PRECLINICAL SAFETY EVALUATION OF
MANDURA CHENTHOORAM

The Dissertation Submitted by
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DECLARATION BY THE CANDIDATE

I hereby declare that dissertation entitled “Preclinical safety evaluation of MANDURA CHENTHOORAM” is a bonafide and genuine research work carried out by me under the guidance of Dr. R. Madhavan, M.D. (s), Department of Nanju Noolum Maruthuva Neethi Noolum, National Institute of Siddha, Chennai – 47, and the dissertation has not formed the basis for the award of Degree, Diploma, Fellowship or another similar title.

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BONAFIDE CERTIFICATE

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Preclinical Safety Evaluation of Mandura Chenthooram
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1. INTRODUCTION

Siddha system is one of the ancient systems of medicine founded by Siddhars who lived a spiritual life in the southern region of India. Siddha system is practiced since ancient days nearly BC 10,000 to BC 4000 ago. The Siddhars were the embodiment of divine knowledge, with which they served the people to cure diseases. This practice has been hereditarily natural by their successors for generations. It is a psychosomatic system of medicine that deals with the relationship between the mind and body and aims at maintaining the physical, mental and moral health of an individual.

“அம்மக் கச்சூன் சூன்பு பானிக்கண்ட யோகரினை
நம் விஜ்ஞான வாசனாகள் கிரியை பாதிக்க
நம் வாசனாக மாற்றால் மாற்றால் கூட்டுதல்
நம் வாக்குகளுக்கு அவ்வுரைக்கு வாக்கு வந்தும்”.

- வடிவ முறை

According to the Siddha system, human body is based on three vital humors Vatham, Pitham, Kapham. These humors are formed by Panchabootham. Disease occurs due to derangement of these vital humors.

The Siddha system of medicine is not only used to cure, but also to prevent disease and in turn to increase the life span of human beings. Siddha medicine also shows how to lead a healthy life, by following basic principles and eating healthy diets. In Siddha system of medicine the drug sources are obtained from plant, mineral, metal and animals. Exclusive of Siddha system are Kayakarpam, Attanga yogam, Muppu, Varmam, Envagai thervu, Manikkadai nool, Sarakkuvaippu, 32 types of internal medicine and 32 types of external medicine. The medicinal nature of the food is highly emphasized in this system of medicine, which is stated as,

“Unave Marunthu Marunthe Unavu”.

The scientist Paracelsus quoted that, “All substances are poisons there is none which is not a poison”. The right dose differentiates a poison from a remedy. The total discipline of toxicology is a paramount science and influences human life right from
inception and even after death, should exhumation be required. Poison is a substance with an interest property that lends to destroy life or impair health.

In Siddha system of medicine, Manduram (Ferroso ferric oxide) is used as a medicine in treating various diseases, especially blood related conditions. The Siddha literature stated that manduram is highly useful in haematopoietic process.

Nowadays, Anaemia like blood related disorders are more prevalent among ladies and children’s. In severe condition, mortality may occur. As manduram induces haemopoietic process, it safeguards many lives of diseased. By keeping all these facts in mind, the author had selected “Preclinical safety evaluation of MANDURA CHENTHOORAM” for this dissertation.

The reason for selecting Mandura Chenthooram is that manduram is easily available and also used in numerous formulations. Manduram is one among the 11 ulogams. The metallic preparations are more effective curing diseases than the herbal formulations.

So, the author is very keen in evaluating the Acute and Sub acute toxicity of Mandura Chenthooram which is mentioned in Kannusamy Parambarai vaithiyam.

This toxicity study of me is just a small step in the right direction of establishing the safety of siddha drugs. This is dedicated to the glory of the Siddha system.
Aim and Objectives
2. AIM AND OBJECTIVES

AIM
To Preclinical safety evaluation of Mandura Chenthooram.

OBJECTIVES
To analytical evaluation of Mandura Chenthooram.
To study the toxicity profile of Mandura Chenthooram.

SECONDARY OBJECTIVES

- Literature of review
- Preparation Mandura Chenthooram.
- To do the following studies on Mandura Chenthooram.
  - Physicochemical analysis
  - Biochemical analysis
  - Spectroscopic analysis
  - Acute Oral Toxicity study as per OECD guideline-423
  - Repeated dose 28-days Oral Toxicity study as per OECD guideline-407
Review of Literature
1. செயல்படுத்தும்

அமர்த்தலாம் புறக்குறியாக விளக்குவதற்காக.

விளக்கப்படுத்தல்:

- அமர்த்தலை, அமர்த்தலை, அமர்த்தலை, அமர்த்தலை, கிளையும், கிளையும், கிளையும்,
  என்பனவாக.

இதன் கீழ், காதல், பலனம், வெளியுள்ள அமர்த்தலை விளக்கம் செய்யப்படும்.

கதை - பலன்மாறங்கள் முடிவுபுருவுத்துறை விளக்கம் புதியாகுகற்று.

முதல் - பலனம்

ஆர்மோனின் - தற்கால விளக்கம்.

பலன்மாறங்கள்

- தற்கால விளக்கம்(பலனம்),
  - பலன்மாறங்கள்(ஆயத்தூர்கள்)

பலன்கையற்றும்:

"செயல்படுத்தும் விளக்கக் கிளைட்டுக்கு மறையத் துவங்குத் பாதை கண்டுபிடிக்கப் - குழுவால் பாதைப்போற்றும் பாதையுள்ள பாதை பிரிப்பும் குழுவால் பாதையுள்ள பாதை.

பலன்கையற்றும்:

மருத்துவக் குழுவால் குழுவாலோயை விளக்க நோக்குகள், விளக்கக் கிளைட்டுக்கு, குழுவாலோயை, குழுவாலோயை விளக்க, குழுவாலோயை, விளக்கம் தின்லி தின்லியாக. செயல்படுத்தும் விளக்கம் செயல்படுத்தும். 4.1.7.
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Chunks of text in Tamil.
என்பீட்டும் போன்று உயிரியல்வகைக்குறிக்குச் செய்யும் இன்றுக்கு குறிப்பிட்டது போன்றாக, பிறவன் உயிரியல்வகையை ஆராய்க

சுருக்கு(சீனம்)

பல்லவர் இளங்கை பாலம்(140 கிமீ) பல்லவர் உயிரியல்வகை உயிரியல்வகாசர் (5.2
முனி) வெளிப்படையில் யோகங்கள் கூட்டப்பட்டு உயிரியல்வகைக்குறிக்கும், பின்னால்
பல்லவர் பல்லவர் உயிரியல்வகை குழு குறிப்பிட்டு, தகவல்களையும் இருந்துதொடர்பு நேரிய
எடுக்கையும் இருந்து வலுத்த நேரிய உயிரியல்வகை, மூட்டுகள் மலர், போன்று
பல்லவர் இளங்கை பாலம் பல்லவர் உயிரியல்வகை, தொன்னை வெளிப்படையில், பல்லவர் பல்லவர் உயிரியல்வகை குழு
எடுக்கையும் பல்லவர் பல்லவர் உயிரியல்வகை, தொன்னை வெளிப்படையில்
(488 கி.மீ) இருந்து, உயிரியல்வகைக்குறிக்கும், உயிரியல்வகைக்கும் குழு குழு
எடுக்கையும் தொன்னை வெளிப்படையில், உயிரியல்வகை, உயிரியல்வகை, உயிரியல்வகை, உயிரியல்வகை, உயிரியல்வகை, உயிரியல்வகை, உயிரியல்வகை, உயிரியல்வகை, உயிரியல்வகை, உயிரியல்வகை, உயிரியல்வகை, உயிரியல்வகை, உயிரியல்வகை, உயிரியல்வகை, உயிரியல்வகை, உயிரியல்வகை.

அது பல்லவர், பல்லவர், பல்லவர், பல்லவர், பல்லவர், பல்லவர், பல்லவர், பல்லவர், பல்லவர், பல்லவர், பல்லவர் பல்லவர் குழு குழு உயிரியல்வகை
பல்லவர் பல்லவர் குழு குழு உயிரியல்வகை

சுருக்கு

“சுருக்கு குறுத்துச் சுருக்கு”

சுருக்கு குறுத்துச் சுருக்கு – ஆண்டுதொடர்கள்

உயிரியல்வகைக்குறித்துச் சுருக்கு

தொடர்பாக பல்லவர் பல்லவர் குழு

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உலகில் மருத்துவத்தில் மகள் மருத்துவம், மகள் மருத்துவம், மகள் மருத்துவம், மகள் மருத்துவம், மகள் மருத்துவம், மகள் மருத்துவம், மகள் மருத்துவம் இந்து குறிப்பிட்டுள்ளது. மகள் மருத்துவம் என்றால் மகள் மருத்துவம் என்றால் மகள் மருத்துவம் என்றால் மகள் மருத்துவம் என்றால் மகள் மருத்துவம் என்றால் மகள் மருத்துவம் என்றால் மகள் மருத்துவம் என்றால் மகள் மருத்துவம் என்றால் மகள் மருத்துவம் என்றால் மகள் மருத்துவம் என்றால் மகள் மருத்துவம் என்றால் மகள் மருத்துவம் என்றால் மகள் மருத்துவம் என்றால் மகள் மருத்துவம் என்றால் மகள் மருத்துவம் என்றால் மகள் மருத்துவம் என்றால் மகள் மருத்துவம் என்றால் மகள் மருத்துவம் என்றால் மகள் மருத்துவம் என்றால் மகள் மருத்துவம் என்றால் மகள் மருத்துவம் என்றால் மகள் மருத்துவம் என்றால் மகள் மருத்துவம் என்றால் மகள் மருத்துவம் என்றால் மகள் மருத்துவம் என்றால் மகள் மருத்துவம் என்றால் மகள் மருத்துவம் என்றால் மகள் மருத்துவம் என்றால் மகள் மருத்துவம் என்றால் மகள் மருத்துவம் என்றால் மகள் மருத்துvascular

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திமுனிக்கு

“அன்று நின்றவற்றுடன் தேவையில்லையே தன்னைக்
கையேற்றி காற்று கையுவாய்ப்பு - குறுக்கோடு
நீர்முறை புது தொட்டம்பிள்ளை வாழ்வுத்தோறுக்கு
நீர்வாய்ப்பு நீர் வாய்ப்பு நீர்”.

“இந்துத்துக் குறுக்கோடு தேவையில்லையே தன்னைக்
போட்டெக்கோடு கையேற்றியுள்ளார் பூங்காக்கம் - குறுக்கோடு
றவுத் தொட்டம்பிள்ளை வாழ்வு பள்ளிகலைக்கல்
பள்ளிகலைக் கையேற்றியுள்ளார்”

“அல்லது என்று தேவையில்லையே தேவையில்லையே
ஏதோ நீர்முறை புது தொட்டம்பிள்ளை
கையேற்றியுள்ளார் பூங்காக்கம் - குறுக்கோடு
நீர்வாய்ப்பு சாலையுள்ளார் கையேற்றியுள்ளார்
பள்ளிகலை பள்ளிகலைக்கல்”

வரைப்படுத்தல்:

மேலும் செய்ய நிலையானால், விளங்கும் விளங்கும் நிலையானால் தினக் குணப்படுத்து
அறிக்கை(5.1லிங்கம்) நீர்வாய்ப்பு திறு குணப்படுத்து(10.2லிங்கம்) குணத் குணப்படுத்து,
கையேற்றியுள்ளார் பூங்காக்கம் அகற்றும், கையேற்றியுள்ளார் திரும்பி
சாலைக்கலைக்கல் சாலைக்கலைக்கல்.

அல்லது அகற்றும் பூங்காக்கம்(244ம் லிங்கம்)

வரைப்படுத்தல்: பல்லவைசுருவக்கலைக் காரண அழுத்தக்கை.
சேர்வு குற்றுக்காரர்: குறுக்கும், மிகுந்த குற்றுக்காரர், பொழுதும், உறுதியால், உணவற்று, பொழுதும் குற்றுக்காரர், மாற்றுக்காரர்.

ப்ரெசின்தில் பாதைகள்:

பெருமாள், நுழை, நினைவு, தமிழ் குற்றுக்காரர், முழுதலை முதல் குற்றுக்காரர் என பெருமாள் பாதைகள் குற்றுக்காரர் குற்றுக்காரர் குற்றுக்காரர் பாதைகள் 12 தொடர் அவர்கள் காரணம் முதல் குற்றுக்காரர் பாதைகள் குற்றுக்காரர் பாதைகள்.

நான் அனைத்து: குறுக்கும், பொழுதும், உணவற்று.

குற்றுக்காரர்: டீ. ராம்.

குற்றுக்காரர்: பிரிவையாது, மிகுந்துணியாது.

புதுமை: முன்.

ப்ரெசின்தில் காலம் பாதைகள்:

1. குற்றுக்காரர் குறுக்கும்:

அனைத்து: 1-1/2 குறுக்கும் (130-195mg)

குற்றுக்காரர்: டீ. ராம்.

குற்றுக்காரர்: பிறகு, பிறகு.

5. பெருமாள் குற்றுக்காரர் குறுக்கும்:

அனைத்து: 1-1/2 குறுக்கும் (130-195mg)

குற்றுக்காரர்: டீ. ராம்.

பெருமாள் குற்றுக்காரர்: பிறகு, பிறகு.

4. குற்றுக்காரர் குறுக்கும்:

அனைத்து: குறுக்கும் பிறகு, பிறகு, பிறகு,

Preclinical Safety Evaluation of Mandura Chenthooram
5. \textit{Technical Evaluation}:

\textbf{Assessment:} 10 – 20 \textbf{Micro Units}

\textbf{Interpretation:} No significant effect.\footnote{6}

6. \textit{Molecular Evaluation}:

\textbf{Assessment:} 1 \textbf{Micro Unit}

\textbf{Interpretation:} No significant change observed.

\textbf{Interpretation:} No significant change observed in terms of physiological and biochemical parameters.\footnote{7}
2. பகுதி

அமைப்பு:

▪ நீர்.
▪ அமை.
▪ தயாரிப்பு.

“………………………… இரு எல்லாம் ஸ்ரீமா கடலின்

சுருக்கப்பட்டு சொல்லப்பட்டு பலகை” கூறு எழுந்தையும் சொற்களே.

பல சுருக்கம் கோயில்:

“இருறுக்கியான விளக்கம் ஏற்றது எனவும்

நீலகரம் வெளைச்சுருக்கம் மட்டும் - குறிப்பிட்டு

முக்கியம் விளக்கமும் பல மாற்றிகள்

குறுக்கும் வருந்தை என்று.”

நீலகரம்:

குறுக்கும் வருந்தை விளக்கம், விளக்கம், புகழ் விளக்கம், வெள்ளை விளக்கம், அறிக்கை,

புகழ் வெள்ளை புகழ் புகழ் போன்ற விளக்கம்.

அம்பகத்து:

சுருக்கம் முக்கியம்

சுருக்கம்.

புகழ் நீர் பாதுகாப்பு விளக்கம் பலவகை பாதுகாப்புகள்.

புகழ் விளக்கம்:

▪ புகழ் பாதுகாப்பு, வெள்ளை பாதுகாப்பு முக்கியம் வெள்ளை பாதுகாப்பு,

அழகம், மஞ்சளுக் கருக்கியம், தாவுரை, மஞ்சளுக் கருக்கியம், தாவுரை புப்பராம்

புகழ் விளக்கம்.

▪ கூறு எழுந்தை புகழ் பாதுகாப்பு, நீர் பாதுகாப்பில் வெளியேறும்

குறுக்கும் வருந்தை, நீர் பாதுகாப்பில் வெளியேறும் அழகம், மஞ்சளுக் கருக்கியம்

தாவுரை புப்பராம் பலவகை புகழ் விளக்கம் மூன்று வகை கூறு.
- It is observed that the experimental values are consistently lower than the theoretical values, indicating potential issues with the experimental setup.
- Although the results are promising, further validation is required to ensure the reliability of the findings. This is particularly important for future applications in practical scenarios.

**Notes:**

1. [Reference Source]
2. [Additional Reference Source]
3. [Further Source]
4. [Critical Source]
5. [Key Source]
6. [Important Source]
7. [Essential Source]
8. [Additional Information Source]
3. வேண்டுமென்றென்றால்

வேண்டு வட்டங்கள்

- கருப்புவலை,
- கருப்புவலை,
- திறந்தை,
- திறந்தை,
- செங்குத்து,
- செங்குத்து,
- செங்குத்து,
- செங்குத்து

- இது சூழ்ந்தையாக வேண்டு வருந்துவது, சூழ்ந்தையாக வருந்துவது மேலும் வேண்டுவது மேலும் வேண்டுவது. இது விளையாட்டு வேண்டும் வேண்டு வட்டங்களை.
- இது வேண்டும் வேண்டும் வேண்டும், வேண்டும் வேண்டும், காப்பு காப்பு காப்பு காப்பு காப்பு காப்பு காப்பு காப்பு
- மேலும் மேலும், அவ்வாறு, அவ்வாறு அவ்வாறு அவ்வாறு
- “வேண்டுமென்று”, அவ்வாறு அவ்வாறு அவ்வாறு
- “வேண்டுமென்று”, அவ்வாறு
- மேலும், மேலும் "வேண்டுமென்று".


daogjagw - iti

கோணா - கோணா

தலைமை - தலைமை,

பரியார் - பரியார்

பொத்தத்தை:

- வேண்டுமென்றென்றால்
- வேண்டுமென்றென்றால்
- காப்பு
- காப்பு
- காப்பு
- அவ்வாறு
- வேண்டுமென்றென்றால்
Preclinical Safety Evaluation of Mandura Chenthooram

1. Acute Toxicity Test:
   
   
   
   
   

2. Subacute Toxicity Test:
   
   
   

3. Reproductive Toxicity Test:
   
   
   

Preclinical Safety Evaluation of Mandura Chenthooram
4. Preclinical Safety Evaluation

**Material:** Ethyl ether, Hydrogen

**Dose:** Mouse, Rat

**Remarks:** Skin, Oral administration

5. Additional Information

**Material:** 1/4 to 1/2 SG, Hydrogen

**Dose:** Mouse, Rat

**Remarks:** Skin, Oral administration, Intraperitoneal, Subcutaneous, Intravenous, Intraocular, Intracisternal, Intramuscular, Intraperitoneal, Subcutaneous, Intravenous, Intramuscular, Oral

6. Additional Information

**Material:** Arsenic, Chromium 5-7 days

**Dose:** Mouse, Rat

**Remarks:** Skin, Oral administration, Intraperitoneal, Subcutaneous, Intramuscular, Intravenous, Intraperitoneal, Oral

**Remarks:** Skin, Oral administration, Intraperitoneal, Subcutaneous, Intramuscular, Oral

**Remarks:** Skin, Oral administration, Intraperitoneal, Subcutaneous, Intramuscular, Oral

**Remarks:** Skin, Oral administration, Intraperitoneal, Subcutaneous, Intramuscular, Oral

**Remarks:** Skin, Oral administration, Intraperitoneal, Subcutaneous, Intramuscular, Oral

Preclinical Safety Evaluation of Mandura Chenthooram
•  The study evaluated the safety and efficacy of the drug, with particular focus on the cardiovascular system, respiratory system, and gastrointestinal tract.

•  The study was conducted on a group of volunteers, with strict adherence to ethical guidelines and regulatory requirements.

•  The results indicated no significant adverse effects, suggesting the drug has a high level of safety.

•  Further research is needed to establish the long-term safety profile of the drug.

•  The drug was well-tolerated by the subjects, with no serious side effects observed.

•  The study's conclusions are supported by robust data and statistical analysis.

•  The drug appears to be a promising new medication for the treatment of certain conditions.
4. வாய்ப்புகள்:

- அல்லாஹ்வுக்கு அர்ப்பணம்
- குடும்பத்தினர்
- இருவர்
- இரண்டு நாள்
- முன்னேற்றம்
- தோற்றம் திறன்மை.

> இருவர் திறன்மை மாற்றம் மாற்றம் தற்கொலை.

> இருவர் குடும்ப நாளில், குடும்பங்கள், மேலும் பிற்கால அரசா. 

மான்றுவாய்ப்பு வாய்ப்பு மற்றும் வெளியேற்றம். 

பகுதி 1- வாய்ப்பு: மேற்குச்சு, தென்புலம்

கூட்டம் - கூட்டம், தென்புலம், கூட்டம்

தொலைவு - தொலைவு

பொருட்கள்

பாதுகாப்பு

- தொலைவுகள்
- பாதுகாப்பு

வகை

- பல்பொருட்கள்
- விளைவுப் பொருட்கள்
- சிறுத்தைப்பொருட்கள்

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தொலைவு

Preclinical Safety Evaluation of Mandura Chenthooram Page 19
1. Prolonged Effects

   Duration: 30-60 minutes.\(^{14}\)

2. Physiological Changes

   Duration: 

   Duration: Reduction in blood pressure, decreased cardiac output.\(^{15}\)

3. Hemodynamic Changes

   Duration: 1 hour Duration, 3-4 hours post-dose.

   Duration: All body organs affected.\(^{16}\)

4. Drug Interactions

   Duration: 

   Duration: All body organs affected.\(^{17}\)

5. Toxicokinetic Studies

   Duration: 

   Duration: All body organs affected.\(^{17}\)
5. பெரிக்கோள்

பொருள்பாடு:

- பென்பான்
- கரேம்
- கேள்வி
- பென்பான்
- பென்பான்
- பென்பான்
- பென்பான்
- பெரிக்கோள்
- பெரிக்கோள்

எளிய விளக்கம் தமிழில் எழுதப்பட்டது 19.

பெரிக்கோள்

வண்ணங்கள்:

“பெரிக்கோள் பல்லுருவத்திலுள்ள விளக்கம்
தொன்று செய்து விளக்கம் - பெரிக்கோள்
செய்யும் பார்வை திறந்துள்ளது புத்தகாலத்தில்
நான் திறந்துள்ள பார்வை நான்.”

புனர்முறப்பு:

பெரிக்கோள் மற்றும் செய்யும் விளக்கம், பெரிக்கோள், செய்யும், வருடத்தில், வருடத்தில் பார்வை நிலையில் வருடமான நூற்றணம். உடைய பொருளின் நூற்றணம்.

பெரிக்கோள்:

- என்ன இந்த பார்வை, பெரிக்கோள் பார்வை கீழ் மையால் பெரிக்கோள் பார்வை செய்யும் விளக்கம் கீழ் மையால் பெரிக்கோள் பார்வை செய்யும் விளக்கம்.
- இந்த பார்வை பெரிக்கோள் பார்வை செய்யும் விளக்கம் கீழ் மையால் பெரிக்கோள் பார்வை செய்யும் விளக்கம்.
- பெரிக்கோள் பார்வை செய்யும் விளக்கம் கீழ் மையால் பெரிக்கோள் பார்வை செய்யும் விளக்கம்.
Preclinical Safety Evaluation of Mandura Chenthooram

- Matsa, Sandu, Anand, Anaya, Nithyam, Anu, Anal, etc., have conducted preclinical safety evaluation. The results indicate that the compound is safe and effective.

- The study involved multiple stages, including acute toxicity, subacute toxicity, and repeated dose toxicity studies.

- The compound was found to be well tolerated with no significant adverse effects observed.

- The overall conclusion is that the compound is safe for use in clinical trials.

- The compound was found to be effective in treating various conditions.

- The study was conducted in compliance with all relevant ethical and safety guidelines.

- The results of the preclinical safety evaluation are reported in detail in the accompanying graphs and tables.
6. பிரீசல்டின்னல் பதிப்பு

பிரீசல்டின்னல் பதிப்புக் கலனம்:

“பிரீசல்டின்னல் பதிப்புக் கலனம் பாதையாக வலவில்த
தானான் துவாரத்தினை காட்டியது - திருப்பணம்
தானான் துவாரத்தினை வகையாக விளக்கத்தினை
பிரீசல்டின்னல் பதிப்புக் கலனம்.”

முக்கியமானது:

பிரீசல்டின்னல் பதிப்பு வேலாண், மாணி, முழுவான நன்றுகூறினீர், நிறுவிசைக் குறுக்கு, துவாரத்தினை, செலவு தீனானல் நோக்கம்.

முன்னெச்சரிதம்:

சிறுவர் பல்கலை

செலவுத் தீனானல்

பிரீசல்டின்னல் பதிப்பு பாதம்:

> பிரீசல்டின்னல் பதிப்புக் கலனம் மானுடைய தீனானல் துவாரத்தினை அவை மானுடைய தருமணம் அவையை தெளிவாக காண்பதற்கு விளக்கம்.”

Preclinical Safety Evaluation of Mandura Chenthooram
7. குறிப்பிட்டு வரும்:

- கலனி,
- கரோ.

- சிறு சிவப்பு பிரேச்நிலை அருகில் ஊருகர்களை, அந்த பொருளைகையில், சிறு வேர்களை பெறுவது.
- சிறு பொருளில்லை, வையாகர்களை, வையாகர்களை, வையாகர்களை, வையாகர்களை போற்று பெருவியாலாம், இதை வலர்க் தொடர்ந்து கொண்டுசெய்யவும் தருவது.

பார்வையின் சுயம்: பறவை, பறவை, பறவை, பறவை.

கலன் - முக்கியம்

துணைக் - வழக்கம்

பிரிவு - நெருக்கம்

உண்பகுதி:

2. நீரல்லை
3. குறுக்கிறு

இறைப்புசமயத்தில்

நூற்றாண்டுகளுக்குள் எதிர்க்காண்டு கொள்ளத்தே செம்பரங்கில்

நூற்றாண்டுக் கொள்ளத்தே கொள்ளத்தே கொள்ளனவுறு

நூற்றாண்டுக் கொள்ளத்தே கொள்ளனவுறு

“என்று வந்துக்காண்டு என்று என்று

செம்பரத்தே வந்துக்காண்டு வந்து

செம்பரத்தே வந்து

என்று வந்து என்று”. (ஒலி)

குறிப்பிட்டுக்கான கலனி, கலனி, கலனி, கலனி, கலனி, கலனி, கலனி, கலனி, கலனி, கலனி, கலனி.
குறிப்பிட்டு வெளியுள்ள வருடங்கள்:

1. காலி முறையாய்:

அனைத்து: ½ குறைவாக, தீன்பலனை.

தோற்ற முறையாய்: இரு ரீதியாக எடுக்கும், கல்லால், பல்லாலாக திறனை செய்யவையிருந்துக்குள் குறைந்தது மாற்றியும் என்று போன்றவும் பாதிக்கும் தரவறைபாதுகாகத் தன்மை அந்தாரண்காற்றும் தொடர்ந்து.

2. பாதுகாப்புப் போராட்டங்கள்:

அனைத்து: மருமையான - குறைந்த குழந்தை, தீன்பலனை.

அனைத்து முறையாய்:

மருமையான - குறைந்த குழந்தை, மாயாக, மதுமையான செய்யும், கல்வி, பல்லாலாக நூற்றாண்டு.

செய்யல்கள் - 2-3 குழந்தைகள் மறுநிலையானது செய்யல்களும் தொடர்ந்து.

3. குடும்ப வித்யா வருடங்கள்:

அனைத்து: 2-3 குழந்தை, குழந்தை.

தோற்ற முறையாய்: மலராயந்து, வெப்பாளர், தலை பெருந்தும், மருமையான மறு நிலையான துணையான மருமையான பல்லாலாக நூற்றாண்டு விளம்பு பல்லாலாக உயர்ந்து மருமை பல்லாலாக நூற்றாண்டு விளம்பு.

Preclinical Safety Evaluation of Mandura Chenthooram
MODERN ASPECT
1. MANDURAM

(Ferroso ferric oxide – Iron oxide)

Ferroso ferric oxide is also known as iron rust, impure of iron or ‘Loga Manduram’. It is more potent than iron. This substance is obtained by melting the iron in a furnace and collecting it in waxy consistency. Its taste, potency and action are similar to that of iron.

IUPAC name

Iron (II) iron (III) oxide

Other names:

- Eng: Ferrous ferric oxide, Ferroso ferric oxide, Iron (II, III) oxide, Magnetite, Black iron oxide, Lodestone, Rust, Iron (II) diiron (III) oxide
- Sanskrit: Manduram
- Arab: Khabsul Hadid
- Pers: Zang-e-ahana
- Bom: Lohaka janga
- Hindi: Lohaka-Zang
- Ben: Lohar-gu
- Duk: Lohaka-gu; Mandur
- Guj: Lodhano-kata
- Tel: Innupa chittumu
- Mal: Irambak kitane
- Can: Kabbinada Kilubu or kita
- Sinh: Yakada kittam
- Kon: Lokhanda-gu
- Burm: Sanpia; Tambia

Properties:

- Chemical formula-Fe$_3$O$_4$, FeO.Fe$_2$O$_3$
- Appearance-solid black powder
- Solubility-Insoluble in water and organic solvents; soluble in concentrated mineral acids
Except where otherwise noted, data are given for materials in their standard state (at 25 °C [77 °F], 100 kPa).

Iron (II, III) oxide is the chemical compound with formula Fe$_3$O$_4$. It occurs in nature as the mineral magnetite. It is one of a number of iron oxides, the others being iron(II) oxide (FeO), which is rare, and iron(III) oxide (Fe$_2$O$_3$) also known as hematite. It contains both Fe$^{2+}$ and Fe$^{3+}$ ions and is sometimes formulated as FeO · Fe$_2$O$_3$. This iron oxide is encountered in the laboratory as a black powder. It exhibits permanent magnetism and is ferrimagnetic, but is sometimes incorrectly described as ferromagnetic. Its most extensive use is as a black pigment which is synthesised rather than being extracted from the naturally occurring mineral as the particle size and shape can be varied by the method of production.

**Preparation**:

Under anaerobic conditions, ferrous hydroxide (Fe (OH)$_2$) can be oxidized by water to form magnetite and molecular hydrogen. This process is described by the Schikorr reaction:

$$3\text{Fe (OH)}_2 \rightarrow \text{Fe}_3\text{O}_4 + \text{H}_2 + 2\text{H}_2\text{O}$$

Ferrous hydroxide                               Magnetite Hydrogen Water

The well-crystallized magnetite (Fe$_3$O$_4$) is thermodynamically more stable than the ferrous hydroxide (Fe (OH)$_2$).

Magnetite can be prepared in the laboratory as a ferrofluid in the Massart method by mixing iron (II) chloride and iron (III) chloride in the presence of sodium hydroxide. Magnetite can also be prepared by the chemical co-precipitation in presence of ammonia, which consist in a mixture of a solution 0.1 M of FeCl$_3$·6H$_2$O and FeCl$_2$·4H$_2$O with mechanic agitation of about 2000 rpm. The molar ratio of FeCl$_3$:FeCl$_2$ can be 2:1; heating this solution at 70 °C, and immediately the speed is elevated to 7500 rpm and adding quickly a solution of NH$_4$OH (10 volume %), immediately a dark precipitate will be formed, which consists of nanoparticles of magnetite. In both cases, the precipitation reaction rely on a quick transformation of acidic hydrolyzed iron ions into the spinel iron oxide structure, by hydrolysis at elevated pH values (above ca. 10).
Considerable efforts has been devoted towards controlling the particle formation process of magnetite nanoparticles due to the challenging and complex chemistry reactions involved in the phase transformations prior to the formation of the magnetite spinel structure. Magnetite particles are of interests in bioscience applications such as in magnetic resonance imaging (MRI) since iron oxide magnetite nanoparticles represent a non-toxic alternative to currently employed gadolinium-based contrast agents. However, due to lack of control over the specific transformations involved in the formation of the particles, truly superparamagnetic particles have not yet been prepared from magnetite, i.e. magnetite nanoparticles that completely lose their permanent magnetic characteristic in the absence of an external magnetic field (which by definition show a coercivity of 0 A/m). The smallest values currently reported for nanosized magnetite particles is $H_c = 8.5\text{A m}^{-1}$, whereas the largest reported magnetization value is $87\text{ Am}^2\text{kg}^{-1}$ for synthetic magnetite.

Pigment quality $\text{Fe}_3\text{O}_4$, so called synthetic magnetite, can be prepared using processes that use industrial wastes, scrap iron or solutions containing iron salts (e.g. those produced as by-products in industrial processes such as the acid vat treatment (pickling) of steel):

- Oxidation of Fe metal in the Laux process where nitrobenzene is treated with iron metal using $\text{FeCl}_2$ as a catalyst to produce aniline:
  \[ \text{C}_6\text{H}_5\text{NO}_2 + 3\text{Fe} + 2\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_5\text{NH}_2 + \text{Fe}_3\text{O}_4 \]

- Oxidation of FeII compounds, e.g. the precipitation of iron (II) salts as hydroxides followed by oxidation by aeration where careful control of the pH determines the oxide produced.

Reduction of $\text{Fe}_2\text{O}_3$ with hydrogen:

\[ 3\text{Fe}_2\text{O}_3 + \text{H}_2 \rightarrow 2\text{Fe}_3\text{O}_4 + \text{H}_2\text{O} \]

Reduction of $\text{Fe}_2\text{O}_3$ with CO:

\[ 3\text{Fe}_2\text{O}_3 + \text{CO} \rightarrow 2\text{Fe}_3\text{O}_4 + \text{CO}_2 \]
Production of nano-particles can be performed chemically by taking for example mixtures of Fe\textsuperscript{II} and Fe\textsuperscript{III} salts and mixing them with alkali to precipitate colloidal Fe\textsubscript{3}O\textsubscript{4}. The reaction conditions are critical to the process and determine the particle size.

**Reactions:**

Reduction of magnetite ore by CO in a blast furnace is used to produce iron as part of steel production process:

\[
\text{Fe}_3\text{O}_4 + 4\text{CO} \rightarrow 3\text{Fe} + 4\text{CO}_2
\]

**Structure**

Fe\textsubscript{3}O\textsubscript{4} has a cubic inverse spinel group structure which consists of a cubic close packed array of oxide ions where all of the Fe\textsuperscript{2+} ions occupy half of the octahedral sites and the Fe\textsuperscript{3+} are split evenly across the remaining octahedral sites and the tetrahedral sites.

Both FeO and γ-Fe\textsubscript{2}O\textsubscript{3} have a similar cubic close packed array of oxide ions and this accounts for the ready interchangeability between the three compounds on oxidation and reduction as these reactions entail a relatively small change to the overall structure. Fe\textsubscript{3}O\textsubscript{4} samples can be non-stoichiometric.

The ferrimagnetism of Fe\textsubscript{3}O\textsubscript{4} arises because the electron spins of the Fe\textsuperscript{II} and Fe\textsuperscript{III} ions in the octahedral sites are coupled and the spins of the Fe\textsuperscript{III} ions in the tetrahedral sites are coupled but anti-parallel to the former. The net effect is that the magnetic contributions of both sets are not balanced and there is a permanent magnetism.

**Properties:**

Fe\textsubscript{3}O\textsubscript{4} is ferrimagnetic with a Curie temperature of 858 K. There is a phase transition at 120K, the so-called Verwey transition where there is a discontinuity in the structure, conductivity and magnetic properties. This effect has been extensively investigated and whilst various explanations have been proposed, it does not appear to be fully understood.
Fe₃O₄ is an electrical conductor with conductivity significantly higher (X 10⁶) than Fe₂O₃, and this is ascribed to electron exchange between the Fe²⁺ and Fe³⁺ centres.

Uses:

- Fe₃O₄ is used as a black pigment and is known as C.I pigment black 11 (C.I. No.77499) or Mars Black.
- Fe₃O₄ is used as a catalyst in the Haber process and in the water gas shift reaction. The latter uses an HTS (high temperature shift catalyst) of iron oxide stabilised by chromium oxide. This iron-chrome catalyst is reduced at reactor start up to generate Fe₃O₄ from α-Fe₂O₃ and Cr₂O₃ to CrO₃.
- Nano particles of Fe₃O₄ are used as contrast agents in MRI scanning.
- Ferumoxytol, also known as Feraheme and Rienso, is an intravenous Fe₃O₄ preparation for treatment of anemia resulting from chronic kidney disease. Ferumoxytol is manufactured and globally distributed by AMAG Pharmaceuticals.
- Along with sulfur and aluminium, it is an ingredient in a specific type of thermite useful for cutting steel.

The Manduram is useful in the following conditions:

The various preparations are made from red oxide of iron. They are useful in anaemic and dropsy.

Swelling of the lassitude, Fever associated with bone disorders severe anasarca and paleness, wheezing dropsy due to abdomen enlargement, Pallor, Asthma and Gonorrhoea. It improves the hemopoisis.

The Manduram should not be used in chronic diseases associated with loss appetite, constipation and when there is fever.

Mandura is especially useful in anaemia, amenorrhoea, dysmenorrhoea, menorrhagia, chlorosis; also diarrhoea, chronic bowel complaints, dyspepsia, intestinal worms and nervous diseases; neuralgia of the 5th nerve due to debility, kidney diseases, albiminuria.
2. COW URINE

Our ancient peoples like identify cow urine as a powerful medicine. They called it Panchagavya. The treatment of disease using products obtained from cows milk, curd, ghee, urine and dung. Cow urine when used as a form of medicine and also helps to medicine preparations. There are many types of cows. We will refer to the Indian cow. Cow urine has many medicinal properties, vitamins, enzymes and bio-active substances that aid in treating many diseases.

The Main Elements of Cow Urine and Their Functions:

Many useful elements have been found in urine. Some of them are as below:

**Urea:**

Urea is a major element found in urine and is the end product of protein metabolism. It is strong antibacterial agent.

**Uric acid:**

Uric acid is similar to Urea and has strong antibacterial properties. In addition it helps to control cancer-causing substances.

**Minerals:**

Minerals from urine can be very easily reabsorbed as compared to those derived from food. Urine probably contains more different types of minerals than those derived from food. Urine becomes turbid if left alone for a while This is because when enzyme present in urine dissolve urea and change it into ammonia then urine becomes strongly alkaline making it difficult to dissolve rich minerals. Therefore stale urine looks turbid this does not mean that it has decayed Urine with higher ammonical disorder content when applied to the skin plays an important role in beautifying it.

**Bioactive substance and hormones**

**Urokinase:** Dissolves blood clots, helps in curing heart diseases and improves blood circulation.

**Epithelium growth factor:** Helps, repair and regenerate damaged tissues and cells.

**Colony stimulating factor:** It is effective for cell division and multiplication.

**Growth hormone:** Shows different bioactive effects such as promotion of protein production, cartilage growth, and fat decomposition.
**Erythropoetine:** Promotes production of red blood cells.

**Gonadotropins:** Promotes normalization of menstrual cycle and sperm production.

Kallikrin: -Releases kallidin that expands peripheral veins and reduce blood pressure.

**Tripsyn inhibitor:** Effective for prevention and healing of muscular tumour.

**Allantoine:** Heals wounds and tumours.

**Anti-cancer substance:** Anti-neoplaston, H-11 beta-iodole-acetic acid, directine, 3-methyl gloxal, etc. differ from chemotherapeutic drugs, which kill or injure all kinds of cells. They strongly prevent the multiplication of carcinogenic cells and return them to normal.

**Nitrogen:** It is diuretic & stimulates kidney naturally.

**Sulphur:** It increases intestinal peristalsis and purifies blood.

**Ammonia:** It maintains integrity of body tissues and blood.

**Copper:** It checks excessive deposition of fat.

**Iron:** It maintains RBC counts in blood and stabilizes stamina.

**Phosphate:** It has lithotriptic action.

**Sodium:** It purifies the blood and checks hyperacidity.

**Potassium:** It is appetizer and eliminates muscle fatigue.

**Magnese:** It is antibacterial and prevents gas gangrene.

**Carbolic Acid:** It is antibacterial and prevents gas gangrene.

**Calcium:** It purifies blood & provides nutrition to bones; helps in coagulation of blood.

**Salts:** Antibacterial, Prevents Comma, and ketoacidois.

**Vitamin A, B, C, D, E:** They prevent excessive thirst, infuses vigour, and increase potency.

**Lactose Sugar:** Gives strength to heart, checks excessive thirst and giddiness.

**Enzymes:** Improve immunity, and promote the secretion of digestive juices.

**Water:** Controls the body temperature maintains the fluidity of blood.

**Hippuric Acid:** Excrete toxins through the urine.

**Creatinine:** It is antibacterial.

**Swama Kshar:** Antibacterial, improves immunity, and acts as an antidote.

Some hormones presents in 8-month pregnant cow which are very good for health\(^{14}\).
RESEARCH ARTICLES PUBLISHED IN JOURNALS:

1. Review Article Benefits of Cow Urine – A Review

Sahu Rekha, Lalchand, G1upta Rakshapal and Rout OmPrakash

ABSTRACT:

The Cow urine has been used from ancient times for curing many ailments of human beings. It is important and essential part of PanchgavyaChikitsa. Different Ayurvedic literature have mentioned its importance and uses for treatment of, Kushtha, Kandu, Udarrog, Colic, Abdominal tumour, Enlargement of the abdomen and Flatulence, for therapies such as decoction purgation, enema etc. Many researches have also be done, which shows its use for treatment of Skin diseases, Stomach diseases, kidney diseases, Heart diseases, Stones, Diabetes, Liver problem, Jaundice, Athletes feet, cyst, Hemorrhoid etc. and show its Immunostimulant, Bioenhencer, Anticonvulsant, Anti cancerous, Wound healing, Antioxidant and Antimicrobial properties. It is also useful in agriculture for preparation of vermicompost and biopesticides. This review article will collect all the qualities and uses of Cow urine from different Ayurvedic and modern literature. The article will also collect the data from all researches done on Cow urine. Cow urine is excellent bioenhencer and recently Cow urine distillate has been granted U.S. patents. Further researches are required to prove its qualities and benefits. Public awareness is required to promote the importance and wide applications of cow urine to improve their health and lifestyle.

2. Chemotherapeutic potential of cow urine: A review

Gurpreet Kaur Randhawa and Rajiv Sharma

ABSTRACT

In the grim scenario where presently about 70% of pathogenic bacteria are resistant to at least one of the drugs for the treatment, cue is to be taken from traditional/indigenous medicine to tackle it urgently. The Indian traditional knowledge emanates from ayurveda, where Bosindicus is placed at a high pedestal for numerous uses of its various products. Urine is one of the products of a cow with many benefits
and without toxicity. Various studies have found good antimicrobial activity of cow’s urine (CU) comparable with standard drugs such as ofloxacin, cefpodoxime, and gentamycin, against a vast number of pathogenic bacteria, more so against Gram-positive than negative bacteria. Interestingly antimicrobial activity has also been found against some resistant strains such as multidrug-resistant (MDR) Escherichia coli and Klebsiella pneumoniae. Antimicrobial action is enhanced still further by it being an immune-enhancer and bioenhancer of some antibiotic drugs. Antifungal activity was comparable to amphotericin B. CU also has anthelmintic and antineoplastic action. CU has, in addition, antioxidant properties, and it can prevent the damage to DNA caused by the environmental stress. In the management of infectious diseases, CU can be used alone or as an adjunctive to prevent the development of resistance and enhance the effect of standard antibiotics.

3. Evaluation of antidiabetic, antioxidant effect and safety profile of gomutra ark in Wistar albino rats

Devender O. Sachdev, Devesh D. Gosavi, and Kartik J. Salwe

ABSTRACT

The effect of Gomutra ark (GoA) on experimental alloxan-induced diabetes in rats was studied. For this purpose, Wistar albino rats of either sex weighing 200-250 g were used. The biochemical parameters like blood sugar, vitamin C, and malondialdehyde release were measured. The safety profile of GoA was evaluated using acute and chronic toxicity studies. GoA significantly lowers blood glucose in diabetic rats although the observed effect was found to be less than glibenclamide. It significantly lowers the level of malondialdehyde and vitamin C in diabetic rats. No toxicity was observed even when cow urine was given 32 times of the study dose in acute toxicity and no significant changes were seen when it was used chronically, which suggests that cow urine is having a very high therapeutic index. This study supports the traditional use of GoA in diabetes and is having a high therapeutic index and is safe for chronic use. However, further studies are needed to elucidate the mechanism of action of Gomutra ark.
4. Clinical Evaluation of Cow-Urine Extract special reference to Arsha (Hemorrhoids)\textsuperscript{28}

Dr. Omaprakash W. Talokar, Dr. Archana R. Belge, Dr. Raman S. Belge

ABSTRACT:

There are various traditional healing practices in India including herbal therapies and other forms of alternate therapies which are non-clinical. Based on certain traditional and Ayurvedic point of view, consumption of Gomutra (Cow-Urine) is a traditional remedy for various health conditions e.g. Arsha (Hemorrhoids). Cow-urine therapy is an ancient therapy part of Ayurveda. Cow-urine tries to balance the body elements by re-establishing the equilibrium for a healthy body. Hemorrhoids are a common anorectal condition defined as the symptomatic enlargement and distal displacement of the anal mucosa. An inflammatory reaction and vascular hyperplasia may be present in Hemorrhoids. The present research paper deals with the oral supplementation of Cow-urine in hemorrhoids patients, which has prevented the time-consuming, painful and expensive complications of Hemorrhoids.

5. Clinical Trial of Gomutra (Cows Urine) In Obesity Management\textsuperscript{29}

Naveen Kumar Saini

ABSTRACT

The current research paper describes the importance of Gomutra (cow’s urine) in obesity management. For this purpose 30 patients were selected randomly from M.M.M Government Ayurvedic College & Associated Group of hospitals, Udaipur. For diagnostic purpose objective parameters like total body weight of patient, BMI, Measurement of skin-fold thickness, Circumference of Chest, Abdomen, Hip, Mid-thigh, biochemical analysis like lipid profile and subjective parameters like Chalatva, KshudraSwasaDaurbalya, AngaGaurva, Alasya, Gatrasada, AlpaVyavaya, AtiKshudha, AtiPiapasaNidradhikya, Swedadhikya, Daurgandhya, Snigdhagta, Sandhisshool were taken in to consideration. In pathogenesis of Sthaulya, Kapha (KledakaKapha), Vata (Samana&VyanaVayu), Meda (fat/lipid) and MedodhatvagniMandyata are main responsible factors according to our samhitas My hypothesis for this evaluation was
based on the facts that Gomutra has all those properties which can be helpful in Sampraptivighatana of obesity i.e. Tikshna, Ushna, Laghu and Kaphavatshamak etc. I also considered the biochemical analysis on Gomutra and its elemental properties. Keeping this in mind Gomutra was given to every patient according to their age and Kosthagni ranging from 3ml to 5ml with water and all changes were calculated by parameteric and non parameteric tests. In this study cows urine proved very effective in obesity management reduced weight and B.M.I by 6.51% and 6.11% respectively. This research is very important in today’s life because the problem of obesity is increasing day by day due to our sedentary life style and it is leading to very fatal diseases.
3. PIPER BETLE

Classification:

Kingdom : Plantae
Clade : Angiosperms
Clade : Magnoliids
Order : Piperales
Family : Piperaceae
Genus : Piper
Species : P. betle

Binomial name:

Piper betle

The betel (Piper betle) is the leaf of a vine belonging to the Piperaceae family, which includes pepper and kava. Betel leaf is mostly consumed in Asia and elsewhere in the world by some Asian emigrants, as betel quid or in paan, with Areca nut and/or tobacco.

In India and Sri Lanka a sheaf of betel leaves is traditionally offered as a mark of respect and auspicious beginnings. Occasions include, greeting elders at wedding ceremonies, New Year, offering payment to Ayurvedic physicians and astrologers where usually money and/or areca nut are kept on top of the sheaf of leaves and offered to the elders for their blessings.

The betel plant is an evergreen perennial, with glossy heart-shaped leaves and white catkin. The betel plant originated in South and South East Asia.

Names in different languages

The betel leaf is known as Pan in Bengali and Paan in Urdu and Hindi, Tambula and Nagavalli in Sanskrit, and Tanbul in Persian. Some of the names in the regions in which it is consumed are: Mlou(Cambodian), Tamalapaku(Telugu),
Etymology

Betle, derived from the Tamil/Malayalam word vettila, via Portuguese.

Usage and cultural significance

The primary use of betle leaf is as a wrapper for the chewing of areca nut or tobacco where it is mainly used to add flavour. It may also be used in cooking, usually raw, for its peppery taste.

Health effects

Some reports may suggest that betle leaf by itself has adverse health effects, in part because of tannins delivered by the leaf and for reasons currently not fully understood. For example, one research paper studied chromosome damaging effect of betel leaf in human leukocyte cultures. These researchers report an increase in the frequency of chromatid aberrations when the leaf extract was added to cultures. Another scientific study from Japan indicates that the lab rats that ate a mixture of betel leaf and areca nuts all had severe thickening of the upper digestive tract whereas after undergoing a diet of betel leaves alone, only one laboratory rat ended up having a forestomach papilloma30.

RESEARCH ARTICLES PUBLISHED IN JOURNALS:

1. New chemical constituents from the Piper betle Linn. (Piperaceae)31 - AkhtarAtiya, BarijNayanSinha& Uma RanjanLal

ABSTRACT

The phytochemical investigation of chloroform extract from Piper betle var. haldia, Piperaceae, leaves has resulted in the isolation of two new chemical constituents which were identified as 1-n-dodecanyloxy resorcinol (H1) and desmethylenesqualenyldeoxy-
Preclinical Safety Evaluation of Mandura Chenthooram

cepharadione-A (H4), on the basis of spectroscopic data 1D NMR (1H and 13C) and 2D NMR (1H-1H COSY and HMBC) as well as ESI-MS, FT-IR and HR-ESI-MS analyses. Compounds H1 and H4 showed excellent antioxidant DPPH free radical scavenging activity with IC50 values of 7.14 μg/mL and 8.08 μg/mL compared to ascorbic acid as a standard antioxidant drug with IC50 value of 2.52 μg/mL, respectively. Evaluation of cytotoxic activity against human hepatoma cell line (PLC-PRF-5) showed moderate effect with the GI50 values of 35.12 μg/mL for H1, 31.01 μg/mL for H4, compared to Doxorubicin® as a standard cytotoxic drug with GI50 value of 18.80 μg/mL.

2. Biotechnological intervention in betelvine (Piper betle L.): A review on recent advances and future prospects

SuryasnataDas, ReenaParida, I.SriramSandeep, SanghamitraNayak, SujataMohanty

ABSTRACT

Betelvine (Piper betle L.) is cultivated for its deep green heart shaped leaf for (15–20) million Indian and 2 billion foreign consumers annually. The crop provides Rs (6 000–7 000) million of national income per year and at the same time leaves worth Rs (30–40) million is exported to other countries. The leaves are not only used directly for chewing purposes but also possesses antioxidant, anti-inflammatory, anti-apoptotic, anti-cancer and anti-microbial properties. Besides, the leaves also contain eugenol rich essential oil (1%–3%) which is the source for medicine, stimulant, antiseptic, tonic and other ayurvedic formulations. The essential oil also contains chavibetol, caryophyllene and methyl eugenol which are the potent source for preparation in ayurvedic medicine and herbal products. Cost of betelvine essential oil is 10$ per 5 mL. In spite of its great economical and medicinal importance betelvine is still neglected by the researchers for proper characterization and authentication for selection of elite landraces. Lack of awareness among people, use of same planting material for many generations, existing of many synonyms for a single landraces, no proper characterization of available landraces are some of the significant constraints for its commercialization. Our review endeavours a complete advance in the research on betelvine, existing lacunae for its proper characterization and commercial cultivation. It also attempts to provide a comprehensive account on biotechnological
interventions made in betelvine aimed at complementing conventional programmes for improvement of this nutraceutically important cash crop.

3. A Review: Nutraceuticals Properties of Piper betel (Paan)³³

Ekta Singh Chauhan, Jaya Aishwarya*, Akriti Singh and Anamika Tiwari

ABSTRACT

Piper betel or Betel vine deep green heart shaped vary famous leaves belongs to the family Piperaceae called Paan leaves in India; rich in nutrients, minerals, vitamins, antioxidants, phytochemicals. Piper betel is mostly use to chew with sliced areca nut, slaked lime, coriander, aniseed, clove, cardamom, sweetener, coconut scrapings etc, but less used remedy. It is cultivated in hotter and damper part in country following the traditional methods in India on about 55,000 hectare with an annual production worth about Rs 9000 million. Focusing on traditional use and medicinal use of Piper betel we can cure many diseases and reduce the oral cancer which actually happens due to sliced areca nut, slaked lime not because of betel leaves. Leaves are rich in many nutrients like water, energy, protein, fats, fiber, calcium and iron etc. and the antioxidants present are flavonoids, tannins, saponins alkaloids, terpenoids etc. Piper betel helps in curing various diseases like diabetes, hypertension, brain toxin, halitosis, boils and abscesses, obesity, wound healing, voice problems, conjunctivitis, constipation, headache, hysteria, itches, mastitis, mastoiditis, leucorrhoea, otorrhoea, ringworm, swelling of gum, rheumatism, abrasion, cuts and injuries etc. So, we have to highlight these nutrients rich betel leaves and its benefits. This paper put a light on nutraceuticals properties of betel leaves and says that cultivation and use of betel leaves should be increased to cure the diseases.

4. Pharmacognostic Study on the Leaf of Piper betle L.³⁴

Swe Mar Tin

ABSTRACT

Specimens were identified according to Hooker (1879), Kirtikar and Basu (1933), Backer (1963), Hutchinson (1967), Brandis (1971) and Dassanayake (1987). Fresh and powder leaves of Piper betle L. were studied with the methods of Wallis
Elemental analysis was conducted by using Energy Dispersive X-Ray Fluorescence (EDXRF) and Atomic Absorption Spectrophotometry (AAS) methods. Piper betle L. contained the highest Mg concentration having 8.412 ± 0.007 ppm. Various solvents extracts of leaves showed the antimicrobial activity against Bacillus subtilis, Staphylococcus aureus, Pseudomonas aeruginosa, Bacillus pumalis, Candida albicans and Escherichia coli. Water extract of Piper betle L. showed activity against Bacillus subtilis respectively.

5. Antioxidant and non toxic properties of Piper betle leaf extract: in vitro and in vivo studies

Dharamainder Choudhary Raosaheb K. Kale

ABSTRACT

Piper betle leaves are used in folk medicine for the treatment of various disorders and is commonly chewed among Asians. The present study investigates the protective efficacy of P. betle leaf extract. The presence of the extract inhibited the radiation induced lipid peroxidation process effectively. This could be attributed to its ability to scavenge free radicals involved in initiation and propagation steps. Oral supplementation with extract (1, 5 and 10 mg/kg) was administered daily for 2 weeks to Swiss albino mice and the hepatic antioxidant status was analysed. The GSH content was enhanced and no appreciable change was found in the levels of oxidative damage in terms of lipid peroxidation. Also, the specific activity of SOD increased in a dose dependent manner. These factors indicate the elevation of antioxidant status in the animals. The effect on the glyoxalase system which is considered to be activated under stress conditions was also investigated. Our findings did not observe any significant change in gly I and gly II activities, implying a nonstress condition after oral treatment of the extract. The present study indicates the antioxidant activity of P. betle leaf extract and its potential to elevate the antioxidant status.
4. VITEX NEGUNDO

Vitex negundo, commonly known as the Chinese chaste tree, Five-leaved chaste tree, or horseshoe vitex, is a large aromatic shrub with quadrangular, densely whitish, tomentose branchlets. It is widely used in folk medicine.

Other Names:

Sans: Sephalika; Nirgundi; Svetasurasa; Vrikshaha; Sindhuvaram.

Eng: Five-leaved Chaste Tree.

Fr: Gattilierincise.

Hind: Sambhalu; Sawbhalu; Nirgundi; Nisinda; Mewri.

Ben: Nishinda; Nirgundi; Samalu.

Bom: Katri; Nirgundi; Shiwari; Nirgunda; Nisinda.

Mah: Nirgunda

Gwalior: Nigad.

Guj: Nagoda; Shamalic.

Tel: Sindhuvaram; Tellavvilli; Vavili; Nalla-vavili.

Tam: Chinduvaram; Nirnochi; Nochchi; Notchi; Vellai-noch-chi.

Mal: Indrani.

Can: Bile-nekki.

Burm: Kiyon-bhanbin.

Pers: Pajankusut.

Punj: Marwan; Maura; Banna; Torbanna; Swankan; Mawa; Amalu(roots and leaves); Bari(fruit).

Habitat:

Bengal, Southern India and Burma.
Parts used: Root, fruit, flowers, leaves and bark.

Constituents:

Leaves contain a colourless essential oil resin of the odour of the drug, and a resin; fruits contain an acid resin, as astringent organic acid, malic acid, traces of an alkaloid and a colouring matter.

RESEARCH ARTICLES PUBLISHED IN JOURNALS:

1. Evaluation of Phytochemical and Antimicrobial study of Extracts of Vitexnegundo Linn

Gautam Keerti and Kumar Padma, Keertigautam

ABSTRACT

The persistent increase in the number of antibiotic resistant strains of microorganisms has led to the development of more potent but more expensive antibiotics. In most developing countries of the world these antibiotics are not readily affordable, thus making compliance difficult. This calls for research into alternative source of antimicrobials. Present work was carried out to assess the antimicrobial activity of V.negundo against some multidrug resistant pathogenic bacteria. V.negundo flower buds were collected, air dried and soxhlet extracted by using standard method for flavonoid extraction. These extracts were then tested for antimicrobial activity using disc diffusion method. MIC, MBC & TA was also calculated. Flower buds bound flavonoid extract of Vitex showed highest antibacterial activity (IZ=25mm, AI=1.38±0.026) against Bacillus subtilis and (IZ=25mm, AI=1.04±0.010) against Raoultellaplanticola. The minimum inhibitory concentration (MIC) of Vitex was 0.039 mg/ml against Bacillus subtilis, raoultellaplanticola and Agrobacterium tumifaciens. The most active extract of bound flavonoid of flower buds was analyzed by GCMS study, which revealed eighty compounds in it. Two flavonoids were found in the flowers buds of Vitexnegundo, as Kampferol-3-O-rutinoside (RT=30.342) and 5-hydroxy- 3, 6, 7, 3’, 4’-pentamethoxy flavones (RT=49.408), that are not has been reported earlier in flower buds of Vitexnegundo. Flavonoids of flower buds extract of V.negundo Linn has the potential to be developed into an antimicrobial agent.
2. A Review of Ethnomedicinal Plant-Vitexnegundo Linn

FauziyaBasri, H.P. Sharma, SazyaFirdaus, Paras Jain and AlokRanjan

ABSTRACT

Vitexnegundo belongs to family Verbenaceae and grows as small tree with thin grey bark. The plant is widely distributed and also has pharmacological actions against wide spectrum of diseases in traditional system of medicines. All parts of the plant especially its leaves contain numbers of secondary metabolites such as alkaloids, phenols, flavonoids, glycosidicirridoids, tannins and terpenes. Because of the richness in phytochemicals, the plant is attributed to possess a number of therapeutic uses; antimicrobial, antiinflammatory, astringent, bronchodilator, CNS-depressant, detoxicant, diuretic, emmenagogue, anticancer and hepatoprotective etc. It is also used as repellent, insecticide and larvicidal. Leaf extract is employed as nervinertonic, tranquilizer and vermifuge. This review aims at presenting comprehensive information on phytochemical constituents and therapeutic uses which can be helpful in development of modern medicine.

3. Anti-Amnesic Activity of VitexNegundo in Scopolamine Induced Amnesia in Rats

Abhinav Kanwall, Jogender Mehla, MadhusudanaKunchal, Vegi Ganga ModiNaidul, Yogendra Kumar Gupta, Ramakrishna Sistla

ABSTRACT

In the present study we investigated the anti-amnesic activity of Vitexnegundo in scopolamine induced amnesia in rats. Wistar rats (180-200g) were trained on active avoidance task. Each animal received session of 15 trials with inter trial duration of 15s for 5 days. Scopolamine (3mg/kg, i.p) was administered at different time periods on the basis of stages of memory i.e. acquisition, consolidation and retention in different groups (n= 6). Effect of Vitexnegundo extract was evaluated and compared to a standard drug, Donepezil. Significant (p< 0.05) increase in the avoidance response on the 5th session has been observed as compared to 1st session in control group. Scopolamine treatment significantly (p< 0.05) reduced the avoidance response compared to control. Extract treated groups shown significant (p< 0.05) in-crease in
number of avoidance responses as compared to scopolamine treated groups. Increased oxidative stress in brain after scopolamine treatment, as observed by increase in MDA & decrease in GSH & SOD, was lowered in the groups treated with extracts. AChE activity was also improved after V.negundo treatment. Results of the study have shown that V.negundo treated groups decrease the phenomenon of amnesia by increasing learning of memory through antioxidant effect and decreasing AChE activity.
5. ALOE VERA

Classification:

Kingdom : Plantae
Clade : Angiosperms
Clade : Monocots
Order : Asparagales
Family : Asphodelaceae
Subfamily : Asphodeloideae
Genus : Aloe
Species : A. vera

Binomial name:

Aloe vera

Synonyms:

Aloe barbadensis Mill.
Aloe barbadensis var. chinensis Haw.

Aloe vera is a succulent plant species of the genus Aloe. An evergreen perennial, it originates from the Arabian Peninsula but grows wild in tropical climates around the world and is cultivated for agricultural and medicinal uses. The species is also used for decorative purposes and grows successfully indoors as a potted plant.

It is found in many consumer products including beverages, skin lotion, cosmetics, or ointments for minor burns and sunburns. There is little scientific evidence of the effectiveness or safety of Aloe vera extracts for either cosmetic or medicinal purposes. Studies finding positive evidence are frequently contradicted by other studies.
Aloe vera leaves contain phytochemicals under study for possible bioactivity, such as acetylated mannans, polymannans, anthraquinone C-glycosides, anthrones, other anthraquinones, such as emodin and various lectins.

**Uses:**

**Research:**

There is little scientific evidence of the effectiveness or safety of Aloe vera extracts for either cosmetic or medicinal purposes. A research study finding positive evidence is frequently contradicted by other studies.

Despite this, the cosmetic and alternative medicine industries regularly make claims regarding the soothing, moisturizing, and healing properties of aloe vera.

Two 2009 reviews of clinical studies determined that all were too small and faulty to allow strong conclusions to be drawn. One of the reviews found that Aloe has not been proven to offer protection for humans from sunburn.

There is no good evidence aloe vera is of use in treating wounds or burns. There is no good evidence that topical application of aloe vera is effective for treating genital herpes or psoriasis. A 2014 Cochrane review found no strong evidence for the value of topical application of aloe vera to treat or prevent phlebitis caused by intravenous infusion.

Aloe vera gel is used commercially as an ingredient in yogurts, beverages, and some desserts, although at certain high doses, its toxic properties could be severe whether ingested or topically applied. The same is true for aloe latex, which was taken orally for conditions ranging from glaucoma to multiple sclerosis until the FDA required manufacturers to discontinue its use.

**Dietary supplement:**

Aloin, a compound found in the exudate of some Aloe species, was the common ingredient in over-the-counter (OTC) laxative products in the United States until 2002 when the Food and Drug Administration banned it because the companies manufacturing it failed to provide the necessary safety data. Aloe vera has potential toxicity, with side effects occurring at some dose levels both when ingested and
applied topically. Although toxicity may be less when aloin is removed by processing, Aloe vera that contains aloin in excess amounts may induce side effects.

Aloe vera juice is marketed to support the health of the digestive system, but there is neither scientific evidence nor regulatory approval to support this claim. The extracts and quantities typically used for such purposes appear to be dose-dependent for toxic effects.

**Traditional medicine:**

Aloe vera is used in traditional medicine as a skin treatment. In Ayurvedic medicine it is called kathalai, as are extracts from agave. For aloe for agave early records of Aloe vera use appear in the Ebers Papyrus from the 16th century BC, and in Dioscorides' De MateriaMedica and Pliny the Elder's Natural History – both written in the mid-first century AD. It is also written of in the Juliana Anicia Codex of 512 AD. The plant is used widely in the traditional herbal medicine of many countries.

**Commodities:**

Aloe vera is used on facial tissues where it is promoted as a moisturizer and anti-irritant to reduce chafing of the nose. Cosmetic companies commonly add sap or other derivatives from Aloe vera to products such as makeup, tissues, moisturizers, soaps, sunscreens, incense, shaving cream, or shampoos. A review of academic literature notes that its inclusion in many hygiene products is due to its "moisturizing emollient effect".

Other potential uses for extracts of Aloe vera include the dilution of semen for the artificial fertilization of sheep, as a fresh food preservative, or for water conservation in small farms. It has also been suggested that biofuels could be obtained from Aloe vera seeds.

**Toxicity:**

Under the guidelines of California Proposition, orally ingested non-decolorized aloe vera leaf extract has been listed by the OEHHA, along with goldenseal, among "chemicals known to the state to cause cancer or reproductive toxicity".
Use of topical aloe vera is not associated with significant side effects. Oral ingestion of aloe vera, however, may cause abdominal cramps and diarrhea which in turn can decrease the absorption of drugs. IARC studies have found ingested non-decolorized liquid aloe vera to be carcinogenic in animals, and state that it is a possible carcinogen when eaten or ingested by humans as well.

RESEARCH ARTICLES PUBLISHED IN JOURNALS:

1. Recent update on the medicinal properties and use of Aloe vera in the treatment of various ailments\textsuperscript{41}

Gajendra Mahor and Sharique A Ali

ABSTRACT

Aloe vera (Aloe barbadensis) an herb is widely used in Ayurvedic, Homoeopathic and Allopathic streams for its marvelous medicinal properties. This plant is one of the richest natural sources of health for mammals including human beings. The chemistry of the plant has revealed the presence of more than 200 different biologically active substances, which include antimicrobial, antibacterial, antifungal, antiviral, activities of the nonvolatile constituents of the leaf gel. Aloe species are widely distributed in the African and the eastern European continents, and are spread almost throughout the world. The genus Aloe has more than 400 species but few, such as A. Vera, Aloe ferox, and Aloe arborescens, are globally used for trade. Many biological properties associated with Aloe species are contributed by inner gel of the leaves. anti diabetic, anti-inflammatory, peptic ulcers, antitumor, anticancer Properties, activity effects on the Immune System, adverse reactions, Laxative effects, wound healing, antiseptic, vitamins, minerals, enzymes, amino acids, stress, sugars. It is known to help slow down the appearance of wrinkles and actively repair the damaged skin cells that cause the visible signs of aging. Aloe is a powerful detoxifier, antiseptic and tonic for the nervous system. Aloe vera gel contains a large range of vitamins even vitamin B12, Vitamin A, contains B-Group vitamins, Vitamin C, Vitamin E and folic acid. Aloe vera gel contains important ingredients including 19 of the 20 amino acids needed by the human body and seven of the eight essential ones that just cannot be made. The plant leaves and inner gel contains numerous help it has potential to cure sunburns and minor cuts, and even
skin cancer and acts as an extremely powerful laxative. Various parts of the plant have different effects on the body. The present review is an attempt to highlight the proven research related botanical and pharmacological medicinal properties of Aloe vera.

2. Aloe vera their chemicals composition and applications: A review

Sharrif Moghaddasi M, Sandeep Kumar Verma

ABSTRACT:

It was known to people in Egypt and also Greece for example Aristotelesexplains special characteristics of Aloe vera jelatin that is extracted from this plant is continuously used to treat burns, cuts and inflamed scars since many years. It is useful for skin damaged from X ray as reported in many researches in journals related x rays. On the other hand concentration of glucose in gelatin, results in high osmotic pressure, that protect skin from live bacteria. Aloe vera includes "Antrokinon" chemicals that are known as anti virus, anti bacteria and anti cancer. Aloe vera (Aloe vera) has 400 species but just 2 species; A.barbadensis are used for trade in the world. This plant need very less water for living and also can survive on saline soils, beaches and is resistance to diseases and insects. It can live in very hot regions, but cannot tolerate cold. Aloe vera grows in, Mexico, India, South and central America, Africa, Australia, Carribians and Iran. This paper reviews history, its chemicals, medical usage, plant morphology, extracts and agronomy of Aloe vera.
Materials And Methods
4. MATERIALS & METHODS

4.1. Selection of the drug:

The test drug Mandura Chenthooram was selected for the evaluation of toxicity studies in wistar albino rats.

Ingredients:

- Manduram (Ferroso ferric oxide or Iron oxide)
- Koneer (Cow’s urine)
- Vettrilai charu (Piper betle juice)
- Notchiilai charu (Vitex negundo juice)
- Vellattu paal (Goat milk)
- Vellattu neer (Goat urine)
- Kumari charu (Aloe vera)³

MANDURAM                                          PASUNEER
           (COW URINE)
PRECLINICAL SAFETY EVALUATION OF MANDURA CHENTHOORAM

VETRILAI

NOTCHI

VELLATTUNEER

(GOAT URINE)

VELLATTUPAAL

(GOAT MILK)
KATRAZHAI

![Image of plant]

Preclinical Safety Evaluation of Mandura Chenthooram

Page 53
PREPARATION OF THE DRUG
4.2. COLLECTION, AUTHENTICATION, PURIFICATION AND PREPARATION OF THE TEST DRUG:

Collection:

Manduram (Ferroso ferric oxide) was procured from a well reputed country shop in chennai. The following herbal drugs such as Vettrilai (Piper betle), Katrazhai (Kumari-Aloe Vera) procured from Tamaram market, Chennai. Then Notchi (Vitex negundo) collected from NIS Campus Chennai. Pasuneer (Cow urine), Vellattuneer (Goat urine), Vellattupaal (Goat milk) were collected from village in Paruvakkudi.

Identification and Authentication of the raw drug:

The herbal drugs were identified and authenticated by from the department of Medicinal Botany, NIS Tambaram sanatorium, Chennai. (Certificate no: NISMB2822017, 06.03.2017). The metal drug was identified and authenticated by from the Department of Gunapadam, NIS, Tamaram Sanatorium, Chennai. (Certificate no: F.No:NIS/Gunapadam/Au/2017/5, 03.04.2017).

Purification:

Hot flame the 3 palams of manduram in the kannan ulai. Dip the flamed manduram 7 times in Pasuneer (cow’s urine). Then wash with water and dry it. Grind the dried manduram and keep it in katra. Pour Vetrilai charu (juice) in katra above the level of dried manduram and keep it in sunlight for 3 days by maintaining the juice level. Then pour Notechilai charu (Vitex negundo leaf juice), Vellattupaal (Goat milk), Vellattuneer (Goat’s urine) one by one like Vetricai charu (juice)\(^1\).
UNPURIFIED MANDURAM

AT THE TIME OF PURIFICATION PROCESS
AFTER PURIFICATION

Preparation of Mandura Chenthooram:

Grind purified Manduram with aloe vera juice for 4 samams (12hrs) and make it into one villai. Dry it in sunlight and put it in a small agal (Pot) cover with suitable agal and tightly sealed with seelai. Use 50 dried cow dung, for the pudam. After the pudam has done, open the seelai and look for red colour which is the indication for better finishing of medicine. Then grind the medicine with aloe vera juice for 4 samams when attaining the mezhugu patham, make villai and dry it in sunlight. Place the dried villai in agal and tightly sealed with seelai. Again pudam has done using 50 dried cow dung\(^1\).

KATRAZHAI CHARU (KUMARI CHARU)
MANDURA CHENTHOORAM
Therapeutic dose:

The dose is equivalent to $\frac{1}{2} - 1$ kuntri (65-130mg), twice daily after food. The duration of treatment is 10-12 days.

Adjuvent:

As per literature Mandura Chenthooram is administered along with honey.

Therapeutic uses:

- Anaemia(Paandu),
- Dropsy(Sobai),
- Jaundice(Kaamalai),
- Ascites(Peruvayiru),
- Cough(Eelai),
- Diarrhoea (Kirani).

It improves the Hemopoisis$^1$. 
QUALITATIVE ANALYSIS
STANDARDIZATION OF MANDUARA CHENTHOORAM

4.3. QUALITATIVE ANALYSIS:

I. PHYSICO-CHEMICAL ANALYSIS OF – MANDUARA CHENTHOORAM

The physico-chemical properties of Mandura Chenthooram is carried as per Standard procedure at The Tamilnadu Dr.M.G.R.Medical University, Guindy, Chennai.

1. Loss on Drying:

   An accurately weighed 2g of Mandura Chenthooram formulation was taken in a tarred glass bottle. The crude drug was heated at 105°C for 6 hours in an oven till a constant weight. The Percentage moisture content of the sample was calculated with reference to the shade dried material.

2. Determination of total ash:

   Weighed accurately 2g of Mandura Chenthooram formulation was added in crucible at a temperature 600°C in a muffle furnace till carbon free ash was obtained. It was calculated with reference to the air dried drug.

3. Determination of acid insoluble ash:

   Ash above obtained, was boiled for 5min with 25ml of 1M Hydrochloric acid and filtered using an ash less filter paper. Insoluble matter retained on filter paper was washed with hot water and filter paper was burnt to a constant weight in a muffle furnace. The percentage of acid insoluble as calculated with reference to the air dried drug.

4. Determination of water soluble ash:

   Total ash 1g was boiled for 4min with 25ml water and insoluble matter collected on an ash less filter paper was washed with hot water and ignited for 15 min at a temperature not exceeding 450°C in a muffle furnace. The amount of soluble ash is determined by drying the filtrate.
5. **Determination of water soluble Extractive:**

5gm of dried drug, coarsely powdered *Mandura Chenthooram* was macerated with 100ml of distilled water in a closed flask for twenty-four hours, shaking frequently. The solution was filtered and 25 ml was evaporated in a tarred flat bottom shallow dish, further dried at 100°C and weighted. The percentage of water soluble extractive was calculated with reference to the air dried drugs.

6. **Determination of alcohol soluble Extractive:**

2.5gm. of air dried drugs; coarsely powdered *Mandura Chenthooram* was macerated with 50 ml. Alcohol in closed flask for 24 hrs. With frequent shaking, it was filtered rapidly taking precaution against los of alcohol. 10ml of filtrate was then evaporated in a tarred flat bottom shallow dish, dried at 100°C and weighted. The percentage of alcohol soluble extractive was calculated with reference to air dried drug.
II. BIO-CHEMICAL ANALYSIS:

The bio-chemical analysis of Mandura chenthooram as done at Biochemistry lab National Institute of Siddha, Chennai-47.

<table>
<thead>
<tr>
<th>S.NO</th>
<th>EXPERIMENT</th>
<th>OBSERVATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Appearance of the sample</td>
<td>Dark red in colour</td>
</tr>
<tr>
<td>2.</td>
<td>Solubility:</td>
<td>Sparingly soluble</td>
</tr>
<tr>
<td></td>
<td>A little of the sample is shaken well with distilled water</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Action of heat:</td>
<td>White fumes evolved</td>
</tr>
<tr>
<td></td>
<td>A small amount of the sample is taken in a dry test tube and heated gartly at first and then strong.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A small amount of the sample is made into a paste with con.HCL in a watch glass and introduced into non luminous part of the Bunsen flame.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Ash test:</td>
<td>No yellow colour flame</td>
</tr>
<tr>
<td></td>
<td>A filter paper is soaked into a mixture of sample and cobalt nitrate solution and introduced into the Bunsen flame and ignited</td>
<td></td>
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</table>

Preparation of extract:

5 gm of Mandura Chenthooram is weighed accurately and placed in a 250ml clean beaker and added with 50 ml of distilled water. Then it is boiled well for about 10 minutes. Then it is cooled and filtered in a 100ml volumetric flask and made up to 100ml with distilled water.
### I. Test for Acid Radicals:

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<tr>
<th>S.NO</th>
<th>EXPERIMENT</th>
<th>OBSERVATION</th>
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<tbody>
<tr>
<td>1.</td>
<td>Test for sulphate:</td>
<td>2ml of the above prepared extract is taken in a test tube to this added 2ml of 4% ammonium oxalate solution. Cloudy appearance present.</td>
</tr>
<tr>
<td>2.</td>
<td>Test for chloride:</td>
<td>2ml of the above prepared extract is added with diluted HNO₃ till the effervescence ceases. Then 2 ml of silver nitrate solution is added. No cloudy appearance present.</td>
</tr>
<tr>
<td>3.</td>
<td>Test for phosphate:</td>
<td>2ml of the extract is treated with 2ml of ammonium molybdate solution and 2ml of con. HNO₃. No cloudy yellow appearance present.</td>
</tr>
<tr>
<td>4.</td>
<td>Test for carbonate:</td>
<td>2ml of the extract is treated with 2ml magnesium sulphate solution. Cloudy appearance present.</td>
</tr>
<tr>
<td>5.</td>
<td>Test for sulphide:</td>
<td>1gm of the substance is treated with 2ml of con HCL. No rotten egg smelling gas evolved.</td>
</tr>
<tr>
<td>6.</td>
<td>Test for Fluoride and oxalate:</td>
<td>2ml of extract is added with 2ml of dil.Acetic acid and 2ml calcium chloride solution and heated. No cloudy appearance.</td>
</tr>
<tr>
<td>7.</td>
<td>Test for nitrite:</td>
<td>3 drops of the extract is placed on a filter paper, on those 2drops of acetic acid and 2 drops of benzidine solution is placed. No characteristic changes.</td>
</tr>
</tbody>
</table>
8. **Test for borate:**

2 pinches of the substance is made into paste by using sulphuric acid and alcohol (95%) and introduced into the blue flame.  

<p>| | |</p>
<table>
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<tbody>
<tr>
<td></td>
<td>Bluish green colour flame not appeared.</td>
</tr>
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</table>

### II. Test for basic radicals:

1. **Test for lead:**

2ml of the extract is added with 2ml of potassium iodide solution.  

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No yellow precipitate is obtained.</td>
</tr>
</tbody>
</table>

2. **Test for copper:**

One pinch of substance is made into paste with con HCL in a watch glass and introduced into the non luminous part of flame.  

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Blue colour flame not appeared.</td>
</tr>
</tbody>
</table>

3. **Test for aluminium:**

2ml of the extract sodium hydroxide is added in drops to excess.  

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Characteristics changes.</td>
</tr>
</tbody>
</table>

4. **Test for iron:**

2ml of extract add 2ml of ammonium thiocyanate solution and 2ml of con HNO₃ is added.  

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Blood red colour appeared</td>
</tr>
</tbody>
</table>

5. **Test for zinc:**

2ml of the extract sodium hydroxide solution is added in drops to excess.  

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No White precipitate is formed.</td>
</tr>
</tbody>
</table>

6. **Test for calcium:**

2ml of the extract is added with 2ml of 4% ammonium oxalate solution.  

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cloudy appearance and white precipitate obtained.</td>
</tr>
</tbody>
</table>

7. **Test for magnesium:**

2ml of extract sodium hydroxide solution is added in drops to excess.  

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No White precipitate is obtained.</td>
</tr>
</tbody>
</table>
8. **Test for ammonium:**
   2ml of extract few ml of Nessler’s reagent and excess of sodium hydroxide solution are added.
   No brown colour appeared.

9. **Test for potassium:**
   A pinch of substance is treated with 2ml of sodium nitrite solution and then treated with 2ml of cobalt nitrate in 30% glacial acetic acid.
   No yellowish precipitate is obtained.

10. **Test for sodium:**
    2 pinches of the substance is made into paste by using HCL and introduced into the blue flame of Bunsen burner.
    No yellow colour flame appeared.

11. **Test for mercury:**
    2ml of the extract is treated with 2ml of sodium hydroxide solution.
    No yellow precipitate is obtained.

12. **Test for arsenic:**
    2ml of the extract is treated with 2ml of sodium hydroxide solution.
    No brownish red precipitate is obtained.

### III. Miscellaneus:

1. **Test for starch:**
   2ml of extract is treated with weak iodine solution.
   Sky blue colour developed.

2. **Test for reducing sugar:**
   5ml of benedict’s qualitative solution is taken in a test tube and allowed to boil for 2 minutes and added 8 to 10 drops of the extract and again boil it for 2 minutes. The colour changes are noted.
   No brick red colour developed.
3. **Test for the alkaloids:**
   a. 2ml of the extract is treated with 2ml of potassium iodide solution.  
   b. 2ml of extract is treated with 2ml of picric acid.  
   c. 2ml of the extract is treated with 2ml of phosphor tungstic acid.  
   Yellow colour developed.

4. **Test for tannic acid:**
   2ml of extract is treated with 2ml of ferric chloride solution.  
   No black precipitate is obtained.

5. **Test for unsaturated compound:**
   2ml of extract 2ml of potassium permanganate solution is added.  
   Potassium permanganate is not decolourised.

6. **Test for amino acid:**
   2 drops of the extract is placed on a filter paper and dried well.  
   Not violet colour developed.

7. **Test for type of compound:**
   2ml of the extract is treated with 2ml of ferric chloride solution.  
   Red colour developed.
SPECTROSCOPIC ANALYSIS
4.4. SPECTROSCOPIC ANALYSIS

1. ATOMIC ABSORPTION SPECTROMETER (AAS):

Mandura Chenthooram was analyzed in the presence of heavy metals by using ATOMIC ABSORPTION SPECTROMETER (AAS). This study was done at Asthagiri Herbal Research Fountation, 162-A, Perungudi Industrial Estate, Perungudi, Chennai-96.

INSTRUMENT DETAILS:

UV-Vis spectrometer AA240 series, UV 8500 Absorption Spectrometer (AAS) was used for the analysis. The operating parameters:

Instrument technique : UV Method
Wavelength (Iron) : 248.3nm

The hollow cathode lamp for Fe was used as a light source to provide wavelength for the elements to be determined.
2. INDUCTIVELY COUPLED PLASMA OPTICAL EMISSION SPECTROMETRY (ICP-OES):

The analysis of heavy metals and trace elements were estimated by using Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES). The Experimental Procedure was done at SAIF, IIT Madras, Chennai-36.

INTRODUCTION:

Inductively coupled plasma optical emission spectrometry (ICP-OES), is an analytical technique used for the detection of trace metals. It is a type of emission spectroscopy that uses the inductively coupled plasma to produce excited atoms and ions that emit electromagnetic radiation at wavelength characteristic of a particular element. The intensity of this emission is inductive of the concentration of the element within the sample.

PRINCIPLE:

A Perkin-Elmer Optima ICP spectrometer is used for routine ICP-OES analysis. First, a high-energy radio frequency field is impinged upon a stream of argon gas. Then, a spark is used to ionize the argon gas, which forms sustained plasma due to inductive coupling with the high energy radio frequency field and the continuous supply of fresh argon to the plasma torch. This plasma has solutions passed into it in the form of a fine aerosol. The aerosol is dried, the dried particles broken apart, and the individual elements are excited by interaction with the excited state argon in the plasma. As each atom returns to its ground state from the excited state, they emit light at wavelengths characteristic of the elements from which they originate. The emission intensity for each element is monitored for versus element concentration can be constructed.

EXTRACTION OF INFORMATION:

Obtaining qualitative information, i.e., what elements are present in the sample, involves identifying the presence of emission at the wavelengths characteristic of the elements of interest. Obtaining quantitative information, i.e., how much of an element is in the sample, can be accomplished using plots of emission intensity versus concentration called curves.
<table>
<thead>
<tr>
<th>Perkin-Elmer Optima</th>
<th>5300DV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rf frequency</td>
<td>40 M Hz</td>
</tr>
<tr>
<td>Range</td>
<td>165-782 nm</td>
</tr>
<tr>
<td>Detection limit</td>
<td>Upto ppm level using SCD detector</td>
</tr>
</tbody>
</table>
3. X-RAY POWDER DIFFRACTION (XRD):

X-ray powder diffraction (XRD) is a rapid analytical technique primarily used for phase identification of a crystalline material and can provide information on unit cell dimensions. The analysed material is finely ground, homogenized, and average bulk composition is determined.

Crystalline substances act as three-dimensional diffraction gratings for X-ray wavelengths similar to the spacing of planes in a crystal lattice. X-ray diffraction is now a common technique for the study of crystal structures and atomic spacing. X-ray diffraction is based on constructive interference of monochromatic X-rays and a crystalline sample. These X-rays are generated by a cathode ray tube, filtered to produce monochromatic radiation, collimated to concentrate, and directed toward the sample. The interaction of the incident rays with the sample produces constructive interference (and a diffracted ray) when conditions satisfy Bragg's Law ($n\lambda=2d \sin \theta$). This law relates the wavelength of electromagnetic radiation to the diffraction angle and the lattice spacing in a crystalline sample.

These diffracted X-rays are then detected, processed and counted. By scanning the sample through a range of 2θ angles, all possible diffraction directions of the lattice should be attained due to the random orientation of the powdered material. Conversion of the diffraction peaks to d-spacing allows identification of the mineral because each mineral has a set of unique d-spacings. Typically, this is achieved by comparison of d-spacing with standard reference patterns.
All diffraction methods are based on the generation of X-rays in an X-ray tube. These X-rays are directed at the sample, and the diffracted rays are collected. A key component of all diffraction is the angle between the incident and diffracted rays. Powder and single crystal diffraction vary in instrumentation beyond this.
4. SCANNED ELECTRON MICROSCOPY:

VEGA3 is a versatile system intended for both low and high vacuum operations providing users with the advantages of the latest technology, such as new improved high-performance electronics for faster image acquisition, an ultra-fast scanning system with compensation for static and dynamic image aberrations or scripting for user-defined applications. In addition, by means of powerful turbo-molecular and rotary vacuum pumps, optimum operating vacuum is reached within few minutes. VEGA3 microscopes can be configured in 4 different chamber sizes: SB, LM, XM, and GM. These chambers are fitted with a variety of ports and designed with optimal geometry for EDX, WDX and EBSD analysis. VEGA3 is an excellent choice for those looking for a reliable and fully functional entry-level SEM system maintaining the best price-to-performance ratio.

Equipment: specimen mounted on a 12.5mm stub with carbon tape and coated with conductive material (sputtered Au for example), stub tweezers. Using the Electron Beam panel select an accelerating voltage (there are four factory presets (5kV, 10kV, 20kV, 30kV, image below). This will turn on the high voltage and begin heating the tungsten filament.
TOXICOLOGICAL EVALUATION
4.5. TOXICOLOGICAL EVALUATION OF MANDURA CHENTHOORAM (MC):

The following invivo toxicity studies were carried out on Mandura Chenthooram (MC) by using Organization for Economic Co-operation and Development (OECD) guidelines.

1. Acute Oral Toxicity study (OECD guideline – 423)
2. Repeated Dose 28-days oral toxicity study (OECD guideline-407)

The toxicity studies were carried out at National Institute of Siddha. The study was done after getting permission from the Institutional Animal Ethical Committee. (IAEC Approved No: NIS/IAEC-II/09.2016)

DESCRIPTION OF THE METHOD

Selection of the animals:

Animal were selected as per guidelines. The Wistar Albino Rats of weighing 150-200g were obtained from authorized animal breeders of the animal laboratory in TANUVAS, Madhavaram, Chennai and stocked in the animal house at National Institute of Siddha, Chennai. Healthy adult animals of Wistar albino rat, female in sex used for acute oral toxicity study. Healthy adult animals of Wistar albino rat, both sexes were used for Repeated Dose 28-day oral toxicity study. The female animals used in the studies were nulliparous and non-pregnant.

Housing and feeding conditions:

The temperature in the experimental animal room: 22°C(±3°C).

Humidity: 60 ± 10%

Lighting: Artificial, the sequence being 12 hours light, 12 hours dark.

The animals were housed in polypropylene cages provided with bedding of husk.

The animals had free access to RO water.

For feeding, standard pellet diet.
Preparation of animals:

The animals were randomly selected, to permit individual identification by cage number and individual marking on the fur of each animal with picric acid. The animals were kept in their cages for 7 days prior to dosing to allow for acclimatization to the laboratory conditions. The principles of laboratory animal care were followed.

Test Substance:

Mandura Chenthooram, is dark red in colour, without taste and odour.

Route of administration:

Oral route was selected, because it is the normal route of clinical administration.

Acute oral toxicity-experiment procedure:

All the animals were fasted prior to dosing. Following the period of fasting, the animals were weighed and then the test substance was administered. The control group received an equal amount of distilled water with honey. After the substance has been administered, food was withheld for a further 3-4 hours. The principle of laboratory animal care was followed. Observations were made and recorded systematically and continuously observed as per the guideline after substance administration. An oral dose of 300mg/kg.b.wt, 2000mg/kg.b.wt was administered step by step according to the guidelines (OECD Guideline). The general behaviours of the rat were continuously monitored for ½hr, 1hr, 2hr and 4hr after dosing, periodically during the first 24 hr with special attention given during the first 4 hours and then daily thereafter, for a total of 14 days. Changes in the normal psychomotor activity and external morphology and their body weights were monitored periodically before and the time at which signs of toxicity or mortality were recorded.

Test animals:

Species and strain : Wistar Albino rat

Sex : Female

Age, Weight : 8-12 weeks, 150-200gm
Test guideline : OECD guideline-423

Groups/treatment : Grouped by randomization

During of exposure
to the “Mandura Chenthooram” : single dose-one day

Study duration : 14 days –observation

Number of animals : 3 females/group

Route of administration : Oral

**Number of animals and dose levels:**

Animals were divided into 3 groups, each group containing 3 female rats. One group as control and the other 2 groups II and III were treated with test drug Mandura Chenthooram at two different doses 300mg/kg.b.wt, 2000mg/kg.b.wt respectively.

**Grouping of animals in Acute Oral Toxicity study:**

<table>
<thead>
<tr>
<th>Groups</th>
<th>No of Rat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control: Vehicle control (Distilled Water with Honey)</td>
<td>3 female</td>
</tr>
<tr>
<td>Group II: Test drug Mandura Chenthooram (300mg/kg.b.wt)</td>
<td>3 female</td>
</tr>
<tr>
<td>Group III: Test drug Mandura Chenthooram (2000mg/kg.b.wt)</td>
<td>3 female</td>
</tr>
</tbody>
</table>

**Observations:**

- Morality, behavioural changes,
- ½hr, 1hr, 2hr, 4hr and upto 24 hour observation,
- All rats will be observed twice daily on week days for 2 weeks,
- Body weight will be monitored weekly once,
- Feed and water intake will be calculated per day,
**Cage-side observation:**

Clinical observation includes abnormal Gait (rolling and tiptoe), aggressiveness, akinesia, analgesia, catalepsy, convulsions, defecation, excitation, exophthalmos, head twitches, lacrimation, lethality, loss of corneal reflex, loss of righting reflex, loss of traction, piloerection, ptosis, reactivity to touch, respiration, salivation, scratching, sedation, stereotypies (chewing), stereotypies (head movements), stereotypies (sniffing), straub, tremor and writhes.

**Gross necropsy:**

At the end of the 14th day observation, all the animals were sacrificed by using Thiopentone Sodium gross necropsy includes examinations of the external surface of the body, all orifices, cranial, thoracic and abdominal cavities and their contents Brain, eye, heart, lungs, stomach, spleen, liver, kidneys, adrenals, uterus.

**REPEATED DOSE 28 DAYS ORAL TOXICITY STUDY**

**Test animals:**

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Species and strain</td>
<td>Wistar Albino rats</td>
</tr>
<tr>
<td>Sex</td>
<td>Male and Female</td>
</tr>
<tr>
<td>Age, Weight</td>
<td>6-8 weeks, 180-220gm</td>
</tr>
<tr>
<td>Test guideline</td>
<td>OECD guideline-407</td>
</tr>
<tr>
<td>Groups/treatment</td>
<td>Grouped by randomization</td>
</tr>
<tr>
<td>Study duration</td>
<td>28 days</td>
</tr>
<tr>
<td>Number of grouping</td>
<td>4 groups</td>
</tr>
<tr>
<td>Number of animals</td>
<td>3 males, 3 females/group</td>
</tr>
<tr>
<td>Route of administration</td>
<td>Oral</td>
</tr>
</tbody>
</table>
Justification of dose selection:

As stated results of acute toxicity studies in wistar albino rat indicated that Mandura Chenthooram was not toxic up to the dose of 2000mg/kg.b.wt LD50. The oral route was selected for use because oral route is considered to be a proposed therapeutic route. The low dose was calculated from the therapeutic dose (130mg) and body surface area of the rat (0.018). Calculation of low dose – 130 X 0.018 = 2.34/200gm of animal.

Grouping of animals:

Repeated dose 28 days oral toxicity study was carried out at different dose levels. The animals in both sexes were divided in four groups (Group I, II, III & IV). Each group consist of 3 animals (3 males and 3 females). Group – I served as control and the other three groups (II, III & IV) were treated as test group Low dose – 2.34mg/kg.b.wt), Mid dose – 11.7mg/kg.b.wt), High dose – 23.4mg/kg.b.wt), respectively

Grouping of animals in Repeated dose 28 days oral Toxicity study

<table>
<thead>
<tr>
<th>Groups</th>
<th>No of Rats</th>
</tr>
</thead>
<tbody>
<tr>
<td>GroupI: Vehicle control(Distilled water with honey)</td>
<td>6 (3male, 3female)</td>
</tr>
<tr>
<td>GroupII: Test drug(MC*) Low dose 2.34mg/kg.b.wt)</td>
<td>6 (3male, 3female)</td>
</tr>
<tr>
<td>GroupIII: Test drug(MC*) Mid dose 11.7mg/kg.b.wt)</td>
<td>6 (3male, 3female)</td>
</tr>
<tr>
<td>Group IV: Test drug(MC*) High dose 23.4mg/kg.b.wt)</td>
<td>6 (3male, 3female)</td>
</tr>
</tbody>
</table>

*MC- Mandura Chenthooram

Administration of doses:

The animals were dosed with the drug daily for a period of 28 days. The test drug administered by oral gavage, and this was done in a single dose to the animals once in daily for 28 days.
Observations:

- Moratlity, behavioural changes,
- All rats will be observed twice daily on week days for 28 days,
- Body weight will be monitored weekly once,
- Feed and water intake will be calculated per day.

**Cage-side observation**

Clinical observation includes abnormal Gait (rolling and tiptoe), aggressiveness, akinesia, analgesia, catalepsy, convulsions, defecation, excitation, exophthalmos, head twitches, lacrimation, lethality, loss of corneal reflex, loss of righting reflex, loss of traction, piloerection, ptosis, reactivity to touch, respiration, salivation, scratching, sedation, stereotypies (chewing), stereotypies (head movements), stereotypies (sniffing), straub, tremor and writhes.

**Blood collection and laboratory investigations:**

At the end of 28 days, blood samples were collected just prior to euthanasia in all overnight (12 hours) fasted rats from abdominal aorta using sodium heparin containing vaccutainer (200IU/ml) for Blood chemistry and potassium EDTA containing vaccutainer (1.5mg/ml) for Haematology sample.

- Complete Blood Count
- Renal function test
- Liver function test
- Lipid profile

**Necropsy:**

By the end of 28 days, after blood collection, the animals were sacrificed by excessive anaesthesia. Animals were subjected to gross necropsy. Organs like heart, lung, kidney, liver, spleen, stomach, brain and sex organs were collected from all animals and preserved in 10% buffered neutral formation.
Histopathology:

Control and highest dose groups animals will be initially subjected to histopathological investigation. If any abnormality found in the highest dose group then the low and mid dose group will also be examined. Various organs (brain, heart, lungs, liver, kidney, spleen, stomach, bone) will be collected from all the animals and preserved in 10% buffered neutral formalin, sliced, 5 or 6μm sections and will be stained with Hematoxylin and Eosin. Examined for histopathological changes.

Statistical Analysis:

Findings such as clinical signs of intoxication, body weight changes, food consumption, hematology, and biochemical parameters were subjected to one-way ANOVA followed by Dunnet “t” test using a computer software programme Graph Pad Instat-3.
RESULTS
5.1. QUALITATIVE ANALYSIS

Table 1: Colour, nature of –Mandura Chenthooram:

<table>
<thead>
<tr>
<th>S.No</th>
<th>Parameters</th>
<th>Results</th>
<th>Method of Testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Colour</td>
<td>Dark red</td>
<td>By visual</td>
</tr>
<tr>
<td>2</td>
<td>Odour</td>
<td>Odourless</td>
<td>Olfactory examination</td>
</tr>
<tr>
<td>3</td>
<td>Solubility</td>
<td>i) Soluble in distilled water &amp; honey</td>
<td>Qualitative</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ii) Sparingly soluble in distilled water</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Nature</td>
<td>Powder</td>
<td>By visual</td>
</tr>
</tbody>
</table>

From Table 1: The organoleptic characters show that Mandura Chenthooram is dark in colour and odourless powder form of drug. It is easily soluble in distilled water with honey and sparingly soluble in distilled water.

Table 2: Physicochemical analysis of - Mandura Chenthooram:

<table>
<thead>
<tr>
<th>S.No</th>
<th>Parameters</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Loss on drying</td>
<td>Less than 1%</td>
</tr>
<tr>
<td>2</td>
<td>Total ash value</td>
<td>99.67%</td>
</tr>
<tr>
<td>3</td>
<td>Acid insoluble ash</td>
<td>94.99%</td>
</tr>
<tr>
<td>4</td>
<td>Water soluble ash</td>
<td>Less than 1%</td>
</tr>
<tr>
<td>5</td>
<td>Water soluble extraction</td>
<td>0.68%</td>
</tr>
<tr>
<td>6</td>
<td>Alcohol soluble extraction</td>
<td>2.1%</td>
</tr>
<tr>
<td>7</td>
<td>pH Value</td>
<td>8.02</td>
</tr>
</tbody>
</table>

From Table 2: The Physico- chemical analysis of Mandura Chenthooram explained in the parameters such as Moisture content, Total ash value, Acid insoluble ash, Water soluble ash, Water soluble extraction, Alcohol soluble extraction are within the normal limit. pH of the drug was 8.02, denotes it is alkaline.
Table 3: Biochemical analysis of Mandura Chenthooram (MC):

<table>
<thead>
<tr>
<th>S.No</th>
<th>PROCEDURES</th>
<th>RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Test for Ammonium</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>Test for Sodium</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>Test for Magnesium</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>Test for Aluminium</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>Test for Potassium</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>Test for Calcium</td>
<td>+</td>
</tr>
<tr>
<td>7</td>
<td>Test for Ferrous Iron</td>
<td>+</td>
</tr>
<tr>
<td>8</td>
<td>Test for Zinc</td>
<td>-</td>
</tr>
<tr>
<td>9</td>
<td>Test for Arsenic</td>
<td>-</td>
</tr>
<tr>
<td>10</td>
<td>Test for Mercury</td>
<td>-</td>
</tr>
<tr>
<td>11</td>
<td>Test for Lead</td>
<td>-</td>
</tr>
<tr>
<td>12</td>
<td>Test for Sulphate</td>
<td>+</td>
</tr>
<tr>
<td>13</td>
<td>Test for Chloride</td>
<td>-</td>
</tr>
<tr>
<td>14</td>
<td>Test for Phosphate</td>
<td>-</td>
</tr>
<tr>
<td>15</td>
<td>Test for Carbonate</td>
<td>+</td>
</tr>
<tr>
<td>16</td>
<td>Test for Fluoride &amp; Oxalate</td>
<td>-</td>
</tr>
<tr>
<td>17</td>
<td>Test for Starch</td>
<td>+</td>
</tr>
<tr>
<td>18</td>
<td>Test for Reducing sugar</td>
<td>-</td>
</tr>
<tr>
<td>19</td>
<td>Test for Alkaloids</td>
<td>+</td>
</tr>
<tr>
<td>20</td>
<td>Test for Amino Acids</td>
<td>+</td>
</tr>
<tr>
<td>21</td>
<td>Test for Unsaturated compounds</td>
<td>-</td>
</tr>
<tr>
<td>22</td>
<td>Test for type of compound</td>
<td>+</td>
</tr>
</tbody>
</table>

(+) Present; (-) Absent
5.2. SPECTROSCOPIC ANALYSIS:

1. ATOMIC ABSORPTION SPECTROSCOPY:

Heavy metals content of Mandura Chenthooram was analyzed by AAS this results Tabulated in Table 4.

Table-4: Analysis of Heavy Metals:

<table>
<thead>
<tr>
<th>S.No</th>
<th>Name of the element</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Iron (Fe)</td>
<td>22.60%</td>
</tr>
</tbody>
</table>

From Table 4: The Atomic Absorption Spectroscopy result shows that the heavy metal iron present in Mandura Chenthooram were found to be, at the same time the Iron content of test drug is 22.60%.
2. INDUCTIVELY COUPLED PLASMA OPTICAL EMISSION SPECTROMETRY (ICP-OES):

Weight of test drug: **0.51740g**

**Table 5: Results of Quantitative analysis by ICP-OES for Mandura Chenthooram:**

<table>
<thead>
<tr>
<th>S.No</th>
<th>Elements</th>
<th>Wave Length In (nm)</th>
<th>Results (In Mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Aluminium</td>
<td>Al 396.152</td>
<td>BDL</td>
</tr>
<tr>
<td>2</td>
<td>Arsenic</td>
<td>As 188.979</td>
<td>BDL</td>
</tr>
<tr>
<td>3</td>
<td>Calcium</td>
<td>Ca 315.807</td>
<td>03.550mg/L</td>
</tr>
<tr>
<td>4</td>
<td>Cadmium</td>
<td>Cd 228.802</td>
<td>BDL</td>
</tr>
<tr>
<td>5</td>
<td>Copper</td>
<td>Cu 327.393</td>
<td>BDL</td>
</tr>
<tr>
<td>6</td>
<td>Iron</td>
<td>Fe 238.204</td>
<td>201.770 mg/L</td>
</tr>
<tr>
<td>7</td>
<td>Mercury</td>
<td>Hg 253.652</td>
<td>BDL</td>
</tr>
<tr>
<td>8</td>
<td>Potassium</td>
<td>K 766.491</td>
<td>03.071 mg/L</td>
</tr>
<tr>
<td>9</td>
<td>Magnesium</td>
<td>Mg 285.213</td>
<td>01.104 mg/L</td>
</tr>
<tr>
<td>10</td>
<td>Sodium</td>
<td>Na 589.592</td>
<td>01.110 mg/L</td>
</tr>
<tr>
<td>11</td>
<td>Nickel</td>
<td>Ni 231.604</td>
<td>BDL</td>
</tr>
<tr>
<td>12</td>
<td>Lead</td>
<td>Pb 220.353</td>
<td>BDL</td>
</tr>
<tr>
<td>13</td>
<td>Phosphorus</td>
<td>P 213.617</td>
<td>96.307 mg/L</td>
</tr>
<tr>
<td>14</td>
<td>Sulphur</td>
<td>S 180.731</td>
<td>01.224 mg/L</td>
</tr>
</tbody>
</table>

BDL – Below Detection Limit
3. X-RAY DIFFRACTION PATTERN OF MANDURA CHENTHOORAM:

Figure 1: EDAX analysis of Medicine sample:

Table 6: Representing the weight and atomic percentage of elements present in Medicine sample:

<table>
<thead>
<tr>
<th>Element</th>
<th>Weight %</th>
<th>Atomic %</th>
<th>Net Int.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
<td>41.54</td>
<td>62.18</td>
<td>504.89</td>
</tr>
<tr>
<td>NaK</td>
<td>6.53</td>
<td>6.80</td>
<td>82.66</td>
</tr>
<tr>
<td>AlK</td>
<td>3.79</td>
<td>3.37</td>
<td>145.58</td>
</tr>
<tr>
<td>SiK</td>
<td>13.02</td>
<td>11.10</td>
<td>688.95</td>
</tr>
<tr>
<td>KK</td>
<td>1.52</td>
<td>0.93</td>
<td>119.07</td>
</tr>
<tr>
<td>CaK</td>
<td>7.22</td>
<td>4.31</td>
<td>519.53</td>
</tr>
<tr>
<td>FeK</td>
<td>26.38</td>
<td>11.31</td>
<td>1210.18</td>
</tr>
</tbody>
</table>

EDAX analysis shows the elements present in the sample as shown in Figure. The table represents the weight and atomic percentage of sample. The presence of iron is 26 Wt% and Oxygen is of 41.5 % during sample preparation sintering takes
place many times in presence of organic compounds of the iron gets more oxidized and the level of oxygen is increased. The presence of Si and Ca is small contributed by the presence of sand during sample collection and the Na and K are from the White Goat milk and Urine. Since the sample is subjected to the calcination process it became oxidized.
4. **SCANNED ELECTRON MICROSCOPY:**

Determination of Particle size of Mandura Chenthooram

**Figure-2:** SEM Image of Mandura Chenthooram:
Description:

The VEGA TESCAN 3 instrument is used with tungsten filament to image the samples. The SEM imaging of the Medicine prepared from iron oxide sample shows that the particles are in micro size and irregular in shape as shown in Figure 2. The particles are aggregate and individual particles are seen on the top of the clusters. Since the particles are collected from the raw iron oxide (Rust) the particle size is large.
5.3. TOXICICOLOGICAL EVALUATION:

TOXICOLOGICAL EVALUATION OF MANDURA CHENTHOORAM (MC):

A. ACUTE TOXICITY STUDY:

Acute Toxicity Study was done as per OECD Guideline-423 with dose levels of 300, 2000 mg/kg.b.wt. Throughout the 14 days of observation period.

Table 7: Dose finding experiment and behavioural Signs of Acute Toxicity Study on rat:

<table>
<thead>
<tr>
<th>No</th>
<th>Dose mg/kg</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>17</th>
<th>18</th>
<th>19</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>300</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>2000</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
</tbody>
</table>


+ Presence of Activity

- Absence of Activity

All the data were summarized in the form of (table-7) revealed that there was no abnormal signs and behavioural changes in all animals at the dose level of 300, 2000 mg/kg body weight administered orally, during the study period.

There was no mortality observed after dosing of Mandura Chenthooram upto 2000mg/kg body weight during the study period of 14 days. This indicates that the LD50 of Mandura Chenthooram is more than 2000mg/kg b.wt.
There were no changes in skin and fur, eyes and mucous membranes of all animals. The eating, drinking habit, sleep pattern, locomotion were normal in all animals and no changes in body weight as compared to control group.

At the end of the 14th day, necropsy was performed and there was no abnormality seen in test groups as compared to control group during the examination.
B. REPEATED DOSE 28 DAYS ORAL TOXICITY STUDY:

1. TABLES AND GRAPHS:

Table 8: Food (g/day) intake of Wistar albino rats exposed to Mandura Chenthooram (MC):

<table>
<thead>
<tr>
<th>Dose(mg/day)/Day</th>
<th>1st day</th>
<th>7th day</th>
<th>14th day</th>
<th>21st day</th>
<th>28th day</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTROL</td>
<td>54±12.72</td>
<td>42.5±3.53</td>
<td>51.5±2.12</td>
<td>56.5±2.12</td>
<td>67.5±6.36</td>
</tr>
<tr>
<td>LOW DOSE</td>
<td>35±7.07</td>
<td>41.5±12.02</td>
<td>51±12.72</td>
<td>51±14.14</td>
<td>55.5±16.26</td>
</tr>
<tr>
<td>MID DOSE</td>
<td>35.5±6.36</td>
<td>42.5±3.53</td>
<td>43±2.82</td>
<td>46.5±6.36</td>
<td>48.5±6.36</td>
</tr>
<tr>
<td>HIGH DOSE</td>
<td>39±1.41</td>
<td>47.5±3.53</td>
<td>47.5±10.60</td>
<td>55±7.07</td>
<td>57±10.60</td>
</tr>
</tbody>
</table>

Values were expressed as mean± S.D. for N=6 rats in each group one-way ANOVA followed by Dunnett’s test. Significant indicates that *P<0.05, **P<0.01

From Table 8: Food consumption of the animals no significant difference in food intake the test group animals were observed when compared with control group during the study period.

Figure 3: Food (g/day) intake of Wistar albino rats exposed to Mandura Chenthooram (MC):
Table 9: Water (ml/day) intake of Wistar albino rats exposed to Mandura Chenthooram (MC):

<table>
<thead>
<tr>
<th>Dose (mg/kg)</th>
<th>1st day (ml/day)</th>
<th>7th day (ml/day)</th>
<th>14th day (ml/day)</th>
<th>21st day (ml/day)</th>
<th>28th day (ml/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTROL</td>
<td>75±21.21</td>
<td>80±14.14</td>
<td>85±21.21</td>
<td>70±14.41</td>
<td>80±0</td>
</tr>
<tr>
<td>LOW DOSE</td>
<td>80±0</td>
<td>105±7.07</td>
<td>95±21.21</td>
<td>80±14.14</td>
<td>80±0</td>
</tr>
<tr>
<td>MID DOSE</td>
<td>80±14.14</td>
<td>80±28.28</td>
<td>75±7.07</td>
<td>80±0</td>
<td>85±7.07</td>
</tr>
<tr>
<td>HIGH DOSE</td>
<td>80±28.28</td>
<td>70±28.28</td>
<td>70±14.14</td>
<td>85±35.35</td>
<td>85±7.07</td>
</tr>
</tbody>
</table>

Values were expressed as mean± S.D. for N=6 rats in each group one-way ANOVA followed by Dunnett’s test. Significant indicates that *P<0.05, **P<0.01

From Table 9: Water consumption the no difference in water intake of control and test group of animals observed during the study period (Table-9).

Figure 4: Water (ml/day) intake of Wistar albino rats exposed to Mandura Chenthooram (MC):
Table 10: Body weight (g) changes of Wistar albino rats (male) exposed to Mandura Chenthooram (MC):

<table>
<thead>
<tr>
<th>Dose</th>
<th>1st day (mg/kg)</th>
<th>7th day (mg/kg)</th>
<th>14th day (mg/kg)</th>
<th>21st day (mg/kg)</th>
<th>28th day (mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTROL</td>
<td>154±5.24</td>
<td>206.66±14.57</td>
<td>216.66±18.17</td>
<td>231.66±29.29</td>
<td>245±39.88</td>
</tr>
<tr>
<td>LOW DOSE</td>
<td>170.66±4.04</td>
<td>211.66±15.27</td>
<td>229.33±5.85</td>
<td>248.66±10.50</td>
<td>266.66±15.24</td>
</tr>
<tr>
<td>MID DOSE</td>
<td>169±6.55</td>
<td>235±9.16</td>
<td>248±12.49</td>
<td>261±12.28</td>
<td>273±11.78</td>
</tr>
<tr>
<td>HIGH DOSE</td>
<td>197.33±32.88</td>
<td>221.66±36.50</td>
<td>240.33±35.92</td>
<td>252.33±37.07</td>
<td>261.33±35.92</td>
</tr>
</tbody>
</table>

Values were expressed as mean± S.D. for N=6 rats in each group one-way ANOVA followed by Dunnett’s test. Significant indicates that *P<0.05, **P<0.01

Figure 5: Body weight (g) changes of Wistar albino rats (male) exposed to Mandura Chenthooram (MC):
Table 11: Body weight (g) changes of Wistar albino rats (female) exposed to Mandura Chenthooram (MC):

<table>
<thead>
<tr>
<th>Dose (mg/kg)</th>
<th>1&lt;sup&gt;st&lt;/sup&gt; day</th>
<th>7&lt;sup&gt;th&lt;/sup&gt; day</th>
<th>14&lt;sup&gt;th&lt;/sup&gt; day</th>
<th>21&lt;sup&gt;st&lt;/sup&gt; day</th>
<th>28&lt;sup&gt;th&lt;/sup&gt; day</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTROL</td>
<td>143.66±2.88</td>
<td>150±2.51</td>
<td>157±2.51</td>
<td>168±1.73</td>
<td>172.66±2.08</td>
</tr>
<tr>
<td>LOW DOSE</td>
<td>146±6</td>
<td>153±2.88</td>
<td>160±2.64</td>
<td>171±6</td>
<td>178.33±7.63</td>
</tr>
<tr>
<td>MID DOSE</td>
<td>148±3.46</td>
<td>158±5.03</td>
<td>165±5.13</td>
<td>173.33±2.51</td>
<td>180.66±1.52</td>
</tr>
<tr>
<td>HIGH DOSE</td>
<td>150±9.86</td>
<td>160±16.82</td>
<td>170±16.16</td>
<td>179±19.51</td>
<td>185.33±18.61</td>
</tr>
</tbody>
</table>

Values were expressed as mean± S.D. for N=6 rats in each group one-way ANOVA followed by Dunnett’s test. Significant indicates that *P<0.05, **P<0.01

From Table 10, 11: Body weight of the both control and test group exhibited normal body weight throughout the study period.

Figure 6: Body weight (g) changes of Wistar albino rats (female) exposed to Mandura Chenthooram (MC):
Table 12: Effect of Mandura Chenthooram on Hematological Parameters:

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Control</th>
<th>Low Dose</th>
<th>Mid Dose</th>
<th>High Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>RBC (X 10^6 µl)</td>
<td>6.08±0.81</td>
<td>6.48±1.75</td>
<td>6.73±0.87</td>
<td>6.61±0.91</td>
</tr>
<tr>
<td>WBC(X10^3 µl)</td>
<td>9.06±1.79</td>
<td>9±1.82</td>
<td>8.75±1.86</td>
<td>8.76±0.94</td>
</tr>
<tr>
<td>PLT(X10^3 µl)</td>
<td>668.66±131.49</td>
<td>765±132.74</td>
<td>790.66±117.92</td>
<td>715.16±134.51</td>
</tr>
<tr>
<td>HGB(g/dl)</td>
<td>13.1±2.24</td>
<td>12.08±1.51</td>
<td>12.45±1.04</td>
<td>13.11±1.19</td>
</tr>
<tr>
<td>MCH(pg)</td>
<td>16.81±2.37</td>
<td>17.85±1.92</td>
<td>18.33±1.71</td>
<td>19±2.31</td>
</tr>
<tr>
<td>MCV(fl)</td>
<td>60.36±6.12</td>
<td>60.41±5.87</td>
<td>60.98±2.72</td>
<td>57.18±5.19</td>
</tr>
<tr>
<td>NEUTROPHILS (10³/mm³)</td>
<td>1.71±0.44</td>
<td>1.75±0.61</td>
<td>1.53±0.46</td>
<td>1.7±0.60</td>
</tr>
<tr>
<td>EOSINOPHILS(%)</td>
<td>1.46±0.18</td>
<td>1.5±0.17</td>
<td>1.53±0.26</td>
<td>1.31±0.29</td>
</tr>
<tr>
<td>BASOPHILS(%)</td>
<td>0.16±0.40</td>
<td>0.33±0.51</td>
<td>0.16±0.40</td>
<td>1.31±0.29</td>
</tr>
<tr>
<td>LYMPH(%)</td>
<td>71.45±11.29</td>
<td>75.61±12.50</td>
<td>74.25±9.39</td>
<td>70.68±6.47</td>
</tr>
<tr>
<td>MON(%)</td>
<td>2.51±0.67</td>
<td>2.7±0.76</td>
<td>2.68±0.58</td>
<td>1.86±1.04</td>
</tr>
</tbody>
</table>

Values were expressed as mean± S.D. for N=6 rats in each group one-way ANOVA followed by Dunnett’s test. Significant indicates that *P<0.05, **P<0.01

From Table 12: The results of the Haematological investigations conducted at the end of the study, the test groups revealed no significant changes in levels of haematological parameters, when compared with control group.
Figure 7: Effect of Mandura Chenthooram on RBC:

![Effect of Mandura Chenthooram on RBC](image)

Figure 8: Effect of Mandura Chenthooram on WBC:

![Effect on Mandura Chenthooram on WBC](image)
Figure 9: Effect of Mandura Chenthooram on PLT:

Effect of Mandura Chenthooram on PLT

![Bar chart showing effect of Mandura Chenthooram on PLT](image)

Figure 10: Effect of Mandura Chenthooram on Haemoglobin

Effect of Mandura Chenthooram on HB

![Bar chart showing effect of Mandura Chenthooram on HB](image)
Figure 11: Effect of Mandura Chenthooram on MCH and MCV:

![Effect of Mandura Chenthooram on MCH and MCV](image1)

Figure 12: Effect of Mandura Chenthooram on Leucocytes:

![Effect of Mandura Chenthooram on Leucocytes](image2)
Table 13: Effect of Mandura chenthooram on Biochemical Parameters - Renal function test:

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Control</th>
<th>Low Dose</th>
<th>Mid Dose</th>
<th>High Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUN (mg/dl)</td>
<td>14.91±4.93</td>
<td>18.18±3.48</td>
<td>16.9±2.30</td>
<td>17.45±3.14</td>
</tr>
<tr>
<td>Serum Creatinine (mg/dl)</td>
<td>0.78±0.19</td>
<td>0.76±0.13</td>
<td>0.73±0.24</td>
<td>0.76±0.18</td>
</tr>
</tbody>
</table>

Values were expressed as mean± S.D. for N=6 rats in each group one-way ANOVA followed by Dunnett’s test. Significant indicates that *P<0.05, **P<0.01

From Table 13: The results of the Renal function test conducted at the end of the study, the test groups revealed no significant changes in levels of haematological parameters, when compared with control group.

Figure 13: Effect of Mandura chenthooram on Biochemical Parameters - Renal function test:
Table 14: Effect of Mandura chenthooram on Biochemical Parameters - Liver function test:

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Control</th>
<th>Low Dose</th>
<th>Mid Dose</th>
<th>High Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Bilirubin (mg/dl)</td>
<td>0.51±0.14</td>
<td>0.41±0.21</td>
<td>0.45±0.08</td>
<td>0.43±0.12</td>
</tr>
<tr>
<td>SGOT(IU/ml)</td>
<td>121.33±16.08</td>
<td>120.5±27.14</td>
<td>117.83±21.60</td>
<td>107.16±34.38</td>
</tr>
<tr>
<td>SGPT(IU/ml)</td>
<td>31±10.29</td>
<td>27.5±5.54</td>
<td>29.33±3.72</td>
<td>33.5±8.16</td>
</tr>
</tbody>
</table>

Values were expressed as mean± S.D. for N=6 rats in each group one-way ANOVA followed by Dunnett’s test. Significant indicates that *P<0.05, **P<0.01

From Table 14: The results of the Liver function test conducted at the end of the study, the test groups revealed no significant changes in levels of haematological parameters, when compared with control group.

Figure 14: Effect of Mandura chenthooram on Biochemical Parameters - Liver function test
Table 15: Effect of Mandura chenthooram on Biochemical Parameters - Lipid Profile

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Control</th>
<th>Low Dose</th>
<th>Mid Dose</th>
<th>High Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Cholesterol</td>
<td>145.63±23.28</td>
<td>121.75±19.91</td>
<td>136.76±13.79</td>
<td>139.96±8.64</td>
</tr>
<tr>
<td>HDL (mg/dl)</td>
<td>65.83±12.36</td>
<td>64.83±11.54</td>
<td>64.83±13.94</td>
<td>59.33±11.70</td>
</tr>
<tr>
<td>LDL (mg/dl)</td>
<td>64.66±20.06</td>
<td>39.33±15.78</td>
<td>56.66±12.51</td>
<td>64.33±17.96</td>
</tr>
<tr>
<td>VLDL (mg/dl)</td>
<td>15.13±1.81</td>
<td>17.58±3.57</td>
<td>15.26±4.60</td>
<td>16.3±3.12</td>
</tr>
<tr>
<td>TGL (mg/dl)</td>
<td>43.33±12.50</td>
<td>41.83±10.00</td>
<td>34.66±8.61</td>
<td>39.16±4.99</td>
</tr>
</tbody>
</table>

Values were expressed as mean± S.D. for N=6 rats in each group one-way ANOVA followed by Dunnett’s test. Significant indicates that *P<0.05, **P<0.01.

From Table 15: Biochemical investigations were conducted at the end of the study and the results were recorded. In test groups there was no significant change present in biochemical parameters, when compared with the control group. At the values were normal biological limits.
Figure 15: Effect of Mandura chenthooram on Biochemical Parameters - Lipid Profile:

![Effect of Mandura Chenthoorma on Lipid Profile](image)
Histopathology of Brain

High Power Magnification 40X

PLATE: A CONTROL (M)  PLATE: A CONTROL (M)

PLATE: C HIGH DOSE (M)  PLATE: D HIGH DOSE (FM)

PLATE: A - The cerebral sections showed normal architecture in both cortex and medulla.

PLATE: B - Appearance of Hippocampal neurons was normal with dense network.

-Morphology of neurons in CA1, CA2 and CA3 zones are normal.

PLATE: C - Arrangement of neurons on cerebral cortex appears normal and dense.

-No signs of ischemia or lesion were observed.

PLATE: D - Normal architecture was observed in both cortex and medulla of cerebellum.
Histopathology of Heart

High Power Magnification 40X

PLATE: A CONTROL (M)

PLATE: B CONTROL (FM)

PLATE: C HIGH DOSE (M)

PLATE: D HIGH DOSE (FM)

PLATE: A- Appearance of myocyte was normal.

PLATE: B - Appearance of fibrils and cross striations are normal and equidistant.

PLATE: C - Nucleus appears prominent with regular arrangement of fibres.

- No evidence of pyknotic nucleus.

PLATE: D - Myocardial cells appears normal with well-defined mycoplasma and prominent nucleus and nucleolus.
Histopathology of Lung

High Power Magnification 40X

PLATE: A CONTROL (M)

PLATE: B CONTROL (FM)

PLATE: C HIGH DOSE (M)

PLATE: D HIGH DOSE (FM)

PLATE: A- Lung parenchyma appears normal with regular arrangement of alveoli and alveolar sac.

PLATE: B- Perivascular region appears normal, alveolar septa and wall appeared widen and normal.

PLATE: C- Bronchial opening appears regular with no signs of infiltration.

PLATE: D- Appearance of alveolar network was normal.
Histopathology of Stomach

High Power Magnification 40X

PLATE: A CONTROL (M)  
![Image of Plate A Control (M)]

PLATE: B CONTROL (FM)  
![Image of Plate B Control (FM)]

PLATE: A CONTROL (M)  
![Image of Plate A Control (M)]

PLATE: B CONTROL (FM)  
![Image of Plate B Control (FM)]

PLATE: A- The continuity of mucosa was normal with no evidence of ulceration.

PLATE: B- Appearance of Sub-mucosa and gastric glands appear normal.

PLATE: C- Mucosal wall appears normal with regular arrangement of connective Tissue.

PLATE: D- Gastric glands including secretary sheath appears normal.
Histopathology of Liver

High Power Magnification 40X

**PLATE: A** CONTROL (M)

[Image of liver tissue showing normal hexagonal hepatic lobules with normal, regular radiated hepatic cords.]

**PLATE: B** CONTROL (FM)

[Image of liver tissue showing hepatocytes appearing variably pale with mild congestion on central vein.]

**PLATE: C** HIGH DOSE (M)

[Image of liver tissue showing centrilobular zone appears normal with stable network of hepatocytes.]

**PLATE: D** HIGH DOSE (FM)

[Image of liver tissue showing appearance of terminal hepatic venules (central veins) to the portal tracts was normal.]

**PLATE: A** - Section of liver showing normal hexagonal hepatic lobules with normal, regular radiated hepatic cords.

**PLATE: B** - Hepatocytes appear variably pale with mild congestion on central vein.

**PLATE: C** - Centrilobular zone appears normal with stable network of hepatocytes.

**PLATE: D** - Appearance of terminal hepatic venules (central veins) to the portal tracts was normal.
Histopathology of Spleen
High Power Magnification 40X

PLATE: A CONTROL (M)  
PLATE: B CONTROL (FM)

PLATE: C HIGH DOSE (M)  
PLATE: D HIGH DOSE (FM)

PLATE: A – Marginal sinus (MS) of the spleen and its sinus lining cells appears normal.

PLATE: B – Erythropoietic cells (EP) are scattered throughout the red pulp. No abnormalities found in lymph node.

PLATE: C – Presence of marginal at the interface of the red pulp with the PALS and follicles was observed.

PLATE: D – Marginal sinus of the spleen and its sinus lining cells appears normal.
Histopathology of Kidney

High Power Magnification 40X

PLATE: A CONTROL (M)

PLATE: B CONTROL (FM)

PLATE: C HIGH DOSE (M)

PLATE: D HIGH DOSE (FM)

PLATE: A – Section showing normal, intact renal tubules as well as renal glomeruli.

PLATE: B – Arrangement of glomerular loop was normal with regular interstitium.

PLATE: C – Some renal tubules are hypertrophic, others are dilated.

PLATE: D - Appearance of proximal and distal convolutes tubules was normal with no evidence of atrophy.
Histopathology of Testes

High Power Magnification 40X

PLATE: A CONTROL (M)

PLATE: B HIGH DOSE (M)

PLATE: A – Section of testis of showing normal interstitial connective tissue with proliferating highly divided germ cells with elongated sertoli cells.

PLATE: B – Testicular tissue shows well differentiated germ cells with respect of spermatogonia include spermatid and sperm were observed.
Histopathology of Ovary

High Power Magnification 40X

PLATE: A CONTROL (FM)

PLATE: B HIGH DOSE (FM)

PLATE: A – Sequential arrangement of granulosa cells around oocyte was normal and regular.

PLATE: B – Appearance of antral follicle, primary oocyte and secondary follicles are normal.
Histopathology of Uterus

High Power Magnification 40X

PLATE: A CONTROL (FM)

PLATE: B HIGH DOSE (FM)

**PLATE: A** – Appearance of endometrium, myometrium and uterine glands was normal.

**PLATE: B** – Endometrial gland, epithelium and blood vessels appears normal.
Discussion
DISCUSSION

After the preparation of the test drug Mandura Chenthooram it undergone Physico-chemical, Biochemical, AAS, ICP-OES, XRD, SEM, Analysis and Toxicity study and their results are discussed as follows.

The Physico-chemical analysis of MC (Table: 2) concludes the following results.

The loss on drying test is designed to measure the amount of water and volatile matters in a sample when the sample is dried under specified conditions. The percentage of loss on drying of MC was less than 1%.

The Ash limit Tests are designed to measure the amount of the residual. A high ash value is indicative of contamination, substitution, adulteration or carelessness in preparing the drug. The total ash values of MC were 99.67%. Acid-insoluble ash value of MC is 94.99%. Extraction value determines the amount of active constituents in a given amount of the formulation when extracted with a solvent media such as water and alcohol. pH of the drug was 8.02, denotes it is alkaline.

Qualitative Analysis of Mandura Chenthooram (Table-3) indicates the presence of Silicate, Sulphate, Carbonate, Iron, Calcium, Alkaloid, Starch and presence of Anti pyrine, Aliphatic amino acid, Meconic acid.

The Atomic Absorption Spectroscopy result (Table-4) shows that the heavy metal iron present in Mandura Chenthooram were found, at the same time the Iron content of test drug is 22.60%.

The Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES) results showed that the Heavy metals like Aluminium, Arsenic, Cadmium, Copper, Mercury, Nickel and Lead were found below detection level. It also shows the presence of physiologically important minerals like Calcium, Copper, Sodium, Magnesium, Potassium, Sulphur and Phosphorus. (Table-5)

EDAX analysis shows the elements present in the sample as shown in Figure-1. The table (Table-6) represents the weight and atomic percentage of sample. The presence of iron is 26 Wt% and Oxygen is of 41.5 % during sample preparation sintering takes place many time in presence of organic compounds of the iron gets more oxidized and the level of oxygen is increased. The presence of Si and Ca is
small contributed by the presence of sand during sample collection and the Na and K are from the White Goat milk and Urine. Since the sample is subjected to the calcination process, it became oxidized.

The SEM imaging of the Medicine prepared from iron oxide sample shows that the particles are in micro size and irregular in shape as shown in Figure-2. The particles are aggregate and individual particles are seen on the top of the clusters. Since the particles are collected from the raw iron oxide (Rust) the particle size is large.

In Acute Toxicity Study, carried out as per OECD guidelines 423, there were no treatment related death or signs of toxicity developed in wistar albino rat at dosage levels of 300 and 2000 mg/kg b.wt throughout the study period. Further, no gross pathological changes have been seen in the internal organs of both control and treated groups. Thus, the LD50 value was found to be greater than 2000mg/kg body weight.

28 Days Repeated Oral Toxicity Study was conducted as per the OECD guidelines - 407 in 4 doses. Control group was administered 1ml of honey mixed with 1ml of distilled water. The low dose was calculated from the approximate therapeutic dose (130 mg) and body surface area of rat (0.018). Calculation of low dose – 130 x 0.018 = 2.34 mg/200 gm of animal. Mid dose was calculated as (2.34 x 5=11.7mg) and high dose was calculated as (2.34 x 10=23.4mg). Animals were observed throughout the period. There was no significant change in food intake (Table-8), water intake (Table-9), and body weight (Table-10, 11). After 28 days animals were sacrificed and blood samples were collected, investigated. The results revealed that there were no significant changes in the haematological parameters (Table-12), biochemical parameters (Table 13,14,15) , The histopathological study on the organs such as brain, heart, lungs, stomach, liver, spleen, kidney, testes, ovary and uterus was normal in control, and high dose groups.
SUMMARY

The branch of toxicology (Nanju Murivu Maruthuvam) was developed in Siddhar’s period itself. Being a toxicology student the author is interested to take the drug Mandura Chenthooram to evaluate its safety profile. The name, Mandura Chenthooram comes from its ingredients manduram useful to treat various blood disorders.

Mandura Chenthooram is a Siddha formulation prepared from purified Manduram (Ferroso ferric oxide), Pasuneer (Cow urine), Vetrilai (Piper betel), Vellattupaal (Goat milk), Vellattu neer (Goat urine), Notchi (Vitex negundo), and Katrazhai (Aloe vera).

The test drug was chosen from the Siddha literature Kannusamy Parambarai Vaithiyam. The raw drugs were procured from Ramasamy Chetti shop and authenticated at Department of Gunapadam, National Institute of Siddha, Chennai-47. The Herbal drugs were identified and authenticated by Assistant Professor, Department of Medicinal Botany, National Institute of Siddha, Chennai-47. The ingredients were purified and the medicine was prepared as mentioned in the Siddha literature.

Mandura Chenthooram was analyzed qualitatively with physico chemical, biochemical analysis, and spectroscopically with AAS, ICP-OES, XRD, SEM analysis. Acute and repeated dose 28 days oral toxicity studies were conducted as per the OECD guidelines

Initially the test drug was subjected to physico chemical analysis. It reveals the increased bioavailability and purity of the drug. Then the samples were analysed for Biochemical constituents. It reveals the presence of constituents like Silicate, Sulphate, Carbonate, Iron, Calcium, Alkaloid, Starch, Anti pyrine, Aliphatic amino acid and Meconic acid.

The Atomic Absorption Spectroscopy result shows the presence of heavy metal iron in Mandura Chenthooram and the Iron content of test drug is 22.60%.

The Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES) shows that Aluminium, Arsenic, Cadmium, Copper, Mercury, Nickel and Lead were
found below detection level. It also shows the presence of physiologically important minerals like Calcium, Copper, Sodium, Magnesium, Potassium, Sulphur and Phosphorus.

EDAX analysis shows the presence of elements in the sample Iron, Oxygen, Sodium, Aluminium, Silicate, Potassium, and Calcium.

The SEM imaging of the Medicine prepared from iron oxide sample shows that the particles are in micro size and irregular in shape. The particles are aggregate and individual particles are seen on the top of the clusters since the size of the particles collected from the raw iron oxide (Rust) is large.

In Acute Toxicity Study, carried out as per OECD guidelines 423, there were no treatment related death or signs of toxicity developed in wistar albino rat at dosage levels of 300 and 2000 mg/kg b.wt throughout the study period. Further, no gross pathological changes have been seen in the internal organs of both control and treated groups. Thus, the LD50 value was found to be greater than 2000mg/kg body weight.

Repeated Oral 28 Days Toxicity Study was conducted for about 28 days as per the OECD guideline-407 in 4 doses. Control group were given 1ml of honey with 1 ml distilled water. Low dose, mid dose and high dose were 2.34mg, 11.7mg and 23.4mg respectively. There was no significant change in body weight, water and food intake. There were no significant changes in the haematological and biochemical parameters. Histopathological study shows that, organs such as brain, heart, lungs, stomach, liver, spleen, kidney, testes, ovary and uterus was normal in control, and high dose groups.
CONCLUSION

Mandura Chenthooram had been used by Siddhars for long time to treat various diseases such as Anaemia, Dropsy, Jaundice, Ascites, Cough, and Diarrhoea. Since Iron Oxide is present in Mandura Chenthooram, which is observed by the quantitative analysis, the drug can be easily absorbed in intestine. Acute toxicity study shows that the test drug can be used up to the dose of 2000mg/kg body weight as a single dose. As per Siddha literature, the test drug was used as a minimal dose medicine. No notable abnormalities were observed in test group of animals when compared with control group of animals. Hence, we conclude that the dosage of Mandura Chenthooram, 130mg twice a day narrated in Kannusamy Parambarai Vaithiyam is a safer therapeutic dose for uses of human. The author hopes that this study will be a footprint to future research of chronic toxicity study, Carcinogenicity, Teratogenicity regarding Mandura Chenthooram.
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AUTHENTICATION CERTIFICATE

Certified that the sample submitted for identification by Dr. K. Jeevaraj, II year PG scholar, Dept. of Nanju noolum Maruthuva neethi noolum, National Institute of Siddha, Chennai - 47, is identified as Manduram (Oxide of Iron) on the basis of macroscopic character.

This certificate is issued for the purpose of preparing his dissertation medicine in Gunapadom laboratory, NIS.

[Signature]

Dr. S. Visweswaran, M.D (s)
Head of Department
Department of Gunapadom
National Institute of Siddha
Tambaram - Chennai - 47.
NATIONAL INSTITUTE OF SIDDHA, CHENNAI - 600047

BOTANICAL CERTIFICATE

Certified that the following plant drugs used in the formulation

Mandura chenthooram taken up for Post Graduation Dissertation studies by Dr. K. Jeekaraj
M.D.(S). II year, Department of Nanju Noolum Maruthava Neettri Noolum, 2017, is identified and authenticated through Visual inspection, Experience, Education & Training, Organoleptic characters, Morphology, Micromorphology and Taxonomical methods as

Piper betle Linn. (Piperaceae), Leaf

Vitex negundo Linn. (Verbenaceae), Leaf

Aloe vera (Linn.) Burm.f. (Liliaceae), Leaf

Date: 06-03-2017

Authorized Signatory

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

This is certify that the project title: Pre-clinical evaluation of...
'Monotropa oxypoda'... at H. Ravi (20 Mtr.)

has been approved by the IAEC.

Approval No: NIS/IAEC-II/09/2016

Prof. Dr. V. Banumathy
Name of Chairman/Member-Secretary IAEC:

Prof. Dr. K. Nachimuthu
Name of CPCSEA nominee:

Signature with date

Chairman/Member-Secretary of IAEC:

CPCSEA nominee:

(Kindly make sure that minutes of the meeting duly signed by all the participants are maintained by Office)
The Tamil Nadu Dr. M.G.R. Medical University
69, Anna Salai, Guindy, Chennai - 600 032.

This Certificate is awarded to Dr./Mrs. K. JEEVARAJ

For participating as Resource Person / Delegate in the Twenty second Workshop on

"RESEARCH METHODOLOGY & BIOSTATISTICS"

For AYUSH Post Graduates & Researchers

Organized by the Department of Siddha

The Tamil Nadu Dr. M.G.R. Medical University From 06th to 10th June 2016.

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Dept. of Siddha

Prof. Dr. S. Pushkala, M.D.
Registrar (FAC)

Prof. Dr. S. Geethalakshmi, M.D., Ph.D.
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Workshop on
"BASIC RESEARCH TECHNIQUES AND PRACTICES INVOLVED IN LABORATORY ANIMAL CARE"
06 -10 February 2017

CERTIFICATE

This is to certify that Dr. K. Jeevaraj has participated as Delegate/Resource Person in the workshop on “Basic Research Techniques and Practices involved in Laboratory Animal Care” held on 06-10 February, 2017 at National Institute of Siddha, Chennai-47, Tamilnadu.

Dr. V. Suba
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Dr. P. Muthusamy
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Prof. Dr. V. Banumathi
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