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CASSIA OCCIDENTALIS LINN (CAESALPINACEAE): A TRADITIONAL BONE SETTER-AN OVERVIEW

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ABSTRACT

Medicinal plants are major source of bio-dynamic compounds of therapeutic values. Ethno-medico-botanical study brings out efficient treatment among common human diseases. An ethno-medical- botanical survey was conducted in and around Abishegapakkam, Puducherry by personal interview among the ethnic groups and traditional medical practitioners. In Abishegapakkam, Puducherry, a good number of traditional bone setters are practicing for the past two hundred years. Patients from nearby areas such as Mudiampakkam, Villupuram, Kallakurichi, Neyveli, Cuddalore, Panruti and Puducherry have been benefitting from this treatment. The medicinal plants used by these practitioners have been kept as a guarded secret since ages. So far they have not been documented scientifically. Hence it was thought worth to carry out a survey among these traditional practitioners. The survey revealed that *Cassia occidentalis* are traditionally used for bone setting by this ethnic group of people. The traditional bone setters grind the leaves into the fine paste and it is mixed with the white yolk of egg and applied liberally on the area of injury. Then it is wrapped with gauze and in some cases a bamboo stick to keep the bones in places. This present review highlights the bone setting and bone healing properties of the traditionally used potential herb *Cassia occidentalis* Linn (Caesalpinaceae)..

KEY WORDS: *Cassia occidentalis* Linn. Caesalpinaceae, Traditional bone setter and Bone healer.

INTRODUCTION

Traditional bone setting is quite popular in India. Traditional bone setters (TBS) are one of the largest specialist groups practicing traditional medicine in our country.[1] It is believed that there are about 70,000 traditional healers and bonesetters in India and they treat 60% of trauma.[2] Among them, 3000 TBS Vaidyas are in various districts of Tamil Nadu, Pondicherry, Kerala and Karnataka. There are also many well-known places for bone setting in Orissa like Kalupada, Kuleila, Athagoda, etc. But *Puttur kattu* is famous in Andhra Pradesh, Tamil Nadu, Karnataka, Maharashtra, Kerala and other northern states. Many *Puttur Kattu* clinics are found in big cities like Chennai, Coimbatore, Hyderabad, Visakapatnam, Bangalore, Pune, Mumbai, etc. *Puttur kattu*, the art of setting of fractures and dislocations, is being practiced hereditarily in Rachapalem village near Puttur in the state of Andhra Pradesh since 1881. It attracts a minimum of 200–

300 patients per day with various fractures and dislocations. Education is not a barrier to patronize this traditional treatment for their fracture and dislocation of bones. TBS offer cheaper treatment and are believed to use faster healing methods. Fear of heavy plaster of Paris bandage, prolonged period of immobilization and amputation influence people to visit TBS.[3,4] Specialized orthopedic operations require a up-to-date infrastructure and costly implants which are practically out of reach for the common people. In rural India, the condition is even worse as primary health centers practically lack any orthopedic services. Therefore, reorganization of TBS with proper training is necessary to utilize their services.

Although this is a long traditional practice, with detailed literature in Ayurveda, institutionally qualified Ayurvedic doctors are not able to practice bone setting management, perhaps due to lack of practical training during their undergraduate course. The Ayurvedic institutes

or hospitals have no separate bone setting clinic or unit, except Government Ayurveda College, Trivandrum, Kerala. There is no postgraduate degree or diploma to support this century-old practice. This study is an attempt to reintroduce this traditional practice to Ayurvedic institutes.

Many studies are conducted outside our country to know the strength and weakness of TBS.[5–7] The integration of traditional practice in bone setting started in China.[8,9] Some studies have reported about the science and tradition of bone setting.[10,11] Foundation for revitalization of local health tradition has taken some initiatives to study the TBS.[12] But no special study for Abishegapakkam, Puducherry TBS was undertaken. Therefore, this prospective observational study was undertaken to analyze the techniques in diagnosis, way of management, medicine preparation, plants used and way of applications by Traditional Bone Setting, with special reference to Abishagapakkam. We also tried to understand the reasons which make lots of people go to Abishegapakkam for getting treatment, means of contact for treatment, pathology of fracture and outcome of some treated cases.

BONE, BONE TYPES AND ITS FUCTOINS

A bone is a rigid organ that constitutes part of the vertebrate skeleton. Bone support and protect the various organs of the body, produce red and white blood cells, store minerals, provide structure and support for the body, and enable mobility. Bones come in a variety of shapes and sizes and have a complex internal and external structure. They are lightweight yet strong and hard, and serve multiple functions.

Bone tissue (osseous tissue) is a hard tissue, a type of dense connective tissue. It has a honeycomb-like matrix internally, which helps to give the bone rigidity. Bone tissue is made up of different types of bone cells. Osteoblasts and osteocytes are involved in the formation and mineralization of bone; osteoclasts are involved in the resorption of bone tissue. Modified (flattened) osteoblasts become the lining cells that form a protective layer on the bone surface. The mineralized matrix of bone tissue has an organic component of mainly collagen called ossein and an inorganic component of bone mineral made up of various salts. Bone tissue is a mineralized tissue of two types, cortical bone and cancellous bone. Other types of tissue found in bones include, endosteum, periosteum, nerves, blood vessels and cartilage.

In the human body at birth, there are over 270 bones,[13] but many of these fuse together during development, leaving a total of 206 separate bones in the adult,[14] not counting numerous small sesamoid bones. The largest bone in the body is the femur or thigh-bone, and the smallest is the stapes in the middle ear. There are five types of bones in the human body: long, short, flat, irregular, and sesamoid.[15]

- Long bones are characterized by a shaft, the diaphysis that is much longer than its width; and by an epiphysis, a rounded head at each end of the shaft. They are made up mostly of compact bone, with lesser amounts of marrow, located within the medullary cavity, and areas of spongy, cancellous bone at the ends of the bones.^[16] Most bones of the limbs, including those of the fingers and toes, are long bones. The exceptions are the eight carpal bones of the wrist, the seven articulating tarsal bones of the ankle and the sesamoid bone of the kneecap. Long bones such as the clavicle, that have a differently shaped shaft or ends are also called modified long bones.

- Short bones are roughly cube-shaped, and have only a thin layer of compact bone surrounding a spongy interior. The bones of the wrist and ankle are short bones.

- Flat bones are thin and generally curved, with two parallel layers of compact bones sandwiching a layer of spongy bone. Most of the bones of the skull are flat bones, as is the sternum.^[16]

- Sesamoid bones are bones embedded in tendons. Since they act to hold the tendon further away from the joint, the angle of the tendon is increased and thus the leverage of the muscle is increased. Examples of sesamoid bones are the patella and the pisiform.^[16]

- Irregular bones do not fit into the above categories. They consist of thin layers of compact bone surrounding a spongy interior. As implied by the name, their shapes are irregular and complicated. Often this irregular shape is due to their many centers of ossification or because they contain bony sinuses. The bones of the spine, pelvis, and some bones of the skull are irregular bones. Examples include the ethmoid and sphenoid bones.^[17]

BONE FRACTURE AND ITS TYPES

A bone fracture, also referred to as x, or #, is a medical condition where the continuity of the bone is broken. A significant percentage of bone fractures occur because of high force impact or stress. However, a fracture may also be the result of some medical conditions which weaken the bones, for example osteoporosis, some cancers, or osteogenesis imperfecta (also known as brittle bone diseases).^[18]

Fast facts on fractures

Here are some key points about fractures. More detail and supporting information is in the main article.

- Most bone fractures are caused by falls and accidents.
- Bone fractures caused by disease are referred to as pathological fractures.
- A compound fracture is one that also causes injury to the overlying skin.
- There are a number of different types of fractures, including avulsion, comminuted, and hairline fractures.
- Bone healing is a natural process; treatment revolves around giving the bone optimum conditions to heal it.

- **Types**

There is a range of fracture types, including:

- Avulsion fracture - a muscle or ligament pulls on the bone, fracturing it.
- Comminuted fracture - the bone is shattered into many pieces.
- Compression (crush) fracture - generally occurs in the spongy bone in the spine. For example, the front portion of a vertebra in the spine may collapse due to osteoporosis.
- Fracture dislocation - a joint becomes dislocated, and one of the bones of the joint has a fracture.
- Greenstick fracture - the bone partly fractures on one side, but does not break completely because the rest of the bone can bend. This is more common among children, whose bones are softer and more elastic.
- Hairline fracture - a partial fracture of the bone. Sometimes this type of fracture is harder to detect with routine xrays.
- Impacted fracture - when the bone is fractured, one fragment of bone goes into another.
- Longitudinal fracture - the break is along the length of the bone.
- Oblique fracture - a fracture that is diagonal to a bone's long axis.
- Pathological fracture - when an underlying disease or condition has already weakened the bone, resulting in a fracture (bone fracture caused by an underlying disease/condition that weakened the bone).
- Spiral fracture - a fracture where at least one part of the bone has been twisted.
- Stress fracture - more common among athletes. A bone breaks because of repeated stresses and strains.
- Torus (buckle)fracture - bone deforms but does not crack. More common in children. It is painful but stable.
- Transverse fracture - a straight break right across a bone.

Symptoms:

Symptoms of a bone fracture can vary wildly depending on the affected region and severity.

The signs and symptoms of a fracture vary according to which bone is affected, the patient's age and general health, as well as the severity of the injury. However, they often include some of the following:

- Pain
- Swelling
- Bruising
- Discolored skin around the affected area
- Angulation - the affected area may be bent at an unusual angle
- The patient is unable to put weight on the injured area
- The patient cannot move the affected area
- The affected bone or joint may have a grating sensation
- If it is an open fracture, there may be bleeding

When a large bone is affected, such as the pelvis or femur:

- The sufferer may look pale and clammy
- There may be dizziness (feeling faint)
- Feelings of sickness and nausea.

If possible, do not move a person with a broken bone until a healthcare professional is present and can assess the situation and, if required, apply a splint. If the patient is in a dangerous place, such as in the middle of a busy road, one sometimes has to act before the emergency services arrive.

Causes

Most fractures are caused by a bad fall or automobile accident. Healthy bones are extremely tough and resilient and can withstand surprisingly powerful impacts. As people age, two factors make their risk of fractures greater: Weaker bones and a greater risk of falling. Children, who tend to have more physically active lifestyles than adults, are also prone to fractures.

People with underlying illnesses and conditions that may weaken their bones have a higher risk of fractures. Examples include osteoporosis, infection, or a tumor. As mentioned earlier, this type of fracture is known as a pathological fracture.

Stress fractures, which result from repeated stresses and strains, commonly found among professional sports people, are also common causes of fractures.

Traditional methods for treatment

Treatment also focuses on providing the injured bone with the best circumstances for optimum healing (immobilization). For the natural healing process to begin, the ends of the broken bone need to be lined up - this is known as reducing the fracture. The patient is usually asleep under a general anesthetic when fracture reduction is done. Fracture reduction may be done by manipulation, closed reduction (pulling the bone fragments), or surgery.

Immobilization - as soon as the bones are aligned they must stay aligned while they heal. This may include:

- **Plaster casts or plastic functional braces** - these hold the bone in position until it has healed.
- **Metal plates and screws** - current procedures may use minimally invasive techniques.
- **Intra-medullary nails** - internal metal rods are placed down the center of long bones. Flexible wires may be used in children.
- **External fixators** - these may be made of metal or carbon fiber; they have steel pins that go into the bone directly through the skin. They are a type of scaffolding outside the body. Usually, the fractured bone area is immobilized for 2-8 weeks. The duration depends on which bone is affected and whether there are any complications, such as a blood supply problem or an infection.

List of bone setting medicinal plants.

Table 1. List of Medicinal Plants Used in Bone Setting and for Bone Fracture Treatment

S.No	Biological source	Family	Chemical constituent	Uses	References
01	<i>Blepharis integrifolia</i>	Acanthaceae	p-methoxycinnamic acid, linalool, linoleic acid, β -sitosterol and flavone luteolin, iridoid glycoside, premnine, ganarine and ganikarine, premnazole, aphelandrine, pentacycliterpenebetulin, caryophellen, premmenol, premnaspirodiene, clerodendrin-A,	Bitter, pungent, heating, laxative, alexipharmic, anaemia, fever, astringent, sweet thermogenic, inflammations, cardiogenic, carminative, digestive, stomachic, tonic, neuralgia, cough, asthma, bronchitis, leprosy, skin disorders, dyspepsia, flatulent, constipation, diabetes, anorexia, liver disorders, general debility and neurological diseases. Whole plant is used in the form of decoction in rheumatism and neuralgia.	Hebbar SS etal J 2004
02	<i>Dicliptera paniculata</i>	Acanthaceae	Alkaloids, flavonoids, sterols, triterpenoids, glycosides and water soluble galactomannan have been isolated from leaves, stem, root bark and seeds	Treat inflammatory affections such as ulcer, rheumatism, dermatitis and infections. Recently, several studies demonstrated the antimalarial activity, antimicrobial activity and antiprogestative activity.	Gururaj et al., 1981.
03	<i>Holigarnag rahamii (Wight) Krtz</i>	Anacardiaceae	Long chain hydrocarbons, alcohols, acids, esters, alkaloids, steroids, amino and nitro compounds	They are used to treat cough, cold, inflammation, tumor, cancer and skin diseases.	Upadhyaya et al. 2009
04	<i>Amorphoph alluspaeoni ifolius (Dennst.)</i>	Araceae	Alkaloids, steroids, fats & fixed oil	Piles, abdominal disorders, tumours, enlargement of spleen, asthma and rheumatism They are traditionally used in arthralgia, elephantiasis, tumors, inflammations, hemorrhoids, hemorrhages, vomiting, cough, bronchitis, asthma, anorexia, dyspepsia, helminthiasis, hepatopathy, spleenopathy, amenorrhoea, dysmenorrhoea, seminal weakness, fatigue, anemia and general debility.	Upadhyaya et al.
05	<i>Pothosscandens L</i>	Araceae	Alkaloid, catachin, coumarin, tannin, saponin, flavonoid, phenol, sugar, glycoside and xanthoprotein.	Reduce swelling speedily in trauma area. In China the plants are used as blood coagulant, wounds, tumors and drinking for anti-cough. In India, the infusion of the leaves of this plant as a bath, is used for curing convulsions and epilepsy. Apart from that, the stem is also reportedly used to treat asthma, after being cut with camphor and smoked like tobacco.	Das et al. (2008)
06	<i>Terminalia cuneata Roth</i>	Combretaceae	Tannins like arjunic acid, arjunolic acid, arjunetin, ellagic acid, gallic acid, and triterpenoids like oleanolic acid, betulinic acid and steroid like β -sitosterol.	The bark is bitter & styptic, useful in vitiated conditions of pitta, ulcers, vata, fractures, haemorrhages, bronchitis, cardiopathy, strangury, wounds, haemoptysis, dysentery, cough, verminosis, leucorrhoea, gonorrhoea & burning sensation	Kirtikar and Basu 1999
07	<i>Diospyros montana Roxb.</i>	Ebenaceae	Triterpene Components betulinic acid and ursolic acid.	The plant has an astringent action and is particularly used for the treatment of diarrhoea and dysentery	Anon, 1952
08	<i>Antidesma acicidum Retz</i>	Euphorbiaceae	Clauszoline B, clauszoline H, mukonal, 7-methoxymukonal, and heptaphyline and three	Anticancer agents.	Hebbar SS 2004

			coumarin derivatives, 5-demethyltoddaculin, xanthoxyletin, and alloxanthoxyletin presence of alkaloids, triterpenes, and flavonoids		
09	<i>Brideliastipularis</i> (L.) Blume	Euphorbiaceae	Triterpene components betulin, betulinic acid and ursolic acid	Amoebic dysentery, chest pain, constipation, diarrhea, leucoderma and strangury.2 Decoction of bark is used for cough, fever and asthma. Hypotensive and hypoglycaemic actions in animal model, where the leaves are used for jaundice.	Hebbar SS 2004;
10	<i>Baliospermumsolanifolium</i> (Geiseler) S	Euphorbiaceae	Glycoterpenoids, steroids, Flavonoids	Anticancer, Antimicrobial, free radical scavenging, immune-modulatory, hepatoprotective and anthelmintic	Ignacimutheta l. 2006
11	<i>Glochidion heyneanum</i> (Wight & Arn.)	Euphorbiaceae	Salicylic acid, lutein, polyphenols, and tannins, isobixin, beta-carotene, cryptoxanthin, lutein, zeaxanthin, orellin, bixein, bixol, crocetin, ishwarane, ellagic acid, salicylic acid, threonine, tomentosic acid, tryptophan, and phenylalanine	Anti-inflammatory	Ignacimutheta l. 2006
12	<i>Abrusprecatorious</i> L	Fabaceae	Flavonoids, triterpene glycosides, abrin and alkaloids.	Neuromuscular effects, neuro-protective, abortifacient, antiepileptic, anti-viral, anti-malarial, antifertility, nephroprotective, immunomodulator, immunostimulatory properties, anti-inflammatory activity, antidiabetic effect	Anam2001
13	<i>Cassia fistula</i> L.	Fabaceae	Phenolic compounds, tannins, flavonoids and glycosides.	Analgesic, anti-inflammatory, antioxidant, antidiabetic, as well as hepatoprotective activity. Tumors of the abdomen, glands, liver and throat cancer. Burns, constipation, convulsions, diarrhea, dysuria and epilepsy. Carminative and laxative. Leprosy, skin diseases and syphilis.	BashaandSudarshanam2010
14	<i>Sennatoria</i> (L.) Roxb	Fabaceae	Chrysophanol, 1, 3, 5-trihydroxy-6-7-dimethoxy-2-methyl anthraquinone and β -sitosterol. Naphtho- α -pyrone-toralactone, physcion, emodin, rubrofusarin, chrysophonic acid-9-anthrone. Tricontan-1-ol, stigmasterol, β -sitosterol- β -D-glucoside, freindlen, palmitic, stearic, succinic and d-tartaric acids, uridine, quercitri-iso-quercitrin.	Clear the heat and liver fire. Improves vision and used in preparation of sweet dishes Natural pesticide in organic farms.	Jain SK etal
15	<i>Millettia pinnata</i> (L.)	Fabaceae	Prenylated flavonoids such as furanoflavones, furanoflavonols, chromenoflavones, furanochalcones and pyranochalcones.	Tumours, piles, skin diseases, itches, abscess, painful rheumatic joints wounds, ulcers, diarrhea.	Upadhyaetal.2009

			pongafllavanol and tunicatachalcone.		
16	<i>Tamarindu indica</i> L	Fabaceae	Heptadecanoate, Hexadecanoic acid and n-nonadecanoate, n-octadecanoic, Methyl-n-pentacosanoic, n-tetradecanoate, n-heptacosanoate and then smaller amount, n-nacosanate, Methyl-pentadecanoic, Nonanoic acid, Nonacosatrienoic acid, n-nonanoate, n-hexocosanoate, n-Tridecanoic,	Anti-inflammatory	Upadhyael.2009
17	<i>Caseariato mentosa</i> Roxb	Flacourtiaceae	Flavonoid and ascorbic Acid.	Antioxidant, cytotoxic, cancer and diarrhoea	Trease and Evans, Upadhyael.2009
18	<i>Ocimumbas ilicum</i> L.	Lamiaceae	Eugenol, linalool and phenolic compounds	Flavors, dental and oral products, dressings, confectionery, salads, meat products etc. as a flavoring agent.	Shibata S, Chem Pharm Bull, 1969
19	<i>Cinnamom umwightii</i> Meisn. R	Lauraceae	Alkaloids, glycosides, flavonoids, saponins, coumarins, reducing sugars, phenolics, tannins, sterols and mucilage.	The flower buds are used as one of the ingredients in the preparation of Amukkarachuranam, digestive power, abdominal disorders, cough, dysuria and gynaecological disorders, astringent, aromatic, stimulant and carminative. wounds, fever, intestinal worms, headache and menstrual problems.	Sastry MS, CurrSci, 1968
20	<i>Perseamac rantha</i> (Nees) Kosterm.	Lauraceae	Polyphenols, vitamin-C, vitamin-E and carotenoids.	Treatment of asthma and rheumatism.	Maikhuri RK
21	<i>Tinosporac ordifolia</i> (Willd.)	Menispermaceae	Alkaloids, diterpenoid lactones, glycosides, steroids, sesquiterpenoid, phenolics, aliphatic compounds and polysaccharides.	Fevers, diabetes, dyspepsia, jaundice, urinary problems, skin diseases and chronic diarrhea and dysentery. Heart disease, leprosy and helmenthiasis.	Chakrabortyan dBhattacharjee 2006
22	<i>Tinosporasi nensis</i> (Lour.)	Menispermaceae	Terpenoids, alkaloids, lignans, steroids, Terpenoids, Tinosporaside, phenylpropene disaccharides, cordifolioside A, B and C	Leprosy, fever, asthma and anorexia, astringent, diuretic and potent aphrodisiac and curative against skin infections, jaundice, diabetes and chronic diarrhea and dysentery	Kirtikar and Basu 1999
23	<i>Ficusbenghalensis</i> L.	Moraceae	Rutin, friedelin, taraxosterol, lupeol, β -amyrin along with psoralen, bergapten and β -5,7 Dimethyl ether of leucopelargonidin-3-O- α -L rhamnoside and glucoside, 20-tetratriacontene-2-one.	Treatment of biliousness, ulcers, erysipelas, vomiting, vaginal complaints, fever, inflammations, leprosy. lessens inflammations; useful in piles, nose-diseases, gonorrhoea, syphilis, biliousness, dysentery, inflammation of liver, pains, rheumatism, lumbago and bruises. For the treatment of spermatorrhea.	Varanasi, 2007
24	<i>Moringa oleifera</i> Lam	Moringaceae	Hexacosane, pentacosane and heptacosane pentacosane, hexacosane and (E)-phytol were the	Cardiovascular, gastrointestinal, haematological and hepatic and kidney disorders, purgatives and in the treatment of headaches, haemorrhoids, fevers, inflammation of nose and throat,	Anisuzzaman et al. 2007

				bronchitis, eye and ear infections.	
25	<i>Anisuzzama neta</i> .	Oleaceae	Palmitic acid, phytol, hexenyl benzoate and linalool.	Treat sciatica, arthritis and malaria, hepatoprotective, anti-leishmanial, antiviral and antifungal	MeenaandRao 2010
26	<i>Cynodon dactylon</i> L.	Poaceae	Flavanoids, alkaloids, glycosides, terpenoids, triterpenoids steroids, saponins, tannins, resins, phytosterols, reducing sugars, carbohydrates, proteins, volatile oils and fixed oils	Cardiovascular, antidiabetic, gastrointestinal, antioxidant, immunological, antiallergic, antiinflammatory, antipyretic, analgesic, anticancer, dermatological, diuretic, protective, antimicrobial, antiparasitic.	Brittoetal.2010
27	<i>Citrus limon</i> (L.) Burm.f.	Rutaceae	Beta-pinene and Gamma-terpinene, Oxy genated aldehydes	Anti-inflammatory	Hanuman J 1988
28	<i>Cissus quadrangul aris</i> L	Vitaceae	Triterpenes including α - and β -amyryns, β -sitosterol, ketosteroids, phenols, tannins, carotene and vitamin C.	Healing of fracture of the bones. The Muscular pains. Osteoarthritis, Rheumatoid arthritis and osteoporosis.	Kirtikarand Basu 1999
29	<i>Calotropis procera</i> (Aiton) Dryand.	Asclepidaceae	Cardenolide, procera enin, benzoylinesolone and benzoylisolinelone. calotropin and calotropagenin calotropenyl acetate.	Anti-inflammatory, analgesic, and antioxidant properties	Rakta Arka (Ait.)

CONCLUSION

Traditionally, topical agents have been used to promote the healing of soft tissues and bone fractures. Nonetheless, the formulae of these herbal medicines are too

diversified as yet. More importantly, the serious lack of relevant evidence-based scientific support and good systemic documentation of the clinical data makes them not well accepted worldwide. The aim of this study is to investigate the efficacy of a topical herbal paste on the promotion of bone healing from an evidence-based scientific approach. Both in vitro and in vivo biological platforms will be used to verify the pharmacological properties essential for bone healing, namely, anti-inflammation, proangiogenesis, and cellular regeneration. The most novel component of the study lies in the

confirmation of transcutaneous transport of the chemical compounds via the topical application. Considering that over a hundred of medicinal herbs had been used historically in India for the treatment of skeletal injuries and bone fracture, we select the herbs for the present study according to the classical records and recent scientific papers testifying the pharmacological properties of the herbs related to fracture healing [19]. A herbal paste for topical use) was thus created with four herbs, namely, senna occidental is powder, white egg, bamboo sticks. The identities of all herbs were authenticated using thin-layer chromatography with procedural references recommended by the Indian pharmacopoeia [20]. The herbarium voucher specimens of the tested herbs were deposited in the museum bank of the Herbarium Institut Francais de Pondicherry, at the Pondicherry with reference numbers as follows:

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