



# Formulation & Evaluation Of Rauwolfia Serpentina Tablet For Anti-Hypertensive Effect

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**Abstract:-** Rauwolfia serpentina is an Indian medicinal plant and is a safe and effective treatment for poisonous reptiles, Hypertension, Cancer etc. The plant was used by many physicians throughout India in the 1940s and then was used throughout the world in the 1950.

In this review we focus on the use of Rauwolfia and treatment for High Blood pressure, its botany, chemistry and mode of action with special emphasis on the plant's role in treating high blood pressure and hypertension, and also critically examining its adverse side effects, toxicology and carcinogenicity. Rauwolfia Serpentina Tablet are reported to contain Variety of Alkaloids constituents and hence widely used for the treatment of Hypertension.

The present investigation was aimed to formulate Tablet formulations containing Rauwolfia in order to obtain antihypertension formulations with more effective oral activity, less side effects, increased patient compliance thereby providing multifaceted benefits..

**Keywords:** Rauwolfia serpentina, Alkaloids, Antihypertensive, Herbal remedy, Medicinal plant (Turmeric), Multipurpose cream, Herbal cosmetic.

## INTRODUCTION

Rauwolfia (Rauwolfia serpentina) is an evergreen shrub that is member of the dogbane or apocynaceae family. More than 100 species are included in the Rauwolfia genus, and they are native to tropical and subtropical regions of the world, including Europe, Africa, Asia, Australia and the Central and South America. Rauwolfia serpentina is native to the moist, deciduous forests of Southeast Asia, including India,

Burma, Bangladesh, Sri-lanka and Malaysia. The plant has many shiny, black or purple, round fruits that are approximately

0.5 cm in diameter. It also has small pink or white flowers. The plant has a prominent tuberose. The plant has also tap root that reaches a length between 30 and 50 and diameter between 1.2 and 2.5cm Rauwolfia serpentina or Sarpagandha is an important medicinal plant distributed in the foot-hill of Himalaya range, up to the elevation of 1300–1400 m. Rauwolfia serpentina or sarpagandha is widely used in modern medical system and it is also used in Ayurveda, Unani and folk medicine. Hindus used this plant for centuries as an antidote to the bites of poisonous snakes. It is also used in common treatment for hypertension, insomnia and used also on various central nervous system disorders, both physical and motor, including anxiety states, excitement. Extracts from the root are used for the treatment of intestinal disorders, like diarrhea and dysentery. The plant is known by various common names in different place as given below:

Hindi: Chandrabhaga, Sarpagandha English: Rauwolfi or Indian snake root Latin: Rauwolfia serpentina.

Sanskrit: Sarpagandha

Rauwolfia serpentina contain 50 different alkaloids. In 1891, Dymock detected the presence of alkaloids and

yellow resin in the root of *Rauwolfia serpentina*. It contains two stronger yellow, crystalline bases are "serpentine and serpetinine". Already in India, *rauwolfia* root tablets were highly popular, about 90% of doctors prescribed as routine hypotensive agent and around 50 million tablets had been sold by a single manufacturing firm alone but it fell out of popularity when adverse side effects, including depression and cancer, become associated with it. The chemical of reserpine shows many other side effects like lethargy, sedation, hypertension, nausea, vomiting, etc.

### **SCIENTIFIC**

#### **CLASSIFICATION :-**

Kingdom: plantae Phylum: Angiosperms Subphylum: Eudicots Class: Asteroids Order: Gentianales Family: Apocynaceae Genus: *Rauwolfia* Species: serpentine

#### **CLASSIFICATION OF**

#### **HYPERTENSION :-**

Blood pressure is the force exerted by circulating blood against the walls of the body's arteries,

the major blood vessels in the body. Hypertension is when blood pressure is too high. Blood pressure is written as two numbers. The first (systolic) number represents the pressure in blood vessels when the heart contracts or beats. The second (diastolic) number represents the pressure in the vessels when the heart rests between beats.

#### **ADVANTAGES OF**

#### **RAUWOLFIA :-**

- *Rauwolfia* have following advantages
- It Controls High Blood Pressure
- Relieves Stress And Anxiety
- Manages Stomach Issues
- Treats Skin Issues Consuming herbs may help to prevent and manage heart disease, cancer and diabetes. It may also help to reduce blood clots and provide

anti-inflammatory and anti-tumour properties.

#### **Disadvantages of Rauwolfia :-**

When taken by mouth: *Rauwolfia vomitoria* is possibly unsafe. *Rauwolfia vomitoria* dried root powder can cause shakiness, jerky movements, or slower movements in some people.

*Rauwolfia vomitoria* also contains chemicals that can cause serious side effects, including low or high blood pressure, irregular heartbeat, heart attack, and seizures. When applied to the skin: There isn't enough reliable information to know if *Rauwolfia vomitoria* is safe or what the side effects might be.

#### **LITERATURE REVIEW :-**

#### **Mullar J. M. schittler E, et al**

Reserpine is widely distributed throughout the body to the brain, liver, spleen, kidney and adipose tissue. [15] Other studies have shown that reserpine is also widely distributed red blood cell and peripheral neurons. It has been found to be present breast milk and cross the placenta and blood brain barrier. Its initial half life in the blood has been observed to be 4 to 5 hours. Its elimination half life has been determined to be between 45 and 168 hours in plasma. Its relatively long elimination half life is believed to be due to its binding to protein and blood cells. Hepatic metabolism account for approximately 62% of the degradation of reserpine, where as kidney elimination accounts for less than 8%. Most of the elimination of it occurs through fecal excretion. Between 30% and 60% of eliminated metabolites have been found in reserpine itself.

#### **Lobay et al. 2009 :**

When reserpine binds to the receptor for vesicular monoamine transporters, it prevents nerve neurotransmitters from entering the presynaptic vesicle, resulting in desired clinical effects. Finally, it prevents or limits the ability of the sympathetic neurons in the brain and the rest of the nervous system to respond to the nerve signal received from the nerve. Meanwhile, *Rauwolfia serpentina* flavonoids may lower blood pressure by inhibiting ACE.

**Srivastava et al., 2006:**

Rauwolfia serpentina (family Apocynaceae) is a well-known traditional medicine for the treatment of hypertensive and neurological disorders. In addition, this medicinal plant is reported for many pharmacological properties due to the presence of various secondary metabolites especially the variety of alkaloids belong to the indole alkaloid family, ajmaline, ajmalicine, reserpine, serpentine and others.

**Nitin Biradar et al., 2018 :**

Rauwolfia serpentina is an Indian medicinal plant and is a safe and effective treatment for poisonous reptiles. The use of Rauwolfia and treatment for many diseases, its botany, chemistry and mode of action with special emphasis on the plant's role in treating high blood pressure and hypertension, and also critically examining its adverse side effects, toxicology and carcinogenicity.

**S.A. Fegade et al., 2012 :**

Alkaloids from the Rauwolfia serpentina are widely believed to have antihypertensive properties via an unidentified mechanism that is probably not ACE inhibitors. Alkaloids hypotensive activity may be related to suppressing central nervous system (CNS) mechanism.

**AIM AND OBJECTIVES :-****Aim :-**

- Formulation and evaluation of Rauwolfia serpentina tablet for anti-hypertensive effect.
- The aim of work is to formulate Herbal Tablet containing Rauwolfia as drug.
- Rauwolfia Tablet should show anti-hypertensive action.
- It will be safe, cheaper and easily available.

**Objective :-**

- The objective of this study is to formulate such tablet that can lower Blood pressure And is easy to

administrate.

- To show the antihypertensive activity using herbal drug product.
- To show that herbal drug product is safe and it does not have any side effects.
- To show the herbal product are cheaper and easily available.
- The objective of study was to formulate and evaluate the nutraceutical tablets by the wet granulation methods and to study the effect of it as Antihypertensive.

**PLAN OF WORK :-**

- Literature Survey
- Selection Of Herbal Drug
- Determine Active Constituent of Herbal Drug
- Selection of Excipients
- Selection Of Material & Equipment's
- Identification Test For API
- Prepare Granules
- Pre-compression Test
- Compression Tablet
- Post- Compression Test
- Packing & Labelling

**MATERIAL & METHODS :-****1. Material Used**

Rauwolfia Powder are purchased from local Market and Authenticated In own laboratory, Lactose, Magnesium Stearate, Talc, starch, sodium saccharine, Ethanol chemicals are of analytical grade.

**MATERIALS (INGREDIENTS) USED IN MANUFACTURING OF RAUWOLFIA TABLET**

Sr.no	
1	Rauwolfia Powder
2	Lactose
3	Starch
4	Talc
5	Magnesium Stearate
6	Sodium Saccharine



**Fig 1 : Materials Used In Manufacturing Of Tablets**

## 2. Methodology

### 2.1 Preparation of Rauwolfia Tablet

#### 2.1.1. Wet Granulation Method :-

Rauwolfia granules were prepared by wet granulation method. Other ingredients such as lactose was used as diluent, Magnesium Stearate as lubricant and talc as glidant. API along with excipients weighed as shown in table no.1 and passed through sieve number 20 all the ingredients such as lactose, sodium saccharine were added and mixed. Starch paste (5%) was prepared by using warm water. Dump Mass was formed and sieved through sieve no.80. Granules were dried in air. Talc and magnesium Stearate was added at last.

#### 2.1.2. Tablet punching

Wet about 250mg of granules and places in punching mould and required quantity of tablet where punch using hand operating Tablet punching machine

### 3. Identification Test :-

#### 1. Alkaloids :-

##### **Mayer's test -**

To about 3 ml. of extract, a few drops of Mayer's reagent are added.

##### **Dragendorff's Test -**

To about 3 ml of extract, a few drops of Dragendorff's reagent are added.

##### **Wagner's Test -**

To about 3 ml of sample solution, a few drops of Wagner's reagent are added.

##### **Marme's Test -**

To about 3 ml of extract, a few drops of Marme's reagent are added. Then dil. H<sub>2</sub>SO<sub>4</sub> is added to the mixture.

### 2. Flavonoid

#### **Shinoda test**

To dry powder or extract, add 5 ml of 95% ethanol, few drops of conc. HCl and 0.5 g magnesium turnings. Pink colour observed.

#### Alkaline reagent test

For identification of flavonoids, take 2 ml of test sample (4 mg/ml) in which, add a pinch of magnesium metal powder and few drops of concentrated HCL and heat it. Green color sample turned into brick red color.

It is the identification test for flavonoids

### 3. Phenols

#### **Litmus Test**

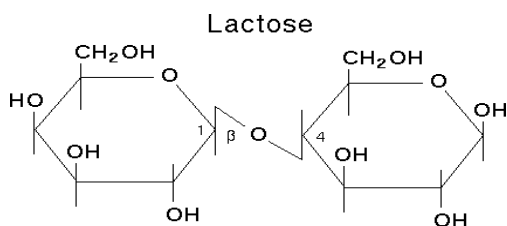
Take the given solution in a test tube and place 1-2 drops of it on the blue litmus paper. The colour of litmus paper changes from blue to red.

#### **Ferric Chloride Test**

Preparation of Ferric chloride solution – To prepare



neutral ferric chloride solution, add diluted solution of NaOH to ferric chloride solution slowly until a permanent brown precipitate is produced. Now filter it and remove the precipitate. The clear filtrate thus obtained is used for

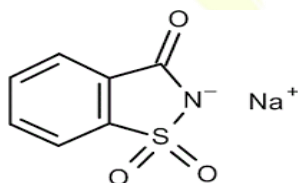


the test of phenols. It should be prepared freshly for the test.

Take 3 ml of the given solution in a test tube and add freshly prepared neutral ferric chloride solution in it dropwise. Note the colour change.

#### Liberman's Test :-

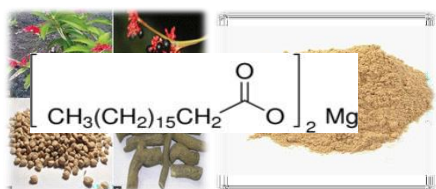
Place a small amount of sodium nitrite crystals in it. Now add 100 mg of the given phenolic compound



to it and heat the test tube for about 30-35 seconds gently. Allow the test tube to cool. Now, add 1 ml of the conc. Sulfuric acid and shake the test tube gently and carefully to mix the contents of it. Observe the colour change and dilute the solution with water. (If a phenol group is present in the given compound then on dilution, the red-colored compound is formed.

#### 4. Tannis

##### Ferric chloride test :-



Tannin extract + Ferric Chloride Solution Gives Blue colour: Hydrolysable tannin Brownish green colour:

Condensed tannin.

#### Gelatine Test :-

Tannin Solution + 1% Gelatine Solution + 10% NaCl Solution Gives White Buff Colour precipitate.

#### EXPERIMENTAL WORK :-

##### HERBAL DRUG

##### Rauwolfia Powder (Rauwolfia Serpentina) :-

Rauwolfia serpentina, Family: Apocynaceae, Genus: Rauwolfia, Species: serpentina. It controls High Blood Pressure, Relieves Stress And Anxiety.

#### SELECTION OF EXCIPENTS

##### LACTOSE

Lactose Used As Diluent. Structure:

Chemical formula :-  $C_{12}H_{22}O_{11}$  Molar mass :- 342.3 g/mol

Uses :- I. Lactose is a natural sugar that's found in milk

II. It is a carbohydrate and it is made up of two sugars: glucose and galactose

##### SODIUM SACCHARIN

Saccharin is an artificial

sweetener with effectively no food energy. Structure:

Chemical formula:  $C_7H_5NNaO_3S^+$  Molar mass: 206.18 g/mol

Uses :- Saccharin is an artificial sweetener, Sodium saccharin can be used for food, such as cold drinks, beverages, jelly, popsicles, pickles.

##### MAGNESIUM STEARATE

Magnesium Stearate Used As Lubricant. Structure :-

Chemical formula:  $Mg(C_{18}H_{35}O_2)_2$  Molar mass: 591.27 g/mol

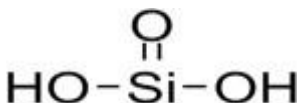
Uses : Magnesium stearate is the magnesium salt of the fatty acid, stearic acid. It has been widely

used for many decades in the food industry as an emulsifier, binder and thickener, as well as an anticaking, lubricant, release, and antifoaming agent

## TALC

Talc Used As Glidant

Structure :-

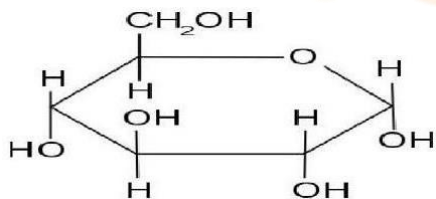


Chemical Formula:  $Mg_3(Si_4O_{10})(OH)_2$  Molar Mass : 379.27

**Uses:** Talc is used as cosmetic (talcum powder), as a lubricant and as a filler in paper. Production.

## STARCH

Use as a Binder Structure :-



Molecular Formula:  $(C_6H_{10}O_5)_n$  Molar Mass: 692.661 g/mol

**Uses:** Starch as diluent/fillers/bulking agent Starch becomes an integral part of a formula during manufacture.

## Evaluation Parameter

### 1) Pre-Compression Test Angle of Repose

Powder is poured from a funnel onto a horizontal surface; it will form a cone due to gravitational forces.

The angle between the sides of the cone and the horizontal is referred to as the angle of repose. The angle of repose is a relatively simple technique for estimation of the flow property of powder. Powders with low angle of repose are free flowing and those with a high angle of repose are poorly flowing powders. 10gm of granules were passed through funnel and the pile was formed. The angle of repose was calculated by using the formula :-

$$\text{Angle of Repose } (\theta) = \frac{\tan^{-1}}{\text{Height (h)}}$$

Radius (r)

## Bulk Density

This is obtained to know the exact volume of the granules that is being placed in the cylinder. Initials are used in the formula. Bulk density is also known as the fluff and poured density and is calculated by using

It is obtained with the help of tap density apparatus, in which the powder is filled in the cylinders and the tapping is done. After few times of intervals the volume of the cylinder is noted down and the tapped density of the granules is calculated using following formula:

$$\text{Tapped density} = \frac{\text{Weight of granules (W)}}{\text{Volume of granules after 50 taps (V50)}}$$

Volume of granules after 50 taps (V50)

## Carr's Index

After obtaining the tapped and fluff density, the Carr's Index is being calculated by using 100ml measuring cylinder and calculated by following formula :-

## % age Compressibility

$$= \frac{\text{Tapped density} - \text{Fluff density}}{\text{Tapped density} * 100}$$

Tapped density \*100

## Hausner's Ratio (H.R.)

This ratio is obtained after the tapped density is calculated by using following formula:

$$\text{H.R.} = \frac{\text{Tapped density}}{\text{Poured density}}$$

Poured density

## Void Volume

This volume of the granules is obtained by using the values of bulk volume and tapped density. This will indicate the air volumes that is being created in the granules during tapping and is calculated by using formula :-

**Void Volume = Bulk Volume –**

**Tapped Volume**

### **1. Post-Compression Test**

#### **Weight Variation**

10 tablets were selected randomly and weight individually. The average of tablets is calculated using formula and the Standard deviation is calculated by using following formula:

$$\text{Standard Deviation (S.D.)} = \sqrt{\frac{\text{Deviation}^2 (D^2)}{\text{No. of tablets (N)}}}$$

#### **Hardness test**

This test is done using the Monsanto and Pfizer apparatus. In this the tablet is kept in its place in the apparatus and the pressure is applied to it. The pressure is noted down which have been recorded by the pressure gauge and average hardness is calculated.

#### **Friability test**

This test is carried out by using Friability apparatus. The weighted tablets are placed in the apparatus and it is rotated at 25 rpm for 5 minutes. After sometimes tablets are removed out from apparatus and again they are weight. The friability is calculated by using following formula:

$$\text{Friability} = \frac{\text{Initial weight (Wi)} - \text{Final weight (Wf)}}{\text{Initial weight (Wi)}} \times 100$$

#### **Acceptability test**

In this test the acceptability of the tablets is checked, whether the tablets are suitable to eat or not. The sweetness & odour of tablets are tested by 5 volunteers and the acceptance is noted down in the table with the remarks given by each volunteer regarding the tablets.

#### **Disintegration test**

3 tablets are taken for the evaluation of the disintegration time. The tablets are placed in the disintegration apparatus and the time is observed till the tablet gets totally disintegrated. The temperature of the apparatus is maintained at 37° C

## **RESULT & DISCUSSION**

The results of all evaluation parameters of tablet were within the acceptable limit. The post compression evaluation of tablets are mention in above. The tablet of Rauwolfia was formulated by wet granulation method. The physicochemical property show satisfactory result by tablet which are in range of prescribed standards required for investigation of present study. The current study presents the outstanding ability of Rauwolfia, to control Hypertension And also this Rauwolfia containing tablet gives nutritional benefits to the human.

## **SUMMARY & CONCLUSIONS**

This study aims to formulate tablet Rauwolfia, this product is expected to lower the blood Pressure in patients, minimizing their symptoms with lesser side effects. From the above study, we conclude that the tablet were prepared by wet granulation method and gave satisfactory and acceptable results. Conventional tablet of nutraceutical shows immediate drug release due to wet granulation method. From the above research work it was concluded that prepared herbal nutraceutical tablet is cost effective tablet which will increase patient compliance in regarding's of administration and enhancing positive effects on the body.

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