

## 5.2. ANTIHYPERTENSIVE

### 5.2.1. Introduction

The pressure exerted by blood against the walls of blood vessels is termed as **blood pressure**. When the blood pressure persistently remains high, the condition is termed as **hypertension**. As a result of this persistently high blood pressure, the heart, blood vessels, and other organs are excessively stressed.

Hypertensive patients are at a high risk of an abnormal increase in blood pressure. These patients are also exposed to secondary complications resulting in diseases affecting other vital organs. This is a single factor that may produce numerous other cardiovascular diseases, resulting in morbidity and premature deaths.

It has found to affect 25% of the adult population. It is a significant risk factor for death resulting from CHF, stroke, MI, and renal failure. In untreated cases, it results in complications such as other heart problems, kidney diseases, and stroke. Factors that may be responsible for contributing to the incidence of hypertension include the urban lifestyle, culture, diet, and stress.

### 5.2.2. Rauwolfia

Rauwolfia or sarpagandha is an evergreen plant named after its discoverer, a German doctor and traveller, **Leonhard Rauwolf** (1582). Due to its immense therapeutic properties it is used in Ayurvedic, Unani, and Homeopathy.

#### Synonyms

Rauwolfia root, Serpentina root, Chhotachand, Sarpagandha, and Indian snake root.

#### Biological Source

Rauwolfia is the dried roots of *Rauwolfia serpentina* Benth.

#### Family

Apocynaceae

#### 5.2.2.1. Occurrence and Distribution

Various species of rauwolfia are found in the tropical regions of America, Africa, and Asia. It is commercially cultivated in America, Thailand, Myanmar, Sri Lanka, and India.

In India, it is cultivated in Gujarat, Maharashtra, Karnataka, West Bengal, Tamil Nadu, Orissa, Bihar, and Uttar Pradesh.

### 5.2.2.2. Organoleptic Evaluation

The organoleptic characteristics of rauwolfia are (figure 5.7):

- 1) **Colour:** Root bark is greyish yellow to brown and wood is pale coloured.
- 2) **Odour:** Odourless.
- 3) **Taste:** Bitter.
- 4) **Size:** Diameter is around 1-3cm and length is 10-18cm.
- 5) **Shape:** Roots are sub-cylindrical in shape, and tortuous with slight tapered end.
- 6) **Fracture:** Short and irregular.

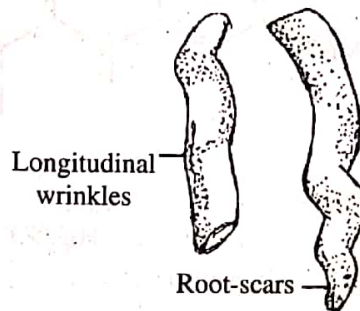
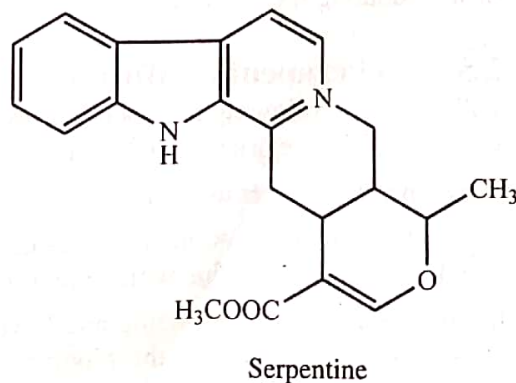
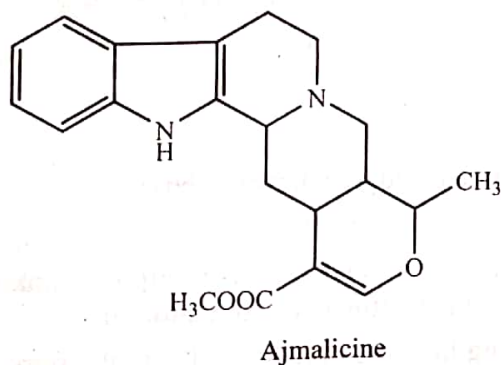
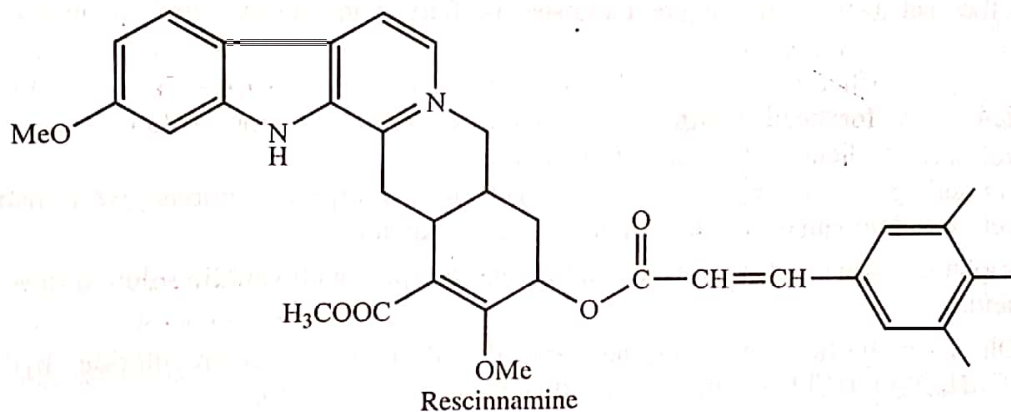


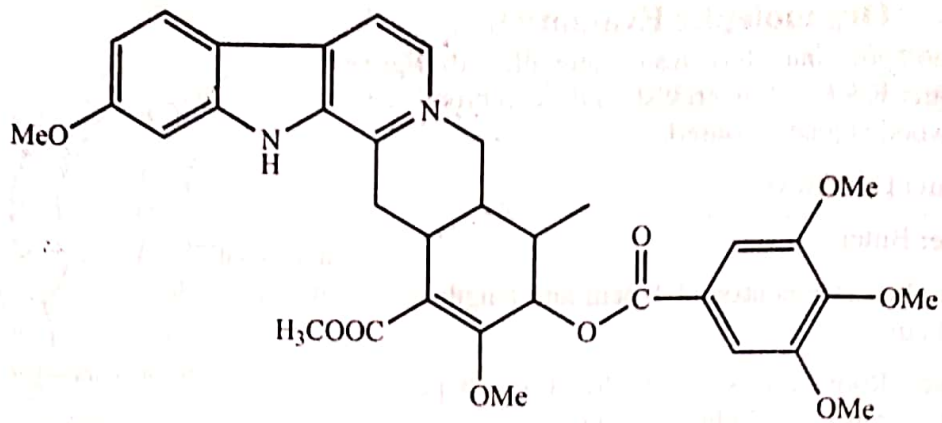
Figure 5.7: Pieces of Rauwolfia Roots

**Extra Features:** Due to longitudinal marking and wrinkled surface, the roots appear rough. Normally, rootlets are absent but some small circular root scars with tetrastichous arrangements can be observed.

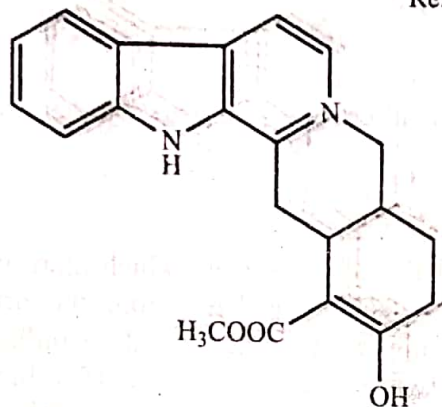
### 5.2.2.3. Chemical Constituents

Rauwolfia contains about 0.7-2.4% of total alkaloidal bases from which more than 80 alkaloids have been isolated. The prominent alkaloids isolated from the drug are **reserpine**, **rescinamine**,  $\Psi$ -**reserpine**, **rescidine**, **raubescine**, and **deserpidine**. The other alkaloidal components are **ajma-lineine**, **ajmaline**, **ajmalicine** (8-yohimbine), **serpentine**, **serpentinine**, **tetrahydroreserpine**, **raubasine**, **reserpinine**, **isoajamaline**, and **yohambinine**.

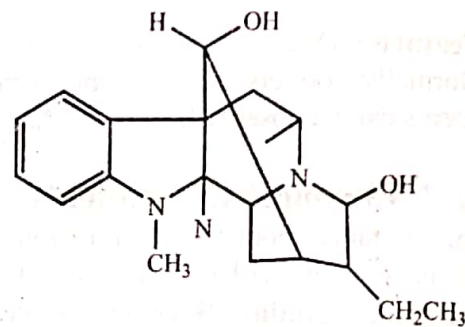




Reserpine



Yohimbine



Ajmaline

The other substances present are phytosterols, fatty acids, unsaturated alcohols, and sugars.

#### 5.2.2.4. Chemical Tests

Rauwolfia can be identified by the following tests:

- 1) On adding an acid or on exposing to light, most reserpine solutions give a distinct yellow colour and also a clear fluorescence on standing.
- 2) Violet red colour solution results on treating reserpine with vanillin solution in acetic acid.
- 3) On crystallisation of reserpine, crystals of reserpine hydrochloride hydrate (C<sub>33</sub>H<sub>40</sub>N<sub>2</sub>O<sub>9</sub>.HCl.H<sub>2</sub>O) are obtained that decomposes at 224°C.
- 4) On treating a freshly fractured surface with concentrated nitric acid, a red colour is observed along the medullary ray.

#### 5.2.2.5. Therapeutic Efficacy

Rauwolfia has the following therapeutic uses:

- 1) It is a hypotensive drug having a strong sedative and hypotensive activity.
- 2) It is a mild tranquiliser used for removing low level of anxiety.
- 3) It is a rich source of indole alkaloids of medicinal value such as reserpine, ajmaline, ajmalicine, and serpentine which are used in the treatment of circulatory disorders.
- 4) Its roots are used for managing and lowering the blood pressure, due to the presence of reserpine which dilates the blood vessels, depresses CNS activity, and acts as a hypnotic.
- 5) Deserpidine and rescinnamine are also used as hypotensive and tranquilliser.

- 6) It is also used as an antianxiety, antipsychotic (neuroleptic), hypnotic and sedative drug. It induces sleep and cause relief in many mental disorders like aggression, anxiety, and sleeplessness.
- 7) In Ayurveda, its roots and whole plant are used for the treatment of rheumatism, insanity, and epilepsy.
- 8) Its leaves are used in removal of opacities of cornea.
- 9) The root decoction is useful for the treatment of snake poison.
- 10) In Ayurveda, it is best for reducing fever, preventing and treating these symptoms.
- 11) It also reduces the symptoms of hangover occurring after heavy drinking.
- 12) It is used to treat uterine pain due to miscarriage as it contracts the uterus and eliminates the toxins from uterine cavity and further relaxes the uterine muscles. This stops bleeding and reduces pain.
- 13) It decreases pain during menstruation by modulating blood flow which reduces cramps and throbbing pain.
- 14) It is also useful for treating dysentery as it reduces the frequency of loose stools, checks bleeding, and alleviates pain.

## 5.3. ANTITUSSIVES

### 5.3.1. Introduction

Antitussives subdue coughing by reducing the activity of cough centre in brain. Cough is a protective reflex. It aids in expelling the respiratory secretions or foreign particles from the lungs and upper airway passages. Antitussives are used for relieving dry cough.

### 5.3.2. Vasaka

Vasaka is an important medicinal herb. Almost all the plant parts (roots, leaves, etc.) are used for treating various diseases. Vasaka leaves are of great importance.

#### Synonyms

Adhatoda, Adulsa, and Malabar nut.

#### Biological Source

Vasaka is the dried and fresh leaves of *Adhatoda vasica* Nees, Syn.

#### Family

Acanthaceae



Figure 5.8: Vasaka Herb

#### 5.3.2.1. Occurrence and Distribution

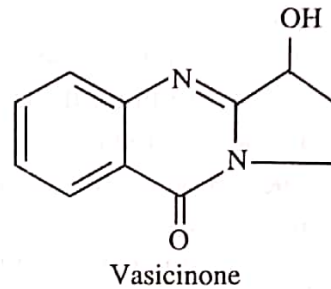
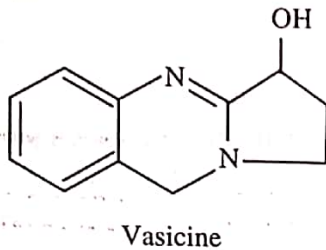
Vasaka is native to India, and found in sub-Himalayan track at an altitude of 1000m. In Maharashtra, it is found in Konkan region. It is also found in Myanmar, Sri Lanka, and Malaya.

#### 5.3.2.2. Organoleptic Evaluation

Vasaka contains stem, leaves, fruits, and seeds. Leaves (figure 5.8) are 10-30cm long and 4-10cm broad. They are petiolate, exstipulate, and lanceolate shaped. Their margin is crenate with acuminate apex. Their surface has 8-10 pairs of lateral veins. They have a characteristic odour.

### 5.3.2.3. Chemical Constituents

The leaves of *vasaka* contain **vasicine**, **vasicinone**, and **6-hydroxy vasicine** (quinazoline derivatives). Vasicine oxidises into vasicinone (its ketonic derivative), which is a bronchodilator. *Vasaka* also contains volatile oil, betain, vasakin, and adhatodic acid.



### 5.3.2.4. Chemical Tests

*Vasaka* gives the following chemical tests:

- 1) Hydrochloride dihydrate derivative is obtained as dry needles with melting point of 208°C.
- 2) Hydroiodide dihydrate derivative is obtained as dry needles with melting point 195°C.
- 3) Methiodide derivative is obtained from methanol as needles with melting point of 187°C.
- 4) Acetyl vasicine derivative is obtained as crystals with melting point of 123°C and boiling point of 230-240°C.

### 5.3.2.5. Therapeutic Efficacy

*Vasaka* has the following therapeutic properties:

- 1) It is used as an expectorant and bronchodilator.
- 2) In large doses, it is irritant and causes vomiting and diarrhoea.
- 3) Vasicine shows oxytocic property (just like oxytocin and methyl ergometrine) due to the release of prostaglandins.
- 4) It also shows abortifacient effect due to the same reason.
- 5) A synthetic derivative of vasicine (bromhexine HCl) changes the structure of bronchial secretions and reduces the viscosity of sputum.

### 5.3.3. Tolu Balsam

Tolu balsam is used as a fragrance and flavouring agent in pharmaceutical products. It also has a mild antiseptic and expectorant property. However no clinical data regarding Tolu balsam to treat any condition has been put forward by the researchers.

#### Synonym

Tolu Balsam

#### Biological Source

The solid or semi-solid balsam is obtained by incision from the trunk of *Myroxylon Balsamum* (Linn.).

#### Family

Leguminosae

### 5.3.3.1. Occurrence and Distribution

The balsam is named after the town, Tolu near Cartagena. The balsam is shipped from Tolu and Savanilla. Tolu balsam trees are grown abundantly in West Indies. Naturally they widely grow in Colombia (mostly in the northern forest area bordering the Magdalena and Cauca Rivers) San Salvador, and Granada. Most of the Tolu balsam produced in Britain enters the American market.

### 5.3.3.2. Organoleptic Evaluation

The organoleptic features of Tolu balsam are:

- 1) **Appearance:** Soft, tenacious, resinous, becomes harder and brittle on storage.
- 2) **Colour:** Yellowish brown.
- 3) **Odour:** Fragrant.
- 4) **Taste:** Aromatic and slightly acidic.
- 5) **Solubility:** Soluble in alcohol (in 1:1), benzol (in 1:3), chloroform (in 2:1), and glacial acetic acid (in 1:1); insoluble in petroleum spirit; and partially soluble in carbon bisulphide, the portion dissolved in this solvent contains cinnamic acid.

### 5.3.3.3. Chemical Constituents

Tolu balsam contains **cinnamic acid** (10-15%) and **benzoic acid** (6-88%). Around 75-80% of resin esters consisting of tolueresinotannol are present combined with cinnamic acid (chiefly) and benzoic acid. All in all 35-50% of free and combined balsamic acids is officially required (calculated on the dry, alcohol-soluble matter).

Toluene, styrol, and vanillin (1-2% together) are the minor constituents of Tolu balsam. These constituents make up the bulk of the aromatic volatile oil obtained by distillation of balsam with water.

It has been proved analytically that styrene, eugenol, ferulic acid, 1,2-diphenylethane, mono and sesquiterpene hydrocarbons, different alcohols, and tri-terpenoids are also present in Tolu balsam.

### 5.3.3.4. Chemical Tests

Tolu balsam gives the following chemical tests:

- 1) 1gm of drug is boiled with 5ml water, filtered, and the odour of filtrate is observed. The obtained solution is warmed with 3ml of potassium permanganate solution (1%) and the odour of benzaldehyde (formed when the cinnamic acid dissolved by the boiling water oxidises) is observed.
- 2) The alcoholic solution (1) is added with a few drops of ferric chloride test solution, a green colour develops.

### 5.3.3.5. Therapeutic Efficacy (12)

Tolu balsam has the following therapeutic properties:

- 1) It is widely used as a flavouring agent in medicinal syrups, confectionery, chewing gums, and perfumeries.
- 2) Cinnamic and benzoic acid are antiseptics and used as a pharmaceutical aid.
- 3) It is also used for:
  - i) Coughs and lung congestion,
  - ii) Skin rashes and wounds,
  - iii) Head lice,
  - iv) Skin parasites and ringworm,
  - v) Colds, flu, and strep throat.