

DEVELOPMENT IN BIO DEGRADABLE & ANTIBACTERIAL FACE MASK

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Abstract: *In recent times, COVID-19 has played a major role in the health of our people. The way to prevent the viruses everyone have to wear face masks. Here, we bring up the face mask with the following features: antibacterial, biodegradable, tulsi and neem ingredients, and linseed oil for a water repellent finish. We used natural products as the basic raw materials and for preparing masks. We selected the spun-laced non-woven bamboo fabric. Tulsi brings fragmented smell with anxiolytic property. Tulsi smell stimulates the mind while working by the ayurvedic method, and neem brings antibiotic property. Non-woven fabric gives a soft finish to the skin, so it avoids irritation to the skin. Finally, a cotton non-woven with a little amount of elaster with a strap is used to wear the mask comfortably.*

Keywords: Non-woven Bamboo Fabric, Tulsi and Neem, Biodegradable, Antibacterial, Water Repellent.

1. Introduction:

We are going to bring up a non woven Mask with Biodegradable property. Our primary raw material is nonwoven bamboo fabric, which is spun-laced. It has natural properties such as antibacterial and absorbency. Though this human can easily inhale and exhale without any disturbance, Then neem has the natural properties of killing viruses and antibacterial nature. Next, tulsi has a good fragment with natural ayurvedic properties. Finally, we used linseed oil, which was extracted from the seeds of olive. It has a natural water repellent property. Totally, it has 3 layers, such as the outer layer as neem coating with linseed oil for both antibacterial and water repellent finish, the middle layer with tulsi coating and acts as a filtrate, and the inner layer with simple fabric with absorbant property.

Azadirachta indica, commonly known as neem, nimtree or Indian lilac, and in Nigeria called dogoyar, is a tree in the mahogany family. It is one of two species in the genus and is native to the Indian subcontinent and most of the countries in Africa. It is typically grown in tropical and semi-tropical regions. Neem trees also grow on islands in southern Iran. Its fruits and seeds are the source of neem oil. It is estimated that about 30.3 million Americans suffer from diabetes. Even more disturbingly, 84.1 million American adults are thought to have prediabetes. 3. Neem may have the potential to treat what's turning in global epidemic. According to an animal study, administration of neem leaf extract and neem seed oil was able to lower blood sugar. In fact, their effect was comparable to that of an antidiabetic drug called glibenclamide. Linseed oil is a drying oil, meaning it can polymerize into a solid form. Owing to its polymer-forming properties, linseed oil can be used on its own or blended with combinations of other oils, resins or solvent as an impregnator, drying oil finish or varnish in wood finishing, as a pigment binder in oil paint, as a plasticizer and hardener in putty, and in the manufacture of linoleum. Linseed oil use has declined over the past several decades with increased availability of synthetic resins

2. *Materials and Methods:*

- Non Woven Bamboo Fabric
- Neem Extract
- Tulsi Extract
- Biodegradable Elasters
- Linseed Oil
- Padding Mangle Method

2.1. *Non-woven Bamboo:*

Made from 100% bamboo fiber; environmental friendly and 100% biodegradable, natural hygiene; super absorbency volume, widely bamboo spun-lace non woven fabric is used for wet wipes production but also dry disposable wipes and so on; Good tensile strength, no linting; good hand feeling. 70 GSM fabric was selected.

2.2. *Neem Coating:*

Take an extract of neem by keeping the neem leaves in dark shade till it loses whole of its moisture content approximately 1 week. After chopped it into a Mixer to get a powdered extract. Then according to the extraction level 10g of powder is mixed with 50ml of ethanol to get maximum extraction of neem solution. This is then coated with outer layer of mask by padding mangle method.

2.3. *Tulsi Coating:*

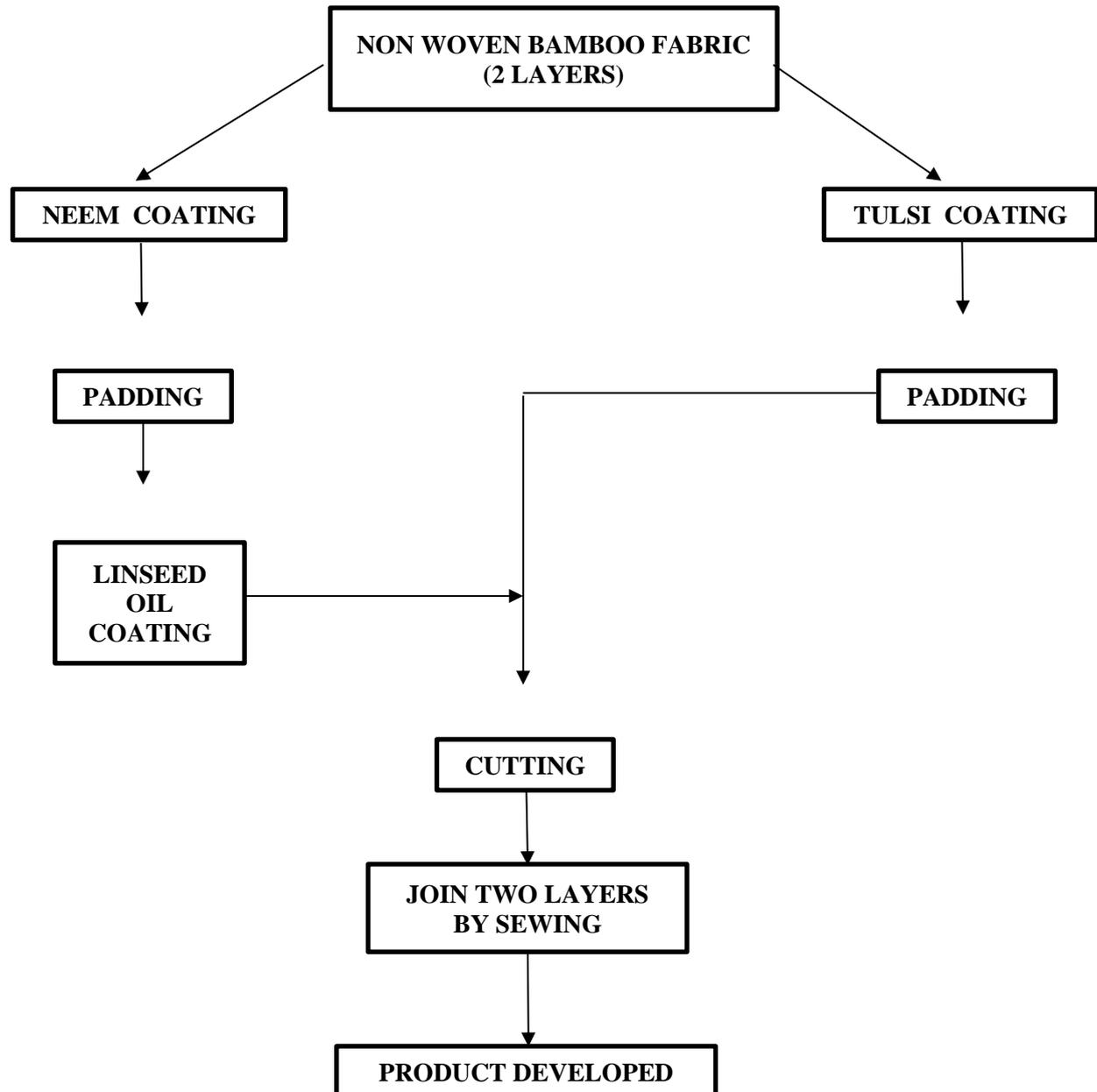
The extraction process is same as that of neem. The extracted solution is then coated with middle layer of the mask by the same padding mangle method.

2.4. *Water Repellent Finish (Linseed Oil):*

It is one of the natural methods to get water repellent finish by linseed oil. Its procedure is to boil the linseed oil till its maximum level and dip the outer layer (i.e., Neem coated fabric) into it. After complete absorption let it dry in natural sunlight for two days to remove the oil surface.

2.5. *Padding Mangle Method:*

It contains chemical trough, guide rollers and squeezing mangle. Fabric is dipped into the finish chemical then sent to squeezing mangle. During this time finish chemicals are applied on the fabric and squeezes out extra chemicals from the fabric. This method is used here to coat both neem and tulsi.

2.5.1. PROCESS FLOW CHART

3.1. Testing:

3.1.1. Water Repellency Test:

Water repellency is a function of fabric that describes the resistance of the fabric to surface wetting & water penetration, i.e., non spreading characteristics of water or any liquid droplets on the surface of the material surface. Usually, most of the water repellent finishes are given by chemical finishes. We can't use that chemical method because we're wearing it on face and so it should not be harmful. So, we used natural linseed oil for water repellent finish.

3.1.2. Anti Bacterial Test:

Antibacterial refers to anything that kills bacteria or prevents them from growing and multiplying. Heat, as well as certain medications and chemicals, all have antibacterial properties. While regular surgical masks and cloth masks may create a physical barrier to bacteria, they are not considered antibacterial.

4.1. Result and discussion:

The antimicrobial test results of neem extraction was shown below :

S.No	20 ($\mu\text{g/ml}$)	40 ($\mu\text{g/ml}$)	60 ($\mu\text{g/ml}$)	80 ($\mu\text{g/ml}$)
<i>B.subtilis</i>	5 mm	6 mm	8 mm	10 mm
<i>E.coli</i>	2 mm	3 mm	4 mm	5 mm

4.2. Bacillus subtilis:

B.subtilis is a Gram-positive, spore-forming organism that can survive in the form of bacterial cells and spores in the air and is found in indoor and outdoor. As a simulation of coughing, speaking, and sneezing conditions, airborne droplets containing *B. subtilis* cells were coated into the face masks for antibacterial property.

4.3. *Escherichia coli*:

E. coli is a gramme-negative rod-shaped bacteria that possesses adhesive fimbriae and a cell wall that consists of an outer membrane containing lipopolysaccharides, a periplasmic space with a peptidoglycan layer, and an inner, cytoplasmic membrane.

The solution acts against bacteria formation when tested with *E. B.Subtilis* gives good prevention against viruses and bacteria. The Zone formation shows a maximum prevention of 10 mm in *B.subtilis* and 8 mm in *E.coli*. It means it prevents bacteria.

5. *Conclusion*:

Our end product is the Bio-degradable Face Mask with some Ayurvedic natural finishes. In this pandemic situation, our world faces a large affect due to harmful viruses, so masking is an important need for each and every human. Existing masks are not biodegradable in nature. After a few years, masks may cause some dangers to nature. So, we selected a biodegradable one. Only the term "Bio-degradable" does not satisfy our product and so we added neem and tulsi Extracts as an extra feature. We used linseed oil for Water repellency. Here, water repellency acts as a gate for the mask as it stops or repels human saliva, bacteria, and blood while operating.

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