Potential Of Biancea Sappan Extract for Acne Prevention: Investigating Anti-Bacterial and Anti-Inflammatory Effect in Pillow Envelope Dye Application

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***Abstract*—Research on exploring the antibacterial and anti-inflammatory activities of Biancaea sappan (B. sappan) extract in preventing and treating acne, especially in pillow envelope application. Acne vulgaris is usually linked with bacterial infection, inflammation, and skin irritation. The B. Sappan extract, having traditional medicinal values, is analyzed for its activity against acne-producing bacterial and in suppressing skin inflammation. The research affirms that the extract possesses strong antibacterial activity against Propionibacterium acnes, the causative bacterium of acne. Additionally, the extract shows encouraging anti-inflammatory activity, inhibiting redness and swelling typically found in acne lesions. Pillow envelops (khadi fabric) application of the extract is tried for ease of use, allowing easy delivery to the skin. The research indicates that B. Sappan extract can be a good natural remedy for acne prevention and control, providing a safe and alternative method of treatment in skincare routines.**

***Index Terms*—Biancaea sappan, pillow envelope, acne, khadi fabric**

1. INTRODUCTION

Acne vulgar is a common dermatologic condition associated with the appearance of inflammation, bacterial infection, and lesion development on the skin of individuals across all ages. Hormonal imbalance, seborrhea, overgrowth of bacterial (especially Propionibacterium acne), and skin inflammation are the main causative factors for this condition.[1] Acne vulgaris is a common disease that carries an enormous financial and psychosocial impact. Androgens, excessive sebum production, ductal hyper cornification, changes in the microbial flora, as well as inflammation and immunological host reactions are considered the major contributors to acne pathogenesis. [2]

This research explores the efficacy of Biancaea sappan extract in inhibiting acne using the integration of the extract in pillow envelop design, where by the extract is released via dyeing. Natural dyes are generally less allergenic and toxic than synthetic dyes and generate waste water that can be treated by bio degradation, this family of colorants has been increasingly contemplated as an environmentally less impactful alternative to certain synthetic dyes. [3]

2. OBJECTIVES

To develop a pillow envelope that helps in reducing acne and skin infections on face. To develop eco-friendly pillow envelope. To develop chemical free dye. To promote natural dye in home textiles.

3. MATERIALS AND METHODS: SELECTION OF FABRIC (KHADI COTTON)

Fabric made of khadi is naturally hand woven. Considerably used in Bangladesh, Pakistan, and India. Generally, cotton is used to weave khadi, along with silk and hair spun on a charkha. Ithasthe capability to be both cool in the summer and warm in the down time. The bed linen is made of khadi cotton since it provides cosy and healthy sleep at night. Khadi is a natural product that has been dermatologist-verified to be devoid of dangerous

ingredients. The company abstains from animal testing, making its goods cruelty-free.

3.2 SELECTION OF HERB (BIANCAEA SAPPAN)

Fig 2 Biancaea Sappan

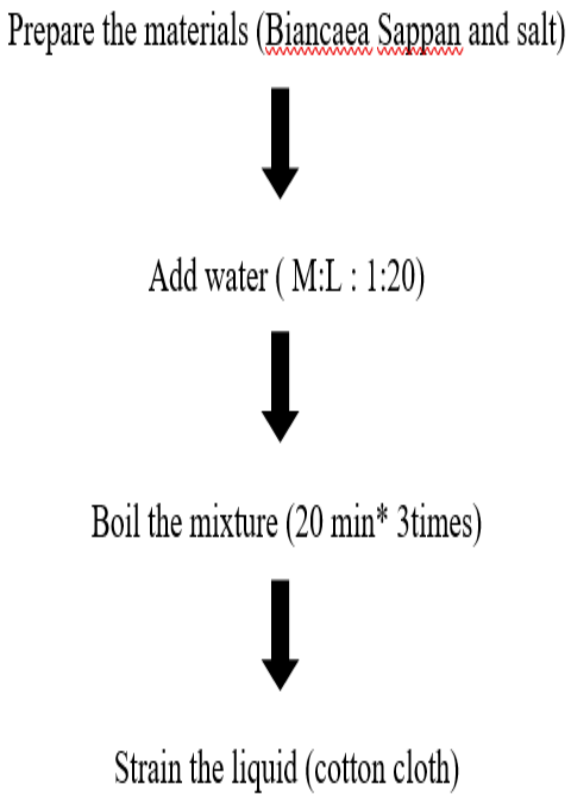
Biancaea sappan, commonly known as sappan wood, is a plant species belonging to the Fabaceae family. Biancaea sappan is a species of flowering tree in the Fabaceae family that is native to tropical Asia. Common names in English include sappan wood and Indian redwood. It is native to Southeast Asia and has a long history of use in traditional medicine, dyeing, and other cultural practices. It has antibacterial, anti-inflammatory and anti-coagulant properties. It also produces a valuable reddish dye called brazilin, used for dyeing fabric as well as making red paints and inks.[4]

3.3 PREPARATORY PROCESS (DESIZING):

Cotton and its blended fabrics contain some inherent impurities such as oil, fat, wax and pectin within the fiber structure. The composition of these impurities depends on the fiber blend, maturity of cotton fiber, weathering and agriculture conditions etc. The yellowness of cotton fiber is due to the presence of protoplasm residue of protein and flavones pigments. The sizing chemicals are usually applied on warp yarns to avoid breakages during weaving process. [5]

Fig 3 Desizing process

3.4 DYE EXTRACTION



3.5 DYEING METHOD: TIE AND DYE (SHIBORI)

The name Shibori is derived from the Japanese verb "shiboru", which means "to wring," "to squeeze," or "to press," reflecting the methods used to manipulate the fabric. Shibori has been one of the ways of dyeing textiles in Japan since the 8th century

STEP 1: The fabric, typically cotton, silk, or linen, is pre-washed to remove any impurities that might affect the dyeing process.

STEP 2: The fabric is folded, twisted, or stitched in specific patterns. The sections that are bound or tied will resist the dye, resulting in lighter areas where the dye cannot penetrate.

STEP 3: After the fabric is bound or folded, it is submerged in a dye bath. The areas that are tied or stitched resist the dye, creating patterns. Traditionally, indigo dye is used in Shibori, but other dyes can be used for different effects.

STEP 4: Once the dyeing process is complete, the fabric is carefully unwrapped or untied, revealing the intricate patterns created by the resist methods.

4. RESULT AND DISCUSSION

4.1 ANTI-INFLAMMATORY ANTIBACTERIAL TEST: Procedure

S.No	Isolates	Zone of inhibition in mm	
		Test sample	Std –ciprofloxacin/itraconazole
1.	*E.coli*	-	12
2.	*K.pneumoniae*	-	-
3.	*S.aureus*	13	-
4.	*E.faecalis*	-	-
5.	*C.albicans*	11	18

Fig 8

S.No	Concentration of product (Sample)	OD	% of inhibition
1.	100 µl	0.20	4..7
2.	200 µl	0.16	23.8
3.	300 µl	0.13	38.0
4.	400 µl	0.10	52.3
5	500 µl	0.06	71.4

Fig 9

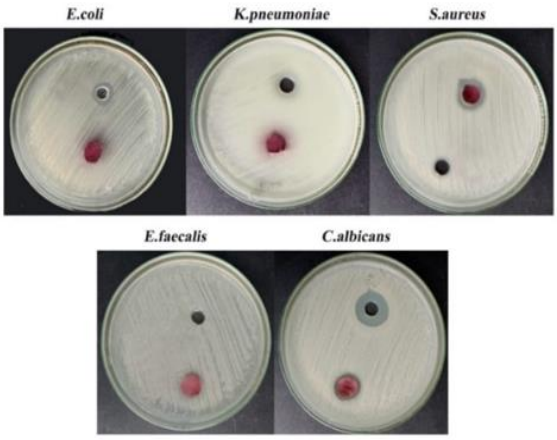


Fig 10

5. SUMMARY OF THE REPORT:

The result find extract treated cloth having antibacterial and anti-inflammatory activity against the *E. Coli*. The result shows the given specimen shows antibacterial and anti-inflammatory activity.

6. COLOR FASTNESS TO LIGHT:

The light fastness of natural dyes is a critical consideration in textile dyeing, with most natural dyes exhibiting a light fastness below BS grade 5, and the major it having a fastness rating below 4. [8] Dyed fabrics when exposed to sunlight will in time, fade or change color. This property is called as color fastness to sunlight.

Fig 11 day 1

Fig 12 day 2

Fig 13 day 3

Fig 14 day 4

Fig 15 day 5

4.2.2 COLOR FASTNESS TO WASHING:

Color fastness is the ability of a material to retain its color when subjected to various influences, such as washing, light, and rubbing.[9] For example, in cotton fabrics, the most important test is color fastness to washing, which is the ability of the fabric dye to resist washing and cleaning operations without fading, bleeding, or transferring to the surrounding materials.[10]

PILLOW ENVELOPE CONSTRUCTION:

Place front piece on a surface and lay it flat. Place the two pieces of back over the front piece, aligning edges. The two pieces of back overlap at the centre. Pin or clip them into position. Sew all the way around pillowcase edges in a straight stitch. Ensure to backstitch at the beginning and end to secure the stitches. Once the edges are sewn, turn the cover gently right side out through the envelope opening at the back. Finally, put the pillow in the envelope-type

case so the opening is on the back where there is fabric overlap.

Fig 16 pillow envelope

7. SUMMARY AND CONCLUSION

The study confirms that Biancaea sappan extract is anti-inflammatory and antibacterial in composition and can thereby be a feasible natural drug in the treatment of acne. Through the addition of the extract in pillow sachets using a dye, it was confirmed that the therapeutic content of the extract was efficiently transmitted. The use method presents a new and modern approach to acne treatment, perhaps reducing the usage of topical medications and creams. The study advises future studies on Biancaea sappan in acne prevention and other cosmetic products.

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