MANAGEMENT OF PANCHA SOOTHAM POISON IN SIDDHA SYSTEM

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***Abstract*: Siddha system is a traditional medicinal system in India. It deals toxicological aspect of management to Pancha sootham poisons. In siddha medical text book referred the "Siddha Toxicology" reveals management for Pancha sootham poisons. In this research explore the world that ancient siddha management for Panchasoothams such as 5 types of metals (Rasam, Rasachenduram, Lingam, Pooram, Veeram) and its management for poisons. This research results were recorded as 29 raw materials; 1 mineral; 4 animal products recorded for Pancha sootham poisons management. In plant raw material most common plants are occupied Arecaceae (3), Poaceae (3), Cucurbitaceae (2), Lamiaceae (2), Piperaceae (2) and other 14 families. And *Indigofera tinctoria* 3 times, *Ocimum tenuiflorum* 3 times, *Momordica charantia* 2 times which plants are most used for management of Pancha sootham poisons among 29 plants. 04 types of Internal medicine and 01 type of external medicine were list for management of Pancha sootham poison. In internal medicine Fresh juice (charu) and kashayam (kudineer) were most commonly used for Pancha sootham poisons management. Finally concluded as siddha medical system dealing with management of Pancha sootham poisons with plants, mineral, and animal products in ancient time which management protocols should be established with proper scientific evidence based in future for man - kind purpose to world.**

***Keywords*: Pancha sootham, Siddha management, Siddha toxicology.**

I.INTRODUCTION

Siddha system is a ancient traditional medical system in Indian medicine. It produced to the siddhars, the principles and practices of the subject are documented in a large number of age-old-texts. Siddha material medica is dominated by substances of plant, mineral and animal origin. Metals and minerals used include mercury, gold, silver, copper, iron etc. but these article only elaborated to the mercurial compounds (panchasootham).

Panchasootham (mercurial compounds) have five elements

1. Rasam
2. Rasachendhuram
3. Veeram
4. Pooram
5. Lingam

These are most important and relevant use of the siddha medical system.

Mercury & compounds

CASR number:
Mercury: 7439-97-6
Mercury bichloride: 7487-94-7
Methyl Mercury: 22967-92-6

Molecular formula:
Mercury: Hg
Mercury bichloride: $HgCl_2$
Methyl Mercury: CH_3Hg^+
Synonyms: Mercury: Quick Silver, Liquid silver, hydragyrum.

Mercury bichloride: Mercuric bichloride, mercuric chloride, Bichloride of Mercury, Corrosive Sublimate, Mercury perchloride, Mercury (II) Chloride, Mercury chloride, perchloride of mercury, sublimate

Physical properties

Mercury, a naturally occurring element, is an odourless, very heavy, silver white, liquid metal. Mercuric chloride is an odourless, white powder or crystal. Both mercury and mercuric chloride are slightly volatile at ordinary temperatures.

Mercury:

Melting Point: -39°C

Boiling Point: 357°C

Specific Gravity: 13.6

Vapour Pressure: 0.0012 (mm Hg/21°C)

Mercuric chloride:

Melting Point: 277°C

Boiling Point: 320°C

Specific Gravity: 5.4

Vapour Pressure: 1.3 (mm Hg/21°C)

Chemical properties

Pure mercury is stable and does not tarnish at ordinary temperatures. It will form alloys with most metals. It is not soluble in water or most other liquids, but will dissolve in lipids (fats and oils). It is an excellent conductor of electricity. Mercuric chloride and methyl mercury are both soluble in most organic solvents. Mercuric chloride is soluble in water, methyl mercury is not.

Mechanism:

Mercury compounds cause toxic action in the body by numerous mechanisms. Molecular and cellular effects of organic Hg in the nervous system have been described in various studies and have suggested that Hg2+ may play a role after exposure to EtHg or MeHg, and that occurrence of Hg2+ in neurons results from breakdown of organic Hg in glial cells (Hargreaves et al., 1985; Tiffany-Castiglioni and Qian, 2001). Moreover, it was found that the levels of Hg2+ after EtHg exposure were higher than after MeHg exposure, while damaged granular layer was observed only after Me Hg exposure. Therefore, it was proposed that the demethylation action or Hg2+ could not be the basic promoter responsible for MeHg neurotoxicity (Magos et al., 1985). Silver staining also revealed that in the course of the latency period, Hg is present in glial cells, and subsequently could be detected in neurons in the symptomatic phase (Pihl, 1967; Hargreaves et al., 1985). These results suggested that demethylation of MeHg occurred in glial cells and then Hg was moved to neurons and contributed to the MeHg neurotoxicity (Syversen and Kaur, 2012). Also, both CH3 Hg+ and Hg2+ exhibit strong affinity to thiol (-SH) groups that have been demonstrated to play a significant role in the toxic mechanism of Hg and its compounds (Risher and Tucker, 2017a). Many subcellular constituents including the membrane systems require free thiol groups for their proper functioning. Various forms of Hg can attack thiol groups in proteins or membranes. Once Hg links to one or more of the sulphur amino acid residues in proteins or membranes, the physiological, metabolic function may be attenuated or blocked (Ynalvez et al., 2016). Also, oxidative stress damaged Ca homeostasis (Dreiem and Seegal, 2007), as well as the glutamate homeostasis changes (Ou et al., 1999; Farina et al., 2003; Yin et al., 2007) have been reported in numerous studies on mechanisms likely to be involved in the sub-cellular neurotoxicity of MeHg. Available data indicate that there exist some significant similarities between the neurotoxic mechanisms of MeHg, EtHg and elemental or inorganic Hg. However, there are some differences in metabolic rates of MeHg and EtHg which are summarized in a recent review by Risher andTucker (2017b).

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Entering the body

Mercury and mercury containing products will enter the body if we breathe in contaminated air, drink contaminated water, eat contaminated food, or have our skin come into contact with it. Mercury may be absorbed through the skin. Mercury released into the environment is converted into methyl mercury by bacteria. The methyl mercury will then build up in the tissues of fish and shellfish. Humans (and other animals) may also be poisoned by eating these fish or shellfish.

Exposure

Mercury can be absorbed through the skin. Workers in the industries that use or produce mercury and its compounds (mercury mines and refineries, chemical manufacturing, dental/health fields, metal smelters) are at risk of exposure. Workers in fossil fuel power plants and in cement manufacturing may be exposed to mercury compounds if they are exposed to gaseous process emissions. Consumers can be exposed to mercury and its compounds by exposure to air from production and processing facilities using mercury and its compounds, by eating fish or shellfish contaminated with methyl mercury. People can also be exposed to mercury from dental work and medical treatments**.**

Medical uses

Mercury has been used in dental fillings until it was replaced with safer materials. They are an amalgam of mercury with another element. An organic mercury compound called thiomersal is used to preserve vaccines.[13] Merbromin, another organic mercury compound, is used as an antiseptic. It has been banned in some countries like the US.[14]

Mercury(I) chloride (also known as calomel or mercurous chloride) has been used as a diuretic, skin disinfectant, and laxative. Together with other mercury compounds, Mercury(II) chloride (also known as mercuric chloride or corrosive sublimate) was used to treat syphilis. The problem with this was that mercury (II) chloride is very toxic. Sometimes the symptoms of its toxicity were confused with those of the syphilis it was believed to treat.[15] It is also used as a disinfectant. Blue mass, a pill or syrup in which mercury is the main ingredient, was prescribed throughout the 1800s for different conditions such as constipation, depression, child-bearing and toothaches.[16] In the early 20th century, mercury was given to children once a year as a laxative and dewormer. Teething powders for infants also had it in them.

Since the 1930s some vaccines have contained the preservative thiomersal. In the body, this is changed to ethyl mercury. At first it was thought that this mercury-based preservative can cause or trigger autism in children, but scientific studies could not show such a link.[17] Because of this, thiomersal has been removed from most U.S. vaccines recommended for children six years of age and under.[18] There are certain exceptions to this rule for influenza vaccines. In some cases, vaccines may still have very small amounts of thiomersal in them.

Cinnabar is still an important component of traditional Chinese, Tibetan, and Ayurvedic medicine. Certain countries do not allow the use of mercury or its compounds in drugs. For this reason, cinnabar has recently been replaced with less toxic products.

Today, the use of mercury in medicine has greatly declined in all respects, especially in developed countries. Thermometers and blood pressure devices using mercury were invented in the early 18th and late 19th centuries, respectively. Now their use is declining and has been banned in some countries, states and medical institutions. In 2002, the U.S. Senate passed legislation to phase out the sale of non-prescription mercury thermometers. In 2003, Washington and Maine became the first states to ban mercury blood pressure devices.[19] Mercury compounds are in some over-the-counter drugs, including topical antiseptics, stimulant laxatives, diaper rash ointment, eye drops, and nasal sprays. The FDA has "inadequate data to establish general recognition of the safety and effectiveness" of the mercury in these products.[20] Mercury is still used in some diuretics, although other things can be used for most therapeutic uses.

Other uses

Mercury is also used:

- In cosmetics, (thiomersal is widely used to make mascara.)
- As a liquid electrolyte in a variant of the chloral kali process.
- In mining, especially of gold and silver.
- In mercury-vapor lamps and fluorescent lamps.
- Certain thermometers, barometers and manometers. Because of its toxicity, it can be replaced by alcohol for most of these uses.
- Certain electrical switches that turn on or off when tilted.

Mercury is found in many industries, such as battery, thermometer, and barometer manufacturing. Some consumer products that contain mercury include automotive equipment with halide relay switches, fluorescent and high-intensity discharge lamps, and fungicides. Before 1990, paints contained mercury as an anti-mildew agent. In medicine, mercury is used in dental amalgams, as a preservative in vaccines, and in various antiseptic agents. It is also used ritualistically among Latino and African Caribbean populations during the practice of spiritist faiths such as Santeria, Esperitismo, and voodoo.

Clinical Signs and Symptoms

Mercury poisoning is frequently misdiagnosed because of the insidious onset coupled with nonspecific signs and symptoms [T2]. The clinical presentation of an individual exposed to mercury depends upon the dose, the length of, and form of exposure. All mercury compounds concentrate in the kidney to some extent. Acute exposure caused by inhaled elemental mercury can lead to pulmonary symptoms. Initial signs and symptoms, such as fever, chills, shortness of breath, metallic taste, and pleuritic chest pain, may be confused with metal fume fever. Other possible symptoms could include stomatitis, lethargy, confusion, and vomiting. Complete recovery is possible, but pulmonary complications of inhaled toxicity may include interstitial emphysema, pneumatocele, pneumothorax, pneumomediastinum, and interstitial fibrosis. The acute presentation can include ashen-gray mucous membranes secondary to precipitation of mercuric salts, hematochezia (bloody stool), vomiting, severe abdominal pain, and hypovolemic shock. Systemic effects usually begin several hours postingestion and may last several days. These effects include metallic taste, mucosal inflammation, gingival irritation, foul breath, loosening of teeth, and renal tubular necrosis leading to oliguria or anuria.

Chronic exposure

Usually results from prolonged occupational exposure to elemental mercury that is converted into the inorganic form, topical application of mercurial salves, or the chronic use of diuretics or cathartics containing mercury. Chronic and high-dose acute mercury exposure produces a variety of renal, neurological, psychological, and cutaneous symptoms. The exposed individual may experience

rather vague and non-specific symptoms, including anorexia, weight loss, fatigue, and muscular weakness that could be indicative of a number of diseases. Elemental mercury vapor and short chain alkylmercury compounds readily enter the CNS where they bind to, and thus inactivate, proteins and enzymes involved in synaptic and neuromuscular transmission. Blocking of these signals lead to characteristic degenerative changes. Early on the patient may have fine tremors in the extremities (the fingers and hands) that over time progress to the entire limb. The classic triad found in chronic toxicity is tremors, gingivitis, and erethism (i.e., a constellation of neuropsychiatric findings that includes insomnia, shyness, memory loss, emotional instability, depression, anorexia, vasomotor disturbance, uncontrolled perspiration, and blushing). Additional clinical features may include headache, visual disturbance (e.g., tunnel vision), peripheral neuropathy, salivation, insomnia, and ataxia. Symptoms of exposure to organic mercury compounds are similar to those found following exposure with elemental mercury: ataxia, tremors, unsteady gait, and illegible handwriting. Slurred speech may also occur as muscle tone of the facial muscles is lost. Acrodynia, known as Pink Disease and considered to be a mercury allergy, presents with erythema of the palms and soles, oedema of the hands and feet, desquamating rash, hair loss, pruritus, diaphoresis, tachycardia, hypertension, photophobia, irritability, anorexia, insomnia, poor muscle tone, and constipation or diarrhoea. Acrodynia typically presents in only a small percentage of those exposed to inorganic mercury and is an indicator of widespread disease.

II.AIM

- To enumerate the number of ingredients used in management for Panchasootham poisons in ancient siddha medical system.

OBJECTIVE

- To list out the number of plants which are used to management of pancha sootham poisons in Siddha Medicine.
- To list out the number of metals & minerals which are used for management of pancha sootham poisons in Siddha Medicine.
- To list out the number of animal products which are used for management of pancha sootham poisons in Siddha Medicine.

III.MATERIALS AND METHODS

Research type – Literature Review

Data collected from – "Siddha Toxicology"**,** - atranslation of Tamil siddha text NanjuMurivuNool written by Vaidya SironmaniPandit Dr. K. S. Murugesa Muthalitar, Revised by Dr. Pon Gurusironmani,Translated by P. Jeyaraj and Edited by: Dr. Anaivaari R. Anandan, published by: Department of Indian Medicine & Homeopathy, Chennai 600 106, 1st edition - 1999, reprinted Year – 2017. This book compendium of following this book,
Theraiyaryemakavenba, Theraiyargunapadam,
Theraiyarkarisal 300, Theraiyarthailavarukasurukkam,
Theraiyarsekarappa, Agasthiyarvidapirathividathirattu,
Agasthiyarvaithiyakaviyam 1500, Bohar
3000 Karuvoorthevar – thandagam,
Theraiyarkarisal, Agasthiyarpatharthagunasindhamani,
Agasthiyar 21000,
Vidasangaraaarudam, Nagaarudam, Sarppaarudam,
Karudaarudam, Pullipani 500,
Vagadasanthrothayam,
Aayulvasittam, Thiruvalluvar Thirukural.

Analysis

- Data analysis by MS excel.
- Descriptive simple Statistical way.

IV.RESULTS

ANIMALS PRODUCT IN TAMIL	IN ENGLISH
Pasuvin thayir	Cow's curd
Pasu moor	cow's butter milk
Pasu vennai	cow's butter
Kozhi muttai venkaru	Egg yolk

MINERAL IN TAMIL	IN ENGLISH
Pottiluppu	Pottasium Nitrate

TYPES OR RAW DRUG

PLANT NAME	BOTANICAL NAME	FAMILY	TAXONOMY	PART USED
Vellai mutchangan	*Azima tetracantha*	Salvadoraceae	Shrub	Whole plant
Mithibagal	*Momordica charantia*	Cucurbitaceae	Climber	Whole plant
Avuri	*Indigofera tinctoria*	Fabaceae	Herb	Leaves
Tulasi	*Ocimum tenuiflorum*	Lamiaceae	Herb	Leaves
Chukku	*Zingiber officinale*	Zingiberaceae	Herb	Rhizome
Kallippakku	*Areca catechu*	Arecaceae	Tree	Fruit
Kaddukkai	*Terminalia chebula*	Combretaceae	Tree	Fruit
Karuvel	*Acacia nilotica*	Fabaceae	Tree	Whole plant
Nelli	*Phyllanthus emblica*	Phyllanthaceae	Tree	Fruit
Naval	*Syzygium cumini*	Myrtaceae	Tree	Fruit
Aruku	*Cynodon dactylon*	Poaceae	Creeper	Whole plant
Milaku	*Piper nigrum*	Piperaceae	Climber	Dry fruit
Surai oodu	*Laginalia siceraria*	Cucurbitaceae	Climber	Dry fruit
Vellam	*Saccharum officinarum*	Poaceae	Shrub	Stem
Velveal	*Acacia leucopholea*	Fabaceae	Tree	Whole plant
Erukku	*Calotropis gigantea*	Apocynaceae	Shrub	Whole plant
Nerunjil	*Tribulus terrestris*	Zygophyllaceae	Creeper	Whole plant
Neisatti	*Vernonia cinera*	Asteraceae	Herb	Whole plant
Thennankal	*Cocus nucifera*	Arecaceae	Tree	Fruit
Ellaneer	*Cocus nucifera*	Arecaceae	Tree	Fruit
Chitramanakku	*Ricinus communis*	Euphorbiaceae	Shrub	Whole plant
Nilapanankilanku	*curculigo orchioides*	Hypoxidaceae	Herb	Root
Vallarai	*Centella asiatica*	Apiaceae	Creeper	Whole plant
Ponnankkanni	*Alternanthera sessilis*	Amaranthaceae	Creeper	Whole plant
Kanduparankki	*Clerodenderum serratum*	Lamiaceae	Tree	Root
Jathikai	*Myristica fragrans*	Myristicaceae	Tree	Fruit
Vaal milaku	*Piper cubeba*	Piperaceae	Climber	Dry fruit
Karkandu	*Saccharum officinarum*	Poaceae	Shrub	Stem
Sembaruthi	*Gossypium arboreum*	Malvaceae	Shrub	Leaves

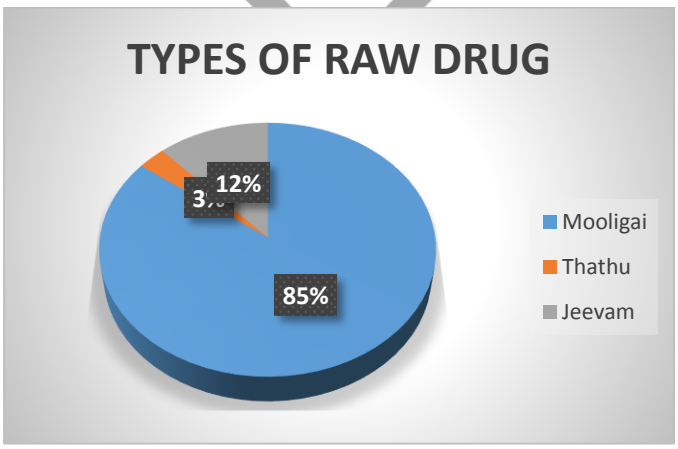

Fig:1- Types of raw drugs

TYPES OF MEDICINE

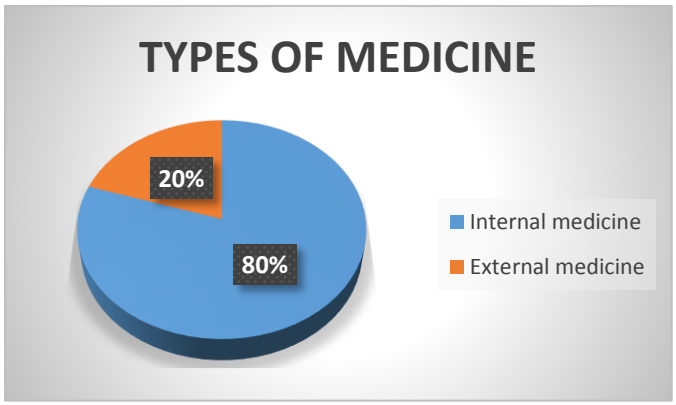

Fig :2-Tyes of medicines

TYPES OF INTERNAL MEDICINE

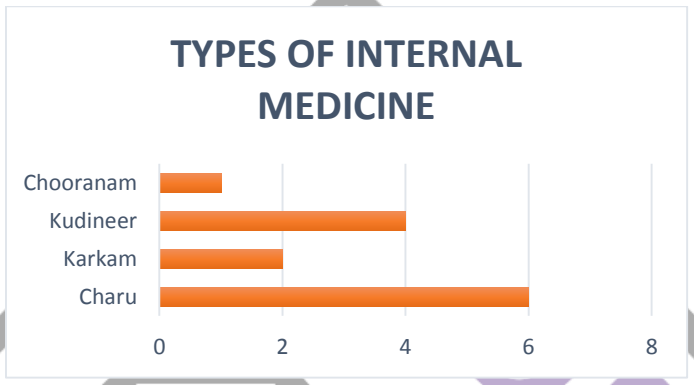

Fig :3- Types of internal medicine

FREQUENTLY USED FAMILY

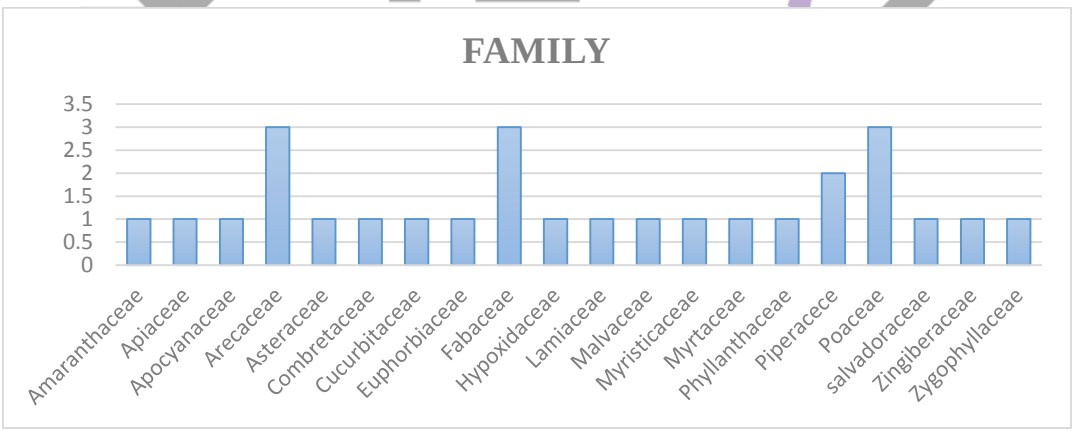

Fig :4- Family

TAXONOMY

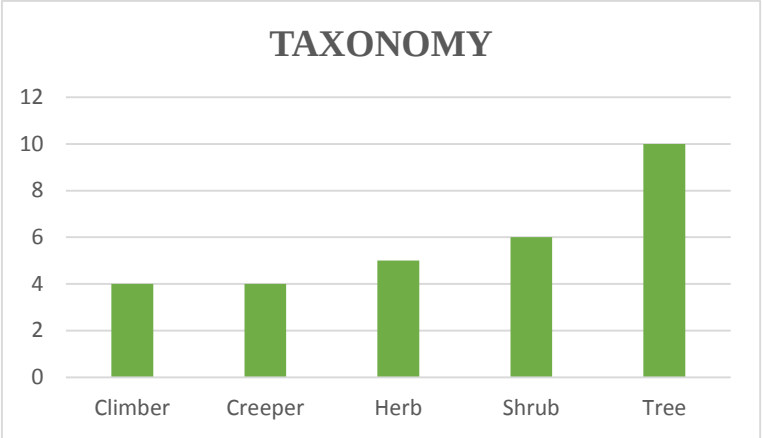

Fig: 5- Taxonomy

PART USED

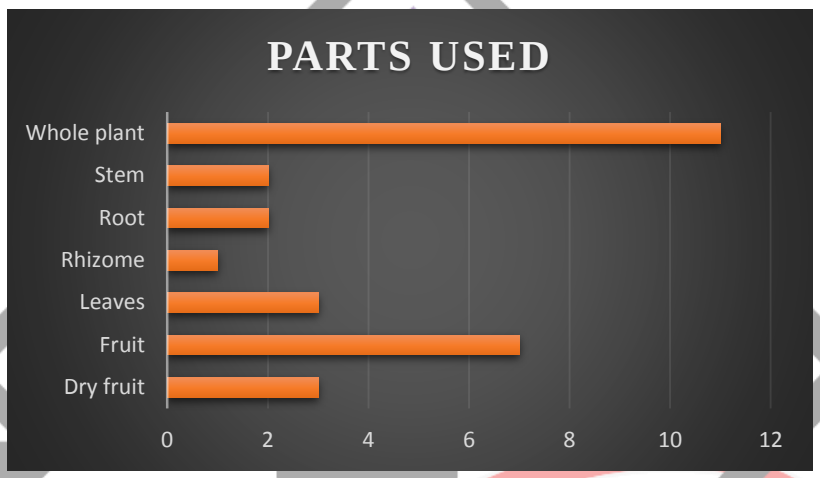

Fig:6- Parts used

V.DISCUSSION AND CONCLUSION

It deals toxicological aspect of management to Pancha sootham poisons. In siddha medical medical text book referred the "Siddha Toxicology" reveals management for Panchasootham poisons. In this research explore the world that ancient siddha management for Panchasoothams such as 4 types of metals (Rasam, Rasachenduram, Lingam, Pooram, Veeram) and its management for poisons. This research results were recorded as 29 raw materials; 1 mineral; 4 animal products recorded for Pancha sootham poisons management. In plant raw material most common plants are occupied Arecaceae (3), Poaceae (3), Cucurbitaceae (2), Lamiaceae (2), Piperaceae (2) and other 14 families. And *Momordica charantia* 2 times, *Indigofera tinctoria* 3 times, *Ocimum tenuiflorum* 3 times which plants are most used for management of Pancha sootham poisons among 29 plants. 04 types of Internal medicine and 01 type of external medicine were list for management of Panchasootham poison. In internal medicine Fresh juice (charu) and kashayam (kudineer) were most commonly used for Pancha sootham poisons management.

Finally **concluded** as siddha medical system dealing with management of Pancha sootham poisons with plants, mineral, and animal products in ancient time which management protocols should be established with proper scientific evidence based in future for man - kind purpose world.

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