STANDARDIZATION AND PHARMACOLOGICAL PROFILE OF BEDHI CHENDURAM

The dissertation Submitted by

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Chennai – 47

DECLARATION BY THE CANDIDATE

I hereby declare that this dissertation entitled **"Standardization and Pharmacological Profile of *Bedhi Chenduram*"** is a Bonafide and genuine research work carried out by me under the guidance of **Dr.A.Mariappan M.D(s), Ph.D,** Lecturer, Department of *Gunapadam*, National Institute of Siddha, Chennai – 47and the dissertation has not formed the basis for the award of any Degree, Diploma, Fellowship or other similar title.

Date: **Signature of the Candidate**

Place: Chennai **Dr. R. ELAKKIYA**

CERTIFICATE BY THE GUIDE

This is to certify that the dissertation entitled **"Standardization and Pharmacological Profile of *Bedhi Chenduram*"** is submitted to The Tamilnadu Dr.M.G.R Medical University in partial fulfilment of the requirements for the award of degree of M.D (Siddha) is the Bonafide and genuine research work done by **Dr. R. Elakkiya** under my supervision and guidance and the dissertation has not formed the basis for the award of any Degree, Diploma, Fellowship or other similar title.

Date:

Place: Chennai

Signature of the Guide

Dr.A.MARIAPPAN M.D(s), Ph.D

BONAFIDE CERTIFICATE

This is to certify that the dissertation entitled **"Standardization and Pharmacological profile of *Bedhi Chenduram*** for its Anti-diarrheal, Intestinal motility, Antispasmodic activities **"** is a Bonafide work done by, **Dr.R.Elakkiya** a candidate of the National Institute of Siddha, Chennai – 47 in partial fulfilment of the University rules and regulations for award of M.D (Siddha) – Gunapadam during the academic year of 2019.

Signature Head of the Department **Signature of the Director**

Date: **Date:**

Place: Chennai **Place:** Chennai

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ABBREVIATIONS

CPCSEA	-	Committee for the Purpose of Control and Supervision of Experimental Animals.
FTIR	-	Fourier Transform Infrared Spectrometry
IAEC	-	Institutional Animal Ethical Committee
ICMR	-	Indian Council of Medical Research
ANOVA	-	Analysis Of Variance
OECD	-	Organisation for economic corporation and development
BC	-	Bedhi Chenduram
WHO	-	World Health Organization
XRF	-	X-Ray Fluorescence
TLC	-	Thin Layer Chromatography
ACH	-	Acetylcholine

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1.INTRODUCTION

Siddha medical world is a highly unique filled with enormous therapeutic potential in a scientific way. Since ancient days siddha medical system and its principle plays an effective role in the management of various diseases in humans. Eventhough siddha medicines having high medicinal values due to changes in our lifestyle and in our ecosystem it has to be validated scientifically for global acceptance in our Era.

Standardization of siddha medicines will helps to follow a protocol for usage of siddha medicine in a safe and effective way around worldwide. Standardization of a drug can achieve through physiochemical characterization. Some modern sophisticated analytical equipments such as AAS, FTIR, XRF etc., The preparatory phase of the drug must follow standard operating procedures as per sastric siddha drugs inorder to achieve standardization of siddha medicines.

Siddha medicines are classified based on the theory of *Arusuvai* and it follows the principles of *Panchabootha ThathuvaKoorukal*. The treatment methodology of siddha system of medicine is based on three bodily vital humours such as *Vatham*, *Pitham* and *Kapham.*

Siddha medicines are classified into two kinds:

1. Internal medicine
2. External medicine

Among, 32 Internal medicine chendhuram is one among them and its shelf life is for 75 years. In Siddha system of medicine some special kind of formulations such as *Chenduram*, *Parpam*, *Chunnam* are known as higher order medicines. These kinds of formulations are considered as nanomedicine because of its fine size and morphology. The bioavailabilities of these drugs were always good.

Chendhuram is described as a Metallic substances or salts which is made into red coloured powder, by the process of either burning them or drying them or exposing to the sunlight or keeping them in specialised tubes by adding decoctions, liquid of victory (*ceyaneer*), acid etc.chendhuram prepared by burning, roasting, grinding, exposing to sunlight, *puda chendhuram*. *Annabethi Chendhuram* is one of the types of puda chendhuram.[1]

Bedhi chenduram is a sastric siddha formulation indicated for the treatment of diarrhoea, lack of intestinal motility disorders and abdominal spasms. Diarrheal disease is the highly prevalenced disease causing mortality worldwide especially among infants and childrens [2]. Diarrhea is the leading cause of childhood mortality in India nearly around 13 percentage [3]. The prevalence of gastric intestinal motility disorders are also seen in a high range among Indians. This may be due to the effect of changes in their food habits now a days. The gastric intestinal motility is common in India especially among childrens.

Though Loperamide, Kaopectate and some other available drugs are in use to treat diarrhoea sometimes minimal adverse effects also occurred towards it. Siddha sastric formulation *Bedhi chenduram* still not investigated scientifically to document its pharmacological effects such as treatment of diarrhoea, gastric intestinal motility disorders.

The ingredients of *Bedhi chenduram* are *Silasathu, Anna bedhi* and *Ezhumichai Pazham.* One research findings reveals that hexane extract of *Citrus Limon* peel proved for its significant antidiarrheal therapeutic property. [4]

Still there is no scientific background regarding the standardization and pharmacological effect of sastric siddha formulation *Bedhi chenduram* towards its Antidiarrheal, Intestinal Motility Activity. Hence the author is interested in doing the Standardization and Pharmacological evaluation of *Bedhi chenduram* for scientific documentation.

2. AIM AND OBJECTIVES

Aim

The aim of this study is to evaluate the Anti diarrheal, Intestinal motility and Anti spasmodic activities of "*Bedhi Chenduram*" in animal models.

Objectives

The following methodology was adopted to evaluate the safety and pharmacological activity of the test drug.

- Collection of information from Siddha and modern literature relevant to the study.
- Preparation of the drug as per the reference classical Siddha literature.
- Physicochemical analysis.
- Bio chemical analysis.

Evaluation of pharmacological study of the drug through the following activities

- Anti diarrheal activity (castor oil induced method)
- Intestinal motility activity (charcoal meal method)
- Anti spasmodic activity (Ach induced contraction in isolated chick ileum method & charcoal and castor oil induced method)

3. MATERIALS AND METHODS

STANDARD OPERATIVE PROCEDURE:

"*Bedhi Chenduram*" is a Siddha formulation which is mentioned in Siddha test *Anuboga vaidhya navaneethaam,* vol 3 page 103 by the author Hakkim Abdulla shayabu.

The Ingredients of *Bedhi chenduram*:

Annabedhi (Iron sulphate) - 175 gm (5 *Palam*)

Silasaththu (Asphaltum) - 35 gm (1*palam*)

Lemon juice - Required amount

Source of collection:

The drugs were purchased from reputed country raw drug shop, Paris corner in Chennai. Lemon was collected from Tambaram, Chennai.

Identification and authentication of the drug:

The Herbal drug was identified and authenticated by Botanist, NIS Tambaram Sanatorium Chennai (Certificate No: NISMB3232018), the identity and authentication of the mineral drugs were given by Dr S.Visweswaran HOD, Department of Gunapadam, NIS Tambaram Sanatorium Chennai.

Purification of ingredients

The purification process of *Annabethi*

The juice of lemon fruit (Citrus lemon) was poured over the *Annabethi* till the powder is immersed in the juice. It was then kept in sunlight until the juice was completely dried and then gets the purified *Annabethi*.

The purification process of *Silasathu*:

The impure form of silasathu were soak in tender coconut water, boils till it evaporates and washed, to get it purified.

Method of preparation:

The purified *Annabedhi* and purified *Silasathu was* powdered in mortar and it was grind with lemon juice for 6 hours (2 *Saamam*). Then it was made into cakes (*Villai*) and dried. The dried cakes was then placed in a earthern saucer which is covered with suitable earthern saucer, junction of the mud pot and earthern saucer was sealed with clay smeared cloth, allowed to dry in sun light. Then the entire setup was subjected to heat combustion using dried cowdung cakes. After, processing the medicine was taken out carefully and grind into fine powder. It was kept in an airtight container.

Labeling:

Name : *Bedhi Chenduram*

Colour : Dark brown colour

Form of medicine : *Chenduram*

Route of administration : Oral

Dose : 2-4 *Kundri (260-520mg)*

Adjuvant : Honey

Date of preparation : 20-8-2018

Date of expiry : 75 years from the date of manufacture

Indication:

- *Thodar Kalichchal* (Chronic dysentery)
- *Vayirru Novu* (Spasmodic pain)
- *Vayirru iraichal* (Gurgling sound in the abdomen)
- *Manthanoi* (Indigestion)
- *Akni mantham* (Impaired or imperfect indigestion)
- *Pithavayu* (Indigestion)
- *Pitha noi, Neer erichchal* (Dysuria) and *Neer kaduppu*(Dysuria)

INGREDIENTS OF BEDHI CHENDURAM

Fig.1.Annabedhi

Fig.2. Silasathu

Fig.3.Elumichai

PURIFICATION OF ANNABEDHI

Fig.4. Before

After

PURIFICATION OF SILASATHU

Fig.5.Before **After**

Fig.6.Grinded process **Fig.7.villai**

Fig. 8. Mud Sealed Earthen Saucer

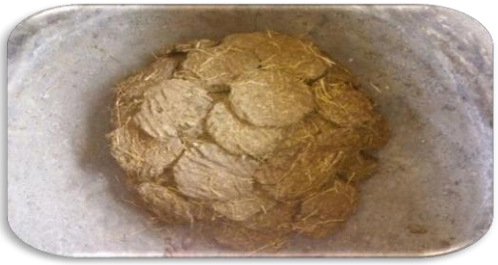


Fig.9.1

Fig.9.2

Fig.9.3

Fig.9.4

Fig.9.5.Bedhi Chenduram

Fig.9. *Pudam* Process

4. LITERATURE REVIEW

4.1 GUNAPADAM REVIEW

அன்னபேதி

அன்னபேதி 120 உபரசங்களில் ஒன்றாகும். இதனை,

“நல்லவனே வைக்கிராந்த மன்னபேதி

நற்சாத்திர பேதியுடன் மாணிக் கந்தான்

சொல்லவென்றா லுபரச நூற்றிரு தப்பா

தொட்டவர்க்குச் சொன்னமய மாகுந் தானே”.

என்பதனால் அறியலாம். [6]

அன்னபேதி தோற்றம்:

“வேதையான அன்னமென்ற பேதிதானும்

விளங்கியதோர் உற்பத்தி சொல்லக் கேளு

மாதையான மலையினுட ருதுயு பொங்கி நீறும்

பாதையான மலைச்சவுடு என்று பேறு

பாங்கான முன்றுவித வண்ணாமாகும்

காதையான காசீச மென்று பேறு

கறுப்புமஞ்சள் வெள்ளைநிற மாகுங் காணே”.[7]

இச்சரக்கு இரும்பு கம்பியுடன் கந்தக திராவகம் சேர்த்து செய்யப்படுகிறது. இவை கட்டிகளாகயும் பச்சை நிறமாயும் இருக்கும். அன்னபேதி காசீசம் மலையில் உற்பத்தியாகிற தென்றும் கறுப்பு, மஞ்சள், வெள்ளை ஆகிய முன்று விதமாக உள்ளது என்று போகர் நூல் கூறுகிறது.இது நீரில்

கரையும் சராயத்தில் கரையாது. இதன்,மேல் காற்றுப்பட்டால் வெண்மையான தூளாய்விடும்.

அன்னபேதி வேறுபெயர்கள்:

“ஆதிக்கல் நாத மளவன்னக் காலனாம்
பேதிக்கல் சவுடு பெருத்த நரம்புதான்
ஒதிக்கல் வேக முயன்ற கல்வீரியம்
வாதிக்கு நாம மரு வன்னபேதியே” [8]

“அன்னபேதி பேரை யறையைக் கேளு
ஆதிக்கல் நாதமா மள வன்ன காலன்
கன்னமாம் பேதியாங்கல் சயுடு நாதங்
கணமான களிம்புதான் கல்லு வேகஞ்
சின்னமாம் பேதியாமலை வீரியமாகும்ந்
திராவகத்துக் கடுங்காரி பேதியாகும்
அன்னமாம் பேதியா மலைருதுவுமாகு
மாசற்ற வன்னமென்ற பேதிதானே” [9]

- கல்நாதம்
- அன்னகாலன்
- கல்சவுடு நாதம்
- களிம்பு
- கல்வேகம்
- மலை வீரியம்
- திராவகத்துகடுங்காரபேதி
- மலைருது

சுவை: துவர்ப்பு சுவை

வீரியம்: வெப்ப வீரியம்

செய்கை: அகசெய்கை:

- **உடல் உரமுண்டாக்கி**
- **துவர்ப்பி**
- **ருது உண்டாக்கி**
- **நாற்றமகற்றி**
- **புழுக்கொல்லி**
- **முறை வெப்பகற்றி**

புறச்செய்கை:

- **துவர்ப்பு**
- **வெப்பமுண்டாக்கி**

அன்னபேதி வகைகள்:

- **கறுப்பு**
- **மஞ்சள்**
- **வெள்ளை**

பஞ்சபூத கூறு: வாயுவின் கூறு

பொது குணம்:

"முளைவிரணம் சூலைமந்த முட்டாமைக் கட்டி

விளையுறன்ம கோதரநோய் வீட்டும் - வளைமலைபோற்

காட்டுமன்னந் தன்னை கணத்திற் சலமாக்கிக்

காட்டுமன்ன பேதியது காண்".

பொருள்:

- அன்னத்தை நீராய்க்கரைக்கின்ற அன்னபேதி
- முலைவிரணம்
- சூலை
- அஜீரணம்
- பாய்கின்ற ஆமைக்கட்டி
- மகோதரம் முதலியவைகளை போக்கும் என்பர்.

"போதமா மன்னபேதி பொருந்திய குணத்தைகேளு

நீதமா மூளையின் நோய்ப்புண் நிலையில்லச் சூலை

கேதமா ஆமைக்கட்டி கிளரும் நீராம்பல் சோகை

பேதமாம் மந்தம் வெப்பு பெரிய காமாலை மாறும்" [10]

பொருள்:

- மூளையின் நோய்
- புண்
- சூலை
- ஆமைகட்டி
- நீராம்பல்
- சோகை
- மந்தம்
- வெப்பு
- காமாலை முதலிய நோய்களை குணப்படுத்தும்.

"கன்னார் கன்மத மிரண்டுங் கண்ணிற்க்கு குளிர்ச்சியாகும்

மன்னிய வன்னபேதி மலமுடன் வாதம் போக்கும்

சொன்ன தீபனமுஞ் சேர்க்கும். [11]

மற்றும் இதனை

- சூதக பாண்டு
- சூதக்கட்டு
- கருப்பப்பிரமேகம்
- காய்ச்சல, கட்டி
- முறை சுரம்
- எழுஞாயிறு
- நாட்பட்ட கக்கிருமல்
- தட்டைகிருமி ரோகம்
- பாண்டு
- அக்கி
- மேக விரணம்,சீழ் மூலம்
- ஆசனவாய் வெளிபடல்,கருப்பவிரணம்

முதலிய பிணிகளுக்கு மேலுக்கு உபயோகிக்கலாம். இதில் அயம் இருப்பதினால் இரும்பினால் தீரும் பிணிகள் நீங்குமென்று கண்டு கொள்ள வேண்டும்.

அன்னபேதி புளிப்பாயும் கண்களுக்கு நன்மை செய்யும்படியானதாயும், ரோமங்களை நாசம் பண்ணும்படியானதாயும், விஷதோஷம், வாததோஷம், சிலேத்துமதோடம், இரணதோஷங்களை போக்கடிக்கும்.[6]

சுத்தி முறைகள்:

திடம் அன்னபேதியதை தேசிச் சாறில்

திண்ணமுடனே கழுவ சுத்தியாகும்

மடமானே எட்டிவிதை தீயில் சுட்டோ

மருவி வறுத்து எண்ணெய் எடுகளங்கம் மாறும் [12]

பொருள்:

- அன்னபேதியை தேசிச்சாற்றில் 1 நாள் முழுவதும் ஊறவைத்து பின் எரித்து நீர் சுண்டும் பக்குவத்தில் எடுத்து ஆறவைத்து பொடித்து கொள்வதெ சுத்தியாகும்.
- அன்னபேதியை நீரில் கரைத்து சிறிதளவு க ந்தக திராவகம் விட்டு வடிகட்டி உப்பு உறையும் பக்குவத்தில் காய்ச்சி கொள்வதே சுத்தியாகும்.[6]
- அன்னபேதியை கரிசலாங்கண்ணி இரசத்தில் வேகவைத்தால் சுத்தியாகும்.
- பழச்சாற்றில் ஒரு நாள் முழுவதும் ஊறவைத்து பழச்சாறு வற்றுகிற வரையிலும் வைத்தால் சுத்தியாகும்.[13]
- அன்னபேதியை சிவக்க வருத்தெடுக்கவும் சுத்தியாகும்.[14]

அன்னபேதியை உபயோகிக்கும் போது கவனிக்க வேண்டியவை:

- ✓ அன்னபேதியை அருந்திவரும் காலத்தில் மலம் கறுத்துக் கெட்ட நாற்றத்தோடு இருக்கும்.
- ✓ அன்னபேதியை சாப்பிடும்போது விடாமுயற்சியாய் வாரத்திற்கொருமுறை விட்டு விட்டு சாப்பிட வேண்டும்.
- ✓ அன்னபேதியை ஆரம்பத்தில் சாப்பிடும் போது அதிக அளவில் கொடுக்க கூடாது .அதிகம் கொடுத்தால் மலம் கறுத்து மலபந்தம் உண்டாகும்.
- ✓ அன்னபேதியை அருந்திகொண்டு வரும்பொழுது பத்து நாளைக்கு ஒருமுறை பேதிக்குக் கொடுத்தால் நல்ல குணமுண்டாகும்.
- ✓ அன்னபேதியை சாப்பிடும்பொழுது பு ளிப்பையும் புளிப்புள்ள பழங்களையும் முற்றிலும் நீக்கி அயத்திற்கு கூறிய பத்தியம் காத்தல் வேண்டும்.

- ✓ குழந்தைகளுக்கு கொடுக்க வேண்டிய அவசியம் இருந்தால் குறைந்த அளவில் கொடுக்கவும்.
- ✓ அன்னபேதியை உணவிற்கு பிறகே அருந்த வேண்டும்.[6]

பிற உபயோகம்:

1. அன்னபேதியைக் கல்வத்திலிட்டு வேண்டிய அளவு நீர்விட்டு குழம்பு பக்குவத்தில் அரைத்து ஆசனம் வெளித்தள்ளல் , கருப்பை விரணம் , பெண்களின் உறுப்புத்தள்ளல் முதலியவற்றிற்கு மேலுக்கு போடச் சுருக்கமடைந்து உள்ளுக்கு இழுத்துகொள்ளும்.
2. மூலரோகத்தில் காணும் இரத்த ஒழிக்கிற்கு அன்னபேதித் தூள் ஒரு வராகனெடையை சுமார் இரண்டு சேர் நீரில் கரைத்து ஒவ்வோரு நாளும் வஸ்தி செய்து வந்தால் இரத்தம் நிற்கும்.
3. சித்த வைத்தியர்கள் அன்னபேதியை தனியாக உள்ளுக்கு கொடுப்பதில்லை. இதனை தனியாகவாவது அல்லது மற்றச்சரக்குகளுடன் கூட்டியாவது செந்தூரமாக்கி கையாளுகின்றனர்.
4. அன்னபேதியை இரண்டு உளுந்தெடையை ஒரு அவுன்ஸ் நிலவேம்புக்குடிநீரில் கலந்து நாள் ஒன்றுக்கு மூன்று நாள் வீதம் பலக்குறைவு பாண்டு நோய்களுக்கு கொடுக்க தீரும்.
5. அன்னபேதியை 30 உளுந்தெடை கரியபோளத்தூள் 12 உளுந்தெடை சேர்த்து போதுமான அளவு தேன் கூட்டி அரைத்து மாத்திரைகள் செய்து நாள் ஒன்றுக்கு மும்முறை கொடுத்துவர பாண்டுவுடன் கூடிய வெள்ளை சூதக ஒழுக்கு நீங்கும்.
6. மகோதரம் சோபை பலக்குறைவு நோய்களில் அன்னபேதி 1 உளுந்தெடையை இரண்டு சேர் நீரில் கலந்து அருந்தி வந்தால் நற்பலனை அளிக்கும்.[6]

சேரும் மருந்துகள்:

1. **அன்னபேதி செந்தூரம்:**

   சுத்தி செய்த அன்னபேதியை காடி நீர்விட்டு அரைத்து வில்லை செய்து இரண்டு அல்லது மூன்று புடமிடசெந்தூரமாகும்.

   அளவு : அரை முதல் ஒரு குன்றி (65 - 130 மி.கி)

   அனுபானம் : தேன்

   தீரும் நோய்கள் : சீதபேதி, பாண்டு [6]

2. **வெடி அன்னபேதி செந்தூரம்:**

   சுத்தி செய்த அன்னபேதி ஒரு பங்கு சுத்தி செய்த வெடியுப்பு கால் பங்கு இவ்விரண்டையும் எலுமிச்சம் பழச்சாறு விட்டு புரட்டி இரண்டு அல்லது முன்றுபுடமிடச் செந்தூரமாகும்.

   அளவு : அரை முதல் ஒரு குன்றி (65 - 130 மி.கி)

   அனுபானம் : தேன்

   தீரும் நோய்கள் : சோகை,பாண்டு,பெருவயிறு,காமாலை [6]

3. **பேதிவீரச்செந்தூரம்**

   அன்னபேதி 5 பலம், வீரம் 1 பலம், எலுமிச்சம் பழச்சாறு செல்லத்தக்க அளவு மேற்கண்ட இரண்டு சரக்கையும் கல்வத்திலிட்டு பொடித்து எலுமிச்சபழச்சாற்றைச் சிறுக சிறுக வார்த்து இரண்டு சாமம் அரைத்து வில்லை செய்து உலர்த்தி ஒட்டிலிட்டு மேலோடு மூடி ஐந்து சீலை மண் செய்து உலர்த்தி கவசத்தின் ஆறு பங்கெடை வறட்டியிற் புடமிட்டு ஆறினபின் எடுத்து கல்வத்திற் பொடித்து முன்போலவே எலுமிச்சம்பழச்சாற்றை வார்த்து வில்லை செய்து முன்று புடமிடவும் முன்றாம் தடவையும் இவ்விதமே புடமிட்டெடுக்க மேலான செந்தூரமாகிருக்கும்

அளவு : 1 முதல் 2 குன்றி (130-260மி.கி)

அனுபானம் : தேன் நெய்

தீரும் நோய்கள் : வாயு சம்பந்தமான நோய்கள்,சுரம்,சன்னி. [5]

4. அன்னபவழ செந்தூரம்:

அன்னபேதி 5 பலம், நாவற்பழம் 1 பலம், எலுமிச்சம் பழச்சாறு செல்லத்தக்க அளவு மேற்கண்ட இரண்டு சரக்கையும் கல்வத்திலிட்டு பொடித்து எலுமிச்ச பழச்சாற்றைச் சிறுக சிறுக வார்த்து இரண்டு சாமம் அரைத்து வில்லை செய்து உலர்த்தி ஒட்டிலிட்டு மேலோடு மூடி ஐந்து சீலை மண் செய்து உலர்த்தி கவசத்தின் ஆறு பங்கெடை வறட்டியிற் புடமிட்டு ஆறினபின் எடுத்து கல்வத்திற் பொடித்து முன்போலவே எலுமிச்சம்பழச்சாற்றை வார்த்து வில்லை செய்து முன்று புடமிடவும் முன்றாம் தடவையும் இவ்விதமே புடமிட்டெடுக்க மேலான செந்தூரமாகும்.

அளவு : 1 முதல் 2 குன்றி (130-260மி.கி)

அனுபானம் : தேன் , நெய்

தீரும் நோய்கள் : சயம், இரைப்பிருமல், இரத்தக்காசம். [5]

5. அன்னபேதி திராவகம்:

தாமிரத்தை தூய்மைப்படுத்தவும் செந்தூரிக்கவும் பயன்படுகிறது.[15]

6. தாமிர அன்னபேதி செந்தூரம்:

அளவு : துவரம் பருப்பளவு

அனுபானம் : தேன்

தீரும் நோய்கள் : குளிர் சுரம், கபசுரம். [16]

7. நாராயணச் செந்தூரம்:

அளவு : துவரம் பருப்பளவு

அனுபானம் : திப்பிலியை நெருப்பனலில் வெதுப்பி இடித்து எடுத்த சூரணம்

தீரும் நோய்கள் : சர்வாங்க வாதம், தோள் வாதம்.[16]

8. சிங்கி செந்தூரம்:

அளவு : 25-30மிகி

அனுபானம் : தேன்

தீரும் நோய்கள் : மேகரணங்கள், வாத பித்த நோய்கள் குணமாகும்.

9. சதுர்முக செந்தூரம்:

அளவு : 50-100மிகி

அனுபானம் : தேன்

தீரும் நோய்கள் : சீதபேதி, இரத்த பேதி. [17]

10. கந்தர்காளகண்ட மேகநாராயண செந்தூரம்:

அளவு : அரை பணவெடை

அனுபானம் : நோய்க்கு தகுந்த அனுபானம்

தீரும் நோய்கள் : சுர ரோகம், கபரோகம்

11. **காஸிஸ பற்பம்:**

அளவு : **200-500மிகி**

அனுபானம் : **தேன்**

தீரும் நோய்கள் : **காணாக்கடி,பாண்டு,கல்லீரல் மண்ணீரல் பெருத்தல்.**

12. **நாயுருவி உப்பு குழம்பு:**

அளவு : **1 குன்றிமணி (130மிகி)**

அனுபானம் : **தாமிரச்செந்தூரம் 1 பணவெடை**

தீரும் நோய்கள் : **எண்வகை குன்மம்,வாய்வு.**

13. **சங்கதிராவகம்:**

அளவு : **1 துளி**

அனுபானம் : **நீர்**

தீரும் நோய்கள் : **மார்பு வலி, வாய்வு.**

14. **வெடியுப்பு திராவகம்:**

அளவு : **1 துளி**

அனுபானம் : **நீர்**

தீரும் நோய்கள் : **வாய்வு தீரும்.** [18]

15. **கபரி மெழுகு:**

பிணியாளன் நிலைமைக்கு தக்கப்படி ஏதேனும்மொரு அனுபானத்தில் கொடுக்க குளிர் சுரம், சன்னி,சூதக வாயு முதலியன தீரும்.[19]

16. **வெடியுப்பு செயநீர்:**

அளவு : 4-10 துளி

தீரும்நோய்கள்:

நீர்எரிச்சல்,நீர்கட்டு,சதையடைப்பு,நீர்தாரைப்புண்,கல்லடைப்பு, பிரமேகம்.

17. **துருசு செந்தூரம்:**

அளவு : 1-3 குன்றி (130-390மிகி)

தீரும்நோய:மூலவாயு,பெருங்கழிச்சல்,பாண்டு,சுரம்,சயம்,இருமல், இரைப்பிருமல்.

18. **வீர பற்பம்:**

அளவு : ஒரு அரிசியெடை

தீரும்நோய்கள்:

எண்வகைகுன்மம்,முன்னிசைவு,பின்னிசைவு,சூலை,சைத்தியம்,தோட ம்,கிரந்தி,குட்டநோய்கள்.[5]

19. **அட்டகுன்ம லேகியம்:**

அளவு : தான்றிகாயளவு (இருவேளை)

தீரும் நோய்கள் : அட்டகுன்மம், வாய்வு, உப்புசம், செரியாமை, பெருவயிறு, திரட்சி, மலக்கட்டு .[20]

சேரும் பிற மருந்துகள்:

- **செந்தூர செயநீர்**
- **பேதி திராவகம்**
- **சொர்ணசார திராவகம்**
- **வண்ண திராவகம்**
- **சிலாசத்து செந்தூரம்**
- **சங்க திராவகம்**
- **ஆறுமுக பற்பம்,**
- **நவலோக செந்தூரம்,**
- **செயநீர்செந்தூர திராவகம்**

கற்பூர சிலாசத்து

வேறு பெயர்கள்:

“சிலத்திற் பிரிதிவி சேத சிலாசத்து
அலத்திய கற்குரு ஆதித்தனுடைய விந்து
குலத்தின் சிலாமணி கூறிய காந்தியோன்
கலத்திய பேரெல்லாங் கற்பூர சத்துக்கே”. [8]

“கற்பூர சிலையுடைய பேரை கேளு
கடுசான காயசித்திக் கடுத்த கண்ணங்
கற்பூரச் சீலத்துக்குப் பிரிதிவியாகும்
சேர்ந்த சிலாசத்து வாகுங் கல்குருவாகும்
அற்பூர மாத்தினுட விந்துவாகும்
அழகாகுங் குலத்துக்குச் சிலாமனியானோன்
உப்பினிற் காந்தியோன் சுண்ணத்தோனாம்
உபரசத்திலாதியாஞ் சுண்ணமாமே”. [9]

பொருள்:

கற்பூர சிலா சத்தானது சிலத்திற்பி ரிதிவி, சிலாசத்து, கற்குரு, ஆதித்தனுடைய விந்து , சிலாமணி காந்தியோன் , சுண்ணத்தோன், உபரசத்திற்கு ஆதி வேறு பெயர்களால் வழங்கப்படுகிறது.

சிலாசத்து உற்பத்தி:

“பாரப்பா சிலாசத்து விளையும் பூமி
பரிவான குமரிக்கு கிழக்கதாக
நேரப்பா காதமது பத்து சென்றால்
நிலத்திலே வெட்டியே யெடுப்பார் பாரு”.

பொருள்:

கற்பூர சிலாசத்தானது மண்பூத சரக்கென்று முன்னரே கூறினோம் அதற்கு சான்றாக குமரி நாடு என்று அழைக்கப்படும் பழைய தமிழ் மக்கள் வாழ்ந்த மதுரையின் கிழக்கு பக்கமாக 10 காதம் சென்றால் அங்கு நிலத்தில் இருந்து வெட்டி எடுப்பதாக கூறப்பட்டுள்ளது.

வேறு

இது படிகாரமும் அயமும் சேர்ந்த ஒரு வித சரக்கென்று பைஷஜகல்பம் கூறுகிறது. இதனை,நேபாளத்தில் துவர் பூமியில் இருந்து பலகை பலகையாக வெட்டி எடுப்பதாகவும் கூறப்படுகிறது.

கற்பூர சிலாசத்தின் சுத்தி முறைகள்:

ஆச்சப்பா கற்பூரச் சிலையை வாங்கி
அடைவாக நொருக்கியதைக் கிழிக்கட்டி வைத்து
பாய்ச்சப்பா ஆவின் பால் தொலாந்திரமாகப்
பால் வற்று மட்டுமங்கே எரித்து பின்னும்
காய்ச்சப்பா அயக்கிண்ணிக் குள்ளே வைத்து
கடியதொரு அல்லியுட நீரிலாட்டு
முச்சப்பா சிலாசத்து சுத்தியாச்சு
மூட்டுவாய் துறைக் கெல்லா முட்டு மூட்டே”.[20]

வேறு

கற்பூரசிலை கஞ்சத்தின் கந்தச் சாறூறச் சுத்தி [11]

வேறு

சிலாசத்தை, இளநீரிலிட்டு நீர் சுண்டும் வரைக் காய்ச்சி கழுவி எடுத்துக்கொள்ள சுத்தியாகும்.

வேறு

கருப்பூரச் சிலாசத்தைப் பாலிலிட்டுக் காய்ச்சிக் கழுவி எடுக்கச் சுத்தியாகும் வேறு

சிலாசத்தைப் பழச்சாற்றிலிட்டுக் காய்ச்சி உலர்த்தி, பின்பு எருக்கம் பாலில் இரண்டு நாட்கள் ஊறவைத்துத்தெடுத்துக் கழுவி கொள்ளச் சுத்தியாகும்.

செய்கை:

- சிறுநீர் பெருக்கி
- கற்கரைச்சி
- துவர்ப்பி
- குருதிபெருக்கடக்கி
- உடல் உரமாக்கி

பொது குணம்:

“கல்லடைப்பு மேகங் கனதூலம் வித்திரதி
சொல்லடைக்கு நீரருறுகற் சோணிதங்காங் - மெல்லிடையார்க்
கில்லகச்சத் தில்லையெனு மிந்திரிய நட்டமுமாங்
கில்லகச்சத் தில்லையெனுங் கால்”

பொருள்:

சிலாசத்தினால் க ல்லடைப்பு, சீழ்மேகம், அதிதூலம், வித்திரதி, மூத்திரகிரிச்சரம், சோணிதவாதம், சந்ததிக்கு ஏதுவான விந்து நஷ்டம் இவை போம். இது மலைக்குள்ளிருந்து வருவதால் கல்லகச் சத்தென்றார் . இதனை, பிரமேகம், உள்விரணம், இரத்தகொதிப்பு, இரத்த பித்தநோய் , கபநோய், கக்கிருமல், அதிசாரம் முதலிய நோய்களிலும் வழங்கலாம்.

வேறு

“என்று கல்லடைப்பு மேகம் எழுந்த நீர்த்தரிப்புகள் நோயு
குன்று யிந்திரிய நட்டம் குறையுற நீரருக்கல்
துன்னுஞ் சுரோணிதத்தின் வாதம் சுருக்கென மாறிப்போம்
நன்று யிந்திரியம் ஊறும் நாடியே சிலாசத்துக்கே”.[10]

வேறு

“கருதிடு மேன்மையாகுங் கற்பூரசிலாசத்தாலே
வருசல ரோகம்போகு மாமென வகுத்திட்டாரே”. [11]

கற்பூரசிலாசத்து பற்பம்

செய்முறை : கற்பூர சிலாசத்து , பொரிகாரம் - வகைக்கு 1 பலம்

அரைப்பு சாறு : பருத்தி வேர்தோல், அத்தி வேர்தோல் கசாயத்தில் ஒருமுறை , முட்டை வெண்கருவில் ஐந்து முறை

தீரும் நோய்கள் : கல்லடைப்பு, நீர்ச்சிறுப்பு, மகோதரம், குட்டம் முதலியன [20]

வேறு

செய்முறை : கற்பூரசிலாசத்து, வெடியுப்பு, பொரிகாரம், சிற்றண்டத்தோடு, பலகறை, சினாகாரம் - வகைக்கு ஒரு பலம்

அரைப்பு சாறு : பழச்சாறு

அளவு : கழஞ்சு அளவு இருவேளை

அனுபானம் : தேன், இளநீர்

தீரும் நோய்கள் :கிரிச்சரம், நீர்ச்சிறுப்பு, நீர்கடுப்பு, மேகவெட்டை முதலியன.

குறிப்பு: இதே பற்பமானது ஆறு ஆதார பற்பம் ,சிங்கார பற்பம், வெடியுப்பு பற்பம் போன்ற வேறு பெயர்களுடன் ,பல்வேறு நூல்களில் காணப்படுகிறது.

கற்பூர சிலாசத்து பற்பம்:

அரைப்பு சாறு : சிறுசெருப்படை

அளவு : பணவெடை

அனுபானம் : வெண்ணெய்

தீரும் நோய்கள் : பித்த வெட்டை, மேலெரிவு, நீர் கடுப்பு.

மேலும் ,

கற்பூரசிலாசத்து பற்பம் : 2 கழஞ்சு

வெங்கார பற்பம் : 2 கழஞ்சு

சேர்த்து புடமிட்ட பற்பமாகும்.

அனுபானம் & தீரும் நோய்கள் : வெண்ணெய் - நீர் கடுப்பு, நீர் கட்டு.

விரால் மீன் தலைகல் பற்பம்:

- வெள்ளரி விதை சாறு - கல்லடைப்பு
- முள்ளங்கி இடித்த சாறு - குணமாக மாட்டாத கல்லடைப்பு தீரும்.[21]

சயகுலாந்தகன்:

செய்முறை : அரிதாரம், சிலாசத்து வகைக்கு 1 பலம்

அரைப்பு சாறு : செம்பருத்திச்சாறு

அளவு : பணவெடை

தீரும் நோய்கள்:

- நாகவல்லி சாறு - சயகாசம்
- ஆடாதோடைச்சாறு - உளைமாந்தை
- தென்னை மட்டை சாறு- சிலேற்பன வாதம்
- பொற்கடுக்காய் தூள் - காச சுவாசம்
- கரிசாலை சாறு - சுர காசம்
- வெண்ணெய் - வாந்தி, விக்கல்
- செங்கழுநீர் சாறு - சர்வசுரம் [20]

அன்னபேதி மற்றும் சிலாசத்து:

கண்டுகொள் ளுபரசத்தின் வகையைச் சொல்வேன்

காந்தமோ டப்பிரகத் துருசு கன்னார்

தொண்டர்களே! பொன்நிமிளை கருங்கல் செங்கல்

அக்கான்கல் லிரக்கல் சூடாலைக்கல்.....

தூளான கற்பூரச் சிலைகற் காவி

சுத்த மணல் செம்மண்ணுஞ் சொன்னபேதி.....

.....

கம்பான மீனெலும்பு கத்தூரி தேன்

கடல்நுரையு மயிரோடு கரடிதானே.....

.....

“நல்லவனே வைக்கிராந்த மன்னபேதி
நற்சாத்திர பேதியுடன் மாணிக் கந்தான்
சொல்லவென்றா லுபரச நூற்றிரு தப்பா
தொட்டவர்க்குச் சொன்னமய மாகுந் தானே”. [22]

பொருள்:

அன்னபேதி, கற்பூர சிலாசத்து , தேன் முதலியன உபரசம் என்ற பிரிவில் அடங்கும் என்பதனை தெரிந்து கொள்ளலாம்.

“சொல்லக்கே ளுபரசத்தின் பூதந் தன்னைச்
சொல்லுகிறோம் பூநாகம் ராச வர்த்தம்
மெல்லக்கே ளப்பிரக மூசிக் காந்தம்
மேலான சிலாசத்தும் பூமி யாச்சு
புல்லக்கேள் நண்டு நத்தை சங்கு முட்டை
பொற்கிளிஞ்சி லிவையைந்தும் புனலே யாகும்
கல்லக்கேள் வெள்ளைக்கல் இந்திர கோபம்
கழுதைவண்டு நிமிளையத்தி கனல் கூறாமே”.

“ஆகுமே கல்மதமும் கல்நார் ரோமம்
அருளன்ன பேதியுடன் சாத்ரபேதி
போகுமே யிவையைந்து வாயு வாச்சு
புகழான சுக்கான்கல் வைக்கிராந்தம்
ஏகுமே கற்சுவடு சாளிக் கிராம்ம
இரசிதசிலை யிவையைந்தா காசமாகும்”. [22]

பொருள்:

கற்பூரசிலாசத்தானது மண்பூதச் சரக்காகவும், அன்னபேதி வாயுபூதச் சரக்காகவும் கூறப்பட்டுள்ளது . ஆகையால், அதனை கொண்டு செய்யப்படும் மருந்துகள் உடலின் அத்தகைய பூதத்தின் தன்மை குறைவிருந்தால் அதனை சரிசெய்யும் என அறியலாம்.

“ஆமேன்ற செம்பு சத்து நாதமாகும்

அப்பனே சிலாசத்து விந்துவாகும்

மேச்சப்பா இரும்பதுவுஞ் சத்தினாதம்

மேவாசாரம் விந்துவென்றே யியல்பலாகும்

வாமென்ற நாதத்தில் விந்து சேர்க்க

மாருதம் போல் வாதமெல்லாங் கைக்குள்ளாகும்

காமென்ற நாவிந்தாற் சடமுமாச்சுக்

கருதியதோர் சக்தியெல்லாம் நாதவிந்தா லாச்சே”.

பொருள்:

சிலாசத்தானது (சிவம்) விந்து சரக்கு என்றும் , அன்னபேதி (சக்தி) நாதச் சரக்கு என்றும் அதனைக் கொண்டு செய்யப்படும் மருந்துகள் சிவமும், சக்தியும் சேர்ந்த உடலை காக்கும் என்று கருதப்படுகிறது.

எலுமிச்சை

வேறு பெயர்கள்:

செப்பினதோர் தேசிநீர் கூதனச்சாரமென்று

சிறுகிளியின் பழச்சாறு வென்றும் பேரு

நெப்பின தோர்நிம்பனச் சாரென்றும் பேரு

ணோவாளி மாதரசி யென்றும் பேரு

யுப்பினதோர் உபணேரஞ் சகமென்றும் பேரு

யுடல்பித்த முறியாத ரென்றும் பேரு

விப்பிபெறும் பேசுங்கனிமாத ரென்றும் பேரு

சேயலான வெலும்பிச் சம்பழத்தின் பேரே”. [23]

- **சம்பீரம்**
- **தேசிநீர்**
- **நிம்பவனச்சாறு**
- **உடல்பித்தமுறிமாதர்**
- **பேசுங்கனிமாதர்**
- **சிறுகிளியின் பழச்சாறு**
- **நோவாளி மாதரசி**
- **கூதழச்சாரம்**
- **சம்பிகோவம்**
- **கொம்பினுடைய பழம்**
- **சோபீசம்**
- **சம்பீரோலத்திரம்**

சுவை:

புளிப்பு

தன்மை:

வெப்பம்

பிரிவு:

கார்ப்பு

பயன்படும் உறுப்பு:

இலை,காய்,பழம்,பழரசம், எண்ணெய்

செய்கை:

குளிர்ச்சியுண்டாக்கி

குணம்:

“தீதெலு மிச்சங்காய் டேர்முத்தோ டத்தையுமுள்
வாதகப சூலையையும் மாகொடிய சாதியெனுஞ்
சாத்திருள் மத்தையுமுள் தங்கமருந் திட்டதையும்
பித்தவெப்பை யுந்தணிக்கும் பேசு”.

இது முக்குற்றம், சூலை, வாந்தி, குன்மம், இடுமருந்து, அழல் இவைகளைப் போக்கும்

“சுதாபலாக் கனிகாய சமுலமு முனவே
நிதானமாய்ப் பயித்திய நிந்தையை யகலுமெ”

எலுமிச்சம்பழம் காய் இவைகளை கொள்ளின் தீக்குற்றத்தால் நோய்களும் வெறி நோயும் போம்.

“மந்திரிக்கு மந்திரியாய் மன்னனுக்கு மன்னனெனத்
தந்திரிக்கு மித்திரன்போற் சாருமே முந்தவரு
கம்பீர மாய்ச்சரக்கின் கெண்ணியமாய் வாகடர்க்குச்
சம்பீர மாமெழுமிச் சை”.

எலுமிச்சம் பழம் மந்திரி எனக்கூறும் தீக்குற்றத்தைத் தணிக்கும் . தந்திரியாகிய ஐயத்திற்கு அன்பன் போலிருந்து அனல் தணிக்கும்.

எலுமிச்சம்பழத்தை ரசமும் ஊறுகாயுமாகக் கற்பமுறையாய்ப் பத்தியத்துடனே ஆறுமாதங்கொள்ள நரை,திரை மாறும்,பிடிப்பு, பெருவயறு, பக்கசூலை, மூடம், வெறி, மயக்கம், மனச்சோர்வு என்பவைகளும் அடியோடு நீங்கும்.

“கோணத் துளையுங் குறியுளையுங் கொக்காகில்
கோணத் துளையுங் குருளைபோற் கோணச்
சடமதியுண் மாறாமற் சண்”

எலுமிச்சம் பழத்தின் பயன்கள்:

- **இந்த பழரசத்தை வேளைக்கு அரை அவுன்ஸ் வீதம் தினம் இரண்டு வேளை 3 அவுன்ஸ் நீருடன் சர்க்கரையிட்டுக் கொடுக்க ஆயாசம் , தாகம், அம்மையினால் நேர்ந்த தேகவெப்பு அடங்கும்.**
- **அரை எலுமிச்சைச்சாற்றில் சிறிது நீர்விட்டு கலக்கிக்கொடுக்க மார்பு எரிச்சல் நீங்கும்.**
- **இச்சாற்றுடன் சம னளவு நீர்விட்டுக் கலக்கி வாய் கொப்பளித்துவர விரணங்கள் ஆறும்.**
- **இதன் ரசத்துடன் சிறிது உப்புக் கூட்டிச் சாப்பிட்டு வர சுரகட்டிகள் கரையும்.**
- **நேர்வாளவித்து, காட்டாமணக்கு பருப்பு இவைகளால் அளவு கடந்து பேதியானால் 2 அவுன்ஸ் எலுமிச்சம்பழச்சாற்றை கஞ்சியில் கலந்து கொடுக்க அதன் வேகத்தை முறிக்கும்.**
- **நீர்கடுப்பு, நீர் எரிச்சல் எலுமிச்சம்பழச்சாறு நல்லெண்ணெய் கலந்து சாப்பிட தீரும்.**
- **வெங்காரம் கற்பூரசிலாசத்து வகைக்கு 1 பலம் எலுமிச்சம் பழச்சாற்றால் அரைத்து வில்லைதட்டி சுண்ணாம்பு குகையில் வைத்து சிறுபுடம்போட்டு 1 வராகனெடை தேனில் கொ டுக்க நீரடைப்பு, கல்லடைப்பு, வெட்டை, கடுப்பு, பிரமேகம் தீரும்.**

சுத்தி முறைகளுக்கு எலுமிச்சம் பழச்சாறு:

- **கடுகை எலுமிச்சம் பழச்சாற்றில் ஊறவைத்து எடுக்க சுத்தியாம்.**
- **திப்பிலியை பழச்சாற்றில் ஊறவைத்து எடுக்க சுத்தியாம்.**
- **ஊமத்தம் விதையை பழச்சாற்றில் ஊறவைத்து எடுக்க சுத்தியாம்.**
- **இரும்பை நறுக்கி பழச்சாற்றில் ஊறவைத்து எடுக்க சுத்தியாம்.**
- **காந்தத்தை மோர்காடி மற்றும் எலுமிச்சம் பழச்சாற்றில் தனித்தனியே ஊறவைத்து எடுக்க சுத்தியாம்.**

தேன்

வேறு பெயர்கள்:

“தேனுடைய பேர் தனையே செப்பக்கேளு
செகப்பான அமுதுவாகும் அவுஷத்திடமாகும்
மானி நிற மாஷிதமாஞ் சப்பிறஷமுமாகும்
மாக்கு சுமாசனமாகும் புஷ்ப ரசமாகுந்
தானுடையத் தயிலவர்ணந் துப்புமாகு
ஷபித்திரந்து கபிலங்கமிறுத வர்ணமாகும்
ஊனிலிட உருக்கினமாம் மெழுகாகுமாம்
ஓதியதோர் தேனினுட நாமமாமே”.[9]

பொருள்:

தேனானது,

- **அமுது**
- **அவுசதம்**
- **மாஷிதம்**
- **பிறஷம்**
- **சுமாசனம்**
- **புஷ்பரசம்**
- **தயிலவர்ணம்**
- **கபிலங்கம்**
- **மிறுதவர்ணம் என்று வழங்கப்படுகிறது**

பொதுகுணம்:

“வாதமே கபமே கக்கல் மகோதரங் குன்மம் புண்நோய்
ஏதமோர் கண்நோய் வாந்தி கோழையோடு
வாதையார் நெஞ்செரிப்பு மந்தமேகங்கள் மாற்றும்
ஓதிடு மலமுங் கட்டு மூவகையார் தேன்றான்மாதே”. [11]

வேறு

“பயப்பிடு பிரசமமுன் பழகுமைச் சுரம்
பயப்படு மாறென””

தேனை, பானமாக உட்கொள்ள நாட்சென்ற சீதசுரம் பயப்பட்டு ஓடும் என்று கூறப்பட்டுள்ளது.

“”இறவுளர் அமுதையை இறவுளதாக்கும””

தேனை பானமாக உண்டு வந்தால் கபப்பிணிகள் நீங்கும்.[24]

தேன் வகைகளும் குணமும்:

“ஐயயிரும லீளைவிக்க லக்கிபுண் வெப்புடல் நோய்
பைய வொழியும் பசியுமுறும் - வையத்தில்
எண்ணுமிசை யாமருந்திற் கேற்ற வனுபானமாம்
நண்ணுமலைத் தேனொன்றி னால்”.

பொருள்:

மலைகளும மலை சார்ந்த இடமான குறிஞ்சி நிலத்தில் கிடைக்கின்ற தேனால் ஐயம் , இருமல், ஈளை, விக்கல், அக்கிபுண், வெப்பு சம்மந்தமான உடல் நோய்கள் நீங்கும் . நல்லபசியுண்டாகும் மருந்துகளுக்கு ஏற்ற அனுபானமாகும்.

கொம்புத்தேன்:

“வாதபித்த ஐயத்தை மாற்றுமுள் மாந்தைதனைக்
காதமென ஓடக் கடியுங்காண் - பூதரமாம்
வம்புமுலை மாதே வருமருசி நீக்கிவிடுங்
கொம்புத்தே னன்றாகுங் கூறு”. [25]

பொருள்:

மாமரம் முதலிய மரங்களின் கொம்புகளில் கட்டுகின்ற தேனால் முத்தோடங்களையும் மாற்றும் , உளைமாந்தை மற்றும் அருசி போன்ற நோய்களை நீக்கும் என கருதப்படுகிறது.

மரப்பொந்துத்தேன்:

“பசி வெப்பமாம் வாந்திமந்தம் பல்விக்கல் வெய்ய
ருசி முக் கபந்தூலரோகங் - கசிவகலாக்
கொந்துத்தேன் பாடுங் குழலணங்கே காவின்மரப்
பொந்துத்தே னுண்டாயிற் போம்”. [25]

பொருள்:

மரபொந்துகளில் கட்டுகின்ற தேனால் பசியும் , வெப்பமும் உண்டாகும். மேலும் மந்தம் , பலவித விக்கல் , அருசி, கபம், அதிதூலரோகம் முதலியன நீங்கும்.

புற்றுத்தேன்:

“கொப்பணியு மாதே குவலயத்து லெல்லார்க்கும்
ஒப்பநின்ற ஐய மொழிக்குங்க்காண் கொப்பளிக்குங்
காசசுவாசம் வாந்தி கண்ணிலெழு நோய்களறும்
வீசப்புற்றுத் தேனுக்கு மெய்”. [25]

பொருள்:

புற்றுகளில் கட்டுகின்ற தேனினால் ஐயம் , காசம், சுவாசம், வாந்தி, கண்ணில் எழும் நோய்கள் முதலியன நீங்கும்.

மனைத்தேன்:

“புண்ணும் புரையும்போம் போகாக் கரப்பனறு
மெண்ணரிய தீபனமா மேந்திழையே - கண்ணுகளிற்
பூச்சிபுழு வெட்டுகபம் பொல்லா விருமலறும்
பேச்சின்மனைத் தேனுக்குப் பேசு”. [25]

பொருள்:

வீடுகளில் கட்டுகின்ற தேனால் புண் , சிலையோடல், கரப்பான், நேத்திரவிரணக்கிருமி, புழுவெட்டு, கபகோபம், காசம் முதலிய பிணிகள் நீங்கும். பசி உண்டாக்கும்.

புதியத்தேன்:

“ஆயுளுட னுட்டிணம் ரோசி யகக்கபமு
மேய வழகும் வளர்ந்திடுங்காண் - தூய
மதிய மெனுவதன மாதரசே நாளும்
புதிய நறுந்தேனாற் புகல்”. [25]

பொருள்:

புதுத்தேனினால் நிறைந்த ஆயுளும் , உடல் வெப்பமும் , ஒளியும் உண்டாகும். இது மிகச் சேர்த்தால் அருசியும், நெஞ்சிற் கபமும் விளையும்.

பழையத்தேன்:

“வாதப் பெருக்கை வயிற்றெரிவை தந்துறையைச்
சேதப் படுத்துமின்னுஞ் செப்பவோ - மாதரசே
சத்திப் புறுமரசந் தன்னைத்தூண் டும்புளிப்புத்
தித்திப் புறும்பழைய தேன்”. [25]

பொருள்:

புளிப்பும், இனிப்புங் கலந்த சுவையையுடைய பழைய தேனானது , வாதரோகக் கூட்டத்தையும் , வயிற்றெரிச்சலையும், வாதமூல ரோகத்தையும் விளைவிக்கும்.

தேனிலுண்டாகும் பொருள்களும் அதன் குணங்களும்:

தேன் பாகு:

“அனலா லெழுந்த வருசி சர்த்தி தாலும்
புனலாடருங் கோழையது பொங்குங் - கனலாருந்
தேன்பாகுக் கென்றுமதைச் சேர் ஓளஷதி யதனாற்
கான்பாவு நோய்க்கூட்டங் காண்”.[25]

பொருள்:

தேன் பாகுவினால் பித்ததால் எழுந்த அருசி , வாந்தி முதலியன நீங்கும். கோழைகட்டும் மருந்துகளோடு சேர்த்து துணை மருந்தாக வழங்க நோய்களை நீக்குமென கூறப்படுகிறது.

தேனில் உண்டாகும் கற்கண்டு:

"தேனிற் பிறந்த செழுங்கண்டாற் கண்விழிக்குள்
ஊனிற் படர்படலா மோடிடுங்காண் - காணத்திற்
காகுஞ் சுரமாகு மண்டும் பசிகங்கால்
ஏகுஞ் சுரமேகு மெண்". [25]

பொருள்:

தேனில் உண்டாகும் கற்கண்டினால் கண்ணில் படரும் கெட்ட மாமிசப்படலம், பசி, கபம், வாதம் முதலியன நீங்கும் . காணம் (இசைக்குரிய) குரல்வளத்தை கொடுக்கும்.

தேன்குழல்:

"ஓங்குங் கபவாதம் உட்டிணமு மீறிவரும்
வாங்குஞ் சலங்கொஞ்ச மந்தமுமாந் - தேங்குமிசை
ஆன்குழலு மியாழுமிக வஞ்சுமொழிக் கிஞ்சுகமே
தேன்குழலுக் காங் குணத்தைத் தேர்". [25]

பொருள்:

தேன்குழலால் கபவாத நோய்களும் , உடலில் உஷ்ணமும் அதிகமாகும். மந்தம் உண்டாகும்.

சுத்தி முறைகள்:

- கடைத்தேனில் மெழுகு , தேனீ, புழு, முட்டை, மகரந்தப் பொடி முதலிய மலினங்களிருக்குமாகையால் , இதனை உபயோகிக்குமுன் நீர் இயந்திரத்தில் வைத்து காய்ச்சிச் சூடாயிருக்கும்போதே , ஈரக் கம்பளித்துணியில்விட்டு வடிகட்டி கொள்ள வேண்டும்.
- ஓட்டை சுட்டுத் தேனில் போட்டு முறித்து உபயோகிப்பது வீட்டு வழக்கம். [6]

உபயோகம்:

- இலேகியம், பாணிதம், மெழுகு, கட்டு, கண் மை போன்ற மருந்துகள் செய்வதற்கு தேன் பயன்படுகிறது.

- பற்பம், செந்தூரம், சூரணம், மாத்திரை, குடிநீர் போன்றவைகளுக்குத் தேன் ஒரு சிறந்த துணை மருந்தாகும்.

“அனுபான மாய்ப்பின் அவிழ்தமுமாய்த் தோன்றி
கனமான தேகநிலை காட்டிப் - பினுமே
யரசன் முதல்வோ ரையுமாட்டு வித்தாலே
பிரசத் தினாற்போம் பிணி”. [26]

பொருள்:

- இஃது அனுபான பொருளாவதன்றி அவிழ்தப் பொருளுமாகி , தேகத்தை நன்னிலையில் வைத்து , வாதமுதலிய முக்குற்றத்தையும் போக்கும்.
- கபவாத சுரத்தினால் வருந்து நோயினருக்கும் , இளைத்த உடம்பினர்க்கும், இதயத்தை பலப்படுத்த தேனை வழங்கி வரலாம்.
- வயோதிகர்களுக்குக் காணும் கோழையை அகற்றி , உடலில் வெப்பத்தை உண்ணுவதற்கும் , சக்தியை அதிகப் படுத்துவதற்கும் தேனை கொடுத்து வரலாம்.
- மதுமேகநோயிற்காக வழங்கபடும் மருந்துகளுள் தேனும் ஒரு முக்கிய பொருளாக சேர்க்கப்படுகிறது.
- தேனும் நெய்யும் சம அளவு சேர்த்து அருந்தினால் விடமிக்கும்.

4.2 MINERALOGICAL REVIEW

FERROUS SULPHATE

VERNACULAR NAMES:

Sans : kasisa, Hurt-turia

Eng : green vitriol, green coppearas, sulphates of iron, crude ferrous sulphate, iron sulphate, salt of steel, sulphate ferreux.

Pers : zankurmandi

Hindi : haratutuia, kasis

Guj : harakasis

Tam : annabedhi

Kash : sang-i-sabz

Tel : tagramu

Malay: madhukalpa [27]

Iron sulphate, chemical compound, **$Feso_4$.** It is known as the monohydrate, $FeSO_4.H_2O$; the tetrahydrate, $FeSO_4.4H_2O$; the pentahydrate, $FeSO_4.5H_2O$; and the heptahydrate, $FeSO_4.7H_2O$. The heptahydrate is also called **green vitriol,** copperas, or melanterite (a mineral that commonly occurs with pyrite).

It is a blue-green monoclinic crystalline water-soluble salt. It is prepared commercially by oxidation of pyrite (iron sulphide) or by treating iron with sulphuric acid. It is used in in the manufacture of inks, in wool dyeing as a mordant, and in water purification as a mordant,and in water purification as a substitute for aluminium sulphate. It melts at 64^oC, AND at 90^oC it loses water of hydration to form the monohydrate, a monoclinic, crystalline powder that occurs naturally as the mineral szomolnokite. The mineral siderotil is iron sulphate pentahydrate

PRODUCTION

In the finishing of steel prior to plating or coating, the steel sheet or rod is passed through pickling baths of sulphuric acid.This treatment produces large quantities of iron sulphate as a waste product. Iron sulphate is prepared commercially by oxidation of pyrite, by treating iron with sulfuric acid.

ACTION:

It is valuable

- Tonic
- Astringent
- Haematinic

VARIETIES:

It was divided into two varieties by the ancient Hindu chemists.

1. **Valuka kasisa or dhatu kasisa**, the green variety (**ferrous sulphate**)
2. **Pushpa kasisa** the yellowish variety which is probably iron sulphate covered with basic sulphate of sesquioxide from absorption of oxygen.

"**Coppers of commerce**", is produced principally from the so called **alum** shales from which alum is prepared. As is the case also with alum, copperas was found sometimes as a natural exudation upon alum shales and other rocks which include **"iron pyrites".** Crude greenish-blue crystals of sulphate of iron are available in all the bazaars in India. Its taste is very astringent or styptic and without any odour, acid reaction, soluble in water, insoluble in alcohol.

HYDRATES:[28]

Iron sulphate can be found in various states of hydration, and several of these forms exist in nature.

- $FeSO_4.H_2O$ (mineral: szomolnokite)
- $FeSo_4.4H_2O$
- $FeSo_4.5H_2O$ (mineral: siderotil)
- $FeSo_4.7H_2O$ (mineral: melanterite)

At 90^0C, the heptahydrate loses water to form the colourless monohydrate it also called green vitriol or copperas.

PHYSICAL AND CHEMICAL PROPERTIES: [29]

Colour – Brown / green crystalline solid

Density -1.898g /cm^3

Melting point - 64^0C

Boiling point - 90^0C (becomes FeSo4)

$FeSo_4.7H_2O$ - 90%

$Mgso_4.7H_2O$ - 4%

pH >1 (10%)

Other sulphates - 1%

Insoluble - 0.1%

Free acid - 0.3%

Residual moisture - 5%

Fe (active substance) - 18%

Dissolves easily in water - 570g/l (20 deg C)

It melts at 64^0C, and at 90^0C it loses water of hydration to form the monohydrate, a white, monoclinic, crystalline powder that occurs naturally as the mineral szomolnokite. The mineral siderotil is iron sulphate pentahydrate Iron sulphate is the chemical compound with the formula ($FeSO_4$). Also known as ferrous sulphate, or copperas, iron sulphate is most commonly encountered as the blue-green heptahydrate. In its anhydrous, crystalline state, its standard enthalpy of formation is $_fH^O_{solid}$ = - 928.4Kj.mol^{-1} and its standard molor entropy is S^0_{solid} =107.5J.K^{-1}.mol^{-1}.

PURIFICATION:

The ferrous sulphate is dissolved in water. A small quantity of sulphuric acid is added to it filtered and heated until it attains the consistency of dry salt.

PROPERTIES:

This has got bitter, body strengthening and hypothermic properties. It also destroys the worms and improves the development of sexual functions.

The following points are to be remembered while using the ferrous sulphate:

1. When the ferrous sulphate is taken, the stool will be black in colour with bad smell.
2. Ferrous sulphate should be taken continuously with a regular gap, once a week.
3. If the ferrous sulphate is consumed in excess quantity, the stool will be blackened besides causing constipation.

USES: [30]

- Preparations made of it was generally bhasma, oil, and solution. Bhasma is prepared by taking equal quantity of **iron sulphate** and sulphur, reducing them fine powder, mixing and mixture or mass. To this is added tripala, pepper, honey, ghee and the whole is triturated.

  A Dose is ¼ to 2 grains a day with honey and milk.
- The bhasma is alternative and diuretic and is given in enlargement of the liver.
- **Iron sulphate**, on accounts of its astringent properties, is used as a lotion in erysipelas, anaemia and constitutional debility, following on malaria, kala-azar.

Following remedies are valuable in Anaemia and debility:

- ✓ A grain of ferrous sulphate in an ounce each of omum water and infusion of chiretta thrice a day after food. This is useful in larger doses in case of neuralgic of rheumatic attacks recurring periodically among the week.
- ✓ 24 grains of ferrous sulphate and 30 grains of black pepper and cinnamon powder, made into 12 pills in sufficient quantity of honey and given in a dose of 1 pill twice a day.
- ✓ For anaemic females suffering from cholera etc leucorrhoea and amenorrhoea purified aloes in equal quantity to ferrous sulphate may be advantageously added.
- ✓ Through iron is useful in simple anaemias, it is useful or even harmful in pernicious anaemia.
- ✓ It sticks or solution applied to foul ulcers various skin diseases as eczema, pruritis, intertrigo etc.
- ✓ It is also applied in fistula in ano for the burning and pain in piles with benefit.
- ✓ In bleeding piles and prolapse of rectum, daily enemas of the simple solution of sulphate are serviceable.
- ✓ In chronic disease, an ointment made of iron pyrites and ghee is used with benefit. It is apt to irritate the stomach.

- ✓ Ferrous sulphate is applied for the purification of water by flocculation and for phosphate removal in municipal and industrial sewage treatment plants to prevent eutrophication of surface water bodies. Large quantities of this salt are used as a reducing agent, mostly for the reduction of chromate in cement.
- ✓ Ferrous sulphate is also used to fortify various foods with iron, for example, the enriched corn meal in Cheetos.
- ✓ Ferrous sulphate is an iron preparation. Iron is a vital component of haemoglobin (oxygen-carrying pigment of red blood cells) and is therefore important in the formation of red blood cells. It is also a component of myoglobin, a pigment which stores oxygen in muscles for use during exercise.
- ✓ Iron is an essential component of several enzymes and is involved in the uptake of oxygen by the cells and the conversation of blood sugar to energy.
- ✓ Colouring: Ferrous sulphate is used in the manufacturing of inks, most notably iron gall ink, which was used from the middle ages until\the American Resolution.It also finds use in wool dyeing as a mordant. Ferrous sulphate can also be used to stain Concrete a yellowish rust colour.

NOT TO BE USED IN: [31]

- ➢ Decreased numbers of red blood cells in the bloodstream caused by an increase in their breakdown (haemolytic anaemia).
- ➢ Iron storage disorder (Haemosiderosis), Hemochromatosis.
- ➢ Known sensitivity or allergy to any ingredient.

USED WITH CAUTION IN:

- Inflammatory bowel disease such as ulcerative colitis or Crohn's disease.
- Narrowing of a gut.

SIDE EFFECTS: [32]

Medicines and their possible side effects can affect individual people in different ways. The following are some of the side effects that are known to be associated with this medicine. Because a side effect is stated here, it does not mean that all people using this medicine will experience that or any side effect.

- Abdominal pain
- Constipation
- Diarrhoea
- Nausea and vomiting

The side effects listed above may not include all of the side effects reported by the drug‟s manufacturer. Side effects of therapy may include nausea and epigastric abdominal discomfort after taking iron. These side effects may be minimized by taking ferrous sulphate at bedtime. Copperas was given indiscriminately by untrained persons to slaves in the 18th and 19th centuries for various ailments. The knowledge that it would cause violent nausea and vomiting made it an ideal "remedy" for virtually anything that ailed a slave and kept him from work. Many slaves were poisoned and died from this practice.

When taken together with antacids, the absorption of iron may be reduced.

When taken together with tetracycline antibiotics, the absorption of both medicines may be reduced.

The absorption of the following medicines may be reduced when taken together with

- Iron
- Penicillamine,
- Zinc salts

RECENT RESEARCHES ABOUT ANNABETHI:

COMPARATIVE STUDY OF KHASISABHASMA AND ABC WITH REFERENCE TO THEIR PHARMACEUTICAL STUDY:[33]

The ancient texts of Rasa Shastra classified the minerals as Maharasa, Uparasa, and SadharanaRasa on basis of their importance in mercurial processing. „Kasisa‟ is described under Uparasa group by Rasacharyas. It is one among the Iron containing minerals. While reviewing the Modern literature, we find medicinal use of Iron after 17th century by the discovery of food rich Iron. „Kasisa‟ is an iron compound which is presented in this article in two forms i.e Kasisa bhasma and Annabhedi chenduram. Annabhedi chenduram is siddha medicine. Like Ayurveda, Siddha is also a traditional medical system of India.. Many research programmes were conducted on Kasisa Bhasma of Ayurveda and Annabhedi Chendooram of Siddha medicine for the management of Anaemia. So far no comparative study is taken up to identify the supremacy between the two. So comparative study with respect to pharmaceutical view studied in this article. Kasisa Bhasma and Annabhedi Chenduram contain number of similarities both in terms of composition and preparation with minimum variations.

A CLINICAL STUDY ON ANNABEDI CHENDURAM IN PANDU BASED ON SIDDHA CONCEPT:[34]

The specific preparation used in this study is reported contain 25% ferrous iron which given good response of average 30% raise Hb% during treatment. There is a definite qualitative improvement in the symptomatic amelioration of anaemic condion

PHARMACEUTICO-THERAPEUTIC VISTAS OF KASISA (GREEN VITRIOL) IN AYURVEDA:

Since ages the Indians have the knowledge of using Kasisa (hydrous ferrous sulphate/ green vitriol) in different modalities. Kasisa is commonly placed under Uparasa group of drugs and is widely used in therapeutics of Ayurveda. Brihatrayi (Charaka Samhita, Sushruta Samhita and Ashtanga Hridaya) is the first known Ayurveda literature that introduced its medicinal utilities, and later on Rasashastra (the iatrochemistry of Ayurveda) treatises comprehensively described its complete mineralogical profile, sources, distribution, varieties, Shodhana (purification and detoxification), Marana (calcinations cycles), Satvapatana (metal extraction), pharmacodynamic properties, actions, therapeutic indications, posology, adjuvants, and formulations in a systemic manner. Scattered information exploring therapeutic potential of Kasisa is accessible and there is need to assemble it. Therefore, an effort is made to assemble the scattered information in prehistoric texts, Brihatrayi, Nighantu, Rasashastra and other Ayurvedic treatises along with modern evidences highlighting the role of Kasisa in therapeutics. [35]

SCIENTIFIC BASIS FOR THE PREPARATION AND CHARACTERIZATION OF IRON BASED TRADITIONAL DRUG ANNABETHI CHENDHURAM: A MATERIALISTIC APPROACH:

Iron based traditional Ayurvedic drug Annabethi chendhuram is used therapeutically for the treatment of disease like Anaemia, Leucoderma, Prolapse of uterus and rectum, Spleenic disorders. The structural and textural properties of the starting materials and the prepared drug were charecterised systematically by different characterisation techniques like XRD, Zeta Potential Analysis, Particle analysis, FTIR, SEM, and BET surface area analysis. The results obtained by characterization of the samples clearly explain the formation of Fe^2O^3, reduction in particle size, modification of surface energy and formation of metal complex with organic moieties.

The strict post and pre preparation conditions followed play an important role in the morphology and medicinal activity of the drug Annabethi chendhuram. [36]

TOXICOLOGICAL EVALUATION OF KASISA BHASMA (GREEN VITRIOL), AN AYURVETHIC ORGANO METALLIC PREPARATION:

Repeated dose oral toxicity study for 28 days of Kasisa bhasma ($Feso_{4,}$ 7 H_2 O, Green vitriol), a popular ayurvethic formulation, was carried ouy in Wister rats to evaluate the toxicity, if any. In this study, the dose schedule was 225,112.5 and 22.5 mg/kg/day, for 28 days resulted in no mortality. In female rats showed significant decrease of SGPT level, Eosinophil count, and prothrombine time respectively, whereas males showed significant decrease of total protein. Moreover there was no changes observed in histopathological evaluation of the high dose group animals when compared to control group, which revealed that there was no adverse effect of Kasisa bhasma, the classical Ayurvedic Organo-metallic preparation in oral consumption in Wistar albino Rats for 28consecutive days for study.[37]

KARPOORA SILASATHTHU

CRYSTALLISED FOLIATED GYPSUM

Karpoora silasaththu, which is a combination of alum and iron available in nature and is available in plenty in nepal. It is taken out from the earth as thick sheets. Gypsum is one of the more common minerals in sedimentary environments. It is a major rock forming mineral that produces massive beds, usually from precipitation out of highly saline waters. Since it forms easily from saline water, gypsum can have many inclusions of other minerals and even trapped bubbles of air and water.

Crystals of gypsum can be extremely colorless and transparent, making a strong contrast to the most common usage in drywall. The crystals can also be quite large. Gypsum is a natural insulator, feeling warm to the touch when compared to a more ordinary rock or quartz crystal. Sheets of clear crystals can be easily peeled from a larger specimen. [42]

ETYMOLOGY AND HISTORY:

The word gypsum is derived from the Greek word γύψος (*gypsos*), "plaster". Because the quarries of the Montmartre district of Paris have long furnished burnt gypsum (calcined gypsum) used for various purposes, this dehydrated gypsum became known as plaster of Paris. Upon addition of water, after a few tens of minutes plaster of Paris becomes regular gypsum (dihydrate) again, causing the material to harden or "set" in ways that are useful for casting and construction.

Gypsum was known in Old English as *spærstān*, "spear stone", referring to its crystalline projections. (Thus, the word spar in mineralogy is by way of comparison to gypsum, referring to any non-ore mineral or crystal that forms in spearlike projections). In the mid-18th century, the German clergyman and agriculturalist Johann Friderich Mayer investigated and publicized gypsum's use as a fertilizer. Gypsum may act as a source of sulfur for plant growth, and in the early 19th century, it was regarded as an almost miraculous fertilizer. American farmers were so anxious to acquire it that a lively smuggling trade with Nova Scotia evolved, resulting in the so-called "Plaster War" of 1820. In the 19th century, it was also known as lime sulfate or sulfate of lime. [38]

VERNACULAR NAMES:

English : gypsum, alabaster, calcium sulphate

Tamil : *Karpoora Silasathu*

Hindi : sufed pathar

Marathi : godanti

Gujarathi : gabhana

Bengal : silajatu

Sanskrit : silajit, silaras

Geological : selenite

SYNONYM:

- Aphroselenon
- Gypsite
- Gypsum Rose
- Lapis Specularis
- Marmor fugax
- Montmartrite
- Oulopholite
- Spectacle-Stone
- Sulphate of Lime
- Selenite
- Alabastera and Satin spar [39]

OCCURENCE:

Gypsum is a common mineral, with thick and extensive evaporite beds in association with sedimentary rocks. Deposits are known to occur in strata from as far back as the Archaean eon. Gypsum is deposited from lake and sea water, as well as in hot springs, from volcanic vapors, and sulfate solutions in veins. Hydrothermal anhydrite in veins is commonly hydrated to gypsum by groundwater in near-surface exposures.

It is often associated with the minerals halite and sulfur. Gypsum is the most common sulfate mineral. Pure gypsum is white, but other substances found as impurities may give a wide range of colors to local deposits. Because gypsum dissolves over time in water, gypsum is rarely found in the form of sand [38].

SYNTHESIS:

Synthetic gypsum is recovered via flue-gas desulfurization at some coal-fired power plants. It can be used interchangeably with natural gypsum in some applications.

Gypsum also precipitates onto brackish water membranes, a phenomenon known as mineral salt scaling, such as during brackish water desalination of water with high concentrations of calcium and sulfate. Scaling decreases membrane life and productivity.

This is one of the main obstacles in brackish water membrane desalination processes, such as reverse osmosis or nanofiltration.

Other forms of scaling, such as calcite scaling, depending on the water source, can also be important considerations in distillation, as well as in heat exchangers, where either the salt solubility or concentration can change rapidly. [40]

CHEMICAL PROPERTIES OF GYPSUM:

Formula:

$CaSO_4 \cdot 2H_2O$

IMA Formula:

$Ca(SO_4) \cdot 2H_2O$

Elements listed:

Ca, H, O, S - search for minerals with similar chemistry[39]

Chemical Formula: CaSO4•2(H2O)

Composition: **Molecular Weight = 172.17 gm**

Calcium	23.28 %	Ca	32.57 % CaO
Hydrogen	2.34 %	H	20.93 % H_2O
Sulfur	18.62 %	S	46.50 % SO_3
Oxygen	55.76 %	O	
	100.00 %		100.00 % = TOTAL OXIDE[41]

PHYSICAL PROPERTIES:

Color: White, colorless or gray, but can also be shades of red, brown and yellow.

Luster: Vitreo to pearly especially on cleavage surfaces.

Transparency: Crystals are transparent to translucent

CrystaSystem: Monoclinic; 2/m

CRYSTAL HABITS:

Tabular, bladed or blocky crystals with a slanted parallelogram outline. The pinacoid faces dominate with jutting prism faces on the edges of the tabular crystals. Long thin crystals show bends and some specimens bend into spirals called "Ram's Horn Selenite" Two types of twinning are common and one produces a "spear head twin" or "swallowtail twin" while the other type produces a "fishtail twin". Also massive, crusty, granular, earthy and fiberous.

Cleavage: Good in one direction and distinct in two others

Fracture: Uneven but rarely seen

Hardness: 2

Specific Gravity: 2.3

Streak: White

Associated Minerals: Halite , calcite, sulfur, pyrite, borax and many others.

Best Field Indicators: Crystal habit, flexible crystals, cleavage and hardness. [42]

CRYSTAL VARIETIES:

Gypsum occurs in nature as flattened and often twinned crystals, and transparent, cleavable masses called selenite. Selenite contains no significant selenium; rather, both substances were named for the ancient Greek word for the Moon.

Selenite may also occur in a silky, fibrous form, in which case it is commonly called "satin spar". Finally, it may also be granular or quite compact. In hand-sized samples, it can be anywhere from transparent to opaque. A very fine-grained white or lightly tinted variety of gypsum, called alabaster, is prized for ornamental work of various sorts. In arid areas, gypsum can occur in a flower-like form, typically opaque, with embedded sand grains called desert rose. It also forms some of the largest crystals found in nature, up to 12 m (39 ft) long, in the form of selenite. [43]

USES OF GYPSUM:

Gypsum is used in a wide variety of applications:

- Gypsum board is primarily used as a finish for walls and ceilings, and is known in construction as drywall, wallboard, sheetrock or plasterboard.
- Gypsum blocks are used like concrete blocks in building construction.
- Gypsum mortar is an ancient mortar used in building construction.
- Plaster ingredients are used in surgical splints, casting moulds and modeling.

- A wood substitute in the ancient world: For example, when wood became scarce due to deforestation on Bronze Age Crete, gypsum was employed in building construction at locations where wood was previously used.
- A tofu (soy bean curd) coagulant, making it ultimately a major source of dietary calcium, especially in Asian cultures which traditionally use few dairy products
- Adding hardness to water used for brewing.
- A component of Portland cement used to prevent flash setting of concrete
- Soil / water potential monitoring (soil moisture)
- A common ingredient in making mead
- In the medieval period, scribes and illuminators mixed it with lead carbonate (powdered white lead) to make gesso, which was applied to illuminated letters and gilded with gold in illuminated manuscripts.
- A medicinal agent in traditional Chinese medicine called *shi gao*
- Impression plasters in dentistry

Tests have shown that gypsum can be used to remove pollutants such as lead or arsenic from contaminated waters. [40]

4.3 BOTANICAL REVIEW

LEMON

VERNACULAR NAMES:

Botanical : Citrus lemon

English : Lime

Hindi : Jamiri nimbu

Kannada : Limbe

Malayalam : Cerunarakaram

Sanskrit : Jambirah

Tamil : Elumichai

Telugu : Peddanimma, Nimma

Unani : Leemu, Baara, Neeebu

CLASSIFICATION:

KINGDOM	**:**	Plantae-plants
SUBKINGDOM	**:**	Trachaobionta-vascular plants
SUPER DIVISION	**:**	Spermatophyte-Seed plants
DIVISION	**:**	Magnoliopsida-flowering
CLASS	**:**	Magnoliopsida-dicotyledons
SUBCLASS	**:**	Rosidae
ORDER	**:**	Sapindales
FAMILY	**:**	Rutaceae
GENUS	**:**	Citrus
SPECIES	**:**	Limon

DISTRIBUTION:

Throughout India, cultivated in plants and hills in area up to 1200 meter elevation. Commonly found in Kumaon parts of Himalayas, northern and central India.

THE PLANT:

A much branched thorny shrub with spreading branches leaves the unifoliately compound, rachis winged, leaflet elliptic-oblong, alternate, coriaceous, entire or crenulated, flowers white in short racemes, fruits large, globose berries with thick or thin rind, pulp pale, very acid, seeds many, horizontal, testa coriaceous.

PARTS USED:

Fruits

ALKALOIDS:

Limonene is a principal constituent of essential oil, others are citronella, n-nonanal, n-decanal, n-dodecanal, linalyl-acetate, citronellyl acetate, methyl anthranilate, lipophilic flavonoids including sinesetin and furocoumarins.

The chief flavonoids are naringin, and neohesperidin, dihydro chalcones hesperidone and rutin. It also contains glycosyl apigenin, p-caryophyllene, limocitrol, limocitrin, abscisic acid, gibberellic acid, abscisin II, auxin and isorhamnetin. [45]

CHEMICAL CONSTITUENTS OF LEMON:

Lemon and other citrus fruits contain different chemicals and thought to have some health benefits. They contain a terpene called limonene which gives their characteristic lemon smell and taste. Lemon contains the significant amount of citric acid,that is why they have a low PH and a sour taste. They also contain vitamin C (ascorbic acid) which is essential to human health.

100 millilitres of lemon juice contains approximately 50mg of vitamin C (55 % of the recommended daily value) and 5 gms of citric acid.

NUTRIENTS – AMOUNT: [46]

- Calories – 15.25
- Carbohydrate- 5.27g
- Sugar total - 2.08g
- Fat total -0.00g
- Protein -0.15g

VITAMINS: [47]

- Vitamin A (IU) -12.2
- Thiamine B1 – 0.02mg
- Riboflavin B2 – 0.01mg
- Niacin B3 – 0.06mg
- Vitamin B6 – 0.03mg
- Vitamin B12 – 0.00mg
- Vitamin C – 28.06mg
- Folate - 7.87mcg
- Pantothenic acid – 0.07mg
- Biotin – 0.19mcg
- Vitamin K -0.00mg
- VitaminE – 0.14mg

MINERALS:

- Calcium – 4.27mg
- Copper – 0.02mg
- Iron - 0.05mg
- Magnesium -3.66mg
- Manganese – 0.01mg
- Selenium – 0.06mg
- Potassium - 62.83mg
- Phosphorus - 4.88mg
- Sodium – 0.61mg
- Zinc – 0.03mg
- Selenium – 0.06mcg

ACTION:

Stomachic and Carminative

OIL:

It is bitter, aromatic , stomachic and carminative

JUICE:

The expressed strained juice of the ripe fruit is a valuable antiscorbutic and refrigerant, primarily anti alkaline and secondarily antacid.

BARK:

It is used as febrifuge and seeds as a vermifuge. The Pulp is exceedingly acid.

MEDICINAL USES OF LEMON: [48]

- ✓ Juice of the baked lemon is an excellent remedy for a cough when mixed with an equal quantity of sugar or honey and taken in teaspoonful doses.
- ✓ Fresh lemon juice is recommended to be taken in the evening for the relief dyspepsia with vomiting and bilious headaches.
- ✓ Preserved with sugar or honey lemons are recommended for a sore throat and are considered to act as detergent they are administered before purgatives to prepare the body for them and afterwards to check excessive action.
- ✓ Lemon plays an important part in perfumery also. The quality of Indian peel is almost equal to the Sicilian variety and it has been estimated that if extraction of lemon oil is attempted from the Indian lemon peel, It will not be a failure commercially.
- ✓ The rind of the fruit is sour, heating, with a sharp taste; anthelmintic; removes "Vatha", "Kapha", lung troubles.
- ✓ The rind of the ripe fruit is stomachic and carminative. The oil mixed with glycerine is applied to the eruption of acne.
- ✓ The juice of the ripe fruit is a valuable antiscorbutic and refrigerant.
- ✓ In scurvy, it is one of the best remedies we possess, both as a prophylactic and as a curative.

- ✓ In acute rheumatism and rheumatic gout, in some forms of acute tropical dysentery and diarrhoea,etc., it has been successfully employed.
- ✓ As an antidote to some acro-narcotic poisons, it often proves effectual.
- ✓ The fruit in the form of pickles is useful in hypertrophy of spleen. Lemon peel is stomachic and carminative.

CANCER

In an experiment with the flavonoid eriocitrin and its metabolites and with coumarins extracted from lemon fruit, apoptosis has been demonstrated in acute myelomonocytic leukemia cells.

ADVERSE REACTIONS

Lemon juice may cause loss of gloss, alteration in enamel colour and irregular dental tissue on tooth enamel.Anaphylactic allergy to lemon soap has been reported resulting from a possible cross sensitivity of citrus seed to peanut allergen. [54]

RECENT RESEARCHES ABOUT LEMON JUICE:

1.DIURETIC AND ANTIHYPERTENSION ACTIVITY: [49]

Lemon juice is value in hypertension and Urinary diseases if used in the form of reconstituted Lemon drink (from powder pocket). Traditionally lemon juice has a vast number of uses including its anti-oxidant properties, anxiolytic, antidepressant effect as well as diuretic potential.

2. HEALTH AND MEDICINAL PROPERTIES OF LEMON: [50]

Vitamin C present in the lemon juice. So it cures scurvy. Lime juice and its oil are very beneficial for skin consumed orally or applied externally. Lime juice has an irresistible scent which waters the mouth and thus aids primary digestion. Primarily, the ample of acids present in lime helps clear the excretory system by washing and cleaning off the tracts, just like some acids are used to clean floor and toilets. An overdose of lime juice with salt also acts as an excellent purgative without any side effects, thereby giving relief in constipation.

3. ANTI BACTERIAL ACTIVITY OF FRUITS AGAINST ESCHERICHIA COLI:

The lemon juice contains Antibacterial activity against E.coli. More organisms can undoubtedly analysed for this antibacterial activity. Numerous fruits are unquestionably utilized to prevent foodborne illness diseases. [51]

4. LEMON POLYPHENOLS SUPPRESS DIET-INDUCED OBESITY:

Lemon polyphenols suppress Diet-induced Obesity by up-Regulation of mRNA levels of the Enzymes Involved in β-oxidation in mouse white adipose tissue. Feeding with lemon polyphenols suppressed body weight gain and body fat accumulation by increasing peroxisomal β-oxidation through up-regulation of the mRNA level of ACO (acetyl CoA oxidase) in the liver and white adipose tissue, which was likely mediated via up-regulation of the mRNA levels of PPARα. [52]

5. PROTECTIVE EFFECTS OF LEMON JUICE ON ALCOHOL-INDUCED LIVER INJURY:

Chronic excessive alcohol consumption (more than 40-80g/day) could induce serious liver injury. Histopathological changes induced by alcohol were also remarkably improved by lemon juice treatment. These findings suggest that lemon juice has protective effects on alcohol-induced liver injury in mice. The protective effects might be related to the antioxidant capacity of lemon juice because lemon juice showed in vitro antioxidant capacity. [53]

6. ANTIDIARRHEAL ACTIVITY OF HEXANE EXTRACT OF CITRUS LIMON PEEL IN AN EXPERIMENTAL ANIMAL MODEL. [55]

Therefore, this study was carried out to investigate the effects of hexane extract of Citrus limon peel (HECLP) on castor oil-induced diarrhea in rats.These results suggest that C. limon peel possesses antidiarrheal effects through antisecretory and antimotility mechanisms that act through the β adrenergic system.

7. LEMON (CITRUS LIMON) JUICE HAS ANTI BACTERIAL POTENTIAL AGAINST DIARRHEA - CAUSING PATHOGEN.

Conclusion Lemon (Citrus limon) juice can inhibit the growth of pathogens that cause diarrhea, in this case, the Enterotoxin Escherichia coli (ETEC) bacteria. This results showed that the optimum dose of lemon (Citrus limon) juice in inhibiting diarrhea-causing pathogenic bacteria was 900 mg/ml.

8. ANTIMICROBIAL ACTIVITY OF LEMON (CITRUS LIMON) PEEL EXRACT AGAINST ESCHERICHIA COLI. [56]

The lemon (*Citrus limon*) peel extract were determined for their antimicrobial activity against Escherichia coli using disc diffusion agar method. From the result it can be concluded that lemon (*Citrus limon*) peel extract have a high potential on antimicrobial activity against the Escherichia coli.

4.4 ZOOLOGICAL REVIEW

HONEY

Honey is a sweet, viscous food substance produced by bees and some related insects. Bees produce honey from the sugary secretions of plants (floral nectar) or from secretions of other insects (such as honeydew) by regurgitation, enzymatic activity, and water evaporation. Bees store honey in wax structures called a honeycomb.

The variety of honey produced by honey bees is the best-known, due to its worldwide commercial production and human consumption. Honey is collected from wild bee colonies, or from hives of domesticated bees, a practice known as beekeeping or apiculture.

Honey gets its sweetness from the monosaccharides fructose and glucose, and has about the same relative sweetness as sucrose (granulated sugar). It has attractive chemical properties for baking and a distinctive flavor when used as a sweetener. Most microorganisms do not grow in honey, so sealed honey does not spoil, even after thousands of years.

Honey provides 46 calories in a serving of one tablespoon (15 ml). Honey is regarded as safe when not taken in excessive amounts. Honey use and production have a long and varied history as an ancient activity. [57]

NUTRITION

In a 100-gram serving, honey provides 304 kilo calories with no essential nutrients in significant content. Composed of 17% water and 82% carbohydrates, honey has low content of fat, dietary fiber, and protein.

SUGAR PROFILE:

A mixture of sugars and other carbohydrates, honey is mainly fructose (about 38%) and glucose (about 32%), with remaining sugars including maltose, sucrose, and other complex carbohydrates. Its glycemic index ranges from 31 to 78, depending on the variety. The specific composition, color, aroma, and flavor of any batch of honey depend on the flowers foraged by bees that produced the honey.

One 1980 study found that mixed floral honey from several United States regions typically contains:

- Fructose: 38.2%
- Glucose: 31.3%
- Maltose: 7.1%
- Sucrose: 1.3%
- Water: 17.2%
- Higher sugars: 1.5%
- Ash: 0.2%
- Other/undetermined: 3.2%

A 2013 NMR spectroscopy study of 20 different honeys from Germany found that their sugar contents comprised:

- Fructose: 28% to 41%
- Glucose: 22% to 35%

The average ratio was 56% fructose to 44% glucose, but the ratios in the individual honeys ranged from a high of 64% fructose and 36% glucose (one type of flower honey; table 3 in reference) to a low of 50% fructose and 50% glucose (a different floral source). This NMR method was not able to quantify maltose, galactose, and the other minor sugars as compared to fructose and glucose.

BENEFITS:

1) **Healing Wounds And Burns:**

Honey has been consumed for thousands of years for its supposed health benefits.

There have been some cases in which people have reported positive effects of using honey in treating wounds.

A review published in *The Cochrane Library* indicated that honey might be able to help heal burns. The lead author of the study said that "topical honey is cheaper than other interventions, notably oral antibiotics, which are often used and may have other deleterious side effects."

However, there is a lack of evidence to fully support this claim. In fact, a study published in *The Lancet Infectious Diseases* concluded that applying medical-grade honey to the wounds of patients has no advantage over normal antibiotics among patients undergoing dialysis.

Honey should never be given to young infants as it can cause botulism, a rare but severe type of food poisoning.

2) Reducing The Duration Of Diarrhea

According to research-based reviews on honey, it has been shown to decrease the severity and duration of diarrhea. Honey also promotes increased potassium and water intake, which is particularly helpful when experiencing diarrhea.

Research that took place in Lagos, Nigeria suggests that honey has also shown the ability to block the actions of pathogens that commonly cause diarrhea.

3) Preventing Acid Reflux

Recent research has shown that honey can reduce the upward flow of stomach acid and undigested food by lining the esophagus and stomach.

This has helped to reduce the risk of gastroesophageal reflux disease (GERD). GERD can cause inflammation, acid reflux, and heartburn.

4) Fighting Infections

In 2010, scientists from the Academic Medical Center at the University of Amsterdam reported in *FASEB Journal* that honey's ability to kill bacteria lies in a protein called defensin-1.

A more recent study in the *European Journal of Clinical Microbiology & Infectious Diseases* showed that a certain type of honey, called Manuka honey, can help prevent the

bacteria *Clostridium difficile* from settling in the body. *C. difficile* is bacteria for causing severe diarrhea and sickness.

Some studies have revealed that Manuka honey may even be effective for the treatment of MRSA infections.

Manuka honey may even help reverse bacterial resistance to antibiotics, according to research presented in the journal *Letters in Applied Microbiology*. This type of honey showed action against *Ureaplasma urealyticum*, a bacteria that is resistant to many different antibiotics.

5) Relieving Cold And Cough Symptoms

The World Health Organization (WHO) recommends honey as a natural cough remedy.

The American Academy of Pediatrics also recognizes honey as a treatment for a cough.

However, They Advise That Honey Is Not Suitable For Children Under The Age Of One Year.

A 2007 study by Penn State College of Medicine suggested that honey reduced night-time coughing and improved sleep quality in children with upper respiratory infection to a greater degree than the cough medicine dextromethorphan. [58]

MEDICINAL USES:

Honey has been used to treat a wide array of illnesses, ailments, and injuries.

It can be mixed with other remedies and consumed or rubbed onto the skin. Practitioners of Ayurvedic medicine have attempted to use honey as a remedy for the following:

- Stress
- Weakness
- Sleep Disturbance
- Vision Problems
- Bad Breath
- Teething Pain

- Cough And Asthma
- Hiccups
- Stomach Ulcers
- Diarrhea And Dysentery
- Vomiting
- Bedwetting And Frequent Urination
- High Blood Pressure
- Obesity
- Jaundice
- Hangover Relief
- Eczema And Dermatitis
- Burns, Cuts, And Wound
- Arthritis [58]

Honey has been suggested as potentially useful for various conditions of the gastrointestinal tract, such as periodontal and other oral disorders, dyspepsia, and as part of oral rehydration therapy. [59]

4.5. PHARMACEUTICAL REVIEW

Pharmaceutics is a discipline of pharmacy that deals with the process of turning a new chemical entity to be used safely and effectively by the patients. (Formulation of pure drug substance into dosage form).

Siddha pharmaceutics has very minute chemical processes in it. It has several chemical processes like purification of raw substances, grinding them with herbal juices for several days and subjecting the ground material to fire by way of pudam process. Medicines prepared according to the above methods undergo several chemical changes. [60]

Siddha medicines are classified into internal medicines (32) and external medicines (32). The drug taken for dissertation is in the form of *Chenduram*. *Chenduram* comes under the category of internal medicines.

***CHENDURAM*:**

Definition:

Chenduram are a category of medicines made from metals or minerals (arsenicals or mercurials or salts) by grinding them with specified juices or distillates or extractives and subjecting them to a process of sublimation or calcination or burning or frying or exposing to insolation till the characteristic reddening of the product takes place. [61]

Shelf Life

The *Chenduram* are said to retain their potency for 75 years

Preservation And Storage

To be stored in a clean, dry and air tight glass containers.

Method Of Preparation:

Usually two method of preparation are adopted in their processing through there are some exceptions and variants.

1. Sublimation by the sand – bath process
2. Calcination.

1. Sublimation By The Sand - Bath Process *(Kuppi Erippu)*:

If the *chenduram* has sulfur and mercury as its components, sulfur is ground to a fine powder in the mortar and grinding should be continued with the addition of the

given quantity of mercury, till a black impalpable mobile powder is obtained. Only often this, the other ingredients are to be added.

In the conventional set up of the sand –bath sublimation contrivance, a heat resistant glass flask with a long neck is used as the container for the drug ingredients. Ceramic ware had also been in use. Before being put to use, these container are wound around with clay ameared cloth ribbons so as to give seven superimposed layers, leaving open the marth of the flask. The flask thus encased should be kept for perfect drying of the covering.

It has been found in recent times that one could make use of the enameled iron bowls instead of glass flasks.

When using enameled iron bowls, two identical bowls of appropriate dimensions and capacity should be selected and checked for neat contact of rims when juxtaposed. Then small holes should be punched along the margins so that the two bowls could be fastened with a bonding wire (metallic). Then a perforation is made in the centre of the bottom of one of the bowls. Having prepared the bowls thus, they should be secured and bound by pasting the binding wire through the marginal holes. This would produce a capsule with a top orifice. Clay smeared cloth tape is wound around as would be done for the glass flask, leaving the central opening uncovered. This opening is the one through which the reaction going on inside is inspected by inserting a probe.The sand – bath is set up by taking a wide earthern trough and spreading fine gravel or coarse sand at the bottom to a depth of two centimetres.

The capsule into which the drug ingredients are put is placed on the gravel or sand and is properly centered. Then the sides packed with sands, leaving the top two centimetres unpacked and exposing the capsule. When using glass flasks, the neck should be just out of the sand. This setup is placed on the oven and heat is applied, by burning fire wood. In the application of heat, there gradations are recognized. These three stages, mild, moderate and intense are best understood and mastered with some experience. It is said that, if the flames are convergent and resemble a single tongue of flame as in a lamp, it is mild fire (*Deepakkini*). If several such tongues of flame lick the vessel and diverge like the flower of lotus, it is moderate (*Kamalakkini*). If the multiple tongues of flame fill the oven and enrich the sand bath. It is the intense stage of fire (*Katakkini*).

These stages of fire should be manipulated and followed as prescribed in the method of preparation. In general, the heating is spread over three continuous days. In such cases, mild, moderate and intense stages are maintained for 24 hours each, in that order of succession.

According to the composition and amount of sulfur in the preparation, the mixture of drugs placed in the capsule will start melting sooner or later. Sulfur starts escaping first in the form of yellow vapour through the opening. Later it will start burning sending out a jet of blue flame. Just when the blue flame goes out if a long probe of steel wire is inserted into the orifice and drawn out the portion that enters the container will show a whitish coating. If the sulfur is still present and not totally burnt out, the probe will have a black sticky coat, when there is no blackening of the probe and when whitish coat indicating should be closed and heating continued for one or two hours and then the heat withdrawn and the setup is allowed to cool by itself.

When the setup has cooled down, the capsule containing the medicine is taken out and the clay tape winding cut out. The material that has sublimed in upper bowl is gently tapped with suitable beater or lifted with a spatula. The sublimate collected should be finely ground in a mortar.

If the glass flasks had been used, the flask is carefully broken, open to collect the medicine that has sublimed in around the neck.

2. Calcination *(Putam)*:

The powder is ground in a *Kalvam* with specified fluids for a specified time. The paste is made into small discs and dried. They are put in earthern saucers (*man agal*) covered with another and the edge well sealed with mud cloth. It is allowed to dry. The cups are placed in the middle of cow – dung cakes and burnt. For *Putams,* generally pits of various depths and circumferences are made in the ground. Half of the pit is covered with cow – dung cakes. The earthern cups are placed and it is covered again with cow-dung cakes. The fire is put in the middle of the heap on all the four sides so that there would be uniform heat from all the sides.

All the metals and other ingredients are taken after the usual purification. In specified cases, specific purification (*Suddhi*) is mentioned; otherwise, it is to be taken as general method of purification for the drug as mentioned in Materia- Medica books.

Other Method Of Preparations:

1. Prepared without heating *(Araippu Chenduram)*
2. Prepared by open heating *(Erippu or Varuppu Chenduram)*
3. Prepared by applying heat in the range close to 100◦c *(Lagu Puda Chenduram).*

Bhasma literally means, anything inorganic or organic material burnt into its ash. The process of burning of a substance is known as *Marana* (Calcination). [61]

5. STANDARDIZATION OF THE DRUG *BEDHI CHENDURAM*

5.1. STANDARDIZATION OF THE DRUG *BEDHI CHENDURAM* AS PER SIDDHA CLASSICAL LITERATURE : [62]

Analysis As Per Classical Siddha Literature:

Floating on Water

Fine enough to enter the crevices of finger

Irreversible reaction

Tasteless

Lusterless

Floating On Water:

A pinch of *Chenduram* gently placed on the still surface of water in a vessel, did not sink immediately. It was found that the particles *Bedhi Chenduram* floated over the surface of water indicated lightness of the trial.

Fine Enough To Enter The Crevices Of Finger:

Chenduram in well prepared form should be fine. When taken between thumb and index finger, the fine powder will fill up the lines of the finger print. A pinch of *Bedhi chenduram* was taken in between the thumb and index finger and rubbed. It was found that the *Bedhi chenduram* entered into the lines of the finger, and was not easily washed out from the lines, confirmed its fineness.

Irreversible Reaction:

The well prepared *chenduram* does not reversible to its metallic state when heated with a mixture of cane jaggery, hemp powder, ghee and honey. A pinch of *Bedhi chenduram* was taken and mixed with cane jaggery, ghee and honey. It was observed that the *Bedhi chenduram* did not reversible to its metallic state.

Tasteless:

The well prepared *chenduram* should be completely tasteless . Presence of any taste like sweet or bitter indicate incomplete preparation which needed another Calcination process. When a small amount of *Bedhi chendram* was kept on the tip of the tongue, no specific taste was found.

Lusterless:

If any shining particles present in *chenduram*, it indicates that the *chenduram* is not manufactured properly and contains unchanged substances like minerals, metals and other toxic substances. There should be no shining particles present in the well manufactured *chenduram*. The *bedhi chenduram* was taken in a Petri bowl and observed for any luster in daylight through magnifying glass. No luster was observed in the *Bedhi chenduram.*

5.2. STANDARDIZATION OF THE DRUG *BEDHI CHENDURAM* BY USING MODERN TECHNIQUES:

Standardization of drugs helps to prove its identity and determination of its quality and potency. Standardization of the siddha formulation is based on the qualitative and quantitative analysis through physico-chemical investigations and instrumental analysis.

As per AYUSH protocol for standardization, the following parameters were evaluated

- **Organoleptic Characters**
  - Colour
  - Odour
  - Taste
  - State of matter
  - Consistency
  - Shape
  - Size
- **Physicochemical Studies**
  - Determination of Ash Values
  - Determination of Extractive Value
  - Physical characterization
- **Chemical Analysis**
  - Preliminary Basic and Acidic radical studies
- **Instrumental Analysis**
  - Fourier Transform Infra-Red Spectroscopy (FTIR)
  - Atomic Absorbtion Spectrometry (AAS)
  - X-Ray Flurorescence (XRF)
  - Thin Layer Chromatogrphy (TLC)

5.2.1. ORGANOLEPTIC CHARACTERIZATION OF *BEDHI CHENDURAM*:

Colour

The *Bedhi chenduram* was taken into watch glasses and placed against white back ground in white tube light. It was observed for its colour by naked eye.

Odour

The *Bedhi chenduram* was smelled individually. The time interval among two smelling was kept 2 minutes to nullify the effect of previous smelling.

Taste

Small amount of *Bedhi chenduram* was kept over the tip of the tongue.

5.2.2. PHYSICOCHEMICAL ANALYSIS

PHYSICAL PROPERTIES OF *BEDHI CHENDURAM*

The physical properties of *Bedhi Chenduram* was analyzed at VS **CLINICAL RESEARCH AND HOSPITAL (P) LTD**, Taramani, Chennai – 600113.

Physico-chemical studies of the plant drugs are necessary for standardization, as it helps in under- standing the significance of physical and chemical properties of the substance being analyzed in terms of their observed activities and especially for the determination of their purity and quality. The analysis includes the determination of ash value, Loss on drying of the sample at 105ºC, pH value and Extractive value. These were carried out as per guidelines.

PROCEDURE:

Determination Of Total Ash

2 to 3 g of drug was weighed in the pre weighed and tared Gooch crucible was kept in the muffle furnace at a temperature not exceeding 450ºC until free from carbon then cooled and weighed and the percentage of the total ash content were calculated with reference to the air dried drug.

Determination Of Acid Insoluble Ash

The ash obtained in total ash content was boiled with 25ml of dilute hydrochloric acid for 5 minutes insoluble matter were collected in an ash less filter paper and washed with the hot water and ignited to constant weight and the percentage of the acid insoluble ash content were calculated with reference to the air dried drug

Determination Of Moisture Content (Loss On Drying)

10 g of the drug without preliminary drying were weighed accurately in a tared evaporating dish dried at 105ºC for 5 hours, weighed and continued to the drying and weighing at one hour interval until difference between two successive weighings of the sample corresponds to not more than 0.25 percent. When two consecutive weighings after drying for 30 minutes and cooling for 30 minutes in a desiccator, obtained less than 0.01 g weight difference shows the constant weight.

Determination Of Water Soluble Extractive

5g of coarsely powdered air dried drug was macerated with 100ml of chloroform-water in a closed flask for twenty-four hours, shaken frequently during six hours and allowed to stand for eighteen hours. After filtering the solution 25ml of this filtrate was evaporated in a tared flat bottomed shallow dish, and dried at 105ºC until a constant weight was obtained. Later the percentage of water-soluble extractive with reference to the air-dried drug was calculated.

Determination Of Alcohol Soluble Extractive

5g of coarsely powdered air dried drug was macerated with 100ml of absolute alcohol in a closed flask for twenty-four hours, shaken frequently during six hours and allowed to stand for eighteen hours. After filtering the solution 25ml of this filtrate was evaporated in a tared flat bottomed shallow dish, and dried at 105ºC until a constant weight was obtained. Later the percentage of alcohol-soluble extractive with reference to the air-dried drug was calculated.

5.2.3. CHEMICAL ANALYSIS OF *BEDHI CHENDURAM*:

The chemical analysis of *Bedhi Chenduram* was carried out in Bio chemistry lab, National Institute of Siddha.

S.No	EXPERIMENT	OBSERVTION	INFERENCE
1.	**Physical Appearance of extract**	Dark brown in colour	
2.	**Test for Silicate** A 500mg of the sample was shaken well with distilled water.	Sparingly soluble	**Presence of Silicate**
3.	**Action of Heat** A 500mg of the sample was taken in a dry test tube and heated gently at first and then strong.	No White fumes evolved.	Absence of Carbonate
4.	**Flame Test** A 500mg of the sample was made into a paste with Con. HCl in a watch glass and introduced into non-luminous part of the Bunsen flame.	No Bluish green flame appeared	Absence of copper
5.	**Ash Test** A filter paper was soaked into a mixture of extract and dil. cobalt nitrate solution and introduced into the Bunsen flame and ignited.	No Appearance of yellow colour flame	Absence of sodium

ESTIMATION OF ACID AND BASIC RADICALS

Preparation of Extract:

5gm of sample was taken in a 250ml clean beaker and added with 50ml of distilled water. Then it was boiled well for about 10 minutes. Then it was cooled and filtered in a 100ml volumetric flask and made up to 100ml with distilled water. This preparation was used for the qualitative analysis of acidic/basic radicals and biochemical constituents in it.

S.No	EXPERIMENT	OBSERVATION	INFERENCE
	I. TEST FOR ACID RADICALS		
1.	**Test For Sulphate** 2ml of the above prepared extract was taken in a test tube to this added 2ml of 4% dil ammonium oxalate solution	Cloudy appearance present	**Presence of Sulphate**
2.	**Test For Chloride** 2ml of the above prepared extract was added with 2ml of dil-HCl until the effervescence ceases off.	No Cloudy appearance was formed	Absence of Chloride
3.	**Test For Phosphate** 2ml of the extract was treated with 2ml of dil.ammonium molybdate solution and 2ml of Con.HNo3	Cloudy appearance was evolved.	**Presence of Phosphate**
4.	**Test For Carbonate** 2ml of the extract was treated with 2ml dil. magnesium sulphate solution.	Cloudy appearance was evolved.	**Presence of carbonate**

5.	**Test For Nitrate** 1gm of the extract was heated with copper turning and concentrated H2SO4 and viewed the test tube vertically down.	No Brown gas was evolved	Absence of nitrate
6.	**Test For Sulphide** 1gm of the extract was treated with 2ml of Con. HCL	No rotten egg smelling gas was evolved	Absence of Sulphide
7.	**Test For Fluoride & Oxalate** 2ml of extract was added with 2ml of dil. Acetic acid and 2ml dil. calcium chloride solution and heated.	No cloudy appearance.	Absence of fluoride and oxalate
8.	**Test For Nitrite** 3drops of the extract was placed on a filter paper, on that-2 drops of dil.acetic acid and 2 drops of dil. Benzidine solution were placed.	No characteristic changes were noted.	Absence of nitrite
9.	**Test For Borate** 2 Pinches (50mg) of the extract was made into paste by using dil.sulphuric acid and alcohol (95%) and introduced into the blue flame.	No Appearance of bluish green colour.	Absence of borate

II. TEST FOR BASIC RADICALS

1.	**Test For Lead** 2ml of the extract was added with 2ml of dil. potassium iodine solution.	No Yellow precipitate was obtained	Absence of lead
2.	**Test For Copper** One pinch (25mg) of extract was made into paste with Con. HCl in a watch glass and introduced into the non-luminuous part of the flame.	No blue colour appeared	Absence of copper
3.	**Test For Aluminium** To the 2ml of extract dil. sodium hydroxide was added in 5 drops to excess.	yellow Colour appeared	**Presence of Aluminium**
4.	**Test For Iron** a. To the 2ml of extract, added 2ml of dil. ammonium solution. b. To the 2ml of extract 2ml thiocyanate solution and 2ml of con.HNO3 were added.	Mild Red colour appeared	**Presence of Iron**
5.	**Test For Zinc** To 2ml of the extract dil. sodium hydroxide solution was added in 5 drops to excess and dil. Ammonium chloride was added.	White precipitate was formed	**Presence of Zinc**

6.	**Test For Calcium** 2ml of the extract was added with 2ml of 4% dil.ammonium oxalate solution	Cloudy appearance and white precipitate was formed	**Presence of calcium**
7.	**Test For Magnesium** To 2ml of extract dil. sodium hydroxide solution was added in 5 drops to excess.	White precipitate was obtained	**Presence of magnesium**
8.	**Test For Ammonium** To 2ml of extract 1 ml of Nessler's reagent and excess of dil.sodium hydroxide solution were added.	Brown colour appeared	**Presence of ammonium**
9.	**Test For Potassium** A pinch (25mg) of extract was treated with 2ml of dil. sodium nitrite solution and then treated with 2ml of dil. cobalt nitrate in 30% dil. glacial acetic acid.	Yellow precipitate was obtained	**Presence of potassium**
10.	**Test For Sodium** 2 pinches (50mg) of the extract was made into paste by using HCl and introduced into the blue flame of Bunsen burner.	No yellow colour flame evolved.	Absence of sodium
11.	**Test For Mercury** 2ml of the extract was treated with 2ml of dil. sodium hydroxide solution.	No Yellow precipitate was obtained	Absence of Mercury
12.	**Test For Arsenic** 2ml of the extract was treated with 2ml of dil. sodium hydroxide solution.	No Brownish red precipitate was obtained	Absence of arsenic

III. MISCELLANEOUS

1.	**Test For Starch** 2ml of extract was treated with weak dil.Iodine solution	Blue colour developed	**Presence of starch**
2.	**Test For Reducing Sugar** 5ml of Benedict's qualitative solution was taken in a test tube and allowed to boil for 2 minutes and added 8 to 10 drops of the extract and again boil it for 2 minutes. The colour changes were noted.	No Brick red colour is developed	Absence of reducing sugar
3.	**Test For Alkaloids** a) 2ml of the extract was treated with 2ml of dil.potassium lodide solution. b) 2ml of the extract was treated with 2ml of dil.picric acid. c) 2ml of the extract was treated with 2ml of dil.phosphotungstic acid.	Yellow colour developed	**Presence of of Alkaloid**
4	**Test For Tannic Acid** 2ml of extract was treated with 2ml of dil. ferric chloride solution	No Blue-black precipitate was obtained	Absence of Tannic acid
5	**Test For Unsaturated Compound** To the 2ml of extract, 2ml of dil. Potassium permanganate solution was added.	Potassium permanganate was not decolourised	Absence of unsaturated compound
6	**Test For Amino Acid** 2 drops of the extract was placed on a filter paper and dried well. 20ml of Burette reagent was added.	No Violet colour appeared	Absence of amino acid
7	**Test For Type of Compound** 2ml of the extract was treated with 2 ml of dil. ferric chloride solution.	No green and red colour developed	Absence of quinole pinephrine and pyrocatechol.

		No Red colour developed No Violet colour developed No Blue colour developed.	Absence of Antipyrine, Aliphatic amino acid and meconic acid are absent. Apomorphine salicylate and Resorcinol were absent Morphine, Phenol cresol and hydrouinone were Absent

5.2.4. FOURIER TRANSFORM INFRARED SPECTROSCOPY (FTIR)[63], [64]

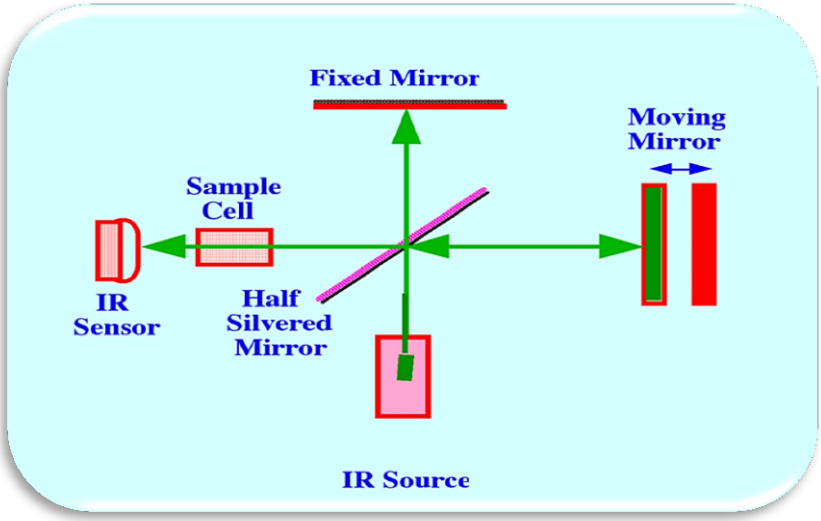
INSTRUMENT DETAILS:

Model	: Perkin Elmer- Spectrum one: FT-IR Spectroscopy
Scan Range	: MIR 450-4000 cm-1
Resolution	: 4cm-1

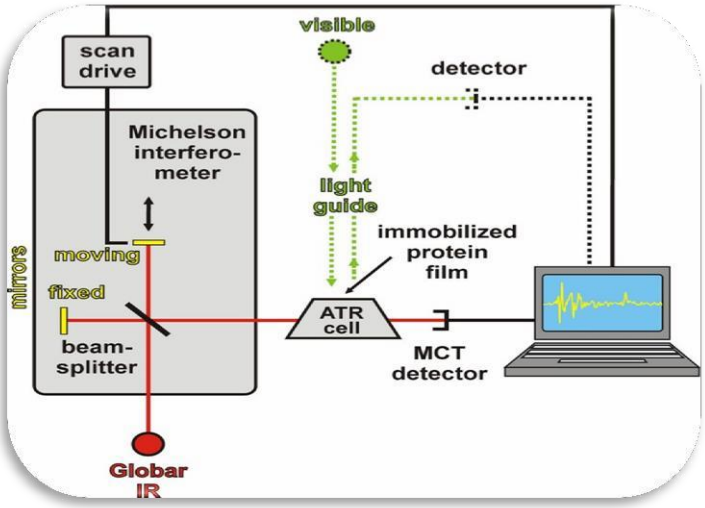
PRINCIPLE:

Fourier Transform Infrared Spectroscopy (FTIR) is an analytical technique used to identify mainly organic materials. FTIR analysis results in absorption spectra which provide information about the chemical bonds and molecular structure of a material. The FTIR spectrum is equivalent to the "fingerprint" of the material and can be compared with cataloged FTIR spectra to identify the material.

Fourier Transform Infrared Spectroscopy (FTIR)



FTIR MECHANISM



Mechanism of FTIR analyzer

FOURIER TRANSFORMS INFRARED SPECTROSCOPY ANALYTICAL CAPABILITIES:

- Identifies chemical bond functional groups by the absorption of infrared radiation which excites vibrational modes in the bond
- Especially capable of identifying the chemical bonds of organic materials
- Detects and Identifies organic contaminants
- Identifies water, phosphates, sulphates, nitrates, nitrites, and ammonium ions
- Detection limits vary greatly, but are sometimes $<10^{13}$ bonds/cm^3 or sometimes sub monolayer
- Useful with solids, liquids, or gases.

APPLICATIONS:

Infrared spectrum is useful in identifying the functional groups like -OH, - CN, -CO, -CH, -NH2, etc. Also quantitative estimation is possible in certain cases for chemicals, pharmaceuticals, petroleum products, etc. Resins from industries, water and rubber samples can be analyzed.

SAMPLE PREPARATION METHOD:

FT-IR spectra were recorded at SAIF, IIT Madras, India. The Perkin Elmer Spectrum One Fourier Transform Infrared (FTIR) Spectrometer was used to derive the FT IR Spectra of *Bedhi Chenduram* in Potassium Bromide (KBr) matrix with scan rate of 5 scan per minute at the resolution 4cm-1 in the wave number region 450- 4000cm-1. The samples were grounded to fine powder using agate motor and pestle and then mixed with KBr. They were then Pelletized by applying pressure to prepare the specimen (the size of specimen about 13 mm diameter and 0.3 mm in thickness) to recorded the FT- IR Spectra under Standard conditions. FT- IR Spectra were used to determine the presence of the functional groups and bands in the *Bedhi Chenduram*.

5.2.5. ATOMIC ABSORBTION SPECTROMETER: [65]

INSTRUMENT

Atomic Absorbtion Spectrometer with Air – acetylene

APPARATUS AND EQUIPMENT

500 ml glaas beakers, hot plate, watch glass, 100ml standard flask

CHEMICALS

Nitric acid, hydrochloric acid, certified reference standards.

SAMPLE PREPARATION FOR AAS ANALYSIS

As per the standard preparation of solution for the AAS, usually solution of 50 ml was prepared, in the proportion 1:25:25 ratio i.e., 1gm of sample were digested in 25 ml Conc. HCL and 25ml of Double distilled water and kept overnight and filtered the solution by Whatman filter paper, 50ml of prepared solution was added with 950ml of Double distilled water, finally 1000ml solution was prepared which is used for the analysis purposes.

CALCULATION

Percentage of the element = A / B X 100

A: Concentration of sample in ppm

B: Dilution facter

5.2.6. X-RAY FLUORESCENCE SPECTROMETER (XRF):

Image of X-ray Fluorescence Spectrometer

An X-ray fluorescence (XRF) spectrometer is an x-ray instrument. It is used for regular, relatively non-destructive chemical analyses of rocks, minerals, sediments and fluids. It works on wavelength-dispersive spectroscopic principles that are related to an electron microprobe (EPMA). However, it cannot commonly make analyses at the small spot sizes classic of EPMA work (2-5 microns), so it is typically used for mass analyses of larger fractions. The relative easiness and low cost of sample preparation, and the constancy and easiness of use of x-ray spectrometers create this one of the most extensively used methods for analysis of major and trace elements in rocks, minerals, and sediment and fluids.

PRINCIPLES OF X-RAY FLUORESCENCE:

The XRF method depends on fundamental principles which are general to several other instrumental methods involving connections between electron beams and x-rays with samples, including: X-ray spectroscopy (e.g., SEM - EDS), X-ray diffraction (XRD), and wavelength dispersive spectroscopy (microprobe WDS).The analysis of major and trace elements in samples by XRF is made possible by the behaviour of atoms when they interact with radiation. When samples are energized with high-energy, short wavelength radiation (e.g., X-rays), they can become ionized. If the energy of the radiation is adequate to displace a tightly-held inner electron, the atom becomes unsteady and an outer electron replaces the missing inner electron. When this happens, energy is released due to the decreased binding energy of the inner electron orbital compared with an outer one. The emitted radiation is of lower energy than the primary incident X-rays

and is termed fluorescent radiation. Because the energy of the emitted photon is typical of a transition between specific electron orbitals in a particular element, the resulting fluorescent X-rays can be used to identify the abundances of elements that are present in the sample.

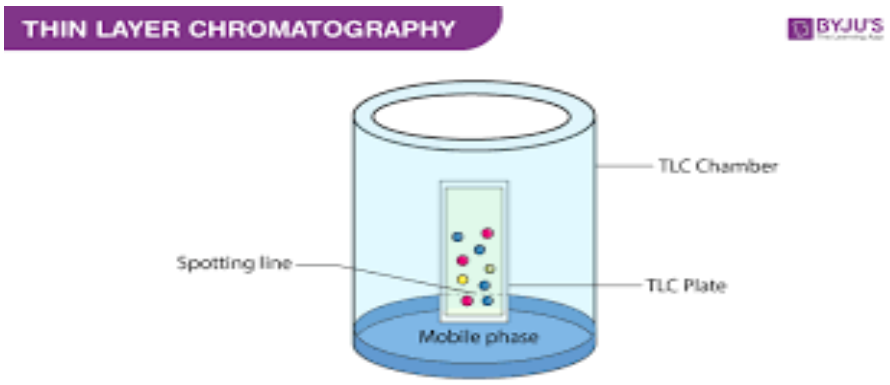
5.2.7. THIN LAYER CHROMATOGRAPHY: [66]

Thin Layer Chromatography is a technique used to isolate non-volatile mixtures. The experiment is conducted on a sheet of aluminium foil, plastic, or glass which is coated with a thin layer of adsorbent material. The material usually used is aluminium oxide, cellulose, or silica gel.

On completion of the separation, each component appears as spots separated vertically. Each spot has a retention factor (R_f) expressed as:

R_f = dist. travelled by sample / dist. travelled by solvent

The factors affecting retardation factor are the solvent system, amount of material spotted, absorbent and temperature. TLC is one of the fastest, least expensive, simplest and easiest chromatography technique.



THIN LAYER CHROMATOGRAPHY PRINCIPLE

Like other chromatographic techniques, thin layer chromatography (TLC) depends on the separation principle. The separation relies on the relative affinity of compounds towards both the phases. The compounds in the mobile phase move over the surface of the stationary phase. The movement occurs in such a way that the compounds which have a higher affinity to the stationary phase move slowly while the other compounds travel fast. Therefore, the separation of the mixture is attained. On

completion of the separation process, the individual components from the mixture appear as spots at respective levels on the plates. Their character and nature are identified by suitable detection techniques.

THIN LAYER CHROMATOGRAPHY PROCEDURE

Before starting with the Thin Layer Chromatography Experiment let us understand the different components required to conduct the procedure along with the phases involved.

1. Thin Layer Chromatography Plates – ready-made plates are used which are chemically inert and stable. The stationary phase is applied on its surface in the form of a thin layer. The stationary phase on the plate has a fine particle size and also has a uniform thickness.

2. Thin Layer Chromatography Chamber – Chamber is used to develop plates. It is responsible to keep a steady environment inside which will help in developing spots. Also, it prevents the solvent evaporation and keeps the entire process dust-free.

3. Thin Layer Chromatography Mobile phase – Mobile phase is the one that moves and consists of a solvent mixture or a solvent. This phase should be particulate-free. The higher the quality of purity the development of spots is better.

4. Thin Layer Chromatography Filter Paper – It has to be placed inside the chamber. It is moistened in the mobile phase.

6. PHARMACOLOGICAL STUDY

EVALUATION OF ANTI-DIARRHEAL ACTIVITY OF *BEDHI CHENDURAM* IN WISTAR ALBINO RATS: [67], [68], [69]

Aim:

To study the Anti-diarrheal effect of *Bedhi Chenduram* in Wistar albino rats by castor oil-induced method.

Materials and methods:

Test Substance	**:**	***BEDHI CHENDURAM***
Animal Source	**:**	TANUVAS, Madhavaram, Chennai.
Animals	**:**	Wistar Albino Rats (Male -12, Female -12)
Age	**:**	6-8 weeks
Body Weight	**:**	140-160gm.
Acclimatization	**:**	14 days prior to dosing.
Veterinary examination	**:**	Prior and at the end of the acclimatization period
Identification of animals	**:**	By cage number, animal number and individual marking by using Picric acid
Diet	**:**	Pellet feed
Water	**:**	Aqua guard portable water in polypropylene bottles
Housing & Environment	**:**	The animals were housed in Polypropylene cages provided with bedding of husk.
Housing temperature	**:**	24-28°C
Relative humidity	**:**	between 30% and 70%,
Air changes	**:**	10 to 15 per hour
Dark and light cycle	**:**	12**:**12 hours.

SELECTION OF ANIMALS:

Healthy Wistar albino rats (140- 160g) of both sexes were used for this study with the approval of the Institutional Animal Ethics Committee and obtained from the animal laboratory. **IAEC approved no: NIS/IAEC-V/09082017/04.**

The animals kept in plastic cages and maintained at 24-28°C. All the rats were housed individually with free access to food, water and libitum. They were feed with standard diet and kept in well ventilated animal house and they also maintained with alternative dark-light cycle of 12hrs throughout the studies. Rats were allowed an acclimatization period of 14 days before actual experiments. The rats were closely observed for any infection and if they show any signs of infection they were excluded from the study. The animal experiment was performed with accordance to legislation on welfare.

THE EXPERIMENTAL PROTOCOL:

Animal grouping:

Both sex of Adult wistar Albino rats weighing (140-160g) were used in this study. Rats were divided into 4 groups, consisting six animals for each group.

Group I : Vehicle control - received only honey orally

Group II : Received Standard drug Loberamide (5mg/kg orally)

Group III : Received *Bedhi chenduram* (50 mg/kg orally)

Group IV : Received *Bedhi Chenduram* (140 mg/kg orally)

ANTI-DIARRHEAL ACTIVITY: (CASTOR OIL INDUCED METHOD)

The animal were deprived food for 12 h prior to the test, with free access to water.

Group 1 received the vehicle (Honey) alone, while those in

Group 2 received Loberamide (5mg/kg) as positive control. Animals in

Groups 3 received *Bedhi Chenduram* 50mg/kg and

Group 4 received *Bedhi Chenduram* 140 mg/kg respectively.

Bedhi Chenduram administration was by the oral route. The animals were housed singly in cages lined with pre- weighed filter paper. One hour after pretreatment with the *Bedhi Chenduram*, the animals were then given 1 ml of castor oil orally and the time between oil administration and appearance of first diarrheal drop was noted. Thereafter, they were observed for 4 h for the presence of diarrhea and total weight of feces excreted was obtained.

The anti-diarrheal activity was calculated according to the following formula.

= % of faecal output mean faecal weight of each treatment group / Mean faecal weight of control x 100

STASTISTCAL ANALYSIS:

All the results were reported as mean + SD. They were further analyzed using one way analysis of variables (ANOVA) followed by Dunnet‘s multiple comparison test.

EVALUATION OF INTESTINAL MOTILITY ACTIVITY OF *BEDHI CHENDURAM* IN WISTAR ALBINO RATS*:* [67], [68], [69]

Aim

To study the Intestinal Motility Activity effect of *Bedhi Chenduram* in Wistar albino rats by Charcoal meal method.

Materials and methods:

Test Substance	**:**	***BEDHI CHENDURAM***
Animal Source	**:**	TANUVAS, Madhavaram, Chennai.
Animals	**:**	Wistar Albino Rats (Male -12, Female -12)
Age	**:**	6-8 weeks
Body Weight	**:**	140-160gm.
Acclimatization	**:**	14 days prior to dosing.
Veterinary examination	**:**	Prior and at the end of the acclimatization period.
Identification of animals	**:**	By cage number, animal number and individual marking by using Picric acid.
Diet	**:**	Pellet feed
Water	**:**	Aqua guard portable water in polypropylene bottles.
Housing & Environment	**:**	The animals were housed in Polypropylene cages provided with bedding of husk.
Housing temperature	**:**	24-28°C
Relative humidity	**:**	Between 30% and 70%,
Air changes	**:**	10 to 15 per hour
Dark and light cycle	**:**	12**:**12 hours.

SELECTION OF ANIMALS:

Healthy Wistar albino rats (140- 160g) of both sexes were used for this study with the approval of the Institutional Animal Ethics Committee and obtained from the animal laboratory. **IAEC approved no : NIS/IAEC-V/09082017/04.**

The animals kept in plastic cages and maintained at 24-28°C. All the rats were housed individually with free access to food, water and libitum. They were feed with standard diet and kept in well ventilated animal house and they also maintained with alternative dark-light cycle of 12hrs throughout the studies. Rats were allowed an acclimatization period of 14 days before actual experiments. The rats were closely observed for any infection and if they show any signs of infection they were excluded from the study. The animal experiment was performed with accordance to legislation on welfare.

THE EXPERIMENTAL PROTOCOL:

Animal grouping:

Both sex of Adult wistar Albino rats weighing (140-160g) were used in this study. Rats were divided into 4 groups, consisting six animals for each group.

Group I : Vehicle control received only (honey +1 ml of charcoal meal orally)

Group II : Received Standard drug Loberamide (5mg/kg+ 1 ml of charcoal meal Orally)

Group III : Received *Bedhi chenduram* (50 mg/kg +1 ml of charcoal meal orally)

Group IV : Received *Bedhi Chenduram* (140 mg/kg + 1 ml of charcoal meal orally)

INTESTINAL MOTILITY ACTIVITY: (CHARCOAL MEAL METHOD)

The animal will be divided into 4 groups. Each group consists of 6 rats .They were deprived of food for 12h before the test ,but allowed free access to water.

Group I rats (control) were treated with the vehicle.

Group II rats received Loperamide (5mg/kg), while

Groups III and IV received different doses of the *Bedhi chenduram*, respectively. 30 minutes after drug administration, 1 ml of charcoal meal was administered orally to all animals and 30 minutes later, all the rats were sacrificed and the abdomen was opened .The small intestine was dissected out from the pylorus to the cecum and the total distance travelled by the charcoal plug along the small intestine was estimatedfor both the control and the treated groups.The percentage distance travelled by the charcoal meal from the pylorus to the cecum was noted .

The intestinal motility activity was calculated according to the following formula.

% SIT = Distance travelled by charcoal meal (cm)/ Total length of intestine x 100

STASTISTCAL ANALYSIS

All the results were reported as mean + SD. They were further analyzed using one way analysis of variables (ANOVA) followed by Dunnet‘s multiple comparison test.

ANTI-SPASMODIC EVALUATION OF SIDDHA DRUG *BEDHI CHENDURAM* (BC) ON ACH INDUCED CONTRACTION ISOLATED CHICK ILEUM: [70], [71]

Institute : National Institute of Siddha

Sample Name : *Bedhi Chenduram* (BC)

Sample ID : BC

ANTI-SPASMODIC EVALUATION USING ISOLATED CHICK ILEUM

Chick ileum was purchased from local slaughter house in which the caecum part of the gut was lifted to identify the ileocaecal junction. About 2- 3cm of the ileum portion was cut and removed and immediately placed it in the watch glass containing physiological salt solution. Sufficient care was taken to avoid the damage to the gut muscle. Bath volume of about 25 ml was maintained, and the tissue was allowed to equilibrate for 30 min before adding test drug. Initial response on Acetylcholine induces the contraction in the ileal smooth muscles which were recorded on Kymograph by using frontal writing lever. Contact time of 30 sec, and 5 min time cycle was kept for proper recording of the responses. After measuring normal response the ileal preparation were incubated with test drug at the concentration of 500µg (0.5ml) for brief period of time and the concentration response curved of acetylcholine was then proceeded the height of response before and after incubation of test drug was measured for calculating the antagonist effect of the test drug

ANTISPASMODIC ACTIVITY OF *BEDHI CHENDURAM* EFFICACY STUDY REPORT

Name of the Investigator	Dr. R. Elakkiya
IAEC No	SU/CLATR/IAEC/XIII/137/2019
Title of the Study	Anti-Spasmodic Evaluation of Siddha formulation *Bedhi Chenduram* (BC) in albino mice
Type of the Study	Efficacy Study
Name of the Test Item	*Bedhi chenduram* (BC)
Natureand category of the Formulation	Siddha
Organization	National Institute of Siddha,Tambaram Sanatoruim, Chennai, Tamil Nadu 600047,India
Study Centre	Sathyabama Institute of Science and Technology, Chennai 600 119, Tamil Nadu, India

PHARMACOLOGICAL EVALUATION OF ANTI- SPASMODIC POTENTIAL OF SIDDHA FORMULATION *BEDHI CHENDURAM (BC)* ON CHARCOAL AND CASTOR OIL INDUCED INTESTINAL MOTILITY IN MICE: [72], [73], [74], [75]

Name of the Investigator	Dr. R. Elakkiya
IAEC No	SU/CLATR/IAEC/XIII/137/2019

Experimental Animals

Healthy Swiss albino mice weighing between 20-25 g were used for the study. The animals were housed in poly propylene cages and were kept in well ventilated with 100% fresh air by air handling unit (AHU). A 12 light / dark cycle were maintained. Room temperature was maintained between 22 ± 2° C and relative humidity 60–65%. They were provided with food (Sai feeds, Bangalore, India) and water ad libitum. All the

animals were acclimatized to the laboratory for 7 days prior to the start of the study. The experimental protocol was approved by The Institutional Animal Ethics Committee of Sathyabama Institute of science and technology, Chennai, Tamil Nadu, India

Evaluation Of Anti - Spasmodic Potential By Castor Oil Induced Purgation

Experimental mice were divided in to four groups of 6 animals each. In which group I served as control was administered with aqueous distilled water (2 mL/100 g body weight). The second group receives test drug BC at the dose of 50 mg/kg,p.o. The third group receives test drug BC at the dose of 150 mg/kg,p.o. Animal belongs to group IV received loperamide (3 mg/kg),p.o. 30 min after administration of the test and standard drug the animals were given with castor oil (0.2 mL) through gastric intubation followed by this each animal monitored for watery faecal material and number of defecation up to 4 h in the transparent metabolic cages with filter paper at the base. The percentage protection offered by the trial drug will be calculated accordingly.

Assessment Of Gastrointestinal Motility By Charcoal Meal Test

Experimental mice were divided in to four groups of 6 animals each. All the mice were starved for 16hrs prior to the start of the experiment. In which group I served as control was administered with aqueous 0.5% tragacanth suspension. The second group receives test drug BC at the dose of 50 mg/kg,p.o. The third group receives test drug BC at the dose of 150 mg/kg,p.o. Animal belongs to group IV received loperamide (3 mg/kg),p.o. 15 min after administration of the test and standard drug the animals were given with 0.5 ml of 10% activated charcoal suspended in 5% aqueous tragacanth p.o., Animals were euthanized 30 min after charcoal meal administration by high dose of anesthesia. The abdomen was cut off and the small intestine carefully removed. The distance travelled by charcoal plug from pylorus to caecum was measured, and expressed as percentage of the distance traveled by charcoal plug for each of animal.

7. RESULTS

Studies have been carried out to bring the efficacy and potency of the drug ***Bedhi Chenduram***.

The study includes literary collections, organoleptic character, physicochemical analysis, pharmacological and analytical studies. The drug *Bedhi Chenduram* has been selected from the text **"Anubogavaidhya navaneetham".**

STANDARDIZATION OF THE DRUG

STANDARDIZATION OF THE DRUG *BEDHI CHENDURAM*

AS PER SIDDHA CLASSICAL LITERATURE:

Siddhars used these following standardization methods to ensure the safety and efficacy of the *chenduram*. It shows the effectiveness of the drug.

Table. No. 1 Results Of Siddha Standardization

S.NO	Parameter	Results Of *Bedhi Chenduram*	Interpretation
1.	Floating on Water	Floats on water	Lightness of drug.
2.	Finger Print Test	Impinged in the furrow of fingers	Indicates fine particles of powder.
3.	Luster	Lusterless	Change of specific character of raw material after incineration
4.	Taste	No specific taste, Mild irritation is felt	Change of specific character of raw material after incineration

Interpretation:

Floating on water:

The test drug which was float on water has less specific gravity.

Thus *Bedhi chenduram* possesses specific gravity less than the water.

Finger print test:

Only the particles which are in micro fine size can enter into the furrows of the finger print. Finger print test indicates the presence of micro fine particles in *bedhi chenduram.*

Lusterless & taste:

Bedhi chenduram is lusterless and tasteless because there is no free metal present.

STANDARDIZATION OF THE DRUG *BEDHI CHENDURAM* BY USING MODERN TECHNIQUES:

Traditional remedies is advantageous, it does suffer some limitations. The main limitation is the lack of standardization of raw materials, of processing methods and of the final products, dosage formulation, and the non- existence of criteria for quality control. Standardization of the drug is more essential to derive the efficacy, potency of the drug by analyzing it through various studies. Following tables and charts are the results of physicochemical and chemical analysis. Physical characterization and estimation of basic and acidic radicals have been done and tabulated. Pharmacological activity and analytical studies of the drug were derived. Its result has been tabulated below.

ORGANOLEPTIC CHARACTERS:

Table. No. 2 .Organoleptic Characters Of *Bedhi Chenduram*

S.No	Parameter	Result
1.	Colour	Dark brown in colour
2.	State of the drug	Powder
3.	Consistency	Fine powder
4.	Solubility	Sparingly soluble in water, DMSO Well soluble in acids (Hcl and H_2So_4)
5.	Sense on touch	Fine
6.	Sense on taste	Tasteless
7.	Sense of sm	No significant smell is observed

Table.No.3.Physicochemical Characterization Of *Bedhi Chenduram*

S.No	Tests performed	Result
1	Moisture Content (Loss on Drying)	**1.378%**
2	Total Ash	**0% Ash content**
3	Acid Insoluble Ash	**0% acid insoluble ash content**
5	Water soluble extractive	**8.2%**
6	Alcohol soluble extractive	**0.73%**
7	TLC	**Complies**

CHEMICAL ANALYSIS OF *BEDHI CHENDURAM*

S.NO	Parameter	Results
1	Test for silicate	Present
2	Action on heat	-
3	Flame test	-
4	Ash test	-

Table. No.4. Results Of Basic And Acidic Radical Studies Of *Bedhi Chenduram*

S.NO	Parameter	Observation	Result
1	Test for Sulphate	Cloudy appearance Present	Positive
2	Test for Chloride	-	Negative
3	Test For Phosphate	Cloudy appearance Present	Positive
4	Test For Carbonate	Cloudy appearance was evolved.	Positive
5	Test For Nitrate	-	Negative
6	Test for Sulphide	-	Negative
7	Test For Fluoride & Oxalate	-	Negative
8	Test For Nitrite	-	Negative
9	Test For Borate	-	Negative

S.NO	Parameter	Observation	Result
1	Test for Lead	-	Negative
2	Test for Copper	-	Negative
3	Test For Aluminium	Characteristic changes present	Positive
4	Test For Iron	Mild Red colour appeared	Positive
5	Test For Zinc	White precipitate is formed	Positive
6	Test for Calcium	Cloudy appearance and white precipitate was Formed	Positive
7	Test For Magnesium	White precipitate is obtained	Positive
8	Test For Ammonium	Brown colour appeared	Positive
9	Test For Potassium	Yellowish precipitate is obtained	Positive
10	Test For Sodium	-	Negative
11	Test For Mercury	-	Negative
12	Test For Arsenic	-	Negative

Miscellaneous

S.NO	Parameter	Observation	Result
1	Test for starch	Blue colour developed	Positive
2	Test for reducing sugar	-	Negative
3	Test for alkaloids	Yellow colour developed	Positive
4	Test for tannic acid	-	Negative
5	Test for unsaturated Compound	-	Negative
6	Test for amino acid	-	Negative

The result of preliminary chemical analysis reveals that the trail drug *bedhi chenduram* has **Silicate, Sulphate, Phosphate , Carbonate, Aluminium, Iron, Zinc, Calcium, Magnesium, Ammonium, Potassium, Starch, Alkaloids.**

FTIR

Fourier Transform Infra-Red Spectroscopy (FTIR) analysis results in absorption spectra provide information about the functional group and molecular structure of a material.

IR relates with the sample and the bonds among atoms in the molecule stretch and bend, absorbing infrared energy and creating the infrared spectrum. It is of two kinds bending and stretching. FT-IR is a very useful tool in the recognition of the functional groups of bio molecules, thus aiding in their structural elucidation, so confirming the presence of active molecules responsible for the therapeutic activity of Siddha drugs.

Bedhi chenduram has following functional group

Fig No: 10.FTIR Image Of Bedhi Chenduram

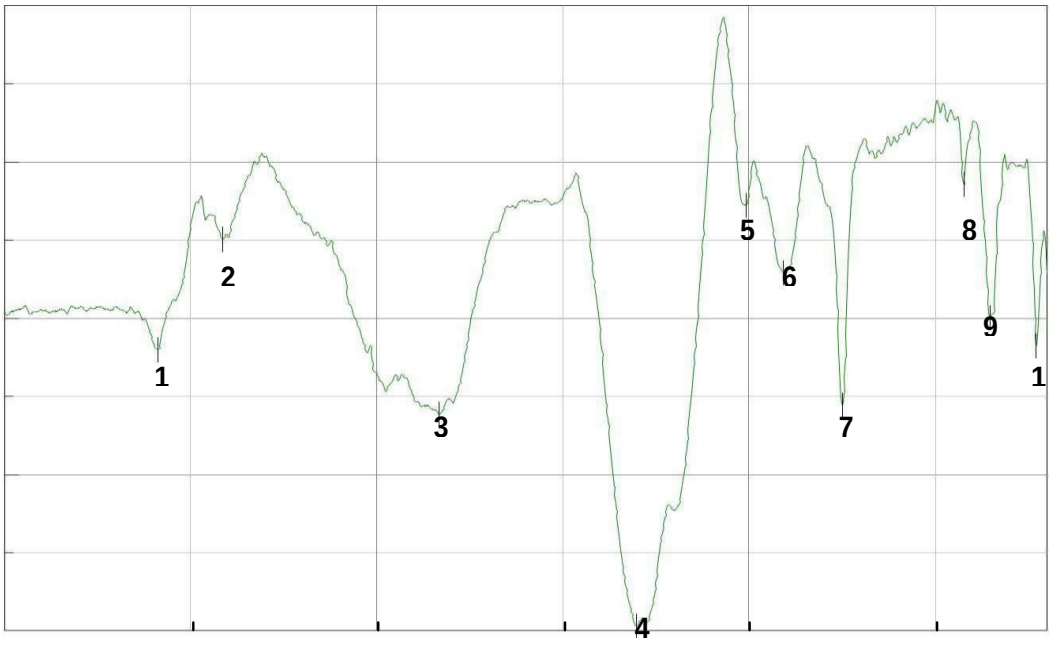


Table.No.5. FTIR Peak Interpretation

S.No	Peak	Intensity	Interpretation
1	**1793**	**77.9582**	C=O stretching, conjugate anhydride
2	**1706**	**85.006**	C=O stretching, primary amide
3	**1416**	**73.81**	O-H bending, carboxylic acid
4	**1151**	**60.2789**	C-O stretching, secondary alchol
5	**1003**	**87.1954**	C=F stretching, fluro compound
6	**953**	**82.8799**	Out of plane bending vibration from aromatic ring
7	**874**	**74.3688**	C-H bending, 1,3 distributed
8	**711**	**88.5542**	C=C bending, alkene
9	**675**	**80.0397**	C=C bending, alkene
10	**614**	**78.1968**	C-Br stretching, halo compound

Table. No.6. Heavy metal analysis BY Atomic Absorbtion Spectrometer

S.No	Test Parameters	Result	Unit
1	Arsenic (as As)	BLQ (LOQ:0.01)	mg/kg
2	Mercury (as Hg)	BLQ (LOQ:0.01)	mg/kg
3	Lead (as Pb)	BLQ (LOQ:0.08)	mg/kg
4	Cadmium (as Cd)	**BLQ (LOQ:0.1**)	mg/kg

Note: BLQ: Below Limit of Quantification; **LOQ**: Limit of Quantification.

Interpretation:

* A high ash value is indicative of contamination, substitution or adulteration by minerals.

* Permissible limit (WHO/ FDA permissible limits for ASU): ppm (or mg/kg)

Lead	10 ppm
Mercury	1 ppm
Cadmium	0.30 ppm
Arsenic	3 ppm

Reference:

- Protocol for testing of ayurvedic, siddha & unani medicines, Government of India, Department of AYUSH, Ministry of Health & Family Welfare, Pharmacopoeial laboratory for indian medicines, ghaziabad.
- A, Ashwini & Kerur, Basavaraj. (2017). Estimation of heavy and trace elements in ayurvedic drug (loha bhasma) alternative medicine for anemia by aas and icp-oes. International Journal of Research in Ayurveda & Pharmacy. 8. 81-85. 10.7897/2277- 4343.085249.

XRF (X-RAY Fluorescence Spectroscopy):

X-ray fluorescence is used to determine the chemical elements both qualitatively and quantitatively by measuring their characteristic radiation of the sample.

Table.No.7. XRF result of Bedhi Chenduram

Element In Oxide Form

Formula	Concentration (%)
Fe_2O_3	**92.47**
SO_3	**1.13**
Zn	**0.7**
CuO	**0.62**
MnO	**0.56**
SiO_2	**0.41**
Al_2O_3	**0.41**
Cr_2O_2	**0.36**
NiO	**0.34**
K_2O	**0.32**
MgO	**0.25**
P_2O_5	**0.16**
Na_2O	**0.05**

Element Form

Formula	Concentration (%)
Fe	**62.46**
O	**32.76**
S	**0.77**
Si	**0.61**
Ca	**0.58**
K	**0.35**
Al	**0.25**
Mn	**0.24**
Na	**0.14**
Ni	**0.14**
Ti	**0.12**
Cr	**0.08**
Cu	**0.07**
Zn	**0.01**

Thin Layer Chromatography Result:

TLC results revealed that the test drug *Bedhi chenduram* .TLC was out with three different solvents, and it was found that there was no spot found in the plate at 366 nm and 254 nm. The given sample was run along with a known *Chenduram* available in the market. This indicates that the sample given does not contain any organic compounds or phytochemicals. Thus, the Chenduram given is purely inorganic substance without organic impurities.

(NOTE: Any herbal substance burnt above 100 degeree C will be devoid of phytochemical.)

PHARMACOLOGICAL STUDIES

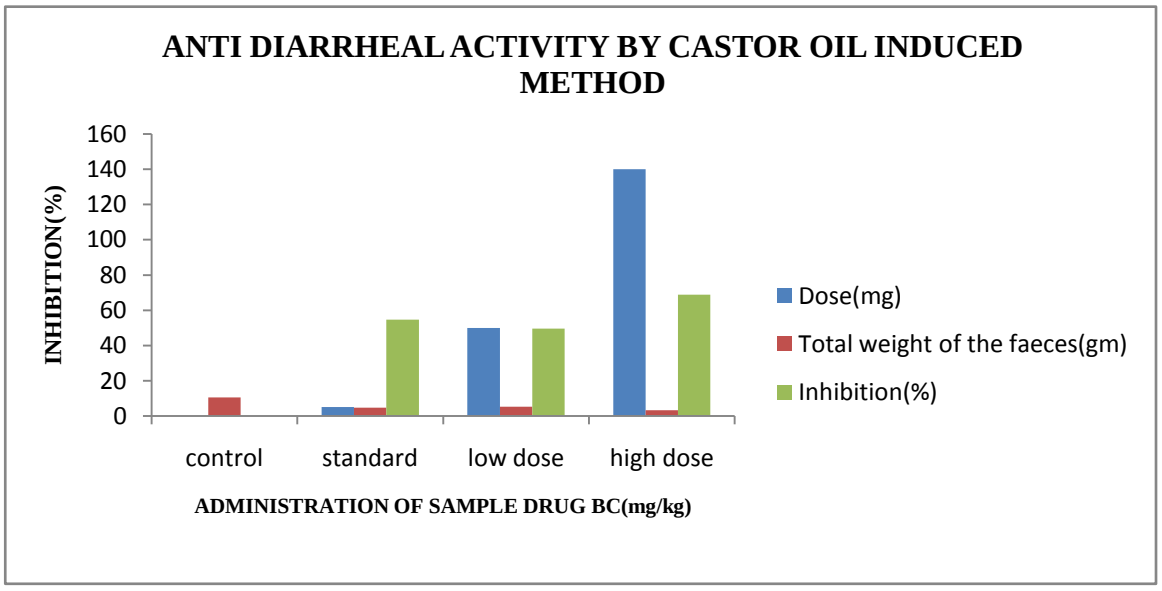
EVALUATION OF ANTI DIARRHEAL ACTIVITY OF *BEDHI CHENDURAM* USING CASTOR OIL INDUCED METHOD IN WISTAR ALBINO RATS

Table.No.8. Effect Of The *Bedhi Chenduram* On Castor Oil Induced Diarrhea In Albino Wistar Rats.

Group	Dose(Mg/Kg)	Total Weight Of Faeces (G)	Inhibition(%)
Control	Honey	10.61±2.22	_
Standard Loperamide	5	** 4.80±1.96	54.75
Low Dose Bc	50	** 5.35±3.05	49.57
High Dose Bc	140	** 3.30±1.4	68.89

The results were expressed as mean ± SD and was analyzed statistically using one way ANOVA followed by Dunnett's multiple comparisons test. N.S – Not significant, **(p> 0.01), *(p> 0.05).

Chart No: 1. Anti Diarrheal Activity In Wistar Albino Rats



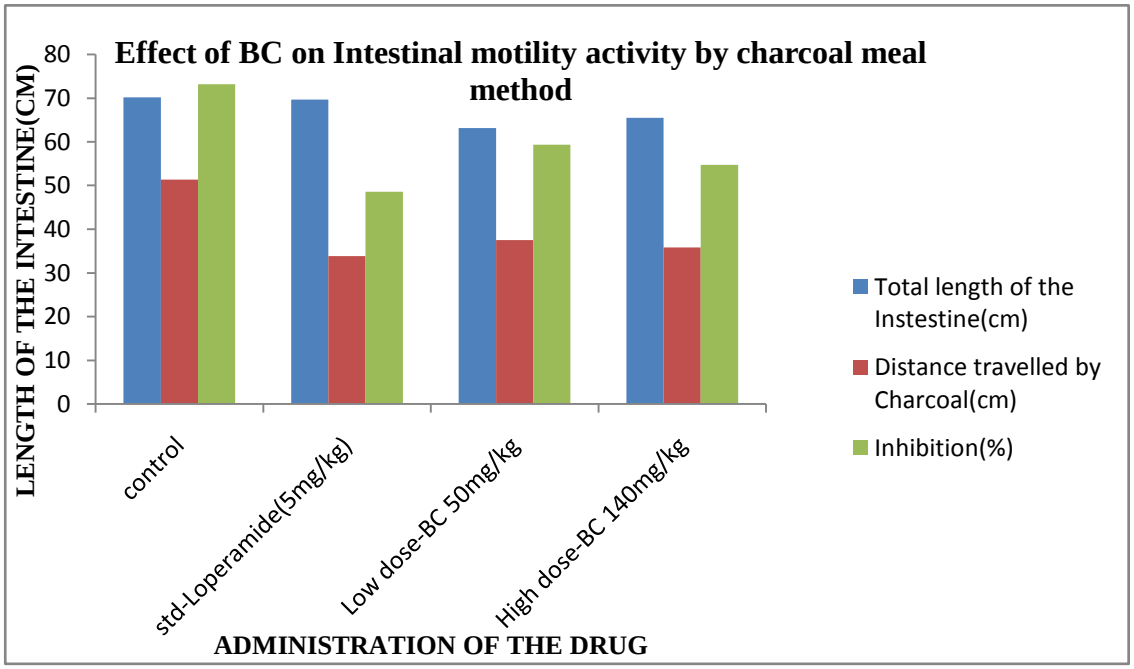
EVALUATION OF INTESTINAL MOTILITY ACTIVITY OF *BEDHI CHENDURAM* IN WISTAR ALBINO RATS

Table.No.9.Effect Of The *Bedhi Chenduram On Intestinal Motility Activity* In Albino Wistar Rats.

Group	Total Length Of The Instestine(Cm)	Distance Travelled By Charcoal(Cm)	Inhibition(%)
Control	70.16±5.564	51.33±5.75	73.16
Std-Loperamide	69.66±3.777	** 33.83±3.162	48.56
Low Dose-BC 50mg/Kg	63.16±3.43	**37.5±5.244	59.37
High Dose-BC 140mg/Kg	65.5±2.738	** 35.83±2.786	54.7

The results were expressed as mean ± SD and was analyzed statistically using one way ANOVA followed by Dunnett's multiple comparisons test. N.S – Not significant, **(p> 0.01), *(p> 0.05).

Chart No: 2. Intestinal motility activity in wistar albino rats



ANTI-SPASMODIC EVALUATION OF SIDDHA DRUG *BEDHI CHENDURAM* (BC) ON ACH INDUCED CONTRACTION ISOLATED CHICK ILEUM

EFFECT OF BC ON RESPONSE OF ISOLATED CHICK ILEUM PREPARATION

It was observed from the datas obtained from the present investigation that the height of response of concentration response curve of acetylcholine before incubation with test drug ranges from 5 mm to 46 mm. There was a promising decrease in the height of the response curve after incubation with test drug BC ranges from 0 mm to 35 mm. As show in table 9 and figure 11.

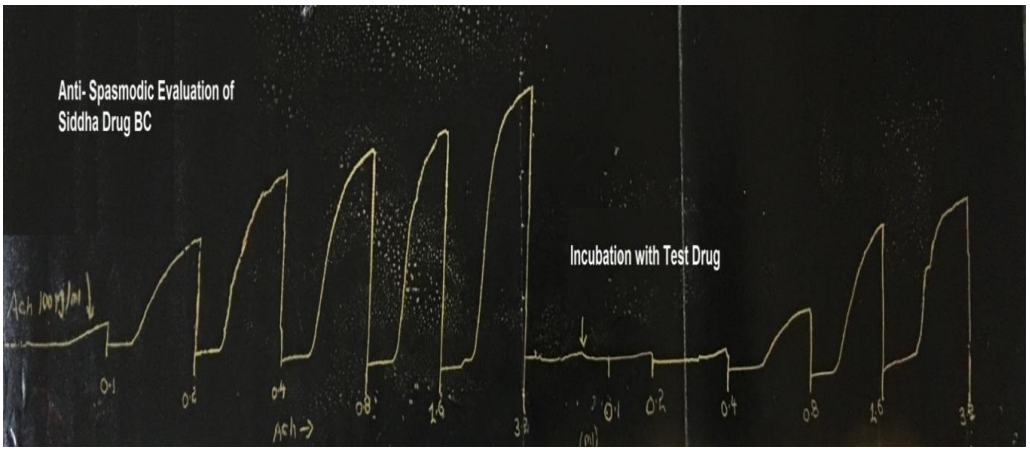
Conclusion

It was concluded that the sample BC possess significant level of anti- Spasmodic activity on contractions induced by acetylcholine.

Table.No.10: Effect of BC on response of isolated chick ileum preparation

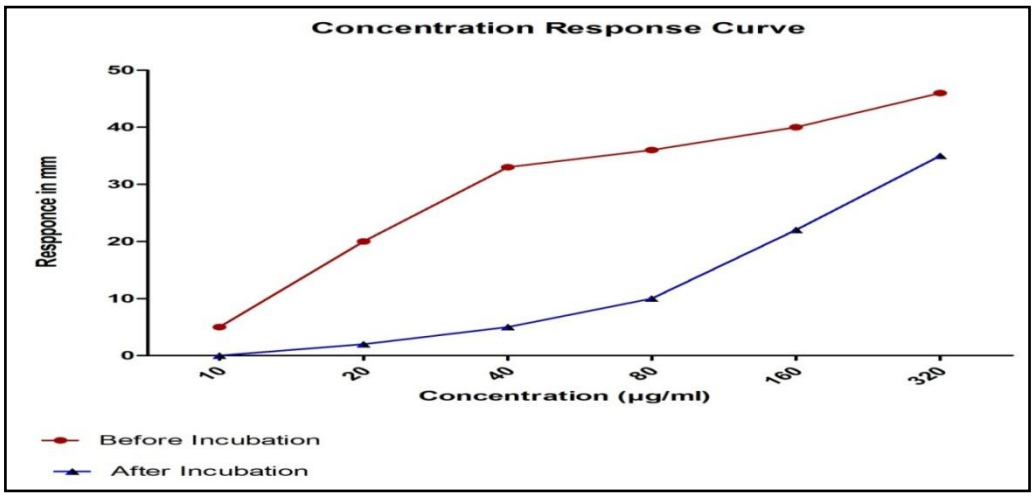
Dose in mcg	Initial Response in mm (Before Incubation)	Final response in mm (After incubation with Test drug BC)
10	5	0
20	20	2
40	33	5
80	36	10
160	40	22
320	46	35

Figure 11: Concentration response curve of Ach in absence and presence of sample BC on Isolated chick ileum in optimized condition



Biological testing is a cheap and specific prelude to identify the nature of receptors and quantifying the unknown substance. In chick ileum M_3 muscarinic receptors were reported. Isolated chick ileum for bioassay of acetylcholine.The small intestine in chick is a long and uniform in the diameter. Its circular muscles are 3 times thicker than the longitudinal muscles. [76]

Chart No: 3. concentration response curve of anti spasmodic activity in isolated chick ileum



Pharmacological Evaluation of Anti- Spasmodic potential of Siddha formulation *Bedhi Chenduram (BC)* on charcoal and castor oil Induced Intestinal motility in Mice Table.No.11: Effect of BC on castor oil-induced Intestinal Motility in Mice

Castor Oil Control	**Onset Of Defecation (Min)**	**Mean Number Of Defecation In 4 Hrs**	**Total Number Of Wet Faeces**	**% Inhibition**
Mean	32.33	7.667	6.333	0
Std. Deviation	3.615	1.862	1.506	
Std. Error	1.476	0.7601	0.6146	
Low Dose of BC	Onset of Defecation (min)	Mean number of Defecation in 4 hrs	Total number of Wet faeces	% Inhibition
Mean	70.33**	5.833*	3**	52.38
Std. Deviation	8.454	0.7528	1.414	
Std. Error	3.451	0.3073	0.5774	
High Dose of BC	Onset of Defecation (min)	Mean number of Defecation in 4 hrs	Total number of Wet faeces	% Inhibition
Mean	96.17**	4.5**	2.333**	63.49
Std. Deviation	11.97	1.049	1.033	
Std. Error	4.888	0.4282	0.4216	
STD – Loperamide	Onset of Defecation (min)	Mean number of Defecation in 4 hrs	Total number of Wet faeces	% Inhibition
Mean	191.7**	1.5**	0.6667**	89.52
Std. Deviation	23.71	0.8367	0.8165	
Std. Error	9.68	0.3416	0.3333	

The results were expressed as mean ± SD and was analyzed statistically using one way ANOVA followed by Dunnett's multiple comparisons test. N.S – Not significant, **(p> 0.01), *(p> 0.05).

Chart No: 4. Anti Spasmodic activity by castor oil method in mice

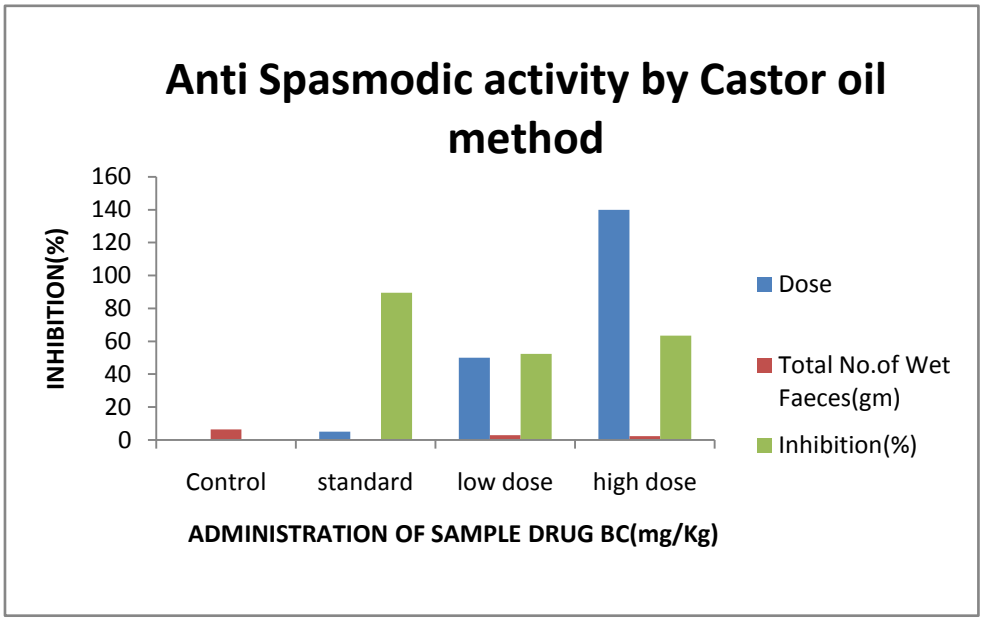


Table.No.12: Effect of BC on gastrointestinal transit and Peristalsis index (%)

Using charcoal meal in Mice

Charcoal meal control	Length of intestine (cm)	Distance travelled by charcoal (cm)	Peristalsis index (%)
Mean	34.5	28	81.34
Std. Deviation	3.332	2.366	4.401
Std. Error	1.36	0.9661	1.797
Low Dose of BC	Length of intestine (cm)	Distance travelled by charcoal (cm)	Peristalsis index (%)
Mean	35.67	24.83	*69.57
Std. Deviation	2.16	3.251	7.35
Std. Error	0.8819	1.327	3.001
High Dose of BC	Length of intestine (cm)	Distance travelled by charcoal (cm)	Peristalsis index (%)
Mean	36	**20.83	**57.78
Std. Deviation	1.897	3.061	7.046
Std. Error	0.7746	1.249	2.877
STD -Loperamide	Length of intestine (cm)	Distance travelled by charcoal (cm)	Peristalsis index (%)
Mean	35.33	**15.33	**42.9
Std. Deviation	3.077	4.082	8.567
Std. Error	1.256	1.667	3.498

The results were expressed as mean ± SD and was analyzed statistically using one way ANOVA followed by Dunnett's multiple comparisons test. N.S – Not significant, **(p> 0.01), *(p> 0.05).

Chart No: 5. Anti spasmodic activity by charcoal meal method in mice

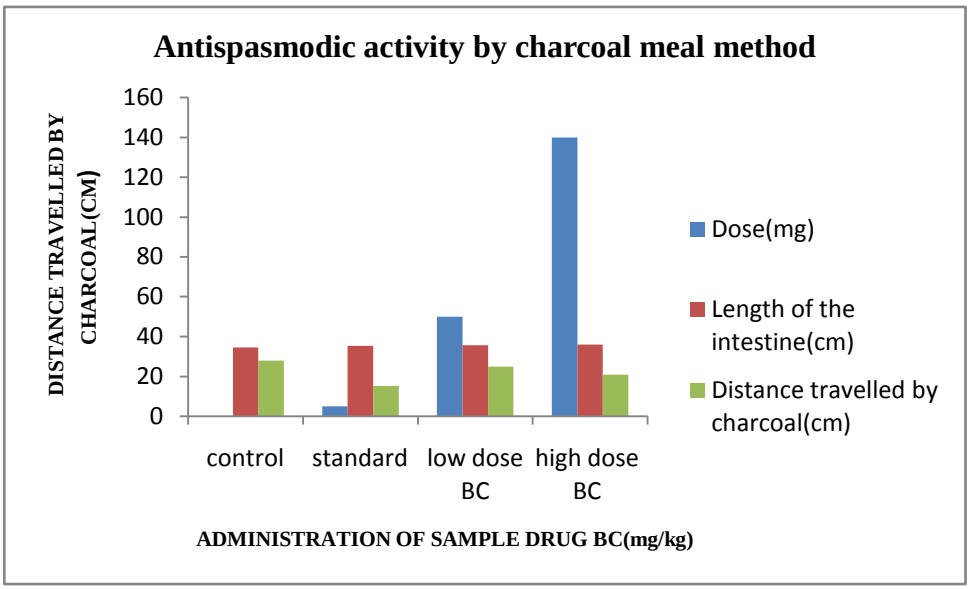
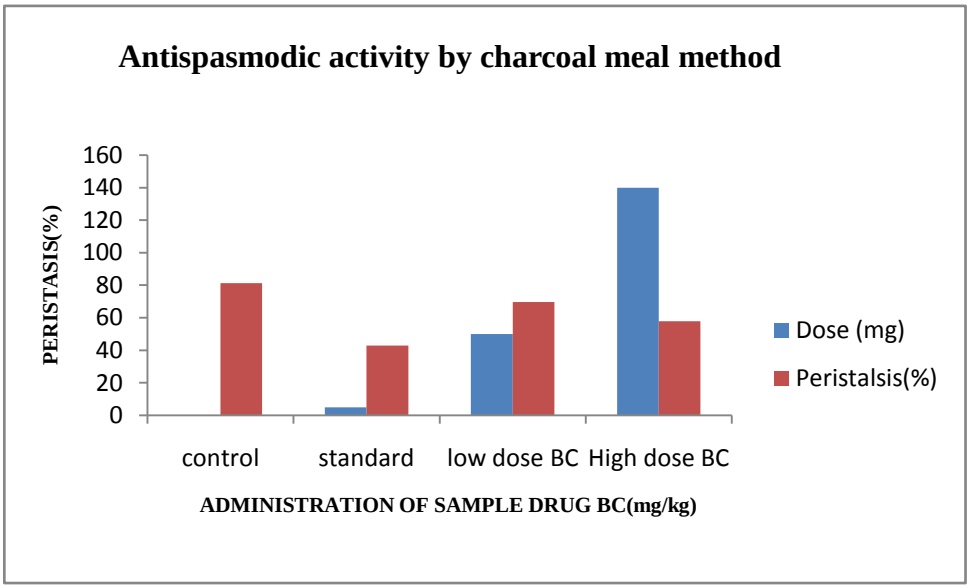


Chart No.6. Anti spasmodic activity by charcoal meal method in mice



Bedhi chenduram - Observation and Inference

It was observed from the present investigation that onset of defecation was shortly induced in castor oil treated group with the mean time of 32.33 ± 1.47 mins. Treatment with trial drug BCat both the dose level of 50 and 150 mg/kg has shown significant delay in the onset of defecation time to the maximum of 96.17 ± 4.88 mins. There was huge delay in defecation time were observed in standard drug treated group with the mean time of 191.7 ± 9.68 mins

The mean number of wet fecal pellet in the Castrol oil group was 6.33 ±0.6, while in the trial drug (BC) treated group this value was found to be 3 ±0.5 and 2.3± 0.42 in a dose dependent manner. Standard drug loperamide significantly reduced the wet fecal pellet count of about 0.6 ± 0.33.

The total number of defecation observed in the castor oil control group was found to be 7.66 ± 0.76, while in the trial drug (BC) treated group it was found to be 5.83 ±0.30 and 4.5 ± 0.42 when compare to that of the standard drug loperamide with frequency of 1.5 ± 0.34.

Percentage protection offered by the test drug BC at the dose of 50 mg/kg against castor oil induced purgation was found to be 52.38 %, whereas treatment with BC at the dose of 150 mg/kg it was found to be 63.49% when compared with standard loperamide with the percentage protection of 89.52 %.

Peristalsis was measured as index of gastro intestinal motility. Peristalsis index of charcoal meal control group was found to be 81.34 %. Further treatment with BC at both the dose level of 50 and 150 mg/kg exhibit significant reduction in peristalsis index up to 57.78% when compared with standard loperamide with the lowest PI of 42.94%.

There was significant reduction in distance travelled by the charcoal plug was observed in BC treated group with the transit distance of 20.83 ± 1.24 cm when compare to that of the control with distance of 28 ± 0.96cm. Further standard drug shown prominent decrease in transit distance of 15.3 ± 1.66 cm

Based on the data's obtained from the present investigation it was concluded that the trial drug BC exhibited significant anti – Spasmodic activity on gastrointestinal transit using charcoal meal and in castor induced purgation model.

8. DISCUSSION

The trial drug ***Bedhi chenduram*** was selected from the text ***–Anuboga Vaithya Navaneetham"***for screening the pharmacological effect of Anti diarrheal, Intestinal motility and Anti spasmodic activities.

The drug indicateted disease fo Thoderkalichchal ***(chronic dysentry)***, Vayirrunovu ***(spasmodic pain),*** Vayirruiraichal ***(gurgling sound in the abdomen),*** Manthanoi ***(indigestion),*** Aknimantham ***(impaired or imperfect indigestion)***, pithavayu ***(indigestion),*** Pithanoi, Neererichchal ***(dysuria)***, Neerkaduppu ***(dysuria).***

The drug was prepared as per the procedure and subjected to various studies to reveal its potency and effectiveness against the disease.

Various collections of Siddha and Modern science about the ingredients of the drug. **Bedhi chenduram** had been subjected to various studies and it confirms the literature evidences. Literary collections, Physicochemical Studies, Chemical analysis, and Pharmacological studies were done to prove the Anti diarrheal, Intestinal motility and Anti spasmodic activities of *Bedhi Chenduram.*

Literary review about the ingredients of *Bedhi Chenduram* from various text books give hope about its activity. The studies strongly substantiated textual references and as discussed below.

Literary Collections:

Literary collections include drug review, which consist Botanical aspect, Zoological aspect, *Gunapadam* aspect, pharmaceutical and pharmacological reviews which support this study.

Drug Review:

Botanical Aspect:

Drug review about the ingredients of *Bedhi Chenduram* from various text books was done. Botanical aspect deals with the identification, description, ethno medical important of the plants.

Gunapadam Aspect:

Basically siddha medicines have five unique properties. They are

- Suvai (Taste)
- Gunam (Properties)
- Veeriyam (Potency)
- Pirivu (Class)
- Mahimai (Action)

All the five properties are based on the *Panchabootham* (Five elements) present in the drug.The therapeutic potency of any drug were designed depending on the following parameters namely

- *Suvai*
- *Gunam*
- *Veeriyam*
- *Vibhaham*

The ingredients of *Bedhi chenduram* are Annabedhi (iron sulphates), Silasathu (asphaltum) and yelumichchai (citrus lemon)

- *Annabedhi* has Astringent action
- *Silasathu* has Astringent action
- *Yelumichchai* has Refrigerant action

Majority of the ingredients of *Bedhi Chenduram* possesses Astringent action. *Iron* which is present enormously in Annabedhi also posseses Astringent action. Hence it normalize the *pitha kutram.* So the selected drug act well as Diarrhea and Intestinal disorders. These collections showed the effectiveness of *Bedhi chenduram* in Diarrhea and Intestinal disorders.

Physico-Chemical Analysis

- The trial drug ***Bedhi chenduram*** showed that the Loss on drying (LOD) was less than 1.378% which reveals the low moisture content present in the prepared medicine. Low moisture content- drug could get maximum stability and better shelf life.

- The trial drug is found to have total ash value 0 % , whereas the acid insoluble ash and water soluble ash was 0 % and 8.2 % respectively. The value of total ash in the formulation is high because of the presence of inorganic ingredients and the method of preparation of this drug is calcinations procedure.
- pH of the trial drug was 0.73%. It shows the alkalinity of the drug.

Chemical Analysis:

Chemical analysis of the drug *Bedhi chenduram* revealed the presence of **Silicate, Sulphate, phosphate, Carbonate, Aliminium, Iron, zinc, Calcium, magnesium, ammonium, potassium, starch, alkaloids.**

Silicate:

It is useful in maintain the tissues in digestive tract which reduces inflammation of stomach and intestine.

Sulphate:

Sulphate gives strength to the mucous membarane of the stomach, intestine and also promote the appetite.

Calcium:

Calcium is necessary for the muscle contraction which helps to reduce muscle cramps in diarrhea. It maintains the waterbalance in the body.

Potassium:

It is required for the regulation of acid-base balance, and water balance in the cells. It maintains intracellular osmotic pressure.

This the bio chemical constituents of *Bedhi Chenduram* help in controlling diarrhea and maintain the electrolyte balance in the body.

Instrumental Analysis:

Based on the results, *Bedhi chenduram* is preferably non-toxic to human in its therapeutic dose. The standardization of the drug was evaluated by chemical characterization with heavy metal analysis, functional group analysis, elemental analysis,

thermal analysis and determination of particle size by AAS, FTIR, XRF and TLC respectively.

AAS (Atomic absorbtion Specrometer) result for heavy metal analysis. In *Bedhi chenduram,* the heavy metals like As, Cd, Pb and trace element like Hg were below detectable level. This reveals the safety of the drug.

The FTIR results showed the presence of C=O stretch, O-H stretch, C=F stretch, C-O stretch, C-Br stretch, C-H bending, C=C bending as functional groups. This indicates the presence of some organic functional groups such as conjugate anhydride, primary amide, carboxylic acid, secondary alcohol, fluro compound, halo compound, alkene, out of plane bending vibration from aromatic ring.

XRF results revealed that the Fe_2o_3 (92.47%), So_3 (1.13%), Fe(62.46%) and o (32.76%) may be the key ingrents present in the test drug *Bedhi chenduram.*

TLC results revealed that the test drug *Bedhi chenduram*. This indicates that the *Bedhi chenduram* given does not contain any organic compounds or phytochemicals. Thus, the *Bedhi chenduram* given is purely inorganic substance without organic impurities.

Chemical analysis and elemental analysis shows the presence of iron as a major compound.

Pharmacological Studies:

The pharmacological activities like Anti diarrheal, Intestinal motility and Anti spasmodic activity of *Bedhi chendurm* shown significant effect.

Anti Diarrheal Activity

The test drug Bedhi chenduram inhibited castor oil induced diarrhea in wistar albino rats at doses of 50 and 140 mg/kg. *Bedhi chenduram* reduced the weight of wet fecal pellets with the test drug treated groups showing lower diarrheal severity than control group rats.

Intestinal Motility Activity

The results were compared with the control group and the distance travaelled by the charcoal meal of the control group was considered 100%. The test drug *Bedhi chenduram* showed inhibition of mean defecation period compared with the control group in wistar albino rats at doses of 50mg/kg and 140mg/kg.

Anti Spasmodic Activity

Ach causes contraction of the chick ileum, the test drug Bedhi chenduram showed a dose dependent inhibition of contractions induced by Ach on chick ileum at doses of 10,20,40,80,160,320mg/kg which is plotted in the gragh above in terms of concentration in µg/ml versus height in mm. The test drug *Bedhi chenduram* anti Spasmodic Activity compared with the control group in wistar albino rats at doses of 150mg/kg and 140mg/kg in mice.

9. SUMMARY

- test drug *Bedhi chenduram*, a traditional Siddha formulation was selected from the classical siddha literature ***Anuboga Vaithya Navaneetham*** for its Anti diarrheal, Intestinal motility and Anti spasmodic activities
- The test drug was prepared as per the procedures mentioned in Siddha literature. All the ingredients were identified and authenticated by the experts.
- Review of Literature in various categories was carried out. Siddha aspect, botanical aspect, Zoological aspect, Pharmaceutical and pharmaceutical review disclosed about the drug and the disease.
- The drug was subjected to analysis such as physicochemical, chemical, instrumental and pharmacological analysis.
- Chemical analysis of the drug *Bedhi chenduram* revealed the presence of Silicate, Sulphate, phosphate, Carbonate, Aliminium, Iron, zinc, Calcium, magnesium, ammonium, potassium, starch, alkaloids.
- Identification of functional groups was engaged by using Fourier Transform Infra-Red Spectroscopy (FTIR).
- The Heavy metal analysis was engaged by using Atomiv Absorbtion Spectrometer (AAS)
- Characterization and Identification of crystalline materials by X-Ray Fluorescence (XRF)
- The organic compounds analysis of *Bedhi chenduram* by Thin Layer Chromatography (TLC)
- The instrumental analysis report reveals that the heavy metals like Lead, Cadmium, Arsenic and Mercury are within the permissible limits.
- Pharmacological studies were done. It revealed that the drug *Bedhi chenduram* possess Anti-diarrheal, Intestinal motility and Anti spasmodic activities in animal model.

From the results and the statistical analysis it was proved that the drug

Bedhi chenduram has

- Anti-diarrheal activity
- Intestinal motility activity
- Anti spasmodic activity

- This present study suggests *Bedhi chenduram* has remarkable medicinal value in the treatment of Diarrhea and Intestinal disorders. Thus the Siddha formulation *Bedhi chenduram* is Standardized and validated its efficacy for treating Diarrhea (*Kazhichal*) and it would be a great drug of choice.

10. CONCLUSION

From the Literature evidence, Physico chemical analysis, chemical analysis, Elemental analysis and Pharmacological studies, the drug *Bedhi Chenduram* have Anti-diarrheal, Intestinal motility and Anti spasmodic activity. It was concluded that the *Bedhi chenduram* can be used in the management of Diarrhea and Intestinal dissorders.

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12. ANNEXUE

CERTIFICATE

This is certify that the project title **Standardization and Pharmacological screening of *"Bedhi Chenduram"*** has been approved by the IAEC. Total No. of animal Sanctioned: 24 Rats (Male or Female)

Approval NO: NIS/IAEC-V/09082017/04

Prof.Dr.V.Banumathi
Chairman IAEC:

Prof.Dr.K.Nachimuthu
CPCSEA nominee:

Signature with date

V. Banumathi 09/8/17
Chairman/Member Secretary of IAEC:

9/8/2017
CPCSEA nominee:

(Kindly make sure that minutes of the meeting duly signed by all the participants are maintained by Office)

Name of the principle investigator:

Dr.R.Elakkiya,
1st year pg scholar,
Department of gunapadam,
National institute of siddha.

Name of the guide :

Dr.A.Mariappan,MD(S)
Lecturer,
Department of Gunapadam
National institute of siddha.

CERTIFICATE

Ministry of AYUSH

NATIONAL INSTITUTE OF SIDDHA

Ministry of AYUSH, Government of India

Tambaram Sanatorium, Chennai - 600 047.

WORKSHOP ON
RESEARCH METHODOLOGY & BIOSTATISTICS

This is to certify that

Dr. R. ELAKKIYA

has participated in the above Workshop held from 16.04.2018 to 20.04.2018 conducted by the Dept. of Noi Naadal, at National Institute of Siddha, Tambaram Sanatorium, Chennai-600 047.

Dr. G.J. Christian
Coordinator
HoD, Dept. of Noi Naadal,
National Institute of Siddha

Prof.Dr.V.Banumathi
Director,
National Institute of Siddha
Chennai - 600 047.

NATIONAL INSTITUTE OF SIDDHA, CHENNAI – 600047

BOTANICAL CERTIFICATE

Certified that the following plant drug used in the Siddha formulation **"Bedhi Chenduram"** taken up for Post Graduation Dissertation studies by **Dr.R.Elakkiya** M.D.(S). II year, Department of Gunapadam, 2018, are identified through Visual inspection, Experience, Education & Training, Organoleptic characters, Morphology and Taxonomical methods as

Citrus limon (Linn.) Burm. f. (Rutaceae), Fruit

Certificate No: NISMB3232018

MEDICINAL BOTANY * CHENNAI 600 047 * National Institute of Siddha

Date: 09-03-18

Authorized Signatory

Dr. D. ARAVIND, M.D.(s),M.Sc.,
Assistant Professor
Department of Medicinal Botany
National Institute of Siddha
Chennai - 600 047, INDIA

SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

Accredited with "A" Grade by NAAC

Chennai – 600 119, Tamil Nadu, India

INSTITUTIONAL ANIMAL ETHICS COMMITTEE

CERTIFICATE

This is to certify that the project entitled 'Evaluation of Antispasmodic potential of Siddha formulation Bedhi chenduram in Mice' has been **approved.**

IAEC Number: SU/CLATR/IAEC/XIII/137/2019

Name of the P.I: Dr.R.Elakkiya

Animal Sanctioned: *Mus musculus*

Total: Male – 6 ;Female- 6.

Date: 05.01.2019

B. Sheela Rani

Dr. B. SHEELA RANI
CHAIR PERSON

Dr. N. SARAVANAN
CPCSEA MAIN NOMINEE