

A Review: Extracts and Fibres from Herbal Plant for Upper Respiratory Tract Infection (URTI)

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ABSTRACT

Colds are characterized as minor infections instigated by over 200 distinct viral strains. Rhinovirus is the most common cause for the flu which leads to congestion or stuffy nose. Medical wipes offer prompt symptom alleviation, best employed at the onset of cold symptoms for temporary relief. People with thyroid issue or high blood pressure should not take decongestants, the wipes help them to get rid from congestion or stuffy nose. The development of medical wipes for cold relief is a significant advancement in medicine and healthcare. A natural fiber extracted from the plant which is known for its various medicinal properties like antimicrobial, anti-inflammatory, antioxidant, antipyretic, insecticidal, analgesic, cytotoxicity, and hepatoprotective, purgative. These fibers are strong, lightweight, and highly absorbent, making them ideal for medical textile wipes. The wipes are designed to be used as a cold relief treatment and are infused with extract like eucalyptus globulus, chrysopogon zizanioides (vetiver), vitex negundo (nochi), coleusamboinicus (karpooravalli), ocimum tenuiflorum (Tulsi), Mentha spicata (pudina) to provide anti-inflammatory and antiseptic effects. These herbs have natural properties that can help relieve cold and flu symptoms. To extract the herbs, we can use various methods such as steam distillation, solvent extraction, or cold pressing. Once herbal extract is extracted, you can add it to the wipes to provide relief from cold and flu symptoms. This wipes are also designed to be biodegradable and compostable, making them more eco-friendly. The development of medical textile wipes with natural fiber is a promising advancement in medicine and healthcare which can be also used by children and can provide cold relief with minimal environmental impact.

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1. Introduction

The common cold, a common upper respiratory tract infection, is primarily caused by viral pathogens targeting the nasal and pharyngeal regions. Its clinical presentation is marked by a constellation of symptoms including rhinorrhea (runny nose), nasal obstruction (stiffness), sneezing, pharyngitis (sore throat), cough, and mild systemic complaints like myalgia (body aches). A comprehensive analysis of the etiologic landscape of the common cold reveals a diverse array of viral pathogens. Notably, rhinovirus, adenovirus, respiratory syncytial virus (RSV), coronavirus, influenza virus, and parainfluenza virus stand out as the predominant causative agents [1]. Rhinovirus and respiratory syncytial virus (RSV) are transmitted through direct contact with contaminated skin and environmental surfaces, highlighting the significance of hand hygiene and surface disinfection in prevention strategies [2]. Antimicrobial fibers play a crucial role in the production of wipes, offering enhanced hygiene and antimicrobial protection. Among these fibers, plant-based materials have garnered attention for their inherent antimicrobial properties. Examples include turmeric, Calotropis gigantea, hemp, kenaf, jute, and flax, which have demonstrated efficacy against various bacteria and fungi. In this review paper, we explore

the antimicrobial potential of these plant fibers and their applications in the development of antimicrobial wipes.

1.1. Cold

"Cold" refers to a common viral infection primarily affecting the upper respiratory tract, including the nose and throat. It is caused by various viruses, with rhinoviruses being the most common culprits. Rhinovirus and respiratory syncytial virus (RSV) are primarily transmitted through direct hand contact with contaminated skin and environmental surfaces, facilitating their spread. Rhinovirus and respiratory syncytial virus (RSV) are spread by direct hand contact with contaminated skin and environmental surfaces. This is followed by self-inoculation of virus into the nasal mucosa or conjunctive [2]. Rhinoviruses, single-stranded RNA viruses within the Picornaviridae family, represent the most prevalent etiology of the common cold, exhibiting remarkable antigenic diversity. This diversity is manifested by over 160 distinct serotypes classified according to their capsid protein composition, contributing to the frequent recurrence of colds throughout a person's lifespan. Influenza viruses stand out from other respiratory viruses due to two key characteristics. Firstly, they have the ability to generate novel strains that much of the population is not immune to, resulting in global outbreaks. This distinct trait of antigenic variation is known as antigenic shift or drift. Secondly, the emergence of the

deadly H5N1 influenza subtype in humans highlighted the potential for direct transmission between humans and infected birds, bypassing the need for an intermediate host [3]. The symptoms and indications of the common cold can resemble those of other ailments. Allergic rhinitis exhibits similar features, although it often shows seasonal patterns or clear allergic triggers and typically doesn't involve a sore throat. If a sore throat is the main concern, streptococcal pharyngitis should be taken into consideration. The Centor criteria can assist in determining the necessity for throat swabs and antibiotics [4]. The common cold represents a multifaceted human ailment stemming from a diverse array of respiratory viruses, making it a ubiquitous affliction with a broad spectrum of severity, ranging from inconspicuous infections to grave complications culminating in mortality. Numerous factors intricately interplay to influence the incidence and severity of colds, encompassing social dynamics such as crowding and sociability, as well as physiological and lifestyle elements including stress, tobacco usage, alcohol consumption, immune competency, gender, age, sleep patterns, seasonal variations, exposure to chilling temperatures, dietary habits, and physical activity levels. Within the framework of disease epidemiology, the common cold epitomizes the concept of the "iceberg," wherein a substantial portion of infections manifest with mild or even no discernible symptoms, while a subset progresses to more pronounced clinical presentations resembling flu-like syndromes or lower respiratory tract infections. This nuanced understanding underscores the breadth of the common cold's impact on public health and underscores the challenges in accurately gauging its true prevalence and burden[5]. The common cold, specifically the cough it induces through the rhinovirus, represents a fascinating interplay between viral exploitation and the body's natural defense mechanisms. Rhinovirus capitalizes on cough as a means to proliferate within the population, although the precise mechanisms driving this phenomenon remain somewhat enigmatic. Several theories have emerged to elucidate the mechanics of infectious cough caused by rhinovirus, encompassing the physical disruption of the epithelial lining, heightened mucus production, inflammatory responses, and modulation of neuronal pathways. Physical disruption to the airways, coupled with increased mucus production, and modulation of neuronal signaling, are all implicated in the heightened sensitivity to cough induced by rhinovirus infection. Dysregulation of the SPDEF pathway, a key regulator of epithelial cell differentiation and mucin production, may perpetuate a cycle of cough and tissue damage, ultimately leading to physical harm and excessive mucus secretion. Furthermore, neurogenic inflammation mediated by neuropeptides, particularly substance P, likely contributes to the heightened sensitivity to cough observed in rhinovirus-infected individuals. The effects of rhinovirus infection on cough are extensively investigated using in vitro cell systems, offering valuable insights into the diverse mechanisms underlying cough induction. These studies have led to the proposal of various hypotheses, each shedding light on different facets of the complex interplay between viral infection and cough hypersensitivity. In summary, the common cold cough induced by rhinovirus represents a sophisticated interplay between viral exploitation and the body's physiological responses. Understanding the intricate mechanisms driving cough induction is crucial not only for unraveling the pathophysiology of cold-related symptoms but also for developing targeted therapeutic interventions to

alleviate cough hypersensitivity and mitigate the burden of rhinovirus infections[6].

Table 1- viruses associated with common cold[1]

Virus	Percentage of case(%)
Rhinovirus	30-50
Coronavirus	10-15
Influenza virus	5-15
Respiratory syncytial virus	5
Parainfluenza virus	5
Adenovirus	<5
Metapneumovirus	±2
Undiscovered virus	20-30

1.2. Fibre

The utilization of antimicrobial plant fibers in wipe production represents a promising avenue for enhancing hygiene and sanitation. This review paper explores the antimicrobial properties of various plant fibers, including turmeric, *Calotropis gigantea*, hemp, kenaf, jute, and flax, against a spectrum of bacteria and fungi. By summarizing recent research findings, this review elucidates the potential of these plant fibers to serve as natural alternatives in the development of wipes with enhanced antimicrobial efficacy. Additionally, it discusses the mechanisms underlying the antimicrobial activity of these plant fibers, providing insights into their practical application in wipe manufacturing. Overall, this review highlights the significance of integrating antimicrobial plant fibers into wipe production processes, paving the way for the development of eco-friendly and effective hygiene solutions. Turmeric (*Curcuma longa*): A traditional herbal remedy revered for its diverse medicinal properties and cultural significance. It belongs to the Zingiberaceae family. The presence of curcumin, a polyphenolic compound, in turmeric extracts exhibits potent antimicrobial and antioxidant properties, making it a promising natural remedy. Therefore, the phenolic compound of curcumin is responsible for its antioxidant activities[7]. The antibacterial properties of various extracts from jute leaves were assessed using the agar well diffusion method against a range of pathogenic bacteria such as *Escherichia coli*, *Pseudomonas aeruginosa*, and *Bacillus cereus*. Jute, predominantly found in tropical and subtropical regions like Bangladesh, is traditionally cultivated for its fiber, but it also holds medicinal value. Studies have investigated the antibacterial potential of jute leaves, including their use in jute leaf[8]. The outcomes of this investigation revealed significant antimicrobial efficacy in kenaf seed, seed oil, and seed meal against a wide range of bacteria and fungi, indicating the potential antimicrobial characteristics present in kenaf fiber[9]. Natural fibers play a crucial role in addressing current environmental challenges through the development of biodegradable composites. This study investigates the potential of utilizing renewable and eco-friendly white *Calotropis gigantea* fibers as an alternative composite material. The extracted fibers undergo characterization via SEM, revealing a significant cellulose content (69.65 wt. %) and low density (558 kg/m³). Chemical analysis shows an average crystalline index (CI) of 56%, while morphological and surface roughness parameters demonstrate the fiber's ability to enhance bonding strength when used as reinforcement in polymer composites. Various samples are prepared, and tensile, compression, and flexural tests are conducted. The findings indicate that *Calotropis gigantea* fiber exhibits superior properties compared to glass fiber[10]. *Calotropis gigantea*, a member of the Apocynaceae family, produces eco-friendly "bowstrings of India" fiber, flourishing in arid regions without the need for fertilizers or

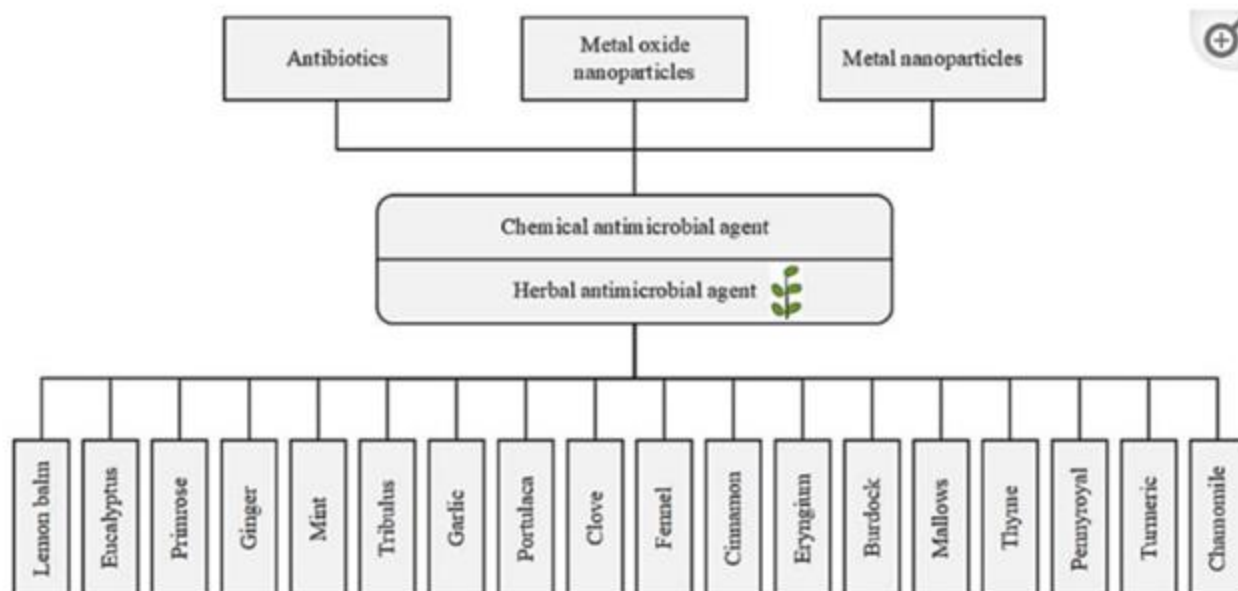


Fig 1 – Classification of antimicrobial agents [7]

cultivation. The stems hold promise for their strong, flexible fibers suitable for fabric production due to their abrasion resistance. Calotropis fibers undergo a processing procedure to extract them from the stems. The process involves drying, retting, and manual extraction from the bark. Due to their coarse nature, the fibers are blended with organic cotton to enhance comfort for wearers. The extracted fibers are then carded, spun into yarns, and woven into fabrics for various applications. This natural fiber offers a sustainable alternative for textile production[11]. Using natural fibers instead of materials like glass fibers, carbon, and talc offers various advantages, including lower density, cost-effectiveness, favorable specific mechanical properties, and biodegradability. Blending involves mixing different fiber masses to create a mixture with properties averaging those of its components. The primary motivation for blending is to achieve new and improved effects. This study, conducted in Assam in 2021, explored four different methods for extracting fiber from the peeled bark of tender stems of *Calotropis gigantea* plants, ultimately selecting chemical retting with alkali (NaOH) for investigation. The study examined the characteristics of blended yarns by combining *Calotropis* and cotton at varying ratios of 25:75, 50:50, and 75:25, presenting an innovative approach to textile material enhancement. Results showed that cotton yarn exhibited higher TPI and extension than blended yarns. The 50:50 blended yarn demonstrated greater tensile stress and lea strength, making it the finest among the blends. Additionally, cotton yarn displayed finer count, higher lea strength, and greater count strength product compared to blended yarns. The 50:50 blended yarn also exhibited a higher count strength product than other combinations[12].

1.3. Herbs

Herbs are plants that are valued for their flavor, fragrance, medicinal properties, or other qualities. They have been used by humans for thousands of years for culinary, medicinal, and even spiritual purposes. Herbs can be utilized either through plant extracts or by isolating and employing their active constituents to maximize their efficacy. While modern medicine offers a vast arsenal of powerful pharmaceuticals, herbs provide a natural and complementary approach to promoting overall health and well-being. They

can address a range of concerns, from boosting immunity and aiding digestion to reducing inflammation and promoting relaxation. The widespread utilization of herbal materials prevailed globally, attributed to their potent antimicrobial properties and foundational contributions to primary healthcare practices. This herbal remedy, native to the Mediterranean, Australia, and Tasmania, has been utilized in traditional medicine to treat various ailments such as diabetes, pulmonary tuberculosis, bacterial and fungal infections, as well as influenza [7].

1.4. Eucalyptus

Eucalyptus is a genus of flowering trees native to Australia, with some species cultivated elsewhere for their aromatic oil. While eucalyptus has a long history of traditional use for various ailments, including colds, scientific evidence for its effectiveness is mixed. Eucalyptus leaves contain compounds like cineole, which exhibit decongestant, antiseptic, and anti-inflammatory properties. When used for cold relief, eucalyptus can help clear nasal passages, soothe sore throats, and reduce coughing. One popular method of using eucalyptus for cold relief is through steam inhalation. Adding a few drops of eucalyptus essential oil or adding leaves to hot water and inhaling the steam can help clear nasal congestion and provide temporary relief from respiratory symptoms. Lately, heightened public awareness regarding hygiene has spurred numerous research endeavors into antimicrobial and antiviral substances. Nevertheless, the application of such agents must be restrained owing to potential toxicity or adverse impacts. In recent times, there has been a growing preference for herbal remedies over synthetic or chemical drugs, largely due to the milder side effects associated with traditional antibiotics. Herbal ingredients are commonly integrated into medicinal formulations, either as plant extracts or active constituents. Moreover, a significant portion of the global populace relies on herbal materials, drawn to their potent antimicrobial properties and fundamental healthcare advantages [7]. The genus *Eucalyptus* boasts a rich history of use in traditional medicine across various cultures. Among these species, *E. globulus* stands out for its unique biological and pharmacological properties. This versatile plant has found applications not only in traditional healing practices but also

in several modern industries. One of the most pressing concerns in healthcare today is the emergence of drug-resistant microbial pathogens. Bacteria like *Escherichia coli* (*E. coli*) and *Staphylococcus aureus* (*S. aureus*) are becoming increasingly resistant to conventional antibiotics, creating a critical need for alternative antibacterial agents. In this context, *E. globulus* essential oil presents a promising avenue for exploration. This essential oil, extracted from the leaves of the *E. globulus* tree, holds immense potential as a natural remedy for bacterial infections. By evaluating the antimicrobial activity of *E. globulus* essential oil against these prominent pathogens, this study aims to bridge the gap between traditional knowledge and modern scientific inquiry. The findings could pave the way for the development of novel therapeutic strategies that harness the power of nature to combat infectious diseases [13]. This document presents an exhaustive exploration of the pharmacological attributes inherent in *Eucalyptus Globulus*, a revered evergreen tree renowned for its medicinal prowess. Encompassing an extensive array of pharmacological activities, including anti-inflammatory, antimicrobial, antiviral, antioxidant, antidiabetic, repellent, antimalarial, stimulant, larvicidal, anti-plaque, antihistaminic, and Ayurvedic properties, it underscores the multifaceted therapeutic potential of this botanical treasure. Notably, the essential oil derived from *Eucalyptus Globulus* emerges as a key protagonist, showcasing its capacity to mitigate inflammation, particularly in airway conditions like bronchial asthma and chronic bronchitis, through the actions of constituents like Eucalyptol and 1-8 cineole. Additionally, its antimicrobial prowess against gram-positive bacteria, antiviral efficacy against Herpes simplex virus type I (HSV-1) and the Epstein-Barr virus, and antidiabetic effects further exemplify its diverse therapeutic repertoire. Moreover, the document sheds light on its utility as a repellent, stimulant, antiseptic gargle, and larvicide against mosquito species, underscoring its broad applicability across various medical domains. In sum, this comprehensive review delineates the multifaceted pharmacological landscape of *Eucalyptus Globulus*, illuminating its profound therapeutic potential and positioning it as a promising candidate for diverse medical interventions [14]. *Eucalyptus* trees are not just fast-growing sources of wood; their leaves, fruits, buds, and bark harbor a treasure trove of medicinal potential. Extracted eucalyptus oil boasts a remarkable array of properties, including antibacterial, antiseptic, antioxidant, and even anti-inflammatory and anticancer activities. This versatile oil has found its way into treatments for respiratory ailments, from the common cold and flu to sinus congestion. This paper delves deeper into the scientific understanding of eucalyptus plants, aiming to illuminate their full spectrum of health benefits and potential future applications [15].



Fig 2– Eucalyptus leaves

1.5. Nochi

Nochi, also known scientifically as *Vitex negundo*, is a plant with a long history of use in traditional medicine systems, particularly in Asian countries like India and China. It is renowned for its diverse therapeutic properties, including its potential to alleviate symptoms associated with the common cold. Nochi is known for its antipyretic, analgesic, anti-inflammatory, and immunomodulatory properties. These properties make it useful in alleviating symptoms associated with the common cold, such as fever, body aches, and inflammation of the respiratory tract. Nochi leaves contain bioactive compounds such as flavonoids, alkaloids, terpenoids, and phenolic compounds, which contribute to its medicinal effects. These compounds have demonstrated antiviral and antibacterial properties, which may help in combating the pathogens responsible for colds. In conclusion, Nochi possesses valuable properties that make it a promising herbal remedy for cold relief. Its long-standing use in traditional medicine systems, coupled with emerging scientific research, underscores its potential as a complementary approach to managing cold symptoms and supporting overall health and well-being. Plants serve as extensive sources of medicine in various medical traditions, including Ayurveda and Western allopathic medicine. While traditional medicine relies primarily on plant-based remedies, Western medicine is increasingly recognizing the significance of plant-derived ingredients in its formulations. *Vitex trifolia*, a plant rich in bioactive compounds found in its leaves, roots, flowers, and fruits, has been traditionally used to treat inflammatory diseases, fevers, and skin conditions, as well as rheumatic pain. Its pharmacological properties include antimicrobial, anticancerous, insecticidal, anti-inflammatory, and hepatoprotective activities. Research indicates that *Vitex trifolia* contains phytochemical constituents with antioxidant, anti-inflammatory, antimicrobial, anticancer, anti-asthmatic, and hepatoprotective properties. While these findings suggest potential applications in modern medicine, further research, especially in oncology and hepatology, is needed for substantial incorporation of these compounds into medical practice [16]. For countless centuries, herbal medicine has been utilized for therapeutic purposes. Among the diverse families of medicinal plants, Verbenaceae stands out, with *Vitex negundo* being a significant member renowned for its therapeutic benefits. This perennial plant, reaching heights of 10-15m, has been traditionally utilized to treat various skin ailments, including leprosy. Verbenaceae, also known as the Vervain family, comprises numerous genera and thousands of flowering plant species within the order Lamiales. Ongoing research into *Vitex negundo* underscores its potential for pharmaceutical applications, further highlighting the invaluable contributions of Verbenaceae to the medicinal field [17]. During the Covid-19 pandemic, traditional medicinal practices such as Homeopathy, Unani, Ayurveda, and Siddha have emerged as significant players. In rural areas of India, people have turned to the use of *Vitex negundo* (Nochi) leaves for steam inhalation to potentially control respiratory virus growth. This study delves into the chemical constituents of *Vitex negundo* leaves through in-silico analysis using docking tools like the Covid-19 online server and offline iGemdock software, aiming to predict future experimental biological activities. The online docking results suggest that compounds like Viridiflorol, Aromadendrene, β -Caryophyllene, and Globulol exhibit promising interactions with the Covid-19 main protease, with scores ranging from -5.50 to -5.90 kcal/mol. Similarly, offline docking scores

range from -50.33 to -26.09 kcal/mol against the Covid-19 protein 6LU7. Notably, these compounds demonstrate favorable efficiency compared to Remdesivir, a known antiviral medication. Remdesivir's docking scores against the Covid-19 main protease are -7.00 kcal/mol (online) and -16.64 kcal/mol (offline), which are comparable to the results observed for Aromadendrene, Viridiflorol, and Globulol [18]. The usage of nearly all parts of the Nochi plant is integral in crafting herbal remedies. Renowned for its array of medicinal properties such as anti-cancer, anti-microbial, anti-inflammatory, and hepatoprotective effects, among others, extensive scientific investigations have underscored its potential in managing various human ailments. Through rigorous experimental studies, *V. negundo* has demonstrated a multitude of biological activities, positioning it as a promising candidate for pharmaceutical development. However, before advocating for its clinical use, thorough clinical trials are imperative to validate its efficacy. In recent decades, there has been a surge in pharmacological research on medicinal plants, highlighting their significance as potential sources of therapeutic compounds and lead compounds in drug development. Thus, there is a pressing need to screen medicinal plants for bioactive compounds to pave the way for further pharmacological exploration [19].



Fig 3– Nochi leaves[32]

1.6. Vetiver

Vetiver (*Chrysopogon zizanioides*) is a perennial grass native to India, particularly prevalent in South India. It has been widely used in traditional medicine systems like Ayurveda and traditional Chinese medicine for its various therapeutic properties. In the context of cold relief, vetiver has been traditionally employed for its expectorant and antimicrobial properties. The essential oil derived from vetiver roots contains active compounds such as vetiverol, vetivone, and furfural, which contribute to its medicinal effects. The Vetiver root contains minimal lignin content, and its extract exhibits promising antimicrobial properties against pathogenic bacteria and fungi. Research indicates that higher concentrations of *Vetiveria zizanioides* extracts demonstrate superior antibacterial and antifungal efficacy compared to untreated or lower concentrations. Specifically, it demonstrates stronger antibacterial activity against gram-positive bacteria than gram-negative bacteria and greater antifungal activity against *Aspergillus niger* compared to *Candida albicans*. The presence of flavonoids, a type of phytochemical compound, contributes to its antimicrobial effects. Thus, exploring *Vetiveria zizanioides* extract represents a novel approach to effectively preventing

microbial penetration in textile materials[20]. Vetiver stands out as one of the most versatile and resilient types of grass. Its roots yield essential oils highly valued in the perfume industry. Across various cultures, different parts of the plant are employed to address a myriad of health issues such as mouth ulcers, epilepsy, and fevers. The extensive range of applications for vetiver underscores its status as a valuable natural resource. As awareness grows about the potential health benefits of herbs and botanicals, their popularity continues to rise, offering promising avenues for both prevention and treatment of various ailments [21]. Continuously seeking new drugs remains pivotal in the success of chemotherapy, particularly in addressing challenges posed by resistant strains. Investigating the ethanolic and aqueous extracts of the *Vetiveria zizanioides* plant, traditionally utilized in Indian folklore medicine for treating bacterial and fungal infections, researchers assessed their *in vitro* antimicrobial activity against pathogens including *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, and *Bacillus subtilis* using the disc diffusion method, alongside standard antibiotics. Both extracts exhibited toxicity against all tested bacteria, with the ethanolic extract demonstrating superior antibacterial activity compared to the aqueous extract. Minimum inhibitory concentration (MIC) assays were conducted, revealing *Vetiveria zizanioides* to possess greater antimicrobial activity against *Escherichia coli* and *Pseudomonas aeruginosa*. Phytochemical analysis detected flavonoids, glycosides, phenols, tannins, saponins, and alkaloids in the extracts. These findings support the traditional use of *Vetiveria zizanioides* in folk medicine for treating infectious diseases, with ongoing investigations focusing on isolating the active constituents responsible for its activity[22]. VEO (Vetiver essential oil) has benefits as antifungal, antibacterial, anti-parasite, anti-convulsion, sedative, anti-anxiety, antidepressant, antioxidant, anti-inflammation, analgesic, skin anti-aging, and cytotoxic against cancer. VEO can be useful in to treat neurological, psychiatric, dermatological, and musculoskeletal disorders [23].



Fig 4– Vetiver Leaves and Grass[33]

1.7. Tulsi

Tulsi, also referred to as holy basil, stands as a revered cornerstone in Ayurvedic medicine owing to its multifaceted health benefits. Among its numerous therapeutic properties, Tulsi's efficacy in assuaging symptoms of the common cold holds particular significance. In Ayurveda, Tulsi is celebrated

for its innate capacity to bolster the immune system, thereby aiding the body in combatting viral infections such as the common cold. Its potent anti-inflammatory and antimicrobial properties serve as formidable allies in mitigating cold symptoms, ranging from nasal congestion to sore throat. Moreover, Tulsi's rich content of essential nutrients and antioxidants not only expedites recovery but also fortifies overall respiratory health. Its versatile nature allows for consumption in various forms, be it as a tea infusion, herbal supplement, or incorporated into culinary dishes. Through centuries of traditional use and modern scientific validation, Tulsi continues to emerge as a potent natural remedy for alleviating the discomforts of the common cold, embodying the harmonious synergy between ancient wisdom and contemporary wellness practices. Plants have long served as a natural source of active compounds with antimicrobial properties, utilized globally since ancient times for treating various ailments. Consequently, researchers primarily focus on botanical sources, particularly herbs and spices. Tulsi, revered as a sacred plant in India, is cultivated for both medicinal and religious purposes. *Ocimum sanctum*, commonly known as Tulsi, boasts numerous beneficial properties, including antioxidative, antimicrobial, antistress, antidiabetic, and antiviral effects, earning it the title "Queen of Herbs." Widely utilized in the pharmaceutical industry, Tulsi, often in the form of extracts and oils, contains key secondary metabolites such as Eugenol, Linalool, β -Caryophyllene, Carvacrol, Apigenin, Rosmarinic Acid, and Urosolic Acid, derived from various compounds like alkaloids, phenols, glycosides, flavonoids, and terpenoids. Tulsi extracts exhibit inhibitory effects against a range of pathogens, including *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *E. coli*, and others, thereby preventing spoilage of fresh produce. Moreover, Tulsi's essential oil and extracts possess antiviral properties, making them valuable in medical applications and as ingredients in both food products and medicines [24]. Organic India, an organization committed to organic agriculture and sustainable development, highlights one of the key attributes of the Tulsi plant as its stress-reducing capabilities. Abundant in essential oils and antioxidants, Tulsi is highly effective in mitigating the impact of stress on the body. With diverse healing properties, Tulsi is not limited to traditional Hindu or Indian usage; its therapeutic benefits are now recognized by a wider audience. Acting as an adaptogen, Tulsi helps balance various bodily processes and plays a significant role in stress management. Extracts of Tulsi have long been utilized in traditional Indian Ayurvedic and Unani systems of medicine [25]. Tulsi, scientifically known as *Ocimum basilicum* L., and belonging to the Lamiaceae family, holds significant importance in Ayurvedic texts due to its medicinal and spiritual significance. Renowned for its therapeutic properties, it is widely utilized in traditional medicine to address various health issues. This study aimed to analyze the diverse phytochemical compounds present in tulsi leaves. By employing Soxhlet extraction, the powdered tulsi (50g) underwent separate experiments using methanol, ethanol, and distilled water as solvents. The array of medicinal constituents found in tulsi underscores its reverence in Hindu culture and beyond, contributing to a longer and more serene life. Revered as the "Queen of Herbs," tulsi holds both mythological and scientifically proven healing attributes, making it a valuable resource in promoting health and well-being across diverse societies [26].



Fig 5– Tulsi[34]

1.8. Karporavalli

Karpooravalli, also known as Indian borage or Mexican mint, is a remarkable herb renowned for its potent medicinal properties, particularly in alleviating symptoms associated with the common cold. Its rich heritage in traditional medicine underscores its efficacy in combating respiratory ailments and promoting overall well-being. This aromatic herb, with its distinctive camphor-like fragrance and succulent leaves, has been utilized for centuries across various cultures for its therapeutic benefits. Its leaves are a powerhouse of bioactive compounds, including essential oils, flavonoids, and phenolic acids, which exhibit powerful anti-inflammatory, antimicrobial, and antioxidant properties. In treating the common cold, Karpooravalli acts as a natural decongestant, helping to clear nasal passages and relieve respiratory discomfort. Its expectorant properties aid in loosening mucus buildup, facilitating easier breathing and promoting faster recovery from respiratory infections. Moreover, its immune-boosting capabilities bolster the body's natural defenses, enhancing resilience against cold viruses and other pathogens. The plant has a rich traditional history of use, but further research into its ethno-botanical uses is necessary to validate its therapeutic potential. Notably, it demonstrates enhanced efficacy when combined with other medicinal plants. A safe and nutritious garden plant, if proven effective through clinical trials for various diseases, could alleviate economic burdens and reduce adverse effects of current treatments. This perennial succulent herb, ranging from 30 to 90 cm in height, features a shrubby base, hairy stem, and aromatic, slightly hairy leaves with pale purplish flowers in dense whorls. Its pharmacological properties, including antimicrobial, antiasthmatic, and antioxidant effects, are attributed to various phytoconstituents like flavonoids, glycosides, and volatile oils such as Calvacrol and Thymol, making it promising for respiratory health and beyond [27]. Karpooravalli, a natural remedy derived from its fresh leaves, is widely employed to address various health issues, particularly colds and coughs. It is prepared by grinding fresh leaves and consuming them with water to alleviate respiratory discomfort. Additionally, it has a historical application in treating skin conditions, with the fresh leaf paste applied directly to affected areas, effectively healing wounds and boils. Moreover, for infants suffering from chest congestion, inhaling the vapors produced by boiling karpooravalli leaves or applying the juice directly to the chest provides relief. Furthermore, it is utilized to alleviate headaches by applying the leaf juice onto the forehead, a common practice in Tamil Nadu. Lastly, karpooravalli's properties extend to hair care, where it is

integrated into oil baths during winter to combat dandruff and prevent colds and headaches [28]



Fig 6– Karpooravalli[35]

1.9. Mint

Mint has long been celebrated for its potential therapeutic properties, particularly in alleviating symptoms associated with the common cold. With its refreshing aroma and invigorating taste, mint offers more than just a tantalizing sensation on the palate. This versatile herb contains compounds such as menthol, which exhibit antiviral and decongestant properties, making it a popular choice for combating cold symptoms. Moreover, mint's ability to soothe sore throats and ease nasal congestion has been well-documented through centuries of traditional use and modern scientific research. Its menthol content acts as a natural analgesic, providing relief from throat irritation and discomfort, while also helping to open up the airways, facilitating easier breathing. The increasing demand for aromatic herbs across various industries including biotechnology, cosmetics, medicine, and food has led to a rise in their market value. Peppermint (*Mentha piperita* L.) stands out as a significant medicinal herb, prized by both the medicinal and food processing sectors for its exceptional health benefits. While commonly used as a flavor enhancer in foods, its renowned antimicrobial and antioxidant properties have garnered global recognition. Due to its highly perishable nature and seasonal availability, peppermint requires drying to ensure year-round availability, thereby extending its shelf life and reducing packaging and transportation costs. Numerous studies have investigated the drying kinetics of peppermint and the impact of various drying methods on drying time, rate, and quality attributes such as color. This review highlights the extensive health benefits of peppermint, including its anti-viral, anti-bacterial, anti-inflammatory, anti-fungal, anti-asthmatic, spasmolytic, anti-headache, anti-septic, and radioprotective properties. Consequently, peppermint presents a promising avenue for future research and exploration, offering potential benefits for human well-being [29]. *Mentha piperita* L., commonly known as peppermint, stands as a venerable natural hybrid revered for its multifaceted therapeutic applications and versatile utility across diverse industries. Revered as one of the oldest medicinal plant species, this perennial herb is renowned for its prolific yield of peppermint oil, while also serving as a key ingredient in flavorings, cosmetics, and pharmaceutical formulations. Its leaves boast anatomical traits crucial for efficient oil extraction, further enhancing its appeal for commercial cultivation. Cryopreservation methodologies,

particularly employing controlled rate cooling and vitrification, have emerged as pivotal techniques for the effective storage of in vitro-grown peppermint plants, ensuring high recovery rates and genetic integrity. With an illustrious history steeped in both Eastern and Western healing traditions, peppermint remains esteemed for its astringent, antiseptic, and carminative properties, solidifying its status as a cornerstone of medicinal herbology. Peppermint extract exhibits a broad spectrum of antimicrobial activity against a multitude of pathogens, encompassing viruses such as Influenza A virus, Herpes simplex virus type 1 and 2, HIV-1, and Vesicular stomatitis virus. Furthermore, its antibacterial efficacy extends to combatting pathogens like *Staphylococcus pyogenes*, *Streptococcus pyogenes*, *Serratia marcescens*, and *Mycobacterium avium*. Peppermint oil also demonstrates antifungal prowess against fungi including *Trichophyton mentagrophytes*, *Fusarium moniliforme*, *Rhizoctonia solani*, and *Aspergillus niger*. Notably, its essential oils exhibit antiprotozoal effects against *Giardia lamblia* and anti-nematodal activity against *Meloidogyne arenaria* race 2. Additionally, peppermint oil inhibits the growth of pathogenic bacteria such as *Helicobacter pylori*, *Salmonella enteritidis*, *Listeria monocytogenes*, and *Staphylococcus aureus*. These remarkable antimicrobial properties position peppermint as a promising candidate for integration into various applications, spanning pharmaceuticals, cosmetics, and food preservation[30]. Mint, encompassing various *Mentha* species, presents a plethora of health-enhancing attributes, including but not limited to cancer prevention, anti-obesity, antimicrobial, anti-inflammatory, anti-diabetic, and cardioprotective effects, owing to its robust antioxidant profile coupled with its minimal toxicity and potent efficacy. Phytochemicals sourced from mint have exhibited notable anticancer properties against a spectrum of human cancers, spanning cervix, lung, breast, among others. Additionally, mint essential oils demonstrate cytotoxic potential, prompting apoptosis, curtailing invasion and migration capabilities of cancer cells, while concurrently showcasing antibacterial efficacy against diverse bacterial strains. These findings underscore mint's multifaceted therapeutic potential, positioning it as a valuable asset in promoting overall well-being and combating various ailments. The Genus *Mentha*, particularly species like *Mentha longifolia*, stands out for its remarkable antimicrobial properties. Extracts from *Mentha longifolia* have exhibited potent antibacterial effects against gram-negative bacteria such as *E. coli*, *P. aeruginosa*, and *S. enterica*. Furthermore, *Mentha* species have emerged as promising reservoirs of antifungal agents, crucial for combatting pathogenic molds; for instance, the essential oil of *M. spicata* has displayed significant inhibitory effects on *Fusarium oxysporum* growth in a dose-dependent manner. Beyond *Mentha*, research has underscored the antimicrobial potential of phenolic compounds present in various plants. Phenolic compounds identified in wild mushrooms and berries have demonstrated notable antimicrobial activity, alongside aromatic alcohols and other phenolic compounds, further broadening the spectrum of natural antimicrobial agents. These findings not only highlight the diverse applications of *Mentha* species and plant-derived phenolic compounds but also pave the way for the development of novel antimicrobial agents with promising prospects in medicine, agriculture, and food preservation [31].



Fig 7– Mint[36]

2. Conclusion

In conclusion, the development of medical textile wipes infused with natural fibers and herbal extracts represents a significant advancement in medicine and healthcare. These wipes, designed to alleviate cold and flu symptoms, offer a promising alternative for individuals seeking relief without the potential side effects associated with traditional medications, particularly those with thyroid issues or high blood pressure who cannot take decongestants. By harnessing the antimicrobial, anti-inflammatory, and antiseptic properties of herbs such as eucalyptus, vetiver, Tulsi, and pudina, these wipes provide not only symptom relief but also promote overall well-being. Furthermore, their biodegradable and compostable nature underscores a commitment to environmental sustainability, ensuring minimal ecological impact while addressing common health concerns. Moreover, the incorporation of plant-based antimicrobial fibers in these wipes adds another layer of protection, enhancing hygiene and reducing the risk of viral transmission. Through a comprehensive exploration of the diverse etiological landscape of the common cold and the role of various viral pathogens, it becomes evident that preventive measures, such as hand hygiene and surface disinfection, are crucial in mitigating the spread of infections. By leveraging the inherent antimicrobial properties of materials like turmeric, hemp, jute, and flax, these wipes not only offer relief but also contribute to broader efforts in infection control and prevention. In essence, the convergence of natural fibers, herbal extracts, and antimicrobial technology in medical textile wipes signifies a holistic approach to healthcare, prioritizing both individual wellness and environmental stewardship in the fight against common colds and respiratory infections.

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