Comparative standardization study for determination of reserpine in Rauwolfia serpentina homoeopathic mother tinctures manufactured by different pharmaceutical industries using HPTLC as a check for quality control

Binit Kumar Dwivedi1*, Manoj Kumar1, Anil Khurana2, Bhopal Singh Arya1, Echur Natrajan Sundaram2, Raj K. Manchanda2
1Dr. DP Rastogi Central Research Institute (H), Noida, 2Central Council for Research in Homoeopathy, New Delhi, India

Abstract

Background: Rauwolfia serpentina (L.) Benth. ex Kurz (Apocynaceae) (Indian snakeroot), popularly known as Sarpagandha (Sanskrit), is used for the treatment of insanity, fever, snake bites, anxiety and in neuropsychiatric conditions. The antihypertensive actions of Reserpine are a result of its ability to deplete catecholamines (amongst other monoamine neurotransmitters) from peripheral sympathetic nerve endings which are normally involved in controlling heart rate, force of cardiac contraction and peripheral vascular resistance. Objective: Comparative study of Reserpine content in R. serpentina homoeopathic mother tinctures manufactured by different pharmaceutical industries and in-house mother tinctures applying high-performance thin-layer chromatography investigative techniques to facilitate the use of correct species. Materials and Methods: The authentic samples of roots of R. serpentina were supplied by Centre of Medicinal Plants Research in Homoeopathy, Emerald, Tamil Nadu, India. Authentic plant material was used to prepare the mother tincture (as per Homoeopathic Pharmacopoeia of India). Reserpine (C33H39N5O3, M.P. 360°C, purity >99% w/w by high-performance liquid chromatography [HPLC]) was purchased from Sigma-Aldrich as a standard reference. The solvents for the study, namely, ethanol, HPLC water, toluene, ethyl acetate, diethylamine and chloroform were of analytical grade purity (MERCK Ltd.), used throughout. Results: Five samples of mother tinctures were used for the study, in-house mother tinctures (labelled: D and E) of R. serpentina shows a higher amount of Reserpine content than the marketed samples (labelled: A, B and C). Conclusion: It may be concluded that mother tinctures prepared by authentic plants showed the excess amount of Reserpine rather than that of mother tinctures procured from the market.

Keywords: High-performance thin-layer chromatography, Homoeopathic mother tincture, Reserpine

Introduction

Rauwolfia serpentina (L.) Benth. ex Kurz (Apocynaceae) is a plant whose roots are therapeutically used as a sedative, a hypnotic drug and in hypertension. Reserpine (an indole alkaloid) was isolated in 1952 from the dried root of R. serpentina (Indian snakeroot),[1] had been known as Sarpagandha (Hindi and Sanskrit), which is used for the treatment of insanity, fever, snake bites,[2] and in anxiety. The antihypertensive actions of Reserpine are a result of its ability to deplete catecholamines (amongst other monoamine neurotransmitters) from peripheral sympathetic nerve endings which are normally involved in controlling heart rate, force of cardiac contraction and peripheral vascular resistance (Pharmacology, An Introduction: Pharmaceutical Sciences, Pharmacology, Edition 6, 2011, Henry Hitner and Barbara Nagle).

Its molecular structure was elucidated in 1953 and natural configuration published in 1955; the first total synthesis was accomplished by R. B. Woodward in 1958.[3] Santapau (1956)

*Address for correspondence: Dr. Binit Kumar Dwivedi,
DDPR Central Research Institute for Homoeopathy, A-1/1 Sector -24
Noida-UP-201301, New Delhi, India.
E-mail: dr.binitdwivedi@gmail.com

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

How to cite this article: Dwivedi BK, Kumar M, Khurana A, Arya BS, Sundaram EN, Manchanda RK. Comparative standardization study for determination of reserpine in Rauwolfia serpentina homoeopathic mother tinctures manufactured by different pharmaceutical industries using HPTLC as a check for quality control. Indian J Res Homoeopathy 2017;11:109-17.
has studied botanical aspects of this plant. Kattel (1987) has reported phyllotaxical morphotypes. Variation of chemo-botanical characters in the indigenous collections of this plant was reported by Sethi et al. (1991).

R. serpentina mother tincture is used in Homoeopathy for treatment of blood pressure without any side effect, but in allopathic system of medicine, some side effects are reported such as nausea and vomiting, diarrhoea, shortness of breath, drowsiness, dizziness and headache.

The plant R. serpentina (L.) Benth ex Kurz (Apocynaceae) is a medicinally famous herb used in Ayurveda, Siddha, Unani, Homoeopathy and in Western systems of medicine. There are different types of alkaloids present in Rauvolfia namely, ajmaline, ajmalamine, ajmalicine, serpentine and serpentinine. Reserpine, Yohimbine, rescinamine, reserpine, rauwolfine, renoxidine, rescinnamine, reserpiline, sarpagine, serpentinine, tetraphyllicine and 3-epi-a-yohimbine have also been reported. It also contains small amounts of phytosterol and fatty substances. The root of R. serpentina was found to possess 0.1% of the active principle, Reserpine (indole alkaloid).

Number of factors relating to climate, altitude, rainfall and other conditions responsible for growth of plants affect the quality of active constituents present in a particular species even when it is grown in the same country. These conditions may produce major variations in the active constituents present in plants and thus cause variation on the therapeutic efficacy. The understanding of how environmental factors affect the production of secondary metabolites will be of great importance for the conservation of medicinal plants and optimising field growth conditions for maximal recovery of active constituents. Resource availability theory suggests that the way a plant defends itself ultimately depends on resource availability and its intrinsic growth rate. This theory predicts that the rapidly growing plants in resource-rich habitats contain low levels of highly mobile secondary metabolites. Nitrogen is taken up early in the growing season in excess of the plant’s need for growth. Excess nitrogen is available to be synthesised into N-based secondary metabolites.

In Homoeopathy, mother tinctures(φ) are defined as the original substance prepared with the aid of alcohol, directly from crude drug. They are the precursors of the corresponding potencies of the respective drug and the starting point for the production of homoeopathic medicines. R. serpentina is one of the most important homoeopathic drugs being prescribed for various disorders including hypertension. Therefore, the present study is proposed to determine the quantity of the active constituent, Reserpine present in R. serpentina mother tinctures manufactured by different pharmaceutical industries were procured to ascertain whether there is uniformity or whether variation exists by applying high-performance thin-layer chromatography (HPTLC) technique studies.

Materials and Methods

The roots of R. serpentina were collected by Center of Medicinal Plants Research in Homoeopathy (CMPRH), Emerald, Tamil Nadu, and was authenticated by the staff of the Center of Medicinal Plants Research in Homoeopathy (CMPRH), Emerald, Ooty. The voucher specimen has been deposited in the herbarium and in the laboratory of DDPR Central Research Institute for Homoeopathy, Noida, Uttar Pradesh, India, for future reference. Authentic plant material was used to prepare the Mother Tincture. Reserpine (C33H40N2O9, M. P. 360°C, purity >99% w/w by HPLC) was purchased from Sigma Aldrich. The solvents ethanol, HPLC water, toluene, ethyl acetate, diethyl amine, chloroform were of analytical grade purity (Merck Ltd.).

Physicochemical studies

Moisture content was determined by loss on drying method. Total ash, water-soluble ash, foreign matter and acid-insoluble ash parameters were performed as per methods recommended in Homoeopathic Pharmacopoeia of India.

Determination of physical constants (raw drug standardisation)

Loss on drying

Loss on drying is the loss of mass expressed as percentage w/w. The test for loss on drying determines both water and volatile matter in the crude drug by IR balance. Moisture is an inevitable component of crude drug, which must be eliminated as far as possible.

An accurately weighed quantity of 2 g of powdered drug was taken in a porcelain dish. The porcelain dish was kept open in a vacuum oven, and the sample maintained at a constant temperature of 100°C. Then, it was cooled in a desiccator at room temperature. The procedure was repeated till constant weight on repeated weighing is observed. Percentage loss on drying was calculated using the following formula.

\[
\% \text{ Loss on drying} = \frac{\text{Loss in weight of the sample}}{\text{Weight of the sample}} \times 100
\]

Determination of foreign matter

Weigh 100–500 g of the plant material under study and spread it out in a thin-layer. Inspect the sample with the unaided eye or with the use of a 6x lens and separate the foreign organic matter manually as completely as possible. Weigh the sorted foreign matter and determine the percentage of foreign matter from the weight of the drug taken.

Ash value

Ash value is helpful in determining the quality and purity of a crude drug, especially in the powdered form. On incineration, crude drugs normally leave a quantity of ash as residue usually consisting of carbonates, phosphates and silicates of sodium, potassium, calcium and magnesium. The total ash of a crude drug reflects the care taken in its preparation.
Dwivedi, et al.: Determination of reserpine content in Rauwolfia serpentina Mother tinctures by HPTLC

of non-dissipation of non-volatile elements. A higher limit of acid-insoluble ash is imposed, especially in cases where silica may be present or when the calcium oxalate content of the drug is very high.

**Determination of total ash value**

Accurately 2 g of the powdered drug in a silica crucible, previously ignited and weighed. Incinerate by gradually increasing the heat to temperatures not exceeding 450°C for 4 h, until free from carbon, crucible is cooled and weighed. Calculate the percentage of ash with reference to air-dried drug using the following formula:

\[
\% \text{ Total ash value} = \frac{\text{Weight of crude drug taken}}{\text{Weight of total ash}} \times 100
\]

**Determination of water-soluble ash value**

The ash is boiled with 25 ml of water for 10 min. Filter and collect the insoluble matter on an ashless filter paper, wash with hot water and ignite in a crucible at a temperature not exceeding 450°C for 4 h. Cool in a dessicator and weigh. The difference in weight represents the weight of water-soluble ash. Calculate the percentage of water-soluble ash with reference to the air-dried drug using the following formula:

\[
\% \text{ Water soluble ash value} = \frac{\text{Weight of total ash} - \text{Weight of water soluble ash}}{\text{Weight of the crude drug taken}} \times 100
\]

**Determination of acid-insoluble ash value**

Boil the ash for 10 min with 25 ml of 2M HCl. Filter and collect the insoluble matter on an ashless filter paper, wash with hot water and ignite in a crucible at a temperature not exceeding 450°C for 4 h. Cool in a dessicator and weigh. Calculate the percentage of acid-insoluble ash with reference to the air-dried drug using following formula:

\[
\% \text{ Acid insoluble ash value} = \frac{\text{Weight of acid insoluble ash}}{\text{Weight of the crude drug taken}} \times 100
\]

The results obtained with reference to air-dried drug are tabulated and observations are recorded in Table 1.

**Phytochemical analysis**

Phytochemical tests were conducted on the roots of R. serpentina to identify various phytochemicals present in the plant material (A.K. Gupta et al., 2008).[14–16] The various tests conducted are given below and the observations are recorded in Table 2.

1. **Test for tannins (lead acetate test):** To the test solution, a few drops of 10% lead acetate were added. Precipitate was formed, indicates the presence of tannins.
2. **Test for saponins (froth test):** A pinch of the dried powdered plant material was added to 2–3 ml of distilled water. The mixture was shaken vigorously. Formation of foam indicates the presence of saponin.
3. **Test for triterpenoids (Salkowski’s test):** To the test solution, add a few drops of concentrated sulphuric acid, shake well and allow to stand for some time. Red colour appears in the lower layer indicating the presence of sterols.

The results of phytochemical tests carried out are recorded in Table 2.

**Preparation of in-house mother tinctures**

100 g of coarsely powdered root were taken, added 824 ml alcohol and 200 ml water to make 1000 ml of mother tincture using the percolation method (as per Homoeopathic

| Table 1: Test of raw material |
|-----------------------------|
| **Name of test** | **Result (%)** |
| Loss on drying | Not >8.13 |
| Total ash | Not >4.09 |
| Water-soluble ash | Not >2.88 |
| Acid-insoluble ash | Not >0.85 |

| Table 2: Phytochemical tests |
|-----------------------------|
| **Name of phytochemical** | **Result** |
| Tannins (lead acetate test) | Positive |
| Saponin (foam test) | Positive |
| Phenolic compounds (FeCl₃ test) | Positive |
| Flavonoids (alkaline reagent test) | Positive |
| Triterpenoid (alkaline reagent test) | Positive |
| Alkaloids | Positive |
| Mayer’s test | Positive |
| Hager’s test | Positive |
| Wagner’s test | Positive |
| Dragendorff’s test | Positive |
This tincture was transferred to a suitable glass container and stored for further study.

**Standardisation of mother tincture**

Standardisation of mother tincture was conducted to identify the organoleptic and physicochemical properties of mother tincture (Banerjee, D.D. 2006, Augmented Textbook of Homoeopathic Pharmacy: B Jain Publishers).[17]

1. **Organoleptic properties**
   - Appearance: Clear liquid
   - Colour: Yellowish brown
   - Odour: Characteristic

2. **Physicochemical properties**
   - Sediments: Nil
   - Weight per ml: 0.867–0.877 g
   - Total solid: Not <1.0 percent w/v
   - Alcohol content: 75.0–79.0 per cent v/v
   - pH value: 5.9.
Dwivedi, et al.: Determination of reserpine content in Rauwolfia serpentina Mother tinctures by HPTLC

Quantification of Reserpine by high-performance thin-layer chromatography study
Quantification of Reserpine was done by HPTLC as mentioned below.

Preparation of standard Reserpine
Five milligrams of Reserpine was weighed in a 10 ml volumetric flask. To this, 5 ml chloroform and 5 ml ethanol were added to make final volume 0.5 µg/µl.

Preparation of sample
5 ml of mother tincture (about 4 g) was taken in 100 ml beaker, added 10 ml of distilled water and 0.2 ml concentrated hydrochloric acid; evaporated to dryness on water bath. Dissolved the residue in 2 ml of chloroform, methanol mixture (1:1) then carried out HPTLC analysis.

Chromatographic conditions

**Instrument**
HPTLC system equipped with a sample applicator device CAMAG Linomat 5. CAMAG Twin Trough Chamber, Camag TLC Scanner and integration software (winCATS).

HPTLC Plate: Silica gel GF254 (Merck) 20 × 10 cm.
Mobile Phase: Toluene-Ethyl Acetate-Diethylamine (7:2:1, v/v/v). Wavelength: 254 nm.

Standardisation of in-house mother tincture
CAMAG HPTLC system comprising Linomat 5 as sample applicator and TLC Scanner controlled by winCATS software was used for quantitative evaluation. Stationary phase used was silica gel 60 F254 and the mobile phase used was toluene-ethyl acetate-diethylamine (7:2:1, v/v/v). Samples and standard were applied as 8 mm bands with 6 mm distance between the tracks. Tank saturation and plate equilibrium were given with filter paper for 10 min. Ascending development for a distance of 80 mm in a Twin Trough Chamber was completed in approximately 15 min. Volume of standard mother tincture (µl) was first optimised at 4 µl for quantification. The λ max of Reserpine was found to be 254 nm after taking the spectra of the standard of Reserpine. Quantitative measurement in the absorbance mode was done at 254 nm using a slit dimension of 6.00 mm × 0.45 mm.

**Linearity response**
The volume of the in-house mother tincture was optimised to 2 µl for quantification. It was then simultaneously applied with different concentrations of standard Reserpine, i.e., 4, 6, 8 and 10 µl. The method was found to be linear with a regression of 0.99983, and a standard deviation of 1.67% and the amount of Reserpine was calculated in the mother tincture.

**Standardisation of the in-house mother tinctures**
Standardisations of the mother tinctures were done using HPTLC method. In-house mother tinctures were chromatographed simultaneously along with three other mother tinctures available from the market at 2 and 5 µl, respectively, on the same plate for comparison [Figures 1-3]. Multiwavelength (MWL) scan was done for finding the optimum wavelength for scanning. The optimum wavelength was found to be 254 nm. The entire plate was further scanned at this wavelength for quantification and spectral match [Figures 4 and 5]. Many fractions of in-house mother tinctures were matched with the help of its characteristic spectra with that of other marketed samples. Individual λ max of each fraction was also found with the help of characteristic spectra, and then the plate was scanned with these selected wavelengths in MWL mode. The pattern of the peaks was compared for the in-house mother tinctures and marketed samples. It was observed that the response for various concentrations of standard Reserpine was linear in the range of 100–500 ng with a coefficient of variation of 0.99983 and a standard deviation of 1.67%. Reserpine was quantified and the amount was calculated in individual mother tinctures. With this method, all available mother tinctures were compared and the active principle was quantified [Figures 6 and 7].

**Quantification of Reserpine in market samples and in-house mother tincture**

**Procedure**
5 ml each of mother tincture taken for analysis, i.e., 5 ml of mother tincture weight is 4 g or 4000 mg, i.e., 5 ml = 4000 mg. Therefore, 1 ml = 800 mg or 1 µl = 0.800 µg

Hence, final concentration (2 µl) by dissolving chloroform and methanol mixture is (1:1, v/v) ratio. Sample applied on plate for sample A, B and C is 5 µl each and for sample for D and E is 2 µl.

So final concentration on plate of
- Sample A = 0.800 × 5 = 4000 µg
- Sample B = 0.800 × 5 = 4000 µg
- Sample C = 0.800 × 5 = 4000 µg
- Sample D = 0.800 × 2 = 1600 µg
- Sample E = 0.800 × 2 = 1600 µg.

**Calculation of Reserpine content in sample A**
- 4000 µg sample (A) on plate
- Reserpine content from calibration graph = 337.56 ng or 0.33756 µg.

**Percentage of Reserpine in sample A**
4000 µg = 0.33756 µg
Therefore 100 µg = \frac{0.33756 \times 100}{4000} = 0.0084% of reserpine in sample A

### Calculation of Reserpine content in sample B
- 4000 µg sample on plate
- Reserpine content from calibration graph = 288.57 ng or 0.28857 µg.

### Percentage of Reserpine content in sample B
- 4000 µg = 0.28857 µg.

Therefore 100 µg = \frac{0.28857 \times 100}{4000} = 0.0072% of reserpine in sample B

### Calculation of Reserpine content in sample C
- 10,000 µg sample (B) on plate
- Reserpine content from calibration graph = 366.26 ng or 0.36626 µg.

### Percentage of Reserpine content in sample C
- 4000 µg = 0.36626 µg.

Therefore 100 µg = \frac{0.36626 \times 100}{4000} = 0.0091% of reserpine in sample C

### Calculation of Reserpine content in sample D
- 1600 µg sample on plate
- Reserpine content from calibration graph = 538.18 ng or 0.53818 µg.

### Percentage of Reserpine content in sample D
- 1600 µg = 0.53818 µg.

Therefore 100 µg = \frac{0.53818 \times 100}{1600} = 0.5381% of reserpine in sample D

### Calculation of Reserpine content in sample E
- 1600 µg sample on plate
- Reserpine content from calibration graph = 465.11 ng or 0.46511 µg.

### Calculation of Reserpine content in sample E
- 1600 µg = 0.46511 µg.

Therefore 100 µg = \frac{0.46511 \times 100}{1600} = 0.0290% of reserpine in sample E

The amount of Reserpine in R. serpentina in the in-house sample (D and E) and market sample mother tinctures (A, B and C) were calculated and presented in Table 3.

### Table 3: Content of Reserpine

| Name of sample | Percentage of Reserpine content |
|---------------|---------------------------------|
| A             | 0.0084                          |
| B             | 0.0072                          |
| C             | 0.0091                          |
| D             | 0.5381                          |
| E             | 0.0290                          |

### Discussion
Repeatability of the method was checked by scanning 15 tracks of 2 µl volume in-house mother tincture. The coefficient of variation was found to be 0.0844. The percentage recovery of Reserpine was calculated using the above method. The average recovery values obtained were 96.6%–104.37%, which confirms that the method is validated. The HPTLC scanning of ‘R. serpentina’ mother tincture(φ) obtained from manufacturer (A, B and C) and the in-house mother tinctures (D and E) had been done at 254 nm wavelength. The scanning report obtained after integration. From the results obtained after densitometry scanning, it was observed that the in-house mother tinctures (D and E) of R. serpentina shows a higher amount of Reserpine content than the marketed samples (A, B and C). It may be concluded that samples procured from the market are showing a lesser amount of Reserpine hence may not be up to the standard level. This quantification may lead to better quality checking of market samples which in turn will be responsible for better therapeutic efficacy.

### Conclusion
It is concluded that in-house prepared mother tincture showed excess greater amount of Reserpine, i.e., 0.5381% and 0.0290% (D and E) in comparison to marketed samples (A, B and C).

### Acknowledgement
Authors wish to express their gratitude to Dr. Raj K. Manchanda, Director General, Central Council for Research in Homoeopathy, New Delhi, for his support and Mr. Dilip Charegaonkar, Mr. T. B. Thite and other Anchom lab staff for help in HPTLC analysis.

### Financial support and sponsorship
Nil.

### Conflicts of interest
None declared.

### References
1. Henry JP, Scherman D. Radioligands of the vesicular monoamine transporter and their use as markers of monoamine storage vesicles. Biochem Pharmacol 1989; 38:2395-404.
2. Baumeister AA, Hawkins MF, Uzelac SM. The myth of reserpine-induced depression: Role in the historical development of the monoamine
Dwivedi, et al.: Determination of reserpine content in Rauwolfia serpentina Mother tinctures by HPTLC

Indian Journal of Research in Homoeopathy | Volume 11 | Issue 2 | April-June 2017

hypothesis. J Hist Neurosci 2003; 12:207-20.
3. Nicolaou KC, Sorensen EI. Classics in total synthesis. Weinheim; Germany VCH; 1996. p. 55.
4. Ajay IA, Ajbade O, Oderinde RA. Preliminary phytochemical analysis of some plant seeds. Res J Chem Sci 2011;1:58-62.
5. S.A. Qureshi, A. Nawaz, S.K. Udani and B. Azmi. Hypoglycaemic and Hypolipidemic Activities of Rauwolfia serpentina in Alloxan-Induced Diabetic Rats. International Journal of Pharmacology 2009;5:323-6.
6. S. Siddiqui and R.H. Siddiqui. Chemical examination of the roots of Rauwolfia serpentina Benth. J Indian Chem Soc 1931;8:667-80.
7. Deshmukh SR, Ashrit DA, Patil BA (2012). Extraction and evaluation of indole alkaloids from Rauwolfia serpentina for their antimicrobial and antiproliferative activities. Int. J. Pharm. Pharm. Sci. 4(5):329-34.
8. Rastogi RP, Mehrotra BN. Compendium of Indian Medicinal Plants I: 1960-1969. New Delhi: CDRI, Lucknow and Publications and Information Directorate; 1993. p. 338-43.
9. Davey R., McGregor J. A., Grange J. M., “Quality control of homoeopathic medicines (1)”, British Hom JOU;81:78-81.
10. Mukherjee PK. Quality Control of Herbal Drugs. 1st ed. New Delhi: Business Horizons; 2002. p. 120-5.
11. Lohani, H, Andola HC, Bhandari U, Chauhan N. HPTLC method validation of reserpine in Rauwolfia serpentina – A high value medicinal plant. Researcher 2011;3:34-7.
12. Kokate CK, Purohit AP, Gokhale SB. Pharmacognosy. 26th ed. Pune: Niral Prakashan; 2004. p. 466-70.
13. Shanbhag D, Jayaraman S, Khandagale A. Application of HPTLC in standardisation of homoeopathic mother tincture Rauwolfia serpentina and its comparison with products in market. Int J Anal Bioanal Chem 2011;1:13-8.
14. Government of India, Ministry of Health and Family Welfare. Anonymous. Homoeopathic Pharmacopoeia of India. Vol. I. New Delhi: The Controller of Publications; 1971. p. 243-4.
15. Harborne JB. Phytochemical Methods. London: Chapman and Hall, Ltd.; 1973. p. 49-188.
16. Kokate CK, Khandelwal KR, Pawer AP, Gokhale SB. Practical Pharmacognosy. 3rd ed. Pune: Niral Prakashan; 1995. p. 137.
17. Tandon N, Sharma M. Quality Standards of Indian Medicinal Plants. Vol. 8. New Delhi: Indian Council of Medical Research; 2010. p. 276-8.
Vergleichende Standardisierungsstudie von Reserpin in Rauwolfia serpentina homöopathischen Mutter Tinkturen, die von verschiedenen pharmazeutischen Industrien unter Verwendung von HPTLC hergestellt wurden

Hintergrund: Rauwolfia serpentina (Indian Snakeroot) im Volksmund bekannt als Sarpagandha und verwendet für die Behandlung von Wahnsinn, Fieber, Schlangenbisse, Angst und neuropsychiatrischen Bedingungen. Die antihypertensiven Wirkungen von Reserpin sind ein Ergebnis ihrer Fähigkeit, Katecholamine (unter anderen Monoamineneurotransmittern) aus peripheren sympathischen Nervenendigungen, die normalerweise an der Kontrolle der Herzfrequenz, der Kraft der Herzkontraktion und des peripheren Gefäßwiderstands beteiligt sind, abzubauen.

Ziel: Vergleichende Untersuchung des Reserpin-Gehalts in R. serpentina homöopathischen Mutter-Tinkturen, die von verschiedenen pharmazeutischen Industrien und im Haus Mutter-Tinkturen unter Verwendung von HPTLC hergestellt wurden, um die Verwendung von korrekten Spezies zu erleichtern.

Materialien und Methoden: Die Wurzeln der R. serpentina wurden vom Zentrum der Heilpflanzenforschung in der Homöopathie (CMPRH), Smaragd, Ooty gesammelt. Authentisches Pflanzenmaterial wurde verwendet, um die Mutter Tinktur vorzubereiten. Reserpin (C33H40N2O9, M.P. 360 °C, Reinheit> 99% G/G durch HPLC) wurde von Sigma Aldrich bezogen. Die Lösungsmittel Ethanol, HPLC Wasser, Toluol, Ethylacetat, Diethylyamin, Chloroform waren von analytischer Reinheit (MERCK Ltd.).

Ergebnisse: Die im Labor von DDPR, CRI (H) Noida (D und E) von R. serpentina hergestellten Mutter-Tinkturen zeigen eine höhere Menge an Reserpin-Gehalt im Vergleich zu Mutter-Tinkturen, die von verschiedenen pharmazeutischen Industrien (A, B und C) hergestellt wurden.

Fazit: Es kann gefolgert werden, dass Muttermänteln, die von authentischen Pflanzen hergestellt wurden, die überschüssige Menge an Reserpin anstatt des zeigten Der aus dem Markt beschafften Muttermänteln.
Etude comparative standardisée de la réserpine présente dans la teinture mère de Rauwolfia serpentina fabriquée par différentes industries pharmaceutiques utilisant le HPTLC

RESUME:

Contexte: Rauwolfia serpentina (Indian snakeroot) dont le nom populaire est Sarpagandha est utilisé dans le traitement de la démence, pour des fièvres, après des morsures de serpents, pour l’anxiété et certaines pathologies psychiatriques. L’action antihypertensive de la réserpine résulte de sa capacité à réduire les cathécolamines (parmi d’autres neurotransmetteurs) des terminaisons nerveuses périphériques sympathiques, qui normalement sont impliquées dans le contrôle du rythme cardiaque, de la contractilité cardiaque, et des résistances vasculaires périphériques

Objectif: L’étude comparative de la réserpine contenue dans la teinture mère de R. serpentina fabriquée par différentes industries pharmaceutiques et la teinture mère artisanale à l’aide du HPTLC pour s’assurer que les bonnes espèces sont utilisées.

Méthodes et matériaux: les racines de R. serpentina ont été récoltées au Center of Medicinal Plants Research in Homoeopathy (CMPRH), Emerald,Ooty. Un matériau végétal authentifié a été utilisé pour préparer le teinture mère. La réserpine (C33H40N2O9, M.P. 360°C, purité > 99% w/w par HPLC) a été achetée chez Sigma Aldrich. Les solvants, éthanol, HPLC, eau, toluène, éthyl acétate, diéthyl amine, chloroforme avaient un degré de purité analytique (MERCK Ltd.).

Résultats: La teinture mère de R. serpentina préparée par le laboratoire du DDPR, CRI(H) Noida (D and E) présente une quantité de réserpine plus importante que les autres teintures mères fabriquées par les différentes industries pharmaceutiques (A, B and C).

Conclusion: On peut en conclure que la teinture mère fabriquée à partir de la plante authentique présente de la réserpine en excès par rapport aux teintures mères présentes sur le marché.