

Formulation and Evaluation of Herbal Thumb Sucking Deterrent Film

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ABSTRACT:

By lengthening healthy life spans in terms of mental, physical, spiritual, and social health, as well as by preventing diseases, Ayurveda seeks to preserve a person's senility. When we talk about Ayurveda, we have to be grateful for the numerous plants and herbs that occur in nature that are used for medicinal purposes and support its very reason for being. The source of phytomedicine has India since the dawn of civilization. Neem and turmeric are examples of bitter herbs that are blended in a mild, non-toxic liquid basis. The bitter flavor deters infants from sucking when applied topically to the thumb or fingers. As a natural solution, it is a safe and efficient alternative to conventional methods that encourages good oral hygiene and lowers the risk of orthodontic and dental problems. Due to the effectiveness and safety of the herbal deterrent, it is a tempting choice for parents who want to gradually help their children quit thumb sucking. Natural bitter herbs are used in this herbal thumb-sucking deterrent for infants to deter thumb-sucking behavior. Parents looking to break this habit in their infants can find a safe and effective solution in its mild, nontoxic ingredients.

KEYWORDS: Herbal Thumb Sucking Deterrent, Deterrent Film, Herbal ingredients

I. INTRODUCTION:

Thumb sucking is a frequent behavior among newborns, frequently offering solace and self-soothing. Long-term thumb sucking, however, might result in dental and orthodontic issues, like palate problems and misaligned teeth. A herbal thumb sucking deterrent film provides a mild and all-natural remedy to this issue. By discouraging thumb-sucking in infants, this movie, which is infused with bitter herbal extracts, fosters good oral

hygiene and lowers the likelihood of dental issues. This herbal movie uses the concepts of aversive taste conditioning to give a secure and successful method for helping young children stop sucking their thumbs. It's safe for infants' delicate skin and dental health. Bitter taste: Successfully discourages thumb sucking without the use of harsh chemicals. ideal for sensitive newborn skin.

The bitter herbal components operate by linking the bad flavor to thumb sucking, which discourages the infant from continuing the behavior.

Using the herbal thumb sucking deterrent film is a good way to stop infants from sucking their thumbs. Children learn to break the habit of sucking their thumbs by linking the unpleasant bitter flavor with the action, which encourages good oral hygiene and lowers the chance of dental issues.

In general, herbal components are safer and less harmful than synthetic substitutes. Many herbs have therapeutic benefits, including anti-inflammatory, antimicrobial, and antioxidant effects. The use of herbal components may be done sustainably, which minimizes environmental harm.

The basis of herbalism is centuries of traditional knowledge and cultural customs.

The fruit of *Helicteris isora* L. belongs to TRIBE II, the Helicteraceae family, where the blooms are hermaphrodite. It is beneficial for youngsters, particularly those suffering from intestinal diseases, and it makes up the majority of grandma's bag. Fruits are refrigerant, demulcent, stomachic, vermifuge, haemostatic, acrid, and astringent. They are helpful in the treatment of diabetes, flatulence, diarrhea, dysentery, wounds, ulcers, hemorrhages, and eye disorders.

The authentic Ativisha of Ayurvedic (The Ayurvedic Pharmacopoeia of India, 1999) and Athividayam of Siddha literature (Anandakumar A. et al, 1982) is the Himalayan endemic *Aconitum heterophyllum* Wall. Ex Royle, Ranunculaceae. Under the categories of Lekhaniya (tissue scraping action), Arsoghna (haemorrhoids-curing), Sirovirecana (errhines, nasal therapy), Gana (groups), and Tiktaskandha (bitter tasting), Charaka described this drug in accordance with its therapeutic effects (Pandeya G. ,1997). Sushruta, on the other hand, categorized it under Mustadi and Vacadi. Ativisha is widely used for its antipyretic, antiinflammatory, anti-diarrheal, and antiemetic properties, as well as for the prevention of coughs and colds (Sharma P. V., 2006). Due to its popularity, *A. heterophyllum* is now in serious danger.

Medicinal plants have been used since ancient times, and *Helicteres. isora* Linn. is one of those plants that contains a variety of herbal components of Asian medicine, notably those that are used in the west.

ORAL CAVITY AND THEIR FUNCTIONS

The lips, buccal surfaces, hard palate, retromolar trigone, gums, floor of the mouth, and anterior or oral aspect of the tongue are all part of the oral cavity. Because physical examination makes this area simple to appreciate, tumors in this location are frequently discovered at an early stage. Tumors of the oral cavity, which are strongly linked to the use of smokeless tobacco and other oral tobacco products, manifest on the buccal and gingival surfaces in the locations where tobacco products are kept in close contact with the mucosa for extended periods of time. In smokers, anterior tongue malignancies are more prevalent. Lip cancers are especially common in transplant recipients and may be brought on by DNA injury caused by solar UV radiation. The safest, most affordable, most convenient, and most patient-compliant way to treat a variety of illnesses is through oral medication delivery. Traditional oral formulations have a number of drawbacks, including low bioavailability, a short retention period in the gastrointestinal (GI) tract, and restricted targeting capabilities. For oral therapy such as the delivery of nucleic acids, peptides, proteins, and small molecule medicines, several drug delivery systems (DDSs) have been researched and employed in recent years. Different nanoparticles (NPs), microparticles, hydrogels, or combinations thereof have been used thus far in an

effort to enhance bioavailability or target specificity in the gut.

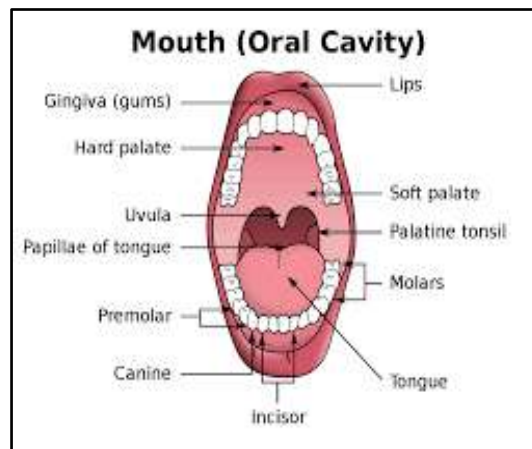


FIG. NO .1 STRUCTURE OF ORAL CAVITY

The oral cavity, often referred to as the mouth, is the first step in the digestive process and is essential for food intake, mastication (chewing), and swallowing. Additionally, it participates in breathing, speaking, and tasting. The lips, teeth, tongue, gums, hard and soft palate, and salivary glands are just a few of the components of the oral cavity. Keeping a healthy mouth is crucial for overall well-being and for warding off a variety of oral health problems.

FUNCTIONS OF THE ORAL CAVITY :

- 1. Ingestion**
The oral cavity acts as the portal by which food and drink enter the body.
- 2. Chewing**
The teeth help with digestion and facilitate swallowing by breaking down food into smaller bits.
- 3. Drooling**
Saliva is produced by the salivary glands. moistens and lubricates meals, aids in swallowing, and initiates digestion via enzyme activity
- 4. Taste**
The tongue has taste receptors that can distinguish: Sweet, sour, salty, bitter, umami
- 5. Speaking**
The mouth plays a significant role in the creation of both words and sounds.

6. Digestion

Through the mouth, the digestive process gets started with:

enzymatic action of saliva, mechanical breakdown of food (chewing)

7. Protection

Protects against germs, promotes oral hygiene

WHAT IS A HERBAL THUMB SUCKING DETERRENT FILM?

The herbal thumb-sucking deterrent film is a natural, efficient, and secure remedy for helping infants and toddlers quit sucking their thumbs, which encourages the development of a healthy mouth. An all-natural method for assisting young children and babies in breaking the thumb-sucking addiction. By using bitter herbal extracts, the movie discourages thumb sucking without the use of harsh chemicals, which helps to promote good oral hygiene and lessen dental problems.



FIG. NO.2 HERBAL DETERRENT FILM

ADVANTAGES OF HERBAL THUMB SUCKING DETERRENT FILM :

Because it is simple to take orally and not invasive, it is the route that patients prefer.

- Patients may take oral medications at home, which increases adherence to treatment schedules.
- Oral medications are often less expensive than injectables or other parenteral routes.
- There are several dosage forms for oral medicines, including pills, capsules, and liquids.
- Patients can give themselves oral medications, which lessens the need for medical personnel.
- Drug delivery methods can increase the bioavailability of medications, guaranteeing that the appropriate amount of the drug reaches the intended location.

• Drug delivery devices may be made to target certain cells, tissues, or organs, which increases their efficiency and minimizes adverse effects.

• Drug delivery methods may ensure regulated drug release, maintaining ideal drug concentrations over a long period of time.

DISADVANTAGES OF HERBAL THUMB SUCKING DETERRENT FILM :

- Drug absorption can be influenced by variables such as meal, pH, and GI motility, which results in varying bioavailability.
- The effectiveness of some drugs is diminished by substantial liver metabolism prior to entering the systemic circulation.
- Because some medications are broken down by stomach acid or enzymes, their bioavailability is decreased.
- Certain controlled-release formulations may release the entire dosage at once, causing toxicity.
- Oral medications can interact with meals, changing how well they are absorbed and work.
- The absorption of certain medications may vary across the GI tract depending on their pH-dependent solubility.

MATERIALS AND METHODS:-

MATERIALS:

Active Herbal Extracts: Hirda, Sagargota, Murudsheng, Ativish
Film-Forming Agents: Hydroxypropyl Methylcellulose (HPMC)
Solvent: Purified water
Preservatives: Citric acid

METHOD:

PROCEDURE FOR PREPARING HERBAL THUMB SUCKING DETERRENT FILM :-

• Step 1:Herbal Extraction

The herbal powders are extracted using hot water or hydroalcoholic extraction to maximize active compound yield. The extract is filtered and concentrated.

• Step 2:Film-Forming Solution

The polymer (HPMC) is dissolved in the solvent. The herbal extract is added gradually with continuous stirring.

• Step 3:Sachet Filling

The liquid formulation is filled into single-use sachets under sterile conditions. Sachets are sealed and stored at controlled temperatures.

- **Step 4: Application on the Thumb**
The liquid is applied to the child’s thumb.

Within 30–60 seconds, it dries into a thin, bitter film, discouraging thumb-sucking.

Constituents	Formula
Hirda	0.5 gm
Balhirda	0.5 gm
Sagargota	0.5 gm
Ativisha	0.1 gm
Murudsheng	0.1gm
HPMC	1 gm
Citric acid	0.1gm
Water q. s.	25 ml

TABLE NO. I FORMULATION OF HERBAL THUMB SUCKING DETERRENT FILM

EVALUATION OF THE HERBAL DETERRENT :-

1. Physical Properties:

Appearance and Texture: Uniform in colour and texture, may have slightly shiny or matte finish.

pH Measurement: Determine the pH level of the Herbal Deterrent, which is crucial for skin compatibility.

2. Spreadability: Evaluate how easily the herbal deterrent spreads on the skin.

3. Stability Test: Assess how the herbal deterrent performs over time, including changes in color, odor, and texture.

4. Antibacterial Activity: Procedure:

a) Preparation of Bacterial Culture:

Inoculate the selected bacterial strains in nutrient broth. Incubate at 37°C for 18–24 hours until turbid (log phase).

b) Preparation of Agar Plates:

Pour molten sterile nutrient agar into sterile Petri dishes. Allow the agar to solidify. Spread 100 µL of the bacterial culture evenly over the surface.

c) Preparation of Deodorant Extract (if needed):

Scrape off a small amount of the deodorant stick. Dissolve in a suitable solvent (e.g.,

ethanol, DMSO, or sterile water depending on solubility). Filter if necessary to remove solid particles.

d) Agar Well Diffusion Assay:

Using a sterile cork borer, punch wells in the agar plate (6–8 mm diameter) Fill each well with a fixed volume (50–100 µL) of the test sample. Include wells for positive and negative controls.

e) Incubation:

Incubate the plates at 37°C for 24 hours.

f) Measurement of Zone of Inhibition:

After incubation, measure the diameter of the clear zone (zone of inhibition) around each well in millimeters.

Results:

1. Physical Properties

Colour: yellowing brown

Odour: Mild herbal scent (from Moringa) + added fragrance (optional)

Texture: Smooth, slightly waxy but glides easily

pH: The pH of the deodorant stick was found to be 5.7-5.8, which is within the skin-compatible range.

Softening Point: The deodorant exhibited a softening point of 57°C -72°C, making it suitable for use in typical environmental conditions without excessive melting.

2. Ash Value :

Hirda	0.68
Balhirda	0.18
Ativisha	0.7
Mudursheng	0.72
Sagargota	0.15

3. Bulk & Tap Density :

	Hirda	Balhirda	Sagargota	Mudursheng	Ativisha
Mass	5 gm	5 gm	5 gm	5gm	5gm
Bulk density	2.5 g/ml	4.1g/ml	2.3g/ml	0.45 g/ml	0.40 g/ml
Tap density	4.54 g/ml	4.67 g/ml	3.5g/ml	0.60 g/ml	0.55 g/ml

4. **Spreadability:** The deodorant showed good spreadability, with easy application and smooth texture upon contact with the skin.



FIG. NO.3 ASH VALUE

FIG. NO.4 SPREADABILITY TEST



FIG.NO 5 BULK DENSITY APPARATUS

5.Stability

The deodorant demonstrated excellent stability over a 1-month period, with no significant changes in appearance, texture, or fragrance under

standard storage conditions. The product also maintained its consistency after exposure to high humidity and temperature fluctuations, indicating good shelf-life stability.

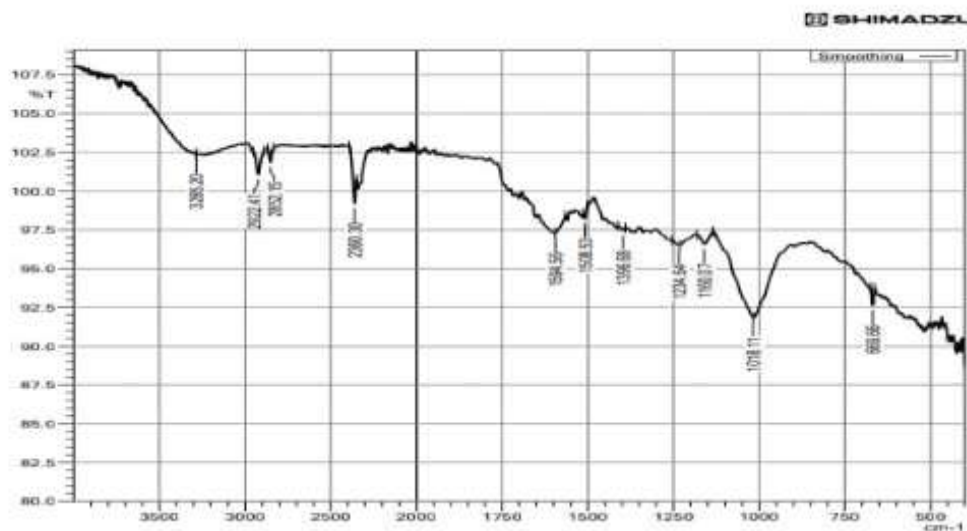
6. Antibacterial Activity



FIG. NO. 6: ANTIBACTERIAL ACTIVITY

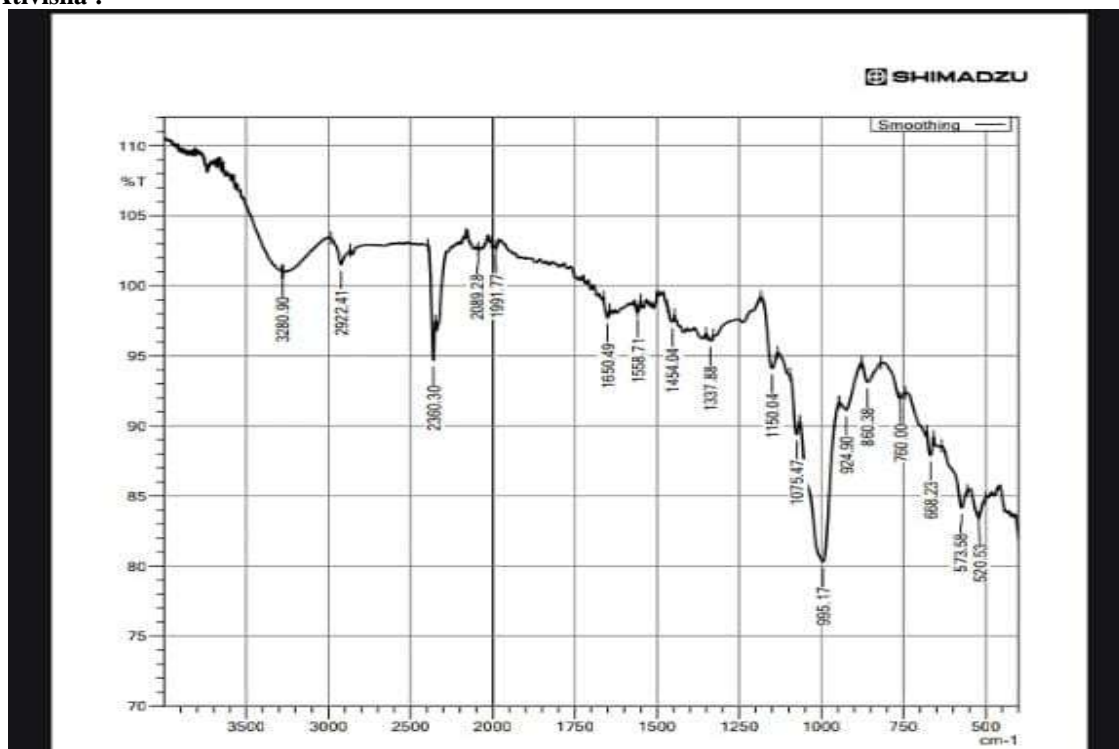
7. FTIR analysis

A) Murudsheng :



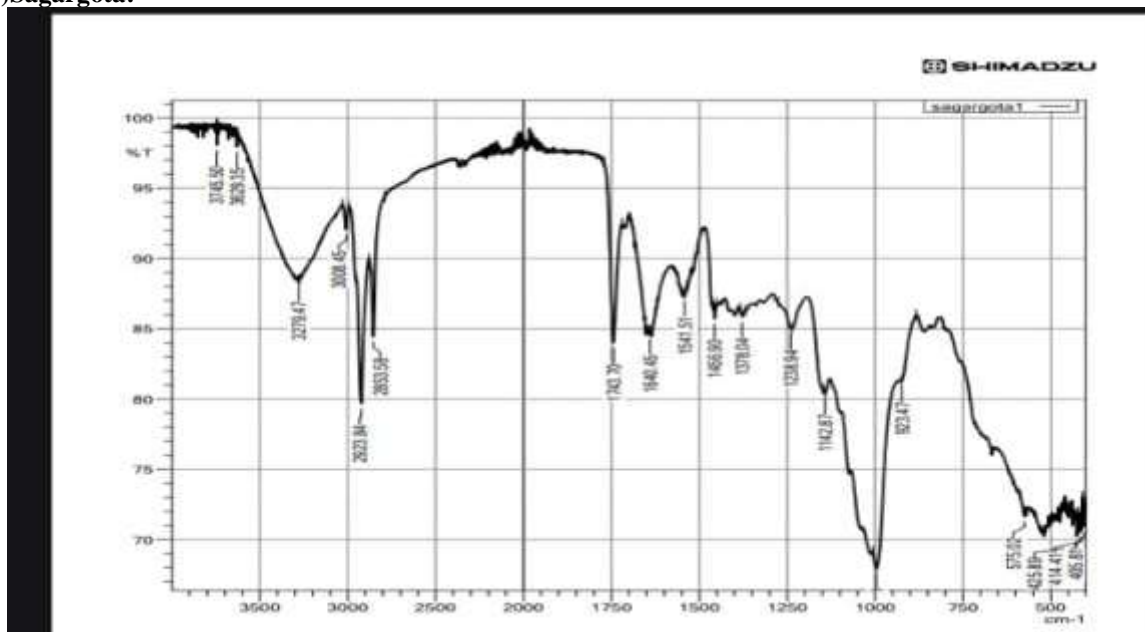
Wavelength	Interpretation
1. ~3300-3200 cm ⁻¹	O-H stretching ,presence of hydroxy group (alcohol and phenol)
2. ~2920-2850 cm ⁻¹	C-H stretching from aliphatic chain,methyl or methylene group
3. ~1700-1600 cm ⁻¹	C=O stretching from ester ,aldehyde or ketone .C=Cstretching from aromatic ring
4. ~ 1400-1300 cm ⁻¹	C-H bending or O-H bending of phenolic compound
5. ~1250-1000 cm ⁻¹	C-O stretching ,supporting the presence of esters ,ethers or glycosidic linkage

B) Ativisha :



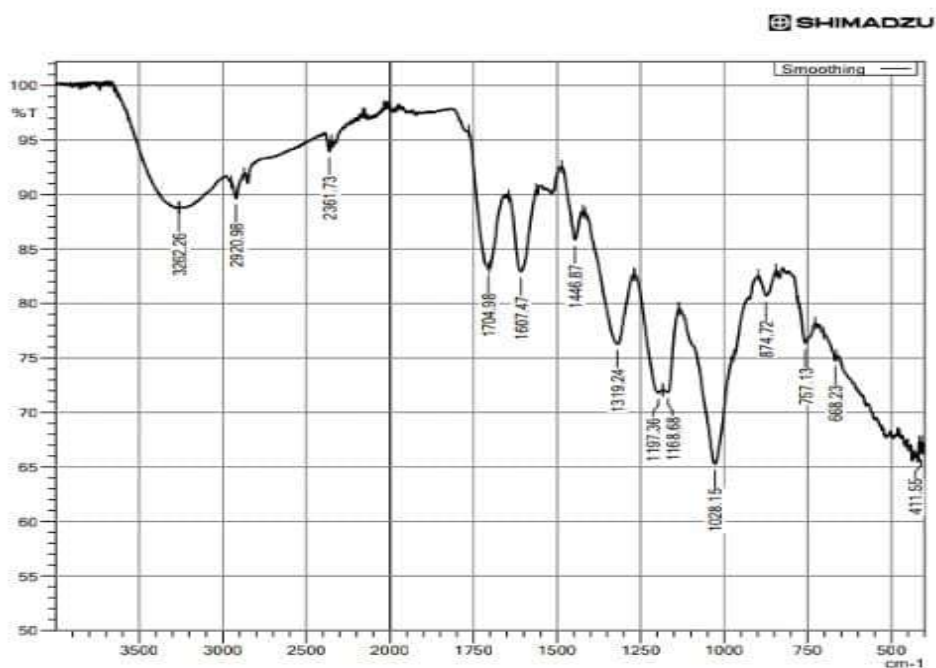
Wavelength	Interpretation
1. ~3300-3200 cm ⁻¹	O-H stretching indicating the presence of hydroxy group (common in alcoholic and phenolic group)
2. ~2920 cm ⁻¹	C-H stretching from aliphatic group (methyl or methylene group)
3. ~1740-1600 cm ⁻¹	C=O stretching from esters, ketones, or carboxylic acids May also include C=C stretching from aromatic compounds.
4. ~1500-1300 cm ⁻¹	N-H bending (suggestive of amide or alkaloid groups) C-H bending and O-H deformation, indicative of phenolics or plant proteins.
5. ~1250 -1000 cm ⁻¹	C-O stretching, characteristic of esters, ethers, or carbohydrates.
6. Below 900 cm ⁻¹	Aromatic C-H out-of-plane bending, confirming the presence of aromatic systems.

C)Sagargota:



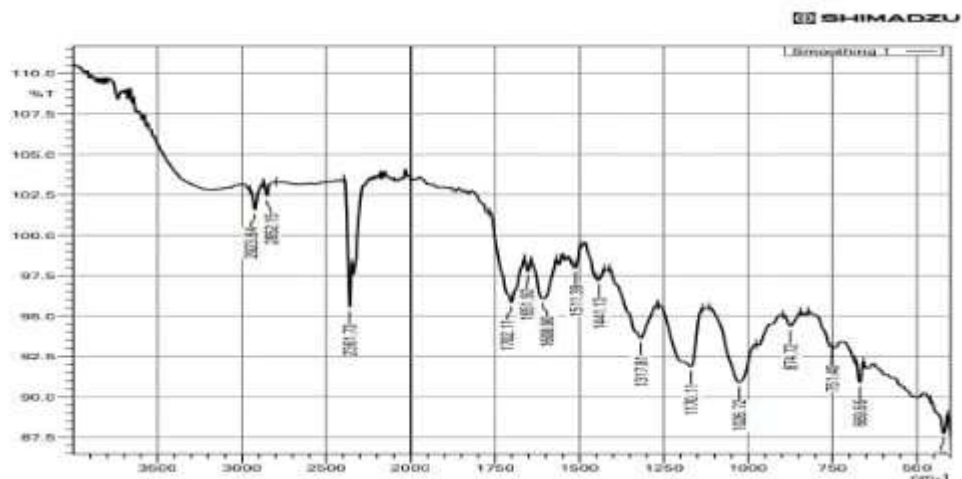
Wavelength	Interpretation
1. ~3300–3200 cm ⁻¹ (broad)	Indicates O–H stretching, which is common in alcohols and phenolic compounds (often present in herbal constituents like tannins or flavonoids).
2. ~2920–2850 cm ⁻¹	Corresponds to C–H stretching in aliphatic hydrocarbons (methyl or methylene groups).
3. ~1740–1600 cm ⁻¹	C=O stretching from carboxylic acids, esters, or ketones Possible C=C stretching from aromatic rings or alkaloids.
4. ~1450–1300 cm ⁻¹	O–H or C–H bending, possibly due to polyphenolic content or alkaloid structures
5. ~1250–1000 cm ⁻¹	C–O stretching from alcohols, esters, or ethers.
6. ~996–575 cm ⁻¹	C–H out-of-plane bending in aromatics, confirming the presence of an aromatic ring system.

D)Hirda:



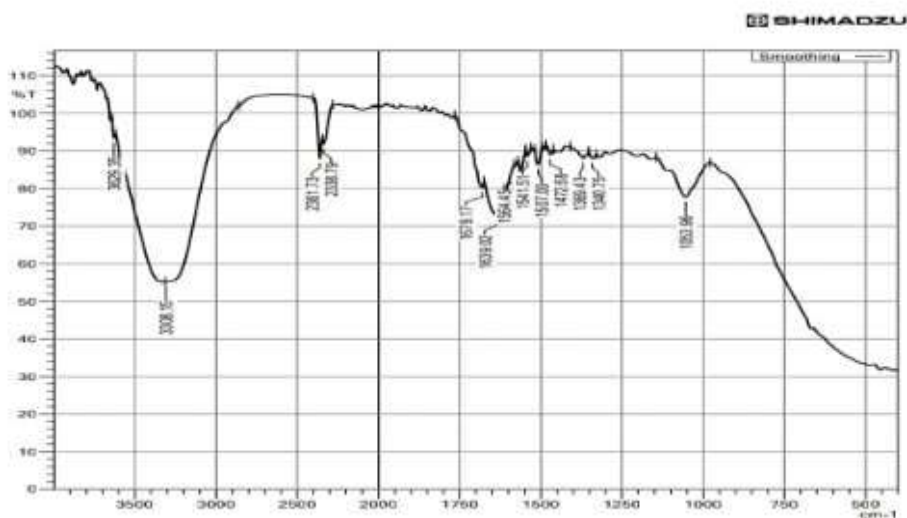
Wavelength	Interpretation
1. 3320.26 cm ⁻¹ – Broad peak	Possible Functional Group: O–H stretching (Alcohols, Phenols, or Carboxylic acids) Indicates hydrogen bonding, possibly due to –OH group.
2. 2920.56 cm ⁻¹ – Medium to strong	Possible Functional Group: C–H stretching (Alkanes)
3. 2361.73 cm ⁻¹ – Weak	Possible Functional Group: Possibly CO ₂ (ambient), often a background peak
4. 1724.99 cm ⁻¹ – Strong, sharp	Possible Functional Group: C=O stretching (Carbonyl group – likely from carboxylic acids, esters, aldehydes, or ketones)
5. 1627.49 cm ⁻¹ – Medium	Possible Functional Group: C=C stretching (Alkenes or aromatic rings)
6. 1519.24 cm ⁻¹ – Medium	Possible Functional Group: Aromatic ring stretching (C=C in benzene derivatives)

E) Balhirda:



Wavelength	Interpretation
1. ~3300–3200 cm^{-1} (broad band)	O–H stretching, characteristic of hydroxyl groups Strong presence of polyphenols, tannins, and gallic acid, which are abundant in Hirda.
2. ~2923–2852 cm^{-1}	C–H stretching vibrations from aliphatic chains.
3. ~1700–1600 cm^{-1}	C=O stretching, usually associated with carboxylic acids, esters, or tannic compounds Also may include C=C aromatic stretching, indicating aromatic structures.
4. ~1450–1300 cm^{-1}	C–O stretching, likely from esters, alcohols, or phenolic acids.
5. ~874–750 cm^{-1}	Aromatic C–H bending, confirming aromatic ring structures

II. CONCLUSION:



The FTIR analysis of the thumb-sucking deterrent film confirmed the presence of key functional groups such as hydroxyl (–OH), carbonyl (C=O), and aromatic structures. These functional groups are indicative of bioactive phytoconstituents like tannins, flavonoids, and phenolic compounds, which are expected from the herbal ingredients used in the formulation—namely Hirda, Ativish, Murudsheng, and Sagargota. The presence of these compounds supports the intended properties of the film, including bitterness, antimicrobial activity, and therapeutic effectiveness. Therefore, the FTIR results validate that the formulation is chemically successful and aligns with its designed purpose as a natural thumb-sucking deterrent.

The herbal thumb sucking deterrent for infants provides a non-invasive, all-natural method for stopping thumb sucking. Parents can discourage their children from sucking their thumbs by using bitter herbs like neem, turmeric, or ginger.

The herbal repellent's efficacy can vary depending on the baby's sensitivity to bitter flavors and how consistently it is administered. Parents can effectively discourage thumb sucking in their infants by being patient, persistent, and thorough.

Using herbs to deter thumb sucking is a natural, mild, and nontoxic method to help infants stop sucking their thumbs. It may be a helpful instrument for parents when used, supervised, and coupled with other approaches.

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