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# Evaluation of Antimicrobialactivity on Tacoma Stans L.

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**Abstract:** *The dicotyledonous herb Tecoma stans (L.) Kunth, which is frequently called "Piliya" in Rajasthan, is a member of the Bignoniaceae family and is commonly grown for its flowers in both regular gardens and temples. Bignonia stans is another name for it. It has numerouspharmacological and therapeutic uses. There are documented medical uses for almost every component of the plant, including the leaves, roots, flowers, seeds, fruits, and bark. Tecoma stans is a potent diuretic, vermifuge, tonic, and herbal remedy used to treat diabetes, digestive issues, and yeast infections. This plant has tannins, flavonoids, alkaloids, quinones, and trace amounts of saponins and amino acids, according to a preliminary phytochemical screening. This evaluation validates all current data about its phytochemical and pharmacological properties as well as its historical applications. People have been using plants, particularly herbs, as medicines since ancient times. Tecoma stans is a species of perennial flowering shrub in the Bignoniaceae family. It is used to treat a variety of illnesses, including diabetes,yeast infections, and stomach Pain. Its properties include antimicrobial, antitumor, anti-inflammatory, anti-diabetic, and Antioxidant. Owing to the flower is commonly called yellow bells due to its appearance as a Bright yellow bell-shaped blossom. It is used in many pharmacological and medicinal Applications. There is medicinal use for every part of the plant, including the leaves, roots, Flowers, seeds, and bark. The pharmacological and phytochemical components of this plant are The main topic of this review.*

**Keywords**: Tecoma stans L., pharmacological, antimicrobial, flavonoids, bigoniaceae, yellow bells.

## I. INTRODUCTION

Tecoma stans L. is a beautiful shrub that grows to a height of 2 to 4 meters. It is upright,branching, sparingly hairy, or almost smooth. Its leaves have four to five leaflets and are opposite, odd-pinnate, and can reach a length of 20 cm. The leaflets are pointed at both ends, lanceolate to oblong-lanceolate, 6–13 cm long, and toothed at the margins. Flowers are carried in short, dense terminal clusters and are yellow in color with a little aroma. The calyx has five to seven teeth and is green in color. The capsules are pointed, linear, compressed, and dangle "tecomaxochitl," which was given to plants with tubular blossoms by Mexico's indigenous from the branches. They measure 15 to 20 cm in length and 6 to 8 mm in width. The seeds are many, with a transparent wing and dimensions of less than 2 cm in length and 7mm in width. It is found in agriculture in large quantities. Within the Bignoniaceae family of trumpet vines, the genus Tecoma has fourteen species of shrubs or small trees. Two of the species are African, while twelve are native to the Americas. The American species can be found in the far south of the United States, Central America, the Antilles, southern Andes, and northern Argentina. The Nahuatl word inhabitants, is the source of the generic name. The entire plant is used to cure diabetes, and the roots are said to have diuretic, tonic, anti-syphilitic, and vermifuge properties. Flowers and bark infusion are used to alleviate stomach aches. Beer is made from roots in Guadalajar below.

### SKIN ANATOMY

- Epidermal layer, measuring approximately 1.5 mm. The dermis is thickest on the back, where it is 30–40 times as thick as the overlying epidermis.
- The epidermis is a stratified, squamous epithelium layer that is composed primarily of two types of cells: keratinocytes and dendritic cells. The keratinocytes differ from the "clear" dendritic cells by possessing intercellular bridges and ample amounts of stainable cytoplasm. The epidermis harbors a number of other cell populations, such as melanocytes, Langerhans cells, and Merkel cells, but the keratinocyte cell type comprises

the majority of the cells by far. The epidermis commonly is divided into four layers according to keratinocyte morphology and position as they differentiate into horny cells, including the basal celllayer (stratum germinativum), the squamous cell layer (stratum spinosum), the granular cell layer (stratum granulosum), and the cornified or horny cell layer (stratum corneum). The lower three layers that constitute. It is made up of three layers, the epidermis, dermis, and the hypodermis, all three of which vary significantly in theiranatomy and function. The skin's structure is made up of an intricate network which serves as the body's initial barrier against pathogens, UV light, and chemicals, and mechanical injury.

- The skin is the largest organ of the body, accounting for about 15% of the total adult body weight. It performs many vital functions, including protection against external physical, chemical, and biologic assailants, as well as prevention of excess water loss from the body and a role in thermoregulation. The skin is continuous, with the mucous membranes lining the body's surface.
- The skin is composed of three layers: the epidermis, the dermis, and subcutaneous tissue. The outermost level, the epidermis, consists of a specific constellation of cells known as keratinocytes, which function to synthesize keratin, a long, threadlike protein with a protective role. The middle layer, the dermis, is fundamentally made up of the fibrillar structural protein known as collagen. The dermis lies on the subcutaneous tissue, or panniculus, which contains small lobes of fat cells known as lipocytes. The thickness of these layers varies considerably, depending on the geographic location on the anatomy of the body. The eyelid, for example, has the thinnest layer of the epidermis, measuring less than 0.1 mm, whereas the palms and soles of the feet have the thickest the living, nucleated cells of the epidermis are sometimes referred to as the stratum malpighii and rete malpighii.
- The epidermis is a continually renewing layer and gives rise to derivative structures, such as pilosebaceous apparatuses, nails, and sweat glands.

**Cross Section of Skin & Panniculus:**

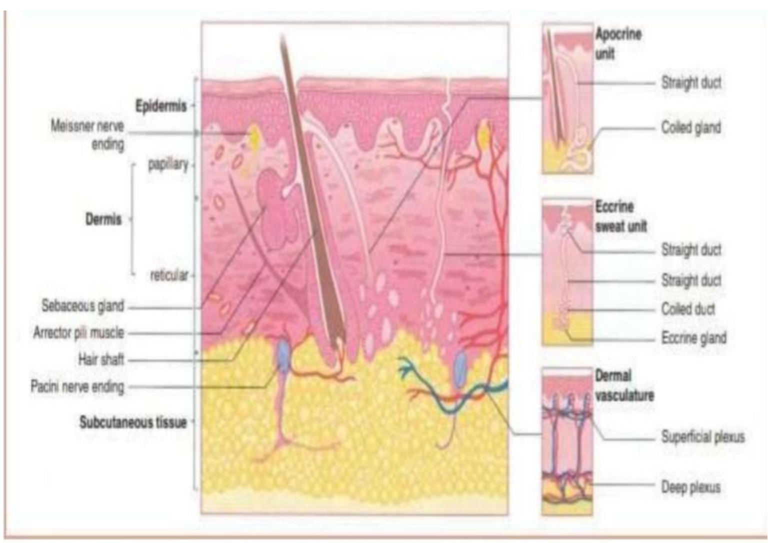


**Fig 1: Cross section of skin & panniculus**

**Epidermis-**

The epidermis is a stratified, squamous epithelium layer that is composed primarily of two types of cells: keratinocytes and dendritic cells. The keratinocytes differ from the "clear" dendritic cells by possessing intercellular bridges and ample amounts of stainable cytoplasm. The epidermis harbors a number of other cell populations, such as melanocytes, Langerhans cells, and Merkel cells, but the keratinocyte cell type comprises the majority of the cells by far. The epidermis commonly is divided into four layers according to keratinocyte morphology and position as they differentiate

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into horny cells, including the basal cell layer (stratum germinativum), the squamous cell layer (stratum spinosum), the granular cell layer (stratum granulosum), and the cornified or horny cell layer (stratum corneum). The lower three layers that constitute the living, nucleated cells of the epidermis are sometimes referred to as the stratum malpighii and rete malpighii. The epidermis is a continually renewing layer and gives rise to derivative structures, such as pilosebaceous apparatuses, nails, and sweat glands. The basal cells of the epidermis undergo proliferation cycles that provide for the renewal of the outer epidermis.

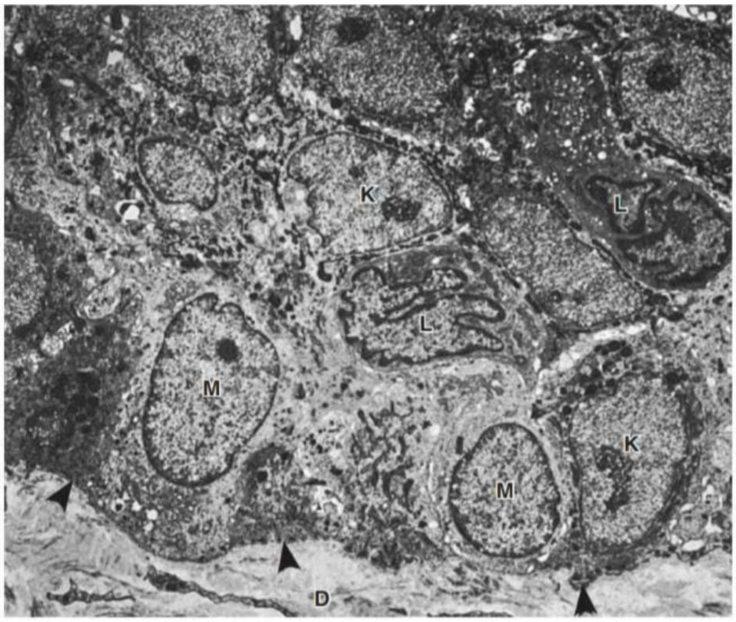


Fig 2: Three Basic Cell Types in the Epidermis

**Keratinocytes- labeled as K-**

At least 80% of cells in the epidermis are the ectodermally derived keratinocytes.The differentiation process that occurs as the cells migrate from the basal layer to the surface of theskin results in keratinization, a process in which the keratinocyte first passes through a synthetic and then a degradative phase. In the synthetic phase, the cell builds up a cytoplasmic supply of keratin, a fibrous intermediate filament arranged in an alpha-helical coil pattern that serves as part of the cell’s cytoskeleton. Bundles of these keratin filaments converge on and terminate at the plasma membrane forming the intercellular attachment plates known as desmosomes.During the degradative phase of keratinization, cellular organelles are lost, the contents of the cell are consolidated into a mixture of filaments and amorphous cell envelopes, and the cell finally is known as a horny cell or corneocyte. The process of maturation resulting in cell death is known as terminal differentiation.

**Basal Layer-**

The basal layer, also known as the stratum germinativum, contains column-shaped keratinocytes that attach to the basement membrane zone with their long axis perpendicular to the dermis. These basal cells form a single layer and adhere to one another as well as to more superficial squamous cells through desmosomal junctions. Other distinguishing features of the basal cells are their dark-staining oval or elongated nuclei and the presence of melanin pigment transferred from adjoining melanocytes. The basal layer is the primary location of mitotically active cells in the epidermis that give rise to cells of the outer epidermal layers. However, not all basal cells have the potential to divide. Epidermal stem cells in the basal layer are clonogenic cells with a long life span that progress through the cell cycle very slowly under normal conditions. Hyperplasiogenic conditions, such as wounding, can increase the number of cycling cells in the epidermis by stimulating division of stem cells. DNA damage caused by carcinogenic agents may

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mutate cell proliferation machinery and can also affect the rate of cellular division. Migration of a basal cell from the basal layer to the cornified layer in humans takes at least 14 days, and the transit through the cornified layer to the outermost epidermis requires another 14days.

**Squamous Cell Layer-**

The squamous layer is composed of a variety of cells that differ in shape, structure, and subcellular properties depending on their location. Suprabasal spinous cells, for example, arepolyhedral in shape and have a rounded nucleus, whereas cells of the upper spinous layers are generally larger in size, become flatter as they are pushed toward the surface of the skin, and contain lamellar granules. Lamellargranules are membrane-bound organelles containing glycoproteins, glycolipids, phospholipids, free sterols, and a number of acid hydrolases, including lipases, proteases, acid phosphatases, and glycosidases. The abundance of hydrolytic enzymes indicates that the lamellar granules are a type of lysosome. Although the lamellar granules primarily are active in cells at the interface between the granular and cornified layers, they also function in cells of the upper spinous layer to deliver precursors of stratum corneum lipids into the intercellular space. Intercellular spaces between spinous cells are bridged by abundant desmosomes that promote mechanical couplingbetween cells of the epidermis and provide resistance to physical stresses. Organized concentrically around the nucleus, keratin filaments in the cytoplasm are bound to desmosomal plaques at one end and remain free at the end closer to the nucleus. The desmosomal plaques are composed of six polypeptides found on the cytoplasmic side of the cell membrane that are important in the regulation of the calcium required for desmosomal assembly and maintenance. The spine-like appearance of the numerous desmosomes along cell margins is where the stratum spinosum derives its name. Gap junctions are another type of connection between epidermal cells. Essentially forming an intercellular pore, these junctions allow for physiologic communication via chemical signals that is vital in the regulation of cell metabolism, growth, and differentiation.

**Granular Layer-**

The most superficial layer of the epidermis containing living cells, the granular layer or stratum granulosum, is composed of flattened cells holding abundant keratohyaline granules in their cytoplasm. These cells are responsible for further synthesis and modification of proteins involved in keratinization. The granular layer varies in thickness in proportion to that of the overlying horny cell layer. For example, under thin cornified layer areas, the granular layer may be only 1–3 cell layers in thickness, whereas under the palms of the hands and soles of the feet the granular layer may be 10 times this thickness. A very thin or absent granular layer can lead to extensive parakeratosis in which the nuclei of keratinocytes persist as the cells move into the stratum corneum, resulting in psoriasis. the keratohyaline granules are deeply basophilic and irregular in shape and size, and they are necessary in the formation of both the interfibrillar matrix that holds keratin filaments together and the inner lining of the horny cells. Enzymatic action of the keratohyaline granules results inthe production of "soft" keratin in the epidermis by providing periodic cutting of keratin filaments. In contrast, the hair and nails do not contain keratohyaline granules, and the tonofibril filaments traversing the cell cytoplasm will harden because of the incorporation of disulfide bonds, producing "hard" keratin in those structures. Lysosomal enzymes present only in small amounts in the stratum basalis and stratum spinosum are found at high levels in the stratum granulosum because the granular layer is a keratogenous zone of the epidermis. Here, the dissolution of cellular organelles is prepared as the cells of the granular layer undergo the abrupt terminal differentiation process to a horny cell of the cornified layer.

**Cornified Layer-**

horny cells (corneocytes) of the cornified layer provide mechanical protection to the underlying epidermis and a barrier to prevent water loss and invasion by foreignsubstances. The corneocytes, which are rich in protein and low in lipid content, are surrounded by a continuous extracellular lipid matrix. The large, flat, polyhedral-shaped horny cells have lost their nuclei during terminal differentiation and technically are considered to be dead. The physical and biochemical properties of cells in the cornified layer vary in accordance with position in order to promote desquamation moving outward. For instance, cells in the middle have a much higher capacity for water-binding than the deeper layers because of the high concentration of free amino acids found in the cytoplasm of middle layer cells. The deep cells also are more densely compact and display a greater array of intercellular attachments than the more superficial layers. Desmosomes undergo proteolytic degradation as the cells progress outward, contributing to the shedding of corneocytes during desquamation. The maintenance of a constant epidermal thickness depends also on intrinsic properties of epidermal cells, such as the ability to undergo apoptosis, programmed cell death. Apoptosis follows an orderly pattern of morphologic and biochemical changes resulting in cell death without injury to neighboring cells, as is often the case in necrosis. This major homeostatic mechanism is regulated by a number of cellular signaling molecules including hormones, growth factors, and cytokines. In the skin, apoptosis is important in developmental remodeling, regulation of cell numbers, and defense against mutated, virus-infected, or otherwise damaged cells.

## II. PLANT PROFILE

- Synonyms: Ginger-thomas, Yellow trumpet.
- Family: Bignoniaceae
- It is a herb which is assigned by Tecoma Stans L.

**Fig 3: Tecoma Stans Plant**

Chemical Constituent: Ecomine, an alkaloids identified from the plant harvested in Egypt, is the therapeutically significant active principle of Tecoma stans. Given the interest in substances capable of treatingtype II diabetes, it was demonstrated that Tecomine was one of the components responsible for the hypoglycemic activity vivo tests revealed that the two other alkaloids that were recovered, 5β- Hydroxyskitanthine previously known as Base C- and Boschniakine, were inert.phytosterols, alkaloids, quinones, amino acids, glycosides, phenols, flavonoids, saponins,tannins, and triterpenes are other chemical constituents.

**MORPHOLOGY OF PLANT-**

o Height: 10-30 feet.
o Spread: 8-30 feet Crown
o Uniformity: Irregular.
o Crown Shape: Oval.
o Crown Density: Moderate.
o Growth Rate: Moderate
o Texture: medium

## III. MATERIALS & METHODS

All the experiments of these investigations were carried out at the laboratories of the Department of Pharmacognosy, Samarth Institute of Pharmacy, Pune, Maharashtra, India. Allthe chemicals used in this study were of analytical grade.

**Collection of Plant Material–**

Plant Material – The flowers of Tecomastans (L) were collected at our college premises and authenticated by P. Satyanarayana Raju, Plant Taxonomy Consultant, Department of Botany & Microbiology, Acharya Nagarjuna University, Guntur.The collected flowers were shade dried and then grind to coarse powder.

**Extraction-**

The Tecomastans ethanol extract (TSEE) was prepared by cold maceration. The dried flower powder (100 g) was macerated with ethanol (1000 ml) by occasional shaking for two days. The extract was collected by filtering through 5 layers of muslin cloth and concentrated at low temperature. The prepared extract was preserved in a desiccator for further study.

**Test bacteria-**

In this study five Gram positive bacteria that are Staphylococcus aureus, Bacillus subtilis, Bacillus megaterium, Enterococcus faecalis, Streptococcus mutans and four Gram negative bacteria that are Escherichia coli, Klebsiella pneumoniae, Pseudomonas aeruginosa.

**Phytochemical screening-**

The phytochemical screening for TSEE was carried out by standard protocols. The presence of alkaloids, cardiac glycosides, saponins, carbohydrates, proteins, amino acids, flavonoids, steroids and phenolic compounds was analyzed.

## IV. MEDICINAL USES

Traditional Uses- All part of the plant, and especially it's contain more amount of the compound alkaloids its called tecomine and tecostamine. Traditionally flowers and bark are used for treatment of various cancers. These flowers contain beta carotene and zeaxanthene to treat eye disorder, At the same time cured also antidiabetic, anti-spasmodic, anti-oxidant, anti-proliferative, wound healing, cytotoxic, anti-microbial, anti-fungal. It is used in the horticulture industry because it is drought and semi-salt tolerant. Yellow elder has been used for a variety of purposes in herbal medicine. Phytochemicals presence of alkaloids, glycosides, carbohydrates, amino acids and steroids.

Almost all the parts of Tecoma stans are of medicinal importance and used traditionally for the treatment of varied ailments, traditionally for reducing blood sugar. The Tecoma stans leaves, barks and roots are used for a spread of purposes in herbal medicine. Bark shows cardiotonic and chloretic activity. Applications include the experimental treatment of diabetes, digestive problems, control of yeast infections and other medicinal contains several compounds that are known for their catnip like effects on felines. The root of the plant is reported to be a powerful diuretic, vermifuge basis of tecomastans and juice is reportedly used as an external application and also taken internally in small quantities as a remedy for snake and rat bites.

Applications include the experimental treatment of diabetes, digestive problems, control of yeast infections and other medicinal contains several compounds that are known for their catnip like effects on felines.

**Table 1- Phytochemical screening**

| | | |
|---|---|---|
| 1. Test for Alkaloids- | Dragendroffs Test | Positive +ve |
| | Mayer's Test | Positive +ve |
| | Wagner's Test | Positive + ve |
| 2. Test for Carbohydrates- | Molisch Test | Positive +ve |
| 3. Test for Glycosides- | Baljets Test | Positive +ve |
| | Liebermann's Test | Positive +ve |

## V. RESULT & DISCUSSION

Medicinal plants have been used in the treatment of numerous human diseases since time immemorial. Traditionally they have been using in the treatment of various diseases such as wound healing, typhoid, dysentery, ulcers, cough, skin diseases and urinary tract infections. They have been used as curative agents because of their antimicrobial traits, which are due to compounds synthesized during secondary metabolism of the plant. The therapeutic index of the plants lies in the presence of phytochemicals. The ethanolic extract of Tecoma stans flowers showed the presence of carbohydrates, amino acids, proteins, alkaloids, glycosides, steroids, saponins, phenolics, flavonoids and tannins. The results of preliminary phytochemical screening. The leaves of T. stans have been found to contain chrysoeriol, luteolin and hyperoside (quercetin-3-O-beta-D-galoctoside) an iridoid glucoside, 5-deoxystansioside. The present investigation has shown that the flowers possess active phytochemicals which are able to inhibit the growth on human pathogenic bacteria. The TSEE showed more potent antimicrobial efficacy against B. subtilis (20.33 ± 0.57 mm), S. aureus (18.33 ± 0.57) and moderate activity was observed in K. pneumoniae (17.0 ± 1.0), B. megaterium (16.66 ± 1.52), E. faecalis (15. 66 ± 1.15) and minimum activity in S. mutans (14.33 ± 0.57), E. coli (14.33 ± 1.52), P. vulgaris (13.66 ± 1.52) and P. aeruginosa.

## VI. CONCLUSION

The present study indicated that the flowers of Tecomastans (L.) possess potent antimicrobial agents. The results of the study provide scientific evidence to support the traditional use of the plant medicinally. The TSEE showed significant antimicrobial activity against Gram positive and gram-negative bacteria, but predominantly against Gram positive bacteria. The activity may be due to the presence of phytochemicals alkaloids, glycosides, polyphenols, saponins, flavonoids and tannins. This medicinal plant may be useful as potential source for the discovery of novel antimicrobial agents. However, further study is required to identify the active principles responsible for antimicrobial activity.

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## REFERENCES

[1]. Costantino, L., Raimondi, L., Pirisino, R., et al. Isolation and pharmacological activities of the Tecomastans alkaloids.

[2]. Roman-Ramos, R., Flores-Saenz, JL., Partida-Hernandez, G., et al. Experimental study of the hypoglycemic effect of some antidiabetic plants. Arch Invest Med (Mex). 1991. 22: 87-93.

[3]. Roman-Ramos, R., Flores-Saenz, JL., Partida-Hernandez, G., et al. Experimental study of the hypoglycemic effect of some antidiabetic plants. Arch Invest Med (Mex). 1991.

[4]. Mohamed, Z.M., Yousry, M., Camacho, LM., et al. Antioxidant and antibacterial activities of leaves and branches extracts of Tecomastans (L.) Juss.exKunth against nine species of pathogenic bacteria. African Journal of Microbiology Research.

[5]. Senthilkumar, CS., Suresh Kumar, M., & Rajasekarapandian, M, In vitro antibacterial activity of crude leaf extracts from Tecoma stans (L) Juss. exkunth, Coleus forskohlii and

[6]. Pogostemon patchouli against human pathogenic bacteria. International Journal of PharmtechResearch.

[7]. Senthilkumar, CS., Suresh kumar, M., &Rajasekarapandian, M, In vitro antibacterial activity of crude leaf extracts fromTecomastans (L) Juss. ex kunth, Coleus forskohlii and

[8]. Pogostemon patchouli against human pathogenic bacteria. International Journal of Pharmtech.

[9]. Senthilkumar, CS., Suresh kumar, M., &Rajasekarapandian, M, In vitro antibacterial activity of crude leaf extracts .

[10]. Tecomastans (L) Juss. exkunth, Coleus forskohlii and Pogostemon patchouli against human pathogenic bacteria.

[11]. International Journal of Pharmtech Research. 2010. 2(1): 438-442.Rajeswari R, Umadevi M, Rahale CS, Pushpa R, Selvavenkadesh S, Sampath Kumar KP, Bhowmik D. Aloe vera:

[12]. The Miracle Plant Its Medicinal and Traditional Uses in India. J Pharmacognosy phytochemical 2012; 1(4):118-124.

[13]. Nemade CT, Baste N. Formulation and evaluation of a herbal facial scrub. World J Pharm Res 2014; 3(3): 4367-4371.Himaja N, Ashok kumar A, Bhartkumar B. Preparation and Evaluation of Poly Herbal Fruit Face Mask. J Res Pharm Sci 2015; 2(11):07-13.

[14]. Koli DS, Mane AN, Kumbhar VM, Shaha KS. Formulation & Evaluation of Herbal Anti-Acne Face Wash. World J Pharm Sci 2016; 5(6): 2001-2007.

[15]. Farheen B, Mohammad I. Design and Development of Unani Face Pack for Skincare. European J Pharm Med Res 2016; 3(12):627-632.

[16]. Khandelwal KR. Practical Pharmacognosy 12th ed.2004.

[17]. Banchhor M, Ashawat MS, Saraf S. Herbal cosmetics: Trends in Skin Care Formulation. Pharmacognosy Reviews 2009; 3(5):82-89.

[18]. Singh M, Sharma S, Khokra SL, Sahu RK, Jangde R. Preparation and evaluation of herbal cosmetic cream. Pharmacology online. 2011; 2:1258-64