A CLASSICAL REVIEW ON ANTI-ULSAR MEDICINAL PLANT LAGHUDUDHIKA (*EUPHORBIA THYMIFOLIA*)

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(Received on Date: 11th May 2017 Date of Acceptance: 29st July 2017)

ABSTRACT

The oldest remedies known to mankind are herbal medicines. India is known worldwide for its Ayurvedic treatment. *Euphorbia thymifolia* L. (*Euphorbiaceae*) is a small branched, hispidly pubescent, prostate annual herb, commonly known as *laghududhika* or *choti-dudhi*. *Euphorbia thymifolia* is often used traditionally for female disorders, respiratory ailments (cough, coryza, bronchitis, and asthma), worm infestations in children, dysentery, jaundice, pimples, gonorrhea, digestive problems, and tumors. It is reported to contain alkanes, triterpenes, phytosterols, tannins, polyphenols, and flavonoids. The present work is an extensive review of published literature concerning clinical activity and ethano pharmological activity,phytochemical and biochemical, nanotechnology, antioxidant and antimicrobial, pharmacological ethnobotanical and environmental potential of *E. thymifolia*. Data was searched and designed using various review modalities manually and using electronic search engines with reference to all aspects of *E. thymifolia* and was arranged chronologically. This will be helpful for researchers to focus on the priority areas of research yet to be explored and to find out new chemical entities responsible for its claimed traditional activities.

KEY WORDS:laghududhika, *Euphorbia thymifolia*phytochemical, anti-microbial, anti-oxidant.

No: of Figures : 3 **No: of References: 61**

INTRODUCTION

The traditional medicine involves the use of extracts of various plants, which are found to have various medicinal properties. Not only the traditional medicine like Ayurveda and Siddha use these plant extracts, but in recent times the allopathic medicine is focusing on using plant ex- tracts to develop medicine which shows more improvement and cures the disease without any side effects. *Euphorbia thymifolia Linn*. is usually referred to as laghududhika or chotidudhi. *E. thymifolia* belongs to the family Euphorbiaceae, which has around 7500 species in about 300 genera. The plants under *Euphorbia* genus are used to treat cancer, migraine, warts, intestinal parasites, tumours, etc. The use of *E. thymifolia* in curing many ailments are increasing as more and more properties of this plant is being found due to advanced research. The *E. thymifolia* is found in tropical regions, but it is absent in North Australia. (Prabha T, and Singh S.K, 2005 ;) This plant is present in the wastelands, along roadsides and wall sides in humid conditions, abandoned fields, etc.(Ramakrishnan P.S,1965;) In India, the plant is found in the hills and plains. *E. thymifolia* is found usually two ecotypes as green and red forms. The traditional use of this *E. thymifolia* is mainly due to its actions involving laxative, aromatic, sedative, blood purification, anti-viral, anti- helminthic, anti-inflammatory, anti-spasmodic, anti-fungal, anti-bacterial, anti-microbial, diuretic properties(Jabbar A, Khan, G.A.M.S,1965;) etc.*Euphorbia thymifolia* is commonly known as *laghududhika* or *chotidudhi*.(Anonymous,2003, Nadkarni, K.M, Nadkarni,A.K 2007;).Actually, 70% of drugs approved between 1940 and 2002 are either natural products or have been developed based on knowledge gained from natural products.[6]Depending on the primary information available on this plant, further studies such as phytochemical and pharmacological standardization of extracts, isolation and identification of active constituents, pharmacological studies on isolated compounds, mode of action, formulation development, clinical and toxicological efficacy etc.

Plant description

Fig-1 *Euphorbia thymifolia*

Fig-2 Flower of *Euphorbia thymifolia*

Softly hispid prostrate herbs. Stem puberulous, slender, cylindrical, pale green but often pink in colour when fresh, becoming greyish green or dark purplish on drying. Stems are with white latex, spreading on the ground, 10-20 cm in length with a diameter from 1 to 3 mm; branches radiating, slender, reddish and pubescent. Leaves are simple, opposite, elliptic, oblong or ovate, 4-8 mm long and 2-5 mm wide with rounded apex, oblique base, small, unequal sided at base. The petiolate, 3-6 mm long, 2-4 mm wide, mostly green, but often coppery red when fresh, becoming grayish green or dark purplish on drying. The lamina is oval-oblong or obliquely oblong. Cyathia in axillary clusters. Involucre campanulate, c. 8 mm long; glands 4. Male flowers 1-4, bracteolate. Female laterally pendulous; ovary tomentose; style 3-forked from base. Fruits are ovoid-globose, acutely 3-lobed, almost sessile capsule 1 mm × 1 mm base truncate, short-hairy. They are cocci when mature. Seeds are conical, log, ovoid and obtusely quadrangular, up to 1 mm long, acutely 4-angled, reddish brown without caruncle. (Philippines, Dudhika. Gabriëlla HS and Ameenah GF, Khare CP. Dugdhika.)the treatment of various infectious diseases because microbial resistance against conventionally used synthetic antimicrobial agents is increasing with an alarming rate (Ge Y, Difuntorum S, Touami S, *et al.,* 2002;Nair R, Chanda S 2005; Neogi U, Soumya R, Mishra RK, *et al.,*2008;) Survey study has revealed that almost all the microbes have developed resistance against all introduced antibiotics.(Eloff, J.N,2000;). Methicillin resistant Staphylococci, vancomycin resistant Enterococci, penicillin resistant Pneumococci and gramnegative microbes having multi-drug resistant, are the prominent examples of the drug resistance. *Euphorbia thymifolia Linn;* (Euphorbiaceae) in Ayurveda is called as Chhoti dudhi, laghu Dudhika, in English - chicken weed, red caustic creeper, asthma plant, in unani Dudhi khurd (Gupta Band Srivastava R 2007;)It is a small annual herb, more or less hispidly pubescent; stems prostrate, divaricately branched, slender, cylindric, more or less hairy. Leaves opposite, very small, numerous, 3-6 by 2.5-4mm., obliquely oblong or elliptic-oblong, rounded at apex, crenulate, glabrous above, glaucous and usually slightly pubescent beneath, base rounded, very unequal-sided; petioles very short; stipules fimbriate. Involucres axillary, solitary or 2-3 in an axil, campanulate, 0.8mm. long, obtusely keeled, pubescent; styles short, 2-fid. Seeds 1.25mm. long, quadrangular, bluntly pointed, with 5 or 6 transverse furrows (Kritkar KR and Basu BD 1975;)*Euphorbia thymifolia* Linn is commonly known as duddhi & is grown in India. It belongs to family Euphorbiaceae. The plant is bitter, acrid, sweet, thermogenic, and laxative, diuretic. It is useful in vitiated condition of constipation, helminthiasis, and ringworm, skin diseases and leprosy (Dr A. K. Nadkarni; 1982 ;). The leaves and seeds are given in worm cases and in certain bowel affections of children & they are considered stimulant and laxative.4,5 Antiviral activity is proven in experiment & Antimicrobial activity is reported.(Gupta B. Srivastava RS and Goyal R. 2007;)

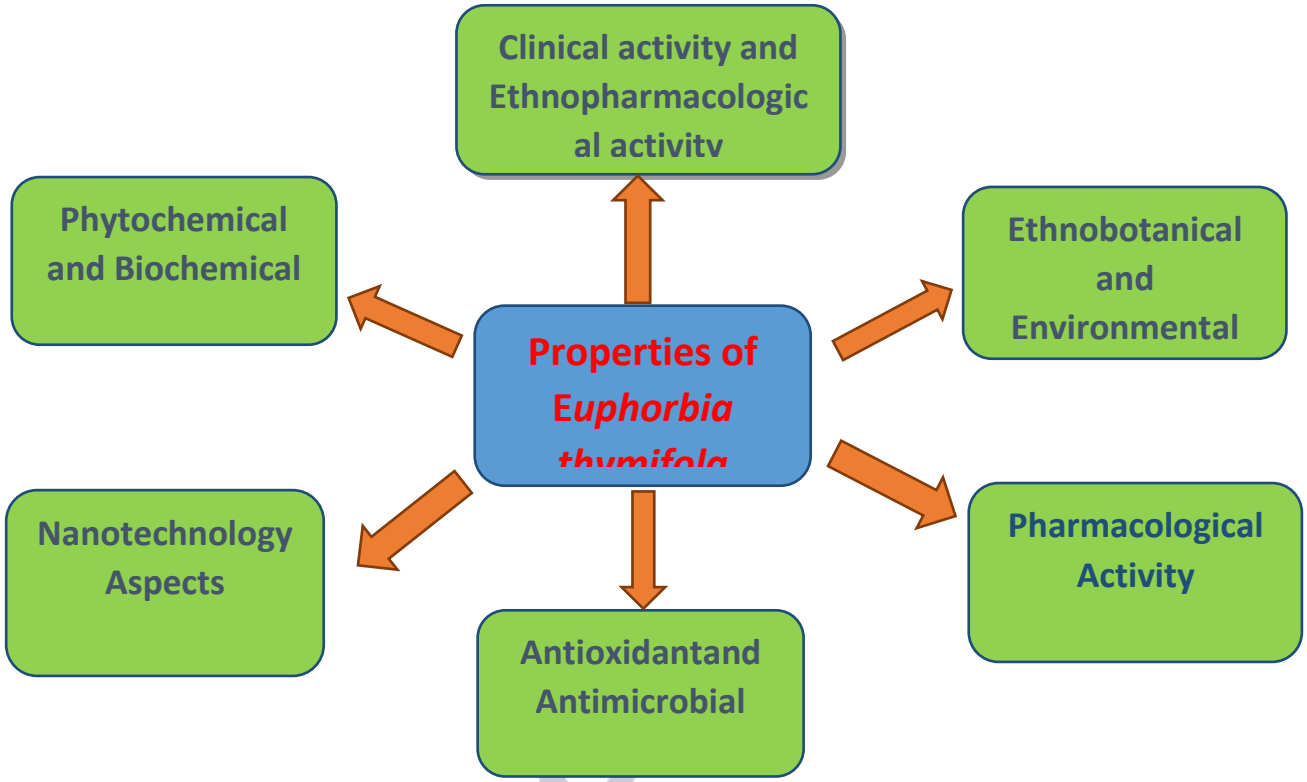

Fig. 3 Flow chart for various aspects of *Euphorbia thymifolia*.

Clinical and Ethanopharmological activity

Cleome rutidosperma DC. and *Euphorbia thymifolia* L. are herbal medicines used in traditional Indian and Chinese medicine to treat various illnesses. They may offer therapeutic potential for suppressing over activated microglia and alleviating neuro degeneration. (Ding Hy, *et al.,* 2016 ;) Dysentery and diarrhoea are major causes of morbidity and mortality in rural communities of developing world. Ethno medicinal survey was conducted in different villages of Bhoxa community located in district Dehradun, Uttarakhand, India. Thirty Bhoxa traditional healers were interviewed to collect information on plants used by them for treating dysentery and diarrhoea. For each of the recorded plant species the use value (UV) and fidelity level (FL) was calculated. Detailed literature survey was conducted to summarize ethno medicinal, pharmacological, microbiological and phyto chemical information on the medicinal plants listed in the present study. Fifty medicinal plants (45 genera and 30 families) were used by Bhoxa community to treat dysentery and diarrhoea, among which 27 species were used for dysentery, 41 for diarrhoea and 18 for both dysentery and diarrhoea. Three plants viz., *Dioscorea bulbifera L., Euphorbia thymifolia L.* and *Prunus persica (L.)* Stokes, recorded in the present survey has been reported for the first time in treatment of dysentery and diarrhoea by any indigenous communities in India. Except 6 plants all the other recorded plants have shown antimicrobial properties in previous microbiological studies. The present information may serve as a baseline data to initiate further research for discovery of

new compounds and biological activities of these potential plants. Further researchon these plants may provide some important clues for development of new drugs for dysentery and diarrhoea or other related diseases.(Gairola s, *et al.,* 2013;)To study the antihyperglycemic and antinociceptive activities of methanolic extract of the whole plant of *Euphorbia thymifolia L.*, a plant used in folk medicine of Bangladesh for treatment of diabetes and pain. The significant antihyperglycemic and antinociceptive activities demonstrated by the extract validate the use of *E. thymifolia* in folk medicine of Bangladesh for treatment of diabetes and pain, and merit further scientific studies leading to discovery of efficacious drugs.(Rahmatullah M,*et al.,* 2012;) The ethyl acetate (EtOAc) extract and 3-O-galloyl-4,6-(S)-hexa hydroxyl diphenoyl-d-glucose(3OG46HG) of *Euphorbia thymifolia* Linnea have been shown to exhibit anti-herpes simplex virus (HSV)-2activity in vitro. The virucidal ability of the EtOAc extract was affected by the incubation period, but not by the incubation temperature. In the case of the action of 3OG46HG against HSV-2, the effects of incubation time and temperature were negligible. 3. In summary, the EtOAc extract and 3OG46HG of *E. thymifolia* are concluded to inhibit HSV-2 multiplication by reducing virus infectivity. (Yang CM, *et al.,* 2005;)The plant Dugdhika belongs to the family Euphorbe aceae and is found all over India up to the height of 6000 ft. Various workers have proved it beneficial for the treatment of Bronchial asthma, on the basis of their clinical and experimental studies conducted on the mixture of two plants i.e. *Euphorbia thymifolia Linn* and *Euphorbia Prostrate W*. Ait, taken by the name of Dugdhika. Again, both the plant species have two ecotypes - Red & Green. The study reveals that the drug causes relaxation of smooth muscles by virtue of which the spasm of Bronchial muscles during an acute attack of bronchial asthma, is relieved and thus exhibits its beneficial effect. (Sharma GD and Tripathi SN. 1984 ;)

Phytochemical and Biochemical Aspects

Herbal medicines have become strongly preferred treatment to reduce the negative impacts of diabetes mellitus (DM) and its severe complications due to lesser sideeffects and low cost. Graphical abstract *Euphorbia thymifolia Linn*.is a small prostrate herbaceous annual weed that can positively impact on reducing hyper glycemic effect. In order to clearly understand about molecular level of the its bioactive compounds, in silico approach is performed. (Nguyen Vo TH, *et al.,* 2016 ;) *Euphorbia thymifolia L.* (Euphorbiaceae) is a small branched, hispidly pubescent, prostate annual herb, commonly known as laghu dudhika or chotidudhi. The leaves, seeds and fresh juice of whole plant are used in worm infections, as stimulant, astringent. This will be helpful for researchers to focus on the priority areas of research yet to be explored and in scientific use of the plant for its wide variety of traditional therapeutic claims and also as to find out new chemical entities responsible for its claimed traditional activities. (Mali PY and Panchal SS. 2013;)Two new cinnamic acid derivatives, thymofolinoates A (1) and B (2) have been isolated from the chloroform soluble fraction of Euphorbia thymifolia and their structures assigned

from 1H and 13C NMR spectra, DEPT and by 2 D COSY, HMQC and H MBC experiments. In addition, p-hydroxy cinnamic acid (3),5-hydroxy-6,7,8,4'-tetramethoxy flavone (4), and5-hydroxy-3',4',6,7,8-pentamethoxy flavone (5) have also been isolated for the first time from this species. (Hussain R *et al.*, 2012;)Larvicidal activity of crude hexane, ethyl acetate, petroleum ether, acetone and methanol extracts of five medicinal plants, *Abutilon indicum, Aegle marmelos,Euphorbia thymifolia, Jatropha gossypifolia* and *Solanum torvum* were assayed for their toxicity against the early fourth-instar larvae of *Culex quinquefasciatus*. The separation and identification of a beta-sitosterol as a potential new mosquito larvicidal compound with LC50 value of 11.49, 3.58 and 26.67 ppm against Aedes aegypti L, Anopheles stephensi Liston and C. quinquefasciatus Say (Diptera: Culicidae), respectively. 1H NMR, 13C NMR and mass spectral data confirmed the identification of the active compound (Abdul Rahuman A, *et al.*, 2008;)[Identification of *Euphorbia humifusa Wind,* and *E. maculata Raf*. from itsconfused species,*E. thymifolia L.*](Attias M, and de Souza W.1994 ;)

Antioxidant and Antimicrobial analysis

The antioxidant and antiviral activities of *Euphorbia thymifolia L.*(Euphorbiaceae) were investigated in this study. Electron spin resonance studies showed that water extract and pure compounds of*E. thymifolia* exhibited superoxide radical and hydroxyl radical scavenging activities. Besides antioxidant activities, 3-O-galloyl-4, 6-(S)-HHDP-D-glucose and EtOAc fraction also showed anti-HSV-2 activity. Thus, *E. thymifolia* wasconcluded to possess antioxidant and anti-HSV-2 activities. (Lin CC, *et al.,* 2002) Antibacterial activity of *Euphorbia thymifolia Linn.* (Khan NH, *et al.,*1988;) Plukenetia volubilis Linneo, or Sacha inca, is an oleaginous plant from the Euphorbiaceae family. Thin layer chromatography analysis revealed the presence of phenolic compounds, steroids, and/or terpenoídes. On the other hand, the extracts HEL and AEL were able to induce cell proliferation of normal fibroblast 3T3 cells.ica, Centro de Biociências, Universidade Federal do Rio Grande do Norte, 59072-970 Natal, Brazil. (Ana Karina Lima Nascimento, *et al.*, 2013;) Recent years have witnessed that there is a revival of interest in drug discovery from medicinal plants for the maintenance of health in all part of the world. The aim of this work was to investigate 26 plants belonging to 17 families collected from a unique place in Yemen (Soqotra Island) for their in vitro anticancer, antimicrobial and antioxidant activities. Evaluation for in vitro anticancer activity was done against three human cancer cell lines (A-427, 5637 and MCF-7) by using an established microtiter plate assay based on cellular staining with crystal violet. Antimicrobial activity was tested against three Gram-positive bacteria, two Gram-negative bacteria, one yeast species and three multi resistant Staphylococcus strains by using an agar diffusion method and the determination of MIC against three Gram-positive bacteria with the broth micro-dilution assay. Antioxidant activity was investigated by measuring the scavenging activity of the DPPH radical. The greatest antimicrobial activity was exhibited by extracts from *Acacia*

pennivenia, Boswellia dioscorides, Boswellia socotrana, Commiphora ornifolia, Euclea divinorum, Euphorbia socotrana, Leucas samhaensis, Leucas virgata, Rhus thyrsiflora, and Teucrium sokotranum with inhibition zones > 15 mm and MIC values ≤ 250 µg/ml. In addition, the methanolic extracts of Acacia pennivenia, Boswellia dioscorides, Boswellia socotrana and Commiphora ornifolia showed good antioxidant potential at low concentrations (more than 80% at 50 µg/ml).Our results show once again that medicinal plants can be promising sources of natural products with potential anticancer, antimicrobial and antioxidative activity. The results will guide the selection of some plant species for further pharmacological and phytochemical investigations. (Ulrike Lindequist, *et al.,* 2009;)

Pharmocological and Nanotechnological aspects

This study represents the first in-depth ethnobotanical study in the province of Uíge in northern Angola and documents the traditional knowledge of the Bakongo people living in the area. The study is based on 32 semi-structured and free-listing interviews, group discussions of varying scope and 14 field trips, involving a total of 82 informants. i.e. regarding pharmaceutical agents, but also for the design of a planned botanical garden ofthe University Kimpa Vita in Uíge, which aims at communicating the findings to the local people. (Northern Angola Anne Göhre, *et al.,* 2016;)The hypothesis underlying this current work is that fresh juice expressed from Papua New Guinea (PNG) medicinal plants (succus) will inhibit human Cytochrome P450s (CYPs). Of 15 species tested, succus from 6/15 was found to inhibit CYP1A2, 7/15 inhibited CYP3A4, and 4/15 inhibited CYP2D6. Chi-squared tests determined differences in inhibitory activity between succus and methanol preparations. Further, the general reproducibility of these findings suggests that methanol extraction of dried material is a reasonable surrogate preparation method for fresh plant samples. (Erica C. Larson, *et al.,* 2016 ;) Pd nanoparticles (NPs) were synthesized by using aqueous extract of leaves of *Euphorbia thymifolia* L., a non-toxic eco-friendly material. The catalytic activity of the Pd NPs was investigated in the cyanation of aryl iodides using K4Fe(CN)6 as the cyanating agent under ligand-free conditions. The nitriles were obtained in good to excellent yield and the catalyst can be recovered and reused for five times without significant loss of catalytic activity. (Nasrollahzadeh M, and Sajadi SM. 2016;)

A literature review was undertaken by analysing distinguished books, undergraduate and postgraduate theses, and peer-reviewed scientific articles and by consulting worldwide accepted scientific databases, such as SCOPUS, Web of Science, SCIELO, Medline, and Google Scholar. Medicinal plants used as immuno stimulants were classified into two categories:(1) plants with pharmacological studies and (2) plants without pharmacological research Medicinal plants with pharmacological studies of their immune stimulatory properties were sub classified into four groups as follows: (a) plant extracts evaluated for in vitro effects, (b) plant extracts with documented in vivo effects,

(c) active compounds tested on in vitro studies, and (d) active compounds assayed in animal models. Local availability is the main factor influencing which species are used. Quantitative indexes, especially Cultural Value Index, proved very useful for evaluating the usefulness of plants as recorded in the literature. (Yin Zhang, *et al.,* 2014 ;) This article reports the preliminary findings of an ethno-botanical survey that was carried out in the Thal Desert, Punjab, Pakistan during 2010 to 2013. This study revealed that the inhabitants possessed empirical knowledge of medicinal plants which would be useful in developing health care products and preserving traditional cultures as well as phyto diversity. (Humaira shahan, *et al.,* 2014;) Increases in ethnobotanical studies and knowledge in recent decades have led to a greater and more accurate interpretation of the overall patterns related to the use of medicinal plants, allowing for a clear identification of some ecological and cultural phenomena. "Hidden diversity" of medicinal plants refers in the present study to the existence of several species of medicinal plants known by the same vernacular name in a given region. The results indicate that there is an average of at least 2.78 different species per catalogued ethno species in the region. Phylogenetic proximity and its attendant morphological similarity favour the interchangeable use of these species, resulting in serious ecological and sanitary implications as well as a wide range of options for conservation and bioprospecting. (Deyvson Rodrigues Cavalcanti, and Ulysses Paulino Albuquerque, 2013 ;) *Avicennia marina (Avicenniaceae)* is a species of mangrove tree used for treatment of small pox lesions in Persian folk medicine. The antiviral activity of methanol, ethanol, water, chloroform and n-hexane extracts was evaluated against HIV-1 and HSV. Methanol extract had the highest antiviral activity and the most polar fraction of this extract (fraction D) inhibited HSV with TI and SI values of 57.1 and 133; however, it showed mild activity against HIV with SI value of 6.25 (fraction 3). This promotes further investigation in anti-HSV drug discovery. (Rahele Namazi, *et al.,* 2013 ;) Positive and negative plant-plant interactions are major processes shaping plant communities. tenacissima and its neighbours. coccifera and its neighbours, while climatic conditions (irradiance) played a secondary role. Values of phylogenetic distance between 207-272.8 Myr led to competition, while values outside this range or fleshy-fruitiness in the beneficiary species led to positive interactions. The low importance of environmental conditions as a general driver of pairwise interactions was caused by the species-specific response to changes in either rainfall or radiation. This result suggests that factors other than climatic conditions must be included in theoretical models aimed to generally predict the outcome of plant-plant interactions. Our study helps to improve current theory on plant-plant interactions and to understand how these interactions can respond to expected modifications in species composition and climate associated to ongoing global environmental change. (Santiago Soliveres, *et al.,*2015).This study assessed the intracultural knowledge of the use of medicinal plants in an urban-rural community in an Atlantic forest fragment in north eastern Brazil.

Comparing knowledge of local experts with that of the general community, we noted that experts know a similar wealth of plant families and therapeutic indications, but the community knows a greater species richness. These results indicate that local experts may provide useful information for studies that search for a quick diagnosis of the knowledge of a given community. (Cecília de Fátima Castelo, *et al.,* 2012 ;) The oldest remedies known to mankind are herbal medicines. India is known worldwide for its Ayurvedic treatment. *Euphorbia thymifolia* is often used traditionally for female disorders, respiratory ailments (cough, coryza, bronchitis, and asthma), worm infestations in children, dysentery, jaundice, pimples, gonorrhea, digestive problems, and tumors. It is reported to contain alkanes, triterpenes, phytosterols, tannins, polyphenols, and flavanoids. This review describes the medicinal properties, chemical constituents, and other important aspects of *Euphorbia Thimifolia.*(Sunil Kumar, *et al.,* 2016;)There are many vanishing cultures that possess a wealth of knowledge on the medicinal utility of plants. Our research sheds some light on a traditional culture that believes that a healthy lifestyle is founded on a healthy environment and we suggest that TAK such as that of the Malasars may serve toward a global lifestyle of health and environmental sustainability. (Subramanyam Ragupathy*et al.,* 2008 ;) In this second part of the study an alphabetical checklist of 211 medicinal plants not covered in the enumeration together with a bibliography is presented here. (Koppula Hemadri, *et al.,* 1987 ;) The medicinal plants used in Indian system of medicine and its distribution in Jammu and Kashmir have been categorized systematically here. The paper deals with 246 medicinal plants and has to off-set an index which is not there so far. Out of 246 medicinal plants 12 plants are considered to be controversial. Substitutes, Adulterants of these plants which are being used in various parts of India were also recorded separately in this study. (T. N. Srivastava, *et al.,* 1986;)In this paper, the author presents medicinal or otherwise useful weed species with details of family, vernacular name and its medicinal utility. Information on other general economic importance of medicinal weeds is also described here. (T. R. Sahu, 1984;)

Ethnobotanical and Environmental Aspect

An ethnobotanical survey was conducted on the Caribbean island of Trinidad to identify medicinal plants commonly used in traditional medicine to treat a variety of medical conditions. A pilot survey was conducted to identify the top ten most common ailments where medicinal plants were used. The results of the foregoing study guided a wider national survey conducted between October 2007 and July 2008. A total of 450 households from 50 rural communities were interviewed using the TRAMIL (Traditional Medicine in the Islands) questionnaire for data collection. Details of plants, part(s) used, and remedy formulations were elicited from informants and voucher specimens collected for identification at the National Herbarium of Trinidad and Tobago. The TRAMIL methodology set a limit of a plant with 20 % or more citations for any particular ailment as having significant or popular use. Although the scientific literature show

that some of the cited plants possessed antimicrobial, anti-inflammatory and related pharmacological activities in laboratory studies, these results must be taken with caution until clinical trials are conducted to establish safety and efficacy. (Y. N. Clement, *et al.,* 2015)

Measuring wild pollinator services in agricultural production is very important in the context of sustainable management. Large size flies Eristalinus spp. and Chrysomya spp. were found to be effective pollen carriers and visited more mango flowers compared with other flower visitors. (A. Nurul Huda, *et al.,*2015;)This paper is based on an ethnobotanical investigation that focused on the traditional medicinal plants used by local Maonan people to treat human diseases in Maonan concentration regions. information was collected through the approaches of participatory observation, semi-structured interviews, ranking exercises, key informant interviews, focus group discussions, and participatory rural appraisals. Awareness is also needed to be raised among local Maonans focusing on sustainable utilization and management of both medicinal plants and traditional knowledge.(Liya Hong, *et al.,* 2015;)Worldwide, mestizo communities ethnobotanical knowledge has been poorly studied. Based on a mestizo group in Mexico, this study assesses a) the use value (UV) of the local flora, b) gendered differences in plant species, and c) the association between socio-economic variables and ethnobotanical knowledge. It also provides information on plant resources and habitats and how local peasants value them. This information could help in the development of proposals to improve biocultural conservation and strengthen traditional knowledge systems for effective forest management. (Mexico Leonardo Beltrán-Rodríguez, *et al.,* 2014;)This paper constitutes an important ethnobiological survey in the context of utilizing biological resources by residents of Kala Chitta hills of Pothwar region, Pakistan. They reveal that medicinal and food consumption of underground and perennial plants was more as compared to aerial and annual categories of plants. Future conservation, phytochemical and pharmacological studies are recommended on these identified plants and animals in order to use them in a more sustainable and effective way. (Muhammad Arshad, *et al.,* 2014 ;) Acinetobacter baumannii is well-recognized as an important nosocomial pathogen; however, due to their intrinsic resistance to several antibiotics, treatment options are limited. Holarrhena and tidy senterica at 7.8 µg/ml demonstrated remarkable resistant modifying ability against A. baumannii in combination with novobiocin. The phytochemical study revealed that constituents of this medicinal plant contain alkaloids, condensed tannins, and triterpenoids. The use of Holarrhena anti dysenterica in combination with novobiocin provides an effective alternative treatment for multidrug resistant A. baumann infections. (Pinanong Na Phatthalung, *et al.,* 2012)

Miscellaneous

The use of plants of the family Euphorbiaceae, particularly *Euphorbia tirucalli* (avelós) has been popularly widespread for treating a variety of

diseases of infectious, tumoral, and inflammatory. The animals that died were necropsied, and the time of death was recorded. The survivors were killed on postoperative day 11, and necropsy was subsequently performed for evaluation of the intestinal adhesions. Significant differences were observed in the control and antibiotic groups ($p<0.01$) with respect to the survival hours when compared with the saline and *E. tirucalli* groups. Necropsy of the animals in the saline and E. tirucalligroups showed strong adhesions resistant to manipulation, between the intestinal loops and abdominal wall. The remaining groups did not show any adhesions. Topical treatment with *E. tirucalli* latex stimulated an increased formation of intestinal adhesions and prevented the death of all animals with peritonitis.and Research, Area V, Campus I, the Catholic University of Goiás. (Lilhian Alves de ARAÚJO, *et al.,* 2015;)

Loranthus ferrugineus (L. ferrugineus) from Loranthaceae, mistletoe, is a medicinal herb used for a variety of human ailments. errugineus and discussed relevant findings, including important future directions and shortcomings for the medicinal values of this parasitic shrub. Other medicina applicative areas of this parasitic shrub, such as wound healing, gerontologica effects, and antiviral and anticancer activities, are yet to be researched. (Ameer Omar Z, *et al.,* 2015;)To investigate the neuroprotective potential of a saponin isolated from the roots of Momordica cymbalaria against peripheral neuropathy in streptozotocin-induced diabetic rats. SMC treatment showed significant decrease in superoxide dismutase, catalase activity, and lipid peroxidation in the nerves. The steroidal saponin of M. cymbalaria (SMC) possesses potential neuro protective effect in diabetic peripheral neuropathy with respect to neuropathic analgesia, improvement in neuronal degenerative changes, and significant antioxidant activity. (Raju B. Koneri, *et al.,* 2014;)To evaluate the effects of chlorella crude extract (CCE) on intestinal adaptation in rats subjected to short bowel syndrome (SBS). Wistar rats weighing 230-260 g were used in the study. Rats were sacrificed on the fifteenth postoperative day and blood and tissue samples were taken. CCE has beneficial effects on intestinal adaptation in experimental SBS. (Mustafa Kerem, *et al.,* 2008;)Diseases of skin account for a great deal of misery, suffering, incapacity and economic loss, Including the genetic causes the diet, climate, sunlight mental factors and allergy etc. have been proved as aetiological factors beyond doubts. Natural herbs seem to be more promising in the field of dematology as already described in ancient Ayurvedic texts. (O.R Singh, 2003;)

CONCLUSION

The current review reveals that, *E. thymifolia* was found to be having potent antihyperglycemic, antinociceptive, larvicidal, anti-HSV-2, antioxidant, anti-inflammatory, antibacterial, anthelmintic, and laxative activities. This plant has been reported to contain quercetrin, cymol, carvacrol, 2-sesquiterpenes, salicylic acid, etc., phytoconstituents. Furthermore, it contains steroids, terpenoids, glycosides, essential oils, minerals, tannins, flavonoids, large number of phenolics. It was also observed that there is no patent so far on

this plant. Therefore, further studies of standardization of extracts, separation and identification of active constituents, pharmacological studies on isolated mixtures, mode of action, formulation development, clinical and toxicological efficacy remain to be explored so far. These studies will be helpful for modern drug development and serve the purpose of Ayurvedic formulation development in curing and treating diseases and to prove clinical safety, reliability and efficacy. This plant can be used as a cheap source of active therapeutics.In the present review, we have made an attempt to provide the morphological, phytochemical, ethnopharmacological, and pharmacological information on *E. thimyfolia* a herb used traditionally for medicinal purposes.This herb shows antibacterial, anti-inflammatory, antimalarial, galactogenic, antiasthmatic, antidiarrheal, anticancer, antioxidant, antiinferlity, antiamoebic, and antifungal activities. Further research is going on to find out more activities in constituents of *E.thymifolia*.

ACKNOWLEDGMENT

We take this opportunity to acknowledge my sincere thanks to our respected chairman Dr. SCKulshrestha andHonourable Dr. B.K. Tyagi ExecutiveDirector, Shri Ram Group of Colleges Muzaffarnagar, Uttar PradeshIndia for providing necessary facilities and tools to carry out the researchdissertation of PG students of M.Sc Biotechnology.

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