera gel and 2 ml Guava extract syrup were added. At last, 1 ml Dettol was added and mixed the whole mixture to get homogeneous liquid sanitizer. The total amount of Sanitizer is made 100ml. The ingredients were brought from market. The amounts and corresponding prices according to market are listed. Then, the amount of ingredients used to make the Sanitizer are listed and the corresponding prices are calculated. The total cost to make the 100 ml Sanitizer is also calculated.

4. Analysis and Observations

The total amount of Sanitizer is made 100ml. The ingredients were brought from market. The amounts and corresponding prices according to market are listed. Then, the amount of ingredients used to make the Sanitizer are listed and the corresponding prices are calculated. The total cost to make the 100 ml Sanitizer is also calculated.

| TABLE:2 | The amounts and corresponding prices are listed below according to market. |
|---------|---------------------------------------------------------------|
|         | Materials            | Amount  | Price (rupees) |
| Surgical Spirit | 100 ml  | 20      |
| Glycerine       | 100 ml  | 12      |
| Aloe Vera pulp  | 40 gm   | 2       |
| Guava Leaf     | 10 pieces | 10      |
| Dettol          | 100 ml  | 40      |

| TABLE:3 | The amount and Corresponding prices according to product (Sanitizer) |
|---------|---------------------------------------------------------------|
|         | Material            | Amount  | Price (rupees) |
| Spirit  | 70 ml              | 14      |
| Glycerine| 7 ml               | 0.84    |
| Aloe Vera Pulp | 20 gm  | 1       |
| Guava Leaf Syrup | 2 ml   | 0.5     |
| Dettol | 1 ml               | 0.4     |

Total amount of Sanitizer: 100 ml. Total price: 16.74 rupees.
So, for making 100 ml Sanitizer, the total cost was 16.74 rupees.

The main ingredient of Sanitizer is Alcohol. Alcohol based Sanitizer is effective to control the transmission of disease and it maintains hand hygiene. Here, surgical spirit is used because it contains Isopropyl Alcohol. After reviewing all the side effects of sanitizer some specific ingredients are used to make this Sanitizer. The next important ingredient is Aloe Vera gel. Aloe vera has high healing capacity [8] [10]. It reduces wrinkling of skin because it contains polysaccharides and growth hormone gibberellins. It also prevents the scar tissue and helps to form new cell [8]. Aloe vera gel also gives relief from skin burn and itching [10]. Aloe vera is one of the most famous Herbal for skin treatment. Next is Glycerin. Some skin disease like dryness, damaging, cracking of skin, Eczema, skin irritating can be recovered by the application of Glycerin. It accelerates wound healing process and it also shows anti-microbial effect [18]. Glycerin has unique ability to remove the dead skin cell and it helps to generate new skin cell [19]. That is why the Glycerin is introduced as ingredient. Guava extract is effective against bacteria. Guava leaves extract shows good activity against intestinal microbes, Vibrio Cholera, etc. Guava leaves has ability to heal the wound surface. The ancient people of India and China made a
Guava leaf paste and applied to wound surface. Guava leaf extract also reduces allergic reaction [20]. The American Journal of Chinese Medicine published a research paper which showed that Guava leaves are helpful against specific bacteria causing Acne. The leaves are also used to reduce itching problem and Eczema of skin [21]. These abilities in Guava leaves can make Sanitizer effective.

WHO described that, There are many types of skin reaction like dryness, irritation, itching, allergy, skin cracking and bleeding are seen after the use of Hand Sanitizer [12]. 13 years old girl suffered from severe distress with erythema and cracking on both hands. The patient reported that she washed her hands 10 times per day with soap and water, with application of Alcohol-based Sanitizer [15] Overuse of hand Sanitizer can disturb the skin and trigger an auto immune reactions like itching, swelling, peeling, cracking [16]. The use of Sanitizer can increase the risk of Eczema, skin irritation and affects the immune system. It also causes hormone problems [17] After studying these, two tests were performed to check if the Sanitizer is harmful or not. After making the Sanitizer, some sanitizer was poured in hand immediately. It was observed after two hours that there were no skin reactions and diseases in skin. Then, after two months again some sanitizer was poured in hand but still there was no negative results.

![Skin reactionless Sanitizer](image)

**Figure:1 Skin reactionless Sanitizer**

Maintaining proper hygiene is a very important part of Sanitizer. Because of demand of Sanitizer in this pandemic, new brands of Sanitizer have come into market but there is always a doubt on effectiveness of Sanitizers. If proper amount of alcohol is not used then Sanitizer will not be effective. So, to check whether the amount of Alcohol in Sanitizer is right or wrong, we performed two small experiments 1. Tissue paper test, 2. Wheat dough test [12]

**TISSUE PAPER TEST**: This test is based upon Paper Chromatography [22]. We draw a circle by ball pen on tissue paper and poured some drops of sanitizer on circle. If Sanitizer contains sufficient amount of Alcohol the Ink will be dissolved into Sanitizer and starts spreading [12] [22]. It is observed that sanitizer slowly diffused and moved out the circle.

**WHEAT DOUGH TEST**: Other process is that we poured some Sanitizer on 1 table spoon wheat and mixed it. If excess water is present then it will make the wheat into dough [12] [22]. It was observed that there was no formation of a dough.

If hands are rubbed by Alcohol based Sanitizer for 30 seconds, followed by complete air drying, can effectively reduce population of Bacteria, Fungi [14]. The similar result was seen after rubbing the hands by the Sanitizer.
Figure 2: Tissue Paper Test

Figure 3: Wheat dough Test

5. Conclusion:
The number of infected people by Corona Virus are increasing day by day. Until the invention of vaccine, Sanitizing is very much important in this pandemic. The approach of making effective, affordable, Alcohol based hand Sanitizer was taken to reduce the transmission of Corona Virus. Various research papers are searched and also reviewed about ingredients of branded Sanitizers. After that, a new method of making effective Sanitizer with herbal products is presented in this paper. We did not get any chances to perform laboratory experiments. But after observing the observations, it can be concluded that this process can be a new approach of making Sanitizer in future.

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Acknowledgments
We would like to thank lab assistants for helping us to complete this project.