



## Family of Strychnine and its relatives

### ABSTRACT

This study is done based upon the action of Strychnine and the alkaloids which have similar effect on nervous system especially Titanic spasms and convulsions. Their practical utility with relative comparison has been described on the basis of physiological action. Signs and symptoms appears during proving and poisoning as well as clinical observations.

### INTRODUCTION

Strychnine is an organic compound, a poisonous alkaloid. It has been used in rodent poisons. Within 20 minutes after ingestion, it causes painful muscular contraction and convulsions pulling the head back and arching the back. Death usually results from respiratory mus-

cular spasms. Strychnine is the common alkaloid of Loganiaceae family. The remedies of Strychnine family are *Nux-vomica*, *Ignatia*, *Gelsemium*, *Upas-tiente*, *Curare*, *Spigelia*, *Hoangnan* and *Strychninum*. Among them *Nux-vomica* (*Strychnos Nux-vomica*), *Ignatia* (*Strychnos-ignati*), *Upas-tiente* (*Strychnos-tiente*) contain only Strychnine along with very little amount of Brucine.

### COMMON EFFECTS OF STRYCHNINE

It produces excitation of all portion of the nervous system by increasing ongoing neuronal activity through blocking of post synaptic inhibitory influences, hence causes convulsions affecting all the muscles at a time. It causes first clonic then tonic type of spasm with shorter interval and longer paroxysms.

During spasms face becomes cyanosed and wears an anxious, apprehensive look.

Eyes are staring; eye balls prominent and pupils dilated. There is frothing at the mouth, frequently stained with blood.

Body is arched in the position of opisthotonos ie hyperextension with resting on his heels and occiput.



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The contractions of respiratory muscles produce a sense of suffocation, which may end in asphyxia.

Rarely, the spasms of the abdominal muscles may bend the body forward (emprostotonos).

Mind usually remains clear till the end of life, and the patient is conscious of the pain.

The reflex excitability is so great that any sensory stimulus like the slightest movement of patient, a sudden noise or touch of glass of water on the lips, or even a flash of light is enough to induce symmetrical extensor thrusts and later sustained tonic convulsions.

#### INDIVIDUAL CHARACTERISTICS OF DRUGS THOUGH CONTAINING COMMON ALKALOID STRYCHNINE

##### *NUX-VOMICA*

The general physiological action of *Nux-vomica* is on the spinal cord, or rather on the cranio-spinal axis. In its first degree, it manifests itself by the patient becoming more susceptible to external impressions, as of light, sound, touch, odour and variation of temperature. A sudden impression on the surface, as a tap on the ham, will induce convulsive paroxysm. This is the characteristic of this drug.

##### *IGNATIA*

According to Hahnemann "Although it's positive effects have a great resemblance to those of *Nux-vomica* (which indeed might be inferred from the botanical relationship) yet there is a great difference in their therapeutic employment. The emotional disposition of patients for whom *Ignatia* is serviceable, differs widely from those for whom *Nux-vomica* is of use. *Ignatia* is not suitable for persons or patients in whom anger, eagerness or violence is predominant, but for those who are subject to rapid alterations of gaiety and disposition to weep. . . . Even in a high potency, *Ignatia* is a main remedy in cases of vexation in subjects who have tendency to break-out violently or to revenge themselves, but who keep their annoyance to themselves; in whom, in a word, the remembrance of the vexations occurrence is want to dwell in the mind and especially in morbid states which are produced by

grief."

Spasms and convulsions not only of hysterical origin, but also in those occurring in delicate women who are not hysterical and in children. If excited by emotions, such as fright or fear. For example, the child has a convulsion after being punished. So *Ignatia* is especially indicated when the convulsions have appeared after grief, fright or some violent emotions. Another characteristic of this drug in the word of Dr Wurmb, by which the whole character of *Ignatia* may be expressed in two words— "Entgagengesetzte Nebenbeschwerden", ie accessory or concomitant phenomena which are contradictory to, or inconsistent with, each other.

##### *UPAS-TIEUTE*

Pitel has proved this drug. It causes titanic symptoms with a large proportion of symptoms occurred in the head and eyes. Patient is irritable; there are dull pains in the brain and lancinating pains through the right lung towards the liver. The hands and feet are numb, with remarkable headache – superficial drawing pain traverses left temple from before backward and ceases at outer angle of orbit; the part is hot and painful to touch. Another important indicating feature of this drug, "Drowsiness – every morning, weakness of the eyes with lachrymation; the lids are so heavy that they close involuntarily as if from drowsiness."

##### *STRYCHNINUM*

Mr Henry Robinson has proved the liquor *Strychniae*, one prover being a man, the other a woman. Continual full and bursting headache, with heat in the eyes; icy sensation all down the spine, are key indications.

##### *GELSEMIUM*

Besides strychnine, other alkaloids like gelsemine, gelseminine and gelsemic acid are also present in these drug substances. Gelsemine acts as a mild central nervous system stimulant with toxic side effects including double vision, muscular weakness and respiratory arrest.

Though sometimes *Gelsemium* causes clonic convul-



sions, but mainly it affects the muscles. Great muscular weakness, non-coordination, staggering gait, paralysis, difficulty of articulation and swallowing due to paralysis of the mouth and throat, ptosis, strabismus, diplopia, dilatation of pupils along with nausea, headache, giddiness, depression of temperature, pulse and respiration are the prominent feature of this drug.

#### **CURARE**

Although it contains strychnine, but acts quite differently on account of presence of other alkaloids-curarine or curine and d-tubocurarine. It acts on the motor end plates causing paralysis of the voluntary muscles from legs upwards, and causes death by paralysis of respiration and anoxia.

Principal symptoms are difficulty in speech and swelling, drooping of eyelids, diplopia, dilatation of pupils and paralysis of limbs, neck, chest, muscles and diaphragm but consciousness is not affected. (Resemblance to sign and symptoms of Myasthenia gravis).

**SPIGELIA**- It is not like other members of Loganiaceae. It has also nervous system disorders as neuralgia. Neuralgia involves the head, begins in occiput, coming forward and settling over the left eye. The indicating feature like, fear of pointed things, precordial anguish is important.

#### **RELATIVES OF STRYCHNINE**

Strychnine-like actions are also found in other drugs containing different alkaloids as Esrine (alkaloid of *Physostigma*), Thebaine (alkaloid of *Opium*), Cicutine and cicutoxine (alkaloids of *Cicuta-virosa*), Picrotoxine (alkaloid of *Cocculus*) etc.

**ESRINE** (or *Physostigmine*): It is a Cholinergic alkaloid having anticholinesterase activity obtained from the dried ripe seed of *Physostigma-venenosum*.

Action of esrine (ie manifestations of *Physostigma*) can be confused with strychnine but some differentiating points like spinal paralysis and diminished reflex action

causes difficulty in making the muscles obey the will; unsteady when walking with the eyes closed. Twitching of eyelids and defective accommodation may help to differentiate it from strychnine.

**CICUTINE AND CICUTOXINE**: Cicutine causes diarrhoea, vomiting, titanic convulsions and strabismus; whereas cicutoxine causes strychnine like tonic and clonic spasms. But in *Cicuta* exhaustion, prostration is marked after jerking or violent distortion with great oppression of breathing and loss of consciousness.

**PICROTOXINE**: It stimulates all positions of CNS by blocking presynaptic inhibition of neural impulses. In its action, tonic and clonic spasms alternatively appear (in case of strychnine predominantly tonic spasms). Increase secretion of saliva, bile, frequent vomiting with accelerated respiration due to spasms of glottis and less susceptibility to slight touch are the differentiating feature of this drug. (ie *Cocculus*).

**THEBAINE**- Thebaine has similar action of strychnine, but its hypnotic effect will make distance from strychnine.

#### **OTHER**

*Passiflora-incarnata*, another well known drug which is useful in muscular twitching and nervous excitement of children, when convulsions are threatened. It often prevents convulsion while the cause is still operative and during its removal. Just like strychnine it is often indicated in tetanus with opisthotonus, trismus and in convulsions of children. The indication is sleeplessness.

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