



Received on 05 May 2020; received in revised form, 23 September 2020; accepted, 28 September 2020; published 01 November 2020

SIMPLE PROCEDURE FOR PREPARATION OF TRIPLE LAYERED HOMEMADE MASK AS PREVENTIVE MEASURE FOR SARS-COV-2 INFECTION

Amit Kumar ^{*1} and Richa Kaushik ²

Bharat Immunological and Biologicals Corporation Limited (BIBCOL) ¹, Chola, Bulandshahar - 203203, Uttar Pradesh, India.

Department of Humanities and Applied Sciences ², Ch. Braham Prakash Government Engineering College, Jaffarpur - 110073, Delhi, India.

Keywords:

Homemade mask, Triple-layered, Simple procedure, Preventive measure, Cost-effective, SARS-CoV-2 infection

Correspondence to Author:

Dr. Amit Kumar

Bharat Immunological and Biologicals Corporation Limited (BIBCOL), Chola, Bulandshahar - 203203, Uttar Pradesh, India.

E-mail: akbibcol@gmail.com

ABSTRACT: The current study was performed to prepare a three-layered homemade mask by simple procedure with the help of easily available raw materials at home in minimum duration without any major equipment like a stitching machine. The masks are useful to protect us against SARS-CoV-2 and other respiratory pathogens according to recently issued guidelines by the centre for disease control and prevention. The homemade mask was prepared by commonly available materials at home and easily prepared by using the simple procedure, which was described step by step in the current study. The simple procedure was consisting of only seven steps that were described in the text and practical aspect, also. Finally, an evaluation of the cost and duration of one mask was also done. The results of the study revealed that the mask could easily and successfully prepared to follow the seven steps of the simple procedure, which was performed and shown theoretically and practically in the study. It was also found that the mask was prepared only in average duration, *i.e.*, 21 min with any cost if raw materials were available at home. In addition, cost of mask per piece was also calculated only rupees 6.75/- per piece after purchasing the consumable material from market. Further, the cost of the mask was compared and found cheaper than the others. Three-layered homemade mask is a better option to cover face, which can provide us prevention measures from SARS-CoV-2 infection. In the current situation, there is a huge demand of the mask due to the emerging and highly contagious viral COVID-19. Therefore the study provides an option to prepare the three-layered homemade mask by this simple procedure at your place and use it many times after washing and disinfecting properly.

INTRODUCTION: The International Committee of Taxonomy of Viruses (ICTV) has established a standard format to facilitate good practice and exchange about scientific knowledge, and first of all, they provided a name to know about the novel virus; Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2).

Recently, SARS-CoV-2 is considered as emerging viral pathogen, and it causes a serious & potentially life-threatening viral infection called as Coronavirus disease (COVID-19). The COVID-19 is an acute respiratory disease, and the World Health Organization (WHO) characterized COVID-19 as a pandemic disease on 11th March 2020 ¹, which originated from Wuhan in China ².

Recent reports also provided data of positive cases for COVID-19 with their characteristics among the Indian population ³. It can be transmitted human-to-human through potentially droplets containing the viral pathogen; it can enter through three common routes eyes, nose, and mouth of another human host

	<p>DOI: 10.13040/IJPSR.0975-8232.IJP.7(11).316-21</p>
	<p>The article can be accessed online on www.ijpjournal.com</p>
<p>DOI link: http://dx.doi.org/10.13040/IJPSR.0975-8232.IJP.7(11).316-21</p>	

after contact with these droplets. Currently, there are no FDA approved vaccines and treatments available for COVID-19^{4, 5}. Prevention measures are only optioning to protect and save you from the SARS-CoV-2. Therefore, the consumption of the mask is high, and also the availability of the mask is very limited due to lockdown in India. National and international health agencies recommended different preventive measures for public health concerns like social distancing, wearing masks, maintain hygiene *etc.*^{6, 7, 8, 9}. On 4th April 2020, at 12:22 PM, CDC published a document where it suggested that wearing face-covering and maintains distance at least a one-meter distance in between two persons in public places such as Grocery, Market, Medical store, Dairy boots *etc.*^{7, 9}. After undertaken of this account, the authors tried to prepare a three-layered homemade mask by simple procedure as preventive measures that will provide us protection from COVID-19 and also provide a proper way to disposal of the used mask. The current study with the aim performed to describe a simple stitching technique to prepare a safe three layered mask with available used cloth at home with any major equipment and will help to give protection against various contagious respiratory infections, including COVID-19, as emerging and potentially life-threatening viral infection globally.

MATERIALS AND METHODS:

Raw Materials: One person was required to perform the task, which has acquainted with minimum measurement, cutting and stitching skills. The following raw materials with the purpose were used to prepare the three layers homemade mask.

1. Cloth was selected based on its tightly woven and soft felling new or old cotton cloth like quilting fabric, cotton sheet. The cloth was washed with commonly used detergent at home and then disinfect with available disinfect such as Dettol, Savlon, Alcohol (70%), *etc.*
2. Inch tape was used to measure rectangular shape and size or 15 × 25 cm) of the cloth, as per the CDC standard specifications (6 × 10 inches)⁷.
3. Pencil was used to mark the measurement on the cloth.

4. Stainless steel scissor was used to cut the cloth in pieces (03 numbers for one mask).
5. Stainless steel needle and white one color reel thread were used for the stitching purpose.
6. Elastic (½ cm wide) was used to make earloops for both sides.

Procedure: The three-layered homemade mask was prepared as per the described method of CDC 7 with minor modifications. In brief, the following steps were adopted to prepare a simple and protective triple-layered homemade mask to protect from COVID-19.

Step I: Take a woven and soft felling new or old cotton cloth and measure length 16 cm and width 26 cm size in rectangular shapes with the help of inch tape and then mark it by a pencil.

Step II: Cut the marked area of the cloth and total three equal size pieces of 16 cm length & 26 cm width with the help of the scissor and stack the three rectangles pieces.

Step III: Fold ½ cm individually of all four sides of the mask and then stitch by hand with the help of thread in needle manually.

Step IV: Two pieces of the elastic used to connect both corners of the left side and another both corners of the right side, respectively. Gather the sides of the mask covering on the elastic and primary checking of the homemade mask covering fits on your face in a mirror.

Step V: Then securely stitch manually the elastic in place to keep it with the help of thread in the needle, and you see two ear loops ready to hold the mask on your face.

Step VI: Final checking to see your face in the mirror for fitting and covering of the three-layered homemade mask on your face and measure the actual size of the prepared rectangular shape mask, approximately 15 cm in length & 25 cm in width.

Step VII: Fold the mask four times to keep it easily in your bag or pocket.

Disposal Procedure of the Mask: The homemade mask was disposed of after certain used, torn off

damaged and stained conditions. These masks were disposed of into two steps:

Step I: These masks were cut into two pieces.

Step II: Then disinfect the masks properly with the recommended concentration of disinfectant by the manufacturer such as Dettol, Savlon, Alcohol (70%), etc. Evaluation of the cost and duration: Stepwise procedure of homemade mask was described sequentially, and the duration & cost were also calculated accordingly. Finally, the cost of a homemade mask was calculated and compared with each other.

RESULTS AND DISCUSSION: WHO has already developed guidelines, and it is easily accessible for the general public on the website as guidance for home care and health care settings on infection prevention and control (IPC) strategies for the use of surgical mask and its management for SARS-CoV-2 infected & suspected patients 10,11,6. Recently, CDC advises & encourages the use of simple cloth face coverings as a barrier for the virus transmission from an infected person (symptomatic and/or Asymptomatic) to a healthy another. Cloth face coverings prepared by using household items or made at home from common materials at low cost can be used as an additional, voluntary public health measure ⁷. In the current scenario, every person needs a mask to protect him, but the availability of the mask is limited due to various reasons such as lockdown, production, and supply shortage. In this situation, a homemade mask is the best option, so any person can prepare their mask at home with the help of available materials cloth, inch tape, pencil, scissor, elastic, needle & thread reel through this simple procedure as described step-by-step in **Fig. 1**.

The homemade mask is simply flat, comfortable, easy to wear, less time consuming, and cost-effective. Besides, there are two major benefits to prepare your own homemade mask; you prepare yourself with appropriate size and color when you need it and don't need to go outside for the purchase only. Every person can prepare the mask to follow these simple procedural steps.

The mask was taken an average time 21 min, and it has no cost if required materials available at home otherwise, its incurred cost is also lower than the market mask as given data in **Table 1**.

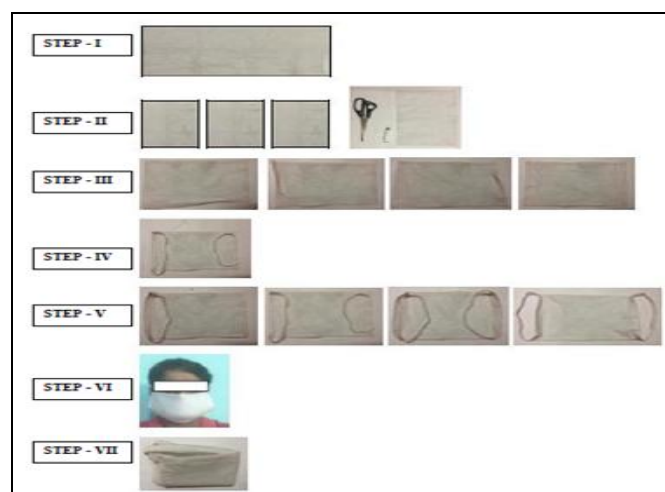


FIG. 1: STEP BY STEP PRACTICAL PROCEDURE OF THE TRIPLE LAYERED HOMEMADE MASK

The cost of the homemade mask was calculated for the 08 pieces only because the quantity was prepared by one meter of the cloth. Therefore the cost was depended based on consumable, non-consumable, and both types of the items and cost of the eight pieces calculated and summarized in **Table 2**, and the cost comparison was done for one piece of the mask, and the detail is given in **Table 3**.

TABLE 1: STEPWISE PROCEDURE, RAW MATERIALS AND COST

S. no.	Procedure	Duration	Required Material	Cost incurred (in Indian Rupees)	
				Available at Home	Purchase from Market
1	I	03 to 04	Cloth [✱] Inch tape	Yes	20 to 30 per meter [Ⓞ] 20 to 30 per piece 02 to 04 per piece
2	II	02 to 03	Pencil [✱]	Yes	50 to 55 per piece
3	III	06 to 08	Scissor	Yes	02 to 03 per piece 04 to 05 per piece
4	IV	02 to 03	Needle [✱] Reel [✱]	Yes	18 to 20 per meter 30 to 40 per piece
5	V	03 to 04	Elastic [✱] Mirror	Yes	Already included Already included
6	VI	01 to 02	Needle Reel [✱]	Yes	Already included
7	VII	01	Mirror	Yes	Not applicable
Total	07 Steps	17 to 25 (Mean-21 min)	By hand	Yes	146 to 187 (Mean-166.5/-)
			08 nos	YES	

Note: marked as consumable materials. 08 pieces were made from 01m² cloth.

TABLE 2: COST-EFFECTIVENESS OF THE MASK (08 PIECES/01M² CLOTH)

S. no.	Material	Costing with (in Indian Rupees)		
	Cloth	Consumable	Non- Consumable	Both
1	Pencil	25	00	25
2	Needle	03	00	03
3	Elastic	2.50	00	2.50
4	Reel	19	00	19
5	Inch tape I	4.50	00	4.50
6	Scissor	00	25	25
7	Mirro	00	52.50	52.50
8		00	35	335
	Total	54	112.50	166.50

The final calculation of the mask was done only based on consumable items because other items did not consume in the eight pieces and these items have a long life span. A total of six rupees and seventy-five paisa (Rs. 6.75 per piece) was meeting

the cost of one homemade mask, as shown in **Table 3**, and it is reusable after washing & disinfect so, it is cheaper than the purchased mask ready to use with single-use from the market.

TABLE 3: COST COMPARISON OF THE MASK PRICE

Cost of Number of Piece	Cost incurred (in Indian Rupees)				
	Ready to use (Disposal)	Homemade			Available at Home
		Consumable	Non-Consumable	Both	
08	96	54	112.50	166.50	00
01	12	6.75	14.06	20.81	00

The triple-layered homemade mask is used by a human being as a preventive measure for the protection of SARS-CoV-2 and other respiratory infections. Therefore, disposal of the triple-layered homemade mask has the main concern because it was used to provide protection from contagious diseases such as COVID-19.

In this case, we need a simple, easy, effective method for disposal of the masks after certain used, torn off damaged and stained conditions. These masks were disposed of into two steps as suggested by guidelines of authorized agencies: first cut the mask into two pieces and then disinfect properly with a recommended concentration of disinfectant, for example, Dettol, Savlon, Alcohol (70%), *etc.* Despite this, you can prepare your homemade mask with choice of color, sizes, and shapes to protect yourself from COVID-19 as well as other respiratory diseases.

It can also protect from dust in routine life when you go outside to visit any public places such as markets, offices, shopping malls, airports, bus stations, railway stations, and other places. In my opinion, it has numerous benefits and minimum requirements as described & categorized separately.

Benefits:

1. You can easily prepare many masks anytime on your own, even in the lockdown period and during the shortage condition of mask in the market.
2. The mask gives you protection and safety from dust particles, microbes, droplets containing COVID-19, and other respiratory syndromes.
3. The mask is reusable because it is washable and disinfects the number of times easily.
4. It would have no cost if you used materials available at home.
5. It provides us independence.
6. Most important thing is that no need to go outside of your home. In this way, you can maintain social distancing.
7. Its disposal is easy when it will damage or not in use.
8. There is no need for any major equipment to prepare it like a stitching machine.

Minimum Requirements:

- It is a laborious job because the preparation of the mask has taken average time 21 min.
- It requires self-motivation with minimum stitching skills.

CONCLUSION: World Health Organization declared that Coronavirus disease (COVID-19) is a highly contagious pandemic disease worldwide and a pathogenic viral infection caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), which emerged first in Wuhan, China at the end of 2019.

It is suggested that the route of human-to-human transmission of SARS-CoV-2 is either *via* respiratory droplets or contact.

It can enter through three common entry routes eyes, nose, and mouth of another human being after coming in close contact of the potentially infective respiratory droplets.

Wearing a medical mask is one of the prevention measures to limit the spread of certain respiratory diseases, including Coronavirus disease.

As CDC recommends wearing face mask covering in public places where social distancing is difficult to maintain, especially in the area of significant community-based transmission in the first week of April 2020.

On the basis available literature, it is well established that a simple cloth mask can use as preventive measures to protect persons from COVID-19 and other respiratory diseases also, which are transmitted through contact and droplets containing disease-causing microbial pathogens and the mask should be disposed of only after disinfect properly.

In this direction, the current study was performed to aware the general public that they can prepare their own the three-layered mask at home by applying the simple procedure without any special need of equipment & raw materials and prevent themselves against the current pandemic COVID-19, caused by emerging SARS-CoV-2 viral pathogen. Apart from this, it has numerous benefits

and minimum requirements, as already discussed in the result & discussion section of the article.

ACKNOWLEDGEMENT: Due to the pandemic infection of SARS-CoV-2, the current scenario motivates the authors to conduct and publish the study for the good health of the human being.

CONFLICTS OF INTEREST: The authors report no conflicts of interest.

REFERENCES:

1. World Health Organization "WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020". Available at <https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020>.
2. Zhu N, Zhang D and Wang W: A Novel Corona virus from Patients with Pneumonia in China 2019 N Engl J Med 2020; 727-33.
3. Gupta N, Praharaj I, Bhatnagar T, Thangaraj JWV, Giri S, Chauhan H, Kulkarni S, Murhekar M, Singh S, Gangakhedkar RR, Bhargava B and ICMR COVID Team: Severe acute respiratory illness surveillance for corona virus disease 2019, India. Ind J Med Res, 2020. Epub ahead of print (DOI: 10.4103/ijmr.IJMR_1035_20). Available at Downloaded free from <http://www.ijmr.org.in> on Friday, April 10, 2020, IP: 182.77.121.180.
4. Steward J: COVID-19: Prevention and investigational treatment, Drugs 10th April 2020; Available at <https://www.drugs.com/condition/covid-19.html>.
5. US Food and Drug Administration, Beware of Fraudulent Corona virus Tests, Vaccines and Treatments. Available at <https://www.fda.gov/consumers/consumer-updates/beware-fraudulent-corona-virus-tests-vaccines-and-treatments>.
6. World Health Organization "Advice on the use of masks the community, during home care and in health care settings in the context of the novel corona virus (2019-nCoV) outbreak, Interim guidance, 29 January 2020. Available at [WHO/nCov/IPC_Masks/2020.1](https://www.who.int/publications-detail/11-01-2020-advice-on-the-use-of-masks-in-the-community-during-home-care-and-in-health-care-settings-in-the-context-of-the-novel-coronavirus-(2019-ncov)-outbreak).
7. CDC, Department of Health and Human Services, USA. The Documented CS316353B 04/04/2020, 12:22 PM on the website. Available at www.cdc.gov/coronavirus.
8. Ministry of Health and Family Welfare, Directorate General of Health Services [Emergency Medical Relief] "Guidelines on use of masks for health care workers, patients and members of the public". Available at <http://pbhealth.gov.in/Guidelines%20on%20use%20of%20masks%20for%20health%20care%20workers,%20patients%20and%20member%20of%20Public.pdf>
9. Ministry of Health and Family Welfare, Directorate General of Health Services [Emergency Medical Relief] "Novel Coronavirus Disease 2019 (COVID-19): Guidelines on rational use of Personal Protective Equipment". Available at <https://www.mohfw.gov.in/pdf/GuidelinesonrationaluseofPersonalProtectiveEquipment.pdf>.
10. World Health Organization "Home care for patients with suspected novel coronavirus (nCoV) infection presenting with mild symptoms and management of contacts". Available at [https://www.who.int/publications-detail/home-care-for-patients-with-suspected-novel-coronavirus\(ncov\)](https://www.who.int/publications-detail/home-care-for-patients-with-suspected-novel-coronavirus(ncov))

infection presenting with mild symptoms and management of contacts.

11. World Health Organization "Infection prevention and control during health care when novel corona virus (nCoV)

infection is suspected". Available at [https://www.who.int/publications-detail / infection prevention and control during health care when novel corona virus \(ncov\) infection is suspected](https://www.who.int/publications-detail/infection-prevention-and-control-during-health-care-when-novel-corona-virus-(ncov)-infection-is-suspected) 20200125.

How to cite this article:

Kumar A and Kaushik R: Simple procedure for preparation of triple layered homemade mask as preventive measure for sars-cov-2 infection. *Int J Pharmacognosy* 2020; 7(11): 316-21. doi link: [http://dx.doi.org/10.13040/IJPSR.0975-8232.IJP.7\(11\).316-21](http://dx.doi.org/10.13040/IJPSR.0975-8232.IJP.7(11).316-21).

This Journal licensed under a Creative Commons Attribution-Non-commercial-Share Alike 3.0 Unported License.

This article can be downloaded to **Android OS** based mobile. Scan QR Code using Code/Bar Scanner from your mobile. (Scanners are available on Google Playstore)