A TOXICITY STUDY ON

"KARUVEPPILAI CHOORANAM"

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Department of Nanju Noolum Maruthuva Neethi Noolum

Government Siddha Medical College

Palayamkottai – 627 002

OCTOBER – 2019

GOVT. SIDDHA MEDICAL COLLEGE, PALAYAMKOTTAI

DECLARATION BY THE CANDIDATE

I hereby declare that this dissertation entitled "**A Toxicity Study on KARUVEPPILAI CHOORANAM**" is a bonafide and genuine research work carried out by me under the guidance of **Dr. M. P. ABDUL KADER JEYLANI**, **M.D(s).,** Professor, Post Graduate Department of Nanju Noolum Maruthuva Neethi Noolum, Govt.Siddha Medical College, Palayamkottai, and the dissertation has not formed the basis for the award of any Degree, Diploma, Fellowship or other similar title.

Date: **Signature of the Candidate**

Place: Palayamkottai **Dr. M. YASHIKA**

CERTIFICATE

This is to certify that the dissertation entitled **"A TOXICITY STUDY ON KARUVEPPILAI CHOORANAM"** is a bonafide work done by **Dr. M. YASHIKA (Reg.No. 321616010)** Govt. Siddha Medical College, Palayamkotai in partial fulfillment of the university rules and regulations for award for **MD(s) Nanju Noolum Maruthuva Neethi Noolum** under my guidance and supervision during the academic year 2016-2019.

Name and signature of the Guide :

Name and signature of the Head of Department:

Name and signature of the Principal:

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This certificate is awarded to Dr/~~Mr/Mrs~~.....M. YASHIKA.....

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Palayamkottai.

GOVERNMENT SIDDHA MEDICAL COLLEGE, PALAYAMKOTTAI

CERTIFICATE OF BOTANICAL AUTHENTICITY

Certified the following plants drugs used in Siddha formulation **"Karuvepilai Chooranam"** taken up for Post-Graduation Dissertation studies by **Dr.M.YASHIKA,** PG Scholar MD Siddha, Department of Nanju Noolum Maruthuva Neethi Noolum, are correctly identified and authenticated through visual inspection / organoleptic characters / Experience and Training, Morphology, Microscopical and Taxonomical methods.

S. No.	Tamil Name (herbals)	Botanical Name	Family	Parts used
1	Karuveppilai	Murraya koenigii	Rutaceae	Leaves
2	Sundaivattral	Solanum torvum	Solanaceae	Fruit
3	Mangottai paruppu	Mangifera indica	Anacardiaceae	Seed
4	Omam	Trachyspermum ammi	Apiaceae	Seed
5	Nellimulli	Phyllanthus officinalis	Euphorbiaceae	Fruit
6	Mathulai Odu	Punica granatum	Punicaceae	Fruit shell
7	Venthayam	Trigonella foenum-graecum	Fabaceae	Seed

20/2/19

Station: Palayamkottai

Date: 20/2/19.

Authorized Signature

Dr. S. SUTHA, M.Sc.,M.Ed.,Ph.D.,
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NANDHACOLLEGE OF PHARMACY, ERODE - 52

Committee for the Purpose of control and Supervision of Experiments on Animals (CPCSEA)
Institutional Animal Ethics Committee (IAEC)
Reg No: 688 /PO/Re/S/02/CPCSEA

CERTIFICATE

Title of the project	:	A TOXICITY STUDY ON KARUVEPPILAI CHOORANAM
Proposal Number	:	NCP/IAEC/2018-19/24
Date received after modification (if any)	:	---
Date received after second modification	:	---
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Name of the IAEC / CPCSEA Nominee	:	Dr. C. Gunasekaran

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Biological Scientist

Dr. K. Abdhul
Scientist From Different Discipline

GOVERNMENT SIDDHA MEDICAL COLLEGE& HOSPITAL
PALAYAMKOTTAI

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S.No: 099

CERTIFICATE

This Certifies that

Dr. M. Yashika

has participated in Continuing Medical Education on "**AYUSH External Therapies-II**" held at GSMCH, Palayamkottai on Dec, 4 2018

Dr. A.S.Poongodi Kanthimathi MD (s).,
Head - Dept. of Sirappu Maruthuvam

Authorised Signatory
VAIDYARATNAM

Dr. R. Neelavathy MD (s), Ph.D.,
Principal

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LIST OF TABLES

ABBREVIATIONS

KC	KARUVEPPILAI CHOORANAM
No.	Number
Mg	Milligram
Kg	Kilogram
LD_{50}	Lethal $Dose_{50}$
ED_{50}	Effective $Dose_{50}$
p.o	peros
ML	Milliliter
%	percentage
R&D	Research and Development
EDTA	Ethylene Diamine Tetra Acetic Acid
M	Male
g%	Gram percentage
g	Gram
NOAEL	No-Observed-Adverse-Effect-Level
MLD	Minimum Lethal Dose
MTD	Maximum Tolerated Dose
OECD	Organization of Economic Co-operation and Development
CPCSEA	Committee for the Purpose of Control and Supervision of Experiments on Animals
FTIR	Fourier Transform – Infra Red Spectroscopy
SEM	Scanning Electron Microscopy
ICP-OES	Inductively Coupled Plasma Optical Emission-Spectrometry
LD	Low Dose
MD	Middle Dose
HD	High Dose
BDL	Below Detection Limit

1. INTRODUCTION

Siddha system of medicine is one of the traditional systems of medicine in India originated in the State of Tamilnadu. Siddhars are a group of Tamil Scientific philosopher endoured with supernatural powers who revealed their revolution to save the humanity. They are men with extra ordinary intelligence, high culture, noble thinking and sound experience.

"மறுப்பது உடல் நோய் மருந்தெனலாகும்
மறுப்பது உளநொய் மருந்தென சாலும்
மறுப்பது இனி நோய் வாரா திருக்க
மறுப்பது சாவை மருந்தென லாமே"

\- திருமந்திரம்

One that cures physical ailment is medicine
One that cures psychological ailment is medicine
One that prevent ailment is medicine
One that bestows immortality is medicine

Preparations based on naturally occurring materials have been employed by trial and an error since time immemorial, for combating human ailments. Thus all the traditional system of medicine are primarily in plant, animal and mineral sources. In Siddha medicine there are used in the form of crude powder, parpam, tablets, decoction paste etc.,

According to the basis of Siddha system, the universe consists of five senses of the human body. Man consumes water and food, breathes air and maintains the heat in the body. He is alive because of the life force given by ether. The earth is the first element which gives the shape to the body including bones, tissues, muscles, skin, hair etc., fire the third element that gives emotion, vigour and vitality to the body. It also helps digestion, circulation and stimulation besides respiration and the nervous system.

Concept of Treatment:

The treatment in Siddha system is aimed at keeping the three humors in equilibrium and maintenance of seven elements. So proper diet, medicine and disciplined regimen of life are advised for a healthy living to restore equilibrium of humours in diseased condition.

Treatment is classified into three categories:

Devamaruthuvam (Deivine method) In divine method, medicine like parpam, chenduram, guru, kuligai made of rasam, gandagam and padanams are used. in surgical method, aruvai, Karanool Sluduthal are used. In the rational method, medicines made of herbs like churanam kudineer, vadagam are used.

The Siddhars were those, who had renounced the world after experiencing its instability and uncertainty. They practiced the eight kinds of yogas and great miracles with divine power and ultimately attained the stage of perpetual consciousness or samathi and enjoyed eternal bliss.

The contribution of Siddhars, to Siddha literature with its boundless therapeutics and wonderful pharmaceutical preparation of medicine is acclaimed for excellence (Pre-eminent) even in the 20^{th} century and worthy of its remarkable results. The siddha treatment deals and not only as a curative but also a preservative, taking care of the external body with its internal being soul.

The physiological function in the body is mediated by three substances (Mukkutram) which are made upto five elements. The mukkutram are **Vatham, Pitham**, and **Kabam**. In each and every cell of the body. These three doshas coexist and function harmoniously.

1. **Vatham** is formed by Akasathin Vayu. Vatham controls the nervous actions such as movement, sensation etc.,
2. **Pitham** is formed by thee (Fire) pitham controls the metabolic activities of the body, digestion, assimilation, warmth etc.,
3. **Kabam** is formed by Mann and Neer, Kabam controls stability.

Universe consists of two essential entitles, matter and energy. The siddhars call them Shiva (Male), Sakthi (Female) creation. Matter cannot exist without energy inherent in it and vice versa, the two co-exist are in separable.

Justification of the drug:

It is a herbal component of medicine (Karuveppilai Chooranam). It cures diarrhoea, indigestion. As a student of Nanju Nool Dept. It is our prime duty to prove safety of the drug by conducting acute and chronic toxicity studies. Hence I took topic for my dissertation.

2. AIM AND OBJECTIVES

AIM:

The main aim of this study is to access the safety of the drug **"Karuveppilai Chooranam"** on wistar rats under various dose levels of drug administration especially in acute and sub acute toxicity studies.

OBJECTIVE:

- To collect the literature and other evidences of each ingredient on pharmacological and toxicological aspect.
- To collect and purify the raw drugs according to literature evidence.
- To prepare the medicine based on the procedure quoted in literature.
- To establish the acute and sub acute toxicity of the drug.
- To evaluate the biochemical analysis of the drug.
- To analysis the haematological investigations and histopathological study of the organs such as kidney, liver, heart and brain in wister rats.
- To create an awareness among the practitioners of siddha to go for further study regarding the adverse effect in the drug.

3. REVIEW OF LITERATURE

3.1. SIDDHA ASPECT

1. நெல்லிமுள்ளி

இதற்கு "நெல்லிமுள்ளி" என்று பெயர். காமன் போன்று அழகுண்டாக்குவதில் இது சிறப்புடையது. இது துவர்ப்பி, குளிர்ச்சியுண்டாக்கி மற்றும் சிறுநீர்ப்பெருக்கியாகவும் செயல்படுகின்றது.

நெல்லிக்காயைப் பகற்போதுண்ணல், வெறி, ஐயநோய், பீனிசம், வாய்நீர் சுரப்பு, வாந்தி, மயக்கம், தலைச்சுழலல், பிரமேகம் இவற்றை குணப்படுத்தும்.

பித்தமன வையம் பீநிசம்வாய் நீர் வாந்தி
மத்தமலக் காடும் மயக்கமுமில் - ஒத்தவுரு
வில்லிக்கா யம்மருங்கா மென்னாட்கா வந்தேர்ந்தே
நெல்லிகா யம்மருந் துண்.

- தேரன் குணவாகடம்

நெல்லிக்காய்க் குப்பித்தம் நீங்கு மதன்புளிப்பால்
செல்லுமே வாதமதிற் சேர்துவரால் - சொல்லுமையம்
ஓடுமிதைச் சித்தத்தில் உன்ன அனலுடனே
கூடுபிற மேகமும் போங்கூறு.

இல்லா மலக மிரண்டு மயின்றானே
யில்லா மலகமிருக்குமே - இல்லாமல்
வாழைக் கனியும் வுடையு மிழுது முண்பான்
வாழைக் கனியுள் வைத்த வன்.

- தேரன் யமக வெண்பா

நெல்லிமுள்ளியின் குணம்

ஆகவன லஞ்சகி அசிர்க்கென்பு ருக்கிகண்ணோய்
தாக முதிரவித்தந் தாதுநஷ்டம் - மேகத்தின்
இல்லிமுள்ளி போலருகல் எண்கா மியவியங்கம்
நெல்லிமுள்ளி யாற்போ நினை.

- தேரன் குணவாகடம்

நாவுக்குச் சுவையைத் தருகின்ற நெல்லி முள்ளியால், உட்சூடு, எலும்புருக்கி நோய், குருதியழல் நோய், பெரும்பாடு, வெறிநோய், நீரருகல், வாந்தி, வெள்ளை, ஆண்குறிக் கொப்புளம் ஆகியவை விலகும்.

கருநெல்லி மரத்தின் குணம்

பதினைந் தெனுஞ்சன்னி பாதந் தயக்கம்
மதினைந் திடச் செய்வினை மானும் - பதியிற்
சனித்த கருவுருத் தானும்வே றாகுந்
தனித்தகரு நெல்லி மரத்தால்

- தேரன் குணவாகடம்

முப்பிணி வகைகள் யாவற்றையும் போக்கும். உடலை அழியாமற் காக்கும். இதனால் மனக்களிப்பு உண்டாக்கும்.

நெல்லிமுள்ளியின் பொது மருத்துவப் பயன்கள்

- மூப்படைந்தவரும் இளமையுடைய மாப்பிள்ளையை போல் அழகுடன் இருக்கவேண்டின், நெல்லிகனியை பாகஞ் செய்து உண்ணுதல் வேண்டும்.
- நெல்லிக்காயை துவையல் செய்து சாப்பிட, சுவையின்மை, வாந்தி இவையைப் போக்கும்.
- நெல்லி வற்றலை குடிநீர் செய்து கொடுக்க மயக்கம், தாகம், ஒக்காளம் இவை நீங்கும்.
- இலைக் கொழுந்தை அரைத்து மோரில் கலந்து சீதக்கழிச்சலுக்கு தரலாம்.
- 2100 கிராம் நெல்லி வற்றலை 44,800 மிலி தண்ணீரில் போட்டு எட்டில் ஒரு பங்கு வற்றவைத்து வடித்திறுத்ததில், 855 கிராம் சர்க்கரையைக் கூட்டிப் பாகு செய்து அதில் அதிமதுரம், கூகைநீர், முந்திரிப்பழம் வகைக்கு 70 கிராம், பேரிச்சம்பழம், திப்பிலி வகைக்கு 105 கிராம் இவைகளை அரைத்து நெய்விட்டுக்கிண்டி மெழுகுபதத்தில் தேன்விட்டு பிசைந்து புன்னைக்காய் அளவு கொள்ள வாந்தி, காமாலை, பாண்டு, குன்மம் தீரும்.

  - குணபாடம் மூலிகை

- நெல்லிமுள்ளி, வில்வம், சுக்கு, சீரகம், நெற்பொரி, சிற்றாமுட்டி வேர் இவைகளை ஒன்று கூட்டி குடிநீர் செய்து பருகில் பித்த சத்தி நீங்கும்.
- நெல்லிவிதையைக் கொண்டு வந்து நொறுக்கி அதனுள்ளிருக்கும் பருப்பைப்யெடுத்து கால்பலம் வீதம் சாப்பிட்டு வர சூடு ஒக்காளம் இவை நீங்கும்.
- ஒரு பலம் நெல்லிவேரைக் கொண்டு வந்து (1/2 படி) ஜலத்தில் போட்டு (1/4) படியாகக் காய்ச்சி காலையில் சாப்பிட்டு வர பித்தம், தாகம், வாந்தி இவைகள் தீரும். மலம் நன்றாகக் கழியும்.
- இரண்டுபடி நெல்லிக்காயைக் கொண்டு வந்து உரலில் போட்டு துவைத்து கொட்டையை நீக்கி அதற்குப் போதுமான மிளகாயும் உப்பும் சேர்த்துப் பிசைந்து எலுமிச்சங்காய்ப் பிரமானம் உருண்டைசெய்து அடைத்தட்டி வெயிலில் உலர்த்தி வைத்துக்கொண்டு தேவையான போது ஒரு அடையை

துவையல் செய்து சாதத்தோடு உபயோகிக்க கபரோகம், மலக்கட்டு, வாந்தி இவைகள் தீரும்.

- கோஷாயி அனுபோக வைத்திய பிரம்ம ரகசியம். (இரண்டாம்பாகம்)

- நெல்லிக்காய், தான்றிக்காய், கடுக்காய், மிளகு இவைகளை இருநாழி நீர்விட்டு எட்டொன்றாக் கியாழம் வடித்து மூன்றாம்நாள் குடிக்கும்போது சுக்கு, திப்பிலி, மிளகு மூன்றும் சரியெடையாய்ப் பொடித்து ஒரு சிட்டிகைப் போட்டு கொஞ்சம் தேன்விட்டு குடிக்கவும். ஈளை, இசிவு, மேகச்சூடு இவைகள் தணியும்.

- கோஷாயி அனுபோக வைத்திய பிரம்ம ரகசியம் (முதல்பாகம்)

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நெல்லிமுள்ளி சேரும் பிற மருந்துகள்

1.அஷ்டாதி குடிநீர்

தீரும் நோய்கள்: பித்தம், கிறுகிறுப்பு, வாந்தி, விக்கல், உஷ்ணவாயு, அசீரணம்.

- எளிய வைத்திய முறைகள் 800

ஆகவன லஞ்சசிஅ சுர்க்கென்பு ருக்கிகண்ணோய்
தாக முதிரபித்தந் தாதுநஷ்டம் - மேகத்தின்
இல்லிமுள்ளி போல் அருகல் எண்கா மியவியங்கம்
நெல்லிமுள்ளி யார்பேர் நினை.

இதுவுமது

நல்லநெல்லி முள்ளியறு நாக்குக் குருசிதரும்
அல்லல்விரி பித்தம் அகற்றும் அதை – மெல்லத்
தலைமுழுகக் கண்குளிருந் தாவுபித்த வாந்தி
இவையிழிமே சுங்களும்போம் எண்.

- பதார்தகுண சிந்தாமணி மூலமும் உரையும்.

2.அதிமதுரச் சூரணம்

தீரும் நோய்கள் : வாந்தி, அரோசகம், சித்தப்பிரமை

- சிகிச்சாரந்தீபம் வைத்திய சிந்தாமணி

2. ஓமம்

ஓமம் கார்ப்பு சுவையைக் கொண்டுள்ளது. பசித்தீத்தூண்டி, இசிவகற்றி, அகட்டுவாய்வகற்றி, அழுகலகாற்றி ஆகிய செய்கையைக் கொண்டுள்ளது.

ஐயசுரம், இருமல், செரியாமந்தம், பொருமல், கழிச்சல், ஊழி, குடலிரைச்சல், இரைப்பு, பல்நோய், குய்யரோகம் இவைகள் போம்.

சீதசுரங் காசஞ் செரியாமந் தம்பொருமல்
பேதியிரைச் சல்கடுப்பு பேராமம் - ஓதியிருமல்
பல்லொடுபல் மூலம் பகமிவைநோ யென்செயுமோ
சொல்லொடுபோம் ஓமமெனச் சொல்.

- அகத்தியர் குணவாகடம்

ஓமத்தின் மருத்துவப் பயன்கள்

- ஓமம், சுக்கு, சித்திரமூல வேர்ப்பட்டை இவை மூன்றும் ஓரெடை பொடித்து ஒன்றுகலந்து, கலந்த எடைக்கு நேர் கடுக்காய்ப் பொடி கூட்டி வேளைக்கு மூவிரல் அளவு மோரில் கொடுக்க மந்தம் நீங்கும்.
- ஓமம், கடுக்காய் தோல், முக்கடுகு, சிற்றரத்தை அக்கிரகாரம், திப்பிலி வேர் இவைகளின் பொடி ஓரெடை கூட்டிய எடைக்கு நேர் பாதி, சர்க்கரை சேர்த்து காலை மாலை மூவிரல் அளவு கொள்ள புகையிருமல் தீரும்.
- ஓமம், மிளகு வகைக்கு 34 கிராம் இவற்றை வெதுப்பி, வெல்லம் 34 கிராம் சேர்த்தரைத்து, காலை மாலை 10 நாள் கொட்டைப் பாக்களவு சாப்பிட வயிற்றுக்கடுப்பு, பொருமல், கழிச்சல் தீரும்.
- 3400 கிராம் தூணிநீரிற் சேர்த்து எட்டிலொன்றாய் வடித்து, அதில் சர்க்கரை 340கி கரைத்து பாகு செய்து, அமுக்கிராக்கிழங்கு, குக்கில், பறங்கிப்பட்டை, கார்போகரிசி வகைக்கு 34 கிராம் பொடித்துத் தூவி நறு நெய் நாழி விட்டுக்கிண்டி, இலேகியஞ் செய்து வேளை ஒன்றுக்கு 6 கிராம் எடை வீதம் கொள்ள பறங்கிச்சூலை, சிரங்கு, புண், கரப்பான், வாயு, நஞ்சு கடிகள் தீரும்.
- ஓமம் 252 கிராம் ஆடாதோடைச்சாறு, இஞ்சிரசம், பழரசம், புதினாச்சாறு வகைக்கு 135கி இந்துப்பு 34 கிராம் சேர்த்து ஊற வைத்து உலர்ந்த இருமல், சுவாசகாசம், அசீரணம் ஆகியன நீங்கக் கொடுக்கலாம்.
- ஓமத்திலிருந்து ஓமத்தீநீர், ஓமத்தைலம் எடுத்து வழங்கலாம்.

ஓமத்தீநீர்

1440 கி ஓமத்தில் 8400மி.லி தண்ணீர் விட்டு வாலையில் வடிக்க உண்டாவது ஓமத்தீநீர். இதனால் ஊழி, வயிற்றுப்பொருமல், வயிற்றுவலி, செரியாக் கழிச்சல், மந்தம் இவைகளைப் போக்கும். அகட்டுவாய் அகற்றி செய்கை இதற்குண்டு.

ஓமத்தைலம்

தீநீரின் மீது மிதந்து படியும் எண்ணெய் ஓமத்தைலமெனப்படும்.

1-3 துளி வரை ஓமத்தைலம் நோய்களுக்கு தரலாம்.

- குணபாடம் மூலிகை

ஓமம் சேரும் பிற மருந்துகள்:

1. திப்பிலியாதிச் சூரணம்

அனுபானம் : தேன்

தீரும் நோய்கள் : உள் மூலம், அட்டகுன்மம், வாய்வு.

- எளிய வைத்திய முறைகள் 800

2.திரிகடுகாதி சூரணம்

அளவு : வெருகடி (ஒரு சிட்டிகை அளவு)

தீரும் நோய்கள் : மந்தம், சத்தி, அரோசகம்

- எளிய வைத்தியமுறைகள் 800.

3. அசீரணத்திற்கு குடிநீர்

தீரும்நோய் : அசீரணம்

- எளிய வைத்திய முறைகள் 800

4. ஆறு அதிசாரத்துக்கும் குடிநீர்

தீரும் நோய்கள் : சர்வ அதிசாரங்கள்

- எளிய வைத்திய முறைகள் 800

5. ஓம லேகியம்

அளவு : 7 மஞ்சாடி (1820 மி.கிராம்)

தீரும் நோய்கள் : எண்வகை குன்மம், மூலவாயு அதிசாரம், பொருமல், செரியாமை, புளித்தேப்பம்.

- எளிய வைத்திய முறைகள் 800

3. மாதளைஓடு

மாதளைஓடு துவர்ப்பி செய்கையையும் பசித்தீத்தூண்டி செய்கையையும் கொண்டுள்ளது.

“வாந்திபித்த தோடமொடு மாறாக் கடுப்பனலஞ்
சேர்ந்துநின்ற மூலரத்தந் தீர்க்குங்காண் - மாந்தளிர்க்கை
மாதே! யிசத்தபுஷ்டி வல்லபவன் உண்டாகும்
பூதலத்துள் மாதுளையின்பூ”

- அகத்தியர் குணவாகடம்

இதனால் குருதி வாந்தி, வயிற்றுக்கடுப்பு, வெப்பம், குருதி மூலம் இவை போகும். இது குருதியைப் பெருக்கும் வன்மையைத் தரும்.

“மாதுளை கனியுண மதனகா மேசுரந்
சூதென வாயுனர் சொல்லுவர் மிக்கவே”

மாதுளம் பழத்தைத் தினமும் புசித்துவரின் ஆண்மைப்பெருக்கு முதலியன உண்டாகும்.

இப்பழத்தினால் முப்பிணி சுரத்தில் காண்கின்ற வாந்தி, நீர் வேட்கை இவைகள் போம். பிள்ளை உண்டாகாமற் செய்கின்ற சூலநோயைப் போக்கும். வாய்நீர் ஊறல், விக்கல், மந்தம், வெப்பத்தால் உண்டான காய்ச்சல், நெஞ்செரிவு, காதடைப்பு, மயக்கம் இவைபோம்.

“வெடித்துவீழ் பழத்தை வாங்கி மெல்லிய சீலை கட்டி
கடுகெனப் பிழிந்து கொண்டு கண்டசர்க்க கரையுங்கூட்டி
குடித்திட வெடிப்பு மாறுங் குளிர்ந்திடும் அங்கமெல்லாம்
வடித்ததநன் மொழியி னாளே! மாதுளம் பழத்தின்சாறே”

- தேரன் குணவாகடம்.

மாதளையின் பொது மருத்துவப்பயன்

- பூமொக்கை உலர்த்திப் பொடித்து 130மிகி கொடுக்க இருமல் நீங்கும்.
- பழத்தோல் பொடி 17 கிராம், வெள்ளைப்போளம் 17கி, சீமைச் சுண்ணாம்புத்தூள் 34 கிராம் சேர்த்துக் கலந்து பல் துலக்க பல்வலி போகும்.
- பழத்தோலுடன் சிறிது இலவங்கம், இலவங்கப் பட்டை நசுக்கிப்போட்டு முறைப்படி குடிநீரிட்டு 15-30மிலி வீதம் தினம் 3-4 வேளை கொடுத்து வர நாட்பட்ட சீதக்கழிச்சல் நீங்கும்.
- பழத்தோல், மங்குஸ்தான் பழத்தோல், மலைமரப்பட்டை வகைக்கு 40 கிராம் எடுத்து, 1400 மி.லி நீர் விட்டு முறைப்படி குடிநீரிட்டு 15-30 மிலி கொடுக்கலாம்.
- மாதுளைப் பிஞ்சு குடிநீரிட்டு சீதபேதி, அதிசாரம் முதலியவைகளுக்கு கொடுப்பது நாட்டு வழக்கம்.

- பூவை உலர்த்தி சூரணித்து அதில் 4 கிராம் எடுத்து வேலம் பிசின் தூள் 4 கிராம், அபின் 195 மிகி சேர்த்து வேளைக்கு 260-390 வீதம் கொடுத்துவர சீதக்கழிச்சல், குருதி கழிச்சல் ஆகியவை நீங்கும்.
- பழச்சாற்றை இளைப்பு நோயினர்க்கு கொடுக்க நன்மைத்தரும்.

– குணபாடம் மூலிகை

மாதளை ஓடு சேரும் பிற மருந்துகள்:

1. சர்வ சுரங்களுக்கும் அதிசாரத்திற்கும் குடிநீர்

தீரும் நோய்கள் : சர்வ சுரங்கள், அதிசாரம்

2. ஆறு அதிசாரத்துக்கும் குடிநீர்

தீரும் நோய்கள் : சர்வ அதிசாரங்கள்

- எளிய வைத்திய முறைகள் 800

3. மூல நிவாரண லேகியம்

தீரும் நோய்கள் : இரத்த மூலம், சீழ்மூலம், ஆசனக் கடுப்பு, மூலக்கிராணி

- சிகிச்சாரந்தீபம் வைத்திய சிந்தாமணி

4. கறிவேப்பிலை

கறிவேப்பிலை பசித்தீத்தூண்டி மற்றும் உரமாக்கி செய்கையைக் கொண்டுள்ளது.

"வாயினருசி வயிற்றுளைச்ச னீடுசுரம்
பாயுகின்ற பித்தமுமென் பண்ணுங்கான் - தூய
மருவேறு காந்தளங்கை மாதே! உலகிற்
கருவேப் பிலையருந்திக் காண்."

- அகத்தியர் குணவாகடம்

கருவேப்பிலையால், சுவையின்மை, சீதபேதியால் வரும் வயிற்றுளைவு, பழஞ்சுரம், பயித்தியம் ஆகிய இவை நீங்கும்.

கறிவேப்பிலையின் பொது மருத்துவப்பயன்கள்

- கறிவேப்பிலை இலையை நிழலிலுலர்த்தி இதனுடன் மிளகு, உப்பு, சீரகம், சுக்கு முதலியவற்றை பொடியாக்கி சோற்றில் கூட்டி, கொஞ்சம் நெய் விட்டு கலந்து உண்ண மந்தம், மந்தபேதி, மலதோடம், மலக்கட்டு நீங்கும்.
- கறிவேப்பிலை இலையுடன் வறுத்த உப்பு, வறுத்த மிளகாய் கூட்டி துவையல் செய்து ஆகாரத்துடன் சாப்பிட அரோசகம், அதிசாரம், பித்தவாந்தி, செரியாமை இவைகள் நீங்கும்.
- ஈர்க்கின் புறணியை முலைப்பாலிட்டு இடித்து இரசம் பிழிந்து, கிராம்பு, திப்பிலி சேர்த்து 2, 3 தரம் குழந்தைகட்குப் புகட்ட வாந்தி நிற்கும்.
- இதன் ஈர்க்குடன் வேர்ப்பீர்க்கு, நெல்லியீர்க்கு சேர்த்து இடித்து நீர்விட்டு காய்ச்சி கொடுக்க உடனே வாந்தி நிற்கும்.
- இதன் இலையுடன் 1, 3 மிளகு சேர்த்து நெய்யில் வறுத்து வெந்நீர் விட்டு அரைத்து கரைத்து பாலர்களுக்கு நீராட்டிய பின் குடிப்பிக்க மந்தம் நீங்கி பசியை உண்டு பண்ணும்.
- அரிசியுடன் இலையை சேர்த்து உரலிலிட்டு குத்தித் தேய்த்துப் புடைத்து விட்டு, இவ்வரிசியுடன் ஒரு பழுத்துலர்ந்த மிளகாய் கூட்டி கருக்கி, சாந்த நிறம் வரும் பக்குவத்தில் வசம்பு சாம்பல், சிறுநாகப்பூ, அதிவிடயம் இவைகள் சேர்த்து நீர் விட்டு சுண்டக்காய்ச்சிக் கொடுக்க, அசீரணபேதி நீங்கும்.

- குணபாடம் மூலிகை

குணம்

மேகம் அனல்வெட்டைசுரம் வீனுபித்த முந்தொலையும்
போகமுறும் மெய்மருந்தும் பொய்மருந்தாம் - பாகுமொழி
மானே கறிப்பாளை மன்னும்இலை யைத்தினமுந்
தானே யருந்துவர்க்குந் தான்.

- பதார்த்த குணசிந்தாமணி

மேகம், அனல், சுரம், பித்தம் போகம் உண்டாம்.

5. சுண்டைவற்றல்

சுண்டைக்காய் கைப்பு சுவையைக் கொண்டு உள்ளது. கோழையகற்றி, நுட்புழுக்கொல்லி மற்றும் பசித்தீத்தூண்டி செய்கையைக் கொண்டுள்ளது.

சுண்டையின் காய்மந் துறையுட னயின்றிட
மண்டிய பயித்திய வலியெலா மகலுமே.

- தேரன் காப்பியம்

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சுண்டைக்காய் வற்றலைப் புசித்துவரின் தீக்குற்றத்திலுண்டான ஏப்பம், வயிறூதல், வயிற்றுவலி முதலியன போம்.

பித்தஅ ரோசகம்போம் பேராப் புழுச்சாகும்
உற்ற கிராணியறும் உட்பசியாந் - சத்தியமாய்ப்
பண்டைக் குதஆமம் பற்றுமிங்கி யாரையுந்தான்
சுண்டைக்காய் வற்றலுண்ணச் சொல்.

- பதார்த்த குண சிந்தாமணி மூலமும் உரையும்

சுண்டைவற்றலின் பொது மருத்துவப்பயன்

- சுண்டைவற்றல், கருவேப்பிலை, மாங்கொட்டைப் பருப்பு, ஓமம், நெல்லிமுள்ளி, மாதுளை ஓடு, வெந்தயம் ஆகியவை தனித்தனியே இளவறுப்பாக வறுத்து சூரணஞ் செய்து கூட்டி மூன்று சிட்டிகையை காலை மாலை மோரில் இருவேளை தர செரியாக்கழிச்சல், மூலம் நீங்கும்.
- சுண்டக்காயை சிற்றாமணக்கெண்ணெய் விட்டு வறுத்து உப்பு, மிளகு, சீரகம், கறிவேப்பிலை, வெந்தயம் ஆகியவற்றை வறுத்துக் கூட்டிப் பொடித்து சோற்றுடன் கலந்து உண்ண மூலம், மந்தம் நீங்கும்.
- சுண்டைவேர், தும்பைவேர், இலுப்பைப் பிண்ணாக்கு இம்மூன்றும் ஓர் எடை எடுத்துப் பொடிசெய்து முகர முப்பிணி நீங்கும்.
- வேர்ப்பட்டையைப் பொடி செய்து தேங்காய்க் குடுக்கையில் வைக்க வேண்டும். இதனை ஒரு சிட்டிகை மூக்கிலிழுக்க தலைநோய், நீரேற்றம், மண்டைக்குடைச்சல், ஒற்றைத்தலைவலி, மூக்கில் நீர் பாய்தல் இவைபோம்.
- முப்பிணிக்கும், மூச்சுத் தடுமாற்றத்திற்கும் செய்யும் மூக்குப்பொடி இவற்றிற்கு இன்றிமையாத சரக்கு ஆகும்.

சுண்டைவற்றல் சேரும் பிற மருந்துகள்

1. சுண்டைவற்றல் சூரணம்

அனுபானம் : எருமைத்தயிர்

தீரும் நோய்கள் : மந்தம், இரைச்சல், மூலம், கழிச்சல், கிரகணி தீரும்.

- சித்த வைத்திய திரட்டு

6. மாங்கொட்டைப்பருப்பு

மாங்கொட்டைப் பருப்பு புழுக்கொல்லி, துவர்ப்பி, உள்ளழலாற்றி, உடலுரமாக்கி ஆகிய செய்கைகளைக் கொண்டுள்ளது. இவை கழிச்சலுக்கு மிக சிறந்தது. இவை துவர்ப்பு சுவையைக் கொண்டுள்ளது.

"தாதுநட்டம் வாதந் தனிக்கிரந்தி யாம்பிசிபோங்
காதுமுட்டப் பக்குவிடுங் காயமதில் - ஓதுகின்ற
பாங்காறாப் புண்வளரும் பற்கூசங் சொற்குளறும்
மாங்காயுண் பாரை மனு."

- அகத்தியர் குணவாகடம்

"சூதநற் காய்கனி துய்த்திட வுண்மெலி
வேதமுற் றவையெலா மிமைப்பினி லொழியுமே"

- தேரன் காப்பியம்

மாங்காய், மாம்பழம் இவைகளை முறைப்படி புசித்தால் மனத்தளர்ச்சி, வன்மைக்குறைவு ஒழியும்.

மாங்கொட்டைப் பருப்பின் மருத்துவப்பயன்கள்

- கழிச்சல் நோய்களுக்கு ஒரு நன்மருந்தாகும்.
- நாட்பட்ட சீதக்கழிச்சலுக்கு மாம்பருப்புடன் அபின் கூட்டிக் கொடுத்தால் மிகுந்த நன்மை தரும்.
- தனி மாம்பருப்பை மாத்திரம் தூள் செய்து 3 கிராம் முதல் 6 கிராம் எடை கொடுக்கலாம்.
- பருப்பை எடுத்துப் பொன்னிறமாக வறுத்து தூள் செய்து 325-650 மிகி எடை வரை கொடுக்க வயிற்றுக்கடுப்பு, சீதக்கழிச்சல், குருதிக்கழிச்சல் ஆகிய இவைப்போம்.
- மாங்கொட்டைப் பருப்பு, கசகசா, சுக்கு, ஓமம் ஓர் எடை எடுத்துப் பழச்சாற்றாலரைத்து அதில் ஒரு சிட்டிகையை நெய்யில் குழப்பிக் கொடுக்க பெருங்கழிச்சல் தீரும்.
- மாம்பருப்பை சிறு துண்டுகளாக நறுக்கி வெய்யிலில் உலர்த்திப் பொடி செய்த தூள் 172 கிராம் சுக்கு, மிளகு, சீரகம் இவைகளின் தூள் வகைக்கு 42 கிராம், மாம்பிசின் தூள் 20 கி, அபின் 4 கி இவற்றை நன்றாக அரைத்து 3-5 குன்றிவரை தர கழிச்சல் நோய்கள் தீரும்.
- எல்லாவகை கழிச்சல் நோய்களுக்கும் சிறந்தது.

இலை, பூ மருத்துவப் பயன்கள்

- இலையைப் பிழிந்தெடுத்த சாறு 3 தோலா, தேன் ஒரு தோலா, பால் ஒரு தோலா, பசு நெய் ½ தோலா ஒன்றாய்க் கலந்து குருதிக் கழிச்சலுக்குக் கொடுக்கலாம்.
- இலையை சுட்டுச் சாம்பலாக்கி வெண்ணெயில் குழைத்து தடவ தீப்புண் வேக்காடு ஆகியவை போகும்.
- பூவை உலர்த்திக் குடிநீரிட்டு, கழிச்சல், நாட்பட்ட சீதக்கழிச்சல் முதலியவைகளுக்கு கொடுத்து வரப் போகும்.
- பூவை உலர்த்திப் பொடியை புகைவிட கொசுக்கள் ஓடிவிடும்.

மாமர வேர்ப்பட்டையின் மருத்துவப்பயன்கள்

இதனால் சீதக்கழிச்சல், வயிற்றுக்கடுப்பு, வாந்தி இவைகள் போகும்.

மாங்கொட்டை குணம்

இதன் பருப்பினால் சீதக்கழிச்சல், குருதிக்கழிச்சல், பெரும்பாடு ஆகியவை நீங்கும்.

பேசுமே சீதப் பெருக்குஞ்சேர ரிக்கடுப்பும்
வீசுமோ மூலமுறு வெங்கொதிப்பு – மாசுடைய
பூங்கொட்டை யைத்தள்ளிப் போட்டுக் கனியில்வந்த
மாங்கொட்டையைக் காணில் வராது.

- பதார்த்த குணசிந்தாமணி மூலமும் உரையும்

மாங்கொட்டைப் பருப்பு சேரும் பிற மருந்துகள்

1. சுண்டைவற்றல் சூரணம்

தீரும் நோய்கள் : மூலம், கிராணி, கழிச்சல்

- சிகிச்சாரந்தீபம் வைத்திய சிந்தாமணி

7. வெந்தயம்

வெந்தயம் கைப்பு சுவையைக் கொண்டுள்ளது. மேலும் இவை சிறுநீர்ப்பெருக்கி, உள்ளழலாற்றி, துவர்ப்பி, காமம்பெருக்கி, அகட்டுவாய்வகற்றி செய்கைகளைக் கொண்டுள்ளது.

பித்தவுதி ரம்போகும் பேராக் கணங்களும்போம்
அத்திசுரந் தாகம் அகலுங்காண் - தத்துமதி
வேக இருமலொடு வீறு கயம்தணியும்
போகமுறும் வெந்தயத்தைப் போற்று

- பதார்த்தகுண சிந்தாமணி மூலமும் உரையும்

வெந்தயம் தோசையாய் வேண்டி யுண் டிடவுடல்
மைந்துடன் பருத்திடும் வலிகளை யொழித்திடுங்
கருணையி ல.்.திணைக் கலந்தயின் திடவுட
லுரமெனப் பருத்திட முண்மையி தாகவே.

- தேரன் காப்பியம்

வெந்தயத்தின் மருத்தவப் பயன்கள்

- வெந்தயத்தை வறுத்துப் பொடி செய்து ஊறல் நீர் செய்து உட்கொள்ள வயிற்றுவலி, வயிற்றுப் பொருமல், சுரம், உட்சூடு, வெள்ளை சீதக்கழிச்சல் நீங்கும்.
- வெந்தயம் 17 கிராம், 340 மிகி பச்சரிசியுடன் சேர்த்துப் பொங்கி உப்பிட்டுச் சாப்பிட குருதி பெருகும்.
- கஞ்சியில் சேர்த்துக் காய்ச்சிக் கொடுக்க பால் சுரக்கும்.
- அரைத்துத் தலையிலப்பி ஊற வைத்துத் தலை முழுகிவர மயிர் வளரும். மயிர் உதிர்ந்து போவதை தடுக்கும்.
- இதை மாவாக்கிக் களி கிண்டிக் கட்ட புண் பூச்சி போக்கும்.
- இதை வறுத்து இத்துடன் அவ்வளவு வறுத்த கோதுமையை கூட்டி காப்பிக்கு பதிலாக வழங்கலாம். இதனால் உடல் வெப்பம் நீங்கும்.
- மிளகாய், கடுகு, வெந்தயம், துவரம் பருப்பு, கறிவேப்பிலை, காயம் இவைகளைத் தக்களவு எடுத்து நெய் விட்டு வறுத்து, புளிக்குழம்பை இதில் கொட்டி, உப்புசேர்த்துச் சட்டி மூடி, அரைப்பாகம் சுண்டியபின் இறக்கிச் சூட்டுடன் சாப்பிட வெப்பத்தால் நேரிடும் சிற்சிலப் பிணிகள் தணியும்.
- வெந்தயம், கடுகு, பெருங்காயம், கறிமஞ்சள் இவைகளைச் சமபாகம் எடுத்து நெய்விட்டு வறுத்துப் பொடி செய்து சோற்றுடன் கலந்துண்ண வயிற்றுவலி, பொருமல், வலப்பாட்டு - இடப்பாட்டீரல் வீக்கங்கள் நாளுக்கு நாள் குறைந்து கொண்டு வரும்.

வெந்தயம் சேரும் பிற மருந்துகள்

1. கபாட மாத்திரை

தீரும் நோய்கள்

இரத்தக்கடுப்பு, மூலக்கடுப்பு, இரத்தக்கிராணி, மலக்கிராணி ஆகியவை தீரும்.

- சித்த வைத்திய திரட்டு.

3.2. MODERN ASPECT

1. MURRAYA KOENIGII

BOTANICAL ASPECT

According to Bentham and hooker Genera – plantarem murraga koenigi is classified under

Class : Dicotyledons

Order : Sapindales

Family : Rutaceae

Genus : Murraya

Species: Koenigii

Habit and Habituate

From Garhwal to sikkim, Bengal and southward to Travancore.

It is a small tree upto 5m tall with attractive habit.

Part used

Bark, Root and Leaves.

Murraya koeinigii

The plant is propagated from seeds and can be slown directly in the pit or seedings transplanted.

Pits are 60cm depth and diameter and filled with compost. The plant live upto 30 years and go on producing aromatic leaves throughout the year.

Actions

The leaves – bark and the roots possess carminative, tonic and stomachic properties.

Parts used

Bark, Root and Leaves

Phytochemistry of Murraya koeinigii

Leaves

It contain a volatile essential oil, resembling the oil of Aegle marmelos, a resin and a crystalling principle glucoside named koenigin.

The leaves are aromatic and contain protein, carbohydrate, fiber, minerals, carotene, nicotinic acid and vitamin C. It is rich in vitamin A and calcium. The leaves contain very high amount of oxalic acid. The leaves yield essential oil 0.04%, bright yellow in colour.

Bark

Synthesis of murrayanine, m.p 168° from Bark.

Fruits

Koenimbine, m.p 194° and konigcine are present in fruits.

Stem bark

A carbazole carboxylic acid – mukoeic acid m.p. 242° are present in stem bark.

Preparations

Infusion and decoction

Uses

Green tender leaves are eaten raw the cure of dysentery, Decoction of the leaves are given as a febrifuge in fever. Leaves are popularly used for flavouring curries and condiments.

- Medicinal herbs with their formulation – vol-2
- Handbook of medicinal plants

2. PUNICA GRANATUM

Modern aspect of pomegranate

Classification

Kingdom	:	Plantae
Class	:	Magnoliophyta
Order	:	Myrtales
Family	:	Punicaceae
Genus	:	Punica
Species	:	Granatum

Habit and Habituate

It is a deciduous small tree, may attain a maximum height of 8 cm with reddish scarlet flowers. The fruit contains large number of hard seeds covered with a juicy red, pink or yellowish white, sweet astringent acid pulp.

The species is orginated in persia, Afganistan and Balchistan. It is also found wild in the warm valleys of Himalayas.

Parts used

Flowers, rind of this fruit, fresh fruit juice and dried bark of the stem and root.

Action

Astringent and Anthelmintic.

Phytochemistry

Bark of trunk or roots possess medicinal properties which contains 20 to 22% tannin : 0.5 to 1% alkaloids.

The seeds contain steroidal estrogens. The fruit pulp contain proteins, fat, fibre, minerals, oxalic acid, carbohydrate vitamins A, B and C.

Root bark contains punico tannic acid 20 to 25 p.c mannite, sugar, gum pectin, ash 15 p.c, an active liquid alkaloid pelletierine and oil liquid “isopelletieribe” and two inactive alkaloids methylpelletierine and pseudo-pelletierine.

Punico-tannic acid when boiled with dilute sulphuric acid is resolvable into illogic acid and sugar.

Uses

Bark of this plant is anthelmintic and for expelling tapeworm is said to be very effective.

The bark and the rind of the fruits and seeds are commonly used in dysentry and diarrhoea.

Leprosy patients get benefit from fruit juice.

The flowers yield red dye which is used for dyeing cloth.

- Medicinal herbs with their formulations – vol-2
- Handbook of medicinal plants.

3.TRIGONELLA FOENUM-GRAECUM

Modern aspect of Fenugreek seed

Class	:	Dicotyledons
Subclass	:	Rosidae
Order	:	Fabales
Family	:	Fabaceae
Genus	:	Trigonella
Species	:	Foenum-graecum

Habit and Habituate

It is a hardy annual plant leaves are feather shaped. Flowers are whitish in colour.

The species is native to Eastern Europe and Ethiopia. It grows wild in parts of North India.

Botanical description

An annual herb with an erect prostate, smooth, little branched stem and trifoliate leaves, the leaflets oblanceolate to oblong and slightly toothed.

The unstalked yellowish-white, violet-tinged flowers are solitary or in pairs in the upper leaf axils. The fruit is a hairless slender, slightly curved pod with an extended tip.

Parts used

Seeds, pods and leaves.

Action

Astringent, resolvent, emollient.

Phytochemistry of trigonella foenum – graceum

Constituents

A glycoside of furost-5-en 58,22,26- triol with glucose and xylose as sugars isolated from seeds. Saponins –grae urins A, B, C,D, E, F and G-isolated from leaves.

Diosgenin content of seeds from India was 0.78-1.9%, maximum amount (2.03%) in cotyledons; germination increased diosgenin content by 9.0%; germination in presence of yeast extract and cholesterol increased diosgenin content by 25.5%.

The vegetative parts are rich in vitamin A, B and iron.

Uses

The decoction of seeds as administered in drinks, rectal injections and lotions.

The seed is also used to resolve inflammatory tumours, such as carbuncles, phylegmons and whitlows. The flower is recommended for chapping, haemorrhoidal tumours, in rectal injection, for dysentery, diarrhoea, bilious and inflammatory colics.

- Handbook of Medicinal uses
- Medicinal plants and their formulations

4. MANGIFERA INDICA

Modern aspects of Mango

Classification

Kingdom	:	Plantae
Order	:	Sapindales
Family	:	Anacardiaceae
Genus	:	Mangifera
Species	:	Indica

Habitat

This tree indigenous to India and cultivated in many varieties almost everywhere in gardens.

Parts used

Fruit, kernel, leaves, flowers, bark and gum.

Botanical description

It is a large tree with tap root system. The tree is spreading evergreen with a dense rounded or globular crown.

Leaves are simple, alternate, irregularly placed along the branchlets.

Phytochemistry

The fruit is a rich source of vitamin A and C apart from minerals and other vitamins. The ripe fruit contain nearly 20% total soluble sugar 0.2-0.5% acid and 1% protein.

The kernel contain 9.5% protein mango seed oil is extracted from mango kernels.

Mangiferin, amino acids, gallotannin, gallic acids, ethylgallate, isoquercetin, quercetin and β – sitosterol present in various parts of the plant.

Citronellar, diferpene, geranio, limonene, mangiferol, mangiterone, nerol, nerylacetate, α and β – pinene and tanin present in panicles and leaves.

Pharmacological activities

Antibacterial, antifungal, CNS and Cardio stimulant, cardiotonic, anti-influenza virus activity.

Action

Fruit is laxative, diuretic, diaphoretic, astringent, refrigerant.

Unripe fruit is acid, astringent, stomachic.

Bark is astringent and tonic.

Preparations

Sherbats, custards, preserves, confections, pickles, curries and chutneys.

Uses

The bark is astringent, it is use of in diptheria and Rheumatism. It possesses a tonic action on the mucous membrane.

The kernel juice is snuffed once a day for three days to stop nasal bleeding.

The unripe mango is useful in opthalmia and eruptions.

The rind is astringent, stimulating tonic in debility of stomach.

Mango and its preparations are used for several urinary purposes.

- Handbook of medicinal plants
- Database on Medicinal plants used in Ayurveda

5. PHYLLANTHUS EMBLICA

Classification

Kingdom	:	Plantae
Order	:	Malpighiales
Family	:	Phyllanthaceae
Genus	:	Phyllanthus
Species	:	P.emblica

Botanical description

Deciduous tree with the ultimate branches phyllanthoid. Leaves are simple, many in each branch set, small, linear-oblong, 15x3mm, entire; flowers unisexual, greenish yellow in dense axillary fasicles along the branchlets; tepals 6 oblarceslate; in male flowers stamens 3 filaments connate to form a short column;

In females ovary globase, 3-chambered with 2 ovules in each; fruit depressed globase, fleshy, 3cm across, shining yellowish green when ripe; seeds trigonous.

Habitat

The plant is found both in the wild and cultivated state throughout tropical India. Also distributed in North burma, south china, Indo china and Malaysia.

Action

Astringent, laxative, diuretic, bitter, tonic.

Chemical constituents

Vitamin C, this is one of the major ingredients of the famous tonic cyavaraprasam and can also help improve intelligence and memory power.

The major amino acids present are alarine, aspartic acid, glutamic acid, lysine and proline.

The fruit contains chromium and copper.

Parts used

Root, bark, leaves and fruits.

Uses

It acres diseases due to morbid Vatha, Pitha and Kapha and is especially good for the abundant growth of hair.

The drug which cures thirst, burning sensation, vomiting, diabetes, emaciation, anorexia, toxicocis, fever, impurity of blood and haemorrhage.

It is useful in cough, dyspnoea, inflammation of eyes, jaundice, leukorrhoea and menorrhagia.

The ripe fruit is forms an ingredient of preparation like triphaladi tailam, mahatiktaka ghrtam, kayyanyadi tailam.

- Medicinal plants and their formulations
- Medicinal plants – Moshrafuddin ahmed.

6. SOLANUM TORVUM

Classification

Kingdom	-	Plantae
Order	-	Solanales
Family	-	Solanaceae
Genus	-	Solanum
Species	-	S.torvum

Botanical description

A shrub up to 4m high, pubescent, leaves ovate, sorrate or cobed, shortly accuminate, membraneous, sparsely stellate, pubscent, above, more closely so beneath base unequal or rounded; flowers white usually extra-axillary, often branched, anarmes cymes, pedicels slender; fruit pubescent outside, lobes spreading, linear, oblong or lanceolate, berry globose, seated on a persistence calyx .

Flowering and fruiting

September – October

Distribution

Assam, Khasi and Jaintia hills of Meghalaya.

Propagation

By seeds

Parts used

Leaves and fruits

Uses

Leaf is useful for wounds and fruit is used as a cure for cough.

- Medicinal plants (Moshrafuddin ahmed)

7. TRACYSPERMUM AMMI

Classification

Kingdom	-	Plantae
Order	-	Apiales
Family	-	Apiaceae
Genus	-	Trachyspermum
Species	-	T. ammi

Description

Ajwain small, oral shaped, seed like fruits are pale brown schizocarps, which resemble the seeds of other plants in the apiaceae family such as caraway, cumin and fennel. They have a bitter and pungent taste. They smell almost exactly like thyme because they also contain thymol. But they are more aromatic and less subtle in taste, as well as being somewhat bitter and pungent.

Cultivation and production

The plant is mainly cultivated in Iran and India.

Culinary uses

The fruits are rarely eaten raw. They are commonly dry-roasted or fried in ghee. This allows the spice to develop a more subtle and complex aroma. In Indian cuisine, it is often part of a chaunk, a mixture of spices fried in oil or butter, which is used to flavor lentil dishes.

It is widely used in pakistani cusine as well and it is also an important ingredient for herbal medicine practical there.

Uses in traditional medicine

Ajwain is used in traditional Ayurveda primarily for stomach disorders such as indigestion, bloating, fatigue, abdominal pain, flatulence, diarrhoea and colic along with respiratory distress and loss of appetite.

In Siddha medicine, the crushed fruits are applied externally.

https://en.m.w ikipedia.org>wiki>Ajwain

ANUPANAM

HONEY

Honey is a naturally converted form of sugary food, the nectar of flowers and other plant exudations systemically collected and stored by honey bees.

Honey as a vehicle:

Physical properties of honey

Aroma	:	Depends upon the floral source from where it's collected.
Colour	:	It ranges from pale yellow or yellowish brown to dark brown.
Specific rotation	:	+3 to -10

Constituents of honey

Honey contains chiefly dextrose and fructose moisture, small amounts of sucrose and mineral constituents.

- Moisture: 20.6% fructose: 38% glucose : 31% sucrose: 1% other sugar 8.5% fat: 0.1% minerals: 0.2% , Protein 0.3% others: 0.4%.
- Vitamins present in honey are vitamin B1-B6, Vitamin C.
- Minerals include calcium, phosphorous and Iron.
- Trace elements in honey arte magnesium, selenium, sulphur, chloride and silica.
- Coloring matter: Caroline, chlorophyll, xanthophylls, anthocyanin, tanin.
- Acids: Acetic acid, formic acid, malic acid, citric acid, succinic acid, oxalic acid.
- Enzymes: Chief enzyme present in honey is invertase. Other include protease, oxidases, peroxidase, reductase.

-The wealth of India Vol. II Pg.91)

Action

- Antimicrobial
- Antiseptic
- Sedative
- Demulcent

Uses of Honey

Provides wholesome nourishment also an energy giving rich food.

The predigested sugars present in honey are easy to digest and are readily absorbed and assimilated by the body.

Extensively used in preparing breads, cakes, biscuits, pastries, chewing gums, candies.

Honey constitutes all important ingredients of certain lotions, cosmetics, soaps, creams, balms, inhalations.

Distinguishing quality honey

High quality natural honey can be distinguished its fragrance and taste. The honey should not lay down in layers. It this is a case, it indicates the excessive humidity (over 20%) of the product, and such a honey would not be suitable for long term preservation.

A fluffy thin layer on the surface of the honey (like a white foam) or marble-coloured and white spots in crystallized honey at the wall sides of the bottle are caused by filling of liquid honey with subsequent sealing- the air bubbles are surfacing and part of them is concentrated at the wall sides. This is an indication of a high quality honey, which was tilled without pasteurization (heating).

A true honey that is at least one month old is usually of demure (not translucent) colour.

Preservation of Honey:

Because of its unique composition and the complex processing of nectar by the bees.

INGREDIENTS OF KARUVEPPILAI CHOORANAM

KARUVEPPILAI

SUNDAIVATTRAL

INGREDIENTS OF KARUVEPPILAI CHOORANAM

MATHULAI ODU

MANGOTTAI PARUPPU

INGREDIENTS OF KARUVEPPILAI CHOORANAM

VENDHAYAM

OMAM

INGREDIENTS OF KARUVEPPILAI CHOORANAM

NELLI MULLI

DRUG : KARUVEPPILAI CHOORANAM

4. MATERIALS AND METHODS

Preparation of KARUVEPPILAI CHOORANAM according to the Anuboga Vaidhiya Navaneetham part-VIII Pg.no.121, Edition 1995.

Collection and purification of raw drugs

Materials required

Karuveppilai	-	35gms (1 palam)
Sundaivattral	-	35 gms (1 palam)
Mangkottai parupu	-	35gms (1 palam)
Omam	-	35 gms (1 palam)
Nelli mulli	-	35 gms (1 palam)
Mathulai odu	-	35 gms (1 palam)
Venthayam	-	35 gms (1 palam)

Method of purification

All the above ingredients should be dried in sunlight and taken.

Preparation of medicine

Ingredients

Karuveppilai	-	35gms (1 palam)
Sundaivattral	-	35 gms (1 palam)
Mangkottai parupu	-	35gms (1 palam)
Omam	-	35 gms (1 palam)
Nelli mulli	-	35 gms (1 palam)
Mathulai odu	-	35 gms (1 palam)
Venthayam	-	35 gms (1 palam)

Method of preparation

All the above ingredients should be dried in sunlight grinded well seperately and are all mixed and make into fine powder (chooranam) by filtering it with pure white cloth(Vasthirakayam).

Anuboga vaithya Navaneetham Page No.121, edition 1995.

Dose of drug	:	1-1 ½ varagan edai (4.16 - 6.24 gms)
Adjuvant	:	Honey
Indications	:	Diarrhoea and indigestion.

QUALITATIVE AND QUANTITATIVE ANALYSIS
PHYTOCHEMICAL ANALYSIS

PROCEDURE:

Quantitative Estimation of carbohydrate

The total sugar content was estimated by Anthrone method (Roe, 1955). A known amount of the sample was taken, ground well with 80% ethanol and was centrifuged at 4000 rpm. From the supernatant, 0.5 ml was taken and 5 ml of anthrone reagent was added. The tubes were kept in a boiling water bath for 15 min. After that, they were kept in a dark room for another 15 minutes. The colour intensity developed was read in a spectrophotometer at 650 nm.

Ref: ROE, J. H. (1955), "The determination of sugar in blood and spinal fluid with anthrone reagent" Ibid., ill: 335-343.

Quantitative Estimation of flavanoids: (Evans, 1996)

Total flavonoid content was determined by Aluminium chloride method using catechin as a standard. 1ml of test sample and 4 ml of water were added to a volumetric flask (10 ml volume). After 5 min 0.3 ml of 5 % Sodium nitrite, 0.3 ml of 10% Aluminium chloride was added. After 6 min incubation at room temperature, 2 ml of 1 M Sodium hydroxide was added to the reaction mixture. Immediately the final volume was made up to 10 ml with distilled water. The absorbance of the reaction mixture was measured at 510 nm against a blank spectrophotometrically. Results were expressed as catechin equivalents (mg catechin/g dried extract).

Ref: Devanaboyina N et al., "Preliminary Phytochemical Screening, Quantitative Estimation And Evaluation Of Antimicrobial Activity Of Alstoniamacrophylla Stem Bark" ***IJSIT, 2013, 2(1), 31-39***

Quantitative Estimation of Saponins: (Evans, 1996)

Methanolic and water extract was dissolved in 80% methanol, 2ml of Vanilin in ethanol was added, mixed well and the 2ml of 72% sulphuric acid solution was added, mixed well and heated on a water bath at 600c for 10min, absorbance was measured at 544nm against reagent blank. Diosgeninis used as a standard material and compared the assay with Diosgenin equivalents.

Ref: Devanaboyina N et al., "Preliminary Phytochemical Screening, Quantitative Estimation And Evaluation Of Antimicrobial Activity Of Alstoniamacrophylla Stem Bark" ***IJSIT, 2013, 2(1), 31-39***

Quantitative Estimation of Tannins: (Robert, E.B. 1971. Agro.J.63, p.511)

1ml of the extract was mixed with 5ml of vanillin hydrochloride reagent (mix equal volumes of 8% HCL in methanol and 4% vanillin in methanol). The mixed was allowed to stand for 20mins and measure the absorbance at 500nm. The standard graph was plotted for working standard catechin solution (0 to 250µg/µl).

Ref: Robert, EB*, "Method for estimation of tannin in grain sorghum ",* Agro J *, vol.* 63*,* 1971,p.511*; 10.*

FOURIER TRANSFORM – INFRA RED SPECTROSCOPY

PERKIN ELMER – SPECFTRUM ONE

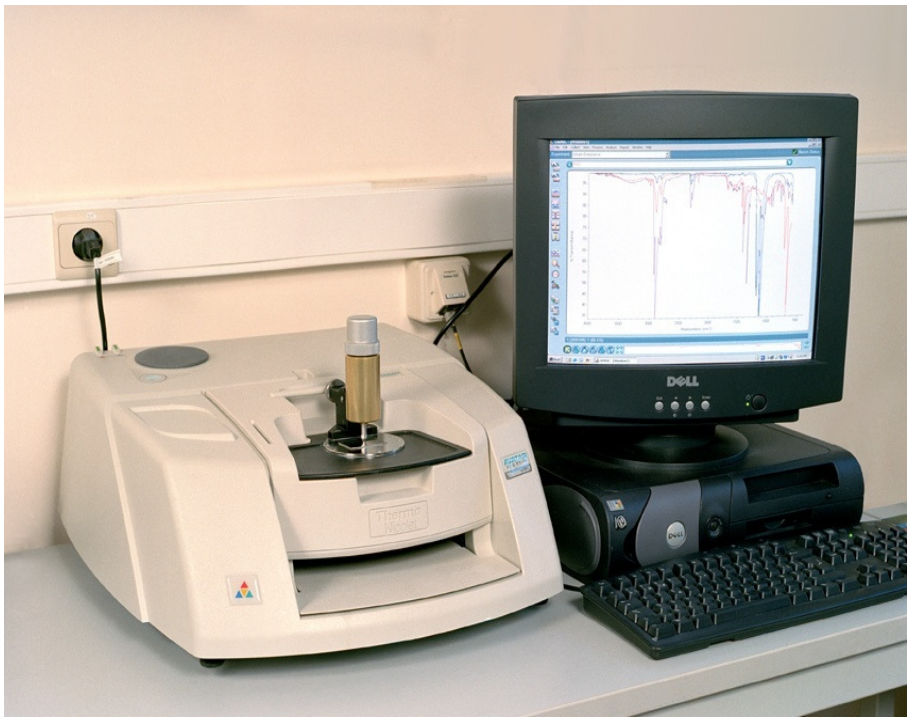
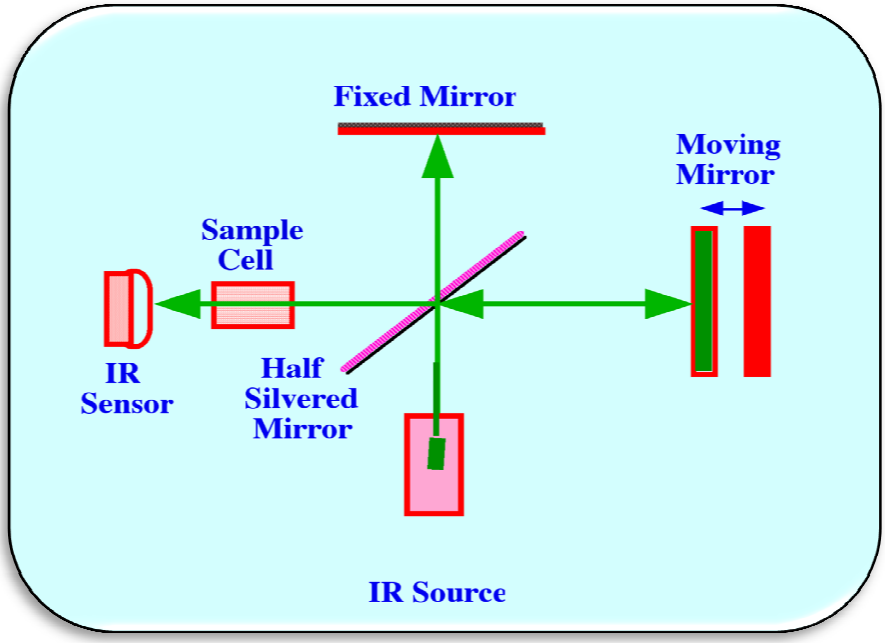


Fig. 3: FTIR Apparatus

FTIR-Mechanism



FOURIER TRANSFORM – INFRA RED SPECTROSCOPY
PERKIN ELMER – SPECFTRUM 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 IR spectroscopy, the resonance absorption in 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 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,l 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 molecurlar 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 number is referred to as the finger print 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

Frequency, cm-1	**Bond**	**Functional group**
3640 - 3610 (s, sh)	O-H stretch	Free hydroxyl alcohols phenols
3500 - 3200 (s,b)	O-H stretch, H – bonded	Alcohols, phenols
3400 – 3250 (m)	N – H stretch	Primary, secondary, amines, amides
3300 – 2500 (m)	O – H stretch	Carboxylic acids
3330 - 3270 (n, s)	–C (triple bond) C – H : C - H stretch	Alkynes (terminal)
3100 – 3000 (s)	C – H stretch	Aromatics
3100 – 3000 (m)	= C – H stretch	Alkenes
3000 – 2850 (m)	C – H stretch	Alkenes
2830 – 2695 (m)	H – C = 0; C –H stretch	Aldehydes
2260 - 2210 (v)	C (triple bond) N stretch	Nitriles
2260 – 2100 (w)	C (triple bond) C- stretch	Alkynes
1760 – 1665 (s)	C = 0 stretch	Carbonyls (general)
1760 – 1690 (s)	C = 0 stretch	Carboxylic acids
1750- 1735 (s)	C = 0 stretch	Esters, saturated aliphatic
1740 – 1720 (s)	C = 0 stretch	Aldehydes, saturated aliphatic
1730 – 1715 (a)	C = 0 stretch	Alpha, beta – unsaturated esters
1715 (s)	C = 0 stretch	Ketones, saturated aliphatic
1710 – 1665 (s)	C = 0 stretch	Alpha, beta – unsaturat aldehydes, ketones
1680 – 1640 (m)	-C = C -	Alkenes
1650 – 1580 (m)	N – H bend	Primary amines
1600 – 1585 (m)	C-C stretch (in – ring)	Aromatics
1550 – 1475 (s)	N – 0 asymmetric stretch	Nitro compounds
1500 – 1400 (m)	C –C stretch (in – ring)	Aromatics
1470 – 1450 (m)	N – 0 asymmetric stretch	Nitro compounds
1370 – 1350 (m)	C – H bend	Alkanes
1360 – 1290 (m)	C – H rock	Alkanes

1335 – 1250 (s)	C – N stretch	Aromatic amines
1320 – 1000 (s)	C – 0 stretch	Alcohols, carboxylic acids, esters, ethers
1300 – 1150 (m)	C – H wag (- CH2X)	Alkyl halides
1250 – 1020 (m)	C – N stretch	Aliphatic amines
1000 – 650 (s)	=C – H bend	Alkynes
950 – 910 (m)	O – H bend	Carboxylic acids
910 – 665 (s, b)	N – H wag	Primary, secondary amines
900 – 675 (s)	C – H "oop"	Aromatics
850 – 550 (m)	C – CI stretch	Alkyl halides
725 – 720 (m)	- C (triple bond) C-H : C- H bend	Alkynes
690 – 515 (m)	C - Br stretch	Alkyl halides

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 / TIBr Cells

Gas : Gas Cells

Experimental Procedure: Done at SAIF, IIT Madras, Chennai – 36KBr 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 100 mg dried KBr salt.
- The mixture was then pressed under hydraulic press using a dye to yield a transparent disc (measure about 13 mm diameter and 0.3mm in thickness), through which the beam of spectrometer passed.

HR SEM - METHODOLOGY

HR SEM-Methodology:

An SEM is essentially a high magnification microscope, which used a focused scanned collection 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 urn of the sample.

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 ***KARUVEPPILAI CHOORANAM*** that will fit into the SEM chamber. And it should be analyzed.

BIOCHEMICAL ANALYSIS

BIOCHEMICAL ANALYSIS OF KARUVEPPILAI CHOORANAM

Preparation of extract:

5 gms of the drug was taken in a 250ml clean beaker and 50ml of distilled water was added to it. Then it was boiled welll for about 10minutes. Then it is allowed to cool and filtered in a 100ml volometric flask and made up to 100ml with distilled water. The extract is used for the qualitative analysis.

Qualitative analysis:

S.No.	EXPERIMENTS	OBSERVATION	INFERENCE
1.	**Test for calcium:** 2 ml 0f the above prepared extract taken in a clean test tube to this add 2 ml of 4% ammonium oxalate solution.	Formation of white colour precipitate	presence of calcium
2.	**Test for sulphate:** 2 ml of the extract is added to 5% barrium chloride solution.	Formation of white colour precipitate	Presence of sulphate.
3.	**Test for chloride:** The extract is treated with silver nitrate solution.	Formation of white colour precipitate	Presence of chloride.
4.	**Test for carbonate:** The substance is treated with concentrated HCL.	Formation of effervescence.	presence of carbonate.
5.	**Test for starch:** The extract is added with weak iodine solution.	Formation of blue colour	presence of starch.
6.	**Test for ferric iron:** The extract is acidified with glacial acetic acid and potassium ferro cyanide.	Formation of blue colour	presence of ferric iron.

7.	**Test for ferrous iron:** The extract is treated with concentrated nitric acid ammonium thiocyanide solution.	Appearance of blood red colour.	presence of ferrous iron
8.	**Test for phosphate:** The extract is treated with ammonium molybdate and concentrated nitric acid.	Formation of yellow precipitate	presence of phosphate.
9.	**Test for albumin:** The extract is treated with esbach's reagent.	Formation of yellow precipitate	presence of albumin.
10.	**Test for tannic acid:** The extract is treated with ferric chloride.	Formation of blue black precipitate.	presence of tannic acid.
11.	**Test for unsaturation:** Potassium permanganate solution is added to the extract.	It gets decolourised.	Presence of unsaturated compounds.
12.	**Test for the reducing sugar:** 5ml of benedict's qualitative solution is taken in a test tube and allowed to boil for 2 minutes and add 8 to 10 drops of the extract and again boil it for 2 minutes.	Colour change occurs.	Presence of reducing sugar.
13.	**Test for amino acid:** One or two drops of the extract is placed on a filter paper and dried well. After drying, 1 % ninhydrin is sprayed over the same and dried it well.	Appearance of Violet colour	Presence of amino acid.
14.	**Test for zinc:** The extract is treated with potassium ferro cyanide.	Formation of white precipitate	Presence of zinc.

PRE-CLINICAL STUDIES

TOXICITY STUDY

TOXICOLOGICAL STUDIES ON KARUVEPPILAI CHOORANAM

OBJECTIVES

The aim of this study is to evaluate the toxicity of the drug KARUVEPPILAI CHOORANAM, when administered orally to male Wistar Albino Rats with different doses, so as to provide a rational base for the evaluation of the toxicological risk to man and indicate potential target organs.

Guidelines followed:

OECD Guidelines No.423.

The experimental protocol was approved by IAEC (Institutional Animal Ethical Committee) as per the guidance of CPCSEA (Committee for the Purpose of Control and Supervision of Experiments on Animals), Ministry of Environment and Forest, Government of India.

Study design and Controls:

1) Wistar Albino Rats in controlled age and body weight were selected.
2) KARUVEPPILAI CHOORANAM was administered at 5mg/kg, 50mg/kg, 300mg/kg, 2000 mg/kg body weight as water as suspension along with blank.
3) The results were recorded on the day of drug administration approximately 1^{st} , 3^{rd} , 4^{th}, 24^{th} hours in post dosing further made in to observation upto 14 days.
4) The animals were kept in a clean environment with 12 hour light and 12 hour dark cycles. The air was conditioned at 22 ±3ºC and the relative humidity was maintained between 30-70% with 100% exhaust facility.

EXPERIMENTAL PROCEDURE

Animals

Male Wistar albino rats (150 – 200 gm) were used for the study. The animals were obtained from animal house, Kerala Veterinary and Animal Sciences, Mannuthy, Kerala. The animals were placed at random and allocated to treatment groups in polypropylene cages with paddy husk as bedding. Animals were housed at a temperature of 24±2^{o}C and relative humidity of 30 – 70 %. A 12:12 light:dark cycle

was followed. All animals were allowed to free access to water and fed with standard commercial pelleted rat chaw (M/s. Hindustan Lever Ltd, Mumbai). All the experimental procedures and protocols used in this study were reviewed by the Institutional Animal Ethics Committee, Nandha College of Pharmacy, Erode (688/PO/Re/S/02/CPCSEA) and were in accordance with the Institutional ethical guidelines (Proposal Number:NCP/IAEC/2018-19/23)

Test Compound

KARUVEPPILAI CHOORANAM

Administration Procedure

Honey was used as vehicle and various doses of KARUVEPPILAI CHOORANAM were administered through oral route using gastric gavage tubes to animals by suspending in vehicle.

The animals were marked on body with picric acid solution prepared in water. The marking within the cage was as below.

Table-1 Group Numbering and Identification animals were marking on body

Group No	Animal Marking
1	Head
2	Body
3	Tail

The group no., sex of the animal and animal numbers were identified as indicated below using cage label and body marking on the animals.

Table – 2 Numbering and Identification cage label and body marking on the animals.

Cage No	Group No	Animal marking	Sex
1	I	H,B,T	Female
2	II	H,B,T	Female
3	III	H,B,T	Female
4	IV	H,B,T	Female
5	V	H,B,T	Female

The doses for the study were selected based on literature search and range finding study. Following the period of fasting, the animals were weighed and then drug was administered orally as single dose using a needle fitted onto a disposable syringe of approximate size at the following different doses.

ACUTE TOXICITY STUDY

Acute Toxicity Studies

Acute toxicity studies were performed according to OECD-423 (Organization of Economic and Cooperation Development) guidelines.

Male Wister albino rats were selected by random sampling technique were employed in this study. The animals were fasted for 4 hr with free access to water. The KARUVEPPILAI CHOORANAM was administered orally at a dose of 5 mg/kg initially and mortality if any was observed for 3 days. If mortality was observed in two out of three animals, then the dose administered was considered as toxic dose. However, if the mortality was observed in only one animal out of three animals then the same dose was repeated again to confirm the toxic effect. If no mortality was observed, then higher (50, 300, 1000 and 2000 mg/kg) doses of the KARUVEPPILAI CHOORANAM were employed for further toxicity studies. The following general behaviour was also observed during the acute toxicity study (Ecobichon DJ, 1997).

3.1. Doses:

The doses for the study were selected based on literature search and range finding study. Following the period of fasting, the animals were weighted and then drug was administered orally as single dose using a needle fitted onto a disposable syringe of approximate size at the following different doses.

Table – 3. Doses

GROUP	DOSE
Group –I	Control
Group – II	5mg/kg
Group – III	50mg/kg
Group – IV	300mg/kg
Group – V	2000mg/kg

The test substance was administered as single dose. After single dose administration period, all animals were observed for 14 days.

General Behaviours

S.No	General Behaviour
1	Sedation
2	Hypnosis
3	Convulsion
4	Ptosis
5	Analgesia
6	Stupar Reaction
7	Motor activity
8	Muscle Relaxant
9	CNS Stimulant
10	CNS Depressant
11	Pilo Erection
12	Skin Colour
13	Lacrimation
14	Stool Consistancy

SUB-ACUTE TOXICITY STUDY

1.Objective

The objective of this 'Sub-acute toxicity study of KARUVEPPILAI CHOORANAM on Wistar Albino Rats' was to assess the toxicological profile of the test substance when treated as a single dose. Animals should be observed for 28 days of drug administration. This study provides information on the possible health hazards likely to arise from exposure over a relatively limited period of time.

2. Test Guideline followed

OECD 407 Method – Sub-Acute Toxic Class Method (Repeated Dose 28-Day Oral Toxicity Study in Rodents)

3. Test substance Detail

Name: KARUVEPPILAI CHOORANAM

Wistar albino rats of either sex weighing 150-200g were used in the study. The animals were divided in to 3 groups of 6 animals each. Group I served as control received Distilled water (1ml/kg). Group II & III received the KARUVEPPILAI CHOORANAM at the dose of 250 and 500 mg/kg respectively.

Table 4. Animal Groupings

Groups	Drug Treatment
I	Control (1ml/kg, p.o)
II	KARUVEPPILAI CHOORANAM (250mg/kg, p.o)
III	KARUVEPPILAI CHOORANAM (500mg/kg, p.o)

Numbering and Identification

The animals were marked on body with picric acid solution prepared in water. The marking within the cage was as below.

Table-5 Group Numbering and Identification animals were marking on body

Group No	Animal marking
Control	H,B,T, HB,BT,HT
Low dose	H,B,T,HB,BT,HT
High dose	H,B,T,HB,BT,HT

H-head, B-body, T-tail

The group no., cage no., sex of the animal and animal no. were identified as indicated below using cage . label and body marking on the animals:

Table-6. Dose level

Cage no	Group no	Animal marking	Sex
1	Control	H,B,T	Male
		HB,BT,HT	Female
2	Low dose	H,B,T	Male
		HB,BT,HT	Female
3	High dose	H,B,T	Male
		HB,BT,HT	Female

HB – Head Body, BT – Body Tail, HT – Head Tail

The vehicle (Honey) and test drugs were administered orally, once daily for 28 days. Body weight, food intake and water intake were monitored at regular intervals. The animals were sacrificed on 29th day for biochemical and histopathological studies. Prior to the sacrifice, animals were isolated in individual cages and fasted for 12 hr, with water provided *ad libitum*.

Then, they were anaesthetized with pentobarbitone (45mg/kg, i.p) and the blood was collected by sino-orbital puncture. Blood samples for the determinations of hematological parameters (Ghai, 1995) were collected in heparinized tubes and used for the following determinations, hemoglobin (Hb), red blood cell (RBC) count, white blood cell (WBC) count and differential count (DC)

Non-heparinized tubes were used for serum biochemistry determinations. To obtain the serum, blood samples were placed at room temperature for approximately 30 min. Then, the tubes were centrifuged at 3000 x *g* for 10 min and the supernatants

were taken for the determinations of SGPT (AST), ALT (SGOT), ALP, Creatinine, Blood urea nitrogen, Creatinine Phosphokinase and Lactate Dehydrogenase.

Estimation of AST and ALT

Activities of serum Aspartate transaminase (AST) and Alanine transaminase (ALT) were assayed by the method of Reitman and Frankel, 1957. 0.2 ml of serum with 1 ml of substrate (aspartate and α-ketoglutarate for AST; alanine and α -keto glutarate for ALT, in phosphate buffer pH 7.4) was incubated for an hour in case of AST and 30 minutes for ALT. 1 ml of DNPH solution was added to arrest the reaction and kept for 20 min in room temperature. After incubation 1 ml of 0.4N NaOH was added and absorbance was read at 540 nm. Activities expressed as IU/L.

Estimation of ALP (King, 1965)

Set up three test-tubes. Into the 1st (test), added 5 ml of the substrate solution (p-nitrophenyl phosphate in glycine/NaOH buffer) followed by 0.1 ml of serum. After 30 minutes reaction at 37^{0}C, the optical density was measured at 405 nm. Into the 2nd tube, 5 ml of substrate solution was added with 0.1 ml of serum. After mixing, the optical density was measured immediately. Into the 3rd tube, 0.1 ml of water was added with 5.0 ml of p – nitrophenol standard solution, optical density was measured.

Estimation of Blood Urea (Natelson et al., 1951)

Labeled three test-tubes as B, T and S. Into B, pipette, 0.02 ml water, into T, 0.02 ml blood and into S, 0.02 ml standard urea solution (40 mg urea in 100 ml of water). 0.1 ml of diacetyl monoxime solution and 5 ml of acid regent (Thiosemicarbazide) was added into all the test-tubes. Mixed and kept in a boiling water bath for 15 minutes. After cooling, the absorbance was read at 540 nm and concentration of urea in mg/dl was calculated.

Estimation of Serum Creatinine (Slot, 1965)

Labeled three test-tubes as B, T and S. Into B, pipetted, 2 ml of water, into T, 2 ml serum and 4 ml of water, into S, 3 ml of water and 1 ml of creatinine standard (4mg/dl). 2 ml of ammonium sulphate and 2 ml of sodium tungstate was added in all the three test-tubes. Centrifuged and removed 3 ml of supernatant from each test tube. 1 ml of picric acid and distilled water was added to the supernatant of test tubes B, T and S. Absorbance was read at 520 nm and concentration of serum creatinine in mg/dl was calculated.

Determination of Creatine Phosphokinase

The activity of CK was estimated by the method of Rosalki (1967). CK catalyses the conversion of creatine phosphate and ADP to creatine and ATP. The ATP and glucose are converted to ADP and glucose-6-phosphate by hexokinase (HK). Glucose -6-phosphate dehydrogense (G-6-PDH) oxidizes D-glucose-6-phosphate and reduces the nicotinamide adenine dinucleotide (NAD). The rate of NADH formation, measured at 340nm, is directly proportional to serum CK activity. One ml of working reagent was added to 50 µl of test sample, mixed and incubated at 37^{o} C for 1min. After incubation, change in the optical density was measured for 3 min at an interval of 1min against blank at 340nm. The activity of creatine Phosphokinase was expressed as U/L.

Determination of Lactate Dehydrogenase

The activity of LDH was estimated by the method of Teitz,1976. The enzyme LDH is distributed in tissues particularly in heart, muscle and kidney. LDH catalyzes the oxidation of lactate to pyruvte in the presence of NAD which is subsequently reduced to NADH. The rate of NADH formation was measured at 340nm and is directly proportional to LDH activity. One ml of the working reagent was added to 10 µl of test sample, mixed and incubated at 37^{o} C for 1min. After incubation, change in the optical density was measured for 1min at an interval of 1 min against reagent blank at 340 nm. The activity of LDH was expressed as U/L.

After blood collection, the animals were sacrificed by cervical decapitation and the organs such as brain, heart, liver, spleen, kidney and testis were removed and weighed. The organs were preserved in 10% buffered formaldehyde for histopathological observations.

HISTOPATHOLOGICAL STUDIES

Anatomy of the liver was studied immediately after sacrificing the animals. A small portion was fixed in 10% neutral buffered formalin as described by Luna 14. Thin sections of 4-5µm were taken, stained with Haematoxylin and Eosin and histology was studied.

Statistical Analysis

The values were expressed as mean ± SEM. The statistical analysis was carried out by one way analysis of variance (ANOVA) followed by Dunnett's *'t'* – test using graph pad version I. *P* values <0.05 were considered significantly.

7. RESULT AND INFERENCES

QUALITATIVE AND QUANTITATIVE ANALYSIS

PHYTO-CHEMICAL STUDY

This experimental study was taken up to qualitative analysis of Phyto-chemicals in the drug of Karuveppilai chooranam, using various test and the results are exhibited in Table No.7

Table No 7: Incidence of various phyto-chemicals in Karuveppilai Chooranam

S.No.	Name of Tests Conducted	Result Observed
Observation of Alkaloids		
1.	Mayer's Test	Negative
2.	Dragendroff's Test	Negative
3.	Hager's Test	Negative
Observation of Carbohydrates and Glycosides		
4.	Molisch Test	Positive
5.	Legal's Test	Negative
6.	Borntrager's Test for anthraquinones	Negative
Observation of Phytosterols		
7.	Liebermann – Burchard Test	Negative
8.	Salkowski Test	Negative
Observation of Flavanoids		
9.	Shinoda Test (Magnesium turnings & Hydrochloric acid)	Negative
10.	Fluorescence Test	Negative
Observation of Tannins		
11.	Ferric chloride test	Negative
12.	Potassium dichromate test	Negative
13.	Lead acetate test	Negative
14.	Millon's test	Negative
15.	Biuret test	Negative
16.	Ninhydrin test	Negative

Observation of fixed oils and fats		
17.	Spot test	Negative
18.	Saponification test	Positive
Observation of Lignin		
19.	Phloroglucinol test	Negative
Observation of Saponins		
20.	Frothing test	Negative

Note: *Positive indicates the presence of Phytochemical; Negative indicates the absence of Phytochemical*

Result

Phytochemical analysis of Karuveppilai chooranam shows the presence of carbohydrates, glycosides, fixed oils and fats.

FOURIER TRANSFORM – INFRARED SPECTROSCOPY

IR TRACER - 100 THE NEW FORURIER TRANSFORM INFRARED SPECTROPHOTOMETER

Chart – 1 FTIR results of Karuveppilai Chooranam

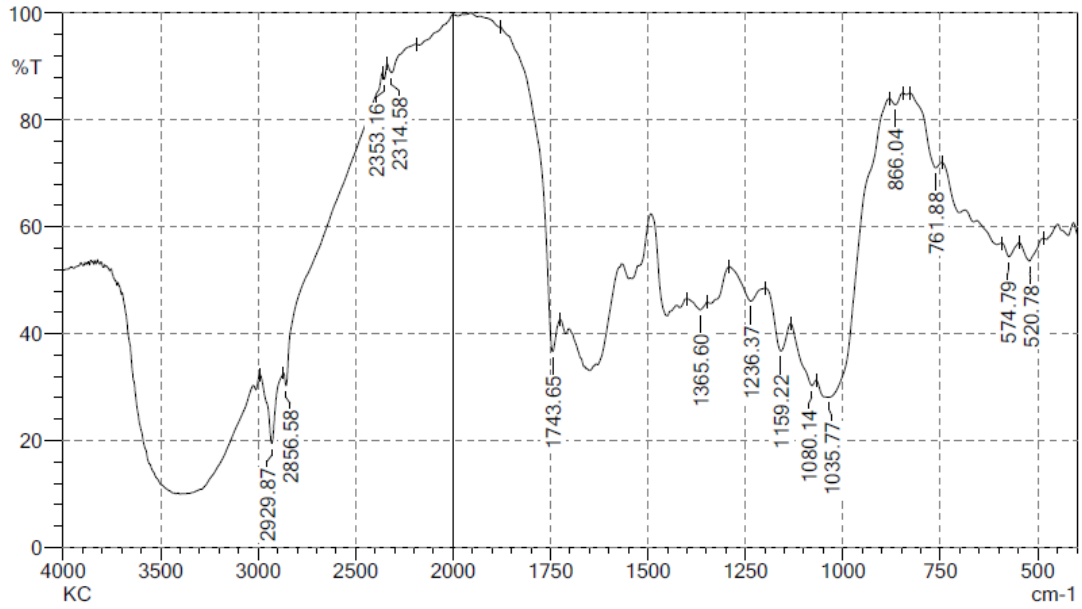


Table – 8 Functional group by FTIR study

FREQUENCY cm-1	BOND	FUNCTIONAL GROUP
520.78	C-1 stretching	Halo compound
574.79	C-1 stretching	Halo compound
761.88	C-Cl stretch	Aliphatic flouro compound
866.04	C-H “oop”	Aromatic
1035.77	C-F stretch	Aliphatic flouro compound
1080.14	C-F stretch	Aliphatic flouro compound
1159.22	C-F stretch	Aliphatic flouro compound
1236.37	C-F stretch	Aliphatic flouro compound
1365.60	C-H rock	Alkanes
1743.65	C=O stretching	δ-Lactone
2314.58	P-H stretch	Phosphines

2353.16	P-H stretch	Phosphorus
2856.58	C-H stretch	Alkanes
2929.87	C-H stretch	Alkanes

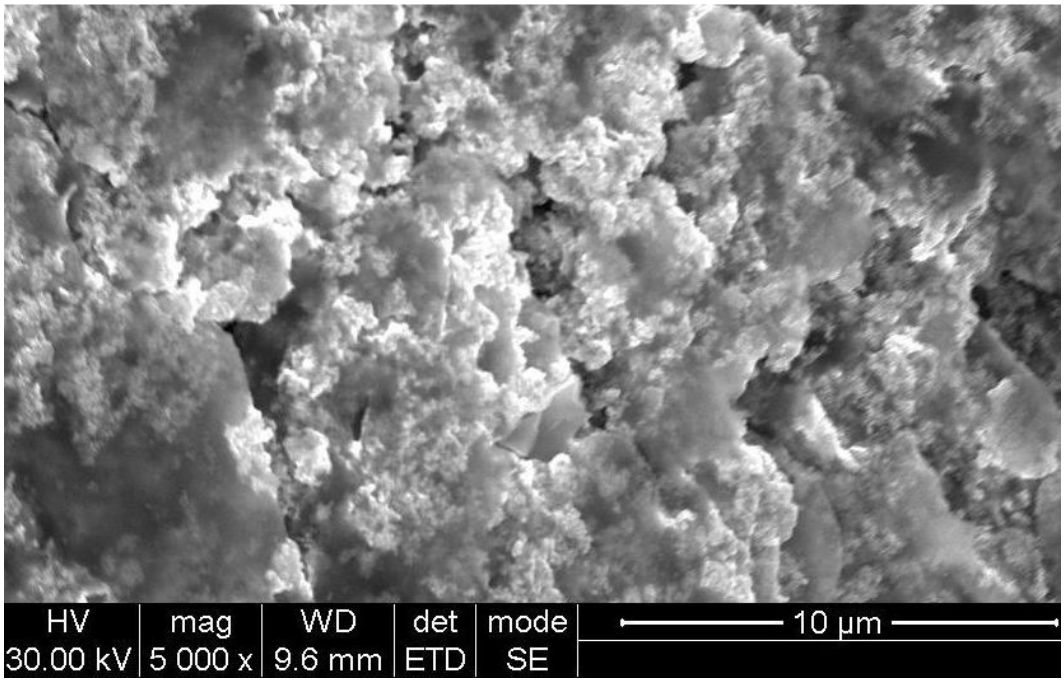
S-strong, W-weak, M-medium

Result:

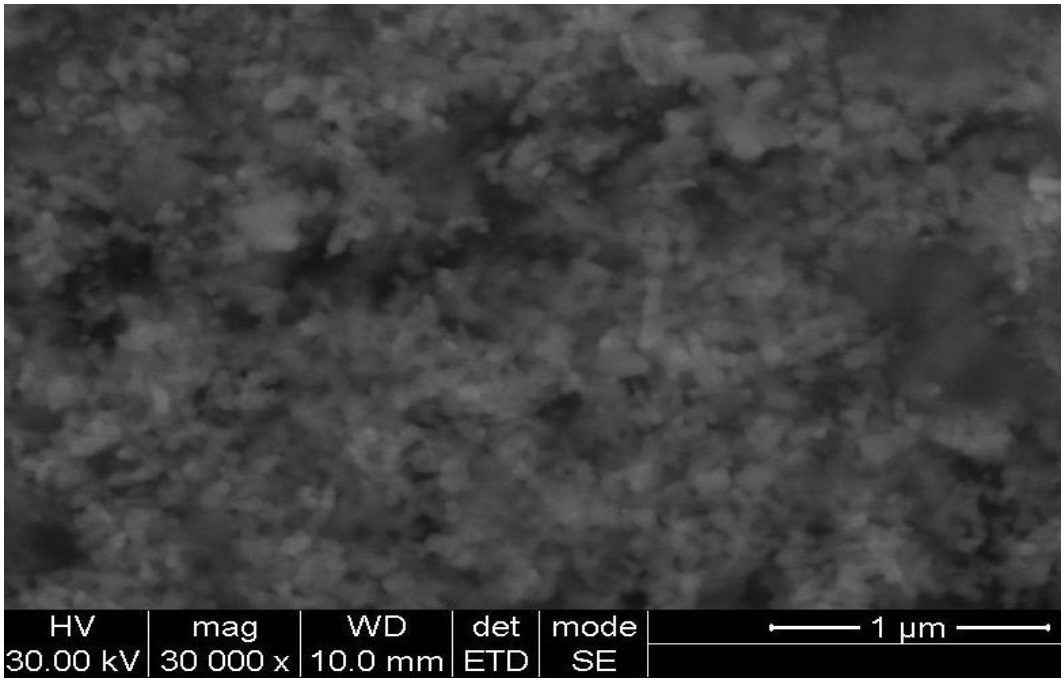
FTIR study of Karuveppilai chooranam shows the presence of functional groups such as Halo compounds, Aliphatic flouro compounds, Aromatics, Alkanes, δ-Lactone **,** Phosphorus and Phosphines.

SEM ANALYSIS

Scanning Electron Microscope (SEM)



SEM -5000 Magnification



SEM -30000 Magnification

Result:

The particles were stabilized and have irregular morphology. The particles were distributed in range10 µm and the size is below 1µm

BIO-CHEMICAL ANALYSIS OF *KARUVEPPILAI CHOORANAM*

Preparation of the extract:

5 grams of the drug was taken in a 250ml clean beaker and 50ml of distilled water was added to it. Then it was boiled welll for about 10minutes. Then it is allowed to cool and filtered in a 100ml volometric flask and made up to 100ml with distilled water. The extract is used for the qualitative analysis.

Table - 9

BIO-CHEMICAL ANALYSIS

S.NO	EXPERIMENT	OBSERVATION	INFERENCE
1.	**TEST FOR CALCIUM** 2ml of the above prepared extract is taken in a clean test tube. To this add 2ml of 4% Ammonium oxalate solution	A white precipitate is formed	**Indicates the presence of calcium**
2.	**TEST FOR SULPHATE** 2ml of the extract is added to 5% Barium chloride solution.	A white precipitate is formed	**Indicates the presence of Chloride**
3.	**TEST FOR CHLORIDE** The extract is treated with silver nitrate solution	No white precipitate is formed	Absence of chloride
4.	**TEST FOR CARBONATE** The substance is treated with concentrated Hcl.	No Brisk effervessence is formed	Absence of carbonite
5.	**TEST FOR STARCH** The extract is added with weak iodine solution	Blue colour is formed	**Indicates the presence of starch**
6.	**TEST FOR FERRIC IRON** The extract is acidified with Glacial acetic acid and potassium ferro cyanide.	No blue colour is formed	Absence of ferric iron

7.	**TEST OF FERROUS IRON** The extract is treated with concentrated Nitric acid and Ammonium thio cyanate solution	Blood red colour is formed	**Indicates the presence of ferrous iron**
8.	**TEST FOR PHOSPHATE** The extract is treated with Ammonium Molybdate and concentrated nitric acid	No yellow precipitate is formed	Absence of phosphate
9.	**TEST FOR ALBUMIN** The extract is treated with Esbach's reagent	No Yellow precipitate is formed	Absence of albumin
10.	**TEST FOR TANNIC ACID** The extract is treated with ferric chloride.	Blue black precipitate is formed	**Indicates the presence of tannic acid**
11.	**TEST FOR UNSATURATION** Potassium permanganate solution is added to the extract	It gets decolourised.	**Indicates the presence of unsaturated compound**
12.	**TEST FOR THE REDUCING SUGAR** 5ml of Benedict's qualitative solution is taken in a test tube and allowed to boil for 2 mts and add 8-10 drops of the extract and again boil it for 2 mts.	colour change occurs.	**Indicates the presence of reducing sugar**
13.	**TEST FOR AMINO ACID** One or two drops of the extract is placed on a filter paper and dried well. After drying, 1% Ninnhydrin is sprayed over the same and dried it well.	Violet colour is formed	**Indicates the presence of amino acid**
14.	**TEST FOR ZINC** The extract is treated with Potassium Ferrocyanide.	No white precipitate is formed	Absence of zinc

Inference:

Analysis reveals the presence of **Calcium, Sulphate, Amino acid, Tannic acid, unsaturated compound, Ferrous iron, Starch, and Reducing sugar** in ***KARUVEPPILAI CHOORANAM*.**

Biochemical Analyis report was given by **Mrs. N.Nagaprema, M.Sc., H.O.D, Bio Chemical Department, Government Siddha Medical College, Palayamkottai.**

ACUTE TOXICITY STUDY ON KARUVEPPILAI CHOORANAM

Effect of Acute Toxicity (14 Days) of *KARUVEPPILAI CHOORANAM*

Table 10 Physical and behavioral examinations.

Group no.	Dose(mg/kg)	Observation sign	Mortality
Group-I	Control	Normal	0 of 3
Group- II	5 mg/kg	Normal	0 of 3
Group-III	50 mg/kg	Normal	0 of 3
Group-IV	300 mg/kg	Normal	0 of 3
Group-V	2000 mg/kg	Normal	0 of 3

Table – 11 shows the effect of control – Distilled water (1ml/kg) on general behavior after single oral administration in Rat.

SL NO	GENERAL BEHAVIOR	Time of observation after control – Distilled water (1ml/kg) administration			
		1st hour	3rd hour	4th hour	24th hour
1	Sedation	-	-	-	-
2	Hypnosis	-	-	-	-
3	Convulsion	-	-	-	-
4	Ptosis	-	-	-	-
5	Analgesia	-	-	-	-
6	Stupor reaction	-	-	-	-
7	Motor activity	-	-	-	-
8	Musle relaxant	-	-	-	-
9	CNS stimulant	-	-	-	-
10	CNS depressant	-	-	-	-
11	Pilo erection	-	-	-	-
12	Skin colour changes	-	-	-	-
13	Lacrimation	-	-	-	-
14	Stool consisteny	-	-	-	-

+ Present, - Absent

Table - 12 shows the effect of KARUVEPPILAI CHOORANAM (5mg/kg) on general behavior after single oral administration in Rat.

SL NO	GENERAL BEHAVIOUR	Time of observation after KARUVEPPILAI CHOORANAM (5 mg / kg) administration			
		1st hour	3rd hour	4th hour	24th hour
1	Sedation	-	-	-	-
2	Hypnosis	-	-	-	-
3	Convulsion	-	-	-	-
4	Ptosis	-	-	-	-
5	Analgesia	-	-	-	-
6	Stupor reaction	-	-	-	-
7	Motor activity	-	-	-	-
8	Musle relaxant	-	-	-	-
9	CNS stimulant	-	-	-	-
10	CNS depressant	-	-	-	-
11	Pilo erection	-	-	-	-
12	Skin colour changes	-	-	-	-
13	Lacrimation	-	-	-	-
14	Stool consisteny	-	-	-	-

+ Present, - Absent

Table-13 shows the effect of KARUVEPPILAI CHOORANAM (50mg/kg) on general behavior after single oral administration in Rat.

SL NO	GENERAL BEHAVIOR	Time of observation after KARUVEPPILAI CHOORANAM (50 mg / kg) administration			
		1st hour	3rd hour	4th hour	24th hour
1	Sedation	-	-	-	-
2	Hypnosis	-	-	-	-
3	Convulsion	-	-	-	-
4	Ptosis	-	-	-	-
5	Analgesia	-	-	-	-
6	Stupor reaction	-	-	-	-
7	Motor activity	-	-	-	-
8	Musle relaxant	-	-	-	-
9	CNS stimulant	-	-	-	-
10	CNS depressant	-	-	-	-
11	Pilo erection	-	-	-	-
12	Skin colour changes	-	-	-	-
13	Lacrimation	-	-	-	-
14	Stool consisteny	-	-	-	-

+ Present, - Absent

Table-14 shows the effect of KARUVEPPILAI CHOORANAM (300mg/kg) on general behavior after single oral administration in Rat.

SL NO	GENERAL BEHAVIOR	Time of observation after KARUVEPPILAI CHOORANAM (300 mg / kg) administration			
		1st hour	3rd hour	4th hour	24th hour
1	Sedation	-	-	-	-
2	Hypnosis	-	-	-	-
3	Convulsion	-	-	-	-
4	Ptosis	-	-	-	-
5	Analgesia	-	-	-	-
6	Stupor reaction	-	-	-	-
7	Motor activity	-	-	-	-
8	Musle relaxant	-	-	-	-
9	CNS stimulant	-	-	-	-
10	CNS depressant	-	-	-	-
11	Pilo erection	-	-	-	-
12	Skin colour changes	-	-	-	-
13	Lacrimation	-	-	-	-
14	Stool consisteny	-	-	-	-

+ Present, - Absent

Table-15 shows the effect of KARUVEPPILAI CHOORANAM (2000 mg/kg) on general behavior after single oral administration in Rat.

SL NO	GENERAL BEHAVIOR	Time of observation after KARUVEPPILAI CHOORANAM (2000 mg / kg) administration			
		1st hour	3rd hour	4th hour	24th hour
1	Sedation	-	-	-	-
2	Hypnosis	-	-	-	-
3	Convulsion	-	-	-	-
4	Ptosis	-	-	-	-
5	Analgesia	-	-	-	-
6	Stupor reaction	-	-	-	-
7	Motor activity	-	-	-	-
8	Musle relaxant	-	-	-	-
9	CNS stimulant	-	-	-	-
10	CNS depressant	-	-	-	-
11	Pilo erection	-	-	-	-
12	Skin colour changes	-	-	-	-
13	Lacrimation	-	-	-	-
14	Stool consisteny	-	-	-	-

+ Present, - Absent

Table-16 Home cage activity

Functional and Behavioral observation	Observation	5mg/kg Group (G-I)	50mg/kg (G-II)	300mg/kg (G-III)	1000mg/kg (G-IV)	2000mg/kg (G-V)
		Female n=3	Female n=3	Female n=3	Female n=3	Female n=3
Body position	Normal	3	3	3	3	3
Respiration	Normal	3	3	3	3	3
Clonic involuntary Movement	Normal behaviour	3	3	3	3	3
Tonic involuntary Movement	Normal behaviour	3	3	3	3	3
Palpebral closure	Normal behaviour	3	3	3	3	3
Approach response	Normal	3	3	3	3	3
Touch response	Normal	3	3	3	3	3
Pinna reflex	Normal	3	3	3	3	3
Tail pinch response	Normal	3	3	3	3	3

Table-17 Hand held observation

Functional and Behavioral Observation	Observation	Control	5 mg/ kg (G-I)	50 mg/kg (G-II)	300 mg/kg (G-III)	1000 mg/kg (G-IV)	2000 mg/kg (G-V)
		Female n=3	Female n=3	Female n=3	Female n=3	Female n=3	Female n=3
Reactivity	Normal	3	3	3	3	3	3
Handling	Normal	3	3	3	3	3	3
Palpebral closure	Normal	3	3	3	3	3	3
Lacrimation	Normal behaviour	3	3	3	3	3	3
Salivation	Normal behaviour	3	3	3	3	3	3
Piloerection	Normal behaviour	3	3	3	3	3	3
Pupillary reflex	Normal	3	3	3	3	3	3
Abdominal tone	Normal	3	3	3	3	3	3
Limb tone	Normal	3	3	3	3	3	3

Table-18 Mortality

Group no	Dose no(mg/kg)	Mortality
Group-I	Control	0 of 3
Group-II	5 (mg/kg)	0 of 3
Group-III	50 (mg/kg)	0 of 3
Group-IV	300 (mg/kg)	0 of 3
Group-V	2000(mg/kg)	0 of 3

Results

The results of acute toxicity study of Karuveppilai Chooranam was shown on table 15. The Karuveppilai Chooranam at all the dose levels (5 to 2000mg/kg) did not alter the general behavior after 1hour to 24hours of oral administration. There was no mortality with the Karuveppilai Chooranam after 1hr to 24 hrs even at higher dose of 2000mg/kg. It did not show any lethality or toxic reactions during and after the study. From the doses administrated in acute toxicity study, there are two doses approximately , 250 and 500 mg/kg were selected for sub-acute toxicity study.

SUB-ACUTE TOXICITY STUDY

Table 19. Effect of Karuveppilai Chooranam on body weight during 28 days drug administration in rats

Groups	Drug Treatment	Body Weight (gms)				
		1st Day	7th Day	14th Day	21st Day	28th Day
I	Control – Distilled water (1ml/kg, p.o)	168.73± 3.42	176.22± 4.97	196.34± 4.77	210.54± 6.04	220.22± 4.40
II	**Karuveppilai Chooranam** (250mg/kg, p.o)	182.50± 11.52	190.83± 9.07	202.5± 6.67	215.53± 8.21	223.55± 6.70
III	**Karuveppilai Chooranam** (500mg/kg, p.o)	180.83± 10.16	190.65± 18.61	203.33± 15.52	218.33± 17.63	228.83± 13.5

Values are in mean ± SEM (n=6)

*P<0.05, **P<0.01, ***P<0.001 Vs Control

Figure Effect of Karuveppilai Chooranam on body weight during 28 days drug administration in rats

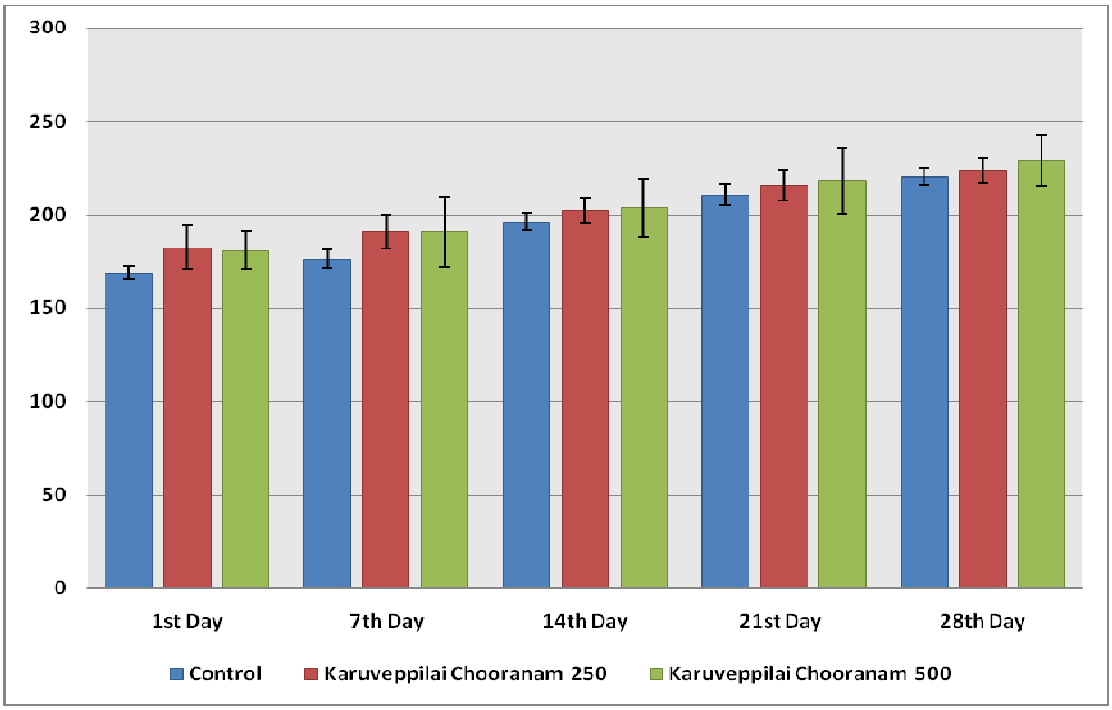


Table 20. Effect of Karuveppilai Chooranam on food intake during 28 days drug administration in rats

Groups	Drug Treatment	Food Intake (gms)				
		1st Day	7th Day	14th Day	21st Day	28th Day
I	Control - Distilled water (1ml/kg, p.o)	38.42±1.32	42.56±2.86	39.30±2.20	53.75±3.19	56.90±2.72
II	**Karuveppilai Chooranam** (250mg/kg, p.o)	55.63±2.97	52.98±3.45	58.22±4.76	55.74±4.2	54.21±4.03
III	**Karuveppilai Chooranam** (500mg/kg, p.o)	52.60±3.79	64.70±5.80	59.21±4.88	65.64±4.20	68.00±5.95

Values are in mean ± SEM (n=6)

*P<0.05, **P<0.01, ***P<0.001 Vs Control

Figure Effect of Karuveppilai Chooranam on food intake during 28 days drug administration in rats

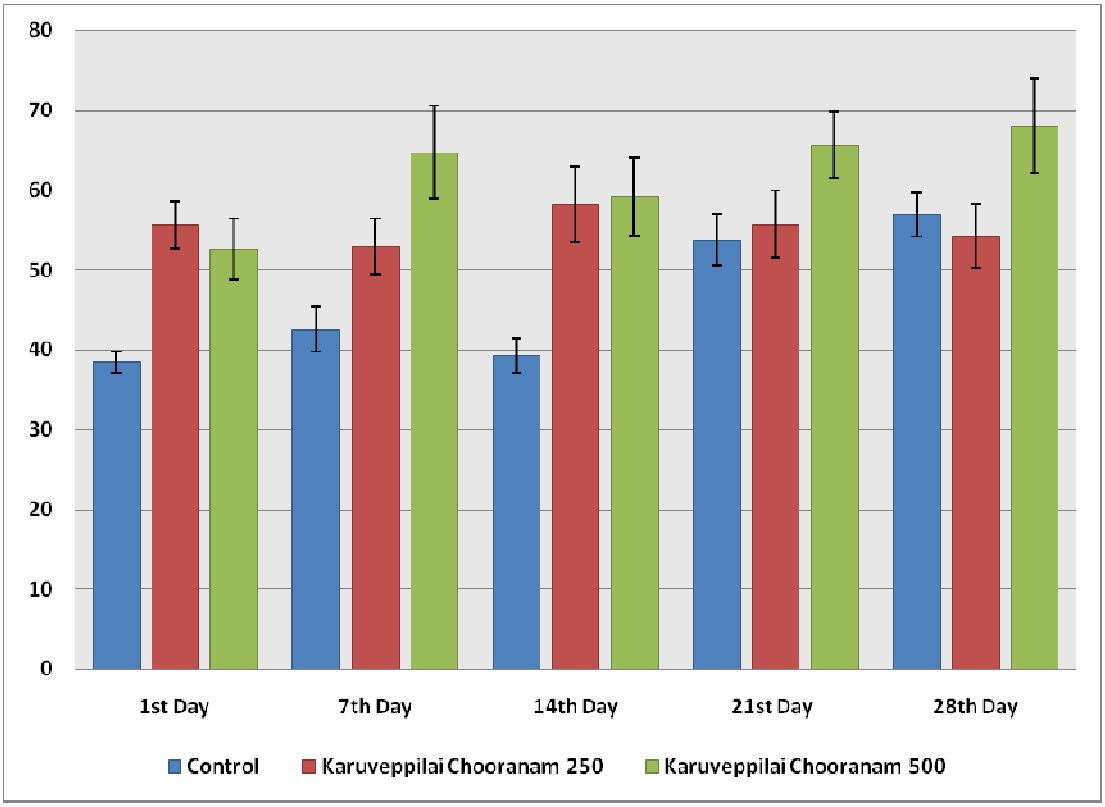


Table 21. Effect of Karuveppilai Chooranam on water intake during 28 days drug administration in rats

Groups	Drug Treatment	Water Intake (ml)				
		1st Day	7th Day	14th Day	21st Day	28th Day
I	Control – Distilled water (1ml/kg, p.o)	51.66± 2.02	58.76± 4.22	64.00± 3.90	70.34± 4.73	65.76± 4.80
II	**Karuveppilai Chooranam** (250mg/kg, p.o)	60.72± 5.43	85.34± 6.03	80.45± 6.80	90.64± 5.75	80.34± 5.97
III	**Karuveppilai Chooranam** (500mg/kg, p.o)	40.78± 2.87	80.25± 5.76	60.54± 5.96	62.54± 5.95	85.33± 5.65

Values are in mean ± SEM (n=6)

*P<0.05, **P<0.01, ***P<0.001 Vs Control

Figure Effect of Karuveppilai Chooranam on water intake during 28 days drug administration in rats

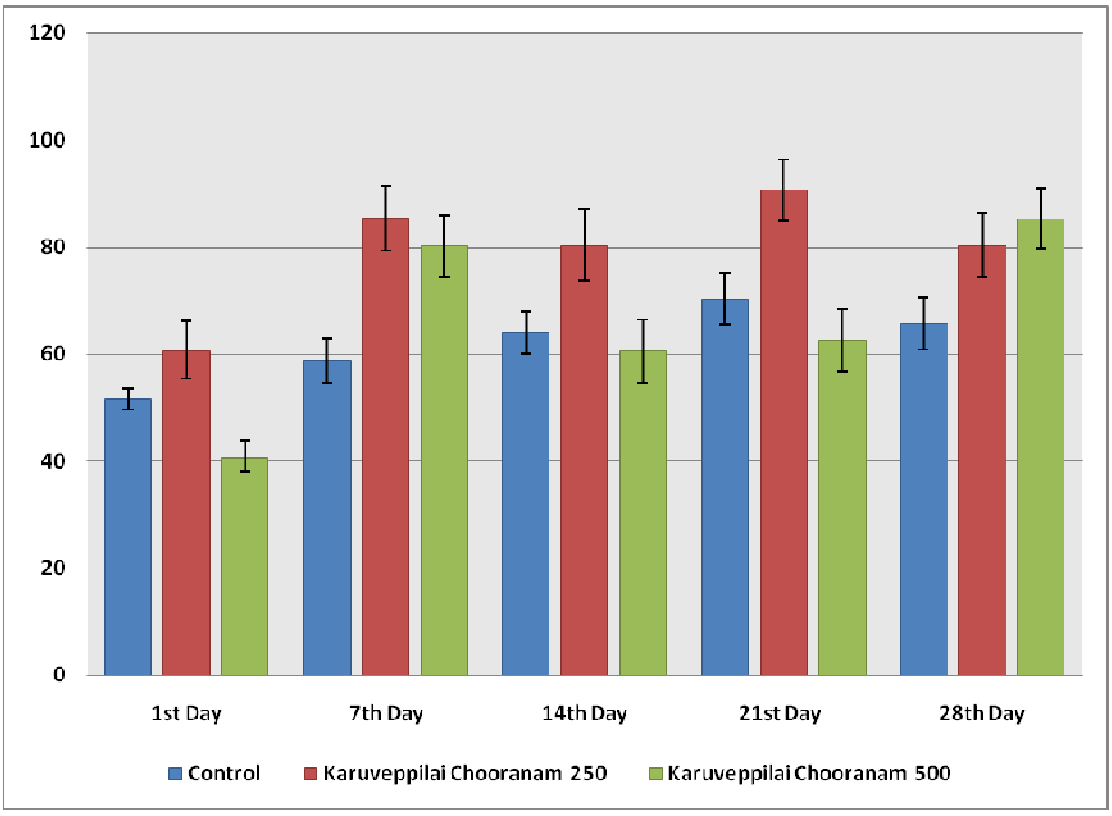


Table 22. Shows the effect of Karuveppilai Chooranam on RBC, WBC and Hb in rats after 28 days drug administration

Groups	Drug Treatment	RBC million cells/cmm	WBC cells/cmm	Haemoglobin gm %
I	Control – Distilled water (1ml/kg, p.o)	4.57 ± 0.16	8638.52± 87.66	11.77± 0.28
II	**Karuveppilai Chooranam** (250mg/kg, p.o)	4.37 ± 0.13	8615.29± 191.52	12.00± 0.27
III	**Karuveppilai Chooranam** (500mg/kg, p.o)	3.95 ± 0.17	8653.72± 164.17	10.44± 0.67

Values are in mean ± SEM (n=6)

*P<0.05, **P<0.01, ***P<0.001 Vs Control

Figure Shows the effect of Karuveppilai Chooranam on RBC and Hb in rats after 28 days drug administration

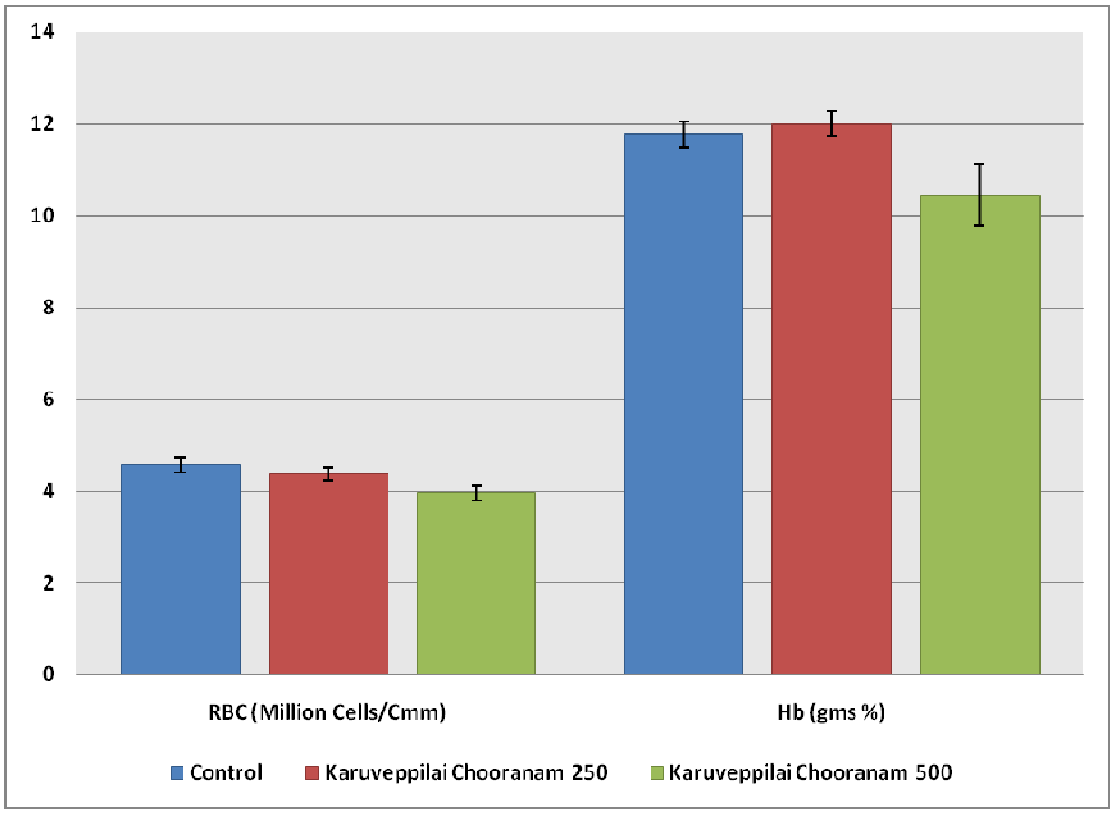


Figure Shows the effect of Karuveppilai Chooranam on WBC in rats after 28 days drug administration

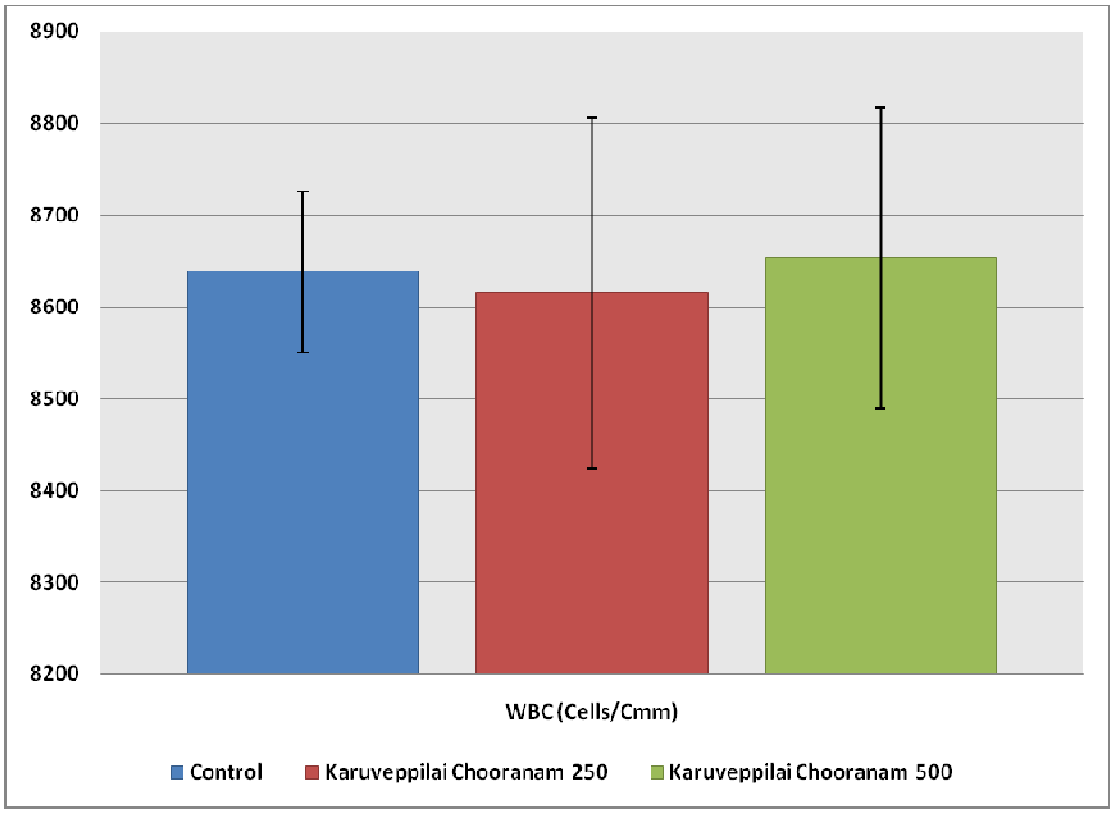


Table . Shows the effect of Karuveppilai Chooranam on Differential Count in rats after 28 days drug administration

Groups	Drug Treatment	Differential Count %			
		Neutophils	***Eosinophils***	***Monocyte***	***Lympocyte***
I	Control – Distilled water (1ml/kg, p.o)	30.00± 1.79	1.17± 0.31	3.33± 0.42	65.83± 1.64
II	**Karuveppilai Chooranam** (250mg/kg, p.o)	28.20± 0.58	1.60± 0.21	3.60± 0.25	65.80± 0.92
III	**Karuveppilai Chooranam** (500mg/kg, p.o)	29.83± 0.60	1.17± 0.21	4.17± 0.41	65.17± 1.11

Values are in mean ± SEM (n=6)

*P<0.05, **P<0.01, ***P<0.001 Vs Control

Figure Shows the effect of Karuveppilai Chooranam on Differential Counts in rats after 28 days drug administration

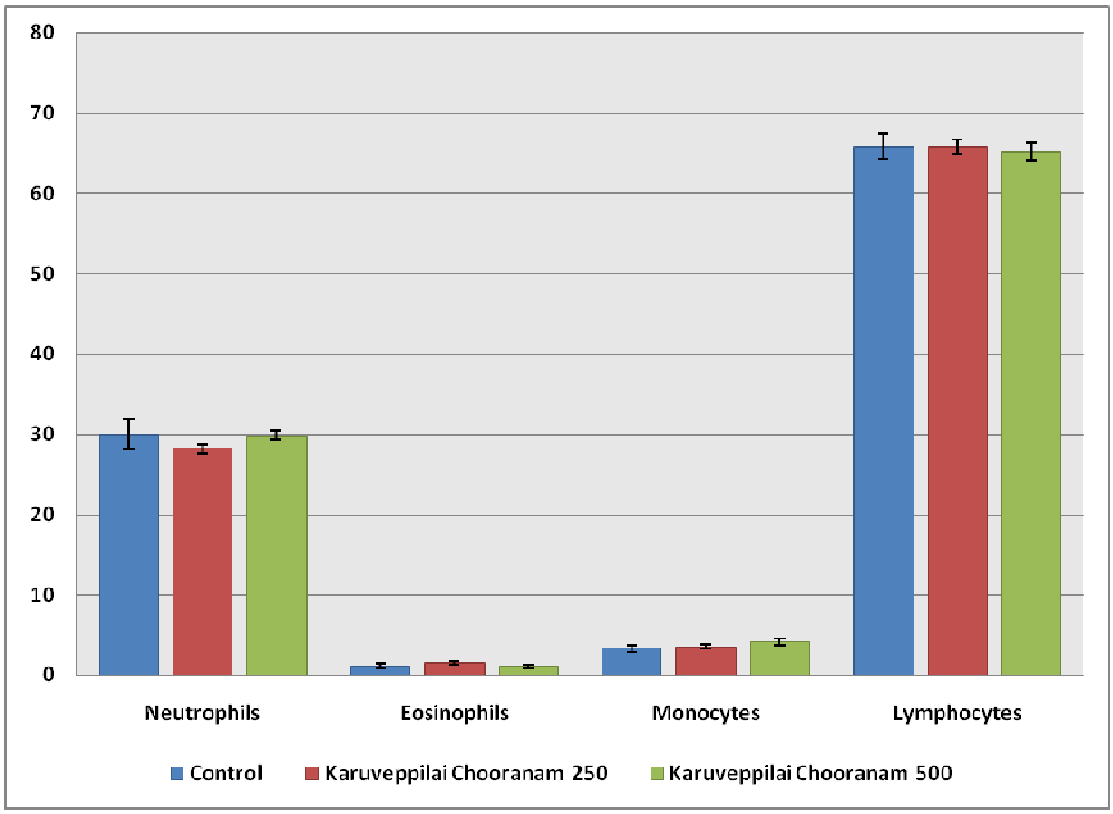


Table 23 . Shows the effect of Karuveppilai Chooranam on Hepatic Functions (SGPT, SGOT and ALP) in rats after 28 days drug administration

Groups	Drug Treatment	SGPT (IU/L)	SGOT (IU/L)	ALP (IU/L)
I	Control – Distilled water (1ml/kg, p.o)	83.83± 1.42	150.17± 4.59	270.83± 4.17
II	**Karuveppilai Chooranam** (250mg/kg, p.o)	90.80± 5.29	169.20± 3.34	276.20± 4.25
III	**Karuveppilai Chooranam** (500mg/kg, p.o)	93.50± 2.75	183.67± 3.20	305.17± 4.22

Values are in mean ± SEM (n=6)

*P<0.05, **P<0.01, ***P<0.001 Vs Control

Figure Shows the effect of Karuveppilai Chooranam on Hepatic Functions in rats after 28 days drug administration

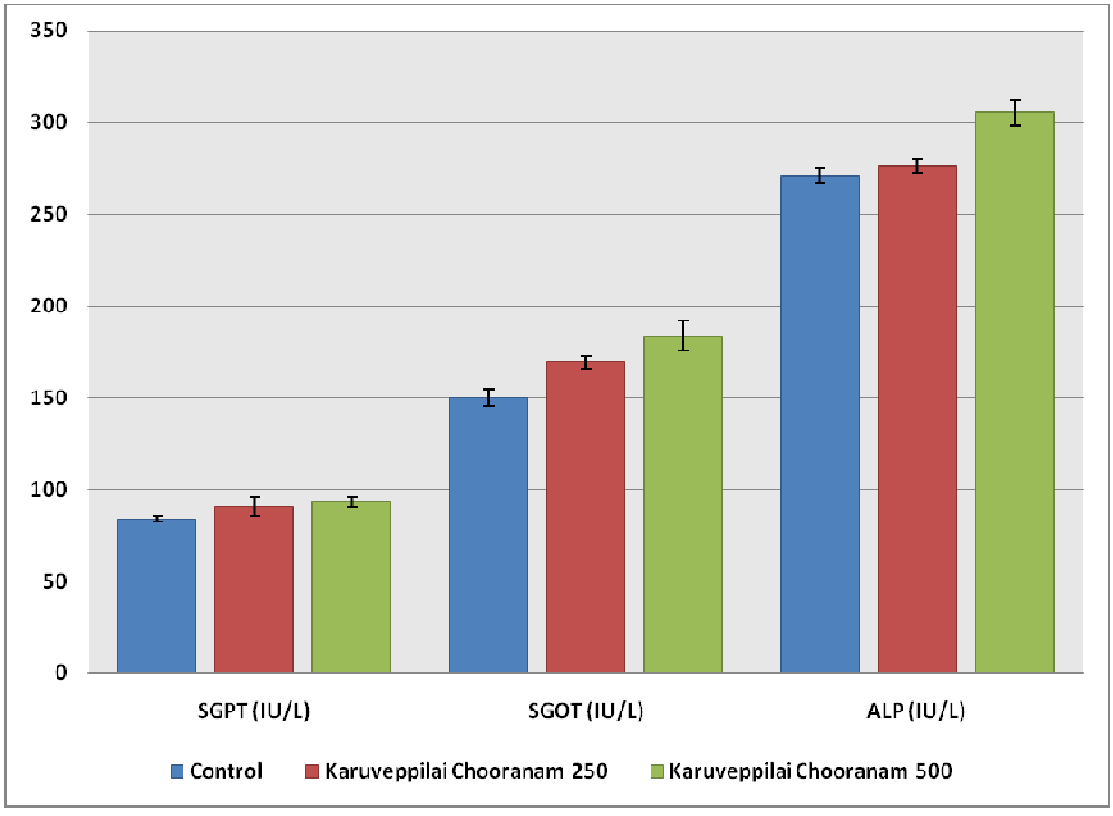


Table Shows the effect of Karuveppilai Chooranam on Kidney Functions in rats after 28 days drug administration

Groups	Drug Treatment	Urea (mg/dl)	Creatinine (mg/dl)
I	Control – Distilled water (1ml/kg, p.o)	34.67± 1.12	0.84± 0.07
II	**Karuveppilai Chooranam** (250mg/kg, p.o)	38.00± 2.88	0.79± 0.06
III	**Karuveppilai Chooranam** (500mg/kg, p.o)	60.00± 2.03	1.89± 0.07

Values are in mean ± SEM (n=6)

*P<0.05, **P<0.01, ***P<0.001 Vs Control

Figure Shows the effect of Karuveppilai Chooranam on Kidney Functions (Blood Urea and Creatinine) in rats after 28 days drug administration

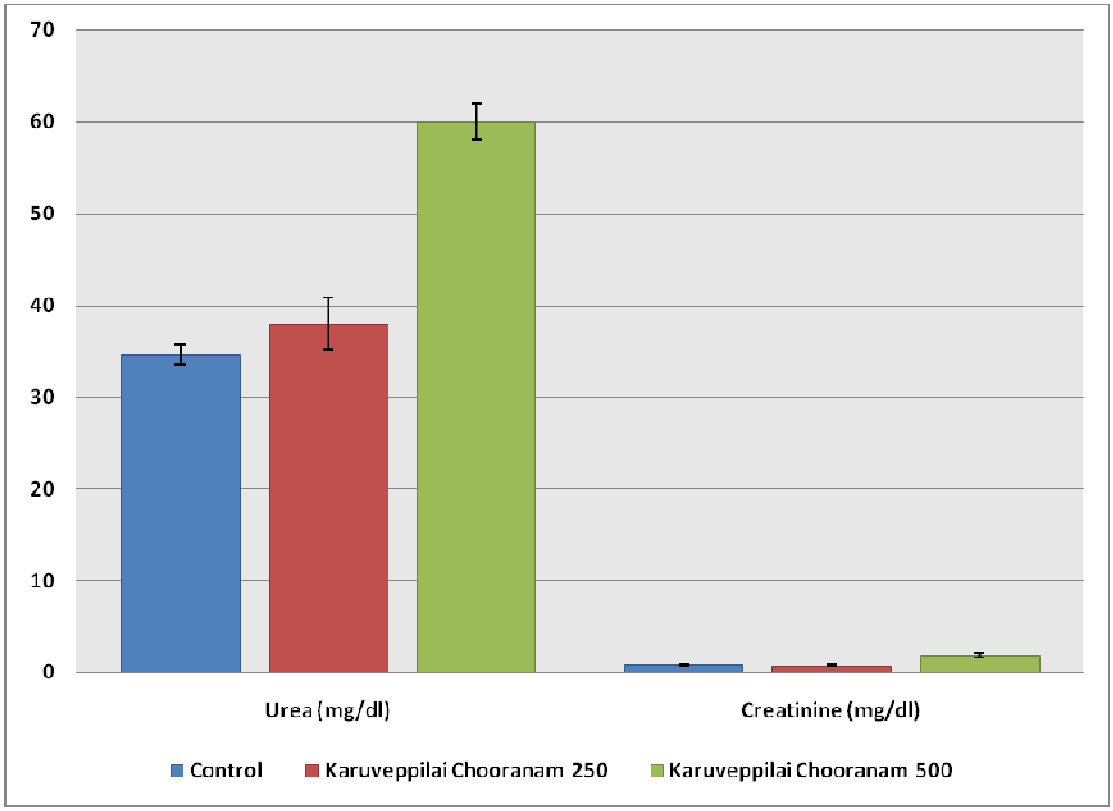


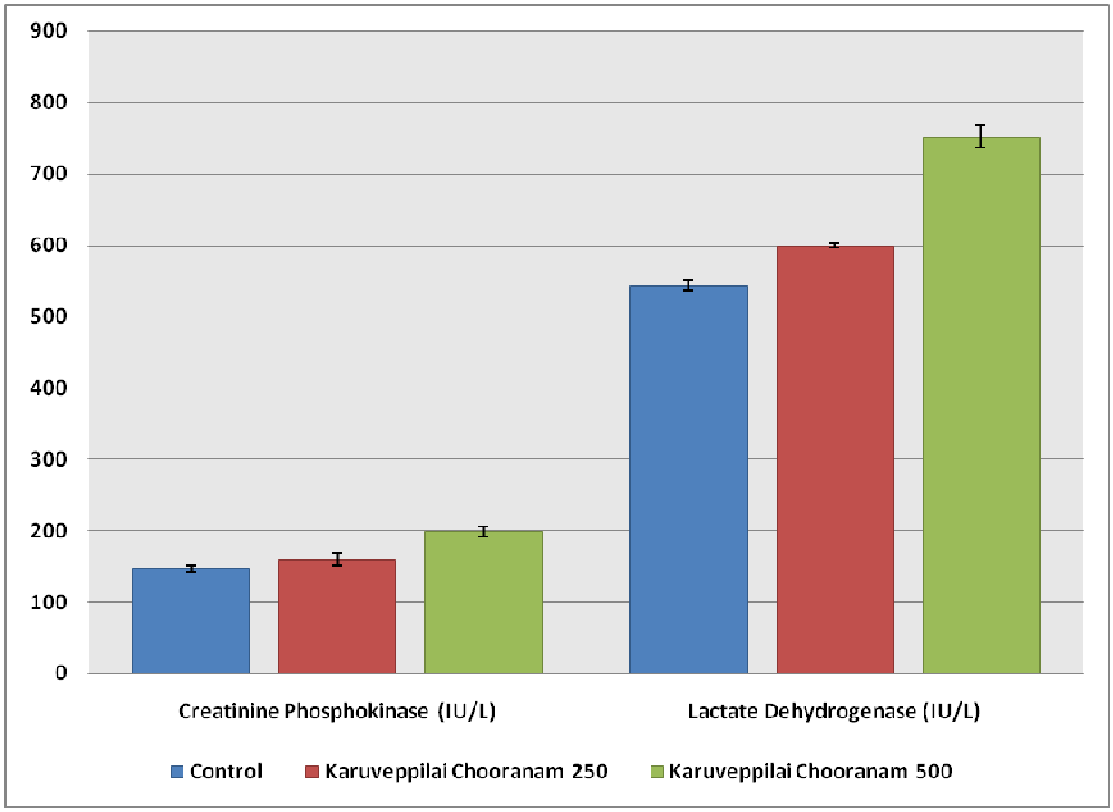
Table Shows the effect of Karuveppilai Chooranam on Cardiac Functions in rats after 28 days drug administration

Groups	Drug Treatment	Creatinine Phosphokinase (IU/L)	Lactate Dehydrogenase (IU/L)
I	Control – Distilled water (1ml/kg, p.o)	146.83± 4.79	543.50± 7.72
II	**Karuveppilai Chooranam** (250mg/kg, p.o)	159.80± 8.69	599.80± 3.73
III	**Karuveppilai Chooranam** (500mg/kg, p.o)	198.17± 7.15	752.83± 8.78

Values are in mean ± SEM (n=6)

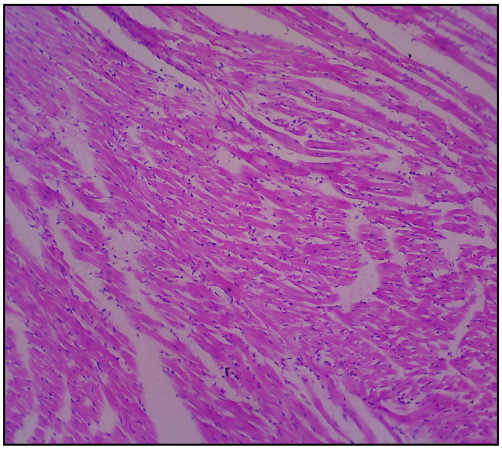
*P<0.05, **P<0.01, ***P<0.001 Vs Control

Figure Shows the effect of Karuveppilai Chooranam on Cardiac Functions (Creatinie Phosphokinase and Lactate Dehydrogenase and in rats after 28 days drug administration

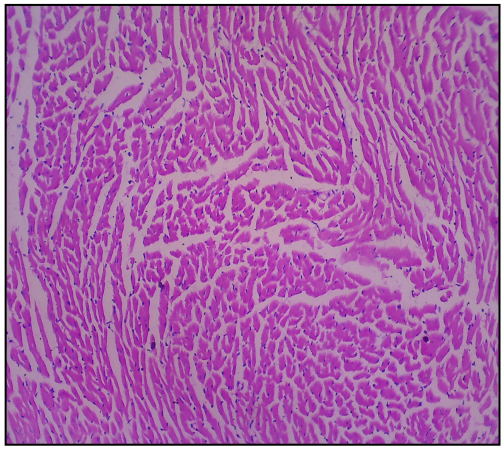


HISTOPATHOLOGICAL STUDIES

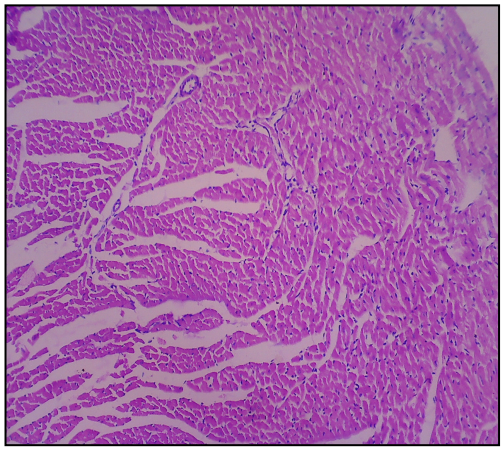
HEART



CONTROL



LOW DOSE (250mg/kg)

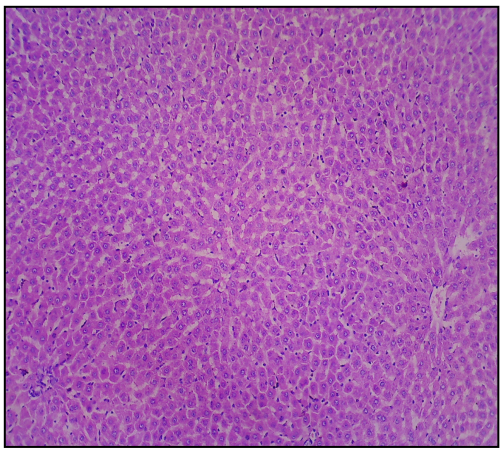


HIGH DOSE (500mg/kg)

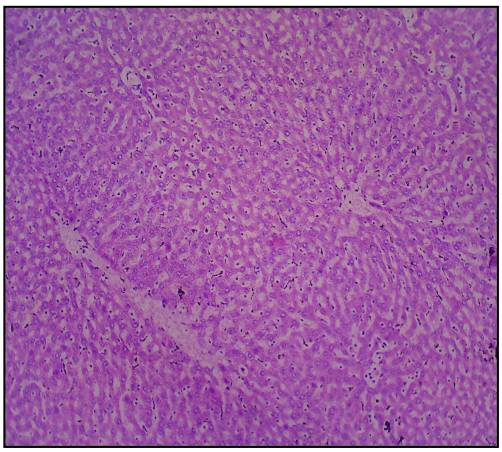
RESULT :

Normal cardiac muscle fibers seen

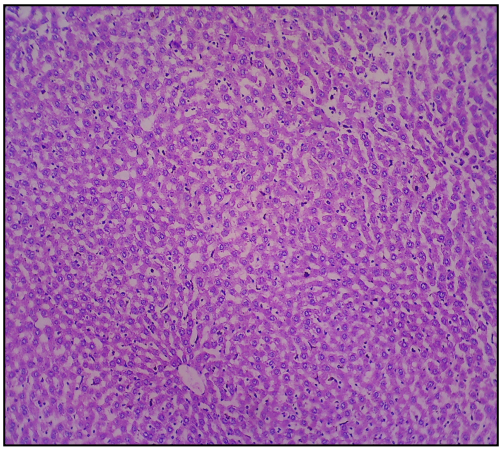
LIVER



CONTROL



LOW DOSE (250mg/kg)

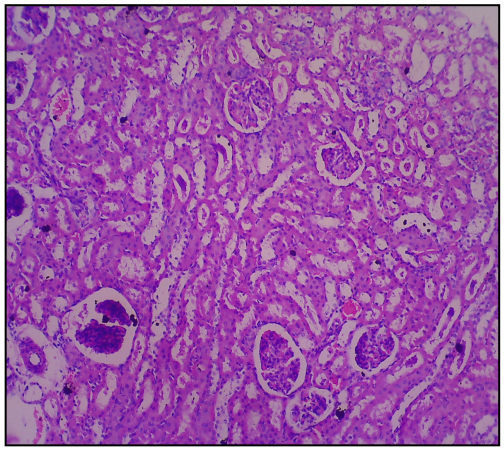


HIGH DOSE (500mg/kg)

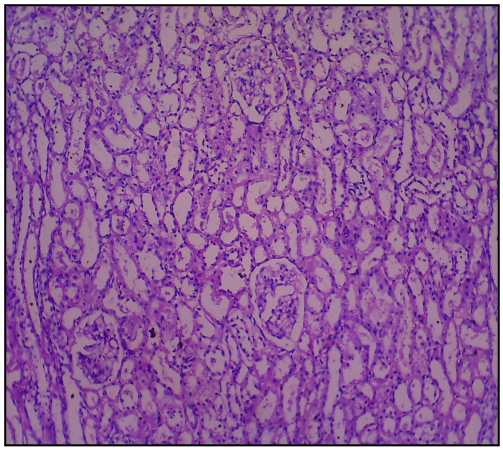
RESULT :

Normal Liver parenchyma seen

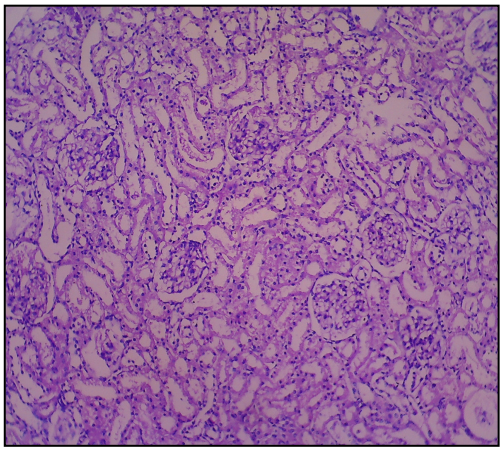
KIDNEY



CONTROL



LOW DOSE (250mg/kg)



HIGH DOSE (500mg/kg)

RESULT :

Normal Renal parenchyma seen

RESULTS

In sub-acute toxicity study, body weight, food intake and water intake were observed on 1st, 7th, 14th 21st and 28th day of Karuveppilai Chooranam after drug administration. The effect of Karuveppilai Chooranam regarding body weight during 28 days treatment in rats was given in table 19 and figure 1. There was no significant change in the body weight compared to control with both the doses of Karuveppilai Chooranam during 28 days treatment.

The effect of Karuveppilai Chooranam on food intake during 28 days treatment in rats was given in table 20 and figure 2. Karuveppilai Chooranam did not alter the food intake at both the dose levels as compared to control during the 28 days treatment. It indicates that Karuveppilai Chooranam didn't have any significant influence on food intake.

The effect of Karuveppilai Chooranam on water intake during 28 days treatment in rats was given in table 21 and figure 3. Karuveppilai Chooranam did not alter the water intake at both the dose levels as compared to control during the 28 days treatment.

The effect of Karuveppilai Chooranam on haematological parameters like RBC, WBC and Hb in rats after 28 days treatment were given on table 22, figure 4 and 5. Both the doses of Karuveppilai Chooranam did not showed any significant change in RBC, WBC and Hb compared to control.

The effect of Karuveppilai Chooranam on Differential Count in rats after 28 days treatment was shown on table 23 and figure 6. Both the doses of Karuveppilai Chooranam did not show any significant change in differential counts like Neutrophils, Eosinpophils, Monocyte and Lympocytes. From the effect of Karuveppilai Chooranam on hematological parameters it was found that it does not produce any toxicity in haemopoietic system.

The effect of Karuveppilai Chooranam on hepatic functions in rats after 28 days treatment was shown on table 24 and figure 7. Karuveppilai Chooranam at low dose (250mg/kg) did not produce any significant change in the hepatic enzymes (SGPT, SGOT and ALP) and found to be normal. The higher dose (500mg/kg) of Karuveppilai Chooranam didn't alter the SGPT, SGOT and ALP.

The effect of Karuveppilai Chooranam on renal functions in rats after 28 days treatment was shown on table 25 and figure 8. Karuveppilai Chooranam at 250mg/kg did not showed any significant change in urea and creatinine after 28 days treatment

compared to control and also the higher dose 500mg/kg of Karuveppilai Chooranam did not showed any significant changes in urea and creatinine.

The effect of Karuveppilai Chooranam on Cardiac functions in rats after 28 days treatment was shown on table 26 and figure 9. Low dose of Karuveppilai Chooranam (250mg/kg) did not alter the cardiac biomarker enzymes as compared to control animals. High dose of Karuveppilai Chooranam (500 mg/kg) significantly did not alter the cardiac biomarker enzymes.

In sub-acute toxicity study shows that Karuveppilai chooranam can be considered safe, as it did not cause either and lethality or adverse chanes with general behavior of rates and salso there were no observable determental effects on 250mg/kg and 500mg/kg over a period of 28days. It is concluded that the Karuvepppilai chooranam is relatively safe when administered orally in human for long administration upto the dose 500mg/kg.

BIOSTATISTICAL ASPECTS

Biological assay refers to assessment of the potency of vitamins, hormones, toxicants and drugs of all types by means of the responses produced when doses are given to experimental animals. In every dose response situation, two components must be considered; the stimulus and the subject.

The stimulus is applied to the subject as a started dose namely concentration, weight, time or appropriate measure. The subject manifest a response, the level of intensity below which the response does not occur & above which the response occur, suh a value has often been called threshold. But the term tolerance is now widely accepted.

MEDIAN EFFECTIVE DOSE (E.D.50)

It is the dose which produces the desired response in half the animal population tested.

MEDIAN EFFECTIVE DOSE (E.D.50)

It is the dose which kills half the population of the animal tested.

LD50 Measurement (Toxicity)

- If the test compound shows any pharmacological activity then the L.D.50 of the drug is determined.
- By determining the L.D.50, we can justify whether to proceed with the drug or not.

Table- 24 Acute toxicity study analysis

Group	Dose in mg/kg	No. of rats	No. of rats died
I	Distilled water (1ml/kg)	3	-
II	5	3	-
III	50	3	-
IV	300	3	-
V	2000	3	-

Since there was no mortality of the animal in acute toxicity study, lethal dose of drug could not be calculated.

Table – 25: Sub – Acute Toxicity Analysis

Group	Dose (mg/kg)	Both sex	Days	No.of rats died
I	Control	3 male + 3 female	28	-
II	250	3 male + 3 female	28	-
III	500	3 male + 3 female	28	-

In case of Sub – Acute Toxicity Study, with the help of physiological parameters such as Haematological investigations and with the Histopathological studies the drug reaction within the animal can be assessed and are being tabulated respectively.

Lethal dose of the drug **"Karuveippilai Chooranam"**can be calculated with higher dose level of the drug which can be done in further studies.

8. DISCUSSION

The preclinical toxicity study of Karuveppilai Chooranam was conducted with the prime objective to find out whether the drug has possess any side effects or adverse reactions on long term administration.

Biochemical analysis of Karuveppilai Chooranam indicated the presence of amino acid, tannic acid, unsaturated compound, ferrous iron, starch and reducing sugar.

Phytochemical analysis of Karuveppilai Chooranam shows the presence of carbohydrates, glycosides, fixed oils and fats.

FTIR study of Karuveppilai Chooranam shows the presene of halo compounds, aliphatic halo compound, aromatics, alkanes, δ- lactone, phosphorus and phosphines.

Scanned Electron Microscope study of end product shows that the particles were stabilized and have irregular morphology. The particles were distributed in range 10µm and the size is below 1µm

In acute toxicity study all the animals were active and did not showed any signs of toxicity. The motor activities were normal in all the 6 groups of animals. This acute toxicity study results reveals that Karuveppilai Chooranam was nontoxic upto a dose level of 2000mg/kg body weight of the animal.

Doses for sub-acute toxicity study were selected on the basis of acute toxicity study. The selected doses were 250mg/kg and 500mg/kg body weight of the animal.

In sub-acute toxicity study no signs of toxicity were observed. No changes in the hematological parameters. There was no changes in food intake, water intake and body weight. No mortality occurred till the last day of the study.

Necropsy study of the major organs liver, kidney and heart showed no apparent change in colour. The texture of the organs maintained and the specimens were normal on macroscopical examination when compared with that of the control group.

Histopathological examination revealed normal architecture in comparison with control and treated animal.

Since, there was no mortality in both acute and sub-acute toxicity studies the lethal dose of the drug could not be calculated. The biostatistical analysis reveals that Karuveppilai Chooranam is safe up to a dose level of 2000mg /kg body weight of the animal.

9. SUMMARY

The ingredients of Karuveppilai Chooranam were purified and the drug was prepared according to the process mentioned in Anuboga vaidhya navaneetham (Part – 8, Pg.No. 121, Second Edition - 2002, Hakim P. Mohamed Abdulla Sahib) and it was selected for evaluating the toxic effects and mortality when given in short and long duration. The aim of this study is to evaluate the safety of the drug Karuveppilai Chooranam by administering it to Wistar albino rats at various dose levels.

In review of literature, the ingredients of Karuveppilai Chooranam were discussed in depth with a special attention paid to their medicinal uses and toxicological aspects.

The ingredients of Karuveppilai Chooranam are karuveppilai, sundaivattral, mangkottai paruppu, omam, nelli mulli, mathulai odu, venthayam. All this drugs were purchased from Palayamkottai. The raw samples were taken purification and test medicine was prepared, as per the method narrated in the literature.

Biochemical analysis of Karuveppilai Chooranam indicated the presence of amino acid, tannic acid, unsaturated compound, ferrous iron, starch and reducing sugar.

Phytochemical analysis of Karuveppilai Chooranam shows the presence of carbohydrates, glycosides, fixed oils and fats.

FTIR study of Karuveppilai Chooranam shows the presence of halo compounds, aliphatic halo compound, aromatics, alkanes, δ- lactone, phosphorus and phosphines.

Scanned Electron Microscope study of end product shows that the particles were stabilized and have irregular morphology. The particles were distributed in range 10µm and the size is below 1 µm

The Acute toxicity study was conducted to know single dose toxicity of Karuveppilai Chooranam on female Wistar Albino Rats. The study was conducted using 15 female Wistar Albino Rats. The female animals were selected for study of 6 weeks old with weight range of within ±20% of mean body weight at the time of randomization. The groups were numbered as group I, II, III, IV and V and dose with control, 5mg/kg, 50mg/kg, 300mg/kg and 2000mg/kg of Karuveppilai Chooranam The drug was administered by oral route single time and observed for 14 days. Daily

the animals were observed for clinical signs and mortality. Body weight of animals was recorded once in a week.

There were no physical and general behavioral changes observed in wistar albino rats of 5mg/kg, 50mg/kg, 300mg/kg and 2000mg/kg to rats during 14 days.

Body weight of all animals did not reveal any significant change as compared to vehicle control group.

Food consumption of all group animals was normal

Mortality was not observed in all treated groups.

In Sub-acute toxicity study, the animals were selected randomly grouped into three different groups containing minimum 6 animals (3male and 3 female in each group) . The groups were numbered as group I, II, III and dose with control, 250mg/kg (low dose), 500mg/kg (High dose), of Karuveppilai Chooranam. The Karuveppilai Chooranam was administered as single dose for 28 days and all animals were observed daily once. These observations were also performed on week ends.

The observations included clinical signs of toxicity, food intake, water intake, body weight. No signs of toxicity were observed. There was no significant changes in food intake, water intake and body weight. No mortality occurred till the last day of the study.

The blood samples were used to evaluate Hematological parameters (like RBC, WBC, HB,DC) and evaluate biochemical parameters (like SGOT, SGPT, ALP, UREA and CREATININE). No changes in haematological parameters and biochemical parameters.

On completion of the 28^{th} day of drug administration, Wistar Albino Rats were sacrificed. In macroscopic examination the Heart, Kidneys and Liver organs were weighed. The organs were normal when compared with control group. Histopathological examination revealed normal architecture in comparison with control and drug treated animal.

10. CONCLUSION

Karuveppilai Chooranam was studied for its acute and sub-acue toxicity effect using laboratory animals. In acute toxicity study, Karuveppilai Chooranam did not produce any specific toxicity or mortality even at the dose of 2000mg/kg in wister albino rats.So No - Observed – Adverse – Effect – Level (NOAEL) of Karuveppilai Chooranam is 2000mg/kg body weight of animal. In sub-acute toxicity study, 250 and 500mg/kg of Karuveppilai Chooranam was used and it was administered once daily for 28 days through oral route. In conclusion Karuveppilai Chooranam can be considered safe, as it did not cause either any lethality or adverse changes with general behavior of rats and also there were no observable detrimental effects (250mg/kg, 500mg/kg) over a period of 28 days. It is concluded that the Karuveppilai Chooranam is relatively safe when administered orally in human for long administration upto the dose 500mg/kg.

BIBLIOGRAPHY

1. Hakim P. Mohamed Abdulla Sahib,Anuboga vaidhya navaneetham , Second Edition - 2002,published by thamarai noolagam chennai 26
2. J.Seetharam prasath, Anuboga Vaidhya Devaragasiyam 1991.
3. Dr.S.Venkatrajan L.I.M., Agasthiyar 2000,at 2002 by Saraswathy mahal, tanjore.
4. S.P.Ramachandran, Agasthiyar vaithiya Sinthamani 4000 at 1992 by thamarai noolagam chennai 26
5. Dr.S. Arangarajan B.I.M , Agasthiyar attavanai vagadam 1991 by Saraswathy mahal, tanjore.
6. S.P.Ramachandran,Bogar Nigandu 1200 by thamarai noolagam chennai 26
7. R.C.Mohan, Bogar 7000 at 3rd edition 2003, by thamarai noolagam chennai 26
8. Ram P.rastogi & B.N.Mehrotra, Compendium of medicinal plants,at 1985 by Central Drug research Institute,Lucknow
9. J.D Hooker, L.R.Eve Pco,Kent, , Flora of the British India at 1875
10. Dr.K.S.Murugesan ,Gunapadam-mooligai Vaguppu at 2006 by Directorate of Indian Medicine and Homeopathy,chennai
11. Dr.R.Thiagarajan B.I.M, Gunapadam Thathu jeeva Vagupu 4th edition 2004, published by Indian Medicine & HomeopathyDept.chennai 106
12. Dr.K.M.Nadkarni, Indian Materia Medica 3rd edition Bombay popular prakashan.
13. K.R kirtikar and B.D Basu, Indian medicinal plants at 1993 by lalit mohan babu Publishers, Alahakad
14. P.S Variers,Indian medicinal plants a compendium of 500 species 1994 by University press
15. C. Kannuswamy pillai, Kannuswamy parambarai vaidhiyam 2006, by ratna nayakar & sons, Chennai-79.
16. Abdullah sahif, Meha Nivarana bothini as nirizhivu maruthuvam 2nd edition 2013, by thamarai noolagam chennai 26
17. Dr sowrirajan, Pathartha Guna palporul vilakam 2000, by Saraswathy mahal, tanjore.
18. Ramachandran, Pancha Kavya Nigandu by thamarai noolagam chennai 26
19. C. Kannuswamy pillai, Pathartha Gunavilakam (moolavarkkam) at 1998, by ratna nayakar & sons, Chennai-79.

20. Raja sarapoji, sarabendirar vaithya ratnavazhi 2nd edition 1965 by Saraswathy mahal, tanjore.
21. Vasudeva sastri, venkatrajan sarabendirar neerizhivu chikithai 2005 by Saraswathy mahal, tanjore.
22. R.C. Mohan Sattaimuni nigandu 1200, 3rd edition 2014 by thamarai noolagam chennai 26
23. Kannuswamy pillai sikhitcha rathna deepam, ratna nayakar & sons, Chennai-79.
24. Dr S.Venkatarajan L.I.M Sarabendra saya Ulaimanthai Roga Sikitchai at 2000 by Saraswathy mahal, tanjore.
25. Kuppusamy mudhaliyar, Siddha maruthuvam 2nd edition 1987 by Directorate of Indian Medicine and Homeopathy,Chennai
26. R.C.Mohan, theriyar vaithyam 1000 at 3rd edition 2012, by thamarai noolagam chennai 26
27. T.V.Sambasivampillai, Tamil-English Dictionary at 1985 by govt of tamilnadu.
28. S.P.Ramachandran, Uyirkakkum Siddha Maruthuvam by thamarai noolagam chennai 26
29. Anonymous, the wealth of India by council of scientific and industrial research New Delhi.
30. *The ayurvedic pharmacopoeia part I, vol II*
31. apurba nandy ,Principles of forensic medicine including Toxicology by New Central Book Agency Ltd.
32. healthyfocus.org/health-benefits-of-mace
33. Toxicity of Nutmeg (Myristicin): A Review by Rahman N.A.A
34. Pharmacology and chemistry of Myristica fragrans Houtt. a review by P G Lath
35. Ecobichon D.J., The Basis of Toxicology Testing. CRC Press, New York.1997; pp 43-86.
36. Ghai, C. L. (1995) A text book of practical physiology, Jaypee Brothers, India, 119.
37. King EJ, Armstrong AR. (1934). A convenient method for determining of Serum and bile phosphatase activity. Journal of Canadian Medical Association. 31, 376-381.
38. Natelson S, Scott M.L, Beffa C (1951). A rapid method for the estimation of urea in biological fluid by means of the reaction between diacetyl-monoxime and urea. American Journal of Chemical Pathology. 21, 275.
39. Rosalki SB. (1967). An improved procedure for serum creatine phosphokinase determination. Translational Research. 69(4), 696-705.

40. Retimen S, Frankel SA. (1957). Colorimetric method for determination of Serum Glutamic Oxaloacetic and Glutamic Pyruvate Transaminases. American Journal of Clinical Pathology. 28, 56-63.
41. Slot C. (1965) Plasma creatinine determination: a new and specific jaffe reaction method. Scandinavian Journal of Clinical Investigation. 17, 381.
42. Tietz NW. (1976). Fundamentals of Clinical Chemistry, 2nd Ed., W.B. Saunders Co., 657.
43. Ecobichon D.J., The Basis of Toxicology Testing. CRC Press, New York.1997; pp 43-86.
44. Ghai, C. L. (1995) A text book of practical physiology, Jaypee Brothers, India, 119.
45. King EJ, Armstrong AR. (1934). A convenient method for determining of Serum and bile phosphatase activity. Journal of Canadian Medical Association. 31, 376-381.
46. Natelson S, Scott M.L, Beffa C (1951). A rapid method for the estimation of urea in biological fluid by means of the reaction between diacetyl-monoxime and urea. American Journal of Chemical Pathology. 21, 275.
47. Rosalki SB. (1967). An improved procedure for serum creatine phosphokinase determination. Translational Research. 69(4), 696-705.
48. Retimen S, Frankel SA. (1957). Colorimetric method for determination of Serum Glutamic Oxaloacetic and Glutamic Pyruvate Transaminases. American Journal of Clinical Pathology. 28, 56-63.
49. Slot C. (1965) Plasma creatinine determination: a new and specific jaffe reaction method. Scandinavian Journal of Clinical Investigation. 17, 381.
50. Tietz NW. (1976). Fundamentals of Clinical Chemistry, 2nd Ed., W.B. Saunders Co., 657.