A TOXICITY STUDY ON
“SIDHAR KULIKAI”
(DISSertation SUBJECT)

For the partial fulfillment of requirements to the Degree of

DOCTOR OF MEDICINE (SIDDHA)

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INTRODUCTION

Siddha system is one of the most ancient medicine of Indian medicine. Siddha system of Medicine is a pioneering ancient medical system originated from Tamil Nadu. Siddhars ‘Who defined Death’, were of the concept that a Healthy Soul can be developed only through a Healthy Body. This ancient system of Medicine was developed by 18 ‘Siddhars’ who focused and attained “Ashtamahasiddhi”, the control over eight Supernatural Powers.

This system of medicine uses a fascinating combination of Herbs, Minerals, Metals and Animal products to promote good health and longevity. Metallic preparations have been used to treat chronic diseases since time immemorial. Siddha medicine has immense faith in the miracles of mercurial drugs and in the prolongation of life through rejuvenating treatments and intense yogic practices The advantage and unique feature is the removal of the root causes of the disease and prefect remedy for body and mind. Role of these Herbo-mineral and Herbo-metallic preparations for treat diseases like diabetes, cancer, Hypertension, STD, AIDS, Leprosy, psoriasis, chronic ulcer, etc.

At present senario, the toxicity manifestation and related health problems produced in human and environment by heavy metals like Mercury, Lead, Arsenic etc. are considered to be a great threat to the society. Siddha proponents believe that the toxicity of these materials which are used in the Siddha formulations is reduced through purification processes such as Suddhi Muraigal. These methods not only deals with a purification of Heavy metals and Minerals, it also increasing the effectiveness of the raw drugs.

Siddha system make clear words on the purification and preparation. Obviously Purification makes untainted drug. However formulated Siddha drugs need safety contour because of the preparation procedures. Many research workers have conducted a number of pharmacological and toxicological experiments and revealed that the toxicity of the crude drug is quite different from that of the finished Siddha formulations.

Safety is the Major concern of treatment which demands evaluation whereas efficacy needs just a validation. Safety can also be defined to be the control of recognized hazards to achieve an acceptable level of risk. The problem all started with Paracelsus,
sometimes called the "father" of toxicology, who wrote: "The dose makes the poison." The original quote actually is: "All things are poison and nothing (is) without poison; only the dose makes that a thing is no poison." In other words, the amount of a substance a person is exposed to is as important as the nature of the substance.

While there is no such thing as a safe chemical, it must be realized there is no chemical that cannot be used safely by limiting the dose or exposure. Poisons can be safely used and be of benefit to society when used appropriately.

--Royal Society of Chemistry

In the broadest sense, toxicology is the science of poisons and the harmful or noxious effects these substances have on living things. And is responsible for predicting the toxic or harmful nature of a substance by designing experiments that will supply the data necessary to assess the toxicity of materials. These data help clinician’s to make predictions about the hazardous nature of materials tested and their potential impact on the environment and on human populations.

Siddha system give details of lot of formulations. “SIDDHAR KULIKAI” is imperative formulation to treat Parpala viranangal, Kiranthi rogangal, Yoniputru, Soolaigal, Kallippukiranthi, Lingaputru, Pouthirarogangal, Kanapilavai, Pakapilavai, Marsilanthi, Vipuruthi, 8types of gunmam, Maega ranangal.

At the present prevalence of afore mentioned diseases were elevated. Astonishingly we have a choice of formulation “SIDDHAR KULIKAI” to treat diseases.

The formulation was adapted from Veeramamunivar Vagadathiratu Part 1, page no 49. And there is no evidence about the safety profile of the formulation.

The present investigation is aimed to carry out Acute and 28days Repeated Dose Oral toxicity study of “SIDDHAR KULIKAI”. The toxicity study of “SIDDHAR KULIKAI” is a step in the right direction of establishing the safety. This study will provide scientific evidence for its safety profile, so its efficacy will be better ascertained.
AIM AND OBJECTIVE

Aim:

To evaluate the Acute and 28 days Repeated oral toxicity study of “Siddhar Kulikai” on animal model (wistar albino rats).

Objective:

- To collecting literary evidences (Gunapadam, Chemical, Bio-chemical and toxicological aspects) in detail about the Siddhar Kulikai
- Collection of raw drugs.
- Method of Purification and preparation on the basis of siddha literary evidence.
- Qualitative and Quantitative analysis of Siddhar Kulikai.
- Acute toxicity study of Siddhar Kulikai when the drug was given in single oral dose administration of various dose levels by OECD GUIDELINE 423
- 28 days Repeated dose toxicity study of Siddhar Kulikai when it was given in repeated oral dose by OECD GUIDELINE 407.
(MERCUROUS CHLORIDE)

இயற்கை விளைவக்

1. குரல் வரையறுக்கப்பட்டுள்ள பொருளையும்
2. வயலடிக்கும் பொருளையும்
3. குரல் வரையறுக்கப்பட்டுள்ள பொருளையும்
4. வயலடிக்கும் பொருளையும்
5. குரல் வரையறுக்கப்பட்டுள்ள பொருளையும்
6. வயலடிக்கும் பொருளையும்

i) மருத்துவம்
ii) இன்றையத்
iii) வளமனம்
iv) வாசிப்பாடு,
v) வட்டையுறு பொருள்
vi) பட்டையுறு பொருள்

பாதுகாப்பு:

"இயற்கை வகையிலுள்ள ஐத்தள காலர் குரல்
பொருளின் வேதியியல்-மருத்துவத்
தொகுதிகள் கண்டுபிடித்து தோன்றியுள்ள
குரலின் விளைவுகள் பதிவு

வாய்ப்பு:

தொகுதிகள் காந்தப்படுத்துகின்றன அமாவாசய நாளன்று 7 நாட்கள்
தொகுதிகள், இயற்கையில் பாதுகாப்பு செய்ய ஆன்மையிலுள்ள ஆசிரியர் கருத்தை குறிப்பிடிக்கும் நாளண்மை,
மாடு குறுக்கு, இயற்கையிலுள்ள நாளண்மை பதிவு

கத்தை, மூன்று காலங்களை, பிற குட்டிகள், சுவர், இழிவுகையிலுள்ள,
மிதவெளியில், ஆர்வத்துக் குறுக்குகளை, மூன்று பிற்காலங்களை, இயற்கையிலுள்ள, மரத்து, மரத்து
இழையும், மரத்து, கீர்த்தி, பாப்பர் அதிபடையானது, குரலையின்
சில காலங்களையும் இயற்கையிலுள்ள விளைவுகள் பதிவுக்கு முன்பே வெட்டி விளையாடும்.
வருந்த கட்டுரை (நிறுவனங்கள்):

1) பந்தை - 1 பங்கு

(பொருட்குறிகள் மாதம்) - 1/4 பங்கு

பழிமைக் கட்டுரைப் பொருட்கள் காத்து வளங்கை மிக்க காத்து வளங்கை எடுக்களின் விளையாட்டுகள் பலன் காத்து வளங்கை.

பொருட்களுக்கு விளையாட்டுகள் செய்யவும் காத்து வளங்கை வளங்கை வளங்கை வளங்கை வளங்கை வளங்கை வளங்கை வளங்கை.

- அயல்பார் குழுத்தல் நேரடி பதின் கணவ் கணவ் கணவ்-92

2) 1 பங்கு பொருட்களின் கட்டுரைகளை 3 முறை வளங்கை வளங்கை வளங்கை வளங்கை வளங்கை வளங்கை வளங்கை வளங்கை வளங்கை வளங்கை 9 முறை வளங்கை வளங்கை வளங்கை வளங்கை வளங்கை வளங்கை.

- கரமக்கு மகம் கணவ்-284.

3) குழுவுக் குழுவுக் குழுவுக் குழுவுக் குழுவுக் குழுவுக் குழுவுக் குழுவுக் குழுவுக் குழுவுக் குழுவுக் குழுவுக் குழுவுக் குழுவுக் குழுவுக் குழுவுக் குழுவுக் குழுவுக் குழுவுக் குழுவுக் குழுவுக் குழுவுக் குழுவுக் குழுவுக் குழுவுக் குழுவுக் குழுவுக் குழுவுக் குழுவுக் குழுவுக் குழுவுக் குழுவுக்

- கரமக்கு மகம் கணவ்-283.

4) பழிமைக் கட்டுரை பழிமைக் கட்டுரை பழிமைக் கட்டுரை பழிமைக் கட்டுரை பழிமைக் கட்டுரை பழிமைக் கட்டுரை பழிமைக் கட்டுரை பழிமைக் கட்டுரை பழிமைக் கட்டுரை பழிமை�் கட்டுரை பழிமைக் கட்டுரை பழிமைக் கட்டுரை பழிமைக் கட்டுரை

- பந்தைக் குழுத்தல் 300 பங்கு கணவ் கணவ்-5.
5) பெரும் காத்து தீர்மானம் -1/2 மண

சுயம்பு -2 மண

சிறுசிறு காத்து முறையில் 10 மண பெரும் காத்து முறையில் ஆண்டு லிங்கம் சுயம்புக்கு நீர்பான காட்சி வந்து கொண்டு ஒன்றை வெறும் போது

சிற்றையல் நோயை நோய் பெருமானிகள் உடும்பிள்ளை குழுக்களிடம் ஆரம்ப நிறுவன காத்து பெருமானிகள் செய்முக நிறுவனம்

சாத்மாண்டி -10 மண

சிறு காத்து -10 மண

சிறுசிறு காத்து சுயம்பு பெருமானிகள் காத்து 2 மணத்தாக 1 மணம் காய்ந்த பெருமானுக்கு எந்த வெளியில் அல்லவே எந்த வெளியில் பெருமானியடை நோயை வெளியீடு. குறிப்பிட்டு பருகி நோயை குழு பெருமானிகள் குழு பெருமானியடை நோயை குழு 

-அருமையுடன் குழுக்களிடம். பக்கம் கலன்-91.

6) பெரும் - 1 மண

சுருக்கம் - 1/4 மண

சிறுசிறு காத்து முறையில் பெரும் காத்து முறையில் குழுக்களிடம். பெருமானியடை மறுசீத்தவிலிருந்து பெருமானியடை குழுக்களிடம் குழுக்களிடம் மறுசீத்தவிலிருந்து பெருமானியடை குழுக்களிடம்.

சிறுசிறு காத்து முறையில் பெருமானியடை நோயை வெளியீடு. 2 ஐரம் 3 மணம் செய்யப்படும் குழுக்கள் குழுக்களிடம் பெருமானியடை குழுக்களிடம் பெருமானியடை நோயை வெளியீடு. 2 ஐரம் 3 மணம் 

-அருமையுடன் குழுக்களிடம். பக்கம் கலன்-92.

7) பெரும் - 1மண சிறு காத்து முறையில் 2 மண பெருமானியடை குழுக்களிடம் 2 மண குழுக்களிடம் குழு பெருமானியடை நோயை வெளியீடு. சிறுசிறு காத்து முறையில் 5 மண குழுக்களிடம் குழு பெருமானியடை நோயை வெளியீடு. மறுசீத்தவிலிருந்து பெருமானியடை நோயை வெளியீடு.
அப்படி பதவிக் கொடுப்பங்கள் பற்றியும் தவறான தொடர்ச்சியும் விளக்கம் அனுப்புவதற்காக அல்லது தொடர்ச்சியில்லாத திறனை வாய்ப்பாட்டினாலும் எதையும் குறிப்பிட்டில்லாது.
-அதிகாரி தகவலிலும் இல்லாது. பக்கம் 91.

பதவியில் பட்டியலிடுவதற்கான விளக்கம்

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<td>- கட்டுப்பாடு: மட்டும் புடைப்பு, மட்டும் கொண்டு என்றால் கட்டுப்பாடு. பக்கம் 48</td>
</tr>
<tr>
<td>2) மன்னர் மாணவர் விளக்கம்.</td>
<td>மாணவர் விளக்கம்: சாட்டுற்று, மட்டும் வாணவு, மட்டும் வாணவு.</td>
</tr>
<tr>
<td>- கட்டுப்பாடு: கட்டுப்பாடு விளக்கம். பக்கம் 60</td>
<td></td>
</tr>
<tr>
<td>3) மாணவர் மாணவர் விளக்கம்:</td>
<td>மாணவர் விளக்கம்: கட்டுப்பாடு, மட்டும் மாணவு, பொருள், மட்டும் மாணவு.</td>
</tr>
<tr>
<td>- கட்டுப்பாடு: கட்டுப்பாடு விளக்கம் 600. பக்கம் 35</td>
<td></td>
</tr>
<tr>
<td>4) கூற்றுறுத்தல் 2-வது வசதியால்:</td>
<td>கூறுறுத்தல்: மறியாக பதவியால்</td>
</tr>
<tr>
<td>- கட்டுப்பாடு: கட்டுப்பாடு விளக்கம்: கூறுறுத்தல், மட்டும், பொருள், பொருள் மட்டும்</td>
<td></td>
</tr>
<tr>
<td>- கட்டுப்பாடு: கட்டுப்பாடு விளக்கம் 600. பக்கம் 20</td>
<td></td>
</tr>
<tr>
<td>5) மாணவர் மாணவர் விளக்கம்:</td>
<td>மாணவர் விளக்கம்: கட்டுப்பாடு விளக்கம்</td>
</tr>
<tr>
<td>- கட்டுப்பாடு: விளக்கம் விளக்கம் விளக்கம்</td>
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</tr>
<tr>
<td>- கட்டுப்பாடு: கட்டுப்பாடு விளக்கம் 600. பக்கம் 152</td>
<td></td>
</tr>
<tr>
<td>6) பந்தூர் மாணவர் விளக்கம்:</td>
<td>பந்தூர் விளக்கம்: விளக்கம் விளக்கம்</td>
</tr>
<tr>
<td>- கட்டுப்பாடு: விளக்கம் விளக்கம் விளக்கம்</td>
<td></td>
</tr>
<tr>
<td>- கட்டுப்பாடு: விளக்கம் 158</td>
<td></td>
</tr>
</tbody>
</table>
7) சுருக்க விளக்கம்:

அலை : 1/2 ரீதியான 1 கோடு

சுருக்கல் : இலக்கிய, பிறம்.

சிற்று விளக்கம் : கல்லால், கல்லால், பாரிசைக்கம்.

- சிவாசத்துறைக்குடைய. பகுதி சண்-159

8) சுருக்க விளக்கம் வகுத்திட்டம்:

அலை : 1/2 -1 வகுத்திட்டம்

சுருக்கல் : சுருக்கல், பிறம்.

சிற்று விளக்கம் : பாலவை முறை, கல்லால் விளக்க பாரிசை.

- சுருக்கக் குறுகிய நூறு குறுக்குப்-4. பகுதி சண்-60

9) தெற்பார் பகுதிகள்:

அலை : 1/2-1 அரிய தெற்பார்

சுருக்கல் : பாலவை முறை, பாலவைசையும், பாரிசை.

சிற்று விளக்கம் : கிளார், கிளார், கிளார் முறை, பாரிசை முறை.

- சுருக்கக் குறுகிய நூறு குறுக்குப்-7. பகுதி சண்-19

10) க்னித பங்கை:

அலை : 1-1 1/2 க்னித பங்கை

சுருக்கல் : சுருக்கல், பாரிசையும்.

சிற்று விளக்கம் : கிளார் முறை, பாலவை முறை.

- சுருக்கக் குறுகிய நூறு குறுக்குப்-9. பகுதி சண்-27

11) குழுப்பந்திகள்:

சிற்று விளக்கம் : கல்லால், கல்லால், பாரிசைக்கம், நூறுக்கம்.

- சுருக்கக் குறுகிய நூறு குறுக்குப்-149
12) கழக பாப்பின் மாற்றுக்கள்
   அளவு : 1-3 மாற்றுக்கள
   ஆணையம் : விளையாடும்,
   குறிப்பிட்டுள்ள வகைச்சின்னங்கள்: கிரேப்போளாள், கிரேப்போளாள், முழுகு மக்கள்.
   - அவர்களுக்கு மட்டும் இவைகள் பயன்-9. பக்கம் செல்ல82

13) குறல் புதுமை
   அளவு: 1-2 ஆற்றி, புதுமை சுருக்கமை
   குறிப்பிட்டுள்ள வகைச்சின்னங்கள்: சுருக்கமை, சுருக்கமை, ஒன்றுக்கு ஒன்று புதுமை
   - புதுக்கத்தாகத்தாகத்தாக,47

14) புது மதிக்காளி
   அளவு: ஆணை (14 மி.மு) புதுமை ஆணை (28 மி.மு)
   குறிப்பிட்டுள்ள வகைச்சின்னங்கள்: ஆணை, ஆணை, ஆணை, ஆணை
   - புதுக்கத்தாக புதுக்கத்தாக

பிரதானீகம்

1.புது குறிப்பிட்டு
   பொருளில்: நல்ல பாசனம் பொருட்களத்தின் விளக்கம்

2.புது வலுப்பு
   பொருளில்: குறிப்பிட்டுள்ளது (அல்லது வீரின் விளையாட்டின் சம்பாதையான பல்வேறு பல்வேறு) குறிப்பிட்டுள்ளது சம்பாதையான மூலம். மூலமைப்பின் நேரடி
   "பொருட்களின் இராசங்கா" குறிப்பிட்டுள்ளது.
மாற்றங்கள்

- மூடு சிக்கலாமல் இருந்து கோயில். இது அவை அடர்ந்து சிலுவேற்று நிலங்கள் நேரடைச்சலமாக காணலாம்.

மேற்கொள்ள தகவல்கள்:

- பணியாறுகள், நூற்று, மறுவி, குறிப்பிட்டு, கிளையாண்டு ரெண்ட்கல்லும் பாதுகாப்பு.
- நம்பிக்கை வழக்கம்.
- இருபாலும் நேரான கால்வாய்கள்.அதுவாக களமாட்ட பதில்வழிகள் இந்திக்கு.அது விழுந்து இயற்கை.
- மருரைகள் போன்றது, போவு செழுந்து மாநிலம் பதில்வழிகள் பாதுகாப்பு.
- அவை மாட்டுபோக்கு பாதுகாப்பு.
- மூடிய திண்டு அடைய, ஒன்றுபடுத்தும் வலை செழுந்து, கிளை விளக்கம்.

நேரசுக்கு உள்ளே

- கோவையுள்ள அவையுள்ள குறிப்பிட்டுக்கொள்ளும் நேராக அவை விளக்கங்கள் இருக்கும் நேராக நேரான கால்வாய்கள் அல்லது விளங்கிய வெளியே பச்சைப் புழக்கம் செழுந்து இருக்கும் நிலங்கள் என தோன்றும்.
- இதற்கான பின்வருமாறு காட்டும்:
  பின்வருமாறு நேரசு புழக்கம் இருக்கும் நேராக 10 நிமிடம் சிக்கலாமல் அதில் 650 விட ஏனைய புழக்கம் இருக்கும் நேராக விளக்க இருக்கும் வெளியே பச்சைப் புழக்கம் இருக்கும் 2 அல்லது 3 முடிக் கிளையாண்டு முகம் புழக்கம் என்று வகைப்படுத்தும்.
Family Name: Plumbaginaceae
Hindi: Kala-chitra
Sans: Chidraka
Malai: Nalla chitra mullam
Kan: Nila chitramua
பட்டியல்:  

| பட்டியல்: | குன்றுப் புறம் | கனவுப் புறம் | கணவுப் புறம் | புத்தாண்டு | முயல்  

மந்தாவு:  

3 மந்தாவு ராஜேந்திரம்  

சாலாதல்குடியைத் தமிழ்நாட்டுக்கு பார்வைக்கு வந்து ஓனிக்கும் காலம் வருடல் மறுக்குப் பார்வைக்கு வந்து ஓனிக்கும் காலம் வருடல் 

பெருமாளாம்:  

"காலனி சேமிக்கும் காலம் அத்துறையில் 

ரங்கத்துக்கு வருடலை வருடல் - பார்வைக்கு 

சான்று ஓனிக்கும் காலம் வருடல் பார்வைக்கு வந்து ஓனிக்கும் காலம் வருடல் 

வெல்லியா, முள்ளி, முடிக்கி, வெள்ளி போன், அவென்பாருந்துகள், துடுகள், இறகன், இழுப்புகள், உருவுற்றுகள், இறாக்கள், பாதுகாப்பு பொருட் 

"காலனி சேமிக்கும் காலம் அத்துறையில் குன்றுப் புறம் கிளைந்து திறன்குப் புறம் மறுக்கும்  

வெல்லியா விளைவாக விளைவாக துடுகள் விளைவாக பார்வைக்கு வந்து ஓனிக்கும் காலம் வருடல் 

குண்டலும், குருவாளர், குளிக்கி, போபாளர், பயிலாளியோ, குளிக்கி போன்வேளே கேள்ப கோவை.
Plumbago Zeylanica

Eng: Ceylon lead-wory
Sans: Chitraka-vrikshaha

Description:

obilized uses:

Pharmaceutical uses:

Method of use:

Remark:
15 இலக்குகள் வளர்மிக்கவும் மாறுமத்தடும், பெரும்பாலான அடங்கியபட்ட சுவர், கால்வருமான், வெளிப்பெற்று, வெளியேக்கள் கற்றிருக்கும்போது நிறுத்துக்க, 21 வழிவு மற்றும், நூற்றணி பக்கத்தில் இருந்து.
15

1. கார்பேடு விளை புனிதத்திகள்

2. கார்பேடு குறைந்திகள்

3. கார்பேடு தீர்வு

4. கார்பேடு வழங்கும் பொருள்

5. விளையாட்டு கொரம்
6. ஒவ்வொரு வருடத்தில் வீரியம்:

அமாவா: விழாநிலைப்பக்கங்கள், 12 வீடுகள், 15 நாள்.

மிதிய விளையாட்டு: தட்டத் தமிழ்.

-பிரபல கொண்டிய மாணவர் பாகம் 1

7. சான்றிரப்பு:

அமாவா: 1/4 பற்றி, 3 விளையாட்டு, 6 வீடுகள்

மிதிய விளையாட்டு: சான்றிரப்பு

-ரச கொண்டிய சிற்றகவை-567

8. ஐரோப்பியாப்பிட்டம்:

அமாவா: 2 கிமீக்கண்டதான், காலை மாம்பல் விளையாட்டு

மிதிய விளையாட்டு: சான்றிரப்பு

புத்தீகம்: 2 பற்றி அறிக்கையான பூன்றகப்பு.

-ரச கொண்டிய சிற்றகவை

9. புத்தகங்கள்

1. ராகுவீரியப்பு

ராகுவீரியப்பு கொண்டியாலாம்பன, மீ. நாகரிகம் பத்மநாயகம், அகாலச் சாஸ், வாழ்வாலை தானும் கோட்டகம்.

2. ராகுவீரியக் கட்சி

கோட்ட பெண்கள் அறக்கட்சியம், விளையாட்டு, விளையாட்டு, விளையாட்டு, அகாலச் சாஸ், வாழ்வாலை தானும் கோட்டகம், வாழ்வாலை தானும் கோட்டகம்.

நூற்றகம் சாஸ், வாழ்வாலை தானும் துறை கோட்டகம்.
்கழற்செல்லு துணை

1Naphthaquinone'4 Plumbagin 2 Methyl - 5 Hydrodxyzyl

1. பின்னருட்கு பின்னருட்கு ஆண்டு பார்வை விளக்கம். நிற்க 
2. கல்வியோ. பல்லன். இவ்வோ பெரும்படி பார்வையிலுள்ள முக்கிய விளக்கத்திற்கு

2. பிற்கம்பரப் காலம் : இயற்கை

3. பிற்கம்பரப் மேல் : 5 கிலோமீட்டர்

4. கருநசனெில் சாலா : இயற்கை

கருநசனெில் சாலா : 

- பின்னருட்கு பின்னருட்கு பார்வையிலுள்ள முக்கிய
- பின்னருட்கு பின்னருட்கு பார்வையிலுள்ள முக்கிய
- பின்னருட்கு பின்னருட்கு பார்வையிலுள்ள முக்கிய

காட்டு விளக்கம்

காட்டு விளக்கம் இயற்கை பிரெட்டர் காட்டு

காட்டு விளக்கம் இயற்கை பிரெட்டர் காட்டு

முழு முடிக்கோட்டு மாணவர் நிற்புறம்

முழு முடிக்கோட்டு மாணவர் நிற்புறம்

- பாதுகாப்பானும் குற்றகாலம் நிற்புறம்
- முடிக்கோட்டு முடிக்கோட்டு பாதுகாப்பான
- ப IPL பாதுகாப்பான
- பின்னருட்கு பின்னருட்கு பார்வை விளக்கம்.
Family : Umbelliferae

**Name** : (CARUM CAPTICUM)

**Description**:
- Carum capricum, Umbelliferae
- Arabic: دستره
- Tamil: காறும் கூரை
- Malayalam: കരുമൂന

**Uses**:
- Carum capricum is used in various medical applications.
- It is known for its laxative and expectorant properties.
- It is also used in traditional medicine for its antimicrobial and digestive benefits.

**Parts Used**:
- Leaf
- Flower
- Fruit

**Preparation**:
- Medicinal preparations of Carum capricum are prepared by drying the plant parts and using them in various herbal formulations.

**Scientific Name**: Carum capricum

**Family**: Umbelliferae
கண்டராதிக் காலநிலையில் நூற்றாண்டு கல்வியாளர்
பதிப்பியுடன் கல்வியாளர் - நடுநிலைய
மாணவருக்கு பயணம் பதிவு செய்ய பயணத்துறை வசதியேற்பாளர்?
ஏற்பாட்டாண்டுகள் ஆண்டுகள் வரும்” (அந்த)

கால், சிற்றியை, வரலாற்றாலைப் பட்டியல், பாரம்பரிய, முறைகள், கால், முறைகள், பட்டியல், பாரம்பரிய வரலாற்றுக் கால்

-கருநாடகம் -சமூகத் வாழ்க்கை பாதுகாக்க. 173, - 7ம் பகுதி

குறிப்பிட்டு:

- கருநாடகப் பணியில் நிறைய 1 வருடம் ஆண்டுகளுக்கு ஆதிகாலம்

- வழக்கு, கால், முறைகளும் வரலாற்றாலைப் பட்டியல், முறைகளும் பதிவுக்கு முன்னால், கால்வாழ்க்கை, நிலையும், முறைகளும்

- முறைகள் முறைகளில் முறைகள் காலத்தில் முறைகள்

- எண்ணிப்பு கொண்டு சுருக்கப்பட்டு வரும் காலத்தில் முறைகளை எண்ணிக்கையில் காலத்தில் முறைகளை இயற்கையான காலத்தில் முறைகளை

- முறைகள் முறைகளாக உருவாக்கப் படும் காலத்தில் முறைகளை முறைகள் காலத்தில் முறைகளை இயற்கையான காலத்தில் முறைகளை

- முறைகள் முறைகளில் முறைகள் காலத்தில் முறைகளை

1.குறிப்பிட்டு:

அலங்கார: 30 போட்டியில் புது 60போட்டியில்

எச்சரிக்கை: வைண்டி, உயிர்ப்பார்வையாளர், வைண்டி, மொழியாளர், வைண்டி முறைகள், மொழியாளர் வைண்டி. எனவே இப்பட்டியல் பாதுகாக்கப்பட்டது. அல்லது இப்பட்டியல் வைண்டி இயற்கையாக.

2.குறிப்பிட்டு:

சேர்மின் பணிகளில் எச்சரிக்கை புது வரலாற்று முறைகளை வைண்டி.
3.துணை விளக்கம்:

அடங்க : பல்வேறு

சிறுமியர்: டியோ, கென்றை

-தமிழ் முறையில் 1000

4.சிறுகூட விளக்கம்:

அடங்க: 2 மிலியன், இரு இலையாண்டு, 20 இலை

சிறுமியர்: மாதகு திட்டின், பி ராஜராஜன்

புத்தீபன்: பார் திலகக்குடும்ப.

-புத்தீபன் முதலில் தமிழ் படம் 1

5.வழக்குப் படத்திறன்:

அடங்க : கலை

அழகானது : புநூரின்

சிறுமியர்: கலை

-அகத்தீபன் முதலில் திலக்கனரின், 125

6.சாதாரண தினம்:

அடங்க: 16 வ.வ.

சிறுமியர்: பல்வேறுத் தினசரியின், தகவல்புத்தின், திந்துபுத்தின், தொல்லான,

புத்தீபன்

-அகத்தீபன் முதலில் திலக்கனரின், 57
(BORASSUS FLABELLIFER)

Family Name : Palmaceae

வம்பு வம்பத் : காகம்,
காப்பார்க், காகம், காகம்,
காகம் கொரிக்,
காகம்

வாழ்க்கையைப்:

திக்குப்படும் வாழ்க்கையை குழுக்கள் நோயிக் காணும் பகுதியாக நோயாக போக்கும். இருக்கும் படத்தால், படக்கை உருக்கிய போக்கும் குறுக்குக் கூறும் பல்கான்களை நோக்கும்.

பல்கான் வகையை: பல்கான் காகம், காகம், காகம், பாண், பாண்டாக் கொரிக், பாண்டாக், கொரிக்:

காகம் : கொரிக்
காகம் : கொரிக்
பாண்டாக் : கொரிக்

கொரிக்:

காகம் : கொரிக்
காகம் : கொரிக்
பாண்டாக் : கொரிக்

சிறொத்தை:

சிறொத்தை, பாண்டாக் :

தங்முப்பிடும்,
ஆண்டம் பிள்ளை,
சிறியை வேகமாக
2-நாள்புறவு
2-நாள்புறவு

மாதான:
சிறியை வேகமாக
மாதான:

கலை:
கொன்று சிறியை வேகமாக

பல்மையார் ஜாக்பரி

பல்மையார் ஜாக்பரி, கால்கள் கலை வேகமாக வேகமாக கொண்டு கொண்டு கொண்டு கொண்டு கொண்டு கொண்டு

“பல்மையார் ஜாக்பரி வேகமாக வேகமாக வேகமாக வேகமாக வேகமாக

Palmyra Jaggery extracted from the juice.

-258, vol-V T.V.Sambasivam pillai

பல்மையார் ஜாக்பரியின் வேகமாக வேகமாக வேகமாக வேகமாக
முனை:

பல்லவரின் வல்லுணர்வு, ஒருவர், குறுக்கு, தன்னை, நாட்கள் விளையாட்டு முறையை.

பாரம்பரிக்குறிய வகை:

பல்லவர் விளையாட்டின் வல்லுணர்வு பற்றியும் பாரம்பரிய வகையில் வல்லுணர்வு பற்றியும் ஆசிரியர்களின் வரையறுத்த தொன்மை பல்லவரின் விளையாட்டு வகை பாரம்பரியத்தினான்.

தொடர்ந்து சிறுகாலில் பிள்ளை அறிந்து, பின்னர் பலரிப்பு, குற்று அடையாளத்தில் வந்தார்.

பாரம்பரிய எழுத்து:

"வல்லுணர் பற்றி வணங்கியிருந்த உருவான விளையாட்டு எழுத்துப் பற்றியும் பாரம்பரிய வகையில் வல்லுணர்வு எழுத்துப் பற்றியும் காட்சியை காண்கள்.

பல்லவர் விளையாட்டின் வல்லுணர்வு பற்றியும், பாரம்பரிய வகையில் வல்லுணர்வு, தன்னை விளையாட்டு முறையை.

அப்பாசலம் பல்லவரின்:

சாத்து விளையாட்டு வருவதன் போது எளிதின் விளையாட்டு வல்லுணர்வு பற்றியும் காட்சியை விளையாட்டு வல்லுணரை சுருக்க வேண்டியது அப்பாசலம் பல்லவரின் வல்லுணர்வை சுருக்கியிருக்கும்.

528, vol-V T.V.Sambasivam pillai

பல்லவரின் கற்றுப் பிள்ளை முறை:

1.சிற்றுக கற்று முறையை:

அளவு: 1/4 பால்

சிற்று கற்று முறையை விளக்க முறை.

- அடைவில் பல்லவர் விளையாட்டு
நாம் நம்பினால்: நார்குலத்தை, காயமணிக், பான்முட்டளி, உயிரியால் அடக்கியுள்ள அணுகுமுறை மாற்றங்கள் லிங்கத்தில் 
அலங்காரத்தில் காணக்கூடிய பகுதியில் லிங்கத்தில் மற்றும் 
கட்டுப்பாட்டில் அலங்காரத்தில் லிங்கத்தில் லிங்கத்தில். 
செயல்கள் உள்ளிட்டு காலத்தில் லிங்கத்தில், 
பொருள்கள் உள்ளிட்டு காலத்தில், 
காலத்தில் உள்ளிட்டு காலத்தில், 
இன்மயமாகிறது.

சொல்லம்: கலப்பு
பிரிதல்: தோல்பட்ட
பிரிதல்: கலப்பு,
சொல்லம்: பாணைச்சிக், 
திசைகர்கு, 
கரிகிரீப்புறமாகிறது, 
பிரிதல், 
சொல்லமாகிறது.

➤ பல்லை பிரிதல் கரிகிரீப்புற பிளாட்டிய நீர்கள் நீர்கள் நீர்கள் நீர்கள் நீர்கள் நீர்கள்.
➤ பல்லை பிளாட்டிய பிளாட்டிய பல்லை பிளாட்டிய பிளாட்டிய பிளாட்டிய.
Test for korosona (Bezoar):

The following is the test for ascertaining the purity of the substance. A red hot needle pierced through it will be found stained with yellow deposit giving out at the same time yellow fumes.

- T.V. Sambasivampillai, II-1736
மூன்று குறுக்கும் நோய்காணல்:

- காரிச்சல முறையில் பயிர்ப்பியலர்கள், குறுக்குகள் இன்று காரிச்சல அறிக்கைத் தன்மைக் குழுக்கள் குறுக்குகள் குறுக்குகள்.

- முன்னெடுக்குத் தமிழியல்கள் அறிக்கைத் தன்மைகளின் காரிச்சல். காவல் தின்ம நேர், குறுக்கு பயிர்ப்பியியலர் தன்மைக் குழுக்கள் குறுக்கு.

- செயற்கை செயல்பாடு காரிச்சல முறையில் பயிர்ப்பியலர் தன்மைக் காவல் மற்றும் காற்றுக்கிள் முன்னெடுக்கும் வழிக் காவலின் முன்னெடுக்கும் வழிக் காவலின் முன்னெடுக்கும் வழிக்

- காரிச்சல், அகராதி செயல்பாடு மற்றும் குறுக்கு பயிர்ப்பியலர் குறுக்கு.

- முன்னெடுக்கும் பயிர்ப்பியலர்கள் குறுக்கு, குறுக்கு, காரிச்சல் தன்மைக் கோரிக்கையில் விளைவாக கோரிக்கையில், பாருத்தி ஆண்டு வேதவை காரிச்சல் பயிர்ப்புறை குறுக்கு குறுக்கு.

- அகராதிகள் காரிச்சல் முறையில் பயிர்ப்பியலர் வன் பங்களித்த அனிதை.

- அகராதிகள் காரிச்சல் முறையில் பயிர்ப்பியலர்.

- முன்னெடுக்கும் முன்னெடுக்கும் அதிகாரியாய் பயிர்ப்புறை குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறுக்கு குறு�
கால்மலை எகிமானவள்

கால்மலை எகிமானவள் (Goat Bazoar) ½ (65ம். கிரே) முதல் 1 காரை (130ம்.கிரே) வரை பாலில் பாலியான மண்டலங்களுக்கு வைக்கப்பட்டது, மித்துண்டிகள் பிறகு கருப்புக்கால் மாறியது, பால்கார்களின் தொல்லியல் ஆரக்கிய விளக்கமாக, கரு விளக்கியக்கியமாக, சுருக்கமாக உள்ளது. மாலிகங்கள் நூற்றாண்டுகளுக்கு மேலும் பிரிவுகூடாக பிரிந்து பிரித்து வைக்கப்பட்டது.

1. கரைக்கட்டு வகைகள்:

அடையாள: பாலகர், கிரே

சிறுமியர் பிரபா பிற்கள்: விளக்கம், கும்பகோணம், கருத்துகள், 13 காரை, கொம்புகள்

2. காலைக்காலநோட்டம் கரைக்கட்டுப் பிரபா:

கரைக்கட்டு கொள்ளும்

சிறுமியர் பிரபா: சோதனைகள், கருக்கால், என்ற வகை

-பிரபா குழுக்கள் கரைக்கட்டு பிளா டெக் 1

3. காலைக்காலநோட்டம் பாக்கிதா

அடையாள: கரைகள் அடையாள பாக்கிதா பொழுதைப்பாக்கிதா.

சிறுமியர் பிரபா: சோதனை பாக்கிதா, கரைகள், இரு பாக்கிதா துறைகள், மேல்கள், கொம்புகள் மற்றும்

-பிரபா குழுக்கள் கரைக்கட்டு பிளா டெக்
4. அறிக்கை தக்கவர்கள்:

அல்லது: காற்று, மாருவாய்மை வரியங்கள்

செய்யக்கூட்டு: வெள்ளை, வெள்ளை, கட்டியல், கம்பை, கூளை, கதைகள்

-சிற்றகைசிய கருவி, 2

5. காசியாக்கள் கருவி:

கல் மாடு, கல், செட்டி, சிளின்னி, செண்டிக்கை, செண்டிக்கை, செண்டிக்கை, செண்டிக்கை, செண்டிக்கை, செண்டிக்கை, செண்டிக்கை

-சிற்றகைசிய கருவி, 1
POORAM
(Mercurous chloride)

Introduction:

Mercury(I) chloride is the chemical compound with the formula Hg₂Cl₂. Also known as calomel (a mineral form, rarely found in nature) or mercurous chloride, this dense white or yellowish-white, odourless solid is the principal example of a mercury(I) compound. It is a component of reference electrodes in electrochemistry.

A relatively rare mineral, associated with other mercury minerals, probably always secondary and late in the mineral sequence. It will be found in small brilliant crystals in cavities, associated with cinnabar and often perched on crystals of that mercury ore.

Two related anhydrous halides are similar in color to calomel even though they contain copper. Rare nantokite (CuCl; copper chloride) and almost as rare marshite (CuI; copper iodide) are the only colorless or white copper minerals. Both are tetrahedral. Marshite forms triangular lustrous tetrahedral crystals at Chuquicamata, Chile, and was formerly found at Broken Hill, New South Wales. In a mine tunnel near Chuquicamata, iron-stained orange incrustations of marshite, catalyzed by iron rails and bolts, form from drainage water.

Marshite is colorless to pale yellow when fresh, as a rule, but seems to turn coppery on exposure to light and air. Iodine vapors emanate when a sealed marshite container is opened, and can be smelled; perhaps copper is freed and remains to give the color noted in older exposed specimens.

History:

The name calomel is thought to come from the Greek word beautiful, and black. This name (somewhat surprising for a white compound) is probably due to its characteristic disproportionation reaction with ammonia, which gives a spectacular black coloration due to
the finely dispersed metallic mercury formed. It is also referred to as the mineral *horn quicksilver* or *horn mercury*. Calomel was taken internally and used as a laxative and disinfectant, as well as in the treatment of syphilis, until the early 20th century.

Mercury became a popular remedy for a variety of physical and mental ailments during the age of "heroic medicine." It was used by doctors in America throughout the 18th century, and during the revolution, to make patients regurgitate and release their body from "impurities". Benjamin Rush, a famed physician in colonial Philadelphia and signatory to the Declaration of Independence, was one particular well-known advocate of mercury in medicine and famously used calomel to treat sufferers of yellow fever during its outbreak in the city in 1793. Calomel was given to patients as a purgative until they began to salivate. However, it was often administered to patients in such great quantities that their hair and teeth fell out.

**Preparation and Reactions:**

Mercurous chloride forms by the reaction of elemental mercury and mercuric chloride:

\[
\text{Hg} + \text{HgCl}_2 \rightarrow \text{Hg}_2\text{Cl}_2
\]

It can be prepared via metathesis reaction involving aqueous mercury(I) nitrate using various chloride sources including NaCl or HCl:

\[
2\text{HCl} + \text{Hg}_2(\text{NO}_3)_2 \rightarrow \text{Hg}_2\text{Cl}_2 + 2\text{HNO}_3
\]

Ammonia causes \(\text{Hg}_2\text{Cl}_2\) to disproportionate:

\[
\text{Hg}_2\text{Cl}_2 + 2\text{NH}_3 \rightarrow \text{Hg} + \text{Hg}(\text{NH}_2)\text{Cl} + \text{NH}_4\text{Cl}
\]

**Photochemistry:**

Mercurous chloride decomposes into mercury(II) chloride and elemental mercury upon exposure to UV light:

\[
\text{Hg}_2\text{Cl}_2 \rightarrow \text{HgCl}_2 + \text{Hg}
\]

The formation of Hg can be used to calculate the number of photons in the light beam, by the technique of actinometry. By utilizing a light reaction in the presence of mercury(II) chloride and ammonium oxalate, mercury(I) chloride, ammonium chloride and carbon dioxide is produced:

\[
2\text{HgCl}_2 + (\text{NH}_4)_2\text{C}_2\text{O}_4 + \text{Light} \rightarrow \text{Hg}_2\text{Cl}_2(s) + 2[\text{NH}_4]^+][\text{Cl}^-] + 2\text{CO}_2
\]
Physical and Chemical Properties:
Molecular formula \( \text{Hg}_2\text{Cl}_2 \)
Molar mass 472.09 g/mol
Appearance White solid
Density 7.150 g/cm³
Melting point 525 °C (triple point)
Boiling point 383 °C (sublimes)
Solubility in water 0.2 mg/100 mL
Solubility Insoluble in ethanol, ether
Refractive index \( (n_D) \) 1.973

Related Compounds:
Other anions Mercury(I) fluoride
Mercury(I) bromide
Mercury(I) iodide
Other cations Mercury(II) chloride

Stability and Reactivity:

Stability:
Stable under ordinary conditions of use and storage. Slowly decomposed by sunlight into mercuric chloride and metallic mercury.

Hazardous Decomposition Products:
Oxides of the contained metal and halogen, possibly also free, or ionic halogen.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Bromides, iodides, ammonia, alkalis, cyanides, chlorides, copper and lead salts, silver salts, carbonates, sulfides, soap, lime water, iodoform, and hydrogen peroxide.
Conditions to Avoid:
Light and incompatibles.

Handling and Storage:
Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from any source of heat or ignition. Protect from light. Follow strict hygiene practices. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

POISONOUS EFFECTS OF POORAM

Potential Health Effects:

Inhalation:
Causes irritation to the respiratory tract. Symptoms include sore throat, coughing, pain, tightness in chest, breathing difficulties, shortness of breath and headache. Pneumonitis may develop. Can be absorbed through inhalation with symptoms to parallel ingestion.

Ingestion:
Toxic! Average lethal dose for inorganic mercury salts is about 1 gram. May cause burning of the mouth and pharynx, abdominal pain, vomiting, bloody diarrhea. May be followed by a rapid and weak pulse, shallow breathing, paleness, exhaustion, tremors and collapse. Delayed death may occur from renal failure.

Skin Contact:
Causes irritation. Symptoms include redness and pain. May cause burns. May cause sensitization. Can be absorbed through the skin with symptoms to parallel ingestion.

Eye Contact:
Causes irritation to eyes, may cause burns and eye damage.
Chronic Exposure:

Chronic exposure through any route can produce central nervous system damage. May cause muscle tremors, personality and behavior changes, memory loss, metallic taste, loosening of the teeth, digestive disorders, skin rashes, brain damage and kidney damage.

Can cause skin allergies and accumulate in the body. Repeated skin contact can cause the skin to turn grey in color. Not a known reproductive hazard, but related mercury compounds can damage the developing fetus and decrease fertility in males and females.

Aggravation of Pre-existing Conditions:

Persons with nervous disorders, or impaired kidney or respiratory function, or a history of allergies or a known sensitization to mercury may be more susceptible to the effects of the substance.

Toxicological Information of Pooram:

Toxicological Data:

Oral rat LD50: 210 mg/kg.

Reproductive Toxicity:

All forms of mercury can cross the placenta to the fetus, but most of what is known has been learned from experimental animals.

Calomel Therapeutic Application:

- Calomel is peculiarly called for as a purgative, whenever, in connection with another demand for cathartic medicine, there is an indication for stimulating the secretory function of the liver.
- Full mercurial purgation will generally entirely relieve this affection, and probably prevent the occurrence of some more serious attack, as bilious colic, cholera morbus, dysentery, or jaundice.
In all cases of constipation, with deficiency of bile in the passages, a purgative dose of calomel may be given. This condition often precedes an attack of jaundice, which may thus be prevented.

In jaundice itself, of the ordinary kind, attended with clay-coloured passages, and bilious urine, a purgative dose of calomel, alone or combined, should be given at the commencement, and occasionally repeated in the course of the disease.

Acute hepatitis generally offers the same indication. Where a purgative is required, calomel should almost always be used, either alone, or connected with other cathartics. In the chronic variety, active purgation is seldom desirable, and it is rather the alterative than the cathartic action of the medicine that is wanted.

In acute splenitis, calomel should be given at the outset, with a view to deplete from the portal circle, so intimately connected with that organ.

In bilious colic, calomel is strongly called for by the congested state of the liver, and, in conjunction with opium, is the most important remedy in the disease.

In gastritis, severe enteritis, and peritonitis, calomel may often be advantageously used as a cathartic, at the commencement of the disease.

In infantile diseases, calomel is peculiarly efficacious. It is recommended here by its want of unpleasant taste, by its retention upon the stomach when others are rejected, and by the general mildness of its operation. It is useful, moreover, in the complaints of children.

In epidemic cholera, dysentery, yellow fever, etc., it has been recommended in large doses as a sedative agent. It is asserted that, when given very largely in these cases, so far from causing local or general excitement, it produces, on the contrary, a remarkable sedative effect, allaying the local irritation, checking vomiting and purging, lowering the frequency and force of the pulse and the heat of skin, and greatly contributing to the cure.
Plumbago Zeylanica

Family : Plumbaginoaceae
Hindi : Kala-chitra
Sans : Chidraka
Malai : Nalla chitra mullam
Kan : Nila chitramua

Chemical Constituents of The Aerial Parts of Plumbago Zeylanica:

Plumbagin,
Isoshinanolone,
Plumbagic acid ,
Beta-sitosterol,
4-Hydroxybenzaldehyde ,
Trans-Cinnamic Acid,
Vanillic Acid,
2, 5-Dimethyl-7-Hydroxychromone,
Indole-3-Carboxaldehyde.

-MID:17727061

Medicinal Uses:

- In Ayurved root is useful in dyspepsia, piles, ana-sarca, diarrhea, skin diseases. A tincture of the root-bark is employed as an antiperiodic.
- Root has a beneficial effect on piles; in these cases it is given in various combinations; e.g., an earthen jar or pot of which the inside is lined with a paste of the root is used for preparing curds (dadhi or Kanjica) which is given to persons suffering from heamorrhoids and prurigo. Root was employed in the treatment of intermittent fevers.
- It acts as a powerful sudorific - (Dymock). For chronic and muscular rheumatism and all painful affections of the joints.
- For epilepsy, hysteria, mania and other mental disorders a compound powder com-posed of Chiraka root, Brahmi and Acorus calamus is useful in doses of 10 to 30 grains three times a day.
Pharmacological Activity:

An antileishmanial prenyloxy-naphthoquinone from roots of Plumbago zeylanica.

This study discloses strong in vitro antileishmanial activity of 2-methyl-5±-(3'-methyl-but-2'-enyloxy)-[1,4]naphthoquinone, a prenyloxy-naphthoquinone isolated and characterised from roots of the plant Plumbago zeylanica.


The constituents in the roots of Plumbago auriculata Lam. and Plumbago zeylanica L. responsible for antibacterial activity.

Plumbagin inhibits cell growth and potentiates apoptosis in human gastric cancer cells in vitro through the NF-κB signaling pathway.

-PMID: 5154609

To investigate the effects and underlying mechanisms of plumbagin, a naphthoquinone derived from medicinal plant Plumbago zeylanica, on human gastric cancer (GC) cells.

Plumbagin inhibits cell growth and potentiates apoptosis in human GC cells through the NF-κB pathway.

PLUMBAGO ZEYLANICA POISONOUS EFFECTS

ACUTE HEALTH EFFECTS OF PLUMBAGIN:
SWALLOWED:

- Toxic effects may result from the accidental ingestion of it. Animal experiments indicate that ingestion of less than 40 gram may be fatal or may produce serious damage to the health of the individual.
- It can produce chemical burns within the oral cavity and gastrointestinal tract following ingestion.
- The material can produce severe chemical burns within the oral cavity and gastrointestinal tract following ingestion.
EYE:

- It can produce chemical burns to the eye following direct contact. Vapors or mists may be extremely irritating.
- It can produce severe chemical burns to the eye following direct contact. Vapors or mists may be extremely irritating.
- If applied to the eyes, it causes severe eye damage.

SKIN

- It can produce chemical burns following direct contact with the skin.
- It can produce severe chemical burns following direct contact with the skin.
- Skin contact with it may damage the health of the individual; systemic effects may result following absorption.
- Open cuts, abraded or irritated skin should not be exposed to this material. Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects.

INHALED:

- It can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage.
- Inhalation of dusts, generated by it during the course of normal handling, may produce serious damage to the health of the Individual.
- Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.
- High concentrations cause inflamed airways and watery swelling of the lungs with edema.
PTYCHOTIS AJOWAN, DC.,
(Carum copticum; P. coptica; Carum roxburghianum or
P. roxburghianum; (Benth); Ammi copticum.

<table>
<thead>
<tr>
<th>Family</th>
<th>Unbelliferae</th>
</tr>
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<tbody>
<tr>
<td>Sans</td>
<td>Yavanika; Ajmada;</td>
</tr>
<tr>
<td>Eng</td>
<td>Bishop’s weed;</td>
</tr>
<tr>
<td>Omum (seeds)</td>
<td>Lovage; Ajawa Seeds.</td>
</tr>
<tr>
<td>Hind &amp; Duk</td>
<td>Ajowan.</td>
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</tbody>
</table>

**Habitat**

This plant (Carum Copticum) grows and is largely cultivated in Eastern India, Particularly abundant in and around Indore and the Nizam’s Dominions.

**Part Used**: Fruit.

**Constituents**:

An aromatic volatile essential oil and a crystalline substance-s earoptin, which collects on the surface of the distilled water; also cumene and terpene, “thyme”.

“The seeds of Carum copticum contain the antiseptic thymol and they yield 2 to 3 percent of an essential oil which is official as ‘oil of aiowan’ which contains not less than 40 to 50 percent of thymol.”

-(Chopra’s “I.D. of Ip. 82).

**Action**

Seeds possess diffusible stimulant,
Stomachic,
Carminative,
Tonic,
Aromatic,
Pungent,
Antispasmodic
Anthelmintic
Uses:

- Omum seeds are useful in flatulence, indigestion, colic, atonic dyspepsia, diarrhea, cholera, hysteria and spasmodic affections of the bowels, and check chronic discharges such as profuse expectoration in bronchitis.
- Vola-tile oil is also used in cholera, flatulent, colic, atonic dyspepsia or diarrhea, hysteria and indigestion. Externally it is applied to relieve rheumatic and neuralgic pains.
- “The chief importance of ajowan seeds is for production of thymol, which is a very valuable anthelmintic”.
- Seeds are used also as spices along with betel-nuts and pan leaves in flatulence, dyspepsia and spasmodic affections.
- A plaster of poultice or the crushed seeds is used to relieve the pain of colic.
- Omum seds made hot are used as a dry fomentation to the chest in asthma and to the hands and feet in cholera, fainting, syncope, and rheumatism.

Pharmacological activity:

Studies on the antihypertensive, antispasmodic, bronchodilator and hepatoprotective activities of the Carum copticum seed extract.

This study describes the antihypertensive, antispasmodic, bronchodilator and hepatoprotective activities of the aqueous-methanolic extract of Carum copticum Benth. These results indicate the presence of calcium antagonist(s) in Carum copticum seeds and thus provides sound mechanistic basis for some of their folkloric uses

- http://dx.doi.org/10.1016/j.jep.2005.01.017, How to Cite or Link Using DOI

Anticonvulsant and depressant effects of aqueous extracts of Carum copticum seeds in male rats.

In this study, the effects of aqueous extracts of Carum copticum seeds (CCS) were evaluated in kindling models of epilepsy. These results suggest that CCS extract has remarkable antiepileptic and central depressant effects.
Antitussive effect of *Carum copticum* in Guinea pigs

Several therapeutic effects including anti-asthma and dyspnea have been described for the seeds of *Carum copticum* In previous studies the relaxant and anticholinergic (functional antagonism) effects, histamine (H(1)) inhibitory effect of *Carum copticum* have been demonstrated on guinea pig tracheal chains. In the present study the antitussive effect of this plant was evaluated.

The results showed significant reduction of cough number obtained in the presence of both concentration.

The analgesic effect of *Carum copticum* extract and morphine on phasic pain in mice

*Carum copticum* (L.) Sprague ex Turrill is a plant in Umbelliferae family, which is mentioned to have some therapeutic effects on headache and joint pains in traditional literature, but there are not enough scientific reports to prove its effects on pain.

So, we conducted to design an experimental clinical trial study to assess and compare the analgesic effect of ethanolic extract of *Carum copticum* fruit with morphine by using a tail-flick analgesiometer device. Our results indicate that the test drug produced significant increase in tail-flick latency (TFL) during 2 h post-drug administration ($p < 0.05$)

The present study supports the claims of traditional medicine showing that *Carum copticum* extract possesses a clear-cut analgesic effect.
Role of Carum copticum seeds in modulating chromium-induced toxicity on human bronchial epithelial cells and human peripheral blood lymphocytes.

The present study pertains to investigate modulatory effects of methanolic extract of C. copticum seeds (MCE) against hexavalent chromium induced cytotoxicity, genotoxicity, apoptosis and oxidative stress on human bronchial epithelial cells (BEAS-2B) and isolated human peripheral blood lymphocyte (PBL) in vitro.

This study provides strong evidence to support the beneficial effect of MCE in preventing Cr(VI) induced toxicity in BEAS-2B and PBL cells


The analgesic effect of Carum copticum extract and morphine on phasic pain in mice

The present study supports the claims of Iranian traditional medicine showing that Carum copticum extract possesses a clear-cut analgesic effect.

BORASSUS FLABELLIFER, Linn.

Family : Palmae
Sans : Tala.
Eng : Palmyra palm; Brab tree.
Hind : Taltar

Habitat :
- The palmyra palm is a large tree up to 30m high and the trunk may have a circumference of 1.7m at the base.
- The palmyra palm is a large tree up to 30m high and the trunk may have a circumference of 1.7m at the base. There may be 25-40 fresh leaves.
- It is commonly cultivated in India, Southeast Asia, Malaysia and occasionally in other warm regions including Hawaii and southern Florida. In India, it is planted as a windbreak on the plains.
- Grows on dry soils or sandy localities along river banks, throughout tropical India, especially in South India.

- Economic Botany (1988) 42(3) 420-441

Parts Used : Root, Flowering Stalk, Juice, Bark and Fruit.

Constituents : Gum,
Fat ,
Albuminoids.

Action :
- Root is cooling and restorative; juice is diuretic, cooling, stimulant and antiphlogistic when fresh;
- Pulp from the unripe fruit is diuretic, demulcent and nutritive; terminal buds are nutritive and diuretic.

Preparations :
- Palm juice and palm-wine, Confection.
- sago from the trunk; poultice; pulp; ashes of the flowering-stalk and decoction.
Uses

➢ It is from the juice of this tree that toddy, jiggery and country-sugar are prepared in large quantities in Southern India.

➢ Sugar-candy produced in the manufacture of sugar from the palm is used in cough and pulmonary affections.

➢ Fresh saccharine juice obtained by excision of the spadix (young terminal buds) early in the morning is cooling and is a stimulant beverage, also acts as a laxative taken regularly for several mornings.

➢ It is useful for inflam-matory affections and dropsy; also in gastric catarrh and to check hiccup; as diuretic it is useful in gonorrhoea.

➢ “Decoction of the root is also used in gastritis and hiccup.,” Slightly fermented juice called Tari (toddy),” an intoxicating liquor, is a favourite drink among the laboring classes” is given in diabetes.

➢ With aromatics it is a good tonic in emaciation or phthisis. Milky fluid from the immature fruits is a sweet and cooling drink, and checks hiccup and sickness.

➢ Toddy poulice prepared by adding fresh drawn toddy to rice flour and subjected to a gentle fire till fermentation takes place, then spread on a cloth forms a valuable stimulant application to in-flamed parts, gangrenous and indolent ulcers, carbuncles etc.

➢ Yellow pulp surrounding the ripe nuts is sweet, but heavy and indigestible. Ashes of the flowering stalk are useful in enlarged spleen.

➢ Bark of the tree burnt, reduced to charcoal and pulverized makes a good dentifrice; decoration of the bark with a little salt added to it is good astringent gargle for strengthening gums and teeth.

➢ The palm yields a fruit which is eaten with much relish.

Toddy

The chief product of the palmyra is the sweet sap (toddy) obtained by tapping the tip of the inflorescence, as is done with the other sugar.
**Jaggery Preparation:**

Unrefined sugar made from palm sap.

- American Heritage® Dictionary of the English Language, Fourth Edition

It is the first extract of the palm juice.

- The juice is boiled, a little salt is added to it to act as a preservative, and so that the jaggery does not taste too sweet.
- It is cooled and poured into a long cone made of palm leaves.
- Jaggery is an amorphous form of unrefined and non-distilled sugar repared from sap or juice of plants which contain considerable amount of sucrose or sugar in them, like sugar cane and palms like date palm and Palmyra

- www.medindia.net

**Constituents:**

Palmyra palm jaggery (gur) is much more nutritious than crude cane sugar, containing

- 1.04% protein,
- 0.19% fat,
- 76.86% sucrose,
- 1.66% glucose,
- 3.15% total minerals,
- 0.861 % calcium,
- 0.052% phosphorus;
also 11.01 mg iron per 100 g
- 0.767 mg of copper per 100 g.

The fresh sap is reportedly a good source of vitamin B complex.

- Economic Botany (1988) 42(3) 420-441

**Types of Jaggery:**

1. Sugarcane Jaggery:

   - Colour : Golden Brown to Dark Brown.
   - Preparation: Prepared by boiling Sugar Cane juice.
   - Physical State: Amorphous solid to viscous granular liquid.
2. **Date Palm Jaggery:**
   Colour : Golden Brown to Dark Brown.
   Preparation: Prepared by boiling sap of Date Palm.
   Physical State: Amorphous solid and viscous granular to clear red liquid.

3. **Palmyra Jaggery:**
   Colour : Off white to pale yellowish white.
   Preparation : Prepared by boiling sap of Palmyra Palm.
   Physical State : Amorphous solid.

4. **Toddy Palm Jaggery:**
   Colour : Golden Brown.
   Preparation : Prepared by boiling sap of Toddy Palm.
   Physical State : Amorphous solid.

5. **Other Palm Jaggery:**
   These days, even the sap of Sago Palm and Coconut Palm are also being used to make Jaggery, but they are rarely

**Nutritive value of 100 gm of palm Jaggery:**

- Energy - 349 Eicals
- Moisture - 9 gm
- Protein(gm) - 2 gm
- Fat(gm) - 0 gm
- Mineral(gm) - 4 gm
- Carbohydrates(gm) - 85 gm
- Calcium(mg) - 1252 mg
- Phosphorous(mg) - 372 mg
BEZOAR

Eng : Serpent stone; gall-stone.
Pers : Hajaratalbaqr; Gaorohan.
Hind : Gorochan.
Tel : Gorochanamu.
Tam : Gorochana

- It is a concretion found in the stomach and in the gall-bladder of an ox or cow and occurs as light, yellowish or green, solid or spherical concretions.

In Hindu medicine it is highly prized and extensively used.

- Dose is 1/6th to 1/4th grain.
- It is cooling, and aromatic. Prescribed is miscarriage. Artificial Bezoar is a substance made up of ox gall mixed with hair, wood, magnesia, phosphate of lime, pipe clay, etc.
FEL BOVIS

Eng. Name: Fresh ox gall

The fresh ox gall secreted by the liver and collected in the gall-bladder.

- It is a dark or yellowish green viscid liquid of a peculiar unpleasant odour and bitterish taste. It is neutral or faintly alkaline in reaction, soluble in water and alcohol.

FEL BOVINUM PURIFICATUM or FEL TAURI DEPURATUS

Eng : Purified ox-gall or ox-bile.
Sans : Gorochanam.
Arab : Hajr-ul-bahr.
Hind : Zehar-mohra. Duk.
Guj : Guruchandan.
Tam : Gorojanai.
Tel : Gorojanam.
Sinh : Visagul.
English : Cow Gallstone, Ox Gallstone
Latin : Calculus Bovis seu Bubali
Pharmaceutical Name : Calculus Bovis

- Burm.-Goyazin is prepared by evaporating ox-gall to one-third, adding alcohol, filtering, distilling off and evaporating until it acquires a suitable consistence for making pills. Gorochanam is light and can be easily broken between the fingers. It is laxative, anti-spasmodic, chlagogue, cooling are aromatic.
- It is specially indicated in measles and small-pox, to reduce excessive heat in the body; also in whooping cough and watery stools and choleric symptoms.
- It is used in convulsions, hysteria, spasmodic diseases, melancholia and intestinal disorders with deficient secretion of bile, in jaundice, etc., and in abortion.
- It is given to infants for stopping green stools and (in small doses) as a laxative. The usual adult dose is from 5 to 10 grains.
- It enters into the composition of some medicines used for skin diseases.
Method for Pharmaceutical Preparations:

- The gallstone of an ox is collected in any season, or the bile of an ox. After gathering, the material is dried and made into powder or pills.

Properties: Bitter and cool

Functions:

- To clear heat and release toxins
- To eliminate endogenous wind and stop convulsions.
- To resolve phlegm and promote resuscitation

Indications:

- Loss of consciousness and convulsions caused by high fever.
- Sore throat or ulcers and boils due to accumulation of toxic heat.

Cautions: This substance is contraindicated during pregnancy.
- ccbolgroup.com/calculosE.html

Chemical constituents:

- It is chemically similar to human bile, so it has seen widespread use in traditional medicine in various cultures.
- After processing for medical use, this substance can be used to assist the body in the breaking down of fats and the assimilation of vitamins A, D, E, and K. It also helps treat constipation, and prevent gallstones and certain liver diseases, such as cirrhosis.
- Ox bile primarily consists of water, salts, pigments, cholesterol, lecithin, and several ions, and it is chemically similar to human bile, making it readily compatible for medical purposes. The use of it in extract form has shown benefit in situations where the liver is not functioning properly and is unable to adequately produce enough bile itself.
- The extract can assist in the assimilation of fat-soluble vitamins, and it also may help in situations of slow colon motility, obstructions of the gallbladder, and cholecystectomy.
- www.wisegeek.org
Benefits of ox bile extract

- Assists in metabolizing cholesterol and fat
- Facilitates absorption of vitamins K, A, D and E
- May help prevent gallstones
- May help moderate cholesterol and triglycerides
- May be beneficial in treating liver diseases such as cirrhosis and hepatitis

Supplemental bile extract helps emulsify fats and promotes absorption of fat-soluble vitamins such as vitamins K, A, D and E.

- www.dermaharmony.com

Side Effects:

- Some indicated side effects of ox bile extract are nausea, upset stomach and diarrhea, often a result of exceeding the recommended dosage. Possible allergic reactions may occur in those sensitive to it.
4.1. COLLECTION, IDENTIFICATION, PURIFICATION AND PREPARATION OF MEDICINE

COLLECTION OF DRUG:

The raw drug was procured from country drug merchant shop, Chennai and Nagarkovil.

AUTHENTICATION:

The raw drug Pooram was authenticated by Siddha Central Research Institute, Chennai.

The raw drug of plants were authenticated by Department of Botany, NIS, Chennai.

METHOD OF PURIFICATION:

PURIFICATION OF POORAM (CALOMEL):

Pooram is kept in mud plate in heat and add quarter liter of Mukia maderaspatana juice drop by drop. On Completion of this, milk is gently added into it. Dust particle on the outer area of Pooram is removed and then Pooram is separated for usage.

- Anuboga Vaidhya Navaneedham part 4, P-92

PURIFICATION OF SITHIRAMOOLAM (PLUMBAGO INDICA):

The roots are pounded well and made into powder.

- vaithiya sinthamani, P-118

PURIFICATION OF OMAM (BISHOPS WEED):

The seeds are soaked in supernatant of limestone solution for the samam (3 hours) and dried well.

- vaithiya sinthamani, P-118

PURIFICATION OF KOROSANAM (BEZOAR):

Dust, stones and dander are removed.
PURIFICATION OF PANAIVELLAM (JAGGERY):

Dust, stones and dander are removed.

METHOD OF PREPARATION:

INGREDIENTS:

Chithiramoola verpattai chooranam (Plumbago indica) : 1.25varagan (5.25gms)
purified rasakarpooram (Mercurous chloride) : 1.25varagan (5.25gms)
Ooma chooranam (Carum copticum) : 1.25varagan (5.25gms)
Korosanai (Ox bile) : 1.25varagan (5.25gms)
Panaivellam (Jaggery) : 3.45varagan (14 gms)

Purified Mercurous chloride, Purified Powder of Plumbago indica, Purified Powder of Carum copticum are ground well in mortar for 1 hour. To this Purified Jaggery and Ox bile are added, these are again ground for 6 hours and rolled into a pepper sized (56mg) pills.

Dose of drug : One to One and Half pills (56mg to 84mg), two times a day.
Adjuvant : Sugar/ Paste of dried ginger / Butter
Duration : 10 days

Therapeutic uses : Parpala viranangal, Kiranthi rogangal, Yoniputru, Soolaigal, Kallippukiranthi, Lingaputru, Pouthirarogangal, Kannappilavai, Pakappilavai, Marsilanthi, Vippuruthi, 8 vagai gunmam, Maega ranangal.

- Ref: Veeramaamunivar vagadathiratu part I; Page No-49; Editio - 1994
பாதுகாலா

- குறிப்பிட்டதுபடி, முன்னர் வெளிப்படுத்தப்பட்ட பதிப்புகள் கொண்டு பாதுகாலா வருவாய்ப் பலகிடும் ஒரு காலகட்டத்தில் வந்து கொண்டு வருவாய்ப் பலகிடும்.

- கூட்டமாக ிறங்கரை விளக்க வந்து வருவாய்ப் பலகிடும். பாதுகாலா சுற்றில் வந்து வருவாய்ப் பலகிடும்.

- பாதுகாலா நிலையாகி செயல்நிலை தொடர்கிளிருந்து வந்து வருவாய்ப் பலகிடும் ஆளவிகள் வெளியாகவும் பாதுகாலா வருவாய்ப் பலகிடும்.

- செயல்நிலை நிலை குறிப்பிட்டதுபடி 10

- பாதுகாலாக்கத் தொடர்கிளிருந்து வந்து வருவாய்ப் பலகிடும், தொடர்கிளிருந்து தொடர்கிளிருந்து வந்து வருவாய்ப் பலகிடும். பெண்கள் வந்து வருந்து பாதுகாலா பலகிடும் வந்து வருவாய்ப் பலகிடும்.

- பெண்கள் பாதுகாலா விளக்கம் 5
Unpurified Pooram

Purified Pooram

Kodi Veli

Omam
4.2. QUALITATIVE ANALYSIS

PHYSICO-CHEMICAL PROPERTIES SIDDHAR KULIKAI

COLOUR

About 50 gm of Siddhar Kulikai was taken in a clean glass beaker and tested for its colour by viewing against a white opaque back ground under direct sunlight.

ODOUR

About 50 gm of the Siddhar Kulikai was placed in 100 ml of beaker and tested for its odour by wafting the air above the beaker.

pH

The pH of the Siddhar Kulikai was estimated as per the method prescribed in the Indian standard (IS) - 6940(1982). One gram of the Siddhar Kulikai was taken into a 100ml graduated cylinder containing about 50 ml of water and filled up to the mark with water. The cylinder was stopped and shaken vigorously for two minutes and the suspension was allowed to settle for an hour at 25 to 27°C. About 25 ml of the clear aqueous solution was transferred into a 50 ml beaker and tested for pH using DIGISUN digital PH meter (DIGISUN electronics, Hyderabad, India)

DETERMINATION OF ASH VALUE

Two gms of the Siddhar Kulikai was weighed accurately in tarred platinum or silica dish and incinerated at a temperature not exceeding 450°C until free from carbon, then cooled and weighed. Calculate the percentage of ash with reference of the air dried drug.
WATER SOLUBLE ASH

To the Gooch crucible containing the total ash, 25 ml of water was added and boiled for 5 minutes. The insoluble matter was collected in a sintered glass crucible or on ash less filter paper. Washed with hot water and ignited in a crucible for 15 minutes at a temperature not exceeding 450°C. Subtract the weight of the insoluble matter from the weight of the ash. The difference of the weight represents the water soluble ash. Calculate the percentage of water soluble ash with reference to the air dried drug.

ACID INSOLUBLE ASH

Ash was boiled for 5 minutes with 25 ml of 1:1 diluted Hcl. The insoluble matter was collected in a Gooch crucible and placed on an ash less filter paper, washed with water and then ignited. Finally cooled in a desiccator and weighed. The percentage of insoluble ash was calculated with reference to the air dried drug.

LOSS ON DRYING

Five grams of the Siddhar Kulikai was heated in a hot oven at 105°C to a constant weight. The percentage loss of weight was calculated as per procedure.
### CHEMICAL ANALYSIS

<table>
<thead>
<tr>
<th>EXPERIMENT</th>
<th>OBSERVATION</th>
<th>INFERENCE</th>
<th>UNPURIFIED POORAM</th>
<th>PURIFIED POORAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance of the sample</td>
<td>White in colour</td>
<td>White in colour</td>
<td>White in colour</td>
<td></td>
</tr>
<tr>
<td>Solubility:</td>
<td>Insoluble</td>
<td>Absence of silicate</td>
<td>Absence of silicate</td>
<td></td>
</tr>
<tr>
<td>a. A little of the sample is shaken well with distilled water</td>
<td>Insoluble</td>
<td>Absence of silicate</td>
<td>Absence of silicate</td>
<td></td>
</tr>
<tr>
<td>b. A little of the sample is shaken well with Con. HCl and Con. H$_2$SO$_4$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Action of heat:</td>
<td>White fumes evolved</td>
<td>Presence of carbonate and nitrate</td>
<td>Presence of carbonate and nitrate</td>
<td></td>
</tr>
<tr>
<td>A small amount of the sample is taken in a dry test tube and heated gently at first and then strongly</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flame test:</td>
<td>No colour flames appeared</td>
<td>Absence of copper</td>
<td>Absence of copper</td>
<td></td>
</tr>
<tr>
<td>The sample is mixed with Con. HCl in a watch glass and introduced in luminous part of the Bunsen flame</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ash Test:</td>
<td>No yellow colour flame</td>
<td>Absence of sodium.</td>
<td>Absence of sodium.</td>
<td></td>
</tr>
<tr>
<td>A filter paper is soaked into a mixture of sample and cobalt nitrate solution and introduced into the Bunsen flame and ignited</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**PREPARATION OF EXTRACT:**

5g of sample was taken in a 250 ml of clean beaker and 50 ml of distilled water was added to it. Then it was boiled well for about 10 min. Then it is allowed to cool and filtered in a 100 ml volumetric flask and made up to 100 ml with distilled water. This preparation is used for the qualitative analysis of acidic and basic radicals.

**TEST FOR BASIC RADICALS**

<table>
<thead>
<tr>
<th>PROCEDURE</th>
<th>OBSERVATION</th>
<th>UNPURIFIED POORAM</th>
<th>PURIFIED POORAM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Test for Potassium:</strong></td>
<td>No formation of yellow colour precipitate</td>
<td><strong>Absence of Potassium</strong></td>
<td><strong>Absence of Potassium</strong></td>
</tr>
<tr>
<td>A pinch of sample is treated with 2ml of sodium nitrate solution and then treated with 2ml of cobalt nitrate in 30% of glacial acetic acid.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Test for Calcium:</strong></td>
<td>No formation of white colour precipitate</td>
<td><strong>Absence of Calcium</strong></td>
<td><strong>Absence of Calcium</strong></td>
</tr>
<tr>
<td>2 ml of extract is taken in a clean test tube. To this add 2 ml of 4% ammonium oxide solution.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Test For Magnesium:</strong></td>
<td>Formation of white colour precipitate</td>
<td>Absence of Magnesium</td>
<td>Absence of Magnesium</td>
</tr>
<tr>
<td>To 2ml of extract, Sodium hydroxide solution is added in drops.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test For Ammonium:</td>
<td>No appearance of Brown colour</td>
<td>Absence of Ammonium</td>
<td>Absence of Ammonium</td>
</tr>
<tr>
<td>---------------------</td>
<td>-------------------------------</td>
<td>----------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>To 2ml of extract few ml of Nessler's reagent and excess of sodium hydroxide solution are added.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test For Sodium:</th>
<th>No Characteristic changes</th>
<th>Absence of Sodium</th>
<th>Absence of Sodium</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 pinches of the sample is made into paste by using Hcl and introduced into the blue flame of Bunsen burner.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test for Iron (Ferrous):</th>
<th>Appearance of Blood red colour</th>
<th>Presence of Ferrous iron</th>
<th>Presence of Ferrous iron</th>
</tr>
</thead>
<tbody>
<tr>
<td>The extract is treated with Conc. HNO₃ and ammonium thiocynate.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test For Zinc:</th>
<th>No Formation of White colour precipitate</th>
<th>Absence of Zinc</th>
<th>Absence of Zinc</th>
</tr>
</thead>
<tbody>
<tr>
<td>To 2ml of the extract sodium hydroxide solution is added in drops.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test For Aluminium:</th>
<th>No Characteristic changes</th>
<th>Absence of Aluminium</th>
<th>Absence of Aluminium</th>
</tr>
</thead>
<tbody>
<tr>
<td>To the 2ml of the extract sodium hydroxide is added in drops.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test For Lead:</td>
<td>2 ml of extract is added with 2 ml of potassium iodide solution.</td>
<td>No Formation of yellow colour precipitate</td>
<td>Absence of Lead</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>------------------------------------------------------------------</td>
<td>------------------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Test for Copper:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. One pinch of substance is made into paste with con. HCl in a watch glass and introduced into the non-luminous part of the flame.</td>
<td>No Formation of Blue colour Precipitate.</td>
<td>Absence of Copper</td>
<td>Absence of Copper</td>
</tr>
<tr>
<td>b. 2 ml of extract is added with excess of ammonia solution.</td>
<td>No Formation of Blue colour Precipitate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test For Mercury:</td>
<td>2 ml of the extract is treated with 2 ml of sodium hydroxide solution.</td>
<td>Formation of Yellow precipitate</td>
<td>Presence of Mercury</td>
</tr>
<tr>
<td>Test for Arsenic:</td>
<td>2 ml of the extract is treated with 2 ml of sodium hydroxide solution.</td>
<td>No Formation of Brownish red precipitate</td>
<td>Absence of Arsenic</td>
</tr>
</tbody>
</table>
# Test for Acid Radicals

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Observation</th>
<th>Unpurified Pooram</th>
<th>Purified Pooram</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Test for Sulphate:</strong></td>
<td>No formation of white precipitate</td>
<td>Absence of Sulphate</td>
<td>Absence of Sulphate</td>
</tr>
<tr>
<td>2 ml of the extract is added to 5 % barium chloride solution.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Test for Chloride:</strong></td>
<td>No Formation of White precipitate</td>
<td>Absence of Chloride</td>
<td>Absence of Chloride</td>
</tr>
<tr>
<td>The extract is treated with Silver nitrate solution.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Test for Phosphate:</strong></td>
<td>Formation of Yellow precipitate</td>
<td>Presence of Phosphate</td>
<td>Presence of Phosphate</td>
</tr>
<tr>
<td>The extract is treated with ammonium molybdate and conc. HNO₃.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Test for Carbonate:</strong></td>
<td>No Formation of Effervescence</td>
<td>Absence of Carbonate</td>
<td>Absence of Carbonate</td>
</tr>
<tr>
<td>The substance is treated with Conc. HCl.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Test for fluoride &amp; oxalate:</strong></td>
<td>No Formation of cloudy appearance</td>
<td>Absence of Fluoride &amp; Oxalate</td>
<td>Absence of Fluoride &amp; Oxalate</td>
</tr>
<tr>
<td>2ml of extract is added with 2ml of dil.acetic acid and 2ml calcium chloride solution and heated.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Test For Nitrate:</strong></td>
<td>No Characteristic changes</td>
<td>Absence of Nitrate</td>
<td>Absence of Nitrate</td>
</tr>
<tr>
<td>1gm of the substance is heated with copper turnings and concentrated H₂SO₄ and viewed the test tube vertically down.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### OTHER CONSTITUENTS

<table>
<thead>
<tr>
<th>PROCEDURE</th>
<th>OBSERVATION</th>
<th>INFRINGEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>UNPURIFIED</strong></td>
<td><strong>PURIFIED</strong></td>
</tr>
<tr>
<td></td>
<td><strong>POORAM</strong></td>
<td><strong>POORAM</strong></td>
</tr>
<tr>
<td><strong>Test for Starch:</strong></td>
<td>Formation of blue colour</td>
<td>Absence of Starch</td>
</tr>
<tr>
<td>The extract is added</td>
<td></td>
<td></td>
</tr>
<tr>
<td>with weak iodine solution.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Test for Reducing Sugar:</strong></td>
<td>No Colour changes</td>
<td>Absence of Reducing sugar</td>
</tr>
<tr>
<td>5 ml of Benedict's</td>
<td></td>
<td></td>
</tr>
<tr>
<td>qualitative solution is</td>
<td></td>
<td></td>
</tr>
<tr>
<td>taken in a test tube and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>allowed to boil for 2 min.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add 8 to 10 drops of</td>
<td></td>
<td></td>
</tr>
<tr>
<td>extract and again boil it</td>
<td></td>
<td></td>
</tr>
<tr>
<td>it for 2min. The colour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>changes are noted.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Test for Alkaloids:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. 2ml of the extract is</td>
<td></td>
<td></td>
</tr>
<tr>
<td>treated with 2ml of</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for Amino Acids:</td>
<td>Test for Tannic Acid:</td>
<td></td>
</tr>
<tr>
<td>-----------------------</td>
<td>-----------------------</td>
<td></td>
</tr>
<tr>
<td>Dilute extract + 2ml of Ninhydrin’s solution.</td>
<td>The extract is treated with Ferric chloride.</td>
<td></td>
</tr>
<tr>
<td><strong>No Appearance of violet colour</strong></td>
<td><strong>No formation of Blue black precipitate</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Absence of Amino acids</strong></td>
<td><strong>Absence of Tannic acid</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Absence of Alkaloids</strong></td>
<td><strong>Absence of Tannic acid</strong></td>
<td></td>
</tr>
</tbody>
</table>

- **potassium Iodide solution**
- **b. 2ml of extract is treated with 2ml of picric acid**
  - **No Appearance of Red colour**
  - **Absence of Alkaloids**
  - **Absence of Alkaloids**
- **c. 2ml of the extract is treated with 2ml of phosphotungstic acid**
  - **No Appearance of Yellow colour**
  - **Absence of Alkaloids**
  - **Absence of Alkaloids**
### Test for type of Compound:

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Absence of</th>
<th>Absence of</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green colour</td>
<td>Oxyquinole, Epinephrine and Pyro catechol</td>
<td>Anti-pyrine, Aliphatic amino acids and Meconic acid</td>
</tr>
<tr>
<td>Red colour</td>
<td></td>
<td>Aliphatic amino acids and Meconic acid</td>
</tr>
<tr>
<td>Violet colour</td>
<td>Apomorphine</td>
<td>Apomorphine</td>
</tr>
<tr>
<td>Blue colour</td>
<td>Salicylate and Resorcinol</td>
<td>Salicylate and Resorcinol</td>
</tr>
<tr>
<td></td>
<td>Morphine, Phenol, Cresol, and Resorcinol</td>
<td>Morphine, Phenol, Cresol, and Resorcinol</td>
</tr>
<tr>
<td></td>
<td>Hydroquinone</td>
<td>Hydroquinone</td>
</tr>
</tbody>
</table>

2ml of the extract is treated with 2 ml of ferric chloride solution.
### CHEMICAL ANALYSIS OF SIDDHAR KULIKAI

<table>
<thead>
<tr>
<th>EXPERIMENT</th>
<th>OBSERVATION</th>
<th>INERENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Siddhar kulki</td>
<td>Green in colour</td>
<td>Green in colour</td>
</tr>
</tbody>
</table>

**Appearance of the sample**
- Green in colour

**Solubility:**
- a. A little of the sample is shaken well with distilled water
- b. A little of the sample is shaken well with con.HCl con.H$_2$SO$_4$
- Insoluble
- Absence of silicate

**Action of heat:**
- A small amount of the sample is taken in a dry test tube and heated gently at first and the strongly
- White fumes
- Presence of carbonate and nitrate

**Flame test:**
- The sample is mixed with Con.HCL in a watch glass and introduced in luminous part of the Bunsen flame
- No colour flames appeared
- Absence of copper

**Ash Test:**
- A filter paper is soaked into a mixture of sample and cobalt nitrate solution and introduced into the Bunsen flame and ignited
- No yellow colour flame
- Absence of sodium.
Preparation of extract:

5g of sample was taken in a 250 ml of clean beaker and 50 ml of distilled water was added to it. Then it was boiled well for about 10 min. Then it is allowed to cool and filtered in a 100 ml volumetric flask and made up to 100 ml with distilled water. This preparation is used for the qualitative analysis of acidic and basic radicals.

### TEST FOR BASIC RADICALS

<table>
<thead>
<tr>
<th>PROCEDURE</th>
<th>OBSERVATION</th>
<th>INFERENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Test for Potassium:</strong></td>
<td>A pinch of sample is treated with 2ml of sodium nitrate solution and then treated with 2ml of cobalt nitrate in 30% of glacial acetic acid.</td>
<td>Formation of Yellow colour precipitate</td>
</tr>
<tr>
<td><strong>Test for Calcium:</strong></td>
<td>2 ml of extract is taken in a clean test tube. To this add 2 ml of 4% ammonium oxide solution.</td>
<td>Formation of white colour precipitate</td>
</tr>
<tr>
<td><strong>Test For Magnesium:</strong></td>
<td>To 2ml of extract, Sodium hydroxide solution is added in drops.</td>
<td>Formation of White colour precipitate</td>
</tr>
<tr>
<td>Test For Ammonium:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>To 2ml of extract few ml of Nessler's reagent and excess of sodium hydroxide solution are added.</td>
<td>No appearance of Brown colour</td>
<td>Absence of Ammonium</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test For Sodium:</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2 pinches of the substance is made into paste by using Hcl and introduced into the blue flame of Bunsen burner.</td>
<td>No Characteristic changes</td>
<td>Absence of Sodium</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test for Iron (Ferrous) :</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>The extract is treated with Conc. HNO₃ and ammonium thiocynate.</td>
<td>Appearance of Blood red colour</td>
<td>Presence of Ferrous iron</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test For Zinc:</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>To 2ml of the extract sodium hydroxide solution is added indrops.</td>
<td>No Formation of White colour precipitate</td>
<td>Absence of Zinc</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test For Aluminium:</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>To the 2ml of the extract sodium hydroxide is added in drops.</td>
<td>No Characteristic changes</td>
<td>Absence of Aluminum</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test For Lead:</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2 ml of extract is added with 2ml of potassium iodide solution.</td>
<td>Formation of yellow colour precipitate</td>
<td>Absence of Lead</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test for Copper:</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. one pinch of substance is made into paste with con. Hcl in a watch glass and introduced into the non-luminous part of the flame. b. 2 ml of extract is added with excess of ammonia solution.</td>
<td>No Formation of Blue colour Precipitate.</td>
<td>Absence of Copper</td>
</tr>
<tr>
<td>Test For Mercury:</td>
<td>Test for Arsenic:</td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>------------------</td>
<td></td>
</tr>
<tr>
<td>2ml of the extract is treated with 2ml of sodium hydroxide solution.</td>
<td>2ml of the extract is treated with 2ml of sodium hydroxide solution.</td>
<td></td>
</tr>
<tr>
<td>Formation of Yellow precipitate</td>
<td>No Formation of Brownish red precipitate</td>
<td></td>
</tr>
<tr>
<td><strong>Presence</strong> of Mercury</td>
<td><strong>Absence</strong> of Arsenic</td>
<td></td>
</tr>
<tr>
<td>PROCEDURE</td>
<td>OBSERVATION</td>
<td>SIDDHAR KULIKAI</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>------------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td><strong>Test for Sulphate:</strong></td>
<td>No formation of white precipitate</td>
<td>Absence of Sulphate</td>
</tr>
<tr>
<td>2 ml of the extract is added to 5 % barium chloride solution.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Test for Chloride:</strong></td>
<td>No Formation of White precipitate</td>
<td>Absence of Chloride</td>
</tr>
<tr>
<td>The extract is treated with Silver nitrate solution.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Test for Phosphate:</strong></td>
<td>Formation of Yellow precipitate</td>
<td>Presence of Phosphate</td>
</tr>
<tr>
<td>The extract is treated with ammonium molybdate and conc. HNO₃.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Test for Carbonate:</strong></td>
<td>No Formation of Effervescence</td>
<td>Absence of Carbonate</td>
</tr>
<tr>
<td>The substance is treated with Conc. HCl.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Test for fluoride &amp; oxalate:</strong></td>
<td>No Formation of cloudy appearance</td>
<td>Absence of Fluoride &amp; Oxalate</td>
</tr>
<tr>
<td>2ml of extract is added with 2ml of dil.acetic acid and 2ml calcium chloride solution and heated.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Test For Nitrate:</strong></td>
<td>No Characteristic changes</td>
<td>Absence of Nitrate</td>
</tr>
<tr>
<td>1gm of the substance is heated with copper turnings and concentrated H₂SO₄ and viewed the test tube vertically down</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROCEDURE</td>
<td>OBSERVATION</td>
<td>INFERENCES</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>---------------------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td><strong>Test for Starch:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The extract is added with weak iodine</td>
<td>Formation of blue colour</td>
<td><strong>Presence</strong> of Starch</td>
</tr>
<tr>
<td>solution.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Test for Reducing Sugar:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 ml of Benedict's qualitative solution</td>
<td>No Colour changes</td>
<td><strong>Absence</strong> of Reducing</td>
</tr>
<tr>
<td>is taken in a test tube and allowed to</td>
<td></td>
<td>sugar</td>
</tr>
<tr>
<td>boil for 2 min.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add 8 to 10 drops of extract and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>again boil it for 2 min. The colour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>changes are noted.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Test for Alkaloids:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. 2ml of the extract is treated with</td>
<td>No Appearance of Red colour</td>
<td><strong>Presence</strong> of Alkaloids</td>
</tr>
<tr>
<td>2ml of potassium iodide solution</td>
<td>Appearance of Yellow colour</td>
<td></td>
</tr>
<tr>
<td>b. 2ml of extract is treated with 2ml</td>
<td>NO Appearance of white</td>
<td></td>
</tr>
<tr>
<td>of picric acid</td>
<td>precipitate</td>
<td></td>
</tr>
<tr>
<td>c. 2ml of the extract is treated with</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2ml of phosphotungstic acid</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Test for amino acids:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dilute extract + 2ml of Ninhydrin’s</td>
<td>No Appearance of violet colour</td>
<td><strong>Absence</strong> of Amino</td>
</tr>
<tr>
<td>solution.</td>
<td></td>
<td>acids</td>
</tr>
<tr>
<td><strong>Test for Tannic acid:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The extract is treated with Ferric</td>
<td>Formation of Blue black</td>
<td><strong>Presence</strong> of Tannic</td>
</tr>
<tr>
<td>chloride.</td>
<td>precipitate</td>
<td>acid</td>
</tr>
</tbody>
</table>
**Test for type of Compound:**

2 ml of the extract is treated with 2 ml of ferric chloride solution

<table>
<thead>
<tr>
<th>Test Result</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Appearance of Green colour</td>
<td>Absence of Oxyquinole, Epinephrine and Pyrocatechol</td>
</tr>
<tr>
<td>No Appearance of Red colour</td>
<td>Absence of Anti-pyrene, Aliphatic amino acids and Meconic acid</td>
</tr>
<tr>
<td>No Appearance of Violet colour</td>
<td>Absence of Apomorphine</td>
</tr>
<tr>
<td>No Appearance of Blue colour</td>
<td>Absence of Salicylate and Resorcinol</td>
</tr>
<tr>
<td></td>
<td>Absence of Morphine, Phenol cresol and Hydroquinone.</td>
</tr>
</tbody>
</table>
4.3. QUANTITATIVE ANALYSIS

INDUCTIVELY COUPLED PLASMA OPTICAL EMISSION SPECTROMETRY (ICP-OES)

Introduction

The elemental composition of a sample is often an important part of the information needed to assess its properties. Hence there is a need for sensitive scientific instrumentation like ICP-OES which plays a pivotal role in the determination of these elements. ICP-OES is widely employed for the estimation of metals and metalloids at trace, minor and major concentrations.

Principle

In this technique, the high temperature plasma source atomizes the sample and excites the atoms resulting in emission of photons. The atoms of each element in the sample emit specific wavelength of light. The emission spectrum from the plasma is dispersed by an optical spectrometer, so that intensities of the individual wavelength can be measured. The number of photons emitted is directly proportional to the concentration of the element. The photon may be detected either sequentially or simultaneously. Quantitative analysis is achieved by measuring the intensity of these specific wavelengths and after performing the calibration using known standards.

Extraction of information

Obtaining qualitative information, i.e., what elements are present in the sample, involves identifying the presence of emission at the wavelengths characteristic of the elements of interest. Obtaining quantitative information, i.e., how much of an element is in the sample, can be accomplished using plots of emission intensity versus concentration called calibration curves. Typical calibration graph is illustrated below.
**Sample preparation – Microwave Digestion** Weigh 0.25g of test sample and transfer into a liner provided with the instrument. Slowly add 9ml of Nitric acid or Sulphuric acid such that no piece of sample sticks on the slides. Mix thoroughly and allow reacting for few minutes. Place the liner in the vessel jacket. Close the screw cap hand-tight in clockwise direction. Seal the vessel and place in the rotor fixed in microwave. Set temperature to 180°C for 5 minutes; hold at 180°C for least 10 minutes. Allow the vessels to cool down to a vessel interior temperature below 60°C and to a vessel surface temperature (IR) below 50°C before removing the rotor. The digested sample was made upto 100ml with millipore water. If visible insoluble particles exist, solution could be filtered through whatmann filter paper. Transfer the digested solution into plastic containers and label them properly.

*Experimental Procedure: Done at SAIF, IIT Madras, Chennai-36*
SCANNED ELECTRON MICROSCOPY (SEM)

A SEM is essentially a high magnification microscope, which uses a focused scanned electron beam to produce images of the sample, both top-down and, with the necessary sample preparation, cross-sections. The primary electron beam interacts with the sample in a number of key ways:

- Primary electrons generate low energy secondary electrons, which tend to emphasize the topographic nature of the specimen.
- Primary electrons can be backscattered which produces images with a high degree of atomic number (Z) contrast.
- Ionized atoms can relax by electron shell-to-shell transitions, which lead to either X-ray emission or Auger electron ejection. The X-rays emitted are characteristic of the elements in the top few μm of the sample.

The SEM is carried out by using FEI-Quanta FEG 200-High Resolution Instrument.

**Resolution:** 1.2 nm gold particle separation on a carbon substrate

**Magnification:** From a min of 12x to greater than 1,00,000 X

**Application:** To evaluate grain size, particle size distributions, material homogeneity and inter metallic distributions.

**Sample preparation:** Sample preparation can be minimal or elaborate for SEM analysis, depending on the nature of the samples and the data required. Minimal preparation includes acquisition of a sample that will fit into the SEM chamber and some accommodation to prevent charge build-up on electrically insulating samples. Most electrically insulating samples are coated with a thin layer of conducting material, commonly carbon, gold, or some other metal or alloy. The choice of material for conductive coatings depends on the data to be acquired: carbon is most desirable if elemental analysis is a priority, while metal coatings are most effective for high resolution electron imaging applications. Alternatively, an electrically insulating sample can be examined without a conductive coating in an instrument capable of "low vacuum" operation.

**Experimental Procedure:** Done at SAIF, IIT Madras, Chennai-36
FOURIER TRANSFORM - INFRA RED SPECTROSCOPY
PERKIN ELMER – SPECTRUM ONE

Introduction

Vibrational spectroscopy is an extremely useful tool in the elucidations of molecular structure. The spectral bands can be assigned to different vibrational modes of the molecule. The various functional groups present in the molecule can be assigned by a comparison of the spectra with characteristic functional group frequencies. As the positions of the bands are directly related to the strength of the chemical bond, a large number of investigations including intermolecular interactions, phase transitions and chemical kinetics can be carried out using this branch of spectroscopy.

In FTIR spectroscopy, the resonance absorption is made possible by the change in dipole moment accompanying the vibrational transition. The Infrared spectrum originates from the vibrational motion of the molecule. The vibrational frequencies are a kind of fingerprint of the compounds. This property is used for characterization of 60 organic, inorganic and biological compounds. The band intensities are proportional to the concentration of the compound and hence qualitative estimations are possible. The IR spectroscopy is carried out by using Fourier transform technique.

Principle

Infra red spectroscopy involves study of the interaction of electromagnetic radiation with matter. Due to this interaction, electromagnetic radiation characteristic of the interacting system may be absorbed (or emitted). The experimental data consist of the nature (frequency of wave length) and the amount (intensity) of the characteristic radiation absorbed or emitted. These data are correlated with the molecular and electronic structure of the substance and with intra- and inter molecular interactions.

FT-IR spectroscopy is used primarily for qualitative and quantitative analysis of organic compounds, and also for determining the chemical structure of inorganic materials. The region between 500-4000 wave numbers is referred to as the fingerprint region. Absorption bands in this region are generally due to intra molecular phenomena and are highly specific for each material. The specificity if these bands allow computerized data searches to be performed against reference libraries to identify a material.
# Table of Characteristic IR Absorptions

<table>
<thead>
<tr>
<th>Frequency, cm⁻¹</th>
<th>Bond</th>
<th>Functional group</th>
</tr>
</thead>
<tbody>
<tr>
<td>3640–3610 (s, sh)</td>
<td>O–H stretch,</td>
<td>free hydroxyl alcohols, phenols</td>
</tr>
<tr>
<td>3500–3200 (s,b)</td>
<td>O–H stretch, H–bonded</td>
<td>alcohols, phenols</td>
</tr>
<tr>
<td>3400–3250 (m)</td>
<td>N–H stretch</td>
<td>primary, secondary amines, amides</td>
</tr>
<tr>
<td>3300–2500 (m)</td>
<td>O–H stretch</td>
<td>carboxylic acids</td>
</tr>
<tr>
<td>3330–3270 (n, s)</td>
<td>–C(triple bond)C–H: C–H stretch</td>
<td>alkynes (terminal)</td>
</tr>
<tr>
<td>3100–3000 (s)</td>
<td>C–H stretch</td>
<td>Aromatics</td>
</tr>
<tr>
<td>3100–3000 (m)</td>
<td>=C–H stretch</td>
<td>Alkenes</td>
</tr>
<tr>
<td>3000–2850 (m)</td>
<td>C–H stretch</td>
<td>Alkanes</td>
</tr>
<tr>
<td>2830–2695 (m)</td>
<td>H–C=O: C–H stretch</td>
<td>Aldehydes</td>
</tr>
<tr>
<td>2260–2210 (v)</td>
<td>C(triple bond)N stretch</td>
<td>Nitriles</td>
</tr>
<tr>
<td>2260–2100 (w)</td>
<td>–C(triple bond)C– stretch</td>
<td>Alkynes</td>
</tr>
<tr>
<td>1760–1665 (s)</td>
<td>C=O stretch</td>
<td>carbonyls (general)</td>
</tr>
<tr>
<td>1760–1690 (s)</td>
<td>C=O stretch</td>
<td>carboxylic acids</td>
</tr>
<tr>
<td>1750–1735 (s)</td>
<td>C=O stretch</td>
<td>esters, saturated aliphatic</td>
</tr>
<tr>
<td>1740–1720 (s)</td>
<td>C=O stretch</td>
<td>aldehydes, saturated aliphatic</td>
</tr>
<tr>
<td>1730–1715 (s)</td>
<td>C=O stretch</td>
<td>alpha,beta–unsaturated esters</td>
</tr>
<tr>
<td>1715 (s)</td>
<td>C=O stretch</td>
<td>ketones, saturated aliphatic</td>
</tr>
<tr>
<td>1710–1665 (s)</td>
<td>C=O stretch</td>
<td>alpha,beta–unsaturated aldehydes, ketones</td>
</tr>
<tr>
<td>1680–1640 (m)</td>
<td>–C=C– stretch</td>
<td>Alkenes</td>
</tr>
<tr>
<td>1650–1580 (m)</td>
<td>N–H bend</td>
<td>primary amines</td>
</tr>
<tr>
<td>1600–1585 (m)</td>
<td>C–C stretch (in–ring)</td>
<td>Aromatics</td>
</tr>
<tr>
<td>Wavenumber Range (cm⁻¹)</td>
<td>Functional Group Description</td>
<td>Compound Class</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-----------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>1550–1475 (s)</td>
<td>N–O asymmetric stretch</td>
<td>nitro compounds</td>
</tr>
<tr>
<td>1500–1400 (m)</td>
<td>C–C stretch (in–ring)</td>
<td>Aromatics</td>
</tr>
<tr>
<td>1470–1450 (m)</td>
<td>C–H bend</td>
<td>Alkanes</td>
</tr>
<tr>
<td>1370–1350 (m)</td>
<td>C–H rock</td>
<td>Alkanes</td>
</tr>
<tr>
<td>1360–1290 (m)</td>
<td>N–O symmetric stretch</td>
<td>nitro compounds</td>
</tr>
<tr>
<td>1335–1250 (s)</td>
<td>C–N stretch</td>
<td>aromatic amines</td>
</tr>
<tr>
<td>1320–1000 (s)</td>
<td>C–O stretch</td>
<td>alcohols, carboxylic acids, esters, ethers</td>
</tr>
<tr>
<td>1300–1150 (m)</td>
<td>C–H wag (−CH2X)</td>
<td>alkyl halides</td>
</tr>
<tr>
<td>1250–1020 (m)</td>
<td>C–N stretch</td>
<td>aliphatic amines</td>
</tr>
<tr>
<td>1000–650 (s)</td>
<td>=C–H bend</td>
<td>Alkenes</td>
</tr>
<tr>
<td>950–910 (m)</td>
<td>O–H bend</td>
<td>carboxylic acids</td>
</tr>
<tr>
<td>910–665 (s, b)</td>
<td>N–H wag</td>
<td>primary, secondary amines</td>
</tr>
<tr>
<td>900–675 (s)</td>
<td>C–H &quot;oop&quot;</td>
<td>Aromatics</td>
</tr>
<tr>
<td>850–550 (m)</td>
<td>C–Cl stretch</td>
<td>alkyl halides</td>
</tr>
<tr>
<td>725–720 (m)</td>
<td>C–H rock</td>
<td>Alkanes</td>
</tr>
<tr>
<td>700–610 (b, s)</td>
<td>–C(triple bond)C–H: C–H bend</td>
<td>Alkynes</td>
</tr>
<tr>
<td>690–515 (m)</td>
<td>C–Br stretch</td>
<td>alkyl halides</td>
</tr>
</tbody>
</table>

m=medium, w=weak, s=strong, n=narrow, b=broad, sh=sharp

**Sampling techniques:**

There are a variety of techniques for sample preparation depending on the physical form of the sample to be analyzed.

**Solid:** KBr or Nujol mull method.

**Liquid:** CsI / TlBr Cells

**Gas:** Gas cells

**Experimental Procedure:** Done at SAIF, IIT Madras, Chennai-36
KBr Method

- The sample was grounded using an agate mortar and pestle to give a very fine powder.
- The finely powder sample was mixed with about 100mg dried KBr salt.
- The mixture was then pressed under hydraulic press using a die to yield a transparent disc (measure about 13mm diameter and 0.3mm in thickness), through which the beam of spectrometer passed.

Experimental Procedure: Done at SAIF, IIT Madras, Chennai-36

X-Ray Fluorescence (XRF)

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

Fundamental Principles of X-Ray Fluorescence (XRF)

The XRF method depends on fundamental principles that are common to several other instrumental methods involving interactions between electron beams and x-rays with samples, including: X-ray spectroscopy (e.g., SEM - EDS), X-ray diffraction (XRD), and wavelength dispersive spectroscopy. Analysis of major and trace elements in geological materials by x-ray fluorescence is made possible by the behavior of atoms when they interact with radiation. When materials are excited with high-energy, short wavelength radiation (e.g., X-rays), they can become ionized. If the energy of the radiation is sufficient to dislodge a tightly-held inner electron, the atom becomes unstable 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 characteristic of a transition between specific electron orbitals in a particular element, the
resulting fluorescent X-rays can be used to detect the abundances of elements that are present in the sample.

**Procedure**

The analysis of major and trace elements in geological materials by XRF is made possible by the behavior of atoms when they interact with X-radiation. An XRF spectrometer works because if a sample is illuminated by an intense X-ray beam, known as the incident beam, some of the energy is scattered, but some is also absorbed within the sample in a manner that depends on its chemistry. The incident X-ray beam is typically produced from a Rh target, although W, Mo, Cr and others can also be used, depending on the application.

![XRF spectrometer](image)

When this primary X-ray beam illuminates the sample, it is said to be excited. The excited sample in turn emits X-rays along a spectrum of wavelengths characteristic of the types of atoms present in the sample. How does this happen? The atoms in the sample absorb X-ray energy by ionizing, ejecting electrons from the lower (usually K and L) energy levels. The ejected electrons are replaced by electrons from an outer, higher energy orbital. When this happens, energy is released due to the decreased binding energy of the inner electron orbital compared with an outer one. This energy release is in the form of emission of characteristic X-rays indicating the type of atom present. If a sample has many elements present, as is typical for most minerals and rocks, the use of a Wavelength Dispersive Spectrometer much like that in an EPMA allows the separation of a complex emitted X-ray spectrum into characteristic wavelengths for each element present. Various types of detectors (gas flow proportional and scintillation) are used to measure the intensity of the emitted beam. The flow counter is commonly utilized for measuring long wavelength (>0.15 nm) X-rays that are typical of K spectra from elements lighter than Zn. The scintillation detector is commonly used to analyze shorter wavelengths in the X-ray spectrum (K spectra of element from Nb to I; L spectra of
Th and U). X-rays of intermediate wavelength (K spectra produced from Zn to Zr and L spectra from Ba and the rare earth elements) are generally measured by using both detectors in tandem. The intensity of the energy measured by these detectors is proportional to the abundance of the element in the sample. The exact value of this proportionality for each element is derived by comparison to mineral or rock standards whose composition is known from prior analyses by other techniques.

X-Ray fluorescence is particularly well-suited for investigations that involve

- bulk chemical analyses of major elements (Si, Ti, Al, Fe, Mn, Mg, Ca, Na, K, P) in rock and sediment
- bulk chemical analyses of trace elements (in abundances >1 ppm; Ba, Ce, Co, Cr, Cu, Ga, La, Nb, Ni, Rb, Sc, Sr, Rh, U, V, Y, Zr, Zn) in rock and sediment - detection limits for trace elements are typically on the order of a few parts per million
- X-ray fluorescence is limited to analysis of
  - relatively large samples, typically > 1 gram
  - materials that can be prepared in powder form and effectively homogenized
  - materials for which compositionally similar, well-characterized standards are available
  - materials containing high abundances of elements for which absorption and fluorescence effects are reasonably well understood

In most cases for rocks, ores, sediments and minerals, the sample is ground to a fine powder. At this point it may be analyzed directly, especially in the case of trace element analyses. However, the very wide range in abundances of different elements, especially iron, and the wide range of sizes of grains in a powdered sample, makes the proportionality comparison to the standards particularly troublesome. For this reason, it is common practice to mix the powdered sample with a chemical flux and use a furnace or gas burner to melt the powdered sample. Melting creates a homogenous glass that can be analyzed and the abundances of the (now somewhat diluted) elements calculated.
**Strengths**

X-Ray fluorescence is particularly well-suited for investigations that involve:

- bulk chemical analyses of major elements (Si, Ti, Al, Fe, Mn, Mg, Ca, Na, K, P) in rock and sediment

- bulk chemical analyses of trace elements (>1 ppm; Ba, Ce, Co, Cr, Cu, Ga, La, Nb, Ni, Rb, Sc, Sr, Rh, U, V, Y, Zr, Zn) in rock and sediment

Done at sastra university, Tanjore.
4.4. TOXICOLOGICAL EVALUATION OF SIDDHAR KULIKAI IN RODENTS

Introduction:

Safety is a fundamental principle in the provision of traditional medicines and herbal products for health care and a critical component of quality control. OECD guidelines provide practical and technical guidance for monitoring the safety of traditional medicines within pharmacovigilance systems. The safety monitoring of traditional medicines is compared and contrasted with that of other medicines, currently undertaken in the context of the WHO International Drug Monitoring Programme. While there are regulatory and cultural differences in the preparation and use of different types of medicines, they are all equally important from a pharmacovigilance perspective.

Scope of work:

Assurance of safety, quality and efficacy of Indian System of Medicines (ISM) is the key issue that needs to be addressed while conducting toxicity studies. It is an essential step, which will strengthen the acceptance of Siddha medicines by scientific community. Information of toxicity and adverse effects of these formulations are lacking. Some of the formulations are proved to be effective in various animal studies and many more are yet to be tested.

Hence, the present study was carried out to evaluate the Preclinical animal toxicity studies of SIDDHA KULIKAI in rodents.

Plan of work:

The following studies were carried out on SIDDHAR KULIKAI

- Acute Oral toxicity – Acute Toxic Class Method - 423(OECD)
- 28-Days Repeated Dose Oral Toxicity Study - 407(OECD)
ACUTE ORAL TOXICITY STUDY OF SIDDHAR KULIKAI
(OECD GUIDELINE – 423)

Introduction:

1. The acute toxic class method is a stepwise procedure with the use of 3 animals of a single sex per step.
2. Depending on the mortality and/or the moribund status of the animals, on average 2-4 steps may be necessary to allow judgement on the acute toxicity of the test substance.
3. This procedure is reproducible, uses very few animals and is able to rank substances in a similar manner to the other acute toxicity testing methods.
4. The acute toxic class method is based on biometric evaluations with fixed doses, adequately separated to enable a substance to be ranked for classification purposes and hazard assessment.
5. In principle, the method is not intended to allow the calculation of a precise LD50, but does allow for the determination of defined exposure ranges where lethality is expected since death of a proportion of the animals is still the major endpoint of this test.
6. The method allows for the determination of an LD50 value only when at least two doses result in mortality higher than 0% and lower than 100%.
7. The use of a selection of pre-defined doses, regardless of test substance, with classification explicitly tied to number of animals observed in different states improves the opportunity for laboratory to laboratory reporting consistency and repeatability.

Principle of the Test:

It is the principle of the test that based on a stepwise procedure with the use of a minimum number of animals per step, sufficient information is obtained on the acute toxicity of the test substance to enable its classification. The substance is administered orally to a group of experimental animals at one of the defined doses. The substance is tested using a stepwise procedure, each step using three animals of a single sex. Absence or presence of compound-related mortality of the animals dosed at one step will determine the next step, i.e.;

− no further testing is needed,
− dosing of three additional animals, with the same dose
− dosing of three additional animals at the next higher or the next lower dose level. The method will enable a judgment with respect to classifying the test substance to one of a series of toxicity classes.

METHODOLOGY:

Selection of Animal Species

The preferred rodent species is the wistar albino rat, although other rodent species may be used. Healthy young adult animals are commonly used laboratory strains should be employed. Females should be nulliparous and non-pregnant. Each animal, at the commencement of its dosing, should be between 6 to 8 weeks old and the weight (150-200gm) should fall in an interval within±20 % of the mean weight of any previously dosed animals.

Housing and Feeding Conditions

The temperature in the experimental animal room should be 22ºC ±3ºC. Although the relative humidity should be at least 30% and preferably not exceed 70% other than during room cleaning the aim should be 50-60%. Lighting should be artificial, the sequence being 12 hours light, 12 hours dark. For feeding, conventional laboratory diets may be used with an unlimited supply of drinking water. Animals may be group-caged by dose, but the number of animals per cage must not interfere with clear observations of each animal.

Test Substance and Vehicle

The Siddhar kulikai is in Green colour. The test substance is freely insoluble in water. In order to ensure the uniformity in drug distribution in the medium the suspension was made with 10% aqueous Tween 80 solution and it was found suitable for dose accuracy.

Justification for Choice of Vehicle:

The vehicle selected as per the standard guideline which is pharmacologically inert and easy to employ for new drug development and evaluation technique.
Test Animals and Test Conditions:

Sexually mature Female Wistar albino rats (150-200gm) were obtained from the Sri Ragavendra Enterprises, Bangalore. All the animals were kept under standard environmental condition (22±3°C). The animals had free access to water and standard pellet diet (Sai meera foods, Bangalore). Rats were deprived of food but not water (16-18 h) prior to administration of the Siddhar kulikai. The principles of laboratory animal care were followed and the Institutional Animal Ethical Committee approved the use of the animals and the study design. (IAEC PROTOCOL NO: 1248/AC/09/CPCSEA/4-36/2011).

Administration of Doses:

_Siddhar kulikai_ suspended in 10% aqueous Tween 80 with vigourous mixing and was administered to the groups of wistar albino rats in a single oral dose by gavage using a feeding needle. The control group received an equal volume of the vehicle. Animals were fasted 12 hours prior to dosing. Following the period of fasting, the animals were weighed and then the test substance was administered. Three Female animals are used for each group. The dose level of 5, 50, 300 and 2000 mg/kg body weight was administered stepwise. After the substance has been administered, food was withheld for a further 3-4 hours. The principle of laboratory animal care was followed. Observations were made and recorded systematically and continuously observed as per the guideline after substance administration. The visual observations included skin changes, mobility, aggressively, sensitivity to sound and pain, as well as respiratory movements. Finally, the number of survivors was noted after 24 h and these animals were then monitored for a further 14 days and observations made daily. The toxicological effect was assessed on the basis of mortality.

**Species and strain**  : Wistar Albino rat  
**Sex**  : Female  
**Age/Weight**  : 6-8 weeks/150-200 gm  
**Accimatization**  : 7days prior to dosing  
**Test guideline**  : OECD guideline - 423
Groups/treatment : Grouped by randomization
Duration of exposure : Single dose
Study duration : 14 days
Number of animals : 3 Female/group,
Route of administration : Oral

<table>
<thead>
<tr>
<th>Groups</th>
<th>No of Rat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I Vehicle control</td>
<td>3 female</td>
</tr>
<tr>
<td>Group II Test drug – 5mg/kg b.wt</td>
<td>3 female</td>
</tr>
<tr>
<td>Group III Test drug – 50 mg/kg b.wt</td>
<td>3 female</td>
</tr>
<tr>
<td>Group IV Test drug – 300 mg/kg b.wt</td>
<td>3 female</td>
</tr>
<tr>
<td>Group V Test drug – 2000 mg/kg b.wt</td>
<td>3 female</td>
</tr>
</tbody>
</table>

Behaviour:

The animals will be observed closely for behaviour in the first four hours which includes abnormal gait, aggressiveness, exophthalmos, ptosis, akinesia, catalepsy, convulsion, excitation, head twitches, lacrimation, loss of corneal reflex, loss of traction, piloerection, reactivity of touch, salivation, scratching, sedation, chewing, head movements, sniffing, straub, tremor and writhes, diarrhea, leathery, sleep and coma.

Observations:

Animals are observed individually after dosing at least once during the first 30 minutes, periodically during the first 24 hours, with special attention given during the first 4 hours, and daily thereafter, for a total of 14 days, except where they need to be removed from the study and humanely killed for animal welfare reasons or are found dead. It should be determined by the toxic reactions, time of onset and length of recovery period, and may thus be extended when considered necessary. The times at which signs of toxicity appear and disappear are important, especially if there is a tendency for toxic signs to be delayed. All observations are systematically recorded with individual records being maintained for each animal.
Observations include changes in skin and fur, eyes and mucous membranes, and also respiratory, circulatory, autonomic and central nervous systems, and somatomotor activity and behavior pattern. Attention was directed to observations of tremors, convulsions, salivation, diarrhoea, lethargy, sleep and coma. The principles and criteria summarized in the Humane Endpoints Guidance Document taken into consideration. Animals found in a moribund condition and animals showing severe pain or enduring signs of severe distress was humanly killed. When animals are killed for human reasons or found dead, the time of death should was recorded.

**Body Weight:**

Individual weight of animals was determined before the test substance was administered and weights will be recorded at day 1, 2, 7 and 14 of the study. Weight changes were calculated and recorded. At the end of the test, surviving animals were weighed and humanly killed.

**Mortality:**

Animals will be observed for mortality throughout the entire period.

**Gross necropsy:**

At the end of 14th day animals will be sacrificed for gross necropsy. It includes examination of the external surface of the body, all orifices, and organs like Brain, Lungs, Heart, Spleen, Liver, Kidneys, Adrenals and Sex Organs of all animals. If there will any occurrence of mortality during the trial period, the vital organs will be subjected to histopathological study.

**Results:**

All data were summarized in tabular form, (Table-1) showing for each test group the number of animals used, the number of animals displaying signs of toxicity, the number of animals found dead during the test and description of toxic symptoms.
### 28-DAYS REPEATED DOSE ORAL TOXICITY STUDY OF SIDDHAR KULIKAI ( OECD GUIDELINE -407 )

<table>
<thead>
<tr>
<th>Test Substance</th>
<th>Siddhar Kulikai</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Animal Source</strong></td>
<td>King Institute of Preventive Medicine, Guindy, Chennai.</td>
</tr>
<tr>
<td><strong>Animals</strong></td>
<td>Wister Albino Rats (Male -3, and Female-3)</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td>6-8 weeks</td>
</tr>
<tr>
<td><strong>Body Weight on Day 0</strong></td>
<td>150-200gm.</td>
</tr>
<tr>
<td><strong>Acclimatization</strong></td>
<td>Seven days prior to dosing.</td>
</tr>
<tr>
<td><strong>Veterinary examination</strong></td>
<td>Prior and at the end of the acclimatization period.</td>
</tr>
<tr>
<td><strong>Identification of animals</strong></td>
<td>By cage number, animal number and individual marking by using Picric acid.</td>
</tr>
<tr>
<td><strong>Diet</strong></td>
<td>Pellet feed supplied by Sai meera foods Pvt Ltd, Bangalore</td>
</tr>
<tr>
<td><strong>Water</strong></td>
<td>Aqua guard portable water in polypropylene bottles.</td>
</tr>
</tbody>
</table>

**Housing & Environment** : The animals were housed in Polypropylene cages provided with bedding of husk.

| **Housing temperature** | between 22°C ± 3°C. |
| **Relative humidity**   | between 30% and 70%, |
| **Air changes**         | 10 to 15 per hour and |
| **Dark and light cycle**| 12 : 12 hours. |
| **Duration of the study** | 28 Days |

**Justification for Dose Selection:**

As per OECD guideline three dose levels were selected for the study they are low dose(x), mid dose dose(5x), high dose(10x). X is calculated by multiplying the therapeutic dose(84 mg) and the body surface area of the rat(0.018). i.e X dose is 3.024 mg/animal, 5X dose is 15.12 mg/animal, 10X dose is 30.24 mg/animal.
Preparation and Administration of Dose:

*Siddhar kulikai* was suspended in 10% aqueous Tween 80 in distilled water to obtain concentrations of 200mg/ml. It was administered to animals at the dose levels of x, 5x, 10x. The test substance suspensions were freshly prepared every two days once for 28 days. The control animals were administered vehicle only. The drug was administered orally by using oral gavage once daily for 28 consecutive days.

METHODOLOGY

Randomization, Numbering and Grouping of Animals:

Wistar Albino Rats (Male -3, and Female-3) were in each group randomly divided into four groups for dosing up to 28 days. Animals were allowed acclimatization period of 7 days to laboratory conditions prior to the initiation of treatment. Each animal was marked with picric acid. The females were nulliporous and non-pregnant.

OBSERVATIONS:

Experimental animals were kept under observation throughout the course of study for the following:

- **Body Weight**: Weight of each rat was recorded on day 0, at weekly intervals throughout the course of study and at termination to calculate relative organ weights. From the data, group mean body weights and percent body weight gain were calculated. (Table-2)

- **Food and water Consumption**: The quantity of food consumed by groups consisting of six animals of for different doses was recorded at weekly interval. Food consumed per animal was calculated for control and the treated dose groups. (Table-3&4)

- **Clinical signs**: All animals were observed daily for clinical signs. The time of onset, intensity and duration of these symptoms, if any, were recorded.

- **Mortality**: All animals were observed twice daily for mortality during entire course of study.
Functional Observations: At the end of the study exposure, ‘sensory reactivity’ to graded stimuli of different types (auditory, visual and proprioceptive stimuli), ‘motor reactivity’ and ‘grip strength’ were assessed.

Laboratory Investigations: Following laboratory investigations were carried out on day 29 in animals’ fasted over-night. Blood samples were collected from orbital sinus using sodium heparin (200IU/ml) for Biochemistry and potassium EDTA (1.5 mg/ml) for Haematology as anticoagulant. Blood samples were centrifuged at 3000 r.p.m. for 10 minutes.

Haematological Investigations: Haematological parameters were determined using Haematology analyzer. (Table-5)

Biochemical Investigations: Biochemical parameters were determined using auto-analyzer. (Table-6, 7 & 8)

Necropsy: All the animals were sacrificed by excessive anaesthesia on day 29. Necropsy of all animals was carried out.

Histopathology:
Control and highest dose group animals will be initially subjected to histopathological investigations. If any abnormality found in the highest dose group than the low, then the mid dose group will also be examined. Organs will be collected from all animals and preserved in 10% buffered neutral formalin for 24 h and washed in running water for 24 h. The organ sliced 5 or 6µm sections and were dehydrated in an auto technicon and then cleared in benzene to remove absolute alcohol. Embedding was done by passing the cleared samples through three cups containing molten paraffin at 50°C and then in a cubical block of paraffin made by the “L” moulds. It was followed by microtome and the slides were stained with Haematoxylin-eosin.

Statistical analysis:
- Findings such as clinical signs of intoxication, body weight changes, food consumption, haematology and blood chemistry were subjected to One-way ANOVA followed by dunnet’t’ test using a computer software programme -INSTAT-V3 version.
# RESULTS OF QUALITATIVE ANALYSIS

## RESULTS OF PHYSICO CHEMICAL ANALYSIS

**Colour:** Green  
**Nature:** Solid

**Physicochemical Properties of Siddhar Kulikai.**

<table>
<thead>
<tr>
<th>S No.</th>
<th>Parameters</th>
<th>Values obtained (%w/w)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Total ash value</td>
<td>8.77</td>
</tr>
<tr>
<td>2</td>
<td>Acid insoluble ash</td>
<td>0.83</td>
</tr>
<tr>
<td>3</td>
<td>Water soluble ash</td>
<td>6.7</td>
</tr>
<tr>
<td>4</td>
<td>Moisture content</td>
<td>9.75</td>
</tr>
<tr>
<td>5</td>
<td>Foreign organic matter</td>
<td>7.8</td>
</tr>
<tr>
<td>6</td>
<td>Crude fibre content</td>
<td>25.0</td>
</tr>
<tr>
<td>7</td>
<td>Alcohol soluble extractive</td>
<td>6.4</td>
</tr>
<tr>
<td>8</td>
<td>Water soluble extractive</td>
<td>10.33</td>
</tr>
<tr>
<td>9</td>
<td>pH</td>
<td>7.5-7.7</td>
</tr>
</tbody>
</table>
Preliminary Phytochemical Analysis of Different Extracts of Siddhar Kuligai:

<table>
<thead>
<tr>
<th>S.no</th>
<th>Phytoconstituents</th>
<th>Aqueous</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Alkaloids</td>
<td>+</td>
</tr>
<tr>
<td>2</td>
<td>Flavonoids</td>
<td>+</td>
</tr>
<tr>
<td>3</td>
<td>Saponins</td>
<td>+</td>
</tr>
<tr>
<td>4</td>
<td>Glycosides</td>
<td>+</td>
</tr>
<tr>
<td>5</td>
<td>Carbohydrates</td>
<td>+</td>
</tr>
<tr>
<td>6</td>
<td>Amino acids</td>
<td>+</td>
</tr>
<tr>
<td>7</td>
<td>Triterpenoids</td>
<td>+</td>
</tr>
</tbody>
</table>

(+ )Present,  (−) Absent.
RESULTS OF CHEMICAL ANALYSIS

The Qualitative analysis of **UNPURIFIED POORAM** indicates the presence of,

- Carbonate and nitrate
- Ferrous Iron
- Mercury
- Phosphate.

The Qualitative analysis of **PURIFIED POORAM** indicates the presence of,

- Carbonate and nitrate
- Ferrous Iron
- Mercury
- Phosphate.

The Qualitative analysis of **SIDDHAR KULIKAI** indicates the presence of,

- Carbonate and nitrate
- Potassium
- Calcium
- Magnesium
- Ferrous Iron
- Mercury
- Phosphate
- Starch
- Alkaloids
- Tannic acid.
RESULTS OF QUANTITATIVE ANALYSIS

Result of HRSEM Analysis

Size : 1.5 – 3micron
Shape : Spherical
Distribution : Evenly distributed
Surface : smooth
RESULT OF FTIR ANALYSIS

<table>
<thead>
<tr>
<th>Functional group (Bond)</th>
<th>Type of Vibration</th>
<th>Functional group</th>
<th>Characteristic Absorptions (cm⁻¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH</td>
<td>(Strong)</td>
<td>Alkynes</td>
<td>582,682</td>
</tr>
<tr>
<td>=C-H≡=CH₂</td>
<td>(Strong)</td>
<td>Alkenes</td>
<td>867,909</td>
</tr>
<tr>
<td>N-H (1°,2°amines)</td>
<td>(Medium)</td>
<td>Amines</td>
<td>1013,1240,1278,1518(m),3389(wk)</td>
</tr>
<tr>
<td>α-CH₃ Bending</td>
<td>(Strong)</td>
<td>Aldehyde ,Ketones</td>
<td>1346,1438,2929(m)</td>
</tr>
<tr>
<td>OH,C=O</td>
<td>(Strong)</td>
<td>Carboxylic acids &amp; Derivatives</td>
<td>1629,2854</td>
</tr>
<tr>
<td>OH</td>
<td>(Strong)</td>
<td>Alcohol&amp;Phenols</td>
<td>3562</td>
</tr>
</tbody>
</table>

![FTIR Analysis Graph](image-url)
## RESULT OF XRF ANALYSIS

| Formula | Z  | Concentration | Status | Line 1          | Net int. | Calc. concentration | Stat. error | LLD          | Analyzed layer |
|---------|----|---------------|--------|-----------------|----------|---------------------|-------------|--------------|----------------|----------------|
| Hg      | 80 | 72.73%        | XRF 0  | Hg LA1-HR-Tr    | 2776     | 72.73               | 0.11%       | 972.9 PPM    | 17.0 um        |
| O       | 8  | 12.67%        | XRF 0  | O KA1-HR        | 1.064    | 71                  | 15.40%      | 1.47%        | 0.180 um       |
| S       | 16 | 7.77%         | XRF 0  | S KA1-HR-Tr     | 206.6    | 11                  | 0.40%       | 118.1 PPM    | 1.73 um        |
| Cl      | 17 | 4.27%         | XRF 0  | Cl KA1-HR-Tr    | 38.63    | 4.27                | 0.92%       | 282.9 PPM    | 0.89 um        |
| As      | 33 | 1.07%         | XRF 0  | As KA1-HR-Tr    | 142.6    | 1.068               | 0.50%       | 146.1 PPM    | 19.6 um        |
| Si      | 14 | 0.24%         | XRF 0  | Si KA1-HR-Tr    | 3.236    | 0.238               | 3.80%       | 219.8 PPM    | 1.13 um        |
| K       | 19 | 0.20%         | XRF 0  | K KA1-HR-Tr     | 1.846    | 0.201               | 4.56%       | 163.0 PPM    | 1.11 um        |
| Ti      | 81 | 0.18%         | XRF 0  | Ti LA1-HR-Tr    | 6.995    | 0.18                | 9.95%       | 332.8 PPM    | 18.2 um        |
| Mg      | 12 | 0.16%         | XRF 0  | Mg KA1-HR-Tr    | 3.472    | 0.16                | 10.60%      | 513.4 PPM    | 0.58 um        |
| Mn      | 25 | 0.16%         | XRF 0  | Mn KA1-HR-Tr    | 4.688    | 0.16                | 3.23%       | 132.2 PPM    | 4.4 um         |
| Fe      | 26 | 0.14%         | XRF 0  | Fe KA1-HR-Tr    | 5.886    | 0.142               | 2.91%       | 110.2 PPM    | 5.4 um         |
| Ca      | 20 | 0.09%         | XRF 0  | Ca KA1-HR-Tr    | 0.9187   | 0.093               | 7.20%       | 186.3 PPM    | 1.38 um        |
| Pb      | 82 | 0.09%         | XRF 0  | Pb LB1-HR-Tr    | 2.705    | 0.088               | 22.80%      | 427.2 PPM    | 13.0 um        |
| Al      | 13 | 0.08%         | XRF 0  | Al KA1-HR-Tr    | 0.9969   | 0.082               | 6.62%       | 122.8 PPM    | 0.80 um        |
| Se      | 34 | 0.06%         | XRF 0  | Se KA1-HR-Tr    | 5.608    | 0.064               | 12.40%      | 184.7 PPM    | 23.1 um        |
| Pt      | 78 | 0.05%         | XRF 0  | Pt LA1-HR-Tr    | 1.954    | 0.049               | 11.80%      | 235.8 PPM    | 14.7 um        |
| V       | 23 | 0.04%         | XRF 0  | V KA1-HR-Tr     | 0.6332   | 0.036               | 12.10%      | 154.2 PPM    | 2.84 um        |
RESULT OF ICP-OES ANALYSIS
(Inductively Coupled Plasma Optical Emission Spectrometry)

<table>
<thead>
<tr>
<th>S.NO</th>
<th>ELEMENTS</th>
<th>WAVELENGTH (nm)</th>
<th>OBSERVED RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Arsenic</td>
<td>193.696</td>
<td>BDL</td>
</tr>
<tr>
<td>2.</td>
<td>Mercury</td>
<td>253.652</td>
<td>0.86 ppm</td>
</tr>
<tr>
<td>3.</td>
<td>Lead</td>
<td>230.204</td>
<td>BDL</td>
</tr>
<tr>
<td>4.</td>
<td>Cadmium</td>
<td>226.502</td>
<td>BDL</td>
</tr>
<tr>
<td>5.</td>
<td>Sodium</td>
<td>589.592</td>
<td>5.26 mg/L</td>
</tr>
<tr>
<td>6.</td>
<td>Potassium</td>
<td>766.490</td>
<td>5.22 Mg/L</td>
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<tr>
<td>7.</td>
<td>Calcium</td>
<td>317.933</td>
<td>200.684 mg/L</td>
</tr>
<tr>
<td>8.</td>
<td>Phosphorus</td>
<td>213.617</td>
<td>4.63</td>
</tr>
<tr>
<td>9.</td>
<td>Sulphur</td>
<td>181.975</td>
<td>3.25</td>
</tr>
<tr>
<td>10.</td>
<td>Ferrous</td>
<td>238.204</td>
<td>15.241 mg/L</td>
</tr>
</tbody>
</table>
RESULTS:

Table 1: Dose finding experiment and its behavioral Signs of acute oral Toxicity

<table>
<thead>
<tr>
<th>No</th>
<th>Dose mg/kg</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
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<th>15</th>
<th>16</th>
<th>17</th>
<th>18</th>
<th>19</th>
<th>20</th>
</tr>
</thead>
<tbody>
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<td>1</td>
<td>5</td>
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</tr>
<tr>
<td>2</td>
<td>50</td>
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<td>-</td>
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<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1↑</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
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<td>1↑</td>
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<tr>
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<td>+</td>
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<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1↑</td>
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<td></td>
</tr>
</tbody>
</table>


Table 2. Body wt (g) of wistar albino rats exposed to Siddhar kulikai for 28days.

<table>
<thead>
<tr>
<th></th>
<th>Days</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>7</td>
<td>14</td>
<td>21</td>
<td>28</td>
</tr>
<tr>
<td>Control</td>
<td>154.36 ± 6.20</td>
<td>156.35 ± 5.08</td>
<td>155.31 ± 6.18</td>
<td>158.11 ± 8.10</td>
<td>159.40 ± 8.50*</td>
</tr>
<tr>
<td>Low dose</td>
<td>151.00 ± 8.18</td>
<td>153.12 ± 7.14</td>
<td>154.65 ± 8.84</td>
<td>154.74 ± 11.55</td>
<td>156 ± 11.10*</td>
</tr>
<tr>
<td>Mid dose</td>
<td>153.09 ± 5.91</td>
<td>153.69 ± 9.41</td>
<td>154 ± 10.11</td>
<td>154.90 ± 11.10</td>
<td>155.80 ± 12.11*</td>
</tr>
<tr>
<td>High dose</td>
<td>153.80 ± 11.11</td>
<td>154 ± 10.11</td>
<td>156 ± 14.65</td>
<td>157.00 ± 15.08</td>
<td>159.08 ± 12.12*</td>
</tr>
</tbody>
</table>

Values are mean of 6 animals ± S.D. (Dunnett's test). *P<0.05; **P<0.01. N=6.
Table 3. Food (g/day) intake of albino rats exposed to *Siddhar kulikai* for 28days.

<table>
<thead>
<tr>
<th>Days</th>
<th>1</th>
<th>7</th>
<th>14</th>
<th>21</th>
<th>28</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>37.98 ± 2.19</td>
<td>35.50 ± 2.77</td>
<td>38.97 ± 2.80</td>
<td>37.10 ± 3.01</td>
<td>39.01 ± 2.89</td>
</tr>
<tr>
<td>Low dose</td>
<td>36.33 ± 2.35</td>
<td>37.80 ± 3.01</td>
<td>36.2 ± 1.90</td>
<td>37.37 ± 3.80</td>
<td>39.80 ± 3.40</td>
</tr>
<tr>
<td>Mid dose</td>
<td>40.65 ± 4.01</td>
<td>39.80 ± 2.90</td>
<td>41.08 ± 2.56</td>
<td>42.80 ± 2.80</td>
<td>41.80 ± 4.80</td>
</tr>
<tr>
<td>High dose</td>
<td>43.3 ± 2.00</td>
<td>41.20 ± 3.80</td>
<td>42.70 ± 2.89</td>
<td>43.08 ± 4.09</td>
<td>40.44 ± 1.80</td>
</tr>
</tbody>
</table>

Values are mean of 6 animals ± S.D. (Dunnett's test). *P<0.05; **P<0.01. N=6.

Table 4. Water (ml/day) intake of male and female albino rats exposed to *Siddhar kulikai* for 28days.

<table>
<thead>
<tr>
<th>Days</th>
<th>1</th>
<th>7</th>
<th>14</th>
<th>21</th>
<th>28</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>45.18 ± 3.00</td>
<td>43.15 ± 8.32</td>
<td>42.20 ± 1.25</td>
<td>43.12 ± 1.80</td>
<td>41.08 ± 3.04</td>
</tr>
<tr>
<td>Low dose</td>
<td>53.83 ± 2.81**</td>
<td>52.80 ± 3.02**</td>
<td>50.18 ± 1.86**</td>
<td>49.01 ± 3.20**</td>
<td>45.30 ± 2.10**</td>
</tr>
<tr>
<td>Mid dose</td>
<td>48.01 ± 2.08</td>
<td>45.90 ± 3.07</td>
<td>43.37 ± 3.19</td>
<td>45.80 ± 2.28**</td>
<td>43.80 ± 3.09</td>
</tr>
<tr>
<td>High dose</td>
<td>48.80 ± 2.88</td>
<td>47.28 ± 1.80</td>
<td>48.60 ± 1.08</td>
<td>45.01 ± 2.18**</td>
<td>48.01 ± 2.53**</td>
</tr>
</tbody>
</table>

Values are mean of 6 animals ± S.D. (Dunnett's test). *P<0.05; **P<0.01. N=6.
Table 5. Hematological parameters after 28 days treatment with

*Siddhar kulikai* in rats.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Control</th>
<th>Low dose</th>
<th>Mid dose</th>
<th>High dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red blood cell (mm$^3$)</td>
<td>8.41 ± 0.17</td>
<td>7.01 ± 0.08**</td>
<td>7.20 ± 0.27**</td>
<td>7.40 ± 0.11**</td>
</tr>
<tr>
<td>HB (%)</td>
<td>16.20 ± 0.31</td>
<td>16.00 ± 0.26</td>
<td>16.10 ± 0.88</td>
<td>16.16 ± 0.98</td>
</tr>
<tr>
<td>Leukocyte (x10$^6$/mL)</td>
<td>10129 ± 116.43</td>
<td>10144 ± 311.04**</td>
<td>12190 ± 546.75**</td>
<td>11475 ± 368.30**</td>
</tr>
<tr>
<td>Platelets/ul</td>
<td>1349 ± 29.66</td>
<td>1298 ± 103.34**</td>
<td>1295 ± 101.34</td>
<td>1189 ± 27.33**</td>
</tr>
<tr>
<td>MCV (gl)</td>
<td>58.78 ± 4.36</td>
<td>55.38 ± 3.68</td>
<td>54.68 ± 2.11*</td>
<td>55.36 ± 4.60*</td>
</tr>
<tr>
<td>DLC (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>4.66 ± 0.72</td>
<td>5.20 ± 1.56</td>
<td>4.50 ± 0.53</td>
<td>5.00 ± 2.16</td>
</tr>
<tr>
<td>L</td>
<td>91.86 ± 3.54</td>
<td>92.80 ± 3.46</td>
<td>90.12 ± 3.18</td>
<td>91.80 ± 3.03</td>
</tr>
<tr>
<td>M</td>
<td>2.0 ± 0.38</td>
<td>2.1 ± 0.48</td>
<td>2.07 ± 1.09</td>
<td>2.36 ± 0.32</td>
</tr>
<tr>
<td>E</td>
<td>1.12 ± 0.22</td>
<td>2.0 ± 0.34**</td>
<td>2.0 ± 0.20**</td>
<td>1.64 ± 0.34*</td>
</tr>
<tr>
<td>B</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>ESR(mm)</td>
<td>2 ± 00</td>
<td>2.4 ± 00</td>
<td>2.1 ± 00</td>
<td>2.2 ± 00</td>
</tr>
<tr>
<td>PCV</td>
<td>48.20 ± 1.88</td>
<td>43.89 ± 2.10</td>
<td>45.38 ± 1.66</td>
<td>44.10 ± 2.14</td>
</tr>
<tr>
<td>MCH pg</td>
<td>18.18 ± 0.25</td>
<td>18.25 ± 1.45</td>
<td>18.39 ± 0.47</td>
<td>18.40 ± 0.10</td>
</tr>
<tr>
<td>MCHC g/dl</td>
<td>30.56 ± 0.88</td>
<td>31.10 ± 0.41</td>
<td>30.44 ± 1.22</td>
<td>30.05 ± 0.44</td>
</tr>
</tbody>
</table>

Values are mean of 6 animals ± S.D. (Dunnett's test). *P<0.05; **P<0.01. N=6.
Table 6. Effect of treatment with *Siddhar kulikai* biochemical parameters.

<table>
<thead>
<tr>
<th>LFT</th>
<th>Control</th>
<th>Low Dose</th>
<th>Mid Dose</th>
<th>High Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dose (mg/kg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Bilirubin (mg/dL)</td>
<td>0.506 ± 0.01</td>
<td>0.513 ± 0.04</td>
<td>0.516 ± 0.05</td>
<td>0.514 ± 0.01</td>
</tr>
<tr>
<td>Bilirubin direct (mg/dL)</td>
<td>0.1 ± 0.02</td>
<td>0.1 ± 0.04</td>
<td>0.1 ± 0.03</td>
<td>0.1 ± 0.04</td>
</tr>
<tr>
<td>Bilirubin indirect (mg/dL)</td>
<td>0.1 ± 0.00</td>
<td>0.1 ± 0.00</td>
<td>0.1 ± 0.00</td>
<td>0.1 ± 0.00</td>
</tr>
<tr>
<td>ALP (U/L)</td>
<td>381.41 ± 10.12</td>
<td>373.20 ± 11.33</td>
<td>385.32 ± 10.20</td>
<td>291.1 ± 11.33**</td>
</tr>
<tr>
<td>SGOT (U/L)</td>
<td>167.13 ± 6.22</td>
<td>158.67 ± 5.57</td>
<td>165.36 ± 4.77</td>
<td>153.31 ± 5.54*</td>
</tr>
<tr>
<td>SGPT (U/L)</td>
<td>45.4 ± 1.23</td>
<td>44.3 ± 3.12</td>
<td>44.01 ± 2.32</td>
<td>45.66 ± 4.04</td>
</tr>
<tr>
<td>Total Protein (g/dl)</td>
<td>10.01 ± 1.10</td>
<td>8.70 ± 0.20</td>
<td>8.02 ± 0.17</td>
<td>8.90 ± 0.08</td>
</tr>
<tr>
<td>Albumin (g/dl)</td>
<td>3.12 ± 0.20</td>
<td>2.98 ± 0.20</td>
<td>3.24 ± 0.23</td>
<td>2.96 ± 0.10</td>
</tr>
<tr>
<td>Globulin (g/dl)</td>
<td>5.82 ± 0.08</td>
<td>5.68 ± 0.22</td>
<td>5.58 ± 0.20</td>
<td>4.82 ± 0.28**</td>
</tr>
<tr>
<td>A/G Ratio (g/dl)</td>
<td>0.54 ± 0.04</td>
<td>0.51 ± 0.10</td>
<td>0.52 ± 0.09</td>
<td>0.61 ± 0.08**</td>
</tr>
<tr>
<td>GGT (U/L)</td>
<td>7.4 ± 0</td>
<td>7.2 ± 0</td>
<td>7.8 ± 0</td>
<td>8 ± 0</td>
</tr>
</tbody>
</table>

Values are mean of 6 animals ± S.D. (Dunnett's test). *P<0.05; **P<0.01 vs. control group N=6.

Table 7 RFT

<table>
<thead>
<tr>
<th>Dose (mg/kg)</th>
<th>Control</th>
<th>Low Dose</th>
<th>Mid Dose</th>
<th>High Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urea (mg/dL)</td>
<td>57.89 ± 1.55</td>
<td>60.90 ± 3.25</td>
<td>60.10 ± 1.98</td>
<td>62.31 ± 1.44*</td>
</tr>
<tr>
<td>Creatinine (mg/dL)</td>
<td>0.78 ± 0.06</td>
<td>0.75 ± 0.04</td>
<td>0.79 ± 0.07</td>
<td>0.76 ± 0.06</td>
</tr>
<tr>
<td>Uric acid (mg/dL)</td>
<td>3.4 ± 0.08</td>
<td>3.4 ± 0.20</td>
<td>3.6 ± 0.18</td>
<td>3.63 ± 0.10</td>
</tr>
<tr>
<td>Na m.mol</td>
<td>138.10 ± 7.10</td>
<td>140.8 ± 4.18</td>
<td>143.11 ± 3.90</td>
<td>141.25 ± 4.08</td>
</tr>
<tr>
<td>K m.mol</td>
<td>20.60 ± 2.78</td>
<td>20.48 ± 1.50</td>
<td>20.7 ± 1.10</td>
<td>19.15 ± 2.10</td>
</tr>
<tr>
<td>Cl m.mol</td>
<td>99.80 ± 3.00</td>
<td>100.80 ± 6.06</td>
<td>102.06 ± 8.85</td>
<td>101.46 ± 6.26</td>
</tr>
</tbody>
</table>

Values are mean of 6 animals ± S.D. (Dunnett's test). *P<0.05; **P<0.01 vs. control group N=6.
Table 8. Lipid Profile

<table>
<thead>
<tr>
<th>Dose (mg/kg)</th>
<th>Control</th>
<th>Low Dose</th>
<th>Mid Dose</th>
<th>High Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total cholesterol(mg/dL)</td>
<td>42.88 ± 2.68</td>
<td>41.5 ± 2.69</td>
<td>43.01 ± 3.03</td>
<td>45.80 ± 3.09*</td>
</tr>
<tr>
<td>HDL(mg/dL)</td>
<td>12.16 ± 1.45</td>
<td>12.28 ± 1.36**</td>
<td>12.25 ± 1.28**</td>
<td>13.00 ± 1.80**</td>
</tr>
<tr>
<td>LDL(mg/dL)</td>
<td>31.68 ± 2.68</td>
<td>35.16 ± 3.13</td>
<td>36.50 ± 3.80</td>
<td>37.30 ± 2.80</td>
</tr>
<tr>
<td>VLDL(mg/dl)</td>
<td>16.09 ± 3.01</td>
<td>16.06 ± 2.31</td>
<td>16.15 ± 2.47</td>
<td>16.11 ± 2.36</td>
</tr>
<tr>
<td>Triglycerides (mg/dl)</td>
<td>83.05 ± 3.48</td>
<td>82.31 ± 3.01</td>
<td>90.15 ± 5.00**</td>
<td>90.38 ± 2.98**</td>
</tr>
<tr>
<td>TC/HDL ratio (g/dl)</td>
<td>3.40 ± 0.01</td>
<td>3.39 ± 0.16</td>
<td>3.56 ± 0.17</td>
<td>3.53 ± 0.26</td>
</tr>
<tr>
<td>Blood glucose(mg/dl)</td>
<td>102.16 ± 8.26</td>
<td>112.2 ± 5.36</td>
<td>113.83 ± 6.69</td>
<td>120.6 ± 2.36**</td>
</tr>
</tbody>
</table>
RESULTS OF TOXICITY STUDY

ACUTE ORAL TOXICITY STUDY OF SIDDHAR KULIKAI (OECD GUIDELINE – 423)

➢ In Acute oral toxicity study female wistar albino rats are treated with the dose level of 5mg/kg bw, 50mg/kg bw, 300mg/kg bw, 2000mg/kg bw.
➢ Mortality was not observed up to dose level of 2000mg/kg bw.

28-DAYS REPEATED DOSE ORAL TOXICITY STUDY OF SIDDHAR KULIKAI (OECD GUIDELINE -407)

Clinical signs:
Clinical signs was not observed during the dosing period of 28 days.

Mortality:
All animals from control and all the treated dose groups survived throughout the dosing period of 28 days.

Body weight:
Results of body weight of animals from control and different dose groups exhibited comparable body weight gain throughout the dosing period of 28 days (Table-2)

Food consumption:
During dosing period, the quantity of food consumed by animals from different dose groups was found to be comparable and normal with that by control animals.

water consumption:
During dosing period, the quantity of water consumed by animals from different dose groups was found to be comparable and normal with that by control animals.

Haematological investigations:
The results of haematological investigations (Table 5) conducted on day 29, revealed no significant changes in the values of different parameters investigated when
compared with control group. However, the increase or decrease in the values obtained was within normal biological and laboratory limits or the effect was not dose dependent. The Lymphocyte count was slightly elevated in test groups, but statistically not significant when compared with control group.

**Biochemical Investigations:**

Results of Biochemical investigations conducted on day 29. No significant changes in the values of different parameters studied when compared with those of respective controls; however, the values obtained were within normal biological and laboratory limits. (Table 6,7,8)

**Histopathology:**

Gross pathological examination of animals doesn’t reveal any abnormalities in control and test groups. The histopathological study of the organs such as Heart, Lungs, Liver, Spleen, Stomach and Kidney was normal in control, Low dose group, Mid dose group and High dose group.
HISTOPATHOLOGICAL REPORT

HEART

Control Group

Section of the heart shows normal appearing cardiac myocytes (Slide 1)

Low Dose

Section of the heart shows normal appearing cardiac myocytes. (Slide 2)

Mid Dose

Section of the heart shows normal appearing cardiac myocytes. (Slide 3)

High Dose

Section of the heart shows normal appearing cardiac myocytes. (Slide 4)
HEART

Slide 1: Cardiac Myocytes

Slide 2: Cardiac Myocytes

Slide 3: Cardiac Myocytes

Slide 4: Cardiac Myocytes
KIDNEY

Control Group

Section of the kidney shows normal appearing glomeruli, tubules and interstitium. (Slide 1)

Low Dose

Section of the kidney shows normal appearing glomeruli, tubules and interstitium. (Slide 3)

Mid Dose

Section of the kidney shows normal appearing glomeruli, tubules and interstitium. (Slide 3)

High Dose

Section of the kidney shows normal appearing glomeruli, tubules and interstitium. (Slide 4)
KIDNEY

slide 1: Glomeruli Tubules

Slide 2: Glomeruli Tubules

Slide 3: tubules on interstitium

Slide 4: Glomeruli Tubules
LIVER

Control Group
Section from the liver shows central vein surrounded by radiating cords of hepatocytes separated by sinusoid containing kupfer cells portal triads of appear normal. (Slide 1)

Low Dose
Section from the liver shows central vein surrounded by radiating cords of hepatocytes separated by sinusoid containing kupfer cells portal triads of appear normal. (Slide 2)

Mid Dose
Section from the liver shows central vein surrounded by radiating cords of hepatocytes separated by sinusoid containing kupfer cells portal triads of appear normal. (Slide 3)

High Dose
Section from the liver shows central vein surrounded by radiating cords of hepatocytes separated by sinusoid containing kupfer cells portal triads of appear normal. (Slide 4)
LIVER

Slide 1: central vein with hepatocytes
Slide 2: Portal Triad
Slide 3: central vein with hepatocytes
Slide 4: Portal Triad
LUNG

Control Group
Section from the lung shows normal appearing bronchioles, alveoli (Slide 1)

Low Dose
Section from the lung shows normal appearing bronchioles, alveoli. (Slide 2)

Mid Dose
Section from the lung shows normal appearing bronchioles, alveoli. (Slide 3)

High Dose
Section from the lung shows, bronchioles, alveoli were normal. (Slide 4)
LUNG

Slide 1: Bronchioles And Alveoli

Slide 2: Bronchioles And Alveoli

Slide 3: Bronchioles, Alveoli
STOMACH

Control Group

Section from the stomach shows lined by stratified squamous epithelium gastric mucosa, muscularis mucosa, muscularis propria appear normal. (Slide 1)

Low Dose

Section from the stomach shows lined by stratified squamous epithelium gastric mucosa, muscularis mucosa, muscularis propria appear normal. (Slide 2)

Mid Dose

Section from the stomach shows lined by stratified squamous epithelium gastric mucosa, muscularis mucosa, muscularis propria appear normal. (Slide 3)

High Dose

Section from the stomach shows lined by stratified squamous epithelium gastric mucosa, muscularis mucosa, muscularis propria appear normal. (Slide 4)
STOMACH

Slide 1: normal gastric mucosa

Slide 2: Lamina Propria
SPLEEN

Control Group

Section of the spleen shows normal white pulp with germinal centres. (Slide 1)

Low Dose

Section of the spleen shows white pulp with germinal center with arterioles surrounded and separated by congested red pulp. (Slide 2)

Mid Dose

Section of the heart shows white pulp with germinal center with arterioles surrounded and separated by congested red pulp. (Slide 3)

High Dose

Section of the heart shows white pulp with germinal center with arterioles surrounded and separated by congested red pulp. (Slide 4)
Slide 1: central arterioles

Slide 2: Red Pulb And White Pulb

Slide 3: central arterioles

Slide 4: central arterioles surrounded by congested red pulp.
CHART 3

Food Intake (g/day)

CHART 4

Hematological Parameters

Control
Low Dose (x)
Mid Dose (5x)
High Dose (10x)
CHART 5

Hematological Parameters

Control
Low Dose (x)
Mid Dose (5x)
High Dose (10x)

CHART 6

Hematological Parameters

Control
Low Dose (x)
Mid Dose (5x)
High Dose (10x)

Leukocyte (x106/ml) Platelets (lakhs/cu mm)
CHART 9

LFT

- Control
- Low Dose (x)
- Mid Dose (5x)
- High Dose (10x)

ALP (U/L)  SGOT (U/L)  SGPT (U/L)

CHART 10

LFT

- Control
- Low Dose (x)
- Mid Dose (5x)
- High Dose (10x)

Total Protein (g/dl)  Albumin (g/dl)  Globulin (g/dl)  A/G Ratio GGT (U/L) (g/dl)
CHART 13

Blood Glucose

Blood glucose (mg/dL)

- Control
- Low Dose (x)
- Mid Dose (5x)
- High Dose (10x)
- Column1
DISCUSSION

Analysis of ‘Siddhar kulikai’ by various methods, provided the vital outcome.

In Physicochemical analysis of ‘Siddhar kulikai’ reveals, pH of 7.5 to 7.7 Total Ash value of 8.77%, Moisture content of 9.75 %and Water soluble Ash 6.7% Acid insoluble ash 0.83%It indicates the ‘Siddhar kulikai’ is acidic in nature. The parameters showed the normal assortment. It reveals the purity of the medicine was fine eminence.

Analysis by HRSEM explicate the Particle Size (Lump) of ‘Siddhar kulikai’ was 10μm. Agglomeration of the particles can be seen. Absorption of the drug was fine for the reason that the size of the fine particle was below the size of the lump. Absorption of the particles are possible.

FTIR analysis indicates, after purification the raw drugs became more efficacious and safe nature is attained by introduction of few new groups and absence of toxic substituents.

Analysis by ICP OES explicate the ‘Siddhar kulikai’ were re-establish and add force by the purification and preparation method. The level of Mercury was with in the permissible limit(0.86 ppm) this indicates the best eminence of the purification and preparation process. Other than Mercury, the level of Sulphur, Pottasium, Sodium, Calcium, Phosphorus were accomplish the therapeutic value.
In Acute toxicity study, rats are treated with the dose level of 5mg/kg/bw, 50mg/kg/bw, 300mg/kg/bw 2000mg/kg/bw. At 2000mg/kg bw dose level behavioral changes observed and no death were observed. And the animals were observed up to 14 days. No death was recorded after 14 days.

The doses selected for Repeated dose toxicity study were 3.024 mg (Low Dose), 15.12 mg (Middle Dose), 30.24 mg (High Dose) and treated up to 28 days. All the male and female animals from control and all the treated dose groups up to 10x dose level survived throughout the dosing period of 28 days. Animals from all the treated dose groups exhibited comparable body weight gain with that of controls throughout the dosing period of 28 days. Food consumption of control and treated animals was found to be comparable throughout the dosing period of 28 days. Haematological, biochemical analysis of collected blood samples from day 29 reveals, the survival of animals throughout the dosing period in all the treated dose groups. No signs of major or significant intoxication were observed in animals during the dosing period of 28 days. Haematological analysis, Liver and Kidney function analysis revealed no remarkable abnormalities attributable to the treatment. Observation of the significant results does not reveals the toxic effect of the dose level because increase or decrease in the values obtained was within normal biological and laboratory limits.

Histopathological examination dose not reveal any abnormalities, in all treated dose group level when compared with control group, reveals the action of drug in every dose level dose not damage the organs. Histopathological analysis was necessary to elucidate the safety of the medicine.
SUMMARY

- The medicine ‘Siddhar kulikai’ was taken for the dissertation work based on “Veerama munivar vagada thiratu, Part I.”
- Pooram, Sithiramoola ver pattai, Omam, Panaivellam, Korosanai, was bought from the raw drug shop, Chennai, Nagarkovil.
- Ingredients were authenticated by Siddha Central Research Institute and Department of Botany, NIS, Chennai.
- Then the ingredients of ‘Siddhar kulikai’ was purified as per the literature in NIS Gunapadam lab.
- And the medicine was prepared in NIS Gunapadam lab as per the literature.
- The prepared medicine “Siddhar kulikai” was subjected to evaluate the Acute oral toxicity study and 28 days repeated dose oral toxicity study in NIS pharmacology lab.
- Qualitative analysis was done in NIS Biochemistry lab.
- Subsequently the medicine was subjected to Physicochemical analysis, Quantitative analysis (ie) HRSEM, ICP-OES, FTIR in IIT Chennai.
- Medicine was subjected for XRF analysis in SASTRA University, Thanjur.
- the Qualitative analysis was done in NIS Biochemistry lab.
- Histopathology analysis were done in Madras Medical College, Pathology lab.
CONCLUSION

Qualitative analysis and Quantitative analysis reveals the foremost purification and preparation of the medicine and bear out the therapeutic dose. Based on the toxicity study, no toxic effect was observed up to 10x dose level (30.24mg/animal) of “Siddhar kulikai” treated via oral route over a period of 28 days. So, it can be concluded that the Siddhar kulikai is safety with the dosage recommendations of 56 to 84 mg which is mentioned in “Veerama munivar vagada thiratu, Part I.” is a safe dosage for clinical use.

In forthcoming days this study will be augment by do the Pharmacological activity, Antimicrobial activity, and Clinical trial of “Siddhar kulikai”.
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CERTIFICATE

Certified that herbal drug SIDDHAR KULIGAI formulated by Dr. S. Malathi III Year M.D(S) Department of Nanjunool, National Institute of Siddha, Tambaram Sanatorium was analysed (quantitative) by ICP-OES, FT-IR, HR-SEM and Physico chemical Analysis Methods at SAIF, IITM, Chennai-36, during December 2012.

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e-mail : saif@iitm.ac.in  http://www.saif.iitm.ac.in
CERTIFICATE

Certified that the minerals submitted for identification by Dr. S. Malathi, III year M.D., Department of Nanju Noolum Maruthuva Neethi Noolum, National Institute of Siddha, Tambaram Sanatorium, Chennai-47 are identified as Korosanam – Ox bile, Poorum – Mercurous chloride.

(R. Shakila)
Research Officer (Chemistry)

(S. Jega Jothi Pandian)
Asst. Director- In charge

08.10.2012
NATIONAL INSTITUTE OF SIDDHA, CHENNAI – 600047
CERTIFICATE OF BOTANICAL AUTHENTICITY

Certified that the following plant drugs used in the formulation “Siddhar kulikai” (Internal) for toxicity studies taken up for Post Graduation Dissertation by Dr. S. Malathi, M.D.(S), III year, Department of Nanjunoolum Maruthuva Neethinoolum, 2012-13, are identified and authenticated through Visual inspection / Experience, Education & Training / Organoleptic characters / Morphology / Taxonomical / Microscopical methods.

Plumbago zeylanica Linn. (Plumbaginaceae), Root
Carum copticum Benth. & Hook. f. (Apiaceae), Fruit
Borassus flabellifer Linn. (Arecaaceae), Palm jaggery

Certificate No: NIS/MB/64/2012

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

Date: 24-8-12
This Certificate is awarded to Mr./Ms./Dr. S. MALATHI for participating as a Resource Person / Delegate in the VII Workshop on "Research Methodology & Biostatistics" for AYUSH Post-Graduates & Researchers organized by the Department of Siddha The Tamil Nadu Dr. M.G.R. Medical University from 6th Feb. 2012 to 10th Feb. 2012.

DR. MAYILVAHANAN NATARAJAN
7th VICE CHANCELLOR

Dr. R. SRILAKSHMI, DCH, Ph.D.
REGISTRAR

Dr. N. KABILAN, M.D. (Siddha)
READER, DEPT. OF SIDDHA
CERTIFICATE

This is certify that the project title......................................................
......................................................
......................................................
has been approved by the IAEC.

Dr. K. Manickavasakam
Name of Chairman/Member Secretary IAEC:

Dr. B. Jayachandran Dare
Name of CPCSEA nominee:

Signature with date

[Signature]
Chairman/Member Secretary of IAEC:

CPCSEA nominee:

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