4. DRUGS AND PLANT PROFILE

4.1 5-AMINOSALICYLIC ACID (Kruis et al, 2001; Wikipedia)

Mesalazine (INN, BAN), also known as mesalamine (USAN) or 5-aminosalicylic acid (5-ASA), is an anti-inflammatory drug used to treat inflammatory, such as ulcerative colitis and mild-to-moderate Crohn’s disease.

Chemical data

**Formula**

\[ C_7H_7NO_3 \]

**Molecular mass**

153.135 gm/mol

IUPAC name

5-amino-2-hydroxybenzoic acid

Mechanism of action

Mucosal production of arachidonic acid metabolites, both through the cyclooxygenase and lipoxygenase pathways, is increased in patients with inflammatory bowel disease. Mesalamine appears to diminish inflammation by inhibiting cyclooxygenase and lipoxygenase, thereby decreasing the production of prostaglandins, and leukotrienes and hydroxyeicosatetraenoic acids (HETEs), respectively. It is also believed that mesalamine acts as a scavenger of oxygen-derived free radicals which are produced in greater numbers in patients with inflammatory bowel disease.

Pharmacokinetic data

Bioavailability

- Orally: 20-30% absorbed
- Rectally: 10-35%

Metabolism

Rapidly and extensively metabolised intestinal mucosal wall and the liver
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Half-life

5 hr after initial dose. At steady state 7 hr.

Contraindication

- Glucose 6 phosphate dehydrogenase deficiency – may cause haemolysis.
- Pregnancy / breast feeding
- Sulphasalazine may be associated with transient reversible oligospermia in men of child bearing potential.
- Folic acid supplements should be prescribed to those trying to conceive and during pregnancy.
- Small amounts of the drug are excreted in breast milk although this is not thought to be a risk to healthy infants.
- Contraindicated in patients with hypersensitivity to sulphonamides / co-trimoxazole.
4.2 PREDNISONE (Drugs.com, Frey FJ et al., 1994, Wikipedia)

Prednisone is a glucocorticoid prodrug that is converted by 11beta-hydroxysteroid dehydrogenase in the liver into the active form, prednisolone. It is used to treat certain inflammatory diseases (such as severe allergic reactions) and (at higher doses) some types of cancer, but has many significant adverse effects. It is usually taken orally but can be delivered by intramuscular injection or intravenous injection.

Chemical data

Formula

C$_{21}$H$_{28}$O$_{5}$

Molecular mass

360.444 gm/mol

IUPAC name

(11β)-11,17,21-trihydroxy-pregna-1,4-diene-3,20-dione

Mechanism of action

Prednisolone irreversibly binds with glucocorticoid receptors (GR) alpha and beta for which they have a high affinity. AlphaGR and BetaGR are found in virtually all tissues with variable numbers between 3000 and 10000 per cell, depending on the tissue involved. Prednisolone can activate and influence biochemical behaviour of most cells. The steroid/receptor complexes dimerise and interact with cellular DNA in the nucleus, binding to steroid-response elements and modifying gene transcription. They induce synthesis of some proteins, and inhibit synthesis of others.

Anti-inflammatory and immunosuppressive actions

- Inhibition of gene transcription for COX-2, cytokines, cell adhesion molecules, and inducible NO synthetase
- Blockage of Vit D3-mediated induction of osteocalcin gene in osteoblasts
- Modification of collegenase gene transcription
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- Increase synthesis annexin-1, important in negative feedback on hypothalamus and anterior pituitary gland
- Anti-inflammatory action, it is presumed

Regulation of gene suppression leads to systemic suppression of inflammation and immune response. This is of clinical usefulness but ultimately leads to gluconeogenesis, proteolysis and lipolysis. Gene transcription returns to normal after cessation, but sudden stoppage can cause Addison's disease. Osteoporosis is permanent.

Pharmacokinetic data
Bioavailability

70%

Metabolism

Prednisolone (liver)

Half-life

1 h

Contraindications

Prednisone Tablets are contraindicated in systemic fungal infections and known hypersensitivity to components.
4.3 DICYCLOMINE (Wikipedia, Drug.com)

Dicyclomine is used to treat intestinal hypermotility and the symptoms of Irritable Bowel Syndrome (IBS) (also known as spastic colon). It relieves muscle spasms and cramping in the gastrointestinal tract by blocking the activity of acetylcholine on cholinergic (or muscarinic) receptors on the surface of muscle cells. It is a smooth muscle relaxant.

Chemical data

**Formula**

\[ \text{C}_{19}\text{H}_{35}\text{NO}_2 \]

**Molecular mass**

309.487 gm/mol

**IUPAC name**

2-(diethylamino)ethyl 1-cyclohexylcyclohexane-1-carboxylate

**Mechanism of action**

Action is achieved via a dual mechanism (1) a specific anticholinergic effect (antimuscarinic) at the acetylcholine-receptor sites and (2) a direct effect upon smooth muscle (musculotropic).

**Pharmacokinetics**

**Bioavailability**

67%

**Metabolism**

Hepatic, by enzymatic hydrolysis.

**Half-life**

Plasma half life is 4-6 hr

**Contraindications:**

1. Obstructive uropathy
2. Obstructive disease of the gastrointestinal tract
3. Severe ulcerative colitis
4. Reflux esophagitis
4.4 ASPARAGUS RACEMOSUS

Botanical name

Asparagus racemosus

Family name

Liliaceous

Other name

Sanskrit-Shatavari, Hindi-Satavari, English-Asparagus, Gujarati-Ekalkanto

Part used for study – Roots

Aqueous extract of asparagus racemosus (Velavan et al., 2006)

The roots were cut into small pieces, shade dried at room temperature for 15 days, finely powdered and used for extraction. A required quantity of the powdered drug (5gm) was suspended in distilled water (600mL). The suspension was boiled until the quantity was reduced to 100mL. The resultant decoction was cooled and dried, dried residue (12%w/w) used for the present study.

Description

Shatavari has been used in India for thousands of years for its therapeutic and tonic properties. The name shatavari is symbolic which means one who possesses one hundred husbands. Charaka has categorized it as balya promoting strength or a tonic, vaya sthapana – promotes longevity, sukra janana (spermatogenic). Susruta has mentioned it as sukra.

The plant grows all over India in tropical areas and is found in Himalaya’s up to an altitude of 1300-1400 meters. The plant is an armed climber, growing 1-2 meters in
length. The leaves are green, shiny, small, and uniform and like pine needles. The flowers tiny, white, in small spikes. The roots are finger-like, clustered, tuberous, 30 cm to 1 meter or more in length and tapering at both ends. The fruits are globose, pulpy berries, purplish black when ripe. The plant flowers in July and fruits in September.

Chemistry and pharmacology

The main constituents include inulin, asparagusic acid, and eight fructo-oligosaccharides (Leung et al., 1996). The two glycosidic bitter principles, officinalisnin-I and officinalisnin-II, are isolated from the dried root and yield β-sitosterol, sarsasapogenin, and nine steroidal glycosides (named asparagosides A to I, in order of increasing polarity) (Leung et al., 1996). Other constituents include asparagine, tyrosine, succinic acid, arginine, \( \alpha \)-aminodimethyl-g-butyrothetin (a methylsulfonium derivative of methionine), fat, and sugar (Stecher et al., 1968). The roots are thought to possess diuretic and hypotensive properties, and to enhance the renal elimination of water (Bruneton., 1995; Leung et al., 1996).

Uses

- Asparagus root in irrigation therapy for inflammatory diseases of the urinary tract and for prevention of kidney stones. Traditionally, the root has been used as diuretic, laxative, and to treat neuritis and rheumatism (Leung et al., 1996).
- Its main use has been as a galactagogue to increase milk secretion during lactation and produce beneficial effect on the female reproductive system.
- Used for regulating menstruation and ovulation, improving lactation, decreasing morning sickness, infertility, menopause, leucorrhoea, inflammation of sexual organs, and general sexual debility.
- Shatavari's mild diuretic action addresses the need in bladder infections, an antacid and demulcent.

Contraindications

- Inflammatory kidney diseases.