A Review on Tridax Procumbens

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Abstract: - It is now believed that nature has given the cure of every disease in one way or another. The researchers today are emphasizing on evaluation and characterization of various plants and plant constituents against a number of diseases based on their traditional claims of the plants given in Ayurveda. Nature has been a source of medicinal agents for thousands of years and an impressive number of modern drugs have been isolated from natural resources. Traditional medicine is an important source of potentially useful new compounds for the development of chemotherapeutic agents. The essential values and uses of some plants have been worked out and published, but many of them remain unexplored to date. Tridax procumbens L. is a highly valuable drug and one of the essential ingredients in the most of the compound preparations included in Ayurvedic literature. The phytochemical screening revealed the presence of alkaloids, carotenoids, flavonoids (catechins and flavones), fumaric acid, fl-sitosterol, saponins and tannins. It is richly endowed with carotenoids, saponins, oleanolic acid and ions like sodium, potassium and calcium. Luteolin, glucoluteolin, quercetin and isoquercetin have been reported from its flowers. The leaf juice possesses antiseptic, insecticidal and antiparasitic properties. Leaf extracts can be used to treat infectious skin diseases in folk medicines. It is also used to check hemorrhage from cuts, bruises and wounds. The juice of leaves has been found to remove subcutaneously harvested granuloma tissue formed on dead space wound in rats at 4 days interval up to 32 days of wounding. Antioxidant properties have also been found in this plant. This review focus on folk occurrence and the wide pharmacological activities like hepatoprotective activity, antinflammatory, wound healing, antidiabetic activity, hypotensive effect, immunomodulating property, bronchial catarrh, dysentery, diarrhea and to prevent falling of hair, promotes the growth of hair, and antimicrobial activity against both gram-positive and gram-negative bacteria Tridax procumbens.

1. Background

Man uses plants in many ways to meet his basic needs food, clothing and shelter. Plants are also known to relieve various diseases in Ayurveda. Wild Plants supply medicines (antibiotic, antispasmodics, emetics, anti-cancer, antimicrobials etc.), crafts and cosmetics to rural and urban communities (Kokwaro, 1976; Prashant et al., 2011). India is a country with a vast reserve of natural resources and a rich history of traditional medicine. The different systems of medicinal usage practiced in India, Ayurveda, Siddha, Unani, Amchi, Homoeopathy and local health traditions, utilize a large number of plants for treatment of human and animal diseases. Those plants used were called as medicinal plants (Gaikwadi et al., 2003). India officially recognizes over 3000 plants for their medicinal value. It is generally estimated that over 6000 plants in India are in use in traditional, folk and herbal medicine (Mohd. et al., 2011).

Medicinal plants contain numerous biologically active compounds which are helpful in improving the life and treatment of diseases (Shivananda, 2006). Natural products are the source of synthetic and traditional herbal medicine and are still the primary health care system. The presence of various life sustaining constituents in plants made scientists to investigate these plants for their uses in treating certain infective diseases and management of chronic wounds. Medicinal plants have been a major source of cure for human diseases since time immemorial. It is no wonder that the world’s one-fourth population i.e. 1.42 billion people, are dependent on traditional medicines for the treatment of various ailments (Reddy & K.J., 2004). Medicinal herbs are moving from fringe to main stream use with a greater number of people seeking remedies and health approaches free from side effects caused by synthetic chemicals. Recently considerable attention has been paid to utilize ecofriendly and bio-friendly plant based products for the prevention and cure of different human diseases. Considering the adverse effects of synthetic drugs, the Western population is looking for natural remedies, which are safe and effective. It is documented that most of the World’s population has taken in traditional medicine,
particularly plant drug for the primary health care (Duby et al., 2004).
Researchers have cast a sharper eye on natural products to get medicinally important compounds from plants (Mehta et al., 2010).
Different plant parts like root, stem, flower, fruit, twigs exudates and modified plant of medicinal plants represent a rich source of antimicrobial agents (Mishra et al. 2011). For medical application plants can be used directly or indirectly used for cure of particular disease. Indirectly, a medicinally active portion of plant tissues is extracted by using selective solvents through standard procedures. The purpose of standardized extraction procedures for crude drugs (medicinal plant parts) is to attain the therapeutically desired portions and to eliminate unwanted material by treatment with a selective solvent. The amount of product extracted depends upon time of extraction, temperature, nature of solvent, solvent concentration, polarity and quantity of plant material to be extracted.
Successful determination of biologically active compounds from plant material is largely dependent on the type of solvent used in the extraction procedure. Properties of a good solvent in plant extractions includes, low toxicity, ease of evaporation at low heat, promotion of rapid physiologic absorption of the extract, preservative action, inability to cause the extract to complex or dissociate.
The various solvents that are used in the extraction procedures are: Water: Water is universal solvent, used to extract plant products with antimicrobial activity. Though traditional healers use primarily water but plant extracts from organic solvents have been found to give more consistent antimicrobial activity compared to water extract. Also water soluble flavonoids (mostly anthocyanins) have no antimicrobial significance and water soluble phenolics only important as antioxidant compound (Yoga et al., 2009; Parekh et al., 2007; Aniel et al., 2010; aya et al., 2011).
Acetone: Acetone dissolves many hydrophilic and lipophilic components from the two plants used, is miscible with water, is volatile and has a low toxicity to the bioassay used, it is a very useful extractant, especially for antimicrobial studies where more phenolic compounds are required to be extracted. A study reported that extraction of tannins and other phenolics was better in aqueous acetone than in aqueous methanol (Yoga et al., 2009; Vishnu et al., 2011). Both acetone and methanol were found to extract saponins which have antimicrobial activity (Amael et al., 2009; aya et al., 2011; Tease & Evans W.C., 1989; Harborne, 1973).
Alcohol: The higher activity of the ethanolic extracts as compared to the aqueous extract can be attributed to the presence of higher amounts of polyphenols as compared to aqueous extracts (Vishnu et al., 2011; Tease & Evans W.C., 1989; Harborne, 1973). It means that they are more efficient in cell walls and seeds degradation which have unpolar character and cause polyphenols to be released from cells. More useful explanation for the decrease in activity of aqueous extract can be ascribed to the enzyme polyphenol oxidase, which degrade polyphenols in water extracts, whereas in methanol and ethanol they are inactive. Moreover, water is a better medium for the occurrence of the micro-organisms as as compared to the aqueous extract can be attributed to the presence of higher amounts of polyphenols as compared to aqueous extracts. It means that they are more efficient in cell walls and seeds degradation which have unpolar character and cause polyphenols to be released from cells. More useful explanation for the decrease in activity of aqueous extract can be ascribed to the enzyme polyphenol oxidase, which degrade polyphenols in water extracts, whereas in methanol and ethanol they are inactive. Moreover, water is a better medium for the occurrence of the micro-organisms as compared to ethanol (Sunil et al., 2012; Tease & Evans W.C., 1989; Harborne, 1973).
The higher concentrations of more bioactive flavonoid compounds were detected with ethanol 70% due to its higher polarity than pure ethanol. By adding water to the pure ethanol up to 30% for preparing ethanol 70% the polarity of solvent was increased (Sunil et al., 2012). Additionally, ethanol was found easier to penetrate the cellular membrane to extract the intracellular ingredients from the plant material (surya & John 2001; aya et al., 2011). Since nearly all of the identified components from plants active against microorganisms are aromatic or saturated organic compounds, they are most often obtained through initial ethanol or methanol extraction (Sunil et al., 2012; Tease & Evans W.C., 1989; Harborne, 1973). Methanol is more polar than ethanol but due to its cytotoxic nature, it is unsuitable for extraction in certain kind of studies as it may lead to incorrect results (Yoga et al., 2009; surya & John, 2001; Paul et al., 1997).
Chloroform: Terpenoid lactones have been obtained by successive extractions of dried barks with hexane, chloroform and methanol with activity concentrating in chloroform fraction. Occasionally tannins and terpenoids will be found in the aqueous phase, but they are more often obtained by treatment with less polar solvents (surya & John, 2001; Paul et al., 1997).
Ether: Ether is commonly used selectively for the extraction of coumarins and fatty acids (Sunil et al., 2012; amal et al., 2009; Tease & Evans W.C., 1989; Harborne, 1973).
Dichloromethanol: It is another solvent used for carrying out the extraction procedures. It is specially used for the selective extraction of only terpenoids (Sunil et al., 2012; Paul et al., 1997; Tease & Evans W.C., 1989; Harborne, 1973).

Hexane: Hexane can be used to extract non polar components of plants (Paul et al., 1997; Tease & Evans W.C., 1989; Harborne, 1973). (Mishra et al. 2011) investigated antioxidant and antistaphylococcal activities of different solvent extracts of Bauhinia variegata, Tinospora cardifolia and Piper longum and found that phytochemicals play as potential antioxidants and antimicrobials. Further, acetone extract of bark and petroleum ether and ethanol extract of leaf of Cinnamomum zeylanicum exhibited complete inhibition of growth of two species of dematiaceous moulds, Alternaria solani and Curvularia lunata (Mishra et al., 2009). Sulphated polysaccharides have a broad range of important bioactivities comprising antioxidant, anticoagulant and antithrombotic activities. They are also known to increase the resistance to some virus and inhibit some tumour development (Toida et al., 2003). Sulphated polysaccharides are either extracted from marine algae (McLellan et al., 1992) invertebrates (Cassaro et al., 1977) or obtained by chemical sulphation of natural polysaccharides. (Rai et al., 2010) has found that E. officinalis extract effected antioxidant enzymes and has the potential acted as an agent to boost the antioxidant system in the diabetic animal model. Freeze-dried rhizome powder of Curcuma longa dissolved in milk increased high-density lipoprotein and haemoglobin with significant decrease in the levels of blood glucose, lipid profile and hepatoprotective enzymes in diabetic rats and therefore can be used as antidiabetic dietary supplement (Rai et al., 2010). Flavonoids from aqueous extract of Cynodon dactylon with marked antioxidant efficacy on diabetes-induced diabetic rats. Furthermore, aqueous extract of C. dactylon showed protective role against carbofuran-induced oxidative stress thereby inhibiting level of acetylcholinesterase in the brain of model rats (Rai et al., 2011). Moreover, ethanolic extract of C. daclylon finds its application as antidiabetic agent of high potential in diabetic models against hepatic complications (Singh et al., 2008). Therefore, medicinal plants are gifts of nature to cure limitless number of diseases among human beings (Pathak et al., 2007).

Phytochemical examinations is carried out for all the extracts as per the standard methods for quinones, flavonoids, polyphenols, tannins, coumarins, terpenoids, essential oils, alkaloids, lectins, polypeptides, glycosides, saponins, steroids etc. The mechanism of their action is given in table

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<tr>
<th>Phytochemicals</th>
<th>Activity</th>
<th>Mechanism of action</th>
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<tr>
<td>Quinones</td>
<td>Antimicrobial</td>
<td>Binds to adhesins, complex with cell wall, inactivates enzymes</td>
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<td>Complex with cell wall, binds to adhesins</td>
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<td>Inhibits release of autocoids and prostaglandins,</td>
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<td>Inhibits contractions caused by spasmodgens,</td>
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<td></td>
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<td>Stimulates normalization of the deranged water transport across the mucosal cells,</td>
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<td>Inhibits GI release of acetylcholine</td>
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<tr>
<td>Flavonoids</td>
<td>Antimicrobial</td>
<td>Binds to adhesins, enzyme inhibition, substrate deprivation,</td>
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<td></td>
<td>Antidiarrhoeal</td>
<td>complex with cell wall, membrane disruption, metal ion complexation</td>
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<td></td>
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<td>Makes intestinal mucosa more resistant and reduces secretion,</td>
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<td></td>
<td></td>
<td>stimulates normalization of deranged water transport across the mucosal cells and</td>
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<td>reduction of the intestinal transit, blocks the binding of B subunit of heat-labile</td>
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<td>enterotoxin to GM1, resulting in the suppression of heat-labile enterotoxin-induced</td>
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<td>diarrhea, astringent action</td>
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<td>Increases supply of digestible proteins by animals by forming protein complexes in</td>
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<td>rumen, interferes with energy generation by uncoupling oxidative phosphorylation,</td>
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<td></td>
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<td>causes a decrease in G.I. metabolism</td>
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<td>Antidiarrhoeal</td>
<td>Interaction with eucaryotic DNA</td>
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<td>Anthelmintic</td>
<td>Membrane disruption</td>
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<td></td>
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<td>Inhibits release of autocoids and prostaglandins</td>
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<td>Membrane disruption</td>
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<td>Intercalates into cell wall and DNA of parasites</td>
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<td></td>
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<td>Inhibits release of autocoids and prostaglandins</td>
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Table 1: Mechanism of action of various Phytochemicals
Anthelmintic Possess anti-oxidating effects, thus reduces nitrate generation which is useful for protein synthesis, suppresses transfer of sucrose from stomach to small intestine, diminishing the support of glucose to the helminthes, acts on CNS causing paralysis

Lectins and Polypeptides Antiviral Blocks viral fusion or adsorption, forms disulfide bridges

Glycosides Antidiarrhoeal Inhibits release of autacoids and prostaglandins

Saponins Antidiarrhoeal Inhibits histamine release in vitro

Steroids Antidiarrhoeal Enhance intestinal absorption of Na+ and water

With the help of column chromatographic techniques these phytochemicals can be separated to chemical constituents to identify their role to control particular disease.

Nowadays, weeds are not really “unwanted” especially in terms of traditional herbal medicines. These “naturally growing plants” are generally known as a group of very aggressive, noxious, competitive and troublesome plants. The weed, Tridax procumbens L. is known to possess remarkable medicinal properties. However, it is listed as a noxious weed in the United States and has pest status in nine states (Suseel et al., 2002).

3. Classification: Its common names include coat buttons and tridax daisy in English, Jayanthi in Kannada, cadillo chisaca in Spanish, herbe caille in French, Jayanti veda in Sanskrit, ghamra in Hindi, Bishalya karani in Oriya, Kambarmodi in Marathi, Gaddi Chemanthi in Telugu, vettukaaya poondu in Tamil and kotobukigiku in Japanese .Tridax procumbens is a species of flowering plant in the daisy family. Tridax procumbens Linn. family Composite commonly known as ‘Ghamra’ and in English popularly called ‘coat buttons’ because of appearance of flowers has been extensively used in Ayurvedic system of medicine for various ailments and is dispensed for “Bhringraj” by some of the practitioners of Ayurveda which is well known medicine for liver Disorders (Saxena & Albert 2005).

Scientific Classifications
Kingdom Planteae
Subkingdom Tracheobionta
Superdivision Spermatophyta
Division Magnoliophyta
Class Magnoliophyta
Subclass Asteridae
Order Asterales
Family Asteraceae
Genus Tridax L.
Species Tridax procumbens
Binomial name Tridax procumbens L.

4. Medicinal Uses
In our country there are a large number of people suffering of deprivation of even essential need, and the urge to survive has prompt them to explore naturally available resources for therapeutic effects with respect to common ailments including Inflammation. Inflammation is a common reaction of the body to be insult cause by various biological and non biological factors present in the environment. The procumbent is valued for its pharmaceutical properties (W.O.I., 1988; Sahoo & P.K, 1998).

Uses in traditional medicine
Commonly used in Indian traditional medicine as anticoagulant, hair tonic, antifungal and insect repellent, in bronchial catarrh, diarrhoea, dysentery, and wound healing (W.O.I., 1995; Srivastava et al., 1984; Udupa et al., 1991; Saraf & Dixit 1991).

4.1 Direct
Leaves are also used for the treatment of bronchial catarrh, dysentery, diarrhoea and for the restoration of hairs (Gaikwadi et al., 2003). The leaf juice possesses antiseptic, insecticidal and antiparasitic properties. It is also used to check hemorrhage from cuts, bruises and wounds (Suseel et al., 2002). The juice of leaves has been found to remove subcutaneously harvested granuloma tissue formed on dead space wound in rats at 4 days interval up to 32 days of wounding (Udupa et al., 1991; Diwan et al., 1982).
4.2 Indirect: Hepatoprotective activity of Tridax procumbens L. a medicinal herb commonly used in folklore system for wound healing and also against jaundice, was evaluated against paracetamol induced hepatic damage in male albino rats. Paracetamol induced hepatic damage was well manifested by significant increase in the activities of Alanine aminotransferase, Aspartate aminotransferase, alkaline phosphatase in serum and enhanced lipid peroxidation (Udupa et al., 1991; Diwan et al., 1982). On the other hand, the activities of Superoxide dismutase and Catalase in liver tissue were lowered. Consequent to paracetamol induced hepatic injury; the Serum Bilirubin level was increased. Paracetamol toxicity also resulted in, significant reduction in total serum protein and the hepatic glutathione and glycogen contents (Wagh & Shinde, 2010). The dose dependent nature of the effects of the leaf extract of T. procumbens plant on blood pressure and heart rate of the rat suggests a cumulative action of the active substances present in the leaves of the plant. The cardiovascular effect of Tridax procumbens anesthetized Sprague- dawley rat on intravenous administration of 3, 6 and 9mg/kg of the aqueous extract of T. procumbens caused significant decreases in the mean arterial blood pressure in a dose related manner i.e. the extract caused greater decrease in the mean arterial blood pressure at higher dose than at lower dose. Also, higher doses of the extract 6mg/kg and 9mg/kg caused significant change in the heart rate. The hypotensive and the brady-cardiac effects were immediate. The hypotensive effects of T. procumbens were inhibited by the pretreatment of the animals with atropine sulfate (1mg/kg) (Salahdeen et al., 2004).

4.2.1 Extraction
An aqueous extract of plant produces reflex tachycardia and showed a transient hypotensive effect on the normal blood pressure (W.O.I., 1976). Leaf extracts can be used to treat infectious skin diseases in folk medicines. It is well known aurvedic medicine for liver disorders besides gastritis and heart burn (Tiwari et al., 2004; Glover et al., 2000). Tridax procumbens leaves can be used for treating diseases caused by the tested organisms (Sunil et al., 2012). Wound healing, to check haemorrhage from cuts, bruise and wounds, Hypertensive activity, Antidiabetic activity, Dysentery, Diarrhoea. To prevent falling of hair and promotes the growth of hair, bronchial catarrh treatment, against conjunctivitis, immunomodulating property, insect repellent activity (Sneha & Ruchi, 2008). The oral administration of varying doses of ethanolic extract of Tridax procumbens L. for the period of 7 days reversed these altered parameters to normal levels indicating the antioxidative and hepatoprotective efficacy of Tridax procumbens L. against paracetamol induced liver injury (Wagh & Shinde., 2010). Ethanolic extract of Tridax procumbens L. was also used for treating kidney stone disorders. It was evaluated against 0.75% v/v ethylene glycol and 2% w/v ammonium chloride induced calcium oxalate urolithiasis and hyperoxaluria induced oxidative stress in male albino rats. Treatment with the extract was able to reduce calciucogenesis induced urinary excretion and renal deposition of calcium oxalate and resultant lipid peroxidation, indicating it’s antiurolithiatic and antioxidant effects (Sailaja et al., 2011).

4.2.1.1 Effect of Extract
Anti- hepatotoxic or Hepatoprotective Activity
Tridax Procumbens had a salubrious effect on the paracetamol- induced hepatotoxicity in Wistar rats. It has been demonstrated the T. procumbens possibly activates muscarinic cholinergic receptors, which also protects the liver via efferent vagus nerve (Kumar et al., 2001). The hepatoprotective effect of ethanolic extract of aerial parts of T. procumbens and its chloroform soluble and insoluble fractions on acute hepatitis induced in rats by single oral dose of CCl₄, 15ml/kg (1:1 of CCl₄ in olive oil) (Saraf & Dixit 1991). Tridax procumbens plants are also used to prepare a drug “Bhringraj”; which is a reputed medicine in Ayurveda for liver disorders. Even alcoholic extract of that plant is useful in Liver regeneration; which showed their hepatoprotective action (Pathak 1991; Vilwanathan et al., 2005) reported the effect of T. procumbens on liver antioxidant defense system during lipopolysaccharide induced hepatitis in Dgalactosamine sensitized rats (Vilwanathan et al., 2005). The protective effect of Tridax procumbens against isoniazid (INZ) induced hepatic damage and concluded that plant extract restored the INZ induced changes in liver tissue back to normal and enhanced its ability to undo the damage caused by free radicals (Wagh & Shinde 2011).

ImmunomodulatoryActivity
Ethanolic extracts of leaves of Tridax have immunomodulatory effect on Albino rats dosed with Pseudomonas aeruginosa also inhibits proliferation of same (Oladunmoye, 2006). Also a significant increase in phagocytic index, leukocyte count and spleenic antibody secreting cells has been reported to ethanol insoluble fraction of aqueous extract of Tridax. Stimulation of humoral immune response was also observed along with elevation in heamagglutination antibody titer. Study also reveals that Tridax influences both
humoral as well as cell mediated immune system (Tiwari et al., 2004).

Wound Healing Activity:-Wound healing involves a complex interaction between epidermal and dermal cells, the extra cellular matrix, controlled angiogenesis and plasma-derived proteins all coordinated by an array of cytokines and growth factors (Bhat et al., 2007). Tridax antagonized anti-epithelization and tensile strength depressing effect of dexamethasone (a known healing suppressant agent) without affecting contraction and antigranulation action of dexamethasone. Aqueous extract was also effective in increasing lysyl oxidase but to a lesser degree than whole plant extract. Further it has been shown that extract of leaves of this plant also promotes wound healing in both normal and immuno compromised (steroid treated) rats in dead space wound healing model (Babu et al., 2003). The plant increase not only lysyl oxidase but also, protein and nucleic acid content in the granulation tissue, probably as a result of increase in glycosamin glycan content (Nia et al., 2003). The plant not only increase lysyl oxidase but also, protein and nucleic acid content in the granulation tissue, probably due to increase of glycosamin glycan content (Udupa et al., 1991; Diwan et al., 1982).

Antimicrobial or Antibacterial Activity:-Though a number of antibiotics are available but increasing capability of microbes to develop multi drug resistance has encouraged search for new, safe and effective bioactive agents of herbal origin. The aqueous as well as ethanolic extracts of Tridax procumbens plant showed antibacterial activity with special reference to nosocomial pathogens. It may be useful for successful therapy against multidrug-resistant pathogens like P. aeruginosa (Pai et al., 2011). The anti-bacterial activity of hexane, petroleum ether, chloroform and methanolic extracts obtained from the aerial parts (leaf, flower and stem) of Tridax procumbens and tested against both gram positive (Staphylococcus aureus and Bacillus subtilis) and gram negative (Enterobacter aerogenesis) bacteria using the agar well diffusion method (Rizvi et al., 2011). Extracts of flowers and leaves were used to study their capacity to control bacterial agents that causes urinary tract infections. Therefore, traditional medicine is an important source of potentially useful new drugs (Jadhav et al., 2011). Tridax procumbens also possesses antifungal property of against three phytopathogenic fungi i.e. Helminthosporium oryzae, Rhizoctonia solani and Pyricularia oryzae (Acharya et al., 2010). The nhexane extract of the flowers showed activity against E. coli. The same extract of the whole aerial parts was active against Mycobacterium smegmatis, Escherichia coli and Salmonella paratyphi. The ethylacetate extract of the flowers of Tridax procumbens was active against Bacillus cereus and Klebsiella sp. The aerial parts extract also showed activity only against Mycobacterium smegmatis and Staphylococcus aureus, while the aqueous extract showed no antimicrobial activity (Taddle & Rosas 2000). Many Scientists also evaluated in-vitro phytochemical screening and anti-bacterial activity of aqueous and methanolic leaf extract of Tridax procumbens against Bovine mastitis isolated from Staphylococcus aureus and in-vitro antiplasmodial activity in Tridax procumbens medicinal plant of South Africa (Dhanabal et al., 2008; Cailean et al., 2004). Invitro activity of methanolic extract of T. procumbens inhibited promastigotes growth of Leishmania Mexicanana (Causative agent of cutaneous leishmaniasis disease in the new world) i.e. anti-leishmanial activity and found that it is an active herb against leishmaniasis (Zhelmy et al., 2009).

Anti-Cancerous Activity:- The results of this analysis revealed the fact that flower crude extract has anti-cancer activity. The effect of anti cancer activity of traditional plant Tridax procumbens flower crude aqueous and acetone extract was tested on prostate epithelial cancerous cells PC3 was determined by measuring cell viability by MTT assay (Tiwari et al., 2004; Ravikuma et al., 2005). Experiment consists of cleavage of the soluble yellow coloured tetrazolium salt MTT [3-(4, 5-dimethyl -thiazole-2-yl)-2, 5- diphenyl-tetrazolium bromide] to a blue coloured formazan by the mitochondrial succinate dehydrogenase. The assay was based on the capacity of mitochondrial enzymes of viable cells to reduce the yellow soluble salt MTT to purple blue insoluble formazan precipitate which is then quantified spectrophotometrically at 570nm (Vishnu et al., 2011; Vikram et al., 2012).

Hypotensive:-The cardiovascular effect of aqueous extract obtained from the leaf of Tridax procumbens Linn. Was investigated on anaesthetized SpragueDawley rat. The aqueous extract has ability to cause significant dose dependant decreases in the mean arterial blood pressure. The higher dose leads to significant reduction in heart rate where as lower dose did not cause any changes in the same. The leaves of Tridax procumbens Linn. Shows hypotensive effect (Salahdeen et al., 2004).

Repellency Activity:-In other study, essential oils were extracted by steam distillation from leaves Tridax procumbens Linn. And they were examined for its topical repellency effects against malerial parasite Anopheles stephensi in mosquito cages (Pareek et al., 2009; Salahdeen et al., 2004). All essential oils were tested at three different concentrations (2, 4 and 6 %). Of these, the
Tridax plants have been reported (Bhagwat et al., 2004). plant material does not affect the sugar levels in fasting blood glucose levels in diabetic rats. This extract of T. procumbens significantly reduces acute and sub-chronic doses of 50% methanol the significant decrease in the blood glucose level in the model of all oxaninduced diabetes in rats (Vyas et al., 2004). The knowledge of diabetes mellitus, as the history reveals, existed with the Indians since from prehistoric age. Madhumeha another name of diabetes in which a patient passes sweet urine and exhibits sweetness allover the body in the form of sugar, i.e., in sweat, mucus, urine blood, etc. from ancient time various herbs were practically used for lowering of blood glucose level as such or in juices form. Aqueous and alcoholic extract of leaves of Tridax showed a significant decrease in the blood glucose level in the model of all oxaninduced diabetes in rats (Bhagwat et al., 2008). The oral administration of acute and sub-chronic doses of 50% methanol extract of T. procumbens significantly reduces fasting blood glucose levels in diabetic rats. This plant material does not affect the sugar levels in normal rats (Pareek et al., 2009; Salahdeen et al., 2004). Anti-diabetic activity of leaf extract of Tridax plants have been reported (Bhagwat et al., 2008). The leaves are reported to be employed in bronchial catarrh, dysentery or diarrhea and for storing hair. An aqueous extract of plant produces reflex tachycardia and showed a transient hypotensive effect on the normal blood pressure (W.O.I., 1976). The crushed leaves are applied to arrest bleeding in bruises and cuts. Leaves are also used for the treatment of bronchial catarrh, dysentery, diarrhoea and for the restoration of hairs (Gaikwadi et al., 2003). Leaf extracts can be used to treat infectious skin diseases in folk medicines. It is well known aurvedic medicine for liver disorders besides gastritis and heart burn (Tiwari et al., 2004; Glover et al., 2000). The leaf juice possesses antisepsic, insecticidal and antiparasitic properties. It is also used to check hemorrhage from cuts, bruises and wounds (Suseel et al., 2002). The juice of leaves has been found to remove subcutaneously harvested granuloma tissue formed on dead space wound in rats at 4 days interval up to 32 days of wounding. Tridax procumbens has been extensively used in Indian traditional medicine for wound healing, as anticoagulant, antifungal and insect repellent; in diarrhoea and dysentery (Ali et al., 2001). Antioxidant properties have also been found in this plant (Ravikumar et al., 2005). Corolla is yellow in colour. (Saraf et al., 1991) have investigated hair growth promoting activity of Tridax procumbens. Various phytochemicals present in Tridax procumbens are responsible for the medicinal value of the plant (Diwan et al., 1989). When these microbial factors are conductive, impaired host defenses set the stage for enacting the chain of events that produce wound infection. The usual pathogens on skin and mucosal surfaces are gram-positive notably Staphylococci however gram-negative aerobes and anaerobic bacteria contaminate skin in the groin areas (Baquero, 1997). In Ghana, medicinal plants used to treat malaria include Tridax procumbens (Compositae) and Phyllanthus amarus Euphorbiaceae, Schum. & Thonn. Similarly the latter is commonly used in Southeastern Nigeria for the treatment of malaria-related symptoms (Traore et al., 2008).

**Anti-Urothiatic Activity:-** Ethanolic extract of Tridax procumbens L. was also used for treating kidney stone disorders. It was evaluated against 0.75% v/v ethylene glycol and 2% w/v ammonium chloride induced calcium oxalate urolithiasis and hyperoxaluria induced oxidative stress in male albino rats. Treatment with the extract was able to reduce calculogenesis induced urinary excretion and renal deposition of calcium oxalate and resultant lipid peroxidation, indicating it’s antiurolithiatic and antioxidant effects (Sailaja et al., 2011; Ingeborg et al., 1998).

**Anti-Inflammatory Activity:-** Tridax procumbens possess significant anti-inflammatory activity as its action influences exudates leucocytes migration, rat paw oedema and granuloma tissue. The anti-inflammatory action of T. procumbens may possibly be due to corticotropic influence as evident from increase in weight (Diwan et al., 1989). The most active fraction of T. procumbens was ethyl acetate (ETA) fraction and was found to contain moderate polar natural products: alkaloids and flavonoids as earlier reported. These bioactive natural principles have been implicated in counteracting reactive oxidative species (ROS) indicated in the pathogenesis of inflammation and related ailments in biological systems (Nia et al., 2003).

**Hemostatic Activity:-** Various extract of the leaves of Tridax procumbens were screened for hemostatic activity by studying the clotting time of 10 human volunteers employing Lee-White’s method performed in vitro. Out of the ethanolic extract, fresh leaf and petroleum extract; Ethanolic extract showed positive activity
(Bhagwat et al., 2008). As the ethanolic extract of the leaves of T. procumbens reduces the clotting time uniformly in the blood samples of all the subjects, it can be suggested that the same possesses hemostatic activity, thus affecting haemostasis (Maurya et al., 1995).

**Hypoglycemic and Antihyperglycemic Activity**:-

Tridax procumbens has been widely used in various medicines and is also reported to possess the property of lowering blood sugar (Bhagwat et al., 2008). The oral administration of aqueous, alcoholic and petroleum ether extracts of T. procumbens leaves on Wistar rats at a dose level of 200mg/kg orally administered for 7 days significantly decreases the blood glucose level in the model of alloxan-induced diabetes in rats and petroleum ether extract exhibits a very weak anti-diabetic activity. It also proves the traditional claim with regard to T. procumbens for its anti-diabetic activity (Pareek et al., 2009).

**4.2.2 Separation of Chemical constituents**

The antibacterial activity of the plant parts extracts (stem, root, leaf, flower and whole plant) of Tridax procumbens L. was studied against Escherichia coli, Klebsiella pneumoniae and Proteus vulgarise (Gram-negative), Bacillus subtilis and Staphylococcus aureus (Gram-positive) by the agar well diffusion method. The ethanol and methanolic extracts displayed broad spectrum activity against all the test organisms but root extracts of chloroform and Petroleum ether showed no activity against Gram-negative bacteria. The antibacterial activity of the extracts was compared to the drug Tetracycline. The minimum inhibitory concentration (MIC) of the ethanol and methanol extracts of leaf and whole plant determined by the agar dilution method ranged between 1.96-19.5 and 1.96 with that of Staphylococcus aureus being the least (Sathya et al., 2012). Phytochemical screening of the plant revealed the presence of tannins, alkaloids, flavonoids and saponins (Aniel et al., 2010). Application silica gel,RP-18,Diaion HP-20,Sephadex LH-20,MCI-gel C HP-20,Toyopearl HW-40 isolation fillers and isolation techniques, combined with the modern spectrum analysis methods(1D,2D NMR,IR,MS) and chemistry method, obtained 15 compounds,11 compounds structures were determined, they were:8,3′-Dihydroxy-3,7,4′-trimethoxy-6-O-β-D-glucopyranoside flavonol(C compound 1),8,3′-Dihydroxy-3,7,4′-trimethoxy-6-O-β-D-glucopyranoside, flavonol-6″-acetate(Compound 2),8,3′-Dihydroxy-3,7,4′-trimethoxy-6-O-β-D-glucopyranoside, flavonol-6″-acetate(Compound 2),8,3′-Dihydroxy-3,7,4′-trimethoxy-6-O-β-D-glucopyranoside, flavonol-6″-acetate(Compound 2),8,3′-Dihydroxy-3,7,4′-trimethoxy-6-O-β-D-glucopyranoside, flavonol-6″-acetate(Compound 2),8,3′-Dihydroxy-3,7,4′-trimethoxy-6-O-β-D-glucopyranoside, flavonol-6″-acetate(Compound 2),8,3′-Dihydroxy-3,7,4′-trimethoxy-6-O-β-D-glucopyranoside, flavonol-6″-acetate(Compound 2),8,3′-Dihydroxy-3,7,4′-trimethoxy-6-O-β-D-glucopyranoside, flavonol-6″-acetate(Compound 2),8,3′-Dihydroxy-3,7,4′-trimethoxy-6-O-β-D-glucopyranoside, flavonol-6″-acetate(Compound 2),8,3′-Dihydroxy-3,7,4′-trimethoxy-6-O-β-D-glucopyranoside, flavonol-6″-acetate(Compound 2),8,3′-Dihydroxy-3,7,4′-trimethoxy-6-O-β-D-glucopyranoside, flavonol-6″-acetate(Compound 2),8,3′-Dihydroxy-3,7,4′-trimethoxy-6-O-β-D-glucopyranoside, flavonol-6″-acetate(Compound 2),8,3′-Dihydroxy-3,7,4′-trimethoxy-6-O-β-D-glucopyranoside, flavonol-6″-acetate(Compound 2),8,3′-Dihydroxy-3,7,4′-trimethoxy-6-O-β-D-glucopyranoside, flavonol-6″-acetate(Compound 2),8,3′-Dihydroxy-3,7,4′-trimethoxy-6-O-β-D-glucopyranoside, flavonol-6″-acetate(Compound 2),8,3′-Dihydroxy-3,7,4′-trimethoxy-6-O-β-D-glucopyranoside, flavonol-6″-acetate(Compound 2),8,3′-Dihydroxy-3,7,4′-trimethoxy-6-O-β-D-glucopyranoside, flavonol-6″-acetate(Compound 2),8,3′-Dihydroxy-3,7,4′-trimethoxy-6-O-β-D-glucopyranoside (Compound 6), Pentadecane (Compound 7),β-Sitosterol (Compound 8), Stigmasterol(Compound 9), β-Daucosessterol (Compound 10), Bis-(2-ethylhexyl yl)-phthalate(Compound 11).Compound 1,Compound 2,Compound 3 and Compound 4 were new compounds (Pathak et al., 1991; Gaikwadi et al., 2003; Suseel et al., 2002; Abubakaret et al., 2012; Ssanna et al., 2005; Ali et al., 2001; Sunil et al., 2012; Chitra et al., 2011; Singh K., & Ahirwar V., 2010; Jude et al., 2009).

**Conclusion**:-

Tridax procumbens Linn. (Compositae) is a weed found throughout India, it is native of tropical America and naturalized in tropical Africa, Asia, and Australia. This plant widely distributed and it’s each and every part having noble pharmacological activities like hepatoprotective activity, antinflammatory, wound healing, antidiabetic activity, hypotensive effect, immunomodulating property, bronchial catarrh, dysentery, diarrhea and to prevent falling of hair, promotes the growth of hair, and antimicrobial activity against both gram-positive and gram-negative bacteria Tridax procumbens The plant product over synthetic compound is the need in treatment of diseases. Plant based antimicrobials have enormous therapeutic potential as they can serve the purpose with no or lesser side effects due to an array of secondary metabolites T. procumbens may have a short shelf-life due to its high moisture content. Dehydration would increase the relative concentrations of the other food nutrients and improve the shelf-life/preservation of the T. procumbens. Then moisture content of food is an index of water activity and is used as a measure of stability and susceptibility to microbial contamination. This plant also used as bioadsorbent for removal of Cr (VI) from the industrial wastewater (summarized in Table). Therefore, there is huge room for research in direction of more pharmacological activities of plant and to elucidate the mechanism of action of same in future.

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