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## ETHNOMEDICINAL PLANTS USED IN SKIN TREATMENT BY KORKUS

OF MELGHAT DIST. AMRAVATI (MS), INDIA

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### ABSTRACT:

Ethnobotanical investigations in Melghat revealed 180 ethnomedicinal plant species out of which 21 are used by Korkus for various skin related problems. These plants are also reviewed for their antimicrobial properties recorded in the literature. Out of 21 plants selected for study 20 species belong to Dicots and only 01 belongs to Monocot. While reviewing the literature it is observed that, only 07 species were exhaustively studied for their antibacterial and antifungal properties, 10 species have been studied for either antibacterial or antifungal properties, however 05 species have not been analyzed for their antimicrobial properties. All the ethnomedicinal plants studied for their antimicrobial properties show significant antimicrobial activity which supports traditional treatment system. The paper deals with ethnomedicinal information along with available information on antimicrobial studies.

**KEYWORDS:** Ethnomedicinal plants, Skin diseases, Microbial activities.

### INTRODUCTION:

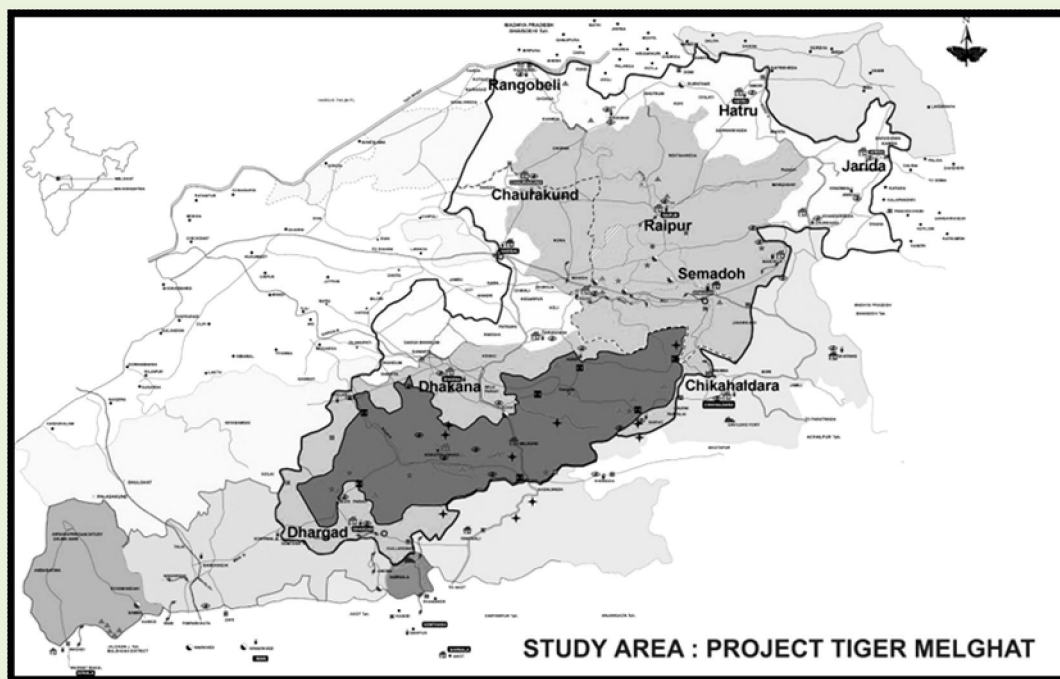
There is no culture on earth that has not made use of plants for physical, emotional and spiritual needs of the human life. Being with nature from centuries; tribal have acquired unique knowledge about the use of wild flora and fauna. Since they lived mostly as isolated societies, their knowledge is not known to the outside world (Anonymous, 1994). Medicinal plants have gained more importance as possible source of alternative and effective drugs. Around 12,000 plant secondary metabolites of antimicrobial importance have been isolated. These compounds fall in one of the major groups of compounds like phenols, quinones, flavonoids, tannins, terpenoids, alkaloids and other mixtures (Schultes, 1978).

Antimicrobials of plant origin have enormous therapeutic potential and have been used since time immemorial. Microorganisms have developed resistance to many antibiotics and this has created immense clinical problem in the treatment of infectious diseases (Davis, 1994). The increase in resistance of microorganisms due to indiscriminate use of commercial antimicrobial drugs

encouraged scientists to search for new antimicrobial substances from various sources including medicinal plants (Karaman *et al.*, 2003). Qualitative analysis of plants for their antibacterial activity for various diseases is growing in recent years. Ethnomedicinal plants always have greater chances for getting positive results because tribals are using these plants since hundreds of years. Thus, traditional practices should be promoted for the practice.

### STUDY AREA:

The study area is situated on the branch of Satpuda range to the south of Tapti River. The prominent feature is the main ridge of Gawilgarh hills. Reserve forest of Melghat division is divided into East Melghat and West Melghat division. It stretches from south to north between latitudes  $21^{\circ} - 11'$  and  $21^{\circ} - 46'$  north and from west to east between longitude  $78^{\circ} - 38'$  and  $77^{\circ} - 34'$  east. It turns to southwest and widens into Chikhaldara and Vairat plateau with. Vairat is highest point being 1,177.75 meters above sea level. The striking feature of Melghat ridge is its almost flat-topped plateau descending in a series of precipitous scarps on either side, one below the other, separated by narrow steps of lesser gradients and finally sloping down to the narrow step valleys known as *Khoras*. There are about 61 villages in buffer and reserve forest zone of Tiger Reserve. About 80% populations are tribal (Indurkar, 1992).



### MATERIALS & METHODS:

The ethnobotanical survey of the study area was conducted during 1998-1999. During survey data on medicinal uses of the plants used by Korku people was documented. Informal discussions,

interviews and forest walks with informants, medicine men (Bhumkas, Vaidus) were held to gather information and herbarium specimens of different species of ethnomedicinal plants available around the villages and in forest. A schedule was used to collect information on personal data, traditional knowledge about each species used by the local informants. Identification of the collected specimens was made with the help of Flora of Melghat (Patel, 1968) and other Standard Floras (Hooker, 1872-1897; Dhore & Joshi, 1998; Naik, 1998; Bhogaonkar & Devarkar, 1999). Herbarium specimens are deposited in the Department of Botany, Govt. Vidarbha Institute of Science and Humanities, Amravati (Maharashtra). Library and Herbarium of Botanical Survey of India, Pune was consulted for review of literature and also for identification and confirmation specimens.

## RESULTS & DISCUSSION:

### *Clematis heynei* M. A. Rao. (Ranunculaceae)

Extensive climbing shrubs. Leaves simple or once ternate, entire or shallowly three lobed; petioles twining. Flowers white, 2-4 cm across, fragrant, in axillary corymbose panicles. Sepals 4-petaloid. Fruit a ovoid, compressed, silky villous achene with long feathery style.

**Occurrence** - Frequent at higher elevations. Common on Chilchaldara & Dhakana, and Makhala plateaux. **Flrs. & Frts.** - October- January

**Korku uses** - Leaf juice applied for skin diseases. Flower juice used as cosmetic and applied externally for acne, black heads and black spots.

**Antimicrobial activity**- Nil

### *Brassica nigra* (L) Koch. (Brassicaceae)

Erect, glaucous, annual herbs. Radical leaves lyrate- pinnatifid, dentate, upto 30 cm long, hispid, cauline ones gradually smaller. Flowers in terminal elongating racemes. Sepals 4-5 mm long. Petals yellow. Siliqua 4-7 cm long, erecto-patent. Seeds dark red.

**Occurrence** - Cultivated. **Flrs. & Frts.** - August-March

**Korku uses** - Seed oil mixed with seed oil of *Cullen corylifolia* (L.) Medic., used against any skin disease. Oil is also used as massage oil.

**Antimicrobial activity**- Antibacterial properties of oil 50% on *Escherichia coli* and 40% on *Staphylococcus aureus* on the same hospital isolate (Obi *et al* 2009). Antibacterial activities on hypocotyle callus, *Escherichia coli*, *Pseudomonas aurugenosa*, *Klebsiella pneumonia* and *Staphylococcus aureus* has been noted by Hussein *et al* (2010) where, moderate activity shown in light induced callus stages.

### *Balanitis aegyptica* (L.) Del. (Balanitaceae)

Large shrubs or small trees; young parts tomentose; branches armed with straight sharp long thorns. Leaves 2 - foliolate; leaflets elliptic to obovate. Flowers greenish white, fragrant, in short axillary cymes. Calyx and corolla silky villous. Fruit ovoid or ellipsoid drupe.

**Occurrence** - On the outskirts of Melghat. **Flrs. & Frts.** -February - November

**Korku uses** - Fruit pulp used to shampoo the hairs to remove the dandruff.

**Antimicrobial activity-** Antibacterial activity observed in ethanolic leaf extracts (Doughary, 2007). *Balanites* was screened for potential antibacterial activity against 3 *Staphylococcus* species, namely *Staphylococcus aureus*, *Staphylococcus epidermidis*, and *Staphylococcus subflava* where, water extract shown moderate activity against *S. aureus* & strong activity in *S. epidermidis* and moderate activity in ethanolic extract is observed for *S. subflava* (Parekh & Chanda, 2008). Screening at 1000 and 500 mg/ml concentrations by agar dilution method against *Bacillus cereus* var. *mycooides*, *Bacillus pumilus*, *Bacillus subtilis*, *Bordetella bronchiseptica*, *Micrococcus luteus*, *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, and *Aspergillus niger* shown the positive antibacterial activity in both water and ethanolic extracts(Kumar *et al*, 2006).

***Boswellia serrata*** Roxb. Ex.Coleb. (Burseraceae)

A gregarious deciduous tree; bark peeling off in thin papery flakes. Leaves crowded at the ends of branches; leaflets 16-31. Flowers small, dull white, in axillary racemes. Ovary surrounded by annular, red crenate disc. Fruit a trigonous drupe.

**Occurrence** - Very Common in Melghat, especially at lower elevations on the peripheral hills of Tiger Reserve. **Flrs.** - January - April, **Frts.** - April - June.

**Korku uses** - Gum is sprinkled on burning coal and smoke of gum is used to fumigate the body in chicken pox.

**Antimicrobial activity-** Antibacterial activity observed in bark extract by Rastogi *et al* (2009). The essential oil of *Boswellia serrata* Roxb. Bark displayed significant inhibitory activity against *Escherichia coli*, *Staphylococcus aureus* and *Proteus mirabilis* (Kasali *et al*, 2002).

***Leea macrophylla*** Roxb. ex Hornem. (Leeaceae)

Stout, erect, tuberous perennial herbs. Leaves broadly ovate, large, upto 60 cm, serrate, pubescent beneath; petioles long, upto, 12 cm, deeply striate. Flowers small, greenish white in terminal much branched puberulous, corymbose cyme. Fruit, a globose berry, black when ripe.

**Occurrence** - Abundant at Koktu, Harisal localities. **Flrs. & Frts.** -October- December

**Korku uses** - Fresh tuber paste applied over skin affections and leucoderma.

**Antimicrobial activity-** No antimicrobial activity.

***Cullen corylifolia*** (L.) Medic. (Fabaceae)

Annual herbs; stems grooved, conspicuously gland dotted. Leaves one foliolate; leaflets broadly ovate, inciso - dentate, punctate. Flowers small, violet-blue in dense short axillary racemes. Fruit a compressed, ovate - oblong, punctate pod.

**Occurrence** - Common in fields and waste land. **Flrs. & Frts.** - September - January.

**Korku uses** - Seed oil used for skin diseases and in leucoderma. Oil is also used to restore the hair pigment in untimely graying.

**Antimicrobial activity-** Harumi *et al* (2001) has observed inhibitory properties in the seed oil against *Staphylococcus spp.*

***Indigofera tinctoria*** L. (Fabaceae)

Appressed hairy shrubs. Leaves pinnate; leaflets 7-13. Flowers small, pink, in dense axillary racemes. Fruit a linear cylindrical deflexed apiculate pod.

**Occurrence** -Frequent, mostly around villages & road sides **Flrs. & Frts.** - August - December.

**Korku uses** - Leaf juice used to control body itch and on scabies.

**Antimicrobial activity-** The antimicrobial activity of *Indigofera tinctoria* is high against *Pseudomonas aeruginosa*, *Staphylococcus aureus* and *Bacillus subtilis* is high (Selvakumar & Karunakaran 2010).

***Uraria picta*** (Jacq.) Desv. (Fabaceae)

Annual under shrubs, stems with hooked hairs. Leaves pinnate; leaflets 1-7, oblong, blotched with white, coriaceous. Flowers small, purple, in racemes; rachis with hooked hairs. Fruit ash coloured, glabrous; jointed pod jointed; joints 3-6, deeply constricted all around.

**Occurrence** - Occasional. throughout in forest undergrowth. **Flrs. & Frts.** -August - October.

**Korku uses** - Seeds crushed and paste applied over skin for white spots caused by salt deficiency.

**Antimicrobial activity-** Dashmula churna is a combination drugs one of which is *Uraria picta*. The drug shows potent antibacterial activity against *Escherichia coli*, *Staphylococcus aureus*, *Enterobacter aerogenes*, *Pseudomonas aeruginosa*, *Bacillus subtilis*, *Klebsiella pneumoniae*, *Salmonella typhi*, *Staphylococcus epidermidis*, *Salmonella typhimurium* and *Proteus vulgaris* (Tambekar & Dahikar,2011).

***Cassia hirsuta*** Linn. (Caesalpiniaceae)

Diffuse under shrubs; stems strongly ribbed. Leaf evenly unipinnate, 15-20 cm long; leaflets in 4-5 pairs, uppermost largest, Inflorescence few-flowered axillary raceme, condensed in to a cluster. Flowers large, 2.5-3 cm across, yellow. Calyx 5, unequal, Corolla yellow, largest petal distinctly bilobed. Fertile stamens 6; 2 longer with hooked connective and dilated filament; 4 shorter without

produced connective and simple filament; 4 staminodes. Ovary densely hairy; style short, curved; stigma capitate; pod pubescent, slender, flattened, many seeded.

**Occurrence** - Rare to Chikhaldara - Semadoh. **Flrs. & Frts.** - June - December.

**Korku uses** - Root powder made into paste and applied over skin affections and in leucoderma.

**Antimicrobial activity**- The extracts of *C. hirsuta* has antimicrobial activity on the bacterias ie. *Proteus vulgaris*, *Bacillus subtilis*, *Clostridium sporogenes*, *Shiegella dysentriae*, *Klebsiella pneumoniae*, *Serratia marcensce*, *Pseudomonas aeruginosa* and *Escherichoa coli* particularly the Gram negative was found to be resistance (Oladunmoye, 2009).

**Lawsonia inermis** L. (Lythraceae)

Thorny shrubs. Leaves broadly elliptic lanceolate, acute at both ends; petioles short. Flowers small, creamy white, in axillary panicles. Petals and stamens inserted on calyx tube. Fruit a globes capsule, supported by persistent calyx and tipped with style.

**Occurrence** - Cultivated as hedge plant. **Flrs. & Frts.** - April - August.

**Korku uses** - Leaf paste used to dye hairs, nails, palms and soles; it is supposed to have cooling effect.

**Antimicrobial activity**- *Lawsonia* has shown marked antimicrobial activity (P. Dinesh & R. Subashri, 2009). The plant is reported to contain carbohydrates, proteins, flavonoids, tannins and phenolic compounds, alkaloids, terpenoids, quinones, coumarins, xanthones and fatty acids. Theplant has been reported to have analgesic, hypoglycemic, hepatoprotective, immunostimulant, anti-inflammatory, antibacterial, antimicrobial, antifungal, antiviral, antiparasitic, antitrypanosomal, antidermatophytic, antioxidant, antifertility, tuberculostatic and anticancer properties (Chaudhari *et al* 2010). Aqueous extract of *Lawsonia inermis* have recorded significant antifungal activity against one or the other *Aspergillus* species tested (S. Satish *et al.*2007). Antibacterial activity in chloroform and methanol chloroform extracts, chloroform extracts showed the maximum activity against *Proteus mirabilis* (7mm) and *Staphylococcus aureus* (11mm), respectively and the minimum activity against *Klebsiella pneumoniae* (2mm) and *proteus mirabilis* (5mm). (Devi *et al* 2009).

**Pentanema cernuum** ( Dalz.) Linn. (Asteraceae)

Erect, slender herbs. Leaves lanceolate, distinctly petiolate. Heads yellow in axillary or teminal lax panicles. Marginal florets ligulate; disc florets tubular, glandular; ovary sparcely hairy, truncate. Fruits obovoid, ribbed, hairy achenes.

**Occurrence** - Semadoh on moist shady slopes. **Flrs. & Frts.** - October - December.

**Korku uses** - Leaf and flower juice massaged over skin to improve skin complexion. Flower juice taken orally for fair complexion.

**Antimicrobial activity**-Nil***Pentanema indicum*** (L.) Linn. (Asteraceae)

Tall, erect annual herbs. Leaves sessile, linear lanceolate, auricled at base. Heads bright yellow; in terminal paniulate cymes. Corolla lobes glandular. Anthers tailed. Fruits terete, sparsely hairy achenes. Pappus of 5, scabrid, deciduous bristles.

**Occurrence** - Throughout very common. **Flrs. & Frts.** - September - February.

**Korku uses** - Leaf and flower juice massaged on skin to improve skin complexion. Flower juice taken internally for fair complexion.

**Antimicrobial activity**- Nil***Tridax procumbens*** L. (Asteraceae)

Procumbent herbs. Leaves ovate-elliptic, pinnatifid or deeply inciso-dentate, acute. Heads yellow solitary, terminal. Fruits densely silky, black achenes. Pappus of aristate, feathery bristles.

**Occurrence** - Very common throughout. **Flrs. & Frts.** - Throughout the year.

**Korku uses** - Leaf juice antiseptic used to treat avoid skin infections, poured in ear to stop pus formation in ear and to heal wounds or cuts. Leaf juice given in rheumatism.

**Antimicrobial activity**- According to Ayyappa *et al.*, (2009), methanol extracts of *Tridax procumbens* and *Spathodea campanulata* showed significant activity against *Staphylococcus aureus*, *Escherichiacoli* and *Streptococcus agalactiae* (Yoglata *et al* 2009). *Tridax procumbens* L. (Asteraceae) have been exhibited broad spectrum antimicrobial activity against two Gram negative bacteria *Escherichia coli* and *Proteus mirabilis*, one Gram positive bacteria *Staphylococcus aureus*, and a fungi *Candida albicans*. (Sharma & Kumar, 2009). The extract of whole plant of *Tridax* showed Antibacterial activity only against *Pseudomonas aeruginosa* (Mundada & Shivhare,2010).

***Xanthium strumarium*** L. (Asteraceae)

Annual hairy herbs. Leaves ovate often 3 lobed, irregularly serrate, Heads greenish - yellow, unisexual; in axillary and terminal racemes. Anthers free, mucronate; filaments monadelphous. Ovary covered with hooked prickles. Fruits oblong - ovoid, covered with hooked bristles.

**Occurrence** - Throughout very common. **Flrs. & Frts.** - October - February

**Korku uses** - Juice of young leaves massaged on bald patches caused by fungal disease Alopecia, twice a day for four days to regain the hairs on that part. The fruits are half burnt and then is powdered. Powdered fruit is used with oil to treat skin infections.

**Antimicrobial activity**- Crude extracts of *Xanthium strumarium* inhibited mycelia growth and zoospore germination of *Phytophthora drechsleri*, the causal agent of Atractylis rot, *in vitro* (Dong *et al*,2002). Leaf extracts had strong antimicrobial activity against the *Staphylococcus aureus*,

*Escherichia coli*, *Salmonella typhimurium*, *Pseudomonas aeruginosa* and *Clostridium perfringens*(Scherer *et al* 2009).

***Plumbago zeylanica*** L. (Plumbaginaceae)

Diffuse glabrous under shrubs. Leaves ovate-oblong, glabrous above, white-punctate beneath. Flowers white in terminal panicles. Calyx glandular hairy outside. Fruit capsular; oblong, enclosed in calyx.

**Occurrence** - Frequent in all localities; in forest undergrowth, especially along gullies and streams.

**Flrs. & Frts.** - August - January

**Korku uses** - Root Leaf juice applied in skin diseases. Leaf decoction supposed to increase immunity if taken daily.

**Antimicrobial activity**- Plumbagin and chloroform extracts of *Plumbago zeylanica* L. root showed antibacterial activity against *Escherichia coli*, *Salmonella typhi* and *Staphylococcus aureus*. Inhibition against *Klebsiella pneumoniae*, *Serratia marcescens* and *Bacillus subtilis* was moderate, and lower against *Proteus vulgaris* and *Pseudomonas aeruginosa*. The methanolic extract exhibited moderate activity and the aqueous extract weak activity (Jeyachandran *et al*,2009). Plumbagin showed an interesting activity against the Gram-positive bacteria *S. aureus* and a very high inhibitory activity against *C. albicans* (Semla *et al* 2003).

***Cuscuta reflexa*** Roxb. (Cuscutaceae)

A twining, much branched, leafless stem parasite. Stem slender, forming a tangled mass, yellowish green. Flowers small, white, in cymose clusters of 2-4 or in racemes. Fruit a globose capsule, circumsessile near the base.

**Occurrence** - Chikhaldara and Vairat plateaux. **Flrs. & Frts.** - September - December

**Korku uses** - Plant juice used against itch and skin diseases.

**Antimicrobial activity**- Antimicrobial activity noted by Anjum & Khan (2003) against *Escherichia coli* and *Staphylococcus spp.*

***Hygophila schulli*** (Buch. Ham.) Mr. & Sm. Almeida. (Acanthaceae)

Stout, annual herbs. Leaves sessile, whorled, 6 at each node, lanceolate, bearing axillary strong spines. Flowers bluish purple, in axillary clusters, of eight at each node. Fruit compressed capsule.

**Occurrence** - Very common throughout; in ponds and ditches. **Flrs. & Frts.** - October- May.

**Korku uses** - Root powder applied directly on herpes.

**Antimicrobial activity**- Nil

***Anisochilus carnosus*** (L.f.) Wall. (Lamiaceae)

Annual, soft textured herbs. Leaves ovate, fleshy. Flowers pale purple, small, in simple to paniculate, cylindrical spikes. Fruit oblong ellipsoid, brownish, shining, as long as broad, nutlet.



**Occurrence** - Throughout common, abundant on wet, rocky substratum. **Flrs. & Frts.** -September - November.

**Korku uses** - Leaf juice on sore skin by muds (Web dermatitis), inflorescences burnt in a plate and the ash mixed with coconut oil is applied to boils and pimples.

**Antimicrobial activity**- The ethanolic extracts of leaves show against antimicrobial activity for *Escherichia coli*, (Valarmathy *et al* 2010).

***Phyllanthus amarus*** Schumach, & Thonn. (Euphorbiaceae)

Annual glabrous herbs. Leaves distichous, overlapping, elliptic-oblong. Stipules lanceolate. Flowers greenish yellow, small, axillary, solitary. Fruit depressed, globose capsule.

**Occurrence** - Common on forest floor. **Flrs. & Frts.** - August - April.

**Korku uses** - Plant juice massaged over the face to improve complexion. Plant juice purified in coconut oil is an excellent hair tonic.

**Antimicrobial activity**- Plant extract shows inhibitory properties against *Staphylococcus aureus* (Aliyu *et al* 2008). Antibacterial activity against *Escherichia coli* is observed by Joseph & Raj (2011). The results of the *in vitro* antimicrobial activity of the crude ethanolic extracts of root and leaf of *P. amarus* ranged from  $8.0 \pm 0.33$  mm to  $25.0 \pm 1.50$  mm against *E. coli* while the mean zones of inhibition the of the leaf extracts ranged from  $8.0 \pm 0.50$ mm to  $26.0 \pm 1.00$  mm against *E. coli* (Table 1). The root extracts showed the highest zone of inhibition ( $25 \pm 1.50$  mm) against *E. coli* at 80 mg/ml while the leaf extracts showed the highest zone of inhibition highest ( $26 \pm 1.00$  mm) against *E. coli* at 80 mg/ml (Akinjogunla *et al* ,2010). Komuraiah *et al* (2009).noted potent antibacterial activity of water and ethanolic extracts Against four gram positive bacteria; *Staphylococcus aureus*, *Bacillus subtilis*, *Micrococcus leuteus*, and four gram negative bacteria, *Salmonella typhi*, *Enterobacter aerogens*, *Proteus mirabilis* and *Proteus vulgaris* .

***Girardinia diversifolia*** (Link.) Friis. (Urticaceae)

Perennial, erect herbs, with long stinging hairs. Leaves simple, suborbicular, entire or palmately lobed. Flowers monoecious. Lower spikes male, elongate; upper female, of capitate clusters. Fruit ovoid, achene.

**Occurrence** - Chikhaldara, Semadoh. Harisal ranges. **Flrs. - Frts.** - September - November

**Korku uses** - Seed oil used to cure all skin diseases.

**Antimicrobial activity**- Nil

***Aloe vera*** (L.) Burm f. (Liliaceae)

Scapigerous herbs. Leaves radical, fleshy, ensiform, with distant horny prickles along margins. Flowers orange or yellow, in Scapose terminal racemes. Fruit cylindrical or ellipsoid-oblong capsule.

**Occurrence** – Cultivated **Flrs. - Frts.** - December - May

**Korku uses** - Leaf juice (gel) applied over the head as yellia (antidandruff) and for smooth & silky texture of hairs.

**Antimicrobial activity**- The maximum antibacterial activities were observed in acetone extracts ( $12 \pm 0.45$ nm,  $20 \pm 0.35$ nm,  $20 \pm 0.57$ nm and  $15 \pm 0.38$ nm) other than aqueous extracts and ethanol extract. Antifungal activity of *Aloe vera* was analyzed against *Aspergillus flavus* and *Aspergillus niger*. The maximum antifungal activity was observed in acetone extracts ( $15 \pm 0.73$ nm and  $8 \pm 0.37$ nm) when compared other extracts. *Aloe vera* plant extract with acetone can be used as antimicrobial agents (Arunkumar & Muthuselvan, 2009). *Aloe vera* ethanolic extract had more antibacterial activity than the hot water and distilled water extracts producing the largest zone of inhibition (22 mm) on *S. aureus* (Esumeh *et al*, 2007). Antifungal properties of *A. vera* pulp against *F. oxysporum*, and the liquid fraction against *R. solani*, *F. oxysporum*, and *C. coccodes* pathogens (Rodriguez, 2005). Antimicrobial activity of acetone extract of Indian Aloe (*Aloe vera*) showed maximum zone of inhibition (32 mm) against *Candida sp.* The antimicrobial activity of methanol extract of Indian Aloe (*Aloe vera*) exhibited maximum inhibitory zone (44 mm) against *Escherichia coli* (Selvamohan *et al*, 2010).

#### **CONCLUSION:**

Most of the skin diseases are of microbial origin and have tendency towards developing resistance against synthetic drugs. Plants are considered as drug houses and plants originated drugs are found always better than synthetic drugs. Thus, the study of traditional ethnomedicinal plants for skin diseases and review of the literature for antimicrobial properties helps in coordination between these two systems to confirm their role in human welfare.

Present ethnobotanical investigation and review of antimicrobial properties of the species revealed that most of the ethnomedicinal plants have been studied for the antibacterial activity. Only three species viz. *Cassia fistula* L., *Tridax procumbens* L. and *Aloe vera* (L.) Burm. studied for their antifungal properties. No plant has been studied for its antiviral activity. Thus, this study suggest that the future attention antiviral properties of these plant species.

Out of 21 ethnomedicinal plants studied only few species viz. *Balanites aegyptica* (L.) Del., *Cassia fistula* L., *Indigofera tinctoria* L., *Lawsonia inermis* L., *Tridax procumbens* L., *Phyllanthus amarus* and *Aloe vera* (L.) Burm. are studied exhaustively for their antibacterial and antifungal activity. Very few researchers have paid their attention towards the antimicrobial activity of *Brassica nigra* (L.) Koch., *Boswellia serrata* Roxb., *Leea macrophylla* Roxb., *Cullen corylifolia* (L.) Medic., *Uraria picta* (Jacq.) Desv., *Cassia hirsuta* L., *Xanthium strumerium* L., *Plumbago zeulanica* L., *Cuscuta reflexa* Roxb. and *Anisochilus carnosus* (L.f.) Wall. and no one recognized the

antimicrobial potential of *Clematis heynei* M A Rao., *Pentanema cernum* (Dalz.) Linn., *Penatanema indicum* (L.) Linn., *Hygrophila schulli* (Buch. Ham.) Mr. & Ms. Almeida, and *Girardinia diversifolia* (Link.) Fris.

The present study can be concluded with the tremendous research scope for antimicrobial studies to be carried out in wild plant species used in non-conventional and ethnic medication practices.

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