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A Review on Medicinal Plants with Anti-Ulcer Activity

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A peptic ulcer is erosion in a segment of the gastro intestinal mucosa. It may typically in the stomach (gastric ulcer) or first few centimeters of duodenum (duodenal ulcer) that penetrates through the muscularis mucosae. Contrary to popular belief, ulcer is not only caused by spicy food but also most commonly due to an infection of *Helicobacter Pylori* and long term use of medications. Standard treatment is a combination of drugs including antibiotics and a proton pump inhibitors. Literature suggests that number of synthetic drugs are used in the management of peptic ulcers but elicit several adverse effects. Therefore Indian herbal plants stand out as being exceptional for its ethnic, ethobotanical and ethno-pharmaceutical use. In this review attempts have been made to know about some plants which may be used in treatment or prevention of peptic ulcers. Various plants like *Excoecaria agallocha*, *Mentha arvensis*, *Uleria salicifolia*, *Emblica officinalis* etc. proved active in antiulcer therapy. This combination of traditional and modern knowledge can produced better antiulcer drugs with fewer side effects. The medicinal plants are available in India and other countries, recent technologies advances have renewal interest in natural product in drug discovery.

Keyword: Anti-ulcer, Phytoconstituents and Medicinal Plants.

1. Introduction

Ulcers are an open sore of the skin or mucus membrane characterized by sloughing of inflamed dead tissue^[1]. Ulcers are lesions on the surface of the skin or a mucous membrane characterized by a superficial loss of tissue. Ulcers are most common on the skin of the lower extremities and in the gastrointestinal tract, although they may be encountered at almost any site. Ulcers on the digestive tract membranes are called peptic ulcers (or stomach ulcers or duodenal ulcers)^[2].

These are sores on the lining of your digestive tract. Our digestive tract consists of the esophagus, stomach, duodenum (the first part of the intestine) and intestines. Most ulcers are located in the duodenum. These ulcers are called

duodenal ulcers. Ulcers located in the stomach are called gastric ulcers^[1].

Peptic ulcers are an inflammation of the stomach or duodenal lining. Once believed to be caused by spicy food and stress, these have been found merely to be aggravating factor, and the real causes have been found by research to include bacterial infection (*Helicobacter pylori*) or reaction to various medications, particularly NSAIDS. The identification of *H. pylori* ulcers has led to a cure for this subtype that was discovered as recently as 1982. Whereas treatment used to involve bed rest and antacids, modern treatment involves killing the *H. pylori* bacteria or removing the underlying NSAIDS medication^[3].

When *H. pylori* bacteria do cause ulcers, here's how doctors think it happens:

1. Bacteria weaken the protective coating of the stomach and upper small intestine.
2. Acid in the stomach then gets through to the sensitive tissues lining the digestive system underneath.
3. Acid and bacteria directly irritate this lining resulting in sores, or ulcers^[4].
4. Following are the medicinal plants which has anti-ulcer activity
- 5.

1.1. Ethanolic Extract of *Buchanania lanzan* Spreng^[5].

It is roots obtained from *Buchanania lanzan* Spreng. (Family: Anacardiaceae) It is commonly known as Char in hindi is a subdeciduous tree. It found throughout the hot dried parts of India. The roots were dried in shade for 15 days and to ensure complete dryness plant roots were kept in hot air oven at 45°C for 10 minutes. Then roots were subjected to size reduction to make coarse powder and passed through 40-mesh sieve and stored in an airtight container for further use. The dried and powdered roots were subjected to hot extraction in Soxhlet apparatus with ethanol.

1.2 Cold Water Extract of *Excoecaria agallocha*^[6].

It is dried bark obtained from *Excoecaria agallocha* (Family: Euphorbiaceae). It is a small mangrove tree that grows widely in the tidal forests and swamps of the Sundarbans and other coastal areas of Bangladesh. This plant is also found in the countries of temperate and tropical like Asia, Australasia and South-western Pacific. Bark were cut into small pieces and shade dried for experimental studies. Dried leaves were powdered and then the extract was prepared. The cold water extract was prepared by keeping leaf powder in cold water (1:50 W/v) for 48hours and Then it was filtered with the help of Whatman paper No. 1 filter paper and filtrate was lyophilized. The hot water extract was prepared by boiling leaf powder in distilled water (1:10 w/v) at 90° c for one hour. Then it was filtered by Whatman No.1 filter paper and the filtrate was

lyophilized. Both the lyophilize samples were stored at dry place.

2. Ether, Chloroform and Aqueous Extract of *Mentha arvensis*^[7].

It is whole plant of *Mentha arvensis* L. (Family: Lamiaceae) It is distributed throughout the western Himalayas and is cultivated throughout world for use as a vegetable. The whole plants of *Mentha arvensis* were washed with tap water and shade dried at room temperature. After 7 day of drying the plant material ground in a pestle and mortar to obtain a fine powder. The powder was weighed and plant powder material was extracted successively using solvents ranging from non-polar to polar i.e. petroleum ether (60-70°C), chloroform (60-70°C) and aqueous (90-100°C), in a soxhlet apparatus for 18 h. The powdered plant material (120 g) was extracted with 500 mL of petroleum ether. The filtrate gave a light green jelly syrup (3 g) with (w/w) yield of 2.5%. One hundred and twenty grams of plant material was extracted with 500 mL of chloroform. The filtrate gave a green jelly syrup (4.85 g) with (w/w) yield of 4.04%. Similarly, 120 g of powdered material was extracted with 500 mL of water. The filtrate gave a brown jelly syrup (11.5 g) with (w/w) yield of 9.58% and was administered suspended in 1% Tween 80.

2.1 Hydroethanolic Extract From *Kielmeyera coriacea*^[8].

It is the stems of *Kielmeyera coriacea* Mart (Family: Guttiferae). The stems of *K. coriacea* Mart were crushed and powdered using a grinding mill, a standardized extract being prepared by maceration. The extract was concentrated by evaporation to 10% of its volume and was then lyophilized. Each 100 g of powdered stem yielded 17 g of lyophilized extract. The active solution was prepared by dissolving the lyophilized extract in saline (0.9% NaCl). The doses employed ranged from 30 to 120 mg/kg, applied in rats.

2.2 *Utleria salicifolia* Rhizome Extract^[9].

It is dried rhizome of *Utleria salicifolia* Bedd. Ex. Hook. F. (Family: Periplocaceae). It is a branched

shrub endemic to South Western Ghats of peninsular India. The Air-dried powdered rhizomes of *Uleria salicifolia* (1000 g) were powdered and exhaustively extracted by overnight maceration with 10 volumes of 50% ethanol and centrifugation at 10,000 revolutions per minute. The extract was separated by filtration and concentrated on rotary evaporator (Buchi, USA) and then dried in lyophilizer (Labconco, USA) under reduced pressure to obtain 42 g of solid residue (yield 4.2%, w/w).

2.3 Ethanolic Extract of *Ixora pavetta*^[10].

It is shrub of *Ixora pavetta* (Family: Rubiaceae) It is a small tree or ever green shrubs, found in deciduous slopes and hills. The flowers of the plant were collected from Marthandum, Tamilnadu. The collected flowers were dried under shade and powdered. The coarse powder was extracted with ethanol using cold percolation method.

2.4 Ethanol and Ethyl Acetate Extract of *Tecomaria capensis*^[11].

It is dried leaves of *Tecomaria capensis* (Family- Bignoniaceae) It also known as Cape-honeysuckle. The leaves of *Tecomaria capensis* were collected from Guntur, Andhra Pradesh. The leaf part of *Tecomaria capensis* was dried at room temperature and grounded into powder and passed through 60# sieve. The powder (500gm) was extracted successively in soxhlet by ethanol and ethyl acetate. The sediments were filtered and the filtrate was dried at 40°C in an oven to get dried product. The different fractions obtained were used for further study.

2.5 Ethanolic Extract of *Boswellia serrata*^[12].

It is dried bark of *Boswellia serrata* [Family- Burseraceae]. The (50) gm of powdered bark was extracted in soxhlet assembly 10-12 with petroleum ether. For aqueous extract, dried and coarsely powdered plant materials were extracted separately with distilled water for 48 hours by cold maceration at room temperature and filtered. The extracts were concentrated with the help of vacuum evaporator and kept in a dessicator 13-15. The colour and consistency of ex-tracts are noted.

2.6 Double Distilled Water Extract of *Emblia officinalis*.^[13]

It is fresh fruit part of *Emblia officinalis* (Family: Euphorbiaceae) the drug collected during February through April of the year. These were cleaned, cut into small pieces, air dried, powdered and extracted with double distilled water by refluxing for 36 hours. The extract thus obtained was vacuum evaporated so as to make it in powder form. The extract was redissolving in double distilled water method.

2.7 *Momordica cymbalaria* Hook.^[14]

The fruits of *Momordica cymbalaria* Hook. (Family- Cucurbitaceae). Five kilograms of the fruit powder was extracted through successive solvent extraction in Soxhlet apparatus using the solvents Pet-ether (60-80), chloroform, ethyl acetate, and methanol; and finally the marc was subjected to aqueous extraction by maceration in 15 volumes of purified water. The solvent extracts were used for phytochemical investigation. The aqueous extract (yield, 9.5%) was concentrated and dried at a temperature not exceeding 60°C in high vacuum (0.1 mmHg). The dried powder of the aqueous extract was suspended in distilled water and used for the following study.

2.8 Hydro Alcoholic Extract of *Ocimum sanctum*^[15].

It is small herb of plant *Ocimum sanctum* Linn. (Family- Lamiaceae). The Fresh leaves of the plant *Ocimum sanctum* were collected during the month of April from a local area in Sevagram and were shade dried and powdered. A hydro alcoholic (70% V/V) extract of shade dried fresh leaves of *Ocimum sanctum* was prepared. This extract was again shade dried and was used to prepare an aqueous solution in desired concentration just before use every time.

2.9 Methanolic Extract of *Abutilon indicum*.^[16]

The Leaves of *Abutilon indicum* L. (Family: Malvaceae). The leaves were separated from the fresh stems and dried on filter paper sheets under shade at room temperature until with changing of color of filter papers. The shade-dried, coarsely

powdered leaves (500 g) were successively extracted with petroleum ether (60-80°C) for 8 hr. to remove fatty matter. The defatted marc was then subjected to soxhlet extraction with 95% methanol to obtain methanolic extract. The methanolic extract were evaporated under reduced pressure at low temperature (30°C) to dryness to yield brownish yellow color extracts of *A. indicum*, stored in an airtight container in refrigerator for further experimental studies.

2.10 *Kielmeyera coriacea*^[17].

The stems of *Kielmeyera coriacea* Mart. (Family-Guttiferae). The stems of *K. coriacea* Mart were crushed and powdered using a grinding mill, a standardized extract being prepared by maceration. The extract was concentrated by evaporation to 10% of its volume and was then lyophilized. Each 100 g of powdered stem yielded 17 g of lyophilized extract.

2.11 Ethanolic Extract of *Ficus religiosa*.^[18]

It is an Stem part of *Ficus religiosa* L. (Family Moraceae).The stem bark of *F. religiosa* was shade dried after collection for 15 days and was powdered. Approximately 0.95 kg of powdered drug material was extracted using 99% pure ethanol in the ratio of 1:2 (w/v) in a Soxhlet apparatus. The extract obtained was dried in a rotavapor and the dried mass was weighed and recorded. The percentage of yield was calculated. The weight of dried crude extract obtained was approximately 0.16 g which commemorated with the percentage yield of 17.16%.

2.12 *Bauhinia purpurea* Leave.^[19]

The leaves part of *Bauhinia purpurea* (Family-Leguminosae). The matured leaves of *B. purpurea* were air dried for 1 to 2 weeks at room temperature (27 ± 2°C) according to previous studies. The dried leaves were then grinded into small particles, weighed (40 g) and then sequentially soaked at room temperature for 72 h with distilled water (dH₂O), chloroform and methanol in the ratio of 1:20 (w/v). Each of the mixture solutions were collected and filtered using Whatman No. 1 filter paper to obtained the aqueous, chloroform and methanol supernatants.

The aqueous extracts of *B. purpurea* was kept at -80°C for at least 48 h and then subjected to the freeze-drying process leading to a yield of 2.1 g (5.2%) of crude extracts, while the chloroform and methanol extracts of the plants were evaporated at 40°C under reduced pressure to dryness resulting in a yield of 2.7 g (6.6%) and 1.1 g (2.7%), respectively. All the dried crude extracts obtained were kept at 4°C and prior to use, the aqueous extracts were dissolved in dH₂O while the chloroform and methanol extracts were dissolved in 100% dimethyl sulfoxide (DMSO) to prepare the respective stock solutions (10 mg/ml).

2.13 Ethanolic Extract of *Polyalthia longifolia*.^[20]

The leaves of *Polyalthia longifolia* (Family-Annonaceae). The leaves were air dried and powdered plant material was extracted by maceration with ethanol for 72 hr. The extract was concentrated using rotary vacuum to get the solid mass. The yield obtained was 13.73 %.

2.14 *Lagenaria siceraria*.^[21]

It is obtained from *lagenaria siceraria* (family-Cucurbitaceae). Dry powder (250g) was used for carrying out soxhlet extraction with 2 liter of n-Hexane, Chloroform, Dichloromethane, ethyl acetate, n-Butanol, methanol and chloroform-water for 72h at room temperature. All the extracts were filtered and filtrates were evaporated using Rotary film evaporator and dried in vacuum drier.

2.15. Methanolic Extract Of Sweet Potato.^[22]

It is a tubers part of *Ipomoea batatas* L. (Family Convolvulaceae). The tubers of sweet potato were size reduced, dried at 60°C and extracted with methanol by using a Soxhlet apparatus at 60°C. The extract was collected and put on a water bath to evaporate the methanol; the extract was further dried in vacuum oven. The dried TE was dissolved in water to get a clear red solution, which used for administration.

2. Discussion

Historically, diet was considered one of the primary causes of peptic ulcer disease. However, current knowledge indicates that diet probably has little influence on the pathogenesis of duodenal ulcers.

Diet is of almost importance in the treatment of ulcer. Milk cream, butter, fruits and fresh, raw and boiled vegetables, natural foods and natural vitamin supplements are the best diet for an ulcer patient. Bananas and milk which are considered an ideal diet for the patients who are in an advanced state of the disease.

Deficiency of certain essential fatty acids necessary for prostaglandin production has been examined as a possible risk factor. However, the incorrect use of the natural products offers dangers to society, so it is important to identify the active compounds, linking its structure with the biological activity and report the correct manner to use them with regards to dose, route of administration and frequency of use^[29]. The natural active compounds classes or secondary metabolites as alkaloids, flavonoids, saponins, tannins and others have attracted researchers to investigate their chemical, toxicological and pharmacological features.

3. Conclusion

Phytogenic agents have traditionally been used by herbalists and indigenous healers for the prevention and treatment of peptic ulcer. This report reviews the anti-acid/anti-peptic, gastro-protective and/or anti-ulcer properties of the most commonly employed herbal medicines and their identified active constituents. Botanical compounds with anti-ulcer activity include alkaloids, flavonoids, saponins and tannins. Also, ethnomedical systems employ several plant extracts for the treatment of peptic ulcer. Despite progress in conventional chemistry and pharmacology in producing effective drugs, the plant kingdom might provide a useful source of new anti-ulcer compounds for development as pharmaceutical entities or, alternatively, as simple dietary adjuncts to existing therapies.

A number of drugs including proton pump inhibitors, H₂ blockers, antibiotics and mucosal protective agents are available for the treatment of peptic ulcer, but these drugs has shown incidence of relapses, side effects and drug interactions. This combination of traditional and modern knowledge can produced better antiulcer drugs with fewer side effects and herbs widely available in India and other countries, recent technologies advances have renewal interest in natural product in drug discovery.

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