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Preparing Herbal Formulations through Indigenous and Modern Methods: An Experimental Study

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Abstract: Traditional medicines can treat many problems because they are based on natural treatments. Because of their historical applications and useful treatments, numerous of these conventional medications have been the subject of extensive pharmacological research of their antibacterial, antiviral, and anti-inflammatory effects. Natural resources are frequently used as a primary or secondary source by academics and pharmaceutical corporations when developing new drugs. A wide variety of plants have long been used as a source of traditional medicine by people in many different cultures. Numerous research have examined the possible antibacterial and antiviral properties of these plants. Since there are so many different kinds of natural sources, including plants, choose the proper one as a starting point is crucial for accurate screening results. Due to their, "effectiveness in treating diseases and lower risk of side effects than synthetic treatments, the usage of plant-based medications has significantly expanded in the modern world. The current study was aimed to confirm the identity, quality and purity of some locally available potential medicinal plants such as Drymaria cordata (whole plant), Alstonia scholaris (bark), Hydrocotyle sibthorpioides (whole plant), Centella asiatica (whole plant), Senna hirsuta (leaf), Oroxylum indicum (bark), Senna occidentalis (leaf), Stephania japonica (tuber) and Solanum indicum (root) in powdered form".

The powdered plant components underwent preliminary phytochemical analysis as well as pharmacognostic tests, physical evaluation and heavy metal analysis. Initial phytochemical study of the various extracts indicated that triterpenoids were absent, but alkaloids, phenolics, carbohydrates and amino acids were present. The powder was studied under a microscope to reveal its, "distinguishing characteristics, including calcium oxalate crystals, fibres, stone cells, trichomes, stomata, xylem vessels, pitted spiral vessels, etc. The colour, smell, fragrance, and texture of the ground plant were all acceptable. The physical characteristics that affect the flow rate of the powder with respect to Carr's index and Hausner's ratio were found to be good to passable, with the exception of Hydrocotyle sibthorpioides (the complete plant) and Oroxylum indicum (bark), which were not easily passable. During the heavy metal test, lead, cadmium, and bismuth were not found. As a result, the current study may be utilised as a benchmark reference for the quality control analysis of the herbal medicine, either alone or in combination".

Keywords: Natural Compounds, Traditional Medicine, Historical Remedies, Plants

Introduction:

The immune response to a respiratory tract infection is a double-edged sword that contributes to many of the symptoms associated with these illnesses, even while the bacterium releases cytokines and chemokines that may induce persistent inflammatory reactions (Ball et al., 2002). An organic and crucial component of the host's defence is the phagocytosis of an invading pathogen by inflammatory cells. But a large body of evidence suggests that the byproducts of these inflammatory cells have harmful consequences over a broad

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spectrum. Products like these may increase mucus formation and impair ciliary clearance, which both may cause an infection to worsen or even recur.

The immune system may paradoxically become less robust while secondary inflammatory cells become more active as a result of primary inflammatory cell byproducts. These results suggest that altering the immune response may be a crucial component of a comprehensive respiratory tract infection therapy strategy (Butler and Buss, 2006). The main defence mechanisms are the mucociliary escalator and secretions made by the lungs, which trap and eject invasive germs. Lung secretions contain immunoglobulin A (IgA) systems, a class of microorganism-inhibiting proteins that function to prevent bacteria from adhering to epithelial cells, limit their growth, and, when possible, destroy them. By boosting neutrophil infiltration of the airways and thus increasing mucus formation, neutrophil elastase may contribute to the pathogenesis of pulmonary illnesses. The production of mucus is increased, and the frequency of ciliary beats is decreased, which are significant indicators of chronic lung disease.

A neutrophil elastase inhibitor can counteract the ciliary beat rate slowing brought on by secretions produced in response to an acute bronchial infection. Patients with chronic inflammatory airway disease had interleukin-8 (IL-8) levels in their sputum that were above normal. IL-8 is a potent neutrophil chemoattractant that is quickly generated by activated macrophages and epithelial cells. Traditional medical practises have long relied on the anti-inflammatory effects of naturally occurring medicines. The anti-inflammatory properties of natural products can take many different shapes. These consist of corticosteroid-like actions, the suppression of further inflammatory mediators, and a reduction in prostaglandin synthesis.

Materials and Methods

Plant materials: Various parts of the Bodo were used to collect plants like, “Alstonia scholaris (bark), Drymaria cordata (whole plant), Centella asiatica (whole plant), Oroxylum indicum (bark), Hydrocotyle sibthorpioides (whole plant), Solanum indic (root), Senna hirsuta, Senna occidentalis (leaf), and Stephania japonica (tuber)”. However, “the voucher specimens were deposited with the Botanical Survey of India's Central National Herbarium in Howrah for final verification and identification (CNH/Tech.II/2021/42, dated 26.11.2021). The plant parts were washed, dried in the shade, mechanically powdered, sieved through a sieve with a mesh size of 600 m, and then stored in airtight glass bottles for further research”. According to the following description, the nine plants selected for the current study are:

a) The botanical name Centella asiatica (L.) Urb. is sometimes referred to as Manimuni geder (Bodo), Indian Pennywort, and Asiatic Pennywort. It is a herbaceous plant of the family Apiaceae that is indigenous to several nations in Africa and Southeast Asia, including India, China, Indonesia, and Malaysia. Both as a vegetable and a herb for health purposes, Centella asiatica has been employed.

C. asiatica is used to treat liver disorders and has medicinal properties that include those that are anti-cancer, anti-bacterial, anti-fungal, anti-inflammatory,

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neuroprotective, antioxidant, wound healing, anti-depressant, cognitive function, anti-diabetic, central nervous system, skin, and gastrointestinal disorders.

b) Drymaria cordata (L.) Willd. ex Schult, also known as Jabsri in Bodo and chickweed in English, is a member of the Caryophyllaceae family and is a native of tropical America. It is widely dispersed in Northeast India. It is typically regarded as a garden weed, but it has a variety of medicinal uses, including the treatment of throat pain, constipation, throat infections, and snake bites. It has also been said to have antibacterial and antitussive properties, which can be used to treat sinusitis, acute colds, and various skin and digestive problems. D. cordata's analgesic and antipyretic abilities are widely known.

c) The perennial herb Hydrocotyle sibthorpioides Lam., a member of the Umbelliferae family, is found throughout most of Asia and Africa. In Bodo, it is referred to as Manimuni pisa and in English as Lawn pennywort. It has long been used by people in India and China to cure a variety of diseases and problems. In addition to these conditions, H. sibthorpioides is frequently used to treat carbunculosis, rheumatalgia, coughing, liver issues, dysentery, sore throat, psoriasis, oedema, herpes zoster, and dysentery. Additionally, it has anti-inflammation and anti-chikungunya virus properties.

d) An evergreen tree in the Bignoniaceae family is called Oroxylum indicum (L.) Kurz. The Indian trumpet tree and Midnight terror are two of its more well-known names in Bodo. It is indigenous to India, as well as Bhutan, some regions of China, Indo-China, and the Malesia region, all of which are located on the foothills of the Himalayas. It is used for the treatment of headaches, epilepsy, muscle discomfort, general health issues, hepatoprotective, purgative, fever, gastritis, hypertension, liver issues, and fever with purging effects.

e) The plant Senna hirsuta (L.) Locally known as sumu bipang (Bodo), H.S.Irwin & Barneby is a type of Fabaceae family woody annual shrub. It is indigenous to Africa and has a long history of use as a medicinal herb for a number of illnesses. According to reports, this species can treat human and livestock bone fractures. It has hepato-protective, anti-diabetic, and antibacterial qualities in addition to being effective in treating rheumatism, hypertension, indigestion, skin conditions, fevers, biliousness, ringworm, dropsy, and eczema.

f) The Fabaceae family plant Senna occidentalis (L.) Link is found all throughout the tropical and subtropical regions of the earth. In Bodo, it is referred to as gangrim bipang, and in English, septic weed or smelly weed. S. occidentalis is a typical addition to or replacement for coffee. Scavenging abilities, larvicidal and mosquitocidal capabilities, antioxidant and antibacterial, anti-inflammatory, immunosuppressive, anti-anxiety, anti-depressant, analgesic, anti-diabetic, and antipyretic activities are all said to be present in it.

g) Indian nightshade and Kuntainara are two common names for Solanum indicum (L.) Kurz, a member of the solanaceae family. Indian subtropical and tropical regions frequently include this species. It is used to, “treat a variety of conditions including pruritis, anorexia, abdominal pain, worm infestation, fever,

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inflammation, and pain. It is also used to treat bronchitis and asthma, blood and sexual issues, bronchitis, and urinary diseases".

h) The Menispermaceae family of plants includes Stephania japonica (Thunb.) Miers, sometimes known as snake vine, tape vine (in English), and dibaolu (in Bodo). It is a thin, twining shrub with Australian and Asian origins that is widely distributed in Northeast India. It has been approved for the treatment of asthma, cancer, diarrhoea, dysentery, dyspepsia, hepatitis, itches, malaria, urinary illness, stomach ache, TB, fevers, and has mild antioxidant and significant analgesic properties.

Preparation of Extracts: In a "Soxhlet apparatus, individual plant powders were extracted one at a time using double-distilled water (1:10 w/v ratio of sample to solvent). Six hours of boiling-temperature extraction later, it was evaporated under pressure at 50 °C. The extract was maintained at 4 °C for the duration of the experiment".

Organoleptic Parameters: The attributes of crude, including appearance (colour and texture), aroma, and taste, were examined and described using sensory impressions in organoleptic evaluation. On how the utilised sensory organs responded, this experiment's findings were drawn.

Microscopic Study: The plant materials were ground into a powder for the investigation, put on clean slides with water and safranin, and examined under a binocular microscope for various properties in fragmented form (LaboMed vision 2000).

Antimicrobial Properties of Plants: It has been demonstrated that the essential oil of Western red cedar (Thujaplicata) prevents the influenza virus from producing the cytokine IL-6 in human lung cells and the replication of a number of respiratory virus strains. While it is possible to treat respiratory illnesses by inhaling the vapours of some essential oils at low concentrations, nasopharyngeal or oral administrations of liquid essential oil phases are frequently more irritating and may even be dangerous (Shafran et al. 1996).

Due to the complexity and diversity of the pathogens involved as well as the frequent incidence of infection in the respiratory system, a mix of pathogens is often present in instances of respiratory tract infection. Pharmaceutical businesses and researchers frequently use natural chemicals as a primary or secondary resource while looking for novel medicines. In many nations, plants have long been employed in conventional medical operations. Iwu, Duncan, and Okunji (1999) and Cowan (1999) also investigated into the possible antiviral and antibacterial effects of these plants.

Methodology

Natural compounds are being used more frequently to develop novel medications for respiratory infections because of their, "antibacterial action as well as their other qualities, like their high vapour pressure, low toxicity, and potential for anti-inflammatory effects (Das, Tiwari, and Shrivastava, 2010). In addition to the roles played by the microorganisms in the pathophysiology of these ailments, the inflammatory process has a significant role in the persistence and recurrence of

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respiratory infectious diseases (Matuand Van Staden, 2003)". These criteria are used in the present study to evaluate the effectiveness of producing herbal formulations using the currently accessible techniques.

Discussion of Results

Due to the fact that traditional medicines usually employ natural remedies, they can treat a wide range of disorders. Incense, tinctures or other alcoholic extracts, water extracts, and other methods all make use of natural sources. Numerous pharmacological studies have been conducted on the antibacterial, antiviral, and anti-inflammatory characteristics of these conventional medicines because many of them have been used successfully in the past (Das, Tiwari, and Shrivastava, 2010). For those who are interested in the function of plants and the chemicals found in them in the treatment of inflammatory and infectious disorders, there are numerous resources available (Konstan, Vargo, and Davis, 1990).

"Traditional medical practises frequently include aromatic and fragrant herbs, several of which have been shown to have strong antibacterial and antiviral activity. Asthma, the common cold and other respiratory conditions (Barnes, Belvisi and Rogers, 1990)". Due to the site specificity of aerosol delivery systems and allopathic medications, the therapeutic ratio for respiratory illnesses may be significantly increased (Lopez, Sanchez, Batlle and Nerin 2005).

Conclusion

An intriguing area of natural product research is the hunt for new therapeutic compounds for the prevention and treatment of various illnesses. Starting with the best natural source that is readily accessible—which includes plants—will produce accurate screening findings. In order to appreciate the logical uses of these sorts of interventions in the prevention, detection, and treatment of disease, scientists have examined the relationship between the chemical makeup of natural substances and natural treatments. There is a lot of debate over whether essential oils can be used in supplemental or exploratory studies due to the large variety of chemical compositions that they can have. A good grasp of the relationship between the plant family and the potential impacts is useful for researchers and medical professionals.

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