3.2.1

3.2.1. Number of papers published per teacher in the Journals notified on UGC website during the year

Sr. no.	Title of the paper	Name of the authors	Name of the journal	ISSN number	It is listed in UGC care list	Page number
1	Privacy Preserving Big Data Publication on Cloud Using Anonymization Techniques with Deep Neural Networks	Dr.Nirmal S A	Journal of Systems Engineering and Electronics	1671-1793	YES	**1-9**
2	Review Article on Tridax Procumbens Linn	Dr.Darekar S M	International Journal of All Research Education and Scientific Methods (IJARESM)	2455-6211	YES	**10-23**
3	Formulation,Development and performulation studeies of Eukalyptol &Thymol contaning organogels for topic al delivery system.	Prof Landage D A	Tuijin Jishu/Journal of propulsion Technology	1001-4055	YES	**24-38**
4	Formulation And Evaluation Of Herbal Tablets	Dr.Raykar M H	Journal of Emerging	2349-5162	YES	**39-43**

	Containing Nyctanthus Arbor Tristis		Technologies and Innovative Research (JETIR)			
5	Herbal Cosmtics:An Overview	Dr.Raykar M H	International Journal of Research Publication and Reviews	2582-7421	YES	**44-50**

Highlight staff name and college name

Privacy Preserving Big Data Publication on Cloud Using Anonymization Techniques with Deep Neural Networks

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Abstract: The exponential growth of big data and its storage in cloud environments has heightened concerns regarding data privacy and security. This research focuses on developing a comprehensive framework for privacy-preserving big data publication on the cloud, employing advanced anonymization techniques integrated with deep neural networks. The proposed approach aims to balance data utility and privacy by applying sophisticated anonymization methods that protect sensitive information while maintaining the analytical value of the data. Leveraging deep neural networks enhances the robustness of the anonymization process, allowing for dynamic adaptation to varying data characteristics and privacy requirements. The framework is designed to address the challenges of scalability and efficiency, ensuring that large datasets can be processed with minimal computational overhead. Empirical evaluations demonstrate the effectiveness of the proposed system in achieving high levels of privacy preservation without compromising data utility, making it a viable solution for secure big data management in cloud environments. This research contributes to the fields of data privacy, CC, and ML by offering a novel methodology that integrates deep learning with privacy-enhancing technologies, paving the way for more secure and trustworthy big data applications.

Keywords: *Privacy Preserving, Big Data, Cloud Computing, Anonymization Techniques, Deep Neural Networks, Data Privacy, Data Security, Machine Learning, Data Utility, Scalable Solutions, etc.*

1. INTRODUCTION

Nowadays, many companies collect data from users actively or passively. The individual's data are also obtained from different databases. These data includes Personally Identifiable Information (PII) that can identify the person through. Scientists and data analyst want the companies to get an idea from the published results. And a huge risk of breach of privacy could arise if the PIIs were not deleted or anonymized. The big data is generated by any electronic operation every day, and the size of the data grows exponentially every day. Which makes the protection of privacy more difficult? Recent years have seen remarkable achievements in various fields of deep neural networks. DNNs demonstrate superb capacity to discover high-dimensional structures from vast quantities of data.

In the meantime, electronic apps such as smartphones, diagnostic instruments, and applications using the Internet of Things (IoT) have become almost omnipresent. The on-device machine learning capabilities are highly requested, including object recognition, language translation, health tracking, and many more. Encouraged by the outstanding success of DNNs in these systems, people naturally seek to drive mobile devices to deep learning. In recent years, perturbation of unauthorized access data is considered a fairly simple and efficient technique for securing electronic data.

Data perturbation has been recognized as a more successful data protection mechanism than re-identification because of the high probability that attacks will occur that connect public datasets to original identifiers or subjects. For that reason, when it comes to confidentiality, data perturbation is hailed as a more solid approach to privacy preservation. The miner will rebuild the corrupted version before conducting data mining operations to retrieve the original data distribution. For this reason, data perturbation is hailed as a more rigorous approach to privacy protection when it comes to encryption. The miner would rebuild the perturbed version before conducting data mining operations to obtain the original data distribution.

Deep learning (aka, deep machine learning) has created promising results in both the academia and industry in recent years, where deep learning systems are approaching and even surpassing accuracy at the human level. This is due to algorithmic breakthroughs and physical parallel hardware for storing large quantities of data applied to neural networks. Huge collection of data, while crucial to deep learning, poses privacy concerns. A photo taken independently can be stored indefinitely on a company server, beyond the control of the owner. Legally, concerns

about privacy and two confidentiality that prohibit hospitals and research centers from sharing their medical data sets, preventing them from enjoying the advantage of deep learning on a large scale over joint datasets.

2. REVIEW OF LITERATURE

- Andrew J et al [1] A Mondrian-based k-anonymity approach is proposed to provide a trade-off between the users' privacy and data utility. Deep Neural Network (DNN) based framework is 1proposed to protect the privacy of high dimensional data. The experimental result shows that the method being suggested mitigates data loss of information without compromising privacy.
- Lingchen Zhao et al [2] they presented practical, collaborative deep learning system that enables users to build a collective deep learning model with data from all participants, without direct data sharing and central data storage, in cooperation. Each participant trains a local model with their own data in our system, and only shares model parameters with the others. To further avoid potential privacy leakage from sharing model parameters, we use functional mechanisms to disrupt the neural network's objective function in the training process to achieve differential privacy.
- Lichen Zhang et al [3] they proposed an efficient data aggregation approach whereby an untrusted mobile sensing aggregator can collect data statistics from multiple mobile users while promoting the privacy of each user and the verification of data integrity. In this approach, information hiding and homomorphic encryption are implemented to ensure the mobile users ' data privacy. In detail, a wide-first search tree is first built among mobile users in the initial phase, and then the original data of each user in cipher text space is disturbed among their neighbors by using information hiding and homomorphic encryption. Their method tests show that our protocol requires lower overhead communication and computation, and therefore more feasible for mobile devices that are computationally limited.
- Mithun Mukherjee et al [4] their paper provides an overview of the security and privacy concerns that exist, especially for fog computing. The survey subsequently highlights ongoing research effort, open challenges and research trends for fog computing in the

areas of privacy and security issues. Madhuri Siddula et al [5] they presented various privacy preserving models and methods including naive anonymization, perturbation, or building a complete alternative network. They showed the work done by multiple researchers in the past where social networks are stated as network graphs with users represented as nodes and friendship between users represented as links between the nodes. They studied ways and mechanisms developed to protect these nodes and links in the network.

- Mehmet Emre Gursoy et al [6] this work aims to employ and evaluate such methods on 14 learning analytics by approaching the problem from two perspectives: (1) the data is anonymized and then shared with a learning analytics expert, and (2) the learning analytics expert is given a privacy-preserving interface that governs her access to the data. They developed proof-of-concept implementations of privacy preserving learning analytics tasks using both perspectives and run them on real and synthetic datasets.
- Y. Sei et al [7] they modify e-differential privacy for machine learning, and they propose three approaches for creating privacy-preserved DNNs based on the modified e-differential privacy. Their proposed approaches are experimentally evaluated using a real data set, and we show that our approaches can protect personal attribute values while maintaining the accuracy of the DNNs.
- M. Keshk et al [8] In this paper, they propose a new Privacy Preservation Intrusion Detection (PPID) technique based on the correlation coefficient and Expectation Maximisation (EM) clustering mechanisms for selecting important portions of data and recognizing intrusive events. This technique is evaluated on the power system datasets for multiclass attacks to measure its reliability for detecting suspicious activities.
- S. Moriai et al [9] they propose a novel deep learning system to protect the gradients over the honest-but-curious cloud server, using additively homomorphic encryption. All gradients are encrypted and stored on the cloud server. The additive homomorphic property enables the computation across the gradients.
- S. Zhu et al [10] this paper proposes a 2-correlated block differential privacy protection model on the internal correlated data sets, and gives the specific implementation process. The maximum information coefficient (MIC) and machine learning algorithm are used to

construct the dependence of correlated data, which improves the accuracy of sensitivity of the query function, and can effectively solve the problems caused by under noise and over noise. A means-Laplace differential privacy implementation mechanism is proposed to improve the accuracy of noise introduction.

3. METHODOLOGY

Privacy-preserving data collection scheme for healthcare IoT service systems is different from regular approaches. Unlike static data, the IoT environment generates data that evolves with time that can be considered a data stream. So, it is essential to develop an efficient privacy-preserving scheme for healthcare IoT. The clustering-based k-anonymity model is efficient in handling healthcare IoT data. This model collects the data over time and generates clusters using the bottom-up approach which will be more effective.

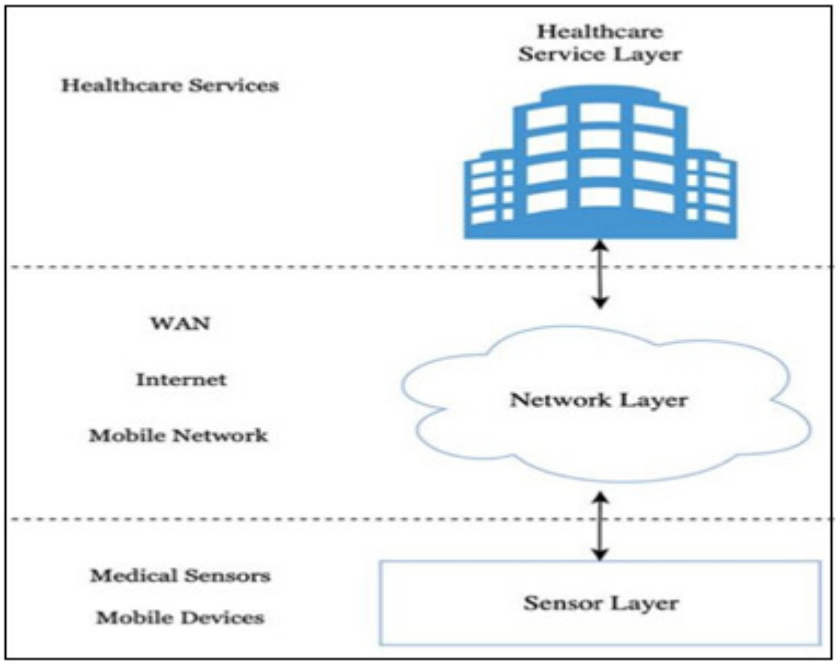

Fig.1: System Architecture

4. RESULTS AND DISCUSSION

The implementation of privacy-preserving big data publication on the cloud using anonymization techniques with deep neural networks has yielded promising results. The proposed framework successfully anonymized large datasets, protecting sensitive information while retaining high data utility. Empirical evaluations demonstrated that the integration of deep

neural networks enhanced the robustness and adaptability of the anonymization process, effectively handling diverse data characteristics and varying privacy requirements. Performance metrics indicated minimal computational overhead, confirming the system's scalability and efficiency. Overall, the framework achieved a significant balance between privacy preservation and data utility, making it a viable solution for secure big data management in cloud environments.

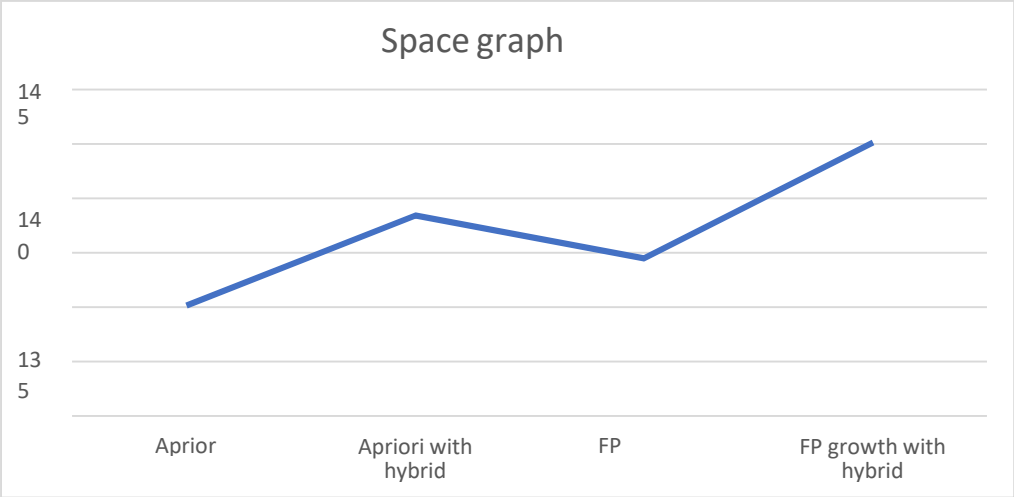

Fig.2: Graph of space used in the system time result

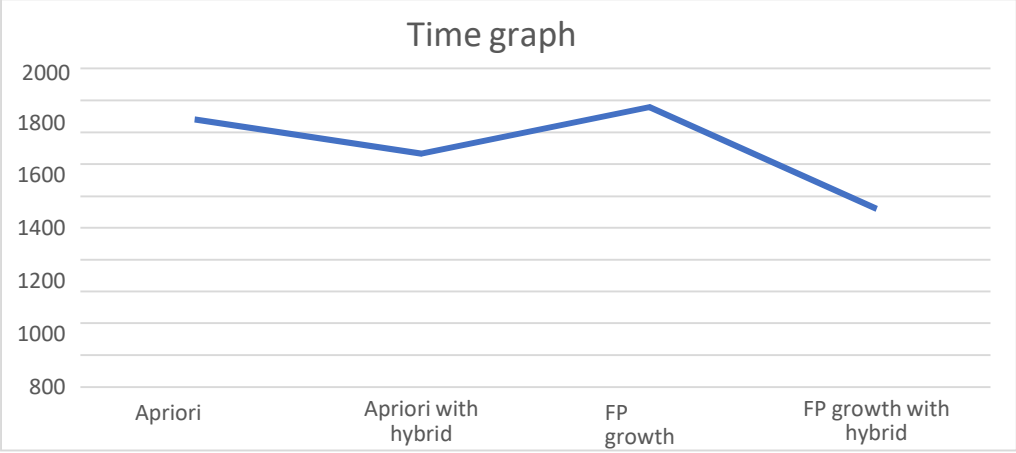

Fig.3: Graph of time required in the system

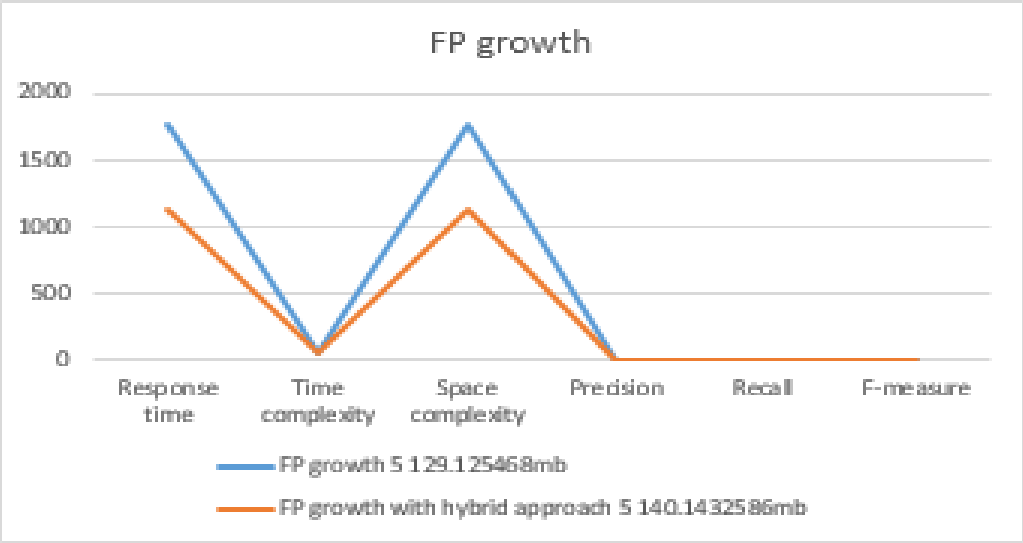

Fig.4: Graph of FP growth

5. CONCLUSION AND SUGGESTION

Recent privacy preserving technique proposes a significant challenge when more records added to the stored record. The integration of SLT algorithm with the incremental data Anonymization can overcome the privacy issues and performance overhead. The major contributions of this paper are a privacy preserving association rule mining algorithm given a privacy preserving scalar product protocol, and an efficient protocol for computing scalar product while preserving privacy of the individual values. We show that it is possible to achieve good individual security with communication cost comparable to that required to build a centralized data warehouse. There are several directions for future research. Handling multiple parties is a nontrivial extension, especially if we consider collusion between parties as well. This work is limited to Boolean association rule mining. Non-categorical attributes and quantitative association rule mining are significantly more complex problems.

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Review Article on Tridax Procumbens Linn

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ABSTRACT

Tridax procumbens L., commonly known as coat buttons or tridax daisy, is indeed a medicinal plant that has been traditionally used in various folk medicine systems. The plant is native to the American tropics but has spread to other parts of the world. Different parts of the plant, such as leaves, roots, and flowers, have been utilized for their potential medicinal properties. the potential therapeutic use of T. procumbens in treating hyperuricemia, oxidative stress, and bacterial infection. T. procumbens, also known as Tribulus terrestris, is a plant commonly used in traditional medicine. One highly promising species is Tridax procumbens, which is known to produce secondary metabolites with a range of medical applications, including anesthetic, anti-inflammatory, anti-diabetic, and anti-anemia effects. In order to better understand T. procumbens, a member of the Asteraceae family that has its origins in Central and South America, this study reviewed the scientific literature on the plant's medicinal qualities, biological activity, and phytochemical components. Liquid chromatography-electrospray ionization-mass spectrophotometry (LC-ESI-MS) and gas chromatography-mass spectrophotometry (GS-MS).

Keywords: Tridax procumbens; beverage; xanthine oxidase; antioxidant; antibacterial activity

INTRODUCTION

Native to Central and South America, Tridax procumbens, commonly referred to as "coat buttons," is a perennial plant in the Asteraceae family (Hilliard, 1977; Ravikumar et al., 2005b). This species has been employed in Indian Ayurveda since ancient times (Kethamakka and Deogade, 2014). This species has been used to make a variety of products, including oils, drinks, and skin poultices (Foret, 2012). This species has been employed in Indian Ayurveda since ancient times (Kethamakka and Deogade, 2014). This species has been used to make a variety of products, including oils, drinks, and skin poultices (Foret, 2012). There is a broad range of biological activity in T. procumbens. This plant's ethyl acetate extract demonstrated potent larvicidal and allelopathic properties. In clinical trials, methanol and ethanol extracts shown anti-hyperglycemic properties, anti-fungal, anti-leshmanial ,and hepatoprotective activities. An abnormally high blood level of uric acid is known as hyperuricemia. For women, normal uric acid levels are 2.4–6.0 mg/dL and for men, 3.4–7.0 mg/dL. Gout is a form of inflammatory arthritis brought on by the buildup of monosodium uracrystal in synovial fluid and other tissues. High blood uric acid levels can aggravate this condition. The primary enzyme that catalyzes the conversion of hypoxanthine into xanthine and xanthine into uric acid is called xanthine oxidase (XO). It is essential in the development of gout and hyperuricemia.

Table 1. Common names of T. procumbens found throughout the world.

Country/ Language	Vernacular Names	Source
Chinese	Kotobukigiku	Ankita and Jain 2012
English	Coat buttons, Tridax daisy	USDA, Ankita and Jain 2012, Kumar et al., 2012; Chauhan and Johnson, 2008; Ravikumar et al., 2005b, Bhagwat et al., 2008.
French	Herbe Caille	Ankita and Jain 2012
Latin	Tridax procumbens (Linn.)	Ankita and Jain 2012
Malayalam	Chiravanak	Ankita and Jain 2012
Marathi	Dagadi Pala	Ankita and Jain 2012
Sanskrit	Jayanti Veda	Ankita and Jain 2012

Spanish	Cadillo, Chisaca	ITIS, ND, Ankita and Jain 2012
Telugu	Gaddi Chemanthi	Ankita and Jain 2012
Tamil	Thata poodu	Ankita and Jain 2012
Australia	Tridax daisy	Holm et al., 1997
Brazil	Erva de Touro	Holm et al., 1997
Burma	Mive Sok Ne-gya	Holm et al., 1997
Colombia	Cadillo Chisaca	Holm et al., 1997
Cuba	Romerillo de Loma, Romerillo	Holm et al., 1997
Dominican Republic	Piquant Jambe	Holm et al., 1997
El Salvador	Hierba del Toro	Holm et al., 1997
Fiji	Wild Daisy	Holm et al., 1997
Ghana	White-dirty Cream, Nantwi bini	Holm et al., 1997; Komlaga et al., 2015
Guatemala	Bull Grass, Bull's herb	Vibrans 2009, Gamboa-Leon et al., 2014
Hawaii	Tridax	Holm et al., 1997
India	Bisalyakarmi, Mukkuthipoo, Phanafuli, Tunki, Ghamara, Javanti Veda, Dhaman grass, Vettukkayapoondu, Vettu kaaya	Holm et al., 1997; Kumar et al., 2012; Kethamakka and Deogade, 2014; Pareek et al., 2009; Ravikumar et al., 2005b, Bhagwat et al., 2008, Silambarasan and Ayyanar, 2015, Yabesh et al., 2014
Indonesia	Gletang, Gletangan, Sidowlo, Tar Sentaran	Holm et al., 1997
Jamaica	Bakenbox	Mitchell and Ahmad, 2006
Madagascar	Anganiay	Holm et al., 1997
Malaysia	Coat Buttons, Kanching Baju	Holm et al., 1997
Malaysia	Coat Buttons, Kanching Baju	Holm et al., 1997
Mauritius	Herbe Caille	Holm et al., 1997
Mauritius	Herbe Caille	Holm et al., 1997
Mexico	Flor Amarilla, Panquica, Rosilla, t'ulum	Holm et al., 1997, Gamboa-Leon et al., 2014
Nigeria	Igbalobe, Muwagun, Muriyam pachila, Jayanti, Vettukkaaya-thala	Olowokudejo et al., 2008; Soladoye et al., 2013, Sureshkumar et al., 2017

Traditional Uses:
In many nations, complementary and traditional medicine is becoming more widely acknowledged as an integrative approach to healthcare (WHO, 2013). Plants may have been used for medical purposes as early as 60,000 years ago, during the Middle Paleolithic period (Solecki, 1975). T. procumbens is a globally distributed plant (Table 2) that has been used for millennia in Central America to treat inflammation, colds, hepatopathies, and anemia (Taddei & Rosas-Romero, 2000). The juice from the leaves is applied to wounds to halt bleeding (Caceres et al., 1998). Tridax can help nursing pregnant women with anemia by reducing their symptoms, according to a study conducted in Chiquimula, Guatemala (Calderón, unpublished data). Additionally, this species is utilized to treat diabetes, high blood pressure, and gastrointestinal and respiratory infections (Poell, 2005, Giovannini et al., 2016)... 2016; Pardeshi and Bhiungade). The entire plant is used in Guatemala to cure protozoal illnesses, such as malaria, leishmaniasis, and dysentery (Caceres et al., 1998; Berger et al., 1998, Martní-Quintal et al., 2009, Gamboa-Leon et al., 2014, Ebiloma et al., 2017).

Traditional Uses and Plant Preaparation

1) **Location :** Guatemala
Preparation/extract :
Leaves: juice
Leaves: poultice, dried infusions
Stems: dried
Plant ailment uses :

Anemia, colds, inflammation, hepatopathies, vaginitis, stomach pain, diarrhea, mucosal inflammation, skin infections, bleeding Reduce, inflammation, gastrointestinal and respiratory infections, high blood pressure, diabetes, Protozoal infections, treatment of chronic ulcers caused by leishmaniasis, gastrointestinal disorders

2) **Location** : India
Preparation/extract :
Leaves: dried and other herbs ingested orally, juice
Plant ailment uses :
Diabetes, insect repellent, used to treat diarrhea, and to help check for hemorrhages, as well as hair loss. Jaundice, healing of wounds, inflammation
3) **Location :** Africa
Preparation/extract :
Whole plant: blending with other herbs adding salt and water
Plant ailment uses :
Treating mastitis in livestock
4) **Location** : Africa (Ghana)
Preparation/extact :
Decoction with Phyllanthus amarus
Plant ailment uses :
Anti-malarial, antibacterial, wound-healing

The entire plant is used in Nigeria to treat epilepsy, typhoid fever, fever, cough, stomachache, backache, and diarrhea (Soladoye et al., 2013; Mann et al., 2003). African farmers utilize the plant to treat their animals (Byavu et al., 2000). For instance, severe mastitis can be treated using Tridax and Vigna parkeri by grounding the two plants, mixing them with salt and water, and putting the mixture to the udder. Breeders in Benin add other plants to the feed that rabbits (Aboh et al., 2002) or other animals ingest (Edeoga et al., 2005); however, rabbits eat less of this type of feed than other types (Aboh et al., 2002), most likely because it is less tasty. Wounds in Togo are treated with fresh, crushed leaves. The leaves' decoction is used to cure abdominal and gastrointestinal mycosis, relieve discomfort, and treat malaria (Agban et al., 2013). It is used to treat diarrhea, to check for hemorrhages, and as an insect repellant in India. Furthermore, some reports mention using it to treat jaundice (Saraf and Dixit, 1991) and hair loss (Policegoudra et al., 2014; Saraf et al., 1990).

Phytochemistry

Numerous papers on T. procumbens' phytochemistry have resulted from its use as a traditional medicine in different parts of the world**.** New medications for the treatment of different illnesses may be developed as a result of the identification of new bioactive chemicals (Fabricant and Farnsworth 2001). We'll talk about the various extraction methods used to separate the different chemicals present in T. procumbens.

Table 2. Phytochemicals found in Tridax procumbens

Extraction	Compound	Plant organ	References
Aqueous	Antidiabetic compounds	Aerial parts	Caceres et al., 1998 Ikewuchi, 2012
Chloroform, Acetone	Tannins,condensed catechic	Leaves	Sawant and Godhate 2013
Ethyl acetate, aqueous, ethanol	Flavonoids, kaempferol, (-)-Epicatechin, Isoquercetin and Glucoluteolin	Leaves, Stem, Root, and Flowers	Kumar et al., 2012; Harborne, 1994
Methanol-dichloromethane	Bioactive components for antifungal activity against dermatophytes	Aerial parts.	Policegoudra et al., 2014.
Ethanol- acetic acid	Alkaloids for antimicrobial activity, against human pathogens, antioxidant, Hepatoprotective	Pedicle and buds.	Jindal and Kumar 2012. Hemalatha 2008.

Petroleum Ether	Antioxidant uses against DPPH.	Dried plants.	Saxena et al., 1977
Distilled Water- ethanol	Immuno-modulatory effects in rats	Aerial parts	Tiwari et al., 2004
methanol -n-butanol	Isolation of antioxidant chemicals, mostly flavonoids and saponins	Dried leaves.	Saxena et al., 2013
n-hexane	Antimicrobial against Mycobacterium smegmatis,Escherichia coli, Salmonella spp.	Flowers and aerial parts.	Kethamakka and Deogade, 2014
Ethanol	Saponin B-Sitosterol-3-O-β-D-xylopyranoside.	Flowers	Saxena and Albert, 2004
Petroleum ether, ethanol	Anti-ulcerogenic effects	Leaves	Jhariya et al., 2015
Hydro-distillation	Essential oil, anti-microbial and anti-inflammatory effects. Terpenes, alpha and beta pinenes	Leaves.	Manjamalai et al., 2012b

Phytochemical Screening

Given the promise of this species, numerous investigations on its phytochemistry have been conducted (Tables 3 and 4), yielding a range of chemicals**.** For instance, leaves contain rather large amounts of anthrones, flavonoids, steroids, and anthraquinones (Nisha, 2011). This paper discusses the secondary metabolites that have therapeutic potential, highlighting the significance of these extraction techniques. Even though the compounds have been identified, it is still unclear which specific bioactive molecules are in charge of the therapeutic effects.

Primary Metabolites

All plants include primary metabolites that are a part of metabolic pathways. Several distinct primary metabolites have been isolated from T. procumbens, including: In living things, lipids are necessary because they affect cellular composition, intercellular communication, and the organism's ability to obtain energy. The Asteraceae family's common lipids are present in T. procumbens. Additionally, this species has certain lipids that give the plant its distinct qualities and potential medical use. The following special fats have been extracted: 1-(2,2-dimethyl-3-hydroxypropyl) heptacosanyl cyclohexane carboxylate, 3-methylnonadecylbenzene, methyl 14-oxooctadecanoate, and methyl 14 oxononacosanoate.phthalate (2-isobutyl), 15-one hydroxytetracosan-12, The compounds dotriacontanol, β-amyrone, Δ12-dehydrolupen-3-one, β-amyrin, lupeol, fucosterol, 9-oxoheptadecane, 10-oxonononadecane, and sitosterol are identified in 32-methyl-30-oxotetratriacont-31-en-1-ol and 30-methyl-28-oxodotriacont-29-en-1-oic acid (Verma and Gupta, 1988). All of these substances are common to many plant species and have vital roles in plants.

Secondary Metabolites

Plants create substances known as secondary metabolites, which are crucial for defense mechanisms, communication, stress reactions, and other aspects of plant life but are not necessary for the plant's regular growth and development**.** Bioactive substances found in secondary metabolites frequently have significant and helpful therapeutic qualities. Compounds like glycosides, nitrogenous organic compounds, fat-soluble compounds, polyphenolic compounds, and minerals contain some of the most significant bioactive substances for medical applications (Edeoga et al., 2005).

Flavonoids

Leafy greens and other organs include flavonoids, which have been demonstrated to be effective as anticoagulants, hair tonics, antifungals, and remedies for bronchial catarrh, diarrhea, dysentery, and wound healing (Ali et al., 2001). Procumbenetin and other flavonoids included in Tridax appear to lessen the kidneys' oxalate and calcium deposits (Sailaja et al., 2012). Along with the flavonoid Procumbenetin, luteolin and quercetin were also extracted from Tridax (Jhariya et al., 2015). T. procumbens flowers contain lutein, glucoluteolin, and isoquercetin (Kumar et al., 2012). According to Rao et al. (2012), luteolin possesses anti-inflammatory and anti-carcinogenic properties, which are likely attributed to its antioxidant properties and capacity to scavenge free radicals (Seelinger et al., 2008). Strong tumor proliferation inhibition has been demonstrated by luteolin through the suppression of angiogenesis (Kawaii et al., 1999).

Tannins

Plants naturally contain water-soluble polyphenols called tannins. Perhaps as a result of their antioxidant qualities, tannins exhibit anti-microbial, anti-carcinogenic, and anti-mutagenic qualities (Chung et al., 1998). Tannins have been reported to exist in T. procumbens by a number of researchers (Kumar et al., 2012, Edeoga et al., 2005). Tannins were detected in T. procumbens leaf extracts by acetone-water or chloroform-water (Table 3, Sawant and Godghate 2013). The pedicle and buds of T. procumbens contain tannins (Ikewuchi, 2012).

Carotenoids

According to Ikewuchi et al. (2009), carotenoids are fat-soluble pigments that are present in leaves and serve three major purposes in plants. collecting light, defense against photooxidative damage, and insect-attracting coloration. It has been suggested that carotenoids shield DNA from oxidative stress (Wagener et al., 2012). Numerous kinds of secondary metabolites, such as beta-carotene, which is crucial for the upkeep of epithelial cells and can be transformed into vitamin A (Ikewuchi et al., 2009), have been identified from T. procumbens. A lack of vitamin A can lead to Xerophthalmia, night blindness, and compromised hematopoiesis and immunity (Sommer, 1995).

Alkaloids

Any family of nitrogenous organic chemicals derived from plants that significantly affect human physiology is known as an alkaloids. T. procumbens has also been shown to contain a few alkaloids (Kumar et al., 2012). Thirty-nine alkaloids were detected in a phytochemical screening examination utilizing an aqueous extraction of the leaves, with the majority being Akuamidine (73.91%) and Voacangine (22.33%) (Ikewuchi, 2012). The extract also included tannins and sterols in addition to alkaloids. Proteus mirabilis and Candida albicans were shown to be susceptible to the antimicrobial activity of T. procumbens pedicle and buds, while E. coli and Trichophyton mentagrophytes were shown to be susceptible to the activity of buds.

Saponins

T. procumbens (Edeoga et al., 2005) has been found to contain saponins, which are steroidal glycosides with pharmacological and medicinal properties (Atelle et al., 1999). Specifically, the flowers of the species contain pB-Sitosterol-3-O-β-D-xylopyranoside and a steroidal saponin (Saxena and Albert 2005).

Pharmacological Properties

Ability of Tridax Procumbens is to prevent anemia, protect the liver, boost immunity, function as antioxidants, and have anticancer, antibacterial, antifungal, antiparasitic, antiplasmodial, and antiviral capabilities. This species' pharmacological potential may allow it to serve as a link between traditional and western treatment. It is necessary to further isolate and characterize the active components. Research has not been done to determine whether the pharmaceutical compounds' production and isolation alter their activity.

Table 3. Pharmacological properties of Tridax procumbens

Pharmacological Properties	Effect	Phytochemical	Extraction	Citation
Antimicrobial Activity	Bacillus Faecalis, B. subtilis, E. coli, Pseudomonas aeruginosa, Antibacterial and fungal infections	Alpha and Beta Pinenes, Alkaloids	Petroleum ether and ethanolic extracts from leaves, essence	Jhample et al., 2015 Manjamalai et al., 2012b; Pai et al., 2011
Antifungal Activity	dermatophytes, Microsporum fulvum, Microsporum gypseum, Trichophyton mentagrophytes, Trichophyton rubrum, Candida albicans, and Trichosporon	Flavonoids, Monoterpenes, and Alkaloids	Aerial parts- pedicle and buds	Ali et al., 2001; Petchi et al., 2013; Policegoudra et al., 2014

	beigelii			
Antibacterial Activity	Bacillus cereus, Mycobacterium smegmatis, E. Coli, Staphylococcus aureus, Klebsiella sp., Salmonella group C, Salmonella paratyphi, and Streptococcus pneumoniae	Alpha and Beta Pinenes	N-hexane extracts, ethyl acetate extract, essential oil extract, chloroform extract	Taddei and Rosas-Romero, 2000, Manjamalai et al., 2012b; Dhanabalan et al., 2008
Antiparasitic activity	Malaria, dysentery, colic, and vaginitis, anti-Leishmaniasis activity	(3,S)-16,17-Didehydr ofalcarinol an oxylipin	bioassay guided fractionation with a methanol extract	with a methanol extract Martní-Quintal et al., 2009
Antioxidant Activity	Antioxidant, anti-inflammatory, anti-cancer	High phenol content , Flavonoids (in water phase), Carotenoids (in lipid phase), Alkaloids	Ethyl acetate and n-Butanol fractions obtained from methanolic extracts, essential oils	Saxena et al., 2013; Habila et al., 2010; Han et al., 2012; Manjamalai and Berlin Grace, 2004, Jachak et al., 2017.
Anticancer Activity	Potent cytotoxic activity against malignant tumor cells	5(alpha)-cholestane, monoterpenes (alpha and beta pinenes	Crude flower aqueous and acetone extracts, essential oil extract	Vishnu et al., 2011; Manjamalai et al., 2012a; Policegoudra et al., 2014
Hepatoprotective Activity	Reduction of oxidative stress, lowered levels of serum Aspartate aminotransferase, serum Alanine aminotransferase, serum Alkaline phosphatase, and serum bilirubin in rats	Alkaloids, Flavonoids	Flowers, leaves, and aerial parts. chloroform insoluble fraction of an ethanol extract, petroleum ether, methanol, and chloroform water extracts, Lipopolysaccharide chloroform- insoluble fraction, aqueous extracts	Ravikumar et al., 2005a; Ravikumar et al., 2005b; Patel et al., 2014; Nwange, 2008.
Immunoenhancement Activity	Activation of the immune system with an increase of percent in neutrophils in rats	Sequesterpene and triterpenoids	No Data Found	Tiwari et al., 2004
Antidiabetic Properties	antidiabetic activity that is comparable to the drug Glibenclamide in rats	Saponins	Ethanolic extract of whole plants, pet ether, methanol, and chloroform extracts	sonawane et al., 201 Petchi et al., 2013
Antihypertensive Activity	Antihypertensive activity comparable to the drug captopril in rats	Flavonoids and potentially alkaloids	ethyl acetate and dichloromethane fractions from the aerial parts of the plant	Adjagba et al., 2015

Antimicrobial Activity

Antimicrobial tests have been conducted; however, further research is required to validate certain findings. The antibacterial qualities of T. procumbens have been demonstrated to be sensitive to a variety of bacterial and fungal species.

In a recent study, Bhati-Kushwaha and Malik (2014) found that callus of stem and leaf was helpful in synthesizing silver nanoparticles that shown some antibacterial action against E. Coli, V. cholerae, A. niger, and A flavus. These results are not certain though, as this activity was less than that of silver nitrate. T. procumbens leaf extracts in ethanolic, ether, and petroleum exhibited antibacterial action against Bacillus faecalis**.** Alkaloids were said to be most likely the cause of this behavior. According to Christudas et al. (2012), the chloroform extracts exhibited antibacterial activity against B. faecalis, B. subtilis, E. coli, and Pseudomonas aeruginosa. However, the tests require improved controls and protocol details.

Antifungal Activity

Research has been done on T. procumbens' antifungal properties. The ideal zone of inhibition from several fungal strains, such as Microsporum fulvum, Microsporum gypseum, Trichophyton mentagrophytes, Trichophyton rubrum, Candida albicans, and Trichosporon beigelii, has been determined using a variety of extraction techniques. Dichloromethane (DCM) fraction produced the best response when extracts of this plant's aerial parts were used to fight dermatophytes; the zones of inhibition ranged from 17 to 25 mm (Policegoudra et al., 2014). But the writers don't say which bioactive substances are in charge of the antifungal qualities**.**

Antibacterial Activity

There has been evidence of antibacterial action for Tridax procumbens. In rural areas of the world, it is one of the most widely used herbs to cure bacterial illnesses (Taddei and Rosas-Romero, 2000). It has been demonstrated that Tridax extracts work well against a range of microorganisms. Salmonella group C, Salmonella paratyphi, E. coli, Mycobacterium smegmatis, and Klebsiella sp. can all be inhibited by N-hexane extracts. The ethyl acetate extract shown efficacy against both Gram-positive and Gram-negative bacteria, including Klebsiella sp. and Bacillus cereus, Mycobacterium smegmatis, and Staphylococcus aureus (Taddei and Rosas-Romero, 2000). The essential oil extract of T. procumbens exhibits substantial efficacy against Gram-positive bacteria: Staphylococcus aureus and Streptococcus pneumoniae (Manjamalai et al., 2012b).

Antiparasitic Activity

T. procumbens has been used to treat a number of diseases brought on by protozoal infections, including dysentery, colic, malaria (Appiah-Opong et al., 2011; Komlaga et al., 2015), and vaginitis. This was done by using a methanol extract fractionation method guided by a bioassay to isolate the active ingredient, (3,S)-16,17-Didehydrofalcarinol, which is an oxylipin. When employing crude extracts from the entire plant, Tridax appeared to show anti-leishmanial activity (Martiкn-Quintal et al., 2009). The antiplasmodial effects of aqueous, chloroform, ethyl acetate, and ethanolic extracts from T. procumbens flowers, leaves, and stem were investigated in a Ghanaian study**.**

Antioxidant Activity

Molecules classified as free radicals are extremely reactive due to an unpaired electron in their atomic orbital. Reactive hydroxyl radicals (OH), superoxide anion radicals, hydrogen peroxides, reactive oxygen species (ROS), and peroxyl radicals are a few of these free radicals. These radicals' instability has the potential to harm a wide range of physiologically significant substances, including DNA and macromolecules, which could disrupt homeostasis and cause damage to cells. To lessen this activity, an antioxidant or a free radical scavenger is employed to stop oxidation from occurring within a biological system. Using the 1,1-diphenyl-2-picrylhydrazyl (DPPH) technique, Agrawal et al. (2009) examined the antioxidant activity of T. procumbens and discovered considerable activity (similar to the activity of ascorbic acid) in the ethyl acetate and n-butanol fractions produced from methanolic extracts. Using the DPPH assay, the essential oils of T. procumbens have demonstrated antioxidant activity by lowering oxidative stress levels. Ascorbic acid does not appear to have the same level of antioxidant activity as these essential oils, and the concentration of the essential oil seemed to boost the antioxidant capacity. An aqueous extract of T. procumbens leaves was found to lessen paw irritation caused by carrageenan.

Anticancer Activity

The disease cancer is complex. The anticancer action of T. procumbens has not been studied till recently. Prostate epithelial malignant cells (PC3) were used to analyze crude floral aqueous and acetone extracts. There was very little antitumor activity seen in the aqueous extract. Within 24 hours of treatment, the acetone extract shown an 82.28% activity against cancer cells (Vishnu et al., 2011). .. The MTT assay was used to assess the viability. Since just the acetone extract had an impact and the controls aren't made obvious in the paper, the results are inconclusive because the authors don't describe the toxicity analysis. Additionally, the selectivity index is not reported in this study, nor are the outcomes compared to those of conventional therapeutic medications. Using T. procumbens resulted in a significant reduction in the growth of tumor nodules in the lungs, most likely as a result of the plant's ability to block the production of new blood vessels in response to

monoterpenes (beta and beta pinenes). Additionally, there was an increase in the expression of caspase and P53, suggesting that the oils from these plants may cause apoptosis**.**

Hepatoprotective Activity

The impact of T. procumbens on lowering oxidative stress in the liver, which causes liver damage, as well as the hepatoprotective action of various extracts, have been assessed using a variety of models. The chloroform insoluble fraction of an ethanol extract is useful for reducing liver stress induced by pharmacological agents that create the same diseases as viral hepatitis, drug intoxication, and lipid peroxidation from a reactive oxidative species (Hemalatha, 2008). In rats treated with CCl4, a distinct investigation shown that the ethanol extract's chloroform insoluble extract decreased hepatotoxic activity by lowering the levels of several enzymes (Saraf and Dixit, 1991). T. procumbens was studied on male albino rats to assess its potential for treating liver damage brought on by paracetamol (acetaminophen). It was found that the oral administration of T. procumbens ethanolic extract at different dosages reduced serum levels of bilirubin, alkaline phosphatase, aspartate aminotransferase, and alanine aminotransferase, leading to hepatoprotection (Wagh and Shinde, 2010) In male Wister Albino Rats, flower extracts in petroleum ether, methanol, and chloroform water demonstrated protection against hepatotoxicity; the most effective extract was methanolic (Patel et al., 2014).

Immuno-enhancement Activity

An adaptogen of Tridax procumbens has been demonstrated to boost the body's nonspecific resistance to infections. A variety of bioactive substances have helped to normalize the immune response to alleviate certain disorders. Swiss Albino was used in a number of tests on mice to assess the impact of Tridax on immune system stimulation. Mice given immunomodulators found in T. procumbens, which have been demonstrated to stimulate the immune system.. In order to assess cell-mediated immunity, this study compared the rats fed the extracts to the controls in terms of Delayed-type hypersensitivity (DTH). .. Furthermore, an investigation into neutrophil adhesion revealed a dose-dependent rise in the DTH response as well as an increase in the proportion of neutrophils. Although the authors (Agrawal et al., 2011) argue that there was sufficient evidence to support the start of clinical trials in immunocompromised patients, we believe that more comprehensive research needs to be done before clinical trials can begin. Although studies have demonstrated that T. procumbens does contain immunostimulators, it is unknown which components of the plant are immunostimulators and which are immunosuppressants. To ascertain the constituents and their activity, various extraction and fractionation techniques must be used, and each solution must then be tested (Tiwari et al., 2004).

Antidiabetic Properties

Global diabetes prevalence has increased, and intriguingly, T. procumbens has demonstrated anti-diabetic effects. The complete plant of T. procumbens was extracted using ethanol and fed to male Wistar albino diabetic rats that were induced with streptozotocin. According to the study, the extract exhibited antidiabetic efficacy similar to that of the medication Glibenclamide, which is prescribed to treat type 2 diabetes. According to Pettiki et al. (2013), the medication functions by boosting the pancreas' production of insulin. In this investigation, two distinct dosages of Tridax whole plant extract (250 mg/kg and 500 mg/kg) were used in addition to appropriate controls. When compared to the controls, an ANOVA and Dennett's post hoc test revealed significant antidiabetic efficacy. According to a different study, methanolic extracts of T. procumbens were more effective in treating male albino rats with diabetes induced by alloxan than the popular medication Glibenclamide. Rats were administered either 250 or 500 mg/kg of plant extracts and 10 mg/kg of Glibenclamide. After six hours of therapy, the blood glucose levels in the rats were shown to be dropped by 10.96%–13.74% more by either dosage of the plant extract than by the traditional medication. The Alloxan-induced diabetic rats' fasting blood glucose levels improved in response to the plant extracts as well. Additionally, there was no proof that the methanolic extracts from Tridax had any negative side effects on the animals that were given diabetes. Another study looked at how the plants affected the rat's body weight (Pareek et al., 2009).

CONCLUSION

This study highlights the significance of ongoing research on plants that are known to be utilized in traditional medicine, since it may lead to the discovery and development of new conventional medications**.** .. Although Tridax procumbens has a long history of traditional use, the isolation and assessment of each phytochemical has not been appropriately linked to its pharmacological effects and may pose challenges for repeatability after these processes. Various extracts have been employed to treat various illnesses and to isolate metabolites. Numerous extraction studies that were assessed did not do confirmatory work based on the reviewed information, and some research contradicted one another. .. Although Tridax procumbens has a long history of traditional use, the isolation and assessment of each phytochemical has not been appropriately linked to its pharmacological effects and may pose challenges for repeatability after these processes. Various extracts have been employed to treat various illnesses and to isolate metabolites. Numerous extraction studies that were

assessed did not do confirmatory work based on the reviewed information, and some research contradicted one another. It is not possible to determine dose based on traditional applications because, at the time this review was written, there was no research revealing the concentration of various phytochemicals in different plant organs. Future studies should concentrate on the relationship between particular phytochemicals and how they affect different types of illnesses. Additional areas that require further investigation are the yield of extraction, concentration, and physiological activity of these phytochemicals, among other things.

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Formulation, Development and Preformulation Studies of Eukalyptol & Thymol Containing organogels for Topical Delivery System

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***Abstract*:** There are many benefits to using a topical application as opposed to the more traditional methods of administering drugs systemically. The stratum corneum serves as an important defence mechanism against the introduction of potentially harmful foreign molecules; however, this barrier prevents most medications from penetrating the skin via the skin's surface. Penetration enhancers, which come in a variety of forms, have been shown to successfully circumvent this barrier and facilitate the efficient transport of medicines through the skin. Some skin penetration enhancers are connected with unpleasant and harmful consequences, despite the fact that the pharmaceutical industry already uses them in commercially available transdermal medications. This highlights the importance of finding novel skin penetration enhancers that are both safe and effective. Natural penetration enhancers are more widely utilised than their synthetic equivalents because they may be produced in large quantities using a renewable resource, and they can be cheaper to extract depending on the method used. The purpose of this article is to provide a synopsis of the findings from scientific studies of natural skin penetration enhancers.

Keywords: *Transdermal medication, Hydrophilic, Organogels, Eudragit, Topical permeation ect.*

1. Introduction

The medication is carried throughout the body via the circulatory system in a topical drug delivery system. Ophthalmic, rectal, vaginal, and cutaneous routes are all available for topical medication administration. [1] The skin has been identified as a significant channel in the topical drug delivery system, making it an essential and

extensively accessible organ for topical administration. The potential benefits of applying drugs topically include delivering the medication directly to the place of activity and extending the medication's effect period [2]. By avoiding the liver's metabolism of the drug and keeping the drug from irritating the gastrointestinal tract, topical preparation improves the drug's bioavailability [3]. In order to maximize the local effect while minimizing the systemic one, or to guarantee adequate absorption, efforts are being made to use sedate carriers that provide satisfactory limitation or penetration of the drug within or through the skin as part of a topical dosage form [4].

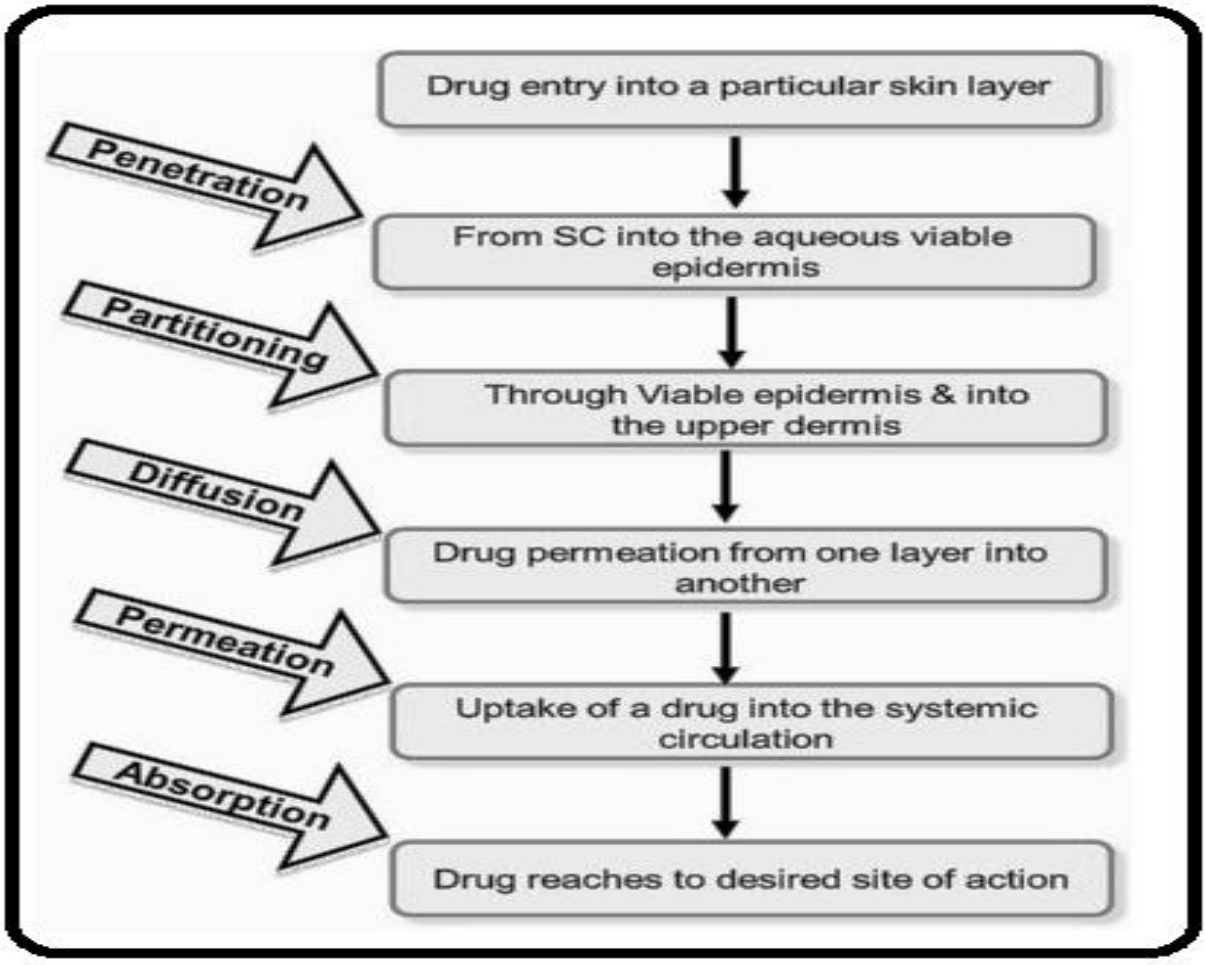


Fig.1 Various route of drug penetration to the skin layer[5]

Advancement of topical drug delivery system

Ophthalmic, rectal, vaginal, and cutaneous administration are all examples of topical medication administration, which is a localised drug delivery mechanism. alternative for the treatment of skin conditions[6]. When applied to the skin, topical medicines can have either a superficial, local, or systemic effect. The base's medicinal characteristics, such as emollient, calming, or protecting activity, might make it useful even when used alone [7]. Therapeutically active chemicals are often distributed or dissolved in the base of many topical treatments. Therapeutically active ingredients can be combined with a variety of bases to create a wide variety of topical preparations suitable for a wide variety of drug delivery and therapy methods. These bases can be categorized according to their physical properties (suspension), their intended use (liniments), or their composition (hydrophiliccreams).

2. Anatomy of human skin

There are tremendous opportunities for medication delivery because of its large surface area in direct touch with the environment [8]. The skin is a complex organ consisting of various layers of protecting tissue. The epidermis, dermis, and hypodermis are the three primary layers of skin. Semisolid preparations need to be very penetrative in order to be absorbed by the skin [9]. Gelation happens when a polar solvent is added to a solution containing lecithin, which causes the polar portion of the lecithin to expand, forming a cylindrical network. The non-polar solvent aids in the product's ability to permeate the skin.

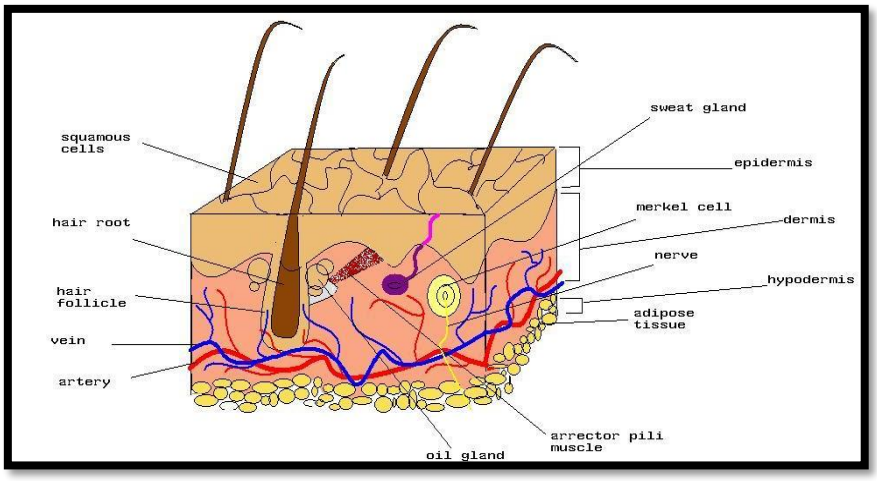


Fig. 2 Structure of Human Skin

3. Principles of topical permeation[11,12]

The stratum corneum, the skin's permeability barrier, must be breached before a topically administered medication can exert its local or systemic effects. Substances are absorbed via percutaneous absorption when they diffuse passively through the skin. It is possible for substances to penetrate the skin by absorption via the epidermis (trans-epidermal absorption) or diffusion via shunts, such as the ones provided by the hair follicles and sweat glands, which are located all over the body[13]. The drug molecules may enter the body through the follicular epithelium and the sebaceous glands after passing through the skin via transitory diffusion. Once the topical permeation has reached steady state, the predominant channel is diffusion via the intact stratum corneum. There is more than one stage involved in the release of a therapeutic drug from a topical formulation and its subsequent transport to the systemic circulation after being applied to the skin[14].

4. Types of organogels

I. Lecithin Organogels

Lecithin Recently, organogels have gained attention as a promising carrier system. An exterior or continuous phase of nonpolar organic solvent, a polar agent (often water), and a surfactant (lecithin) serve as the three primary components of an organogel matrix[15]. When non-aqueous lecithin is mixed with trace amounts of water or other polar compounds like glycerol, ethylene glycol, or formamide, an organogel is produced. Naturally occurring unsaturated lecithin is the only type of lecithin for which the transition into a jelly-like condition has been demonstrated. Most of the latter come from processing soy beans and egg yolks[16].

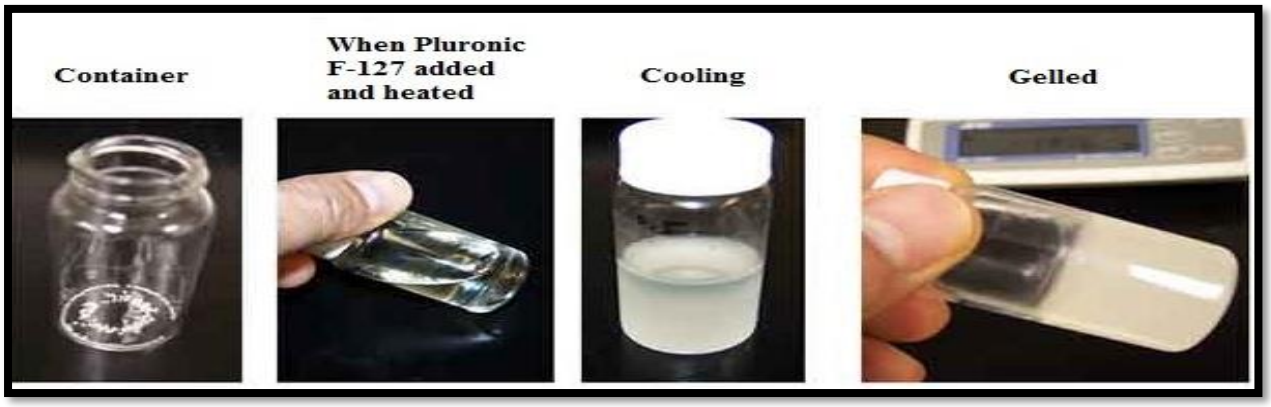


Fig.3 Formation of Organogels

II. Sorbitan monostearate Organogels[17]

Many organic solvents can be gelled at low concentrations with a mixture of Span 60 (sorbitan monostearate) and Span 40 (sorbitan monopalmitate).

III. Nano-emulsion based Organogels[18]

Microemulsions are a type of liquid system consisting of water, oil, and surfactants, often in conjunction with suitable co-surfactants, that is thermodynamically stable and clear, with a single optical isotropy. It is well-known that microemulsions improve the topical and systemic bioavailability of medicines.

IV. Poly (ethylene) Organogels

Only a few number of polymeric organogels have been developed with the intention of being used in medicine. Only two of these systems, poly (ethylene) organogels, have undergone extensive testing for potential drug delivery applications[19]. It was found that PO patches caused little irritation and had minimal sensitising effects.

V. Supramolecular Organogels[20]

Despite the discovery of a low molecular mass gelator in the early nineteenth century, little attention was paid to these materials until the late twentieth century as scientists struggled to better understand their supramolecular nature. Gels, with their wide variety of structural topologies, have been used as templates to create novel inorganic superstructures with potential catalytic and separation applications.

VI. Eudragit Organogels[21]

High concentrations of Eudragit (up to 30 or 40% w/w) are combined with polyhydric alcohols such glycerol, propylene glycol, and liquid polyethylene glycol to form Eudragit organogels. Increasing Eudragit concentrations were shown to enhance gel viscosities, while increasing medication content was found to decrease gel viscosities.

VII. Pluronic lecithin organogel (PLO)

PLO is a low-temperature Pluronic F127 (also known as Polaxomer (407)) solution in isopropyl palmitate or isopropyl myristate, water, and soy lecithin. Poloxamer is a heat-sensitive material that becomes viscous when heated. Both stages of PLO may or may not include the preservative sorbic acid. It often appears as a yellowish gel that is odourless and transparent, and it is rapidly absorbed by the skin. Similar to the tubular reverse micelle structures found in lecithin organogels, PLO can be thought of as having temporal three-dimensional structures.

6. Materials, Chemicals, and Reagents for Making Organogels

All of the following study components were either of pharmaceutical grade quality or of the highest quality Laboratory Reagent (LR) available from the supplier.

Table No.1 Organogel's reagents and compounds list

Sl. No	Reagent & compounds	Company
1	Eucalyptol	Yarrow chemicals, Mumbai
2	Thymol	Yarrow chemicals, Mumbai
3	Sodium Alginate	Otto chemical reagents
4	Guar gum	Yarrow chemicals, Mumbai
5	Xanthan gum	Merck ltd
6	Methyl paraben	Nice Chemicals Pvt. Ltd., Kerala
7	Pluronic F127	Yarrow chemicals, Mumbai
8	Methanol	Karnataka fine chem., Bangalore

Table No.2 List of Instruments used for evaluation of Organogel

Sl. No	Instruments	Manufacturer
1	FT-IR	IR-Affinity-1-FTIR Spectrophotometer, Shimadzu, Japan.
2	UV-Visible Spectrophotometer	UV-1800 Shimadzu UV Spectrophotometer, Shimadzu Corporation, Japan.
3	Electronic Balance	Citizen scales Pvt. Ltd, Mumbai.
4	Hot Air Oven	Servewell Instruments Pvt Ltd.
5	Pen type pH meter	Equinox Electronics Ltd, Bengaluru.

7. Preformulation Studies[22]

I. Melting point determination of Eucalyptol and Thymol[23]

Thiele's tube method was used to determine the melting point of eucalyptol and thymol by placing a little amount of the medication in a capillary tube with a closed end, placing the tube in a Thiele tube with liquid petroleum, and recording the temperature at which the drug melted. We did this three times to ensure accuracy and provide the mean value.

II. Solubility of Eucalyptol and Thymol[24]

Researchers looked at how well eucalyptol and thymol dissolved in water, ethanol, and methanol, among others. Adding 5 ml of each solvent to a clean, dry test tube containing exactly 1 ml (or 1 mg) of the drug and shaking vigorously allowed for visual confirmation of solubility.

III. Infrared spectral studies [25]

Method: This method entails thoroughly combining approximately 1 mg of Eucalyptol and Thymol with approximately 100 mg of KBr (which is transparent to IR) in a mortar at a ratio of 1:100. The compound was manually compacted in a pellet die before being inserted into a Shimadzu FTIR spectrophotometer.

Preparation of standard graph of Eucalyptol and Thymol

Procedure

Preparation of Standard solution (Methanol)

The first stock was created by putting 100 mg each of eucalyptol and thymol to a 100 ml volumetric flask and dissolving them in a modest amount of methanol, then topping off the volume to 100 ml with more methanol (1000 g/ml).

The second stock was made by pipetting one millilitre of the identical solution into a second 100-milliliter volumetric flask, and then filling it to the top with methanol (10 milligrammes per millilitre).

Pipetting 0.5 ml, 1 ml, 1.5 ml, 2.0 ml, 2.5 ml, and 3.0 ml from the 2nd stock standard solution into 100 ml volumetric flasks. Methanol was used to make up the volume to the desired concentrations (5 g/ml, 10 g/ml, 15 g/ml, 20 g/ml, 25 g/ml, and 30 g/ml). The UV-Visible spectrophotometer was used to take a look at this solution's spectrum from 200 to 400 nm. Lambda max for Eucalyptol was measured at 310 nm, while that for Thymol was measured at 274 nm. Using methanol as a blank, we determined the absorbance at 310nm and 274nm for each concentration. We did this three times to ensure accuracy and provide the mean value.Preparation of Standard solution (phosphate buffer pH-6.8).

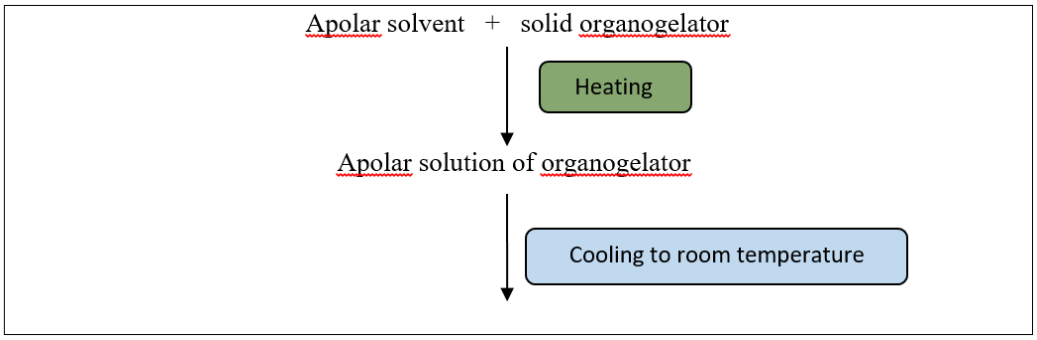
IV. Drug-Polymer compatibility[26]

A. FTIR spectrophotometer

Using an FTIR spectrophotometer, we examined the drug and polymer compatibility. Using a mortar and pestle, 1mg of the material was finely mashed alongside 100mg of potassium bromide (KBr) (1:100 ratio). A little amount of the mixtures was squeezed at 7 Kg/cm^2 for 2 minutes in a hydraulic press, and the resulting translucent pellet was examined under a microscope. Shimadzu FT-IR spectrophotometer was used to scan the pellet from 4000 cm-1 to 400 cm-1. Drug (Eucalyptol and Thymol) and polymer (Sodium Alginate, Guar Gum, and Xanthan Gum) samples, as well as physical mixtures of the drug and polymers, were created. Functional group peaks were examined across spectra and interpreted.

8. Preparation of Eucalyptol and Thymol Organogels E1-E6[27,28]

Components (mg)	**E1**	**E2**	**E3**	**E4**	**E5**	**E6**
Eucalyptol(ml)	10	10	10	10	10	10
Thymol	30	70	70	30	70	70
Sodium Alginate	30	30	70	-	-	-
Guar Gum	-	-	-	20	40	60
Xanthan Gum	-	-	-	-	-	-
Pluronic F-127	30	30	30	30	30	30
Methyl Paraben	20	20	20	20	20	20
Methanol(ml)	15	15	15	15	15	15
Water	QS	QS	QS	QS	QS	QS



Fibres of organogelators precipitate out, interacting with one another physically to produce a three-dimensional networked structure that immobilises the polar solvent.

9. Preformulation tests of Eucalyptol[29]

A. Determination of solubility

The solubility of eucalyptol and thymol in cold water was found to be low, while that of methanol was found to be even lower.

B. IR Spectroscopy

The IR spectra of pure drug was carried out and the graph is shown in Fig.4 and the peak are shown in table no.3

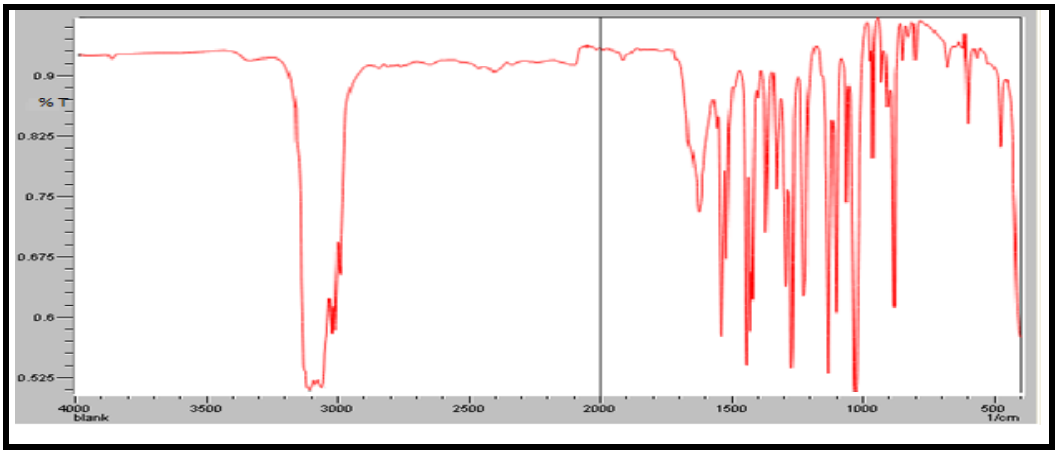


Fig.No.4 IR Spectra of Eucalyptol

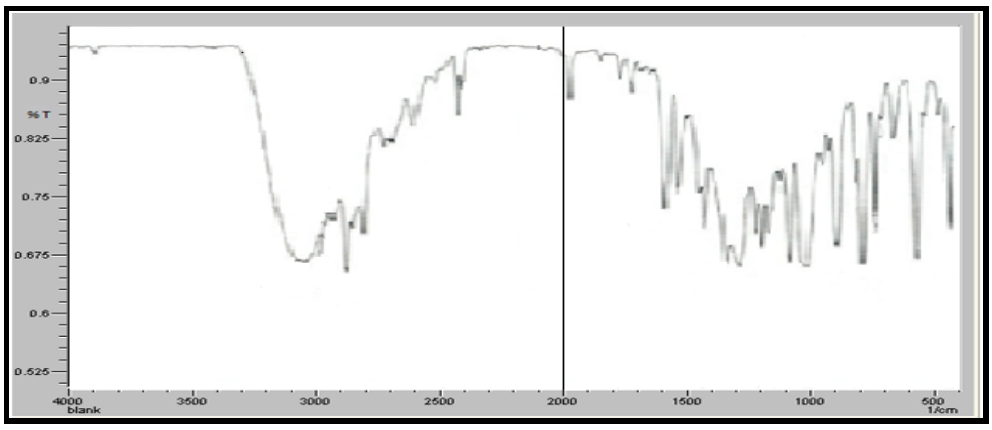


Fig.No. 5 IR Spectra of Thymol

Table no.3 IR Spectra Data of Eucalyptol and Thymol

Name of component	Functional group	Range of standard	Peak obtained
Eucalyptol	C-H Stretch	3,350 cm-1	3110 cm-1
	O-H Stretch		
Thymol	C-H Stretch	3,350 cm-1	3261 cm--1
	O-H Stretch		

C. Maximum absorbance of Eucalyptol[30]

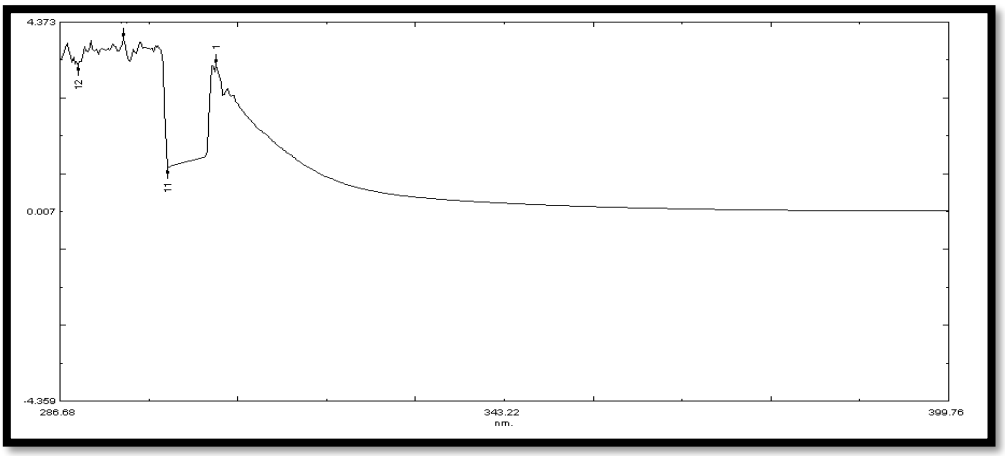


Fig.6 UV spectrum of Eucalyptol from 200-400 nm

D. Calibration curve of Thymol

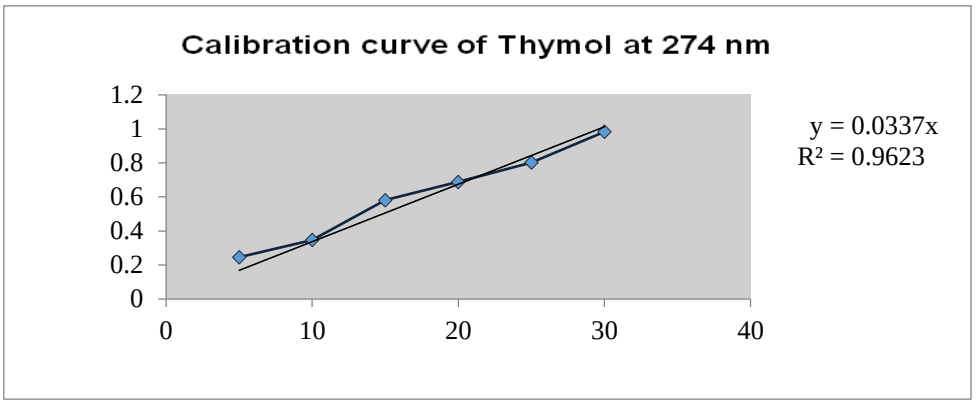


Fig.7 Calibaration curve of Thymol

E. Calibration curve of Eucalyptol.

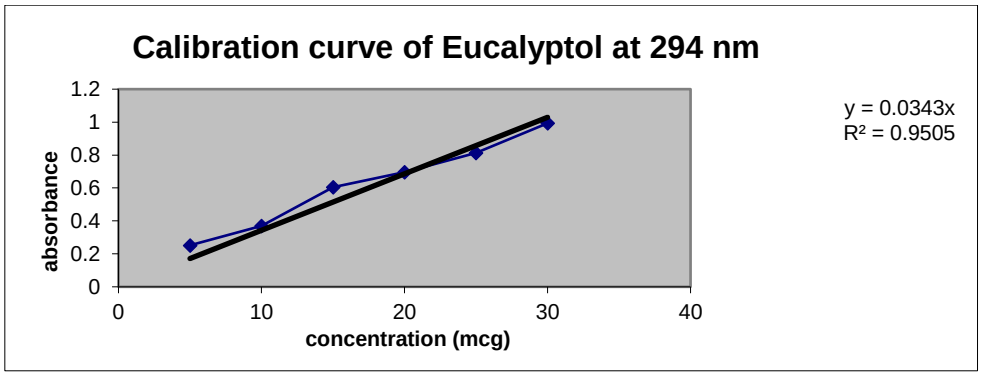


Fig.8 Calibration Curve of Eucalyptol

10. Evaluation studies of organogel[31,32]

1. Physical appearance

Appearance of Organogel observed visually

Formulation	Colour
F1	Pale White
F2	Pale White
F3	Pale white
F4	Cream
F5	Cream
F6	Cream
F7	Yellowish White
F8	Yellowish White
F9	Yellowish white

2. Spreadabililty[33]

The Spreadability of the prepared gel were carried out and the results are shown in table no.4

Table 4. Spreadability of the organogel

Formulation	Spreadability (Mean cm ±SD)*
F1	1.7±0.23
F2	2.4±0.11
F3	2.8±0.16
F4	2.5±0.12
F5	3.2±0.22

F6	3.9±0.36
F7	2.1±0.52
F8	2.4±0.23
F9	2.9±0.56
F10	3.6±0.56
F11	3.3±0.29
F12	3.1±0.28

3. Viscosity:

The viscosity of the optimized formulation of Organogel was shown in table no.5.10. Viscosity of F6 and was found to be 27000 cp.

Table no. 5 Viscosity of the optimized formulation of Organogel

RPM	**F-6**
8	**27000cp**

4. Drug Content:

The drug content in the formulation varied from 86.4-103 % which indicates that the drug was stable in each of the formulations.

Formulation	**Drug content (Mean % ±SD) ***
F1	78.63±0.17
F2	82.36±0.26
F3	86.27±0.49
F4	95.12±0.25
F5	99.0±0.39
F6	102.0±0.48
F7	90.21±0.45
F8	92.36±0.82
F9	93.18±0.24
F10	96.38±0.09
F11	98.26±0.27
F12	99.32±0.45

5. pH

pH was determined by utilising Digital pH metre of each compositions.

Formulation	pH (Mean ±SD) *
F1	6.2±0.6
F2	6.4±0.4
F3	6.5±0.3
F4	6.6±0.2
F5	6.9±0.1
F6	6.8±0.0
F7	7.1±0.3
F8	6.9±0.1
F9	6.7±0.1
F10	7.2±0.4
F11	7.1±0.3
F12	6.9±0.1

(n=3)

6. In-vitro Diffusion Studies of Organogels[34,35]

Table no. 6 In-vitro diffusion studies

Time	F1	F2	F3	F4	F5	F6
0.5	12.3±0.25	14.2±0.23	15.6±0.11	17.2±0.11	18.6±0.25	19.58±0.27
1	17.25±0.24	23.25±0.25	25.63±0.26	28.14±0.13	30.25±0.25	33.24±0.24
2	21.24±0.11	29.65±0.14	32.04±0.27	37.28±0.18	40.28±0.29	42.31±0.28
3	28.4±0.15	35.6±0.12	38.25±0.29	42.02±0.24	45.75±0.16	51.28±0.17
4	33.5±0.18	43.25±0.27	45.28±0.26	52.14±0.21	56.42±0.19	60.87±0.24
5	55.42±0.23	60.23±0.26	67.25±0.29	72.21±0.26	75.26±0.18	81.03±0.27
6	68.5±0.27	79.21±0.14	80.2±0.24	82.25±0.23	84.52±0.35	88.14±0.18
8	88.5±0.26	88.23±0.28	87.45±0.34	92.65±0.31	93.01±0.24	96.18±0.19

Table no.7 In vitro diffusion studies of Organogel

Time	F7	F8	F9	F10	F11	F12
0.5	21.3±0.25	24.2±0.23	25.6±0.11	27.2±0.11	28.6±0.25	29.58±0.27
1	34.25±0.24	35.25±0.25	36.63±0.26	38.14±0.13	39.25±0.25	40.24±0.24
2	41.24±0.11	42.65±0.14	43.04±0.27	45.28±0.18	47.28±0.29	49.31±0.28
3	50.4±0.15	52.6±0.12	53.25±0.29	55.02±0.24	57.75±0.16	55.28±0.17
4	61.05±0.18	63.25±0.27	65.280.26	67.14±0.21	69.42±0.19	70.87±0.24

5	72.42±0.23	74.23±0.26	76.25±0.29	77.21±0.26	79.26±0.18	81.03±0.27
6	83.5±0.27	85.21±0.14	87.2±0.24	89.25±0.23	90.12±0.35	92.18±0.18
8	90.5±0.26	90.23±0.28	92.45±0.34	93.65±0.31	94.01±0.24	95.18±0.19

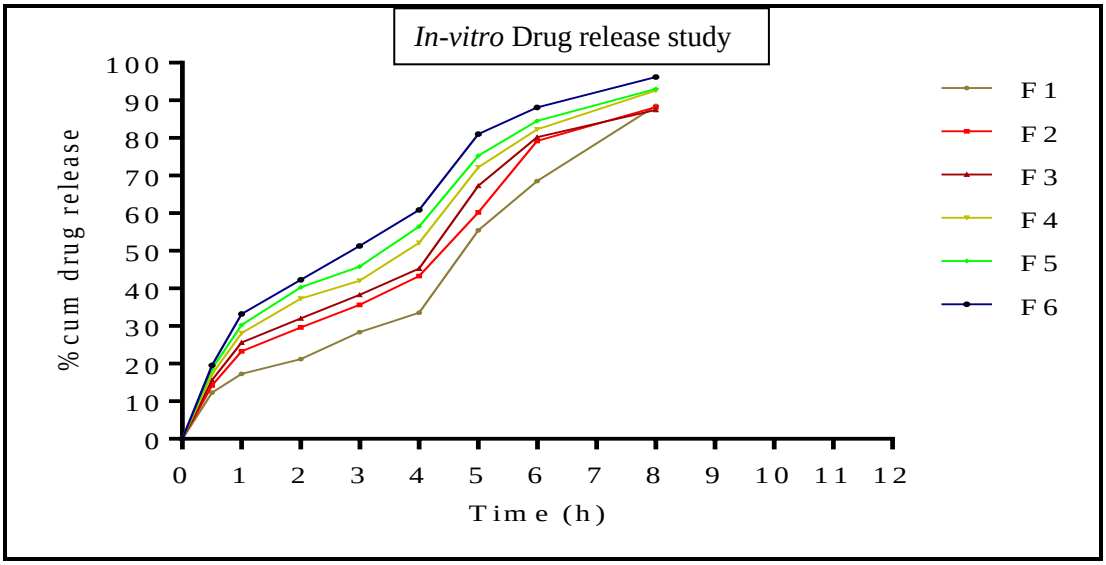


Fig.9 % cumulative drug release vs Time of Eucalyptol and Thymol organogel.

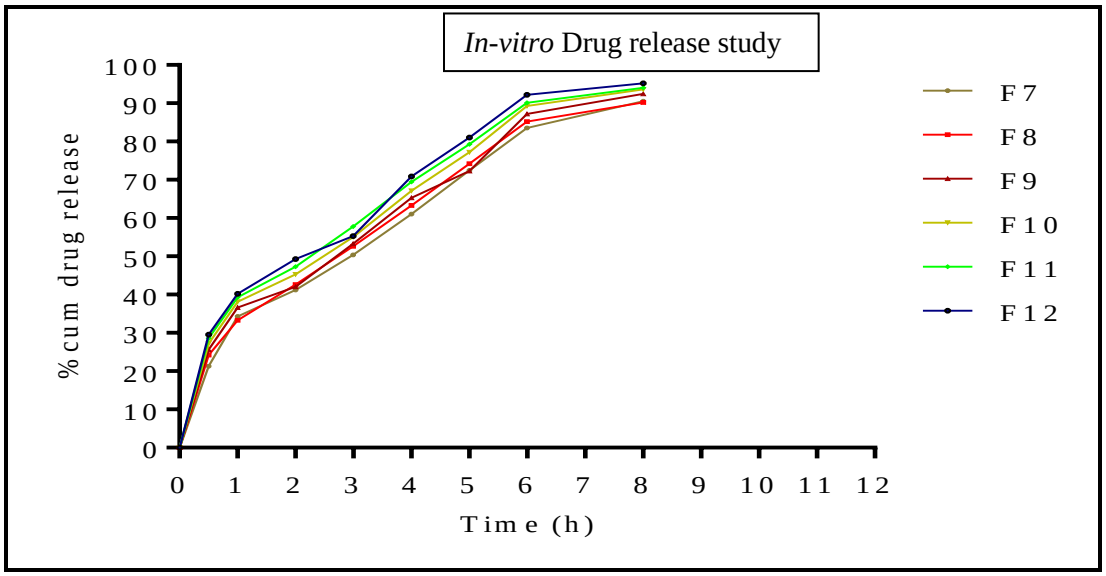


Fig.10 % cumulative drug release vs Time of Eucalyptol and Thymol Organogel.

7. Stability studies of Organogels[36]

No. of days	**Physical Appearance**	**pH evaluation**	**% drug content (Mean cm ±SD)***
Initial	++	6.8	96.18±0.02

30	++	6.8	96.18±0.03
60	+	6.5	94.25±0.16
90	+	6.4	93.56±0.24

*** Average of three trails**

(Table No.8 Data of stability study of formulation F6)

++ No change in color

\+ Slight change in color

11. Result and Discussion

Hydrophobic and acting as an anti-inflammatory, eucalyptol and thymol are found in volatile oils that have a relatively short biological half-life. Ingestion causes problems in the gastrointestinal tract, kidneys, and liver. Therefore, topical application of the medicine is necessary to counteract the aforementioned downside. Pre-formulation investigations compared the medication to the gold standard in terms of solubility and melting point. FTIR was used to test the compatibility of Eucalyptol and Thymol with a few different polymers, and the results were positive. Sodium alginate, guar gum, and xanthan gum were used in the formulation of organogel. The developed topical Organogel of Eucalyptol and thymol was put through a battery of physicochemical tests, including spreadability and in vitro release studies, to ensure its efficacy. Each formulation was determined to have a drug content of between 86% and 103%, and a pH of between 6-7. The Spreadability was excellent across all formulations. An ICH-required stability study was conducted on the final, improved formulation. Formulation F6 subjected to accelerated 40°C 2°C/70°F 5% RH testing. There was no discernible shift in colour, pH, or drug concentration. After all was said and done, it was determined that the Organogel formulation was an efficient drug delivery system. More research is needed to demonstrate the formulation's clinical efficacy.

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FORMULATION AND EVALUATION OF HERBAL TABLETS CONTAINING NYCTANTHUS ARBOR TRISTIS.

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Abstract

This review article aims to summarize the formulation and evaluation of herbal tablets containing Nyctanthes arbor tristis, commonly known as the night-flowering jasmine. Nyctanthes arbor tristis has been traditionally used for its various therapeutic properties, including anti-inflammatory, analgesic, anti-pyretic, anti-microbial, and hepatoprotective effects. The review discusses the formulation aspects such as selection of excipients, optimization of tablet manufacturing process, and evaluation parameters including physical characteristics, drug release profiles, and stability studies. Various research articles and patents related to the formulation of herbal tablets containing Nyctanthes arbor tristis are reviewed to provide a comprehensive understanding of the topic. The review concludes with insights into the potential challenges and future directions for the development of herbal tablets utilizing Nyctanthes arbor tristis..

Keywords: Nyctanthes arbor tristis, herbal tablets, formulation, evaluation, excipients, drug release, stability studies.

1. Introduction :

All around the world, natural ingredients have been employed as medications and cures for a variety of illnesses.They may be able to create a brand-new medicinal substance with excellent advantages and desired effects. Medicinal plants and their active ingredients have been utilised to cure illness and as a source of biologically active substances for several decades. These bioactive substances are utilised to create novel medications with distinct physiological effects on the human body. Because they contain organic molecules that have been demonstrated to be advantageous when compared to synthetics, natural bioactive compounds are the sign of safety.[1-3]The focus of current study is on arthritis; it has been demonstrated that the leaves of Nyctanthes arbor-tristis can treat arthritis and provide relief from fever, discomfort, and inflammation. The entire plant possesses anti-fungal, anti-diabetic, and anti-oxidant properties [4,5]. Arthritis, which is defined as inflammation of the joints, is a chronic autoimmune illness that can affect people of any age. Rheumatoid arthritis and osteoarthritis are the two most prevalent types of arthritis. Pain, soreness, stiffness, and swelling in and around one or more joints are common symptoms of arthritic disorders. The onset of the symptoms may be gradual or abrupt .[6]

Materials And Methods:

Material Nyctanthes arbor-tristis leaves were collected from the local area dried, powdered and used as an antipyretic, analgesic, anti-inflammatory to cure arthritis, joint pains etc. The excipients used in the formulation are Methylcellulose is used as disintegrate, Magnesium stearate is used as a lubricant, Lactose is used as the diluent, Talc is used as a lubricant and gives the pleasant appearance to the tablet, and Acacia, HPMC-K4M, Sodium alginate these three excipients are used as the binder for the preparation of wet granulation.

Methods :

Prepration Of dry powder of nyctanthes arbor-tristis Leaves :

Collection of fresh leaves Nyctanthes arbor-tristis leaves from local area. Use distilled water to wash the leaves. For a few days, leaves are dried at room temperature. The leaves are dried completely in a hot air oven. To create a fine powder, the dried leaves are gathered and ground in a mixer.

Preparation of 2% acacia solution : Take 200 ml distilled water in a beaker. Take 2 gm of acacia powder and mix in 200 ml distilled water. Stir continuously until all powder was mix properly.

Preparation of 2% HPMC-K4M solution: Take 200 ml distilled water in a beaker. Take 2 gm of HPMC-K4M powder and mix in 200 ml distilled water. Stir continuously to form a jelly-like appearance.

Preparation of 2% sodium alginate solution: Take 200 ml alcohol in a beaker. Add 2 gm of Sodium alginate powder in 200 ml alcohol. Stir properly to mix well.

Formulation of Herbal Tablets:

The formulation was done by following the wet granulation process .

Wet granulation method:

Wet granulation is a common technique used in pharmaceutical manufacturing to form granules by adding a liquid binder to a powder mixture. For herbal tablets containing Nyctanthes arbor-tristis (also known as the night-flowering jasmine or Parijat), wet granulation can be employed to improve tablet compaction, flowability, and uniformity of drug distribution. It involves several steps:

Material Selection: Choose suitable excipients such as binders, fillers, and disintegrants. Common binders include starch paste, gelatin solution, or cellulose derivatives.

Powder Mixing: Blend the herbal powder of Nyctanthes arbor-tristis with other excipients uniformly.

Wetting : Add the liquid binder gradually to the powder mixture while mixing until the powder particles adhere and form granules.

Granulation: Continue mixing until the wet mass reaches the desired consistency. The wet mass is then passed through a sieve to obtain granules of uniform size.

Drying: Dry the wet granules using appropriate methods such as tray drying, fluid bed drying, or oven drying to remove moisture.

Sizing: After drying, sieve the granules to achieve the desired particle size range.

Tablet Compression: Finally, compress the dried granules into tablets using a tablet press.

S.No.	Ingredients	Quantity		
		F1	F2	F3
1	Nyctanthes arbor-tristis	250 mg	250 mg	250 mg
2	Methyl cellulose	180 mg	180 mg	180 mg
3	Magnesium stearate	20 mg	20 mg	20 mg
4	Talc	8 mg	8 mg	8 mg
5	Lactose	40 mg	40 mg	40 mg
6	Acacia	2%	-	-
7	HPMC-K4M	-	2%	-
8	Sodium alginate	-	-	2%

Formulation table :

Evaluation :

1]Bulk Density :

Densities in bulk and tapped The mass of an untapped powder sample divided by the volume (which includes the interparticulate void volume) is known as the bulk density of a powder. A glass funnel is used to carefully pour sample powder extract into a cylinder, and the volume occupied is noted. [7,8]

BD = weight of the powder / quantity of the packing.

2] Tapped Density :

The tapped density is the increased bulk density obtained by mechanically tapping a container containing the powder sample. The tapped density of powdered extract is determined by mechanically tapping a graduated measuring cylinder or vessel. After detecting the initial powder volume, the measuring cylinder or vessel is mechanically tapped, and volume is measured until a small volume change is detected.[9,10]

TD = weight of the powder / tapped quantity of the packing.

3] Compressibility index :

The interactions between particles that affect a Powder's bulking characteristics are also responsible for

impeding powder flow; the relative significance of these interactions can be determined by comparing the bulk and tapped densities. Such a comparison, such as the Compressibility Index .

The following equation is used to calculate the dried powdered extract sample's .[7,8,9,10]

Carr's index (%) = [(TD – BD) x 100] / TD

4] Hausner's ratio:

It is the ratio of tapped to bulk density and turned into calculated through the use of the equation.[11]

Hauser's ratio = TD/BD.

5]Angle of repose :

Angle of repose is the maximum possible angle between the surface of the pile of powder and the horizontal plane. A funnel with 10 mm diameter is fixed at a height of 2 cm over the plane. Sample powder is slowly allowed to pass through it till the pile touches the funnel stem then a rough circle was drawn around the pile base and the radius was measured of the circle . The angle of repose is calculated using below mentioned formula:[7,8,9]

$\tan \theta = h/r$, therefore, $\theta = \tan^{-1} h/r$

M

Physical evaluation of tablets: The tablets were subjected to the following evaluation tests.

1) General appearance: The general colour and appearance of the tablets were determined visually.

2) Weight variation test : The weight fluctuation test was run using the guidelines provided. 20 tablets should be weighed separately and referred to as X1, X2, X3,... X20. Find the average weight of 20 tablets using the formula X= (X1+X2+X3+..+X20)/20. The weight of each individual was compared to both the upper and lower bounds. No tablet deviates from the average weight by more than twice the specified percentage error, and no tablet deviates from the weight average by more than two times that amount.

3) Hardness and thickness Test :

Tests for thickness and hardness Twenty pills were tested for thickness and hardness for each formulation. Vernier Callipers were used to measure tablet thickness, while Monsanto hardness testers were used to determine tablet hardness.

4) Friability Test :

Test for friability A Roche friabilator can be used in a laboratory to test the friability of tablets. The friabilator is made out of a plastic chamber that rotates at 25 rpm. The tablets are dropped into the chamber through a six-inch opening, and the device is then turned on for 100 revolutions. We weigh the tablets once more. It is deemed acceptable for compress pills to lose less than 0.5% to 1.0% of their total weight.

5) Disintegration time :

Disintegration duration The disintegration test measured simply the amount of time needed under specific conditions for a group of tablets to break down into particles; this test measured the amount of time needed for the tablet to separate into particles. This test was run to see if the tablet will dissolve within a given time frame.

Conclusion :

The Nyctanthes arbor-tristis was a traditional medicinal plant with a variety of uses, current studies have concentrated on its antipyretic, analgesic, and anti-inflammatory properties in relation to arthritis. Tablets were made with the powdered leaves. Wet granulation was carried out in three batches, designated F1, F2, and F3, utilising various binders. A pre-formulation investigation was conducted and the produced granules' flow characteristics were found to be good. The prepared tablet compression was assessed, and the findings were satisfactory. Comparing batch F3 to batch F1 and batch F2, the latter had a longer disintegration period. It is

determined from the findings that the formulation and evaluation are sound. To treat arthritis, a pharmacological examination is necessary.

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Herbal Cosmetics: An Overview

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A B S T R A C T

Since ancient times, medicinal and cosmetic products have been made from herbal plants. It is generally recognized that they have the ability to soothe, treat, and improve a variety of skin conditions. The herbal industry has made significant advancements since the turn of the twenty-first century. Because they are more readily available and have less adverse effects than chemical drugs, herbal components are recommended. Natural beauty is a blessing, and cosmetics help people exhibit and improve their aesthetic and personality traits. The skin and other body parts cannot be cared for by cosmetics on their own; active substances must be combined to stop skin damage and ageing. Depending on the kind of functional substances they include, cosmetics can have medical effects that influence how the skin functions biologically. The public has become very accustomed to utilizing herbal cosmetics. The popularity of herbal cosmetics has grown significantly among the general public. Due to regular usage in daily life, herbal cosmetics have been proven to be effective and intrinsically acceptable and to avoid the negative consequences frequently associated with synthetic products.

Keywords: Cosmetics, herbs, health, safety.

Introduction

Ancient humankind and civilizations have ideas about beauty and cosmetics. The term cosmetic comes from the Greek word "kosm tikos," which means to have the ability to plan and decorate. The cosmetics, according to the Drugs and Cosmetics Act is defined as articles intended to be rubbed, poured, sprinkled or sprayed on, introduced into or otherwise applied to the human body or any part for cleansing, beautifying, promoting attractiveness or altering the appearance. Typically, natural cosmetics and herbal cosmetics are used interchangeably.

Cosmetic Preparations are classified into following categories (1):

- Solid preparations: Talcum Powder, Face Powder, Compact Powder
- Semisolid preparations: Cream, Ointment, Liniments
- Liquid preparations: Hair Oil, Shampoo, Lotion, Mouthwashes, Sprays etc.

Herbal cosmetics are created by mixing one or more herbal substances with other cosmetic elements to treat a variety of skin conditions. Plants have a significant role in the creation of novel medicinal and cosmetic products. Products that contain herbs in their raw or extracted form are known as herbal cosmetics. (2) Herbs are unprocessed plant parts that may be whole, broken up, or pulverised up, such as leaves, flowers, fruit, seeds, stems, wood, bark, roots, rhizomes, or other plant parts. Along with plants, herbal materials also include fresh juices, gums, fixed oils, essential oils, resins, and dry powders of various herbs. In various countries, these materials can be made locally using a variety of techniques, such as steaming, roasting, or stir-baking them with honey, alcoholic beverages, or other seasonings. (3*)*The natural components in herbs have no negative impact on human health; rather, they give the body nutrition and other beneficial elements. Herbal cosmetics are available in a huge range and are produced and used on a daily basis. The general public loves using herbal cosmetics, including herbal conditioners, herbal shampoos, herbal face washes, and herbal soaps. The nicest part about herbal cosmetics is that they are made completely of herbs and shrubs. Despite the fact that many commercial cosmetic products presently contain natural compounds made from plant extract; this area of study is particularly fascinating. (4, 5)

Advantages of Herbal Cosmetics

The following advantages come with current herbal cosmetics' good maintenance of colour, odour, elegance, and efficacy:

- **Natural products**

The term implies that, herbal cosmetics are supposed to be all-natural and free of any potentially dangerous synthetic ingredients that might hurt the skin. These products employ various plant components and plant extracts in place of conventional synthetic products, such as aloe-vera gel and coconut oil. They also include natural nutrients like Vitamin E, which maintains healthy, radiant skin. For instance, Aloe vera is a naturally occurring herbal plant

species that is accessible and member of the Liliaceae family. Consumers who care more about substances like synthetic chemicals and mineral oils desire more natural goods that are devoid of dangerous chemicals and emphasize the benefits of botanicals. (6,7)

- **Suitable for All Skin Types**

Herbal cosmetics are appropriate for every type of skin. Whether you have dark skin or are fair, you may discover natural cosmetics like foundation, eye shadow, and lipstick that work for you. They can be used by women with sensitive or oily skin without compromising their skin's state. The primary worry with specific coal tar colorants (whether made from coal tar or synthetically) are that they can cause cancer. Coal tar is recognized as a human carcinogen and is used widely in cosmetics. Natural colors made from plants, however, are safer. (8)

- **Safe to use**

In comparison to traditional beauty products, using natural cosmetics is safe. They have been dermatologists-tested and dermatologist-proven hypoallergenic, making them safe to use anytime, anyplace. People don't have to worry about developing skin rashes or itching because they are comprised of natural substances. As an example, the synthetic antioxidants BHA (butylated hydroxy-anisole) and BHT (butylated hydroxytoluene), which are employed as preservatives in lipsticks and moisturizers, are closely related. BHA and BHT might cause adverse skin reactions. BHA has been identified as a potential human carcinogen by the International Agency for Research on Cancer. Natural antioxidants like Vitamin C are present in herbal cosmetics. (9,10,11)

- **Not Tested on Animals**

Some cosmetics are originally tested on animals to make sure they are effective and safe to use on humans. However, it is not necessary to test natural cosmetics on animals. Experts evaluate these natural compositions in labs using cutting-edge machinery without involving any animals. (3)

- **Wide selection to choose from**

Although natural cosmetics are still a relatively young category in the cosmetics market, they already provide an absurdly wide range of cosmetic options. There are several naturally formulated foundations, lipsticks, eye shadows, mascaras, blushes, concealers, and other cosmetics available. Additionally, natural cosmetics produced locally or cosmetics created by well-known international designers are available. Numerous herbal extracts are available, including Andrographis Paniculata (Kalmegh), Boswellia Serrata (SalaiGuggal), Asparagus Racemosus (Shatawari), Asphalt (Shilajit), and others. (12)

- **Affordable**

Natural cosmetics don't cost a lot. In certain cases, these items are less expensive than synthetic ones. During the sale, they are presented at a reduced price and are sold for a low cost. To find fantastic offers, one only needs to complete enough surveys. According to a WHO estimate, 80% of the world's population relies on natural goods for their healthcare due to the negative side effects and escalating costs of modern medication. Due to their accessibility, affordability, and relative safety, traditional herbal remedies are being encouraged and recommended by the World Health Organization in natural health care programmes. (13)

The requirements for basic skin care are as follows (14)**:**

- **Cleaning agent:** It clears the dirt, dead skin cells, and dust that clog skin pores. Vegetable oils including coconut, sesame, and palm oil are some of the popular cleaners.
- **Toners**: Toners aid to tighten the skin and shield it from various environmental pollutants and many of the chemicals that are present in the air. Witch hazel, geranium, sage, lemon, ivy burdock, and essential oils are a few of the plants used as toners.
- **Moisturizing**: Moisturizing makes the skin more supple and smooth. Those who moisturize have a healthy glow and are less likely to age. Vegetable glycerin, sorbitol, rose water, jojoba oil, aloe vera, and iris are a few examples of herbal moisturizers.

Herbal medicines used in various conditions

Turmeric:

Indians utilize turmeric in many of their festivities. Brides would apply turmeric on their bodies, especially at Hindu weddings, to give them a bright appearance. Babies are also given turmeric to rub on their foreheads for luck. In the past, women would apply turmeric on their cheeks to get a golden glow. Tropical South Asia is home to the rhizomatous herbaceous perennial turmeric plant (Curcuma longa), a member of the ginger family (Zingiberaceae). Currently, several sunscreen formulations incorporate turmeric. They have anti-inflammatory, anti-cancer, and antibacterial properties. Skin disorders such psoriasis, atopic dermatitis, face photo aging, alopecia, and acne. Due to its antibacterial properties, turmeric's antioxidants prevent free radical damage to skin cells and hasten the healing of all types of wounds. A dark yellow to orange powder is used to lessen the amount of UVB-induced sunburn cells in mice. (15-17)

Aloe:

A species of succulent plant belonging to the genus Aloe is aloe vera. Aloe, which has over 500 varieties, is widespread and is regarded as an invasive plant in many parts of the world. Traditional medicine use aloe vera as a skin treatment. Its usage is first documented in the fourth millennium BCE.

Additionally, the Juliana Anicia Codex from 512 CE makes reference to it. However, there is little scientific data on the efficacy or safety of Vera extracts for aesthetic or medical uses, and the favourable evidence that is available is frequently refuted by other research. Despite these drawbacks, some preliminary research suggests that aloe vera extracts may be effective in treating diabetes and an increased blood count in people. There is little and frequently conflicting scientific data supporting aloe vera's use in aesthetic and medicinal procedures. Despite this, advertisements for the beauty and alternative medicine sectors frequently promote the calming, moisturizing, and healing benefits of aloe vera, particularly online. Aloe vera is an extremely bitter and disagreeable meal. However, yoghurt drinks, and several sweets sold in stores contain vera gel as a component. Cosmetic businesses frequently add sap or other Aloe vera derivatives to items including cosmetics, tissues, moisturizers, soaps, sunscreens, incense, razors, and shampoos. Aloe vera seeds have also been considered as a potential source of biofuels.(18)

Coconut oil:

The dried kernel of copra, which contains 60–65% oil, is crushed to create it. Lower chain fatty acid glycerides are abundant in coconut oil. Coconut oil is made from the fruit or seed of the Arecaceae family coconut palm tree Cocos nucifera. Since coconut oil is easily used in liquid or solid form and has a melting point of 24 to 25°C (75-76oF), it is frequently used in baking and cooking. Coconut oil does wonder to soften and moisturise the skin. (19)

Jojoba oil:

It is a blend of long-chain, linear liquid wax esters that have been extracted from the seeds of Simmondsia chinensis, a desert plant in the simmondsiaceae family. Jojoba oil is frequently used in cosmetics as a moisturizer and as carrier oil for exotic perfumes since it can be readily refined to remove any odour, colour, and oxidative instability. Jojoba oil and human sebum are quite similar. Sebum serves as a natural barrier and moisturizer for the skin and hair, but it is worn away by toxins, pollutants, the sun, and the ageing process, leaving the skin and hair dry. Jojoba oil replaces lost nutrients and restores skin and hair to their natural pH balance. (20)

Neem:

Azadirachta Indica, sometimes referred to as neem, nimtree, or Indian lilac, is a member of the Meliaceae family of mahogany trees. The tree has several names in India, including "divine tree," "heal all," "nature's drugstore," "village pharmacy," and "panacea for all ailments." Neem is used to make a variety of products, including anti-helmintics. Neem also possesses sedative, antifungal, anti-diabetic, antibacterial, antiviral, and antiviral effects. It is regarded as a key component of Ayurvedic treatment and is particularly recommended for skin conditions. As an herbal cosmetic, Neem oil is used to make cosmetics (soap, shampoo, balms, and lotions) and is good for maintaining skin suppleness and treating acne. The neem tree is also very significant since it prevents desertification and could be an excellent carbon dioxide sink. Patients with chicken pox are advised to sleep on neem leaves by practitioners of traditional Indian medicine. Many different skin care products, body lotions, and face packs include the seed and leaf oils. The recipe is combined with additional all-natural substances. Since the market for herbal cosmetics is booming, neem oil producers everywhere are encouraged to produce high-quality neem oil for use in the cosmetics industry. (18)

Calendula:

Calendula officinalis has been found to possess exceptional antioxidant, anti-inflammatory, and wound-healing properties. According to a previous investigation, the primary constituents of the essential oil of calendula include thujene, pinene, 1,8-cineole, dihydrotagetone, and tmuurolol. Applying calendula tincture or solution topically to treat acne can reduce swelling, stop bleeding, and calm inflamed skin. The use of calendula cream or ointment to treat radiation dermatitis is supported by ‘limited evidence.’ (2)

Henna:

Henna is a dye made from the chemical lawsone, which is found in the Lawsoniainermis plant family Lythraceae and is processed to make henna powder. Gallic acid, glucose, mannitol, lipids, resin (2%), mucilage, and traces of an alkaloid are also found in addition to lawsone. Hennatannic acid and an olive oil-green resin, both soluble in ether and alcohol, are produced by the leaves. Lawsone fruit is palatable. Both the valuable oil that is derived from the fruit's seeds and pulp and used as a therapy for hair and scalp issues as well as the fruit's high vitamin C content are highly commended. It is utilized for things like children's illnesses, hair loss, and eye disorders. (21)

Amla:

The Indian gooseberry (Emblica Officinalis) tree is a native of the Middle East and India. Fresh and dried fruits from the plant are frequently used as ingredients in Ayurveda recipes. The high tannin content of Indian gooseberry fruit, which is frequently used in inks, shampoos, and hair oils, acts as a mordant to set colors in textiles and is said to nourish the hair and scalp and prevent premature graying of the hair. Amla fruit is consumed fresh or prepared into a variety of meals, including dal (a lentil preparation) and amla murabbah, a dessert created by soaking the berries in sugar syrup until they turn into candy. Be gone is often drunk following a meal. In the Batak area of Sumatra, Indonesia, the inner bark is utilized to give the broth of a traditional fish soup called holat an astringent, bitter flavor. (22)

Sandalwood:

The Indian sandalwood tree is a member of the S. album trees or bushes, a type of woody flowering plant of which Sanatlum album L. is the most well-known and economically valuable. The majority are parasitic roots that produce their own food but draw water and inorganic nutrients from the roots of other species. Several species, particularly S. albumin, produce extremely fragrant wood that is utilized in herbal medicine, scent, and perfume. In

Ayurvedic medicine, it is also utilized as a flavoring agent to control the inflammatory responses that cause certain skin ailments. It has also been employed as an astringent. It may be used as a mask, face pack, etc. (23-28)

Carrot

It is derived from the Apiaceae plant species Daucus carota. Due to its abundance in vitamin A and other vital vitamins, it has been regarded as a useful herb for centuries. A revitalizing, renewing, and anti-aging agent is carrot seed oil. Carrots contain -carotene, as well as trace levels of -carotene and -carotene, which give them their distinctive brilliant orange color. Humans partially metabolize and -carotene into vitamin A. (29)

Green tea:

The tea plant has been grown for a very long time in Asia. Green tea is produced only from Camellia sinensis leaves, a member of the Theaceae family. Green tea leaves include (2)-epicatechin (EC), EGC, (2)-EC-3-gallate, and EGCG, which is the most prevalent of the four main polyphenolic catechins. Green tea extracts or a specific green tea polyphenol (GTPP), particularly epigallocatechin (EGC)-3-gallate (EGCG), were found to inhibit two-stage chemical carcinogenesis, such as that caused by 7,12-di-methylbenz(a)anthracene [DMBA] and 12-O-tetra decanoylphorbol 13-acetate [TPA], as well as photo-carcinogenesis, which is brought on by UVB. It is a top-notch skin protector. It limits inflammation and guards against direct cell damage. Even Vitamin E cannot compare to the antioxidant properties of the catechins found in green tea.(30-33)

Rose Oil:

Rose Damascena and Rosa Centifolia, members of the Rosaceae family, provide the well-known essential oil known as rose oil. "Rose otto" is the name for rose oil that has undergone steam distillation; "rose absolute" is the name for the product obtained after solvent extraction. The use of it in perfumery is more frequent. Beta-damascenone, beta-damascone, beta-ionone, and oxide are the main flavouring substances that are responsible for the characteristic aroma of rose oil. (3)

Shikakai:

In Southern Asia's tropical rainforests, a plant known as Acacia concinna Linn. (Leguminosae) grows as a medicine. The fruits of this plant are used as a purgative, expectorant, emetic, and hair-washing agent in addition to promoting hair growth. There are saponins, alkaloids, sugar, tannin, flavanoids, and anthraquinone glycosides in the powder of Acacia concinna Linn. (34)

Brahmi (Bacopa monnoria):

The dried fruit of Reetha is used to make Reetha powder. It may be used as a face pack to lighten the skin on the face. It is applied to the hair to make it glossy and to enhance its beauty. Additionally, it eliminates head lice and dandruff. Additionally, it may be used to wash wool clothing and clean jewelery. It is utilized in herbal shampoos and Ayurvedic medicines. (3)

Multani Mitts (Fullers Earth):

It is Mother Nature's own baby powder. One of the first materials used as a beauty mask to pull oils from the skin, which are natural moisturizers for the hair, teeth, gums, and hair, was clay. to heal sunburn, unclog pores, clear the skin of flakes and grime, and eliminate pimple marks. (3)

Sunflower Oil:

This is non-volatile oil made from the seeds of Helianthus annuus, a member of the Asteraceae family. Lecithin, tocopherols, carotenoids, and waxes are all present in sunflower oil. It smoothes skin and is said to be non-comedogenic. Straightforward yet economical oil that has stood the test of time in a wide range of emulsions designed for face and body preparations. (2)

Almond oil:

The Prunus dulcis tree yields the almond oil. 78% of this fat is really found in almond oil. Super-unsaturated Omega-3 necessary fatty acids are present in extremely modest quantities in this oil. It softens and strengthens the hair and is incredibly nutritious. Additionally, almond oil shows to be an excellent cleaner. Before it became widely utilized as a commercial agricultural product, almond oil has been used for many millennia. (14, 35)

Saffron:

Crocus sativa, a member of the Iridaceae family of plants, produces saffron, which is made up of the stigmas and tips of the styles. It is a perennial plant cultivated in India's Jammu and Kashmir. Saffron powder is used as a flavor and coloring agent in culinary preparations because of its yellow hue and ease of solubilization in water. There are many carotenoids found in saffron, and crocin is a significant natural carotenoid. Picrocrocin, a flavourless bitter glycoside, is in charge of giving saffron its distinctive aroma. (14)

Herbs for skin care

Table 1: List of herbs used for skin care

Latin Name	Common Name	Part Used	Uses
Acoruscalamus	Sweet flag	Rhizome	Aromatic, Dusting Powder, skin Lotions
Allium sativum	Garlic	Bulb	Promote Skin healing, Antibacterial
Aloe vera	Aloe	Leaf	Moisturizer, sun screen Emollient
Alpinia galangal	Galangal	Rhizome	Aromatic, Dusting powder
Avena sativa	Oat	Fruit	Moisturizer, skin tonic
Azadirachtaindica	Neem	Leaf	Antiseptic, reduce dark spots, antibacterial
Cichoriumintybus	Chicory	Seed	Clear skin of blemishes
Citrus aurantium	Orange	Peel	Skin creams, anti-acne, antibacterial
Curcuma longa	Turmeric	Rhizome	Antibacterial, antimicrobial skin creams
Daucuscarota	Carrot	Seed	Natural source of Vit. A, creams
Rubiacordifolia	Manjistha	root	Wound healing, Lighten pigmentation

Herbs for Hair care

Table 2: List of herbs used for hair care

Latin Name	Common Name	Part Used	Uses
Aloe Vera	Aloe	Leaf	Moisturizer, shampoos
Azadirachtaindica	Neem	Leaf	Antif-atigue graying of
Citrus lemon	Lemon	peel	Prevent hair loss
Eclipta alba	Bhringraj	Plant	Promoting hair growth,
Shampoos, Hair oil	Emblicaofficinalis	Amla	Fruits
Hair care,	preventsgrayness, Anti	stress	Hibiscus rosasinesis
Lawsonia alba	Henna	Leaf	Hair growth,
Naturalconditiour	Marticariachamomilla	Chamomile	Flower

Conclusion

The need for herbal cosmetics has increased in the personal care industry nowadays, and they are widely used in daily life. The human body's aesthetic beauty is greatly influenced by the presence of strong teeth, glossy hair, and radiant skin. Herbal cosmetics are created by starting with a base of cosmetic components and adding a variety of herbal substances to cure various skin conditions and enhance beauty. The greatest solution for minimizing skin issues including hyper pigmentation, skin wrinkling, skin ageing, rough skin texture, etc. is to use cosmetic items. The market for herbal cosmetics is expanding quickly. Herbal cosmetics provide advantages such as low cost, no side effects, eco-friendly, safe to use, etc. Comparing the near future to synthetic cosmetics, it looks amazing. The herbal cosmetics industry will see great and considerable expansion as a result of proper regulation and standardization of these plants.

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Disclosure of conflict of interest

The authors report no conflicts of interest.

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