On the Use of *Rauwolfia serpentina* in High Blood Pressure

**Bhatia, B.B., M.D., M.R.C.P. (Lond.),**
Head of the Department of Pharmacology, K.E.M. Medical College, Lucknow, India.

*Rauwolfia serpentina* is a small erect glabrous shrub about 1 to 3 feet in height, bearing white or pinkish flowers. It grows fairly wild in the United Provinces, also in Bihar and Eastern and Western Ghats. It is called ‘Sarpa-gandha’ in Sanskrit and ‘Chota Chand’ in Hindi.

The roots, the leaves and the juice have been considered of medicinal importance from the very early times and have attracted the attention of the practitioners of the indigenous system of medicine. It has been used as an anthelmintic, as an antidote against snake bite and bites of other poisonous insects, in diarrhoea, dysentery, cholera and also as an ecbolic. In recent years interest has been stimulated in this drug, because of its well marked hypnotic and sedative properties. It forms the chief if not the only constituent of the various ‘insanity cures’ which are so widely advertised in the lay press. Its use in the treatment of high blood pressure is of a very recent origin and is the outcome of the pharmacological investigations carried out on this drug. This use may be said to be, still in an experimental stage and hence any record of careful clinical observations, would be valuable in assessing the true value of this drug in the treatment of hyperpnesia.

Chemically, the root contains a number of alkaloids. Sen and Bose (1931) found two alkaloids, with different melting points. Siddiqui and Siddiqui (1931) have reported five alkaloids to which they have given names of *Ajmaline, Ajmalinine, Ajmalicine, Serpentine,* and *Serpentinine.* Von Italie and Steenhaur mention the presence of at least three alkaloids, the nature and identity of which is more or less the same, as found by Siddiqui and Siddiqui. An alkaloid isolated by the Chemistry Department of the Tropical School of Medicine, Calcutta, was experimentally studied by Chopra, Gupta and Mukherjee (1933).

As a result of their pharmacological studies they found that this alkaloid has a toxic action on lower forms of life like Paramoecia Caudatum in dilution of 1 in 20,000. Its toxicity on higher animals was variable. Frogs were quite tolerant, whereas the white mice were very susceptible. The toxicity also varied with the route of administration, the drug being much more toxic, when given intravenously or intraperitoneally, than when given subcutaneously.

On the circulatory system, the drug lowered the blood pressure of cats under anaesthesia, effect lasting for a considerable time. If spinal cats were used the effect produced was very slight, which showed that probably the fall in blood pressure was due to vasodilatation, resulting from the depression of the vasomotor centre in the medulla oblongata. The fall in blood pressure was also noticed after the terminations of the vagi were paralysed with atropine, showing that vagal inhibition does not play much part in the fall produced. The fall in blood pressure was also partly due to diminished cardiac output, which they found on
myocardiographic studies. On perfusing the drug through isolated vessels, Chopra and his co-workers found, that it definitely decreased the number of drops of the perfusate per minute, which meant that it produces ‘vasoconstriction’ though they have erroneously called it vasodilatation.

Both on the intact, as well as the isolated mammalian heart, the drug seemed to have a slight depressant action. The alkaloid had a stimulant action on the plain muscles of the alimentary canal and the uterus. However, its most interesting action was noticed on the central nervous system, which it seems to depress in the reverse order of development. That is, the highest centres, which are the last to be developed, are usually the first to be affected. It produces drowsiness, diminution in motor activity, diminution in the appreciation of sensory stimuli, depression of the medullary centres.

In view of the fact, that the chemistry of this drug is not finally settled (Siddiqui and Siddiqui having recently revised their own findings) and because the pharmacological action of the other alkaloids had not yet been worked out, I decided to use the crude drug for this clinical investigation. The preparation which was used in most of the cases was Serpina tablets, prepared by The Himalaya Drug House, Dehra-Dun. In some cases liquid extract of *Rauwolfia serpentina* prepared by Smith Stanistreet, Calcutta, was also used.

For this investigation, cases of high blood pressure, were divided into two groups, those without renal damage and those with renal damage. The first group constituted what Sir Clifford Albutt had described ‘hyperpiesia’ and some latter writers as ‘essential hypertension’. The second group constituted cases of high blood pressure subsequent to chronic glomerulotubular nephritis. In every case, before starting the drug, the patient was put for a fortnight on ‘high blood pressure regime’, which consisted of proper diet, proper amount of rest and exercise, proper attention to personal hygiene and bowels. The regime invariably resulted in slight fall in blood pressure and figure thus obtained, was taken, as the initial blood pressure, in the cases described hereafter.

**Group I – Cases of Hyperpiesia:**

*Case 1* – A young man of 22, Hindu, vegetarian, highly nerve strung, first came under observation in the Medical Ward in October, 1940, with symptoms of throbbing palpitation and insomnia. Kidney function normal; vessel wall palpable; B.P. 210/125; he was put on Serpina tablets ( 1 tablet daily at bed time). B.P. after one week 182/100, after one month 160/90. Completely relieved of symptoms. Used ½ tablet daily for another month and then gave it up; felt very fit till November, 1941, when the symptoms again reappeared; B.P. in November, 1941, was 200/110; a few days’ use of Serpina tablets again brought it down to 170/95 with complete relief of symptoms.

*Case 2* – An old Christian lady of 65, non-vegetarian with a life full of worries and anxieties had been suffering from headache, throbbing sensation, insomnia, palpitation, flushes and tingling sensations in extremities for about a year before she consulted me in November,
1940. Vessel wall very much thickened and marked hypertrophy of the left ventricle. Kidneys showed no apparent damage; initial B.P. 220/115. After one week’s use of Serpina tablets (one tablet at bed time) it was 200/105. She had been using this drug almost continuously for over a year and her blood pressure in November 1941 was 165/85, with complete relief of all symptoms except tingling sensations in her extremities.

Case 3– A young boy of 17, Hindu, vegetarian, highly emotional and nerve-strung, consulted me in December, 1940, for attacks of fainting fits. Kidneys normal, vessel wall not palpable; no hypertrophy of the heart. Initial B.P. 165/100, after one month’s use of Serpina tablets (one tablet at bed time) 140/90; he used Serpina for about 3 months and then gave it up. B.P. recorded six months after discontinuing the drug was 142/90. The drug incidentally also proved useful for his fainting fits, which were in all probability functional in origin.

Case 4 – A middle aged man of 50, Hindu, vegetarian, very obese (weight 260 lbs) came under observation in December, 1940, for symptoms of palpitation, giddiness, breathlessness, headache and severe insomnia; kidney function normal, vessel wall thickened, size of the heart could not be made out, congestion at the bases of lungs. Initial B.P. 220/140. After one month’s use of Serpina tablets (one tablet at bed time) B.P. was 180/110. Since then he has been using the drug continuously with small breaks of 10 days, after 4 weeks’ use. His B.P. on 1st December was 178/105 with complete relief of his symptoms.

Case 5 – A middle aged man of 53, Hindu, non-vegetarian, came under observation in July, 1940, with throbbing pain over his heart, insomnia, breathlessness, history of haematemesis, vessel wall thickened; hypertrophy of the left ventricle; kidneys normal; initial B.P. 235/110. After a fortnight’s use of Extract Rauwolfia serpentina (10 drops at bed time) B.P. was 185/90, after one months’ use 165/90, with complete relief of symptoms. He gave up the drug after one month and now uses it occasionally for three or four days, when any of the symptoms appear. His B.P. now ranges about 180/100.

Case 6 – A middle aged man of 48, Hindu, non-vegetarian, first came under observation in July, 1920, with attacks of cardiac pain, anginal in type; obese (weight 190 lbs); vessel wall palpable, slight enlargement of the heart; kidneys normal; B.P. 188/100. He was given Extract Rauwolfia serpentina (10 drops at bed time) in November, 1940. B.P. after fortnight’s use came down to 168/86. He gave up the drug then, was again seen in October, 1941. B.P. was 210/110; he was put on Serpina tablets (one tablet at bed time); he used it for a fortnight and then gave it up. B.P. 10 days after discontinuing the drug was 185/100. It had no effect on his anginal pains, which were however, relieved with Deriphyllin.

Case 7 – An old man of 60, Hindu, non-vegetarian, who had been under my observation for high blood pressure for about 10 years and in whom with careful regime and occasional use of bromides and luminal, I had succeeded in keeping his B.P. under control between 180 to 200 systolic and 110 to 120 diastolic. Vessel wall palpable, no hypertrophy of the heart. No kidney damage. During this interval whenever there has been any cause of worry or anxiety...
his blood pressure has tended to shoot up and on one occasion (marriage of his daughter) it shot up to 260/140; with the use of Serpina tablets (one at bed time) it came down in 3 days to 200/110. He uses the drug only occasionally, when he has any symptoms and he tells me, that 2 or 3 days’ use of Serpina tablet, invariably relieves him of his symptoms, which are usually heaviness in the head and giddiness. He had a fair experience of bromide and luminal and used to get some relief from their use but is definitely of the opinion that Serpina tablets are superior to them.

Case 8 – A middle aged man of 55, Hindu, non-vegetarian, came under my observation in August, 1941, with symptoms of throbbing sensation, dyspnoea and pain in the legs; had suffered from diabetes 5 years ago, but the day he consulted me, his urine was sugar and albumin free; vessel wall palpable, hypertrophied left ventricle; congestion at the bases of lungs. B.P. was 190/120; after one month’s use of Serpina tablets (one tablet at bed time) B.P. came down to 158/90, with relief of symptoms. The hypertrophy of the left ventricle and the congestion at the bases of lungs had also disappeared.

The above eight cases are illustrative of some commonly met forms of hyperpiesia. Cases nos. 1, 2 and 3 were those occurring in highly nerve-strung individuals, who worry over trifles and who are exceedingly emotional. All three of them derived immense relief and no. 3, who was an early case of hyperpiesia may be regarded as cured for the time being.

Nos. 4 and 6 were examples of hyperpiesia occurring in obese patients. In both of these also, blood pressure was lowered with the use of Serpina tablets and symptoms attributed to high blood pressure were relieved.

Nos. 4 and 8 were examples of hyperpiesia with early hypertensive heart failure in both of which with the fall in blood pressure produced by Serpina tablets, symptoms of high blood pressure and consequent left ventricular failure were relieved.

The drug has been given altogether in 18 cases of this type with almost similar results as noted above. The above eight are just illustrative cases of the type of action, which is produced by Rauwolfia serpentina in this type of high blood pressure.

Group II – Cases with Renal Damage
Case 1 – A middle aged man of 52, Hindu, vegetarian was admitted to the Medical Wards with symptoms of cardiac failure, marked dyspnoea, enlargement of the liver and oedema; the urine contained albumin, hyaline and granular casts, urea concentration was 0.8%, blood urea 106 mgm per 100 cc. Marked hypertrophy and dilatation of the left ventricle. B.P. 240/150. After a month’s rest, proper diet and digoxin the symptoms of congestive heart failure disappeared. Blood urea came down to 86 mgm per cent. B.P. came down to 220/140. He was then put on, one tablet of Serpina at bed time, rest and diet restrictions were continued. After one month’s treatment with Serpina tablets blood pressure came down to 182/110, with consequent improvement in the hypertrophy and dilatation of the left ventricle.
The patient is continuing to use ½ tablet of Serpina daily, is fairly comfortable and without any signs of congestive failure.

**Case 2** – A lady of 40, Hindu, vegetarian was admitted with symptoms of impending uraemia, (drowsiness, twitchings, rapid breathing, insomnia, severe tinnitus, severe headache), B.P. 225/135; left ventricle hypertrophied but no evidence of congestive failure; urine contained albumin, hyaline and granular casts, specific gravity 1006; blood urea was 146 mgm per 100 cc. In addition to bland diet consisting of fruit juices and glucose and alkalis and calcium, she was put on Serpina tablets (one tablet at bed time). After 3 days the B.P. was 208/118, after 10 days it was 178/105 and the patient was completely relieved of her intense headache, tinnitus and insomnia, the blood urea coming down to 120 mgm per 100 cc. The case is still under treatment.

The above 2 cases, are cases of severe renal damage, with high blood pressure and cardiovascular changes, in which Serpina tablets are not only tolerated but did succeed in lowering the blood pressure and thus producing relief of symptoms, which were caused by high blood pressure. The lowering of blood pressure did not prove injurious to the existing kidney damage.

**DOSAGE**

Except in the beginning, when I used the drug twice daily, I have restricted to a single 5 grain tablet of Serpina, or to a single dose of Extract *Rauwolfia serpentina* 10-15 minims. When 2 doses were given one morning and one evening, some patients complained of lethargy during the day, so in subsequent cases I have restricted to a single dose given at bed time. After the blood pressure has been lowered to a beneficial level, the effect is often maintained even by ½ tablet. In many cases after a month’s course of treatment a gap of 10 days was given and it was noticed, that the effect of the drug continued, during this gap. The drug is a very efficient, mild hypnotic and as most of these patients with high blood pressure had insomnia and their headache, throbbing pain etc., were worse during night or early morning, the night time was thought to be the best for the administration of this drug.

**TOLERANCE**

With the above dosage, no bad effects of this drug were noticed, the drug was well tolerated, did not produce any gastro-intestinal symptoms. One young man felt some sexual weakness and was alarmed, but the condition completely disappeared, after the drug was discontinued. One patient complained of vague pains in the body during its use and I made it a point to inquire about this symptom from all subsequent patients but none of them complained of it; one patient who was a subject of bronchial asthma felt that Serpina aggravated his asthmatic condition, but I understand that he is now tolerating the liquid extract all right. The fact leads me to believe that there might have been something in the crude drug to which he was susceptible. Patients nos. 2 and 4 have used it for over a year now, without any untoward effects.
CONCLUSIONS
My two years’ experience with this drug, during which period I have used it on 20 carefully observed cases, has been very encouraging. For many years, I have been particularly interested in high blood pressure cases and can claim to have a fair experience of the use of various drugs in high blood pressure, such as nitrites, iodides, calcium, diuretin, luminal and bromides. I have no hesitation in saying, that in Rauwolfia serpentina, we have a drug, which is far superior, in its effect on high blood pressure, to those, which we have so far used. The drug is effective in small doses; it is well tolerated and the effect produced is lasting. The drug is particularly useful in relieving the nervous symptoms of high blood pressure, such as headache, tinnitus, vertigo, giddiness, insomnia, etc. It was not so effective in palpitation or precordial pain. Every patient remarked that he got very good sleep with this drug. In all probability, the beneficial effect of the drug in high blood pressure is produced through its action on the nervous system; that is, by its sedative action on the psychic areas, where by mental calmness is produced and by its depressant action on the vasomotor centre in the medulla oblongata.

The drug is not curative but is undoubtedly the best for the relief of symptoms caused by high blood pressure. With small doses blood pressure can be maintained within tolerable limits. It lowers both the systolic as well as diastolic blood pressure. In my opinion, in small doses, which I have used clinically, it does not produce any depression of the heart. On the contrary, by lowering the peripheral resistance, it proved useful in hypertensive heart failure cases nos. 4 and 8 of Group I and case no. 1 of Group II. It is tolerated in the presence of kidney damage and even proved useful in the two cases of Group II described above.

REFERENCES