A PROSPECTIVE OPEN LABELLED NON RANDOMIZED PHASE-II CLINICAL TRIAL TO EVALUATE THE THERAPEUTIC EFFICACY OF THE SIDDHA MEDICINE "*THIRIPALAI MATHIRAI*" (INTERNAL) FOR THE TREATMENT OF "*PITHA PAANDU*"

(IRON DEFICIENCY ANAEMIA)

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GOVERNMENT SIDDHA MEDICAL COLLEGE & HOSPITAL

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BONAFIDE CERTIFICATE

This is to certify that the dissertation entitled "**A PROSPECTIVE OPEN LABELLED NON RANDOMIZED PHASE-II CLINICAL TRIAL TO EVALUATE THE THERAPEUTIC EFFICACY OF THE SIDDHA MEDICINE *THIRIPALAI MATHIRAI* (INTERNAL) FOR THE TREATMENT OF *PITHA PAANDU* (IRON DEFICIENCY ANAEMIA)"** is a bonafide work done by **Dr.B.MAHESHWARI (Reg.No.321611003)** Govt. Siddha Medical College, Palayamkottai - 627 002 in partial fulfilment of the university rules and regulations for award for **MD(S) POTHU MARUTHUVAM (BRANCH-I**) under my guidance and supervision during the academic year **OCTOBER 2016-2019**.

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I declare that the dissertation entitled "**A PROSPECTIVE OPEN LABELLED NON RANDOMIZED PHASE-II CLINICAL TRIAL TO EVALUATE THE THERAPEUTIC EFFICACY OF THE SIDDHA MEDICINE *THIRIPALAI MATHIRAI* (INTERNAL) FOR THE TREATMENT OF *PITHA PAANDU* (IRON DEFICIENCY ANAEMIA)"** submitted for the degree of MD Siddha Medicine of Government Siddha Medical College, Palayamkottai, Tirunelveli, Tamil Nadu (The Tamil Nadu Dr. M.G.R. Medical University, Chennai) the record of work carried out by me under the supervision of **Prof.Dr.A.Manoharan MD(S),(Ph.D),** Head of the Department of Pothu Maruthuvam, and guidance by **Dr.T.Komalavalli MD(S),Ph.D.,** Associate Professor, Govt. Siddha Medical College, Palayamkottai. This work has not formed the basis of award of any degree, diploma, associateship, fellowship or other titles in the university or any other university or institution of higher learning.

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LIST OF ABBREVIATIONS

%	-	Percentage
ANOVA	-	Analysis Of Variance
CTRI	-	Clinical Trial Registry India
Hb	-	Haemoglobin
HbA	-	Adult Haemoglobin
HbF	-	Fetal Haemoglobin
IAEC	-	Institutional Animal Ethics Committee
ICMR	-	Indian Council of Medical Research
IDA	-	Iron Deficiency Anaemia
gms	-	Grams
dl	-	Decilitre
ml	-	Milli litre
kg	-	Kilogram
mg	-	Milligram
RBC	-	Red Blood Corpuscles
WBC	-	White Blood Corpuscles
TC	-	Total Count
DC	-	Differential Count
P	-	Polymorphs
L	-	Lymphocytes
E	-	Eosinophils
PCV	-	Packed Cell Volume
MCV	-	Mean Corpuscular Volume
MCH	-	Mean Corpuscular Haemoglobin
MCHC	-	Mean Corpuscular Haemoglobin Concentration
fl	-	femtolitre
pg	-	picrogram
cu.mm	-	Cubic millimeter
ESR	-	Erythrocyte Sedementation Rate
Bd	-	Twice a day
IEC	-	Institutional Ethics Committee
IPD	-	In Patient Department
KK	-	Karisalai Kudineer
OPD	-	Out Patient Department
TPM	-	Thiripalai Mathirai

ABSTRACT

Pitha Paandu (Iron Deficiency Anemia) is the most prevalent type of anaemia which attribute to 50% of total population suffering from anaemia. It becomes a major problem in the developing countries like India due to majority of people living below poverty line, unhygienic food habits and nutritional deficiency. Since the diagnosis and management of Pitha paandu (Iron deficiency anaemia) remains a great challenge, I have chosen this disease and made an attempt to search for a perfect remedy for the same.

20 patients of the either sex as OP & 20 patients in IP were selected and they were administered with the trial medicine **"THIRIPALAI MATHIRAI" (INTERNAL)** 1 tablet bd and the adjuvant Karisalai kudineer 100 ml bd during the whole study period.

Thiripalai mathirai was chosen for this study with reference from **"KADUKKAI VALLARAIYIN THANI MAANBU"**-Third Edition: 1992, Page No: 81.Author: Hakkim. P. Mohammed Abdullah Sahib.

The trial drug was subjected to Phytochemical analysis, Bio chemical analysis, Antimicrobial, Pharmacological and Toxicological (Acute and Sub-acute) studies.

At the end of the study period, the majority of the cases showed significant results.

CHAPTER - 1

INTRODUCTION

Siddha medicine is a form of traditional medicine, the oldest prevailing system of medicine in India. It is unique in many aspects like its antiquity rationale of diagnosis, treatment modalities based on individual constitution of the body emphasis on special diet and aiming at not only curing the disease but also strengthening the body. Siddha medicine employs a variety of herbs and minerals which were developed now under advanced scientific technique.

The divine power guards the soul and the body. The support for the body namely *Pancha bootha* combination and permutation is the support for the soul are the three *thathus.* They become as the three gunas and guard the soul and the body, say the *Siddhars*, the ancestors of the land.

"உருபொருள் தாங்கு முடலு முயிரும்
உடற்காதார மொன்பஞ் சபூதப்
பஞ்சீ கரணப் பான்மையா மெனவும்
உயிர்க்கா தார முயிர்த்தா தெனவும்
முப்பிரி வாகி முக்குண மணுகி
உடலை யுமுயிரையு மோம்பிக்காத்து
வருமென முதுமறை வகுக்குந் துணிபே"

- நோய் நாடல் நோய் முதல் நாடல்

Many chronic diseases considered incurable in other system of medicine can be treated successfully with siddha medicine; one among such diseases is ***Paandu noi* (Iron deficiency anaemia)**. It is a condition that denotes the pallor of the body. This clinical condition in which pallor of the body occurs is also known as *"Veluppu noi", "Ratha sogai"*. It is described as a diseased condition in which the natural colour of the body including skin and the mucous membrane becomes pale.

In Siddha medicine, Yugi muni classified *Paandu Noi* into five types namely, 1.*Vatha paandu* 2.*Pitha paandu* 3.*Kapha paandu* 4.*Mukkutra paandu* and 5.*Visha paandu*. The symptoms of ***"Pitha Paandu Noi"*** is almost correlated with the clinical conditions of **"Iron deficiency Anaemia"** as described in modern science.

Paandu Noi compared to Anaemia, is a condition in which the number of red blood cells or their oxygen-carrying capacity is insufficient to meet physiologic needs, which vary by age, sex, altitude, smoking, and pregnancy status. Anemia is usually associated with decreased levels of hemoglobin and/or a decreased packed cell

volume (hematocrit), and/or a decreased RBC count. Iron deficiency anaemia is the anaemia caused by a lack of Iron. Iron deficiency is thought to be the most common cause of anaemia globally, although other conditions, such as folate, vitamin B12 and vitamin A deficiencies, chronic inflammation, parasitic infections, and inherited disorders can cause anaemia.

Iron deficiency anaemia is the most common and widespread nutritional disorder in the world. As well as affecting a large number of children and women in developing countries, it is the only nutrient deficiency which is also significantly prevalent in Industralized Countries. Over 2 billion people – over 30% of the world's population – are anaemic, many due to iron deficiency, and in resource-poor areas, this is frequently by infectious diseases. Malaria, HIV/AIDS, hookworm infestation, schistosomiasis, and other infections such as tuberculosis are particularly important factors contributing to the high prevalence of anaemia in some areas.

Iron deficiency Anaemia can be classified based on the size of red blood cells and amount of hemoglobin in each cell. If the cells are small, it is microcytic anemia, if they are large, it is macrocytic anemia and if they are normal sized, it is normocytic anemia. Diagnosis in men is based on hemoglobin less than 130 to 140 g/L (13 to 14 g/dL) while in women it must be less than 120 to 130 g/L (12 to 13 g/dL). Further testing is then required to determine the cause.

A moderate degree of iron-deficiency anemia affects approximately 610 million people worldwide or 8.8% of the population. It is slightly more common in females (9.9%) than males (7.8%). Mild iron deficiency anemia affects another 375 million.

Yugi munivar classified *Paandu roga nithanam* into five types in *Yugi Vaithiya Cinthamani 800*. *Pitha Paandu* is one among them. The symptoms of *pitha paandu* are yellowish discolouration of the body, pallor, visual disturbances, excessive thirst and salivation, shortness of breath, dyspnoea, and giddiness.

Siddha medicine is the promising alternative medicine in treating various kinds of diseases with fewer side effects. So, I have chosen my clinical drug as ***''THIRIPALAI MATHIRAI***" with its reference in ***"KADUKKAI VALLARAIYIN THANI MAANBU"***, a Siddha formulary text by the author **Hakkim. P. Mohammed Abdullah Sahib**, which is indicated for ***''Paandu Noi"***. It has been correlated in modern science as Iron deficiency anaemia (IDA).

CHAPTER - 2

AIM AND OBJECTIVES

2.1 AIM

A Prospective open labelled non-randomized phase-II clinical trial to evaluate the therapeutic efficacy of the Siddha medicine ***"THIRIPALAI MATHIRAI"*** **(**Internal) for the treatment of **"*PITHA PAANDU* (Iron deficiency Anaemia)".**

2.2 OBJECTIVES

2.2.1 PRIMARY OBJECTIVE

To evaluate clinical and therapeutic efficacy of the trial medicine ***"THIRIPALAI MATHIRAI"*** **(INTERNAL)** in treatment of **"*PITHA PAANDU* (IRON DEFICIENCY ANAEMIA)"**

2.2.2 SECONDARY OBJECTIVES

- To collect the literature of both Siddha and Modern aspect of the disease, Pitha Paandu and establish a correlation between them.
- To evaluate Phytochemical analysis, Bio chemical analysis, Antimicrobial studies, Toxicological (Acute and Sub-acute) of the trial medicine and Bio-statistical analysis of the clinical study.
- To evaluate the Haematinic activity of the trial drug ***"THIRIPALAI MATHIRAI"*** and the adjuvant ***"KARISALAI KUDINEER"***.
- To evaluate the safety profile of the trial medicine and the adjuvant.
- To study the Clinical course of the disease with observation on Etiology, Classification, Pathology, Prognosis, Complications and Treatment by Siddha aspect.
- To have an idea about the incidence of the disease with Age, Occupation, Socio- economic status, Habits and Climate conditions.
- To evaluate the Pathology of *Pitha paandu noi* by concentrating *Mukkutram*, *Udalthathukal*, *Udalkattugal* and *Envagaithervu*.
- To evaluate the additional effects and changes of siddha parameters in Pitha paandu.
- To have the Modern Parameters to confirm the Diagnosis and Prognosis of the disease.
- To evaluate the Biostatistical analysis of the clinical study.

CHAPTER - 3

REVIEW OF LITERATURE

3.1 REVIEW OF DISEASE

3.1.1 SIDDHA ASPECT

Siddha literature deals with classification of diseases mainly by Tridosha theory that is Vatham, Pitham and Kabam.

Pithapaandu noi is caused by derangement of Pitham. Hence the basic details regarding Pitham are briefly explained before going into the study about Pitha pandu noi.

MUKKUTRA THEORY OF PITHAM

Pitham is one of the three vital humours (Vatham, Pitham, and Kabam). Among the Panchaboodhas, it is formed by the Theyu bootham. In healthy individuals, the existences of the three humours are found in the following ratio of 1: ½: ¼ respectively. This is told as,

"மெய்யளவு வாதமொன்று மேல் பித்தமோரரையாம்
ஐயங் காலொன்றே அறி"

- கண்ணுசாமியம்

When this ratio is altered in our body, there is disturbance to Pitha dhosham caused by dietary habits, environmental factors etc, which leads to alteration of Pitham leading to Pitha diseases.

SITES OF PITHAM

As per kannusaamiyam thought,

- Between the heart and the naval,
- Pingalai, Piranavayu, Neerpai, Moolaakkini, Irudhayam, Thalai, Koppul, Undhi, Iraippai, Viyarvai, Naavil Oorukintraneer, Senneer, Saaram, Kan, Thol.

As per Yugimuni's thought,

"போமென்ற பித்ததுக்கிருப்பிடமே கேளாய்
பேரான கண்டத்தின் கீழதாகும்"

- யூகி முனி

GENERAL CHARACTERISTICS OF PITHAM

- Veppam (Heat)
- Koormai (Sharpness)
- Neippu (Lubricative)
- Nekizhchi (Elastic)

Pitham conceives the properties of the substance to which it combines.

CHANGES IN PITHAM BY FOOD

Some of characters of food we consume which leads to aggravation of Pitha humour or neutralizing the aggravated Pitha humour, which is given as follows;

Six qualities of food which aggrevate Pitham:

1. Hot
2. Acidic
3. Mobility
4. Liquid
5. Aggressive
6. Pungent

Six neutralizing qualities of food for aggrevated Pitham:

1. Cold
2. Sweet
3. Immobility
4. Solid
5. Calmness
6. Bitter

Qualities of aggrevated Pitham:

- ❖ Yellowish tinge of eyes, skin, urine and stool.
- ❖ Excessive thirst and appetite.
- ❖ Burning sensation all over the body.
- ❖ Decrease in sleep.

Qualities of reduced Pitha:

- ❖ Decrease in normal colour of the skin
- ❖ Loss of appetite
- ❖ Chillness
- ❖ Affecting the normal growth of Kabha humour.

Natural Properties of Pitham:

"பசிதாகம் ஓக்கொளிகண் பார்வைபண் டத்து
ருசிதெரி சத்திவெம்மை வீரம் - உசித
முதிகூர்த்த புத்திவனப் பளித்துக் காக்கும்
ஆதிகாரி யாங்கா னழல்"

- உடல் தத்துவம்

Seripithal (Digestion), Vanmai (Strong), Vemmai (Hot), Menmai (Softness), Paarvai (Sight), Pasi (Hunger), Neervetkai (Thirst), Suvai (Taste), Oli (Brightness), Ninaippu (Thought) and Arivu (Knowledge) are the properties of pitham.

Physiological Functions of Pitham:

1. Increasing the body temperature.
2. Giving red or yellow tinge to the body, skin, eye, motion and urine.
3. Raising the body temperature during digestion and assimilation.
4. Produces perspiration and giddiness.
5. Raising the volume of blood and its expulsion.
6. All tastes are found to be sour, bitter.
7. Anger, irresponsible, immobile, thoughtfulness, emaciation, feeling of irritation and excitement.

Relationship of Pitham with taste:

Salt - Water + Fire

Sour - Earth + Fire

Pungent - Air + Fire

Salt, sour and pungent tastes increase Pitham, because they are formed by fire (heat). So they possess Veppa Veeriyam.

Astringent, sweet and bitter tastes neutralize Pitham, because they do not contain Agni (heat). Hence they Possess Seedha Veeriyam.

Astringent - Earth + Air

Sweet - Earth + Water

Bitter - Space + Air

“பித்தமதி கரிப்பின் பேசும் பரிகாரம்
சுத்தத் துவரோடு சொல்லினிப்புச் சத்தாகும்
கைப்புச் சுவையே கருதவதன் வீறு
எய்ப்படையு மென்றுரைத்தா ரிங்கு”.

- கண்ணுசாமியம்

Aggravation of Pitham in daily routine:

Pitham is raised at the time of 10 a.m to 2 p.m and 10 p.m to 2 a.m

Aggravation of pitham in week days:

If pitha gets aggravated at morning hours of Sunday, Tuesday, Saturday and Krishnapatcham Thursday, the vigour and vitality of body is maintained.

PHYSIOLOGICAL ASPECTS OF SENNEER THATHU [BLOOD]

Our body is made up of seven udal thathus namely saaram, senner, oon, kozhuppu, enbu, moolai, sukkilam / suronitham. These seven thathus constitute the body in normal condition. Senneer has the characters of pitha and it gives life to each cell and tissue of the body. Blood is the only vehicle, which is concerned with anabolic and catabolic functions of the body.

Among the seven thathus, senneer is considered as pitham, which has the character of Thee (Theyu). Circulation and digestion represent thee in the body. Blood is the connective tissue of the body. It reflects the changes that occur in the body. The blood is the combination of various elements like Venthavalam, Senthavalam, Prakruthi mayai, Pranavayu and Neer. Senthavalam moves like a worm in blood. It is mentioned in the following verses;

“ஊறும் புழுவின் ஒழுங்கோ, நீரிடை
வைத்த மலத்தின் குப்பையோ, வைத்துக்
கட்டிய நரம்பின் கயிறோ, உடம்பிற்குள்
பிரியா தொறுக்கும் பிணியோ, தெரியாது
இன்னது யான் என்று அறியேன் என்னை”

- பட்டினத்தார் (திருவிடைமருதூர் மும்மணிக்கோவை-13)

Nourishment of Senneer:

Among seven body constituents, **Senneer** is placed in second order next to saram. This is stated by **Thirumoolar** as follows,

"இரத முதலான ஏழ்தாது மூன்றின்
உரிய தினத்தின் ஒருபுற் பனிபோல்
அரியதுளி விந்து வாகுமேழ் மூன்றின்
மருவிய விந்து வளருங்கா யத்திலே"

- திருமந்திரம் - 1897

According to Siddhars, as the digestion takes place in the body "Saram" or"Rasa thathu" is formed on the very first day. The second day "Raktha thathu" is formed from the Rasa thathu, "Mamisam" is formed from this Raktha thathu on third day. "Kozhuppu" is formed from Mamisa thathu on the fourth day. "Enbu" is formed from kozhuppu on the fifth day, "Moolai" is formed from enbu on the sixth day and finally "Sukkilam" is formed from moolai on the seventh day. The nutrients absorbed after digestion are responsible for the metabolism and formation of blood. They are also responsible for the formation of muscular, adipose and nervous tissues and calcification of bones. As saaram and senneer are the primary important thathus of the body, they get deranged themselves and followed by derangement of other thathus. In Paandu noi, saaram and senneer thathu are mainly affected.

பாண்டு நோய்

வேறுபெயர்:

வெண்மை நோய், வெளுப்பு நோய், வெண்பாண்டம்

இயல்பு:

இயற்கை நிறம் மாறி, உடல் வெளுத்து, கண், நகக்கண் இவைகளை நீக்கிப் பார்க்கில் குருதியின்றி வெளுத்திருக்கும் நோயாம்.

T.V. சாம்பசிவம் பிள்ளை அகராதி,

பாண்டு which means only வெண்மை refers merely to anaemia where patient turns pale or white.

In Agathiyar Gunavagadam,

"தேரடா தேகத்தில் இரத்தம் வற்றித்
தீங்கான விந்தநோய் காணு மப்பா"

- அகத்தியர் குணவாகடம்

In Agathiyar Vaithiya Kaviyam

"சுழிழவாகுந்த தேகமப்பா காணத்தது வந்தாய்
வற்றிவிடு மன்னவாசல் கேட்கில்
பழிகாரர் முகத்தினில் முழியார் போலே பாண்டமெல்லாம்
வெனுக் கடித்தது ரத்தம்"

According to **Pattinathar** there are crores of uyir anukkal in blood.

மேவிய புன்மயிர்த் தொகையே அம்மயிர்
பாவிய தோலின் பரப்போ தோனிடைப்
புகலிட்டுப் பொதிந்த புண்ணோ புண்ணிடை
ஊறும் உதிரப் புனலோ கூறுசெய்து
இடையிடை நிற்கும் எலும்போ எலும்பிடை
முடைகெழு மூளை விழுதோ வழுவழுத்து
உள்ளிடை யொழுகும் வழும்போ மெல்ல நின்று
ஊறும் புழுவின் ஒழுங்கோ நீரிடை...

\- பட்டினத்தார்
(திருவிடைமருதூர் மும்மணிக்கோவை)

In **Uyir Kaakum Siddha Maruthuvam,**

The Characters of Pandu noi are natural colour of the body will be pale and glowing, Oedema in face, Eyes in blue and dark yellow colour urination**.**

In **Agathiyar vaithiya pillai tamil,**

In Pandu, Red blood cells are reduced in blood and the skin is pale in colour.

நோய் வரும் வழி: (Aetiology)

According to **"Yugimuni"** in yugivaithiya chinthamani-800,

"அறிந்துமே உற்பத்தி சொல்லக் கேளாய்
அதிசார மலமிளகி யெந்நே ரந்தான்
பறிந்துமே புளியுப்பு பெருத்த தாலும்
பெத்தமா மக்கினியி லிருத்த லாலும்
பிறிந்துதாம் பூலமிக அருந்த லாலும்
மீறியே மதுக்களைத் தான்புசித்த லாலும்
பறிந்து பகல் நித்திரையே செய்தலாலும்
பாண்டுவந்து பாரிலுள்ளோர் படும் பாடாமே
பாடான பஞ்சுதனைத் திருடி னோர்க்கும்
பாங்கான சிவதுயிலைப் பருகி னோர்க்கும்
மாடான பசுவதைப் பட்டினியாக
வைக்கின்றோர் மறைவழியை நடந்தி டாதார்

காடான வாரணியந் தனிற்ப றித்துக்
கடுவதைகள்! செய்கின்றோர் கண்கா ணாத
கோடான பழிசொல்லிக் குடிகெ டுக்கும்
கொடும்பாவி பாண்டுவினாற் குதிகொள் வாரே''

- **யூகிவைத்திய சிந்தாமணி -800**

The etiopathogenises of paandu noi is said to be excessive intake of salt and sour taste foods, staying in hot climate, excessive intake of alcohol, excessive chewing of pan and nuts, day time sleep. These are some of the factors causing Paandu noi.

In Thanvanthiri Vaithiyam,

''திருந்திடும் பாண்டு ரோகஞ் சேர்ந்திடும் குணத்தைக் கேளாய்
இருந்திடும் வாதபித்தச் சிலேற்பன மிவைதான் மாறிப்
புரிந்துதா னொன்டோன்று பொருந்துவதாலு மண்ணோ
பருந்துவதாலும் பாண்டு வணைந்திடு மென்னலாமே''
''ஆகிய மூலந்தன்னி லணைந்தவுட் டணத்தினாலுள்
தோகையர் மோகத்தாலுந் துயர்மிகு சோகத்தாலுந்
தேகபோஷ ணையுள்ளார்க்குத் தரித்திரஞ் சேர்தலாலும்
வேகமாந் திரிதோடங்கள் மிஞ்சியே பாண்டுவாமே''

According to the above mentioned lines, imbalance between the three humors [Vatham, Pitham, and Kabam], appetite of eating mud, excessive heat accumulation, excessive Sorrow and psychosocial factors are some of the causes of Paandu noi.

In Agathiyar kanmakandam kouvmathi,

''நாமொன்று சொல்லுகிறோம் பாண்டு வந்த
நலமான கருமமது சொல்லக்கேளு
தாமென்ற தாய்தந்தை மனம்நோகச் செய்தல்
தரணிதனி லுள்ளவர்க்கும் வம்பே சொல்ல
லெமென்ற வுறுப்பழித்தல் செவிசு வாச
மற்றுப் பொய் சொல்லாங்காரஞ் செய்தல்
வேமென்ற கருமமது பித்த மேறி
வெளுத்துதடா வெப்புமிஞ்சிக் கைகாலோய்வே''

Agathiyar mentioned that Irresponsiblity and regret to parents, speaking lie, getting anxious and furious on others stimulates pitha dhosha which leads to paandu Noi.

In Agathiyar Paripooranam 400,

‘‘நல்லோர்கள் பெரியோர்கள்ந டத்துஞ் செய்கை
நாட்டிலுள்ள துச்சாதனர்கள்ந கைத்தாலே
பொல்லாத விஷக்கடிநீர் பற்றி வந்து
பொன்னான திரேகமெல்லாங் குடம் போலே
சொல்லாதகடி விடங்கள் குன்மம் பாண்டு
துயர்தீராக் கன்மவினை செய்த பாவம்
எல்லாரு நகைக்கவுடம்பெ டுத்த பாவி
இன்னமுண்டு விபரமதாயி ளகிக் கேளே’’

Hemolysis due to toxin, Acid peptic disease, Abnormal morphological changes in RBC (Genetic Disorder) and kanma vinai are the causes of this disease

In Agathiyar Gunavagadam,

‘‘கொள்ளடா அபக்குவ போசனத்தாலும்
குடி கெடுத்து பெரும்பாடு கிராணியாலும்
கள்ளடா கருப்பத்தின் கிரந்தியாலும்
கனமான இரத்தத்தின் போக்கினாலும்
அள்ளடா அதியாம கவனத்தாலும்
அளவற்ற விசாரந்தா னடையும் போதும்
தெள்ளவே தேகத்தில் இரத்தம் கெட்டு
தெளிவான பாண்டதுவு முண்டாம் பாரே’’

According to agathiyar Improper cooked foods, Altered food habits, Imbalanced diet, menorrhagia in females, chronic Diarrhoea, karupa kirani, blood loss due to various aetiology, stress and strains are the causes for pandu noi.

In **Agathiyar Vaidhyam- 80**

‘‘குயில்வாய் குஷ்டம் சயங்குன்ம நீரிழிவு சுரங்கிராணி
நீரடைப்பு பாண்டு மூலவாய்வு கன்மவாயு
வருங்கண்ணில் குந்தாய் கடினந் தசவாய்வு
காணவாக முன்செய்த உயிர்களும் வினைதானே’’

According to this, Paandu noi is refered as one among the Kanma disease.

According to **Theraiyar Vagadam,**

“கருதிய மீனின் முள்ளும் கலத்துமி நெய்யின்
மருவிய எலும்புங் கல்லும் மங்கையர் மருந்திடுமே
பருகிய பழஞ்சோற்றாலும் பழமல நிறகையாலும்

மருகிய மயிர்களாலும் வந்திடும நோயிதாமே
புறவரை யுண்கை யாலும் போக நீருண்கையாலும்
சுருளவே முடக்கிக் கொண்டு முறக்கிடக் கையாலும்
மருளவே மேடுதன்னில் மனமுறக் கிடக்கையாலும்
பெருக வெண்பாடியினாலும் பிறக்க நோயென்றுகாணே''

In the above versus, Intake of fish bones, paddy brane, small and store old rice, hairs which can produce paandu secondly severe constipation, polluted water, sleeping in abnormal posture were also believed to cause veluppu Noi.

Also in the following versus, it is said that negligence of food and water causes paandu noi,

''தாக முறும் பசியால் தாமுண்ணா ராமாகில்
கோதருநீர் தாகத்தாற் கொள்ளாராய் - போத
மிரத்தந் தனைக்குடிக்கும் மின்பவிடாய் போக்கும்
பருத்த விழிகுருடாம் பார்''

– தேரையர் வாகடம்

According to **Noinadal Noimudhal nadal,**

''கிருமியால் வந்ததோடம் பெருகவுண்டு
கேட்கலதின் பிரிவதனைக் கிரமமாக
பொருமி வரும் வாயு வல்லாங் கிருமியாலே
புழுக்கடி போல் காணுமது கிருமியாலே
தேகமதில் சோகைக் குட்டம் கிருமியாலே
சூட்சமுடன் கிரிமியகைத் தொழில் செய்வீரே''

– நோய்நாடல் நோய்முதல் நாடல் திரட்டு

Worm infestations are the root cause of several diseases including paandu noi.

சரபேந்திரர் பாண்டு காமாலை ரோக சிகிச்சை என்னும் நூலில்,

- புளிப்பு, உப்புப் பதார்த்தங்களையும்,கார பதார்த்தங்களையும் அதிகமாகப் புசித்தல்
- சாராயம் போன்ற போதை தரும் வஸ்துக்களை உபயோகித்தல்
- மண் சாப்பிடுதல், சாப்பிட்டவுடன் பகலில் அதிகமாக உறங்கல், தேகப்பயிற்சி
- ஸ்திரீ சங்கமம் இவைகளினால் சரீரத்திலுள்ள பித்தம் முதலிய தோடங்கள் பிரகோபம் அடைந்து இரத்தத்தைக் கெடுத்துச் சரீரத்தை வெளுப்பாக செய்கின்றன என கூறப்பட்டுள்ளது.

T.V.சாம்பசிவம்பிள்ளை அகராதியில் கூறப்பட்டுள்ள நோய்வரும் வழி,

- ❖ சில்லென்று வீசும் குளிரும் காற்றில் திரிவதாலும், உட்கார்ந்து அல்லது படுத்து இருந்தாலும்
- ❖ குண்டிக்காய் நோய், நுரையீரல், மண்ணீரல் முதலிய உறுப்புகளைத் தாக்கும் நோய்க் கோளாறுகளாலும்
- ❖ பெண்களுக்கு மாதவிடாய் கோளாறினாலும் ஏற்படும்
- ❖ அன்றியும் இந்நோய் பிறவி நோயாயும் இருக்கலாம்
- ❖ மேகசம்பந்தமான கிரந்தி முதலிய நோய்கள், சோகை நோய் இவற்றாலும் உண்டாகலாம் கூறப்பட்டுள்ளது.

பித்தபாண்டு உண்டாகக் காரணங்கள்:

"ஏய்ந்தவுட் டினக்காலத்தில் எழும்பிடும் பித்தந் தன்னில்
வாய்ந்திடும் உப்புப் புளிப்பு மரிசந்தா னெனும் பதார்த்தம்
சேர்ந்துபித் தந்தான கெட்டு சிலேற்பனம் பொருந்தித் தேக்கிற்
பாய்ந்து வண்ணந் தனைக் கெடுக்கும் பயித்தியப் பாண்டுவாமே"

- தன்வந்திரி வைத்தியம் இரண்டாம் பாகம்

- ➢ உட்டிண காலத்தில் சாதாரணமாகப் பித்தம் அதிகரித்திருக்கும் போது உப்பு, புளிப்பு, மிளகு முதலானவைகளை அதிகம் சாப்பிட்டால் பித்தம் கெட்டுப் போம்.
- ➢ கபமும் கேடடைந்து தேக காந்தியை அழிக்கும். பித்த பாண்டு ரோகமும் உண்டாகும்.

NILAM

"குறிஞ்சி வருநிலத்திற் கொற்றமுண்டி ரத்தம்
உறிஞ்சி வருசுர முண்டாம் அறிஞரைக்
கையமே தங்குதரத் தாமை வல்லையுங் கதிக்கும்
ஐயமே தங்கும் அறி"

- சித்த மருத்துவாங்க சுருக்கம்

People living in mountain regions have more chances for the occurrence of paandu noi.

நோய் எண்: (Classification)

According to "**Yugimuni"** Paandu Noi is classified into 5 types as,

"கூறவே பாண்டுவிடப் பெயரைக் கேளாய்
குறிப்பாக வைந்துவித மாகும் பாரே
வாரவே வாதமாம் பாண்டு வோடு

மார்க்கமா பித்தத்தின் பாண்டு வாகும்
தேறவே சிலேட்டுமாம் பாண்டு தானும்
திரிதோடப் பாண்டோடு விடப்பாண் டாகும்
ஆறவே பாண்டுவிட வாண்மை யெல்லாம்
ஆராய்ந்து சொல்லவே அறிந்து கொள்ளே''

- யூகி வைத்திய சிந்தாமணி

ஐந்து பிரிவுகளாக கூறப்பட்டுள்ளது. அவை

1. வாத பாண்டு
2. பித்த பாண்டு
3. சிலேத்தும பாண்டு
4. திரிதோட பாண்டு
5. விட பாண்டு

தன்வந்தரி வைத்தியம்

''பயித்திய பாண்டு வாத பாண்டுவே சிலேத்மபாண்டு
வியத்திரி தோடப் பாண்டு வெளும் பித்தச் சிலேத்ம பாண்டு
பயித்திய வாதபாண்டு பகர் சந்நிவாதபாண்டு
நயப்புறும் பாண்டு வேழின் குணத்தை நான் நவிலலுற்றேன்''

ஏழு பிரிவுகளாக கூறப்பட்டுள்ளது. அவை

1. பித்த பாண்டு
2. வாத பாண்டு
3. சிலேத்ம பாண்டு
4. சந்நிபாத பாண்டு
5. பித்தசிலேத்ம பாண்டு
6. பித்த வாத பாண்டு
7. திரிதோட பாண்டு

அகத்தியர் குணவாகடம்

''பாரடா பாண்டு வகை சொல்லக் கேளாய்
பரிவான பாண்டது தானஞ் சேயாகும்
வாரடா விவாத பித்தம் சீத பாண்டு
வகையான விடபாண்டு மிருத்திகா பாண்டு''

ஐந்து பிரிவுகளாக கூறப்பட்டுள்ளது. அவை

1. வாத பாண்டு
2. பித்த பாண்டு
3. சீத பாண்டு
4. விடபாண்டு
5. மிருத்திகா பாண்டு

T.V.சாம்பசிவம் பிள்ளை அகராதி

எட்டு பிரிவுகளாக கூறப்பட்டுள்ளது. அவை

1. பித்த பாண்டு
2. வாத பாண்டு
3. சிலேட்டும பாண்டு
4. விஷப் பாண்டு
5. திரிதோஷப் பாண்டு
6. ஊது பாண்டு
7. நீர்ப் பாண்டு
8. எரிப் பாண்டு

சரபேந்திரர் பாண்டு காமாலை ரோக சிகிச்சை

ஐந்து பிரிவுகளாக கூறப்பட்டுள்ளது. அவை

1. வாத பாண்டு
2. பித்த பாண்டு
3. கப பாண்டு
4. சந்நிபாத பாண்டு
5. மண் தின்றதாலேற்பட்ட பாண்டு

அனுபவ வைத்திய தேவரகசியம்

ஐந்து பிரிவுகளாக கூறப்பட்டுள்ளது.

1. வாத பாண்டு
2. பித்த பாண்டு
3. சிலேத்ம பாண்டு
4. திரிதோட பாண்டு
5. மண் பாண்டு

சிகிச்சா ரத்ன தீபம் - இரண்டாம் பாகம்

ஐந்து பிரிவுகளாக கூறப்பட்டுள்ளது. அவை

1. வாத பாண்டு
2. பித்த பாண்டு
3. சிலேத்தும பாண்டு
4. திரிதோட பாண்டு
5. விஷபாண்டு

ரோக நிர்ணய சாரம்

ஐந்து பிரிவுகளாக கூறப்பட்டுள்ளது. அவை

1. வாத பாண்டு
2. பித்த பாண்டு
3. சிலேத்தும பாண்டு
4. திரிதோட பாண்டு
5. விஷ பாண்டு

MURKURIKUNANGAL (Premonitory symptoms):

In Siddha Maruthuvam Pothu, Kuppusamy Mudaliar states that,

Paandu patients exhibit the following symptoms from their initial stage of development itself. The patient experiences insidious onset of fatiguability, dyspnoea on exertion, diminished vision, fainting, palpitation and pallor of the skin.

According to **Theraiyar Neerkuri,**

"இயற்கை நீர் சுருங்கினும் இதுவும் சலப் பொருள்
செயற்கை யாயருந்தினும் சிறுத்த நீரிதும்
பாண்டு நோய்ச் சம்பவத்தைத் தருமிதில்"

- தேரையர் நீர்க்குறி

Oliguria occurring suddenly and oliguria occurring even after excessive intake of water are explained as premonitory symptoms of Paandu noi.

பாண்டு குறிகுணங்கள் (Clinical features)

In **Siddha Maruthuvam Pothu**, Kuppusamy Mudaliar states;

Inability to walk, headache, palpitation, blurring of vision, giddiness, syncope, dyspnoea, anorexia, vomiting, paleness of the skin, nail beds become swollen and pallor, fissured tongue, glossitis, hoarseness of voice are general signs and symptoms of Pandu noi. In females scanty menstruation, sometimes menorrhagia may occur. If it occurs in children and elderly, it may manifest because of worm infestation and blood disorders. If it occurs in pitha thegi, anorexia, indigestion, burning sensation, pallor of skin, glossitis, and dysphagia, Vomiting with bile, bitter taste and diarrhoea occurs. If the symptoms persist for longer duration it results in jaundice.

அகத்தியர் குணவாகடம் என்னும் நூலில்,

"உண்டாகும் வேளைதன்னில் தேக நேர்மை
உறுதியாய்ச் சொல்லுகிறேன் நன்றாய்பாரு
குண்டான முகம்கண்கள் உதடு நாக்கு
குறிப்பான வாய்வேறும் தேக முற்றும்
வேண்டாக வேயுலர்ந்து வெண்மையாகி
விரல் நகங்கள் முழுவதிலும் ரத்தம் வற்றி
கண்டான கால்கள்தான் தணிந்து நிற்கும்
கருவான நாடியது மெதுவாய்ப் போமே

போமேதான் தீபனங்கள் மட்டுப்பட்டு
பொலிவான கண்விழிகள் பெருத்துத் தோன்றும்
ஆமேதான் அசக்தியு மாயாசங் கண்டு
அவர் நடையும் தளர்ந்து பெருமூச்சுக் கண்டு
மேதான் மூர்ச்சையுடன் மார் துடித்து
முடிவான கணுக்காலில் வீக்க முண்டாய்
மேதா னிருதயத்தின் வதனந் தன்னிந்
துருத்திநிகர் சத்தமது கேட்கும் பாரே''

Stomatitis, dryness of the skin, pallor of the face, eyes, lips, tongue and nails, lassitude, tiredness, low volume pulse, anorexia, swelling of the eyelids, dyspnoea on exertion, palpitation, oedema of the ankle joint, added heart sounds in the precordium are mentioned as the signs and symptoms of Paandu noi.

யூகிமுனி வைத்திய காவியம் என்னும் நூலில்

''யிருமலும் யிளைப்பும் நெஞ்சில் யிடிப்புடன் துடிப்பும் உண்டாகும்
பெருகவே நடக்கும் போது அதிகம் ஆகும்
வெருவுறக் கிறுகிறுத்து மேனியும் வெளுத்துதக்கி
உருகிடில் பித்தபாண்டு ரோகம்யென்றுரைக்கலாமே''

Dyspnoea on exertion, Chest pain, Giddiness, Pallor present all over the body are mentioned as symptoms of Paandu noi.

அகஸ்தியர் வைத்திய ரத்ன சுருக்கம் என்னும் நூலில்,

''உற்றதோர் அன்னபேதம் அரோசகம் உதரமந்தம்
முற்றிய மார்புநோய் மூத்திரம் பொன்னின் வன்மை
வெற்றி சேர்புறங்கால்கை கண்வீங்குடல் வெளுத்தல் வேர்த்தல்
பற்றி தொக்கிற்காய் பயித்திய பாண்டுவாமே''

Indigestion, Change of taste, Flatulence, Chest tightness, yellowish discolouration of urine, Oedema of limbs, Palor of skin, Sweating are the symptoms of Pitha paandu.

''ஆனகண் மலசங்கள் அணிநகங் கறுப்பதாங்
தாகமா மங்கமெங்கும் தடியடி படுகைபோல
கனமாய் நடுக்கமுண்டா விசைந்து துர்பலமுண்டாம்''

Discolouration of conjunctiva, urine, faeces and nails, Excessive thirst, Pain in whole body, lassitude and Fatigue are also the features.

பதினெண் சித்தர்கள் நாடி சாஸ்திரம் என்னும் நூலில்,

"இரும்பலு மிளைப்பும் நெஞ்சில் லிடியது மிகவுண்டாகும்
வெருகிய கிறுகிறுப்பும் மேனியும் வெளிறிப் போகும்
பெருகிய பித்தபாண்டு யென்னவே பேசலாமே
கருகிய பல்லும்நாவுங் காய்ச்சலுமிளப்பு முண்டாம்"

Cough, Dyspnoea on exertion, Chest pain, Giddiness, Pallor present all over the body are mentioned as symptoms of Paandu noi.

பரராச சேகரம் என்னும் நூலில்,

"பித்தத்தி லெடுத்த பாண்டு பேசுநா வறட்சி யுண்டாம்
மற்றுடல் பசுமை யாகி மஞ்சளி னிறமுண்டாம்
ஊற்றிடு மூர்ச்சை தாக மொளி கெடுங் கண்ணமாமும்
தூற்றிடு மழற்சி வாயிற் றுர்நாற்றம் புளித்தேக்குண்டாம்
இருமலே யிளைப்பு நெஞ்சிலிடிப்புடன் லுரப்பு மாகிப்
பெருகவே நடக்கும்போது பேசு முட்டதுமே யாகும்
வெறுவுறக் கிருமி றுக்கு மேனியும் வெளுத்ததைக்கும்
பெருகியே பித்த பாண்டு வாமன பேசினாரே
ஊதயமெய் யதைத்துக் கைகா லோய்ந்துடன் சுரந்து நோவாய்ப்
புதையவே வீங்கும் கண்ணும் போதவே வெளுக்குஞ் சோர்வாப்
பாதகர மகிலு மிஞ்சிஞ் சொறிவதா யசலுபற்றும்
விதமுறு குணங்கள் பித்த பாண்டென விளம்பினாரே"

Dryness of mouth, Greenish and yellowish discolouration of body colour, Lassitude, Excessive thirst, Bad odour in mouth, Indigestion, Cough, dyspnoea on exertion, Paleness, Cardiac murmurs, Oedema of body and limbs and Tiredness are the features of Pitha paandu.

தீரும் தீராதவை:

யூகி வைத்திய சிந்தாமணி

விடபாண்டு தீராது என கூறப்பட்டுள்ளது

தன்வந்தரி வைத்தியம் பாகம் 2

திரிதோட பாண்டு
சந்நிபாத பாண்டு தீராது

சாத்தியா சாத்தியம் :

அனுபவ வைத்திய தேவரகசியம்

வீக்கம், சோம்பல், தாகம், அரோசகம்,வாந்தி, விக்கல்,இருமல் பேதியென்னும் குணங்களுண்டாகி எந்த வஸ்துவை பார்த்தாலும் மஞ்சள் நிறமாக தோன்றுதல், கண்களிலும், நகங்களிலும், மஞ்சள் நிறமும் உண்டாகில் அசாத்தியம்.

அகத்தியர் குணவாகடம்

தானான அசாத்தியத்தின் பாண்டி னேர்மை
தானறியச் சொல்லுகிறேன் தரணி யோர்க்கு
ஊனான தேகத்தில் இருமல் பேதி
உறுதியாய் வாந்தியுடன் விக்கல் காணும்
தேனான தோற்றமடா மஞ்சள் காட்டும்
தெளிவான நகக்கண்களு மஞ்ச ளாகி
வீணாகப் போகுமடா மருந்து செய்தால்
விண்ணுலகிற் செல்வான்பார் விதிதீர்ந் தானே

இருமல், பேதி, வாந்தி, விக்கல், தேகம் மஞ்சளாதல், நகங்களிலும் கண்களிலும் மஞ்சள் நிறம் தோன்றல் அசாத்தியம் என கூறப்பட்டுள்ளது.

கண்ணுசாமியம் என்னும் வைத்திய சேகரம் என்னும் நூலில்,

"பாண்டு பிரமேகம் பன்வாத சூலைகுன்மம்
வேண்டா சயஞ்சன்னி வெண்சோபை – நீண்ட
அதிநீரே காமாலை யானபிணி தம்மு
ளதி சாரமா காதறி"

பாண்டு நோயில் அதிசாரம் உண்டானால் அசாத்தியம் என கூறப்பட்டுள்ளது.

"வெப்புப் பிணியதனில் வெம்மேகத்தால் வருந்தின்
தப்புமிகை நீரேதா னிறங்கின் செப்பும்
கிராணியிற் பாண்டில் கிளர்நீர் சுருங்கிற்
பிராணன் பிரியுமெனப் பேசு"

நோயாளிக்கு சுரநோயிலும், மேகநோயிலும் சிறுநீர் அதிகரித்து இறங்கினாலும், கிராணி, பாண்டு முதலிய நோயில் சிறுநீர் குறைந்து இழியினும் உயிர்க்கு தீது.

முக்குற்ற வேறுபாடுகள்:

உடல் வன்மை குறைந்து பசித்தீ கேடடைந்து உண்ட உணவு சரியாகச் செரியாத காரணத்தால் இரசக் குருதிகள் ஊட்டம் பெறா, அவைகளுடன் அனல் பித்தமும் கெட்டு, தோலுக்கு நிறத்தைக் கொடுக்கும் அழல் (இரஞ்சித பித்தமும்) மெலிந்து நிறத்திலும் எடையிலும் குறைந்து தீக்குற்றத்தைப் பெருக்கும். அதன் காரணமாக மற்ற இரு குற்றங்களும் தன்னிலை மிகுந்து பரவுகாலின் (வியானன்) வன்மையைக் கெடுத்து வெளுப்பு நோயை உண்டாக்கும்.

நோயின் வன்மை பெருகப் பெருக ஐயமும் பெருகி வீக்கம் முதலியவற்றை துணை நோயாக்கிக் கொள்ளும்.

நாடி நடை:

- பித்த வாதம்
- வாத கபம்
- கப வாதம்

“சிறப்பான **பித்தத்தில் வாத நாடி**
சேரிலுரு தாதுநட்ட **முதிர பீடை**
உறைப்பாகச் செரியாமை குன்மஞ் சூலை
உற்றசுரங் கிராணிவயிற் றிரைச்சல் மந்தம்
அறைப்பான ஓங்கார புறநீர்க் கோவை
ஆயாசங் இரக்கமொடு மயக்க மூர்ச்சை
முறைக்காய்வு விடவீக்கம் மூல வாய்வு
முரடான நோய்பலவும் முடுகும் பண்பே”.

- நோய்நாடல் நோய்முதல் நாடல்

பாங்கான வாதத்தில் சேத்தும நாடிப்
பரிசித்தால் திமிர்மேவு முளைச்ச லாகும்.
தீங்கான இருமலுடன் சந்நி தோடம்
சேர்ந்தவிடம் வெடிசூலை இருத் ரோகம்
வாங்காத ஈளைமந் தார காசம்
வலியுடனே புறவீச்சு உள்வீச்சு வீக்கம்
ஓங்காணுஞ் சுரமுடனே சுவாசகாசம்
உண்டாகும் வெகுநோய்க்கு முறுதி தானே

- நோய்நாடல் நோய்முதல் நாடல்

கண்டாயோ சிலேற்பனத்தில் வாதநாடி
கலந்திடுகில் வயறுபொருமல் கனத்த வீக்கம்
உண்டாலோ ஓங்காரஞ் சக்தி விக்கல்
உறுதிரட்சை வாய்வுவலி சந்நி தோடம்
விண்டாலோ இளைப்பிருமல் சோபை **பாண்டு**
விடபாகம் வியசூலை பக்கவாதம்
திண்டாடு நாசிகா பீடங் கக்கல்
சிரநோய்கள் பலவும்வந்து சிக்குந் தானே

- சதக நாடி

உயிர்தாதுக்கள் :

வாதமாய் படைத்து, பித்த அனலாய் காத்து
சேத்தும சீதமாய் துடைத்து

- தேரையர் மருத்துவ பாரதம்

VATHAM

Sites of Vatham:

Below Naval, Urinary bladder, intestines, Pelvis, umbilical cord, thigh, bone, skin, nerve endings, joints, Musculature, hair root.

Properties: Dryness, lightness, clearness, coolness, mobile formless.

Function

1. Pranan (uyirkaal) :

This controls knowledge, mind and five sense organs, which are useful for breathing and digestion.

2. Abanan (Keezh nokku kaal) :

This is responsible for all down ward movements such as passing urine, stools, semen, menstrual flow etc.

3. Samanan (Nadukkaal) :

This aids in proper digestion.

4. Viyanan (paravukaal) :

This is responsible for all movements of all parts of the body.

5. Uthanan (Mel Nokkukaal) :

Responsible of all upward visceral movements, such as vomiting, erection and nausea.

6. Nagan :

Responsible for opening and closing the eyes.

7. Koorman :

Responsible for vision and yawning.

8. Kirugaran :

Responsible for salivation, nasal secretion and appetite.

9. Devathathan :

Resposible for Laziness, sleeping and anger.

10. Thananjeyan :

Produces bloating of the body after death. It escapes on the third day after death bursting out of the cranium.

In Pitha Paandu

Piranan	: Affected (dyspnoea on exertion)
Abanan	: Affected (in case of menorrhagia and Constipation)
Viyanan	: Affected (Joint pain)
Samanan	: Affected (loss of appetite)
Kirukaran	: Affected (loss of appetite)
Devathathan	: Affected (fatigue)

PITHAM

Sites of Pitham:

Between the heart and naval, sweat, lymph, blood, stomach, urinary bladder, heart, saliva, eye and skin.

Properties:

Dry, cold, hot, light, subtle, keen, soft, liquid, bitter.

Function

1. Anal Pitham : It promotes appetite and helps in digestion.
2. Ranjagam : It gives colour to the blood.
3. Prasagam : It gives complexion to the skin.
4. Alosagam : It brightens the eyes.
5. Sathagam : It controls the whole body. It has the property to fulfill all the activities which the mind desires.

In Pitha Paandu

Anal Pitham	-	Affected (loss of appetite)
Ranjaga pitham	-	Affected (Pallor of skin, mucous membrane and conjuctiva)
Saathaga pitham	-	Affected (Difficulty in working)
Pirasaga pitham	-	Affected (Pallor of skin)

KABAM

Sites of Kabam: Above the heart, stomach, fat, sperm, tongue, uvula, bone marrow, blood, nose, nerves, bones, large intestine, eyes, joints.

Properties: Heavy, cold, mild, watery, sweet stable and slimy

Function

1. Avalambagam: Lies in the lungs, controls the heart and other kabhams.
2. Kilethagam : Lies in the stomach, makes the food moist, soft and helps in digestion
3. Pothagam : Responsible for recognizing taste.
4. Tharpagam : Present in the head and responsible for cooling sensation of Eyes and the body
5. Santhigam : Responsible for lubrication and free movements of joints.

In Pitha Paandu

Avalambagam -Affected (dyspnoea on exertion)

Kilethagam -Affected (loss of appetite)

Ezhu Udal Thathukkal (Physical constituents)

Normal functions:

Saram:

It is responsible for the growth and development. It keeps the individual in good spirit. It gets separated from food and nourishes the body

Senneer:

Blood imparts colour to the body and nourishes the muscle responsible for the ability, intellect of the individual. It is responsible for existence of knowledge, strength, and blood component

Oon:

It gives shape to the body according to the requirements for the physical activity, nourishes fat.

Kozhuppu:

It helps in lubricating different organs, functioning of organs and provides a cover for the body

Enbu:

Structural unit of the body, responsible for posture and movements of the body.

Moolai:

It fills the bony cavity, nourishes semen, simparts strength endurance and shining appearance. It represents the bone marrow and strengthens the bone.

Sukkilam / Suronitham:

It is responsible for reproduction.

In Pitha Paandu:

Saaram : Affected (fatigue)

Senneer : Affected (pallor of skin, mucous membrane and conjunctiva)

Sukkilam / Suronitham: Affected (in case of menorrhagia/ amenorrhoea)

PINIARI MURAIMAI- (DIAGNOSIS):

Diagnostic methods in Siddha system are very unique and solely based on clinical acumen of the physician.

1. ***Poriyal Arithal*** (or) understanding by the fire organs of perception (Mei, Vai, Kann, Mooku, Sevi)
2. ***Pulanal Arithal*** (or) understanding by the sense objects (Uraithal, Suvaithal, Parthal, Mugarthal, and Kettal)
3. ***Vinaidal*** (or) Interrogation

Tools used by Siddha Physicians:

(1) Kanndal (Perception)

(2) Karuthal (Inference)

(3) Oorai (The instruction of the inspired) (தோ.கி.ஆ)

The application of these three is very extensive in diagnosis and treatment.

ENNVAGAI THERVU (Eight tools of Diagnosis)

Ennvagai thervukal is a unique method of diagnosing the disease, which was developed by siddhars.

"நாடிப்பரிசம் நாநிறம் மொழிவிழி
மலம் மூத்திரமிவை மருத்துவராயுதம்".

- நோய் நாடல் நோய் முதல் நாடல்

Naa:

Colour of the tongue, size, shape, anomalies, surface, mobility and local lesion should be noted. Coating deposition of the tongue, increased salivation and dryness of the tongue.

In Pitha Paandu, pallor of the tongue is present.

Niram:

Colour of the skin all over the body, a local region of affection, conjunctiva, tongue, nail bud, hair etc.

Vatha Udal	-	Black and whitish colour
Pitha Udal	-	Yellowish (or) Reddish colour
Kapha udal	-	White or golden colour
Thontha udal	-	Mix of two udal colours

In Pitha Paandu, the colour of skin is pale.

Mozhi:

Speech and voice should be observed.

Vizhi:

Observation of colour, character, vision.

In Pitha Paandu - pallor of conjunctiva is present

Sparisam:

Colour of the skin, Eruption, Hemorrhages, Ulcers, Boils, trophic changes, in the skin can be identified.

Any changes in the internal organs can be noted by palpation (or) percussion.

In Pitha Paandu - normal temperature, sometimes hypothermia, dry skin is present

Malam:

Quantity, colour, smell, froth should be observed.

In Pitha Paandu - constipation present.

Moothiram:

Quantity, colour, froth, smell and specific gravity of urine should be noted.

பாண்டு நோய் உற்பத்தியைக் காட்டும் நீரின் எஞ்சல் இலக்கணம்:

"இயற்கை நீர் சுருங்கினும் இதுவும் சலப்பொருள்
செயற்கை யாயிருந்தினும் சிறுத்த நீரிதுவும்
பாண்டு நோய்ச் சம்பவத்தைத் தருமிதில்
துண்டுறாப் பேதியும் சோர்வும் பிறக்குமே"

- நோய் நாடல் முதல் பாகம்

ஒரு காரணமுமின்றி இயற்கை அளவுக்குக் குறைந்து இழியும் நீரும் நீர்ப்பொருட்களை மிகுதியாயுண்ணினும் குறைந்திழியும் நீரும் பாண்டு நோய் உற்பத்திக்கு வழியாகும்.

நிறக்குறி

"அருந்துமாறிரதமும் அவிரோதமதாய்
அ.ங்கல் அலர்தல் அகாலவூன் தவிர்ந்தழற்
குற்றளவருந்தி உறங்கி வைகறை
ஆடிக்கலசத் தாவியே காது பெய்
தொருமுகூர்த்தக் கலைக்குட்படுநீரின்
நிறக்குறி நெய்க்குறி நிருமித்தல் கடனே"

- நோய் நாடல் முதல் பாகம்

Collection of Sample Urine:

The patient must take well cooked food in the previous day. The intake must be proportionate to the degree of his appetite. Food intake should be taken, at appropriate time. We must have sound sleep on the previous night. The urine is collected on the down of the next day in a glass container and closed immediately to prevent contamination. This specimen must be examination with in one and half hours. This procedure should be followed strictly to get accurate observation of Neerkuri and Neikuri.

நெய்குறி:

"நிறக்குறிக் குரைத்த நிருமாண நீரிற்
சிறக்க வெண்ணெய்யோர் சிறுதுளி நடுவிடுத்
தென்றுறத் திறந்தொலி ஏகாதமைத்ததி
னின்றதிவலை போம் நெறிவிழியறிவும்
சென்றது புகலுஞ் செய்தியை யுணே"ர

- நோய் நாடல் முதல் பாகம்

NEIKURI:

The diagnosis and prognosis of deranged Mukkutrams are studied on the basis of the behaviour of a drop of gingelly oil gently dropped on the surface of the urine kept in a wide vessel in the sunlight.

"ஆழி போற்பரவின் அ.ஃதே பித்தம்"

- நோய் நாடல் முதல் பாகம்

In Pitha Paandu, the oil dropped in urine, showed a ring shaped structure.

Neikuri in pandu noi:

"விரைவுடன் கதிர்போல் நீண்டு வேற்றுமைக் குணங்கள் கண்டால்
குருதிதான் கெட்டு நாசம் குன்றிய குணமதென்னே".

- தேரையர்

If the oil spreads like a kathir (ray), it indicates Pandu noi.

Naadi:

Pulse diagnosis is the confirmatory diagnosis.

In Pitha Paandu - Pitha Vatham, Vatha Kabam, Kaba Vatham

PROGNOSIS OF PAANDU:

Curable and Incurable Types:

It is said that Vida Pandu had poor prognosis. Even though other types are curable, symptoms like vomiting, diarrhoea, oedema of body, excessive thirst, hiccough, diabetes mellitus, tuberculosis occurs it leads to complications.

According to Sarabendrar Vaidhya Muraigal:

அதிக நாளான பாண்டு ரோகம் சிகிச்சைக்கு வசப்படாது. புதிதானாலும் உடல் வீக்கத்தில் மஞ்சள் நிறம் காணப்பட்டால் குணம் ஏற்படாது. மலச்சிக்கலோ அல்லது பச்சை நிறமான அதிசாரமோ ஏற்பட்டால் அசாத்தியம், பலவீனம், வாந்தி, மூர்ச்சை நாவறட்சி, இரத்த குறைவினால் உடல் வெளுப்பு முதலியவைகளுடன் கூடிய ரோகியும் குணமடைவது சிரமம். பற்கள், நகம், கண் இவைகள் அதிகம் வெளுதத்தாலும் எல்லாவறற்றயும் வெண்ணிறமாக பார்த்தாலும் அந்த ரோகம் அசாத்தியமாகும். அசாத்திய ரோகத்தை முற்றிலும் குணப் படுத்த முடியாவிட்டாலும் சிறிது குறிகுணங்களை குறைத்து ஆயுளையும் சிலகாலம் நீடிக்க செய்யலாம்.

கைகள், கால்கள், தலை முதலான இடங்களில் வீக்கம் ஏற்பட்டு இளைத்து கைகால்களும் இளைத்து வயிறு பெருத்தும் உள்ள பாண்டு ரோகியையும், ஆண்குறி, தொடையிடுக்கு ஆகிய இடங்களில் வீக்கம், அடிக்கடி மயக்கம், அதிசாரம், சுரம் கண்டால் தீராது.

பாண்டு ரோகிக்கு வீக்கம், சோம்பல், தாகம், அரோசகம், வாந்தி, விக்கல், இருமல், பேதி என்னும் இக்குணங்கள் உண்டாகி எந்த வஸ்துவை பார்த்தாலும் மஞ்சள் நிறமுண்டாகில் அசாத்தியம். - அகத்தியர் வைத்தியப் பிள்ளைத் தமிழ்.

FATE OF THE DISEASE:

Kannusamiyam States that,

"வெப்புப் பிணியதனில் வெம் மேத்தால் வருந்தின்
தப்பு மிகை நீரே தானிறங்கின் - செப்பும்
கிராணியிற் பாண்டில் கிளர் நீர்சுருங்கிற்
பிராணன் பிரியுமெனப் பேசு."

- கண்ணுசாமியம்

"பாண்டு பிரமேகம் பன்வாத சூலை குன்மம்
வேண்டா சயஞ்சன்னி வெண்சோபை - நீண்ட
அதிநீரே காமாலை யானபிணி தம்மு
ளதி சாரமா காதறி"

- கண்ணுசாமியம்

NOI NEEKKAM (TREATMENT):

The speciality of siddha treatment emphasis not only for complete healing but also for the prevention and rejuvenation. This is said as follows,

- Kappu (Prevention)
- Neekkam (Treatment)
- Niraivu (Restoration)

Siddha system stated that even during the time of conception, some defects creep into the fertilized embryo. These defects form the basis of the manifestation of certain constitutional disease later on during the existence of the individual. Diseases are produced by the unequilibrium of three thathus, which may be due to various causes like diet, life style pattern, mental and physical activities. When treating the diseases the following principles must be noted.

"நோய்நாடி நோய்முதல் நாடியது தணிக்கும்
வாய்நாடி வாய்ப்பச் செயல்."

"உற்றானளவும் பிணியளவும் காலமும்
கற்றான் கருதிச் செயல்."

- திருக்குறள்

So it is essential to know the disease and the cause for the onset of disease, the nature of the patient, the severity of the illness, the season and the time of occurrence of the disease must be observed.

LINE OF TREATMENT OF PANDU:

In Veluppu noi, the appetite is lost. The food taken will not be digested well which results in anaemia and body weakness. Besides these, 'Anal Pitham' and the Ranja kapitham which gives the natural colour to our skin are affected by this disease. The body will be pale and loses its weight. It will increase 'Azal' humour. The increased Azhal humour also increases the other two humours' and Vyanan which results in Anaemia. So the purgatives are given to correct the deranged humours. Later, the appetizer, digestive tonics, and hematinic will be given. The medicines given to induce purgation may be chosen as laxatives. Especially in Pitha Paandu noi,

Rasam and Ratha thathus are mostly affected. So Iron rich components are used in the trial drug.

The trial drug **THIRIPALAI MATHIRAI** is given 1 tablet with Karisalai kudineer 100 ml BD dose to **increase the Hb level**. Iron rich foods are also recommended.

PAANDU ROGA HARAM (drugs for Anaemia):

Trikadugu (dried ginger, pepper and long pepper), Buffalo buttermilk, goat buttermilk, Mandooram (Ferric oxide), Ayam (Iron), Ceylon lead wort (Plumbago zeylanica) root bark, cow's urine, embelia ribes, castor seeds (Ricinus communis), Honey, Irumanjal (Curcuma longa, Curcuma zedoaria), Chebulic myrobalan (Terminalia chebula), Beleric myrobalan (Terminalia bellerica) and Embelica officinalis (Indian goose berry) are drugs given for Anaemia.

உணவு முறைகள்:

- நோய் தொடக்கத்தில், பசியைத் தூண்டக்கூடியதும், உடலின் குருதியைப் பெருக்கக்கூடியதுமான உணவுப் பொருட்களை வழங்க வேண்டும்.
- வயிற்றுப் புழுக்கள் வெளியாயின், அகத்திகீரையை அடிக்கடி சேர்த்து வருவது நன்று.
- உணவும் எளிதில் செரிக்ககூடியதாகவே இருத்தல் வேண்டும்.
- உணவிலிருந்து கிடைக்கும் இரும்புச்சத்து உடலில் உட்கிரகிக்கப்பட வைட்டமின் சி தேவை. வைட்டமின் சி சத்து நிறைந்த உணவுகளை சேர்த்து கொள்ள வேண்டும். - நெல்லிக்காய், எலுமிச்சை சாறு
- கீரை வகைகளில், கரிசாலை, பொன்னாங்காணி, அறுகீரை, சிறுகீரை, மணத்தக்காளி இவைகள் குருதியைப் பெருக்கக் கூடியவை.
- காய்கறிகளில்,கத்தரிப்பிஞ்சு, முருங்கைப்பிஞ்சு, வாழைக்கச்சல், அவரைப்பிஞ்சு எளிதில் செரிக்கக்கூடியவை.
- வெள்ளாட்டுக்கறி, அதன் ஈரல், எலும்பு முதலியனவும், காடை, கௌதாரி முதலியன உடற்கு ஊட்டத்தை தந்து குருதியின் பெருக்கை உண்டாக்கும்.
- நோய் வன்மை மிகுந்திருப்பின், பசித்தீ குறைந்து, உணவில் வெறுப்பு வாந்தி இவைகள் உண்டாகுமாகையால், எளிதில் செரிக்கக்கூடிய உணவுகளாகிய கஞ்சி வகைகளையும், ஊணின இரசத்தையும் வழங்க வேண்டும்.

இரும்புச்சத்து நிறைந்த உணவுகள்:

- எல்லாவிதமான கீரைகள்: முருங்கைக்கீரை, முளைக்கீரை, அகத்திக்கீரை, புளிச்சகீரை மற்றும் அரைக்கீரை.
- வெங்காயத்தாள், முள்ளங்கீரை மற்றும் காலிபிளவர் கீரை.
- பாகற்காய், சுண்டைக்காய், கொத்தவரை போன்ற காய்கறிகள்.
- மாதுளம்பழம், சப்போட்டா, ஆப்பிள், தர்பூசணி, அன்னாசி, அத்தி, நாவல் போன்ற கனிகள்
- உலர்ந்த பேரீச்சம்பழம், திராட்சை போன்ற உலர்ந்த பழங்கள்.
- கேழ்வரகு, கம்பு, கொள்ளு, எள்ளு, சாமை, சோயாபீன்ஸ், உலர்ந்தபட்டாணி, காராமணி
- மொச்சை போன்ற தானியங்களும் பயிறு வகைகளும்
- தாவர வகைகளை விட ஈரல், மண்ணீரல், ஆட்டு இறைச்சி, கோழி ஈரல், மீன், இரத்தம்,கருவாடு போன்ற உணவுப் பொருட்களில் உட்கிரகிக்கக் கூடிய இரும்புச் சத்து (Haem iron) அதிகமாக உள்ளது.
- வெல்லத்தில் இரும்புச்சத்து அதிகமாக உள்ளது. இனிப்பு பலகாரம் செய்ய சர்க்கரையைத் தவிர்த்து வெல்லத்தை சேர்த்துக் கொள்ளலாம்.

இரும்புச்சத்து நிறைந்த உணவுப் பண்டங்கள்:

- கேழ்வரகு மற்றும் வெல்லம் சேர்த்து தயாரித்த அதிரசம்.
- வேர்க்கடலை அல்லது பொட்டுக்கடலையுடன் எள்ளு மற்றும் வெல்லம் சேர்த்து தயாரித்த உருண்டை
- கேழ்வரகு, முருங்கைக்கீரை மற்றும் வெல்லம் சேர்த்து தயாரித்த அடை.
- கைக்குத்தல் அவலில் தயாரித்த உணவுப் பண்டங்கள்.
- புதினா மற்றும் கருவேப்பிலைத் துவையல்.
- பீட்ரூட் சாறு

3.1.2 MODERN ASPECT

DISORDERS OF THE BLOOD

Disorders of the blood cover a wide spectrum of illnesses, ranging from some of the most common disorders affecting mankind (anaemias), to relatively rare conditions such as leukaemias and congenital coagulation disorders. Although the latter are uncommon, advances in cellular and molecular biology have had major impacts on their diagnosis, treatment and prognosis. Haematological changes occur as a consequence of diseases affecting any system and give important information in the diagnosis and monitoring of many conditions.

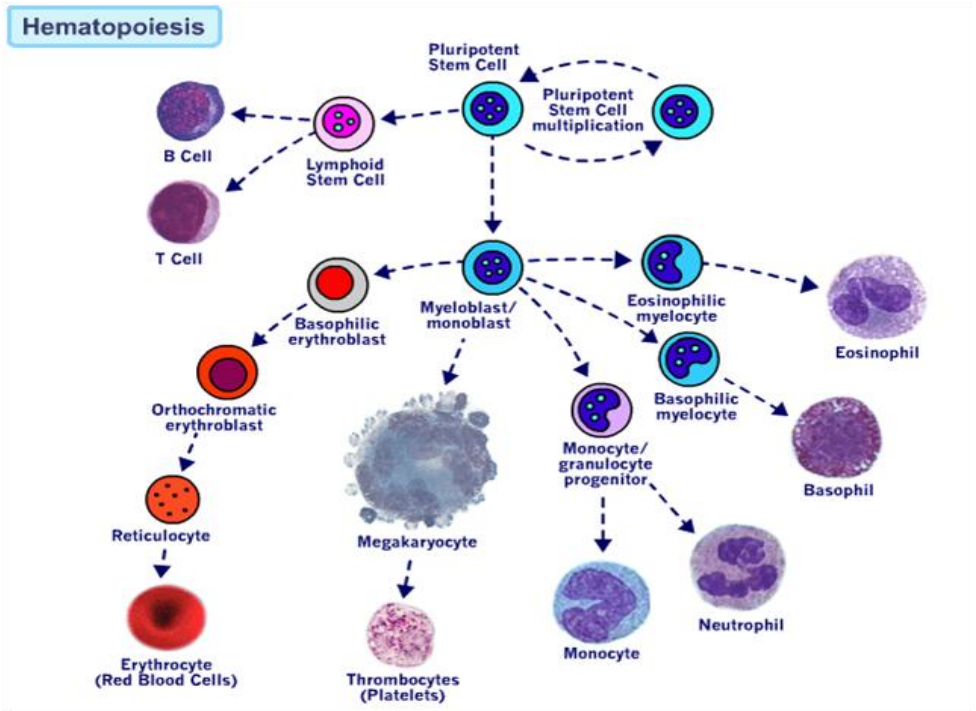
FUNCTIONAL ANATOMY AND PHYSIOLOGY

Blood flows throughout the body in the vascular system, and consists of plasma and three cellular components:

- red cells, which transport oxygen from the lungs to the tissues
- white cells, which protect against infection
- platelets, which interact with blood vessels and clotting factors to maintain vascular integrity and prevent bleeding.

HAEMATOPOIESIS

Figure – 3.1.2 a



Haematopoiesis describes the formation of blood cells, an active process that must maintain normal numbers of circulating cells and be able to respond rapidly to

increased demands such as bleeding or infection. During development, haematopoiesis occurs in the liverand spleen and subsequently in red bone marrow in the medullary cavity of all bones. In childhood, red marrow is progressively replaced by fat (yellow marrow), so that in adults normal haematopoiesis is restricted to the vertebrae, pelvis, sternum, ribs, clavicles, skull, upper humeri and proximal femora. However, red marrow can expand in response to increased demands for blood cells. Bone marrow contains a range of immature haematopoietic precursor cells and a storage pool of mature cells for release at times of increased demand. Haematopoietic cells interact closely with surrounding connective tissue stroma, made of reticular cells, macrophages, fat cells, blood vessels and nerve fibres. In normal marrow, nests of red cell precursors cluster around a central macrophage, which provides iron and phagocytoses extruded nuclei. Megakaryocytes are large cells which produce and release platelets into vascular sinuses. White cell precursors are clustered next to the bone trabeculae; maturing cells migrate into the marrow spaces towards the vascular sinuses. Plasma cells are antibody-secreting mature B cells which normally represent < 5% of the marrow population and are scattered throughout the intertrabecular spaces.

STEM CELLS

All blood cells are derived from pluripotent stem cells. These comprise only 0.01% of the total marrow cells, but they can self-renew (i.e. make more stem cells) or differentiate to produce a hierarchy of lineage-committed stem cells. The resulting primitive progenitor cells cannot be identified morphologically, so they are named according to the types of cell (or colony) they form during cell culture experiments. CFU–GM (colony-forming unit–granulocyte, monocyte) is a stem cell that produces granulocytic and monocytic lines, CFU–E produces erythroid cells, and CFU–Meg produces megakaryocytes and ultimately platelets. A range of growth factors, produced in bone marrow stromal cells and elsewhere, controls the survival, proliferation, differentiation and function of stem cells and their progeny. Some, such as granulocyte macrophage–colony stimulating factor (GM–CSF), interleukin-3 (IL-3) and stem cell factor (SCF), act on a wide number of cell types at various stages of differentiation. Others, such as erythropoietin (Epo), granulocyte–colony stimulating factor (G–CSF) and thrombopoietin (Tpo), are lineage-specific.

HAEMOGLOBIN

Haemoglobin is a protein specially adapted for oxygen transport. It is composed of four globin chains, each surrounding an iron-containing porphyrin pigment molecule termed haem. Globin chains are a combination of two alpha and two non-alpha chains; haemoglobin A (αα/ββ) represents over 90% of adult haemoglobin, whereas haemoglobin F (αα/γ γ) is the predominant type in the fetus. Each haem molecule contains a ferrous ion (Fe2+) to which oxygen reversibly binds; the affinity for oxygen increases as successive oxygen molecules bind. When oxygen is bound, the beta chains 'swing' closer together; they move apart as oxygen is lost. In the 'open' deoxygenated state, 2, 3 diphosphoglycerate (DPG), a product of red cell metabolism, binds to the haemoglobin molecule and lowers its oxygen affinity. These complex interactions produce the sigmoid shape of the oxygen dissociation curve. The position of this curve depends upon the concentrations of 2, 3 DPG, H+ ions and CO2; increased levels shift the curve to the right and cause oxygen to be released more readily, e.g. when red cells reach hypoxic tissues. Haemoglobin F is unable to bind 2, 3 DPG and has a left-shifted oxygen dissociation curve which, together with the low pH of fetal blood, ensures fetal oxygenation. Genetic mutations affecting the haem-binding pockets of globin chains or the 'hinge' interactions between globin chains result in haemoglobinopathies or unstable haemoglobins. Alpha globin chains are produced by two genes on chromosome 16 and beta globin chains by a single gene on chromosome 11; imbalance in the production of globin chains produces the thalassaemias. Defects in haem synthesis cause the porphyrias.

FACTORS NECESSARY FOR HAEMOGLOBIN FORMATION:

1**. First class proteins and amino acids:**

Proteins of high biological value are essential for the formation of haemoglobin. Amino acids derived from these proteins are required for the synthesis of protein part of haemoglobin, the globin.

2. **Iron**: It is necessary for the formation of heme part of the haemoglobin.

3. **Copper**: It is necessary for the absorption of iron from the gastrointestinal tract.

4. **Cobalt and nickel**: Cobalt and nickel are essential for the utilization of iron during haemoglobin formation.

5. **Vitamins:** Vitamin C, riboflavin, nicotinic acid and pyridoxine are also essential for the formation of haemoglobin.

DESTRUCTION

Red cells at the end of their lifespan of approximately 120 days are phagocytosed by the reticulo-endothelial system. Amino acids from globin chains are recycled and iron is removed from haem for reuse in haemoglobin synthesis. The remnant haem structure is degraded to bilirubin and conjugated with glucuronic acid before being excreted in bile. In the small bowel, bilirubin is converted to stercobilin; most of this is excreted, but a small amount is reabsorbed and excreted by the kidney as urobilinogen. Increased red cell destruction due to haemolysis or ineffective haematopoiesis results in jaundice and increased urinary urobilinogen. Free intravascular haemoglobin is toxic and is normally bound by haptoglobins, which are plasma proteins produced by the liver.

IRON

It is present in ferrous (fe++) form. It is in unstable or loose form. Under certain conditions, the iron may be present in ferric (fe++) state, which is a stable form.

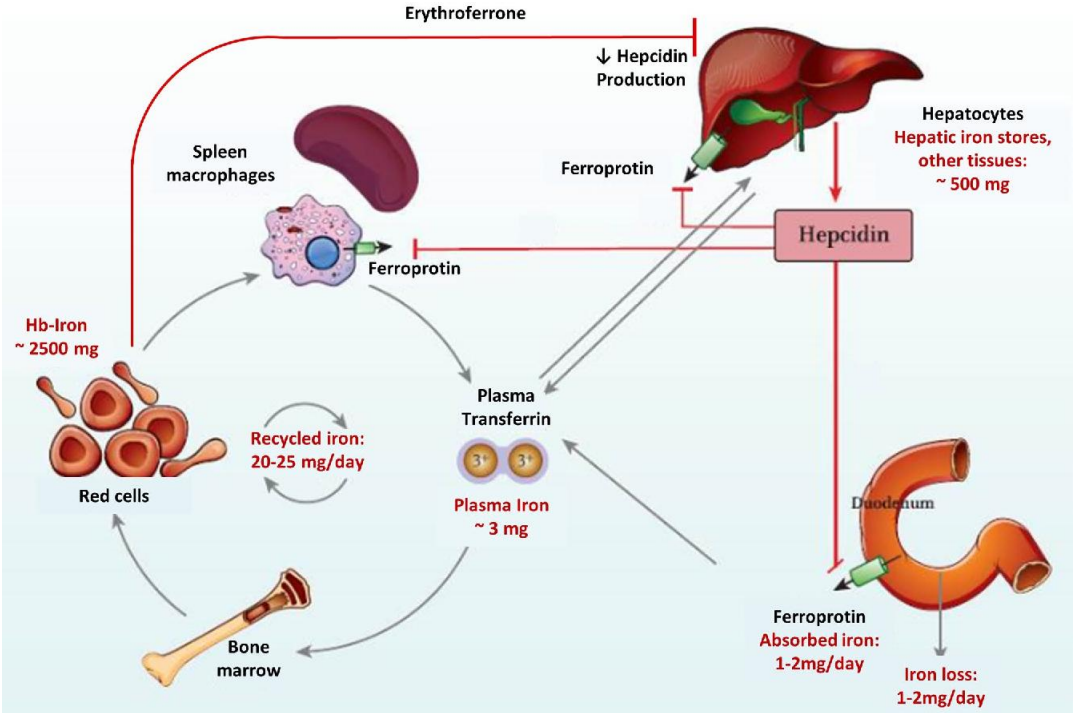
IRON METABOLISM

Iron is a critical element in the function of all cells, although the amount of iron required by individual tissues varies during development. At the same time, the body must protect itself from free iron, which is highly toxic in that it participates in chemical reactions that generate free radicals such as singlet O2 or OH-. Consequently, elaborate mechanisms have evolved that allow iron to be made available for physiologic functions while at the same time conserving this element and handling it in such a way that toxicity is avoided. The major role of iron in mammals is to carry O2 as part of hemoglobin. O2 is also bound by myoglobin in muscle. Iron is a critical element in iron-containing enzymes, including the cytochrome system in mitochondria. Without iron, cells lose their capacity for electron transport and energy metabolism. In erythroid cells, hemoglobin synthesis is impaired, resulting in anemia and reduced O2 delivery to tissue.

Iron taken in diet is absorbed at all parts of GI tract especially duodenal mucosa. Acid medium favours iron absorption. Acid medium favours formation of soluble macromolecular complexes of iron with vitamin C, sugar, amino acid or bile in the duodenum. Only 10% of the ingested iron is absorbed. Normal serum iron level

is 50 to 150 mg/dl. Frank iron deficiency increases absorption by 30- 40% and in iron overload, absorption decreases. Iron absorption is increased in (1) ferrous state, (2) increased erythropoiesis (3) iron deficiency. Iron absorption is decreased in (1) ferric state, (2) in the presence of phosphates and phytates, (3) bone marrow hypoplasia. The absorbed iron is stored in the form of ferritin (water soluble form) and haemosiderin (water insoluble form). In men, storage compartment contains about 1000 mg of iron and in women, it ranges from 0-500 mg; In one-third of healthy women, there is no significant iron in storage compartment. The storage organs are liver, spleen, lymph nodes and bone marrow. Iron is transported after binding with transferrin, a cytoplasmic protein. Transport iron compartment contains 3 mg of iron. Transferrin concentration in plasma is measured by estimating total iron binding capacity or immunologically. Normally l mg of elemental iron is lost from shedding of senescent cells of gastrointestinal tract and genitourinary tract, and from desquamation of skin.

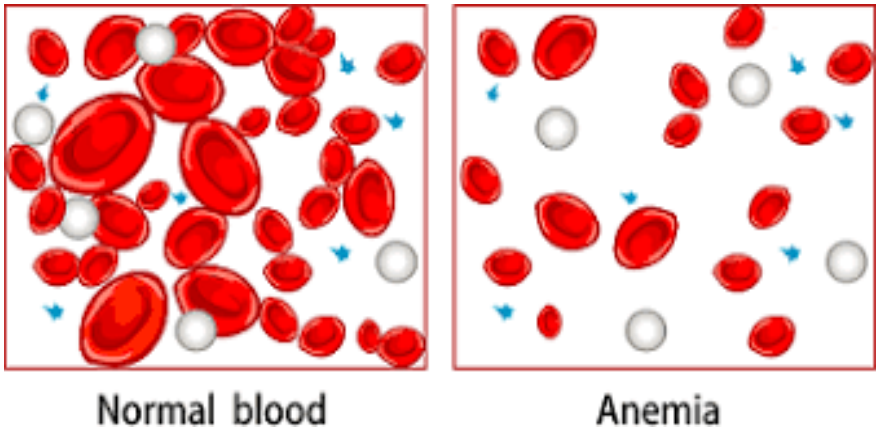
Figure 3.1.2 b) Iron Metabolism



ANAEMIA

Anaemia refers to a state in which the level of haemoglobin in the blood is below the normal range appropriate for age and sex. Other factors, including pregnancy and altitude, also affect haemoglobin levels and must be taken into account when considering whether an individual is anaemic. The clinical features of anaemia reflect diminished oxygen supply to the tissues. A rapid onset of anaemia (e.g. due to blood loss) causes more profound symptoms than a gradually developing anaemia. Individuals with cardiorespiratory disease are more susceptible to symptoms of anaemia. The clinical assessment and investigation of anaemia must not only assess its severity but also define the underlying cause.

Figure 3.1.2 c) Anaemia



CAUSES OF ANAEMIA

- **Decreased or ineffective marrow production**
  - Lack of iron, vitamin B12 or folate
  - Hypoplasia
  - Invasion by malignant cells
  - Renal failure
  - Anaemia of chronic disease
- **Peripheral causes**
  - Blood loss
  - Haemolysis
  - Hypersplenism

Around 30% of the total world population is anaemic and half of these, some 600 million people, have iron deficiency.

CLASSIFICATION OF ANEMIA

Anemia is classified by two methods

A. Morphological classification

B. Etiological classification

Morphological Classification:

Morphological classification depends upon the size and colour of RBC. Colour is determined by quantity of hemoglobin, according to this anemia is classified into four types.

1. Normocytic Normochromic Anemia

The size and heamoglobin content of RBC are normal but the number of RBC is less.

2. Macrocytic Normochromic Anemia

The RBC is larger in size with normal hemoglobin content, the RBC count decreases.

3. Macrocytic Hypochromic Anemia

The RBCs are larger in size. The hemoglobin content in the cell (MCH) is less so the cells are pale in colour.

4. Microcytic Hypochromic Anemia

The RBCs are smaller in size and the hemoglobin content (MCH) is less.

Etiological Classification

On the basis of etiology anemia is classified into five types:

1. Hemorrhagic anemia.
2. Hemolytic anemia.
3. Nutritional deficiency anemia.
4. Aplastic anemia.
5. Anemia of chronic disease.

IRON DEFICIENCY ANAEMIA

Iron deficiency is one of the most prevalent forms of malnutrition. Globally, 50% of anemia is attributable to iron deficiency and accounts for approximately 841,000 deaths annually worldwide. Africa and parts of Asia bear 71% of the global mortality burden; North America represents only 1.4% of the total morbidity and mortality associated with iron deficiency.

STAGES OF IRON DEFICIENCY

The progression to iron deficiency can be divided into three stages. The first stage is *negative iron balance*, in which the demands for (or losses of) iron exceed the body's ability to absorb iron from the diet. This stage results from a number of physiologic mechanisms, including blood loss, pregnancy (in which the demands for red cell production by the fetus outstrip the mother's ability to provide iron), rapid growth spurts in the adolescent, or inadequate dietary iron intake. Blood loss in excess of 10‑20 mL of red cells per day is greater than the amount of iron that the gut can absorb from a normal diet. Under these circumstances, the iron deficit must be made up by mobilization of iron from RE storage sites. During this period, iron stores reflected by the serum ferritin level or the appearance of stainable iron on bone marrow aspirations decrease. As long as iron stores are present and can be mobilized, the serum iron, total iron-binding capacity (TIBC), and red cell protoporphyrin levels remain within normal limits. At this stage, red cell morphology and indices are normal. When iron stores become depleted, the serum iron begins to fall. Gradually, the TIBC increases, as do red cell protoporphyrin levels. By definition, marrow iron stores are absent when the serum ferritin level is <15 μ g/L. As long as the serum iron remains within the normal range, hemoglobin synthesis is unaffected despite the dwindling iron stores. Once the transferrin saturation falls to 15‑20%, hemoglobin synthesis becomes impaired. This is a period of *iron-deficient erythropoiesis*. Careful evaluation of the peripheral blood smear reveals the first appearance of microcytic cells, and if the laboratory technology is available, one finds hypochromic reticulocytes in circulation. Gradually, the hemoglobin and hematocrit begin to fall, reflecting *iron deficiency anemia*. The transferrin saturation at this point is 10‑15%. When moderate anemia is present (hemoglobin 10‑13 g/dL), the bone marrow remains hypoproliferative. With more severe anemia (hemoglobin 7‑8 g/dL),

hypochromia and microcytosis become more prominent, target cells and misshapen red cells (poikilocytes) appear on the blood smear as cigar- or pencil-shaped forms, and the erythroid marrow becomes increasingly ineffective. Consequently, with severe prolonged iron-deficiency anemia, erythroid hyperplasia of the marrow develops, rather than hypoproliferation.

CAUSES OF IRON DEFICIENCY

Conditions that increase demand for iron, increase iron loss, or decrease iron intake or absorption can produce iron deficiency.

- **Increased Demand for Iron**
  - Rapid growth in infancy or adolescence
  - Pregnancy
  - Erythropoietin therapy
- **Increased Iron Loss**
  - Chronic blood loss
  - Menses
  - Acute blood loss
  - Blood donation
  - Phlebotomy as treatment for polycythemia vera
- **Decreased Iron Intake or Absorption**
  - Inadequate diet
  - Malabsorption from disease (sprue, Crohn's disease)
  - Malabsorption from surgery (gastrectomy and some forms of bariatric surgery)
  - Acute or chronic inflammation

STAGES IN IRON DEFICIENCY ANAEMIA

There are three stages in the development of iron deficiency anaemia.

a. Negative iron balance

b. Iron deficient erythropoiesis

c. Iron deficiency anaemia

CLINICAL PRESENTATION OF IRON DEFICIENCY

Certain clinical conditions carry an increased likelihood of iron deficiency. Pregnancy, adolescence, periods of rapid growth, and an intermittent history of blood loss of any kind should alert the clinician to possible iron deficiency. A cardinal rule is that the appearance of iron deficiency in an adult male means gastrointestinal blood loss until proven otherwise. Signs related to iron deficiency depend on the severity and chronicity of the anemia in addition to the usual signs of anemia−fatigue, pallor, and reduced exercise capacity. *Cheilosis* (fissures at the corners of the mouth) and *koilonychia* (spooning of the fingernails) are signs of advanced tissue iron deficiency. The diagnosis of iron deficiency is typically based on laboratory results.

INVESTIGATIONS

I) Blood Investigation

1. Total red blood cell count
2. Differential count
3. Erythrocyte sedimentation rate
4. Mean corpuscular hemoglobin
5. Mean corpuscular volume
6. Mean corpuscular hemoglobin concentration
7. Packed cell volume
8. Red cell survival
9. Serum iron
10. Serum ferritin concentration
11. Serum protein
12. Serum creatinine

II) Urine investigation

1. Urine sugar
2. Urine albumin
3. Deposits
4. Red blood cells
5. Pus cells

From the above investigations the following are predominant in iron deficiency anemia

- Haemoglobin level: When Hb is greater than 10 gm/ dl, symptoms of anaemia develop only on exertion or on exposure to hypoxia or high altitude. If Hb level is less than 7 gm/dl, patient is symptomatic even at rest.
- Microcytic, hypochromic (MCHC < 32%) RBCs in the peripheral smear.
- The hemoglobin may fall to as low as 3gm/100ml but the red cell count is rarely below 2.5 million/cubic millimeter.
- Reticulocyte and platlets are normal or increased.
- The white cell count in normal serum iron is usually below 30 mug/100 ml (normal is 90-150 mug/100 ml)
- Bone marrow hemosiderin is absent
- The MCHC is below 27gm/dl.

DIFFERENTIAL DIAGNOSIS

1. Anaemia of chronic disease
2. Thalassaemias
3. Haemoglobinopathies (Hb E)
4. Chronic liver disease
5. Chronic renal disease
6. Myelodysplastic disorders (refractory anaemia with ringed sideroblasts)
7. Myeloproliferative disorders
8. Hereditary sideroblastic anaemia
9. Myxoedema
10. Congenital atransferrinaemia.

DIET:

- Stomachic and haematinic food items are advised.
- Apart from these, Agati grandiflora green leaves, and bitter gourd (Momordica charantia) like anthelmintic foods may also be advised.
- Easily digestable food items generally advised.

3.2. REVIEW OF DRUGS

KADUKKAI - *TERMINALIA CHEBULA RETZ.*

Family: Combretaceae.

Habitat: Kadukkai is the pericarp of mature fruit devoid of seeds, of Terminalia chebula Retz. (Fam. Combretaceae), a moderate sized or large tree found throughout India, chiefly in deciduous forests and areas of light rainfall upto about 1500 m. elevation, throughout India, It is abundant in Northern India.

English: Chebulic Myrobalan, Black Myrobalan.

Siddha/Tamil: Kadukkai.

Phytochemical constituents: Shikimic, gallic, triacontanoic and palmitic acids, beta-sitosterol, daucosterol, triethylester of chebulicacid and ethyl ester of gallic acid; a new ellagitannin, terchebulin, along with punicalagin and tea flavin A have been isolated from the fruits. A new triterpene, chebupentol, and arjungenin, terminoic acid and arjunolic acid were also isolated from the fruit. Antioxidant constituents of the plant, phloroglucinol and pyrogallol have been isolated along with ferulic, vanillic, p-coumaric and caffeic acids.

Actions: Gentle purgative (The main purgative ingredient of Triphala is T. chebula (the purgative principle is in the pericarp of the fruit), astringent (unripe fruits are more purgative, ripe ones are more astringent; sennoside A and anthraquinone glycoside is laxative, tannins are astringent), stomachic, antibilious, alterative. Bark - diuretic.

Uses: Along with other therapeutic applications, indicated the use of powder of mature fruits in intermittent fevers, chronic fevers, anaemia and polyuria. The fruits of T. chebula are used in combination with Emblica officinalis and T. bellirica (under the name Triphala) in the treatment of liver and kidney dysfunctions. Used in prescriptions for treating flatulence, constipation, diarrhoea, dysentery, cyst, digestive disorders, vomiting, enlarged liver and spleen, cough and bronchial asthma, and for metabolic harmony.

Pharmacological activities: Ether extract showed higher antioxidant activity than BHA and BHT, Acid esters present in phenolic fraction of extract, were found most effective (C P Khare (Ed.) Indian Medicinal Plants, 2007).

The modern pharmacological studies show that myrobalan has multiple biological activities, including antimicrobial, anti-inflammatory, antioxidation as well as anti-tumor (Zhang XJ *et al*., Zhongguo Zhong Yao Za Zhi, 2016).

GUNAPADAM ASPECT

கடுக்காய்

வேறு பெயர்கள்: அம்மை, அமுதம், அரிதகி, பத்தியம், வரிகாய்

சுவை: முக்கிய சுவை - துவர்ப்பு; சிறிது - இனிப்பு, புளிப்பு, கார்ப்பு, கைப்பு

தன்மை - வெப்பம்

பிரிவு - இனிப்பு

பொதுக்குணம்:

தாடை கழுத்தக்கி தாலு குறியிவிடப்
பீடை சிலிபதமுற் பேதிடுமுடம் - ஆடையெட்டாத்
தூலமிடி புண்வாத சோணிகா மாலைவயிரண்
டாலமிடி போம்வரிக்கா யாய்.

கடுக்காயின் சிறப்பு:

கடுக்காயுந் தாயுங் கருதிலொன்றென் றாலும்
கடுக்காய்த் தாய்க்கதிகங் காண்நீ – கடுக்காய்நோய்
ஓட்டி யுடற்றேற்றும் உற்றவன்னை யோசுவைகள்
ஊட்டியுடற் றேற்று முவந்து.

\- அகத்தியர் குணவாகடம்

THANRIKKAI - *TERMINALIA BELLIRICA ROXB.*

Family: Combretaceae.

Habitat: Throughout deciduous forests of India.

English: Belleric Myrobalan, Bastard Myrobalan.

Siddha/Tamil: Thaanrikkaai, Thandri.

Actions: Fruit—purgative when half ripe, astringent when ripe; antipyretic; used in prescriptions for diarrhoea, dyspepsia, biliousness, cough, bronchitis and upper respiratory tract infections, tropical pulmonary eosinophilia and allergic eruptions.

Phytochemical constituents: The fruits contain beta-sitosterol, gallic and ellagic acids, ethyl gallate, galloyl glucose, chebulagic acid and acardiac glycoside, bellaricanin. The fruit contains all components of Chebulic myrobalan (T.chebula) except corilagin and chebulic acid. The fleshy fruit pulp contains 21.4% tannin, both condensed and hydrolysable types.

Pharmacological activities: The fruits produce hepato-protective effect in CCl_4-induced liver injury in mice. Alcoholic extract of the fruit exerted a negative chrono-andinotropic and hypotensive effect of varying magnitude in a dose dependent fashion on isolated rat and frog atria and rabbit heart. The flower showed spermicidal activity. (C P Khare (Ed.) Indian Medicinal Plants, 2007)

GUNAPADAM ASPECT

தான்றிக்காய்

வேறு பெயர்கள்: அக்கந்தம், அமுதம், அம்பலத்தி, எரிகட்பலம், கந்துகன், சகதம், தாபமாரி, விபீதகம், திறிலிங்கம், பூதவாசகம்

சுவை: துவர்ப்பு

தன்மை - வெப்பம்

பிரிவு - இனிப்பு

செய்கை:

துவர்ப்பி (Astringent)

உரமாக்கி (Tonic)

கோழையகற்றி (Expectorant)

மலமிளக்கி (Laxative)

பொதுக்குணம்:

“சிலந்திவிடம் காமியப்புண் சீழான மேகங்
கலந்துவரும் வாதபித்தங் காலோ – டலர்ந்துடலில்
ஊன்றிக்காய் வெப்ப முதிரபித் துங்கரக்குந்
தான்றிக்காய் கையிலெடுத் தால்”

“ஆணிப்பொன் மேனிக் கழகும் ஒளியுமிகும்
கோணிக்கொள் வாதபித்தக்கொள்கைபோம் - தானிக்காய்
கொண்டவர்க்கு மேகமறும் கூறா அனற்றணியும்
கண்டவர்க்கு வாதம்போம் காண்”

NELLI - *EMBLICA OFFICINALIS GAERTN.*

Synonym: Phyllanthus emblica Linn.

Family: Euphorbiaceae

Habitat: Native of tropical Southeast Asia; distributed throughout India; also planted in public parks.

English: Emblic, Indian gooseberry.

Siddha/Tamil: Nellikkaai, Nelli.

Actions: Fruit- haematinic, anabolic, antiemetic, bechic, astringent, antihaemorrhagic, antidiarrhoeal, diuretic, antidiabetic, carminative, antioxidant.

Uses: It is used in jaundice, dyspepsia, bacillary dysentery, eye trouble and as a gastrointestinal tonic. Juice with turmeric powder andhoneyis prescribed in diabetes insipidus. Seed - antibilious, antiasthmatic, used in bronchitis. Leaf - juice is given in vomiting. A decoction of powdered pericarp is prescribed for peptic ulcer. Key application - as an antacid. (Indian Herbal Pharmacopoeia)

Phytochemical constituents: The fruit is an important source of vitamin C, minerals and amino acids. The edible fruit tissue contains protein concentration three fold and vitaminC (ascorbic acid) concentration 160-fold than those of apple. The fruit also contains considerably higher concentration of most minerals and amino acids than apple. The fruit gave cytokinine like substances identified as zeatin, zeatin riboside and zeatin nucleotide; suspension culture gave phyllembin. The leaves contain gallic acid (10.8 mg/g dry basis), besides ascorbic and music acid.

Pharmacological activities:

The fruit contains superoxide dismutase 482.14units/g fresh weight and exhibits antisenescent (anti-aging) activity. Fruit, juice, its sediment and residue are antioxidant due to gallic acid. EtOH (50%) extract -antiviral. Aqueous extract of the fruit increases cardiac glycogen level and decreases serum GOT, GPT and LDH in rats having induced myocardial necrosis. (C P Khare (Ed.) Indian Medicinal Plants, 2007)

Phyllembin exhibits CNS depressant and spasmolytic activity, potentiates action of adrenaline and hypnotic action of Nembutal.

Preliminary evidence suggests that the fruit and its juice may lower serum cholesterol, LDL, triglycerides and phospholipids without affecting HDL levels and may have positive effect on atherosclerosis. (Jacob A *et al*., Eur J clin Nutr, 1988; Anila L *et al*., Phytother Res, 2000)

An aqueous extract of the fruit has been reported to provide protection against radiation-induced chromosomal damage in both pre-and post irradiation treatment. The fruit is reported to enhance natural killer cell activity and antibody dependent cellular cytotoxicity in mice bearing Dalton's lymphoma ascites tumour. The extract of the fruit and ascorbic acid prevents hepatotoxic and nephrotoxic effects induced by lead and aluminium. The toxicity could be counteracted to a great extent by the fruit extract than by an amount of ascorbic acid alone equivalent to that contained in fruits (The fruit can be used as a dietary supplement to counteract prolonged exposure to metals in population in industrial areas). The fruits are reported to activate trypsin (proteolytic enzyme) activity. (C P Khare (Ed.) Indian Medicinal Plants, 2007)

GUNAPADAM ASPECT

நெல்லி

வேறு பெயர்கள்: ஆமலகம், ஆம்பல், தாத்தாரி, கோரங்கம், மிறுதுபலா

இதன் பழம் உலர்ந்த பின் கறுப்பு நிறமாக இருக்கும். இதற்கு நெல்லிமுள்ளி என்று பெயர்.

சுவை: புளிப்பு, துவர்ப்பு, இனிப்பு

தன்மை - தட்பம்

பிரிவு - இனிப்பு

பழம்

செய்கை:

குளிர்ச்சியுண்டாக்கி (Refrigerant)
சிறுநீர்ப்பெருக்கி (Diuretic)
மலமிளக்கி (Laxative)

பொதுக்குணம்:

''நெல்லிக்காய்க் குப்பித்தம் நீங்கும ் தன்புளிப்பால்
செல்லுமே வாதமதிற் சேர்துவரால் - சொல்லுமையம்
ஓடுமிதைச் சித்தத்தில் உன்ன அனலுடனே
கூடுபிற மேகமும் போங் கூறு''

நெல்லிமுள்ளியின் குணம்

ஆகவன லஞ்சசிஅ சிர்க்கென்பு ருக்கிகண்ணோய்
தாக முதிரவித்தந் தாது நஷ்டம் - மேகனத்தின்
இல்லிமுள்ளி போலருகல் எண்கா மியவியங்கம்
நெல்லிமுள்ளி யாற்போ நினை

நல்லநெல்லி முள்ளியது நாக்குக் குருசிதரும்
அல்லல்விரி பித்தம் அகற்றுமதை – மெல்லத்
தலை முழுகக் கண்குளிருந் தாவுபித்த வாந்தி
இலையிழிமே கங்களும் போம் எண்.

- தேரையர் குணவாகடம்

VALLARAI - *CENTELLA ASIATICA LINN.*

Synonym: Hydrocotyle asiatica Linn.

Family: Umbelliferae; Apiaceae.

Habitat: In marshy places throughout India up to 200m.

English: Asiatic Pennywort, Indian Pennywort

Siddha/Tamil: Vallaarai

Actions: Adaptogen, central nervous system relaxant, peripheral vasodilator, sedative, antibiotic, detoxifier, blood-purifier, laxative, diuretic, emmenagogue.

Uses: Used in Indian medicine as a brain tonic and sedative. (IndianHerbal Pharmacopoeia). Used as a brain tonic for improving memory and for overcoming mental confusion, stress, fatigue, also used for obstinate skin diseases and leprosy.

Phytochemical constituents & Pharmacological activity: Triterpenoid saponins—brahmoside, asiaticoside, thankuniside; alkaloids (hydrocotyline); bitter principles (vellarin).

Brahmoside, present in the plant, is reported to exhibit tranquilizing and anabolic activity. Raw leaves are eaten or plant decoction is drunk to treat hypertension. Asiaticoside, extracted from leaves, gave encouraging results in

leprosy. It dissolves the waxy covering of Bacillus leprae. (C P Khare (Ed.) Indian Medicinal Plants, 2007)

Asiaticoside reduced the number tubercular lesions in the liver, lungs, nerve ganglia and spleen in experimental animals. Another derivative of asiaticoside, oxyasiaticoside, inhibits growth of Tubercle bacillus at a concentration of 0.15ml/ml Asiaticosides are also hyperglycaemic. The Asiatic acid acts against resistantbacteria, particularly Mycobacterium tuberculosis and M.leprae as well as Gram-positive cocci. Asiaticosides elevate blood glucose, triglycerides and cholesterol levels. They seem to decrease blood urea nitrogen and acid phosphatase levels. (Pharmacological findings, Natural Medicines Comprehensive Database, 2007)

In research, using rats, the herb exhibited protective effect against alcohol-induced and aspirin-induced ulcers. (Sairam K *et al*., J Exp Biol, 2001)

GUNAPADAM ASPECT

வல்லாரை

வேறு பெயர்கள்: சண்டகி, பிண்டீரி, யோசனவல்லி

சுவை: துவர்ப்பு, கைப்பு, இனிப்பு

தன்மை - தட்பம்

பிரிவு - இனிப்பு

செய்கை:

உரமாக்கி (Tonic)

உடற்றேற்றி (Alterative)

வெப்பமுண்டாக்கி (Stimulant)

ருதுவுண்டாக்கி (Emmenagogue)

சிறுநீர்ப்பெருக்கி (Diuretic)

பொதுக்குணம்:

அக்கர நோய் மாறும் அகலும் வயிற்றிழிவு
தக்கவிரத் தக்கடுப்புத் தானேகும் - பக்கத்தில்
எல்லாரை யுமருந்தென் றேயுரைத்து நன்மனையுள்
வல்லாரை யைவளர்த்து வை.

- தேரையர் குணவாகடம்

KARISALAI - *ECLIPTA ALBA (LINN.)*

Synonym: E.prostrata Roxb.

Family: Compositae; Asteraceae.

Habitat: Throughout India, up to 2000m on the hills.

English: Trailing Eclipta Plant.

Siddha/Tamil: Karisalaankanni.

Actions: Deobstruent, antihepatotoxic, anticatarrhal, febrifuge.

Uses: The plant is also reported to be effective in the treatment of peptic ulcer, inflammatory diseases, including rheumatoid arthritis, diseases of the gallbladder and skin infections. Also used in hepatitis, spleen enlargements, chronic skin diseases. Leaf—promotes hair growth. Its extract in oil is applied to scalp before bed time in insomnia. The herb is also used as an ingredient in shampoos.

Key application: As hepatoprotective. (Indian Herbal Pharmacopoeia)

Phytochemical constituents: The herb should be dried at room temperature under shade. Its active principles are lost due to aerial oxidation during sundrying or drying under reduced pressure below 40°C. The herb contains wedelolactone and demethyl wedelolactone,

Pharmacological activities: The active principle showed a dose dependent effect against CCl_4, d-galactosamine or phalloidin induced cytotoxicity in primary cultured rat hepatocytes, and exhibited potent antihepatotoxic property. The whole plant shows effect on liver cell regeneration (Rownak Jahan et al., Int Sch Res Notices. 2014).

Immunoactive property has been observed against surface antigen of hepatitisB-virus. Aqueous extract of leaves exhibits myocardial depressant and hypotensive activity. (C P Khare (Ed.) Indian Medicinal Plants, 2007)

GUNAPADAM ASPECT

கரிசலாங்கண்ணி

வேறு பெயர்கள்: கரிசாலை, கைகேசி, கையாந்தகரை, பிருங்கராஜம், கையான்

சுவை: கைப்பு,

தன்மை - வெப்பம்

பிரிவு - கார்ப்பு

செய்கை:

பித்தநீர்ப்பெருக்கி (Cholagogue)

உரமாக்கி (Tonic)

உடற்றேற்றி (Alterative)

வாந்தியுண்டாக்கி (Emetic)

பித்தநீர்ப்பெருக்கி (Chologogue)

நீர்மலம்போக்கி (Purgative)

வீக்கமுருக்கி (Deobstruent)

ஈரல்தேற்றி (Hepatotonic)

பொதுக்குணம்:

"குரற்கம்மற் காமாலை குட்டமொடு சொபை
யுறற்பாண்டு பன்னோ யொழிய – நிரற்சொன்ன
மெய்யாந் தகரையொத்த மீளி ண்ணு நற்புலத்துக்
கையாந் தகரையொத்தக் கால்"

- அகத்தியர் குணவாகடம்

KEEZHANELLI -*PHYLLANTHUS AMARUS SCHUM. & THONN.*

Family: Euphorbiaceae.

Habitat: Throughout the hotter parts of India, particularly on cultivated land, up to1,000m.

Phytochemical constituents: The leaves yielded lignans—phyllanthin(bitter), hypophyllanthin (nonbitter); niranthin, nirtetralin and phyltetralin. The whole plant gave a number of flavonoids, including quercetin, quercitrin, astragalin, rutin, kaempferol. Isolation of ahydrolysable tannins, amarulone, is reported from the plant.

Actions: Plant—diuretic, deobstruent, astringent, anti-inflammatory, styptic. Used as a single drug in the treatment of jaundice.

Uses: Used in prescriptions for dyspepsia, indigestion, chronic dysentery, urinary tract diseases, diabetes, skin eruptions.

Pharmacological activities: The plant is reported to show antiviral activity against hepatitis virus and related hepadnavirus. It was also found to effectively repair CCl_4-induced liver damage in rats. (C P Khare (Ed.) Indian Medicinal Plants, 2007)

The herb exhibited hypotensive and hypoglycaemic activity. (Srividhya N *et al*., Indian J Exp Biol, 1995)

GUNAPADAM ASPECT

கீழ்க்காய்நெல்லி

வேறு பெயர்கள்: கீழாநெல்லி, கீழ்வாய்நெல்லி

சுவை: துவர்ப்பு, கைப்பு, புளிப்பு, இனிப்பு

தன்மை - தட்பம்

பிரிவு - இனிப்பு

செய்கை:

குளிர்ச்சியுண்டாக்கி (Refrigerant)

சிறுநீர்ப்பெருக்கி (Diuretic)

வீக்கமுருக்கி (Deobstruent)

துவர்ப்பி (Astringent)

பொதுக்குணம்:

சீதமதி பித்தவிடம் செவ்விழியின் னோய்க் கூட்டம்
பூதமொடு பேயிரத்தப் போக்குகளும் - பூதலத்துள்
தாழ்வாய்ப் பணிந்தேகுந் தப்பாது பொய்யலவே
கீழ்வா யெனுநெல்லிக் கே.

- அகத்தியர் குணவாகடம்

NEERMULLI - *HYGROPHILA AURICULATA (K.SCHUM.)HEINE*.

Synonym: H.schulli(Ham.) MR & SM Almeida. H.spinosa T.anders. Asteracantha longifolia(L.)Nees.

Family: Acanthaceae.

Habitat: Throughout India along the banks of fresh or stagnant water ditches and swampy grounds, mixed with marshy grasses and sedges.

Siddha/Tamil: Neermulli.

Action: Leaves, roots and seeds— diuretic; used for diseases of the urinogenital tract, spermatorrhoea. Seeds promote sexual vigour, arrest abortion and cure diseases due to vitiated blood. Also used for arthritis and oedema.

Phytochemical constituents: The seeds contain linoleic acid (71%), besides diastase, lipase and protease. The seeds contain large amounts of tenacious mucilage and potassium salts, which may be responsible for the diuretic property of seeds. The plant contains lupeol, stigmasterol and hydrocarbons.

Pharmacological activity: EtOH (50%) extract of the plant is spasmolytic and hypotensive. The chloroform soluble fraction of ethanolic extract of aerial parts exhibited promising hepatoprotective activity in albino rats (Kshirsagar AD *et al*., Pharmacogn Rev. 2010).

GUNAPADAM ASPECT

நீர்முள்ளி

வேறு பெயர்கள்: நிதகம், இக்குரம், காகண்டம், துரகதமூலம், முண்டகம்.
சுவை: இனிப்பு, சிறுகைப்பு
தன்மை - தட்பம்
பிரிவு - இனிப்பு

வேர்

செய்கை:

குளிர்ச்சியுண்டாக்கி (Refrigerant)
சிறுநீர்ப்பெருக்கி (Diuretic)
உள்ளழலாற்றி (Demulcent)
உரமாக்கி (Tonic)

பொதுக்குணம்:

பாண்டு குளுப்பையறும் பாரிலுறு நீரேற்றம்
மாண்டுவிடும் நீர்க்கட்டு மாறுங்காண் - பூண்டதொரு
வீக்கமெலாம் நீராய் விடுமேநீர் முள்ளிக்குத்
தாக்கு மயில்விழியால்! சாற்று

ANNABEDHI – *FERRI SULPHAS*

Eng: Green vitriol, Green copperas, copperas of commerse, sulphates of iron (FeSo), Crude ferrous sulphate, Iron sulphate, Salt of steel.

Tam: Annabedhi

Source: It is a salt usually obtained by the decomposition of iron-pyrites by the action of atmospheric moisture. It can be obtained also by dissolving iron wires in sulphuric acid by the aid of heat

Structure and colour: Pale bluish green oblique rhombic prisms, crude greenish blue crystals of iron sulphate available in all bazaars of India.

Taste: Astringent without any odour, acid reaction, soluble in water, insoluble in alcohol.

Action: Haematinic, Tonic, Astringent.

GUNAPADAM ASPECT

அன்னபேதி

சுவை: துவர்ப்பு

வீரியம்: வெப்பம்

செய்கை:

உரமாக்கி (Tonic)

வெப்பமுண்டாக்கி (Stimulant)

ருதுவுண்டாக்கி (Emmenagogue)

புழுக்கொல்லி (Vermifuge)

துவர்ப்பி (Astringent)

முறைவெப்பகற்றி (Febrifuge)

பொதுக்குணம்:

“முளைவிரணஞ் சூலைமந்த முட்டாமைக் கட்டி
விளையறன்ம கோதரநோய் வீட்டும் - வளைமலைபோற்
காட்டுமன்னந் தன்னைக் கணத்திற் சலமாக்கிக்
காட்டுமன்ன பேதியது காண்”.

Fig 3.2.1 KADUKKAI

Fig 3.2.2 THANRIKKAI

Fig 3.2.3 NELLI

Fig 3.2.3a NELLIMULLI

Fig 3.2.4 VALLARAI

Fig 3.2.5 ANNABEDHI CHENDURAM

Fig 3.2.6 KARISALAI

Fig 3.2.7 KEEZHANELLI

Fig 3.2.8 NEERMULLI

CHAPTER - 4
MATERIALS AND METHODS

4.1 STUDY AREA AND SETTING

The study period is covered from June 2017 to July 2019 at the Govt. Siddha Medical College and Hospital, Palayamkottai- 627 002, Tirunelveli, Tamil Nadu. All procedures were carried out after getting the permission from Institutional Ethical Committee.

4.2 STUDY DESIGN

The study design is a prospective open labeled non-randomized Phase-II clinical trial of 40 Pitha paandu (Iron deficiency anaemia) subjects. The included selection were newly diagnosed and already diagnosed as anaemic patients with or without taking treatment. A written informed consent form was recruited in the study. The purpose of the study was explained to the patients before administration of the trial drug. The patient's basic information, life style and siddha parameters were recorded before starting the treatment. The total number of 40 patients, equally in both sex and patient age between 18 and 60 were taken for this study. The selected patients were treated with the trial drug during the study period (30 days).

4.3 SELECTION OF PATIENTS

The criteria for selection of patients are given below (4.3.1). After inclusion of cases, screening is done before starting the treatment.

Detailed personal history, family history, occupation, habits, clinical symptoms, medical history, and the duration of illness were recorded in all patients.

4.3.1 Inclusion Criteria

The parameters for the selection were,

1. Hb level between 7.1-10 gms%
2. Fatigue
3. Weakness
4. Headache
5. Bodyache

6. Dyspnoea on exertion
7. Palpitation
8. Giddiness
9. Pallor of Skin, Conjunctiva, Nailbeds, Mucous membrane of lips and pale tongue
10. Koilonychia
11. Constipation
12. Worm infestations

4.3.2 Exclusion Criteria

Patients are excluded in the following conditions

1. Age below 18 and above 60
2. Hb less than 7 and above 10
3. Congenital heart disease
4. Chronic renal diseases
5. Liver diseases
6. Inherited hemolytic defects
7. Haemorrhagic disorders
8. Thalassemia
9. Thyroid disorder
10. Diabetes mellitus

4.3.3 Diagnosis

The Siddha diagnostic procedures were included this study, which is,

- ❖ Poriyal Arithal
- ❖ Pulanal Arithal
- ❖ Vinathal
- ❖ Mukkutra nilaigal
- ❖ Envagai thervugal
- ❖ Nilam
- ❖ Kaalam & Udal kattugal

4.3.4 Investigations

Blood - Complete blood analysis TC, DC, Hb, TRBC, ESR, PCV, MCV, MCH, MCHC, Sugar, Urea, and Serum Creatinine were carried out.

Specific investigations (For people who are willing)

- Peripheral blood smear, Serum Ferritin, Serum Iron, TIBC

Routine Urine Analysis- Albumin, Sugar, Deposits are noted.

The Lab investigations were carried out before and after administration of trial drug.

4.4 TREATMENT

4.4.1 Preparation of the Trial Medicine (Annexure - I)

The herbomineral preparation of ***THIRIPALAI MATHIRAI*** with the adjuvant ***KARISALAI KUDINEER*** was selected from the Classical Siddha literature,

Reference: "KADUKKAI VALLARAIYIN THANI MAANBU"*-Third Edition:1992, Page No:81,* ***Author:*** *Hakkim. P. Mohammed Abdullah Sahib*

4.4.2 Collection and authentication of Trial Medicine

The required raw drugs for preparations of THIRIPALAI MATHIRAI are purchased form a well reputed country shop in Nagarkoil, Tamilnadu and raw drugs are identified and authenticated by the Medicinal Botanist and Gunapadam experts of Govt. Siddha Medical College& Hospital, Palayamkottai, then they are purified and the medicine is prepared in the P.G.Gunapadam Practical hall of Govt. Siddha Medical College & Hospital, Palayamkottai.

4.5 PRECLINICAL ANALYSIS OF TRIAL MEDICINE

All the preclinical studies of the study drug which includes Bio chemical and pharmacological studies are cross checked before starting the treatment.

A. Biochemical Analysis - It was done in Dept.of Biochemistry, GSMCH, Palayamkottai. The analysis was carried out to find the presence of sulphate, chloride, starch, ferrous iron, unsaturated compound, reducing sugar, amino acid, calcium, carbonate, ferric iron, phosphate, albumin, tannic acid and zinc.
B. Phytochemical Analysis - Phytochemical analysis were done in Biogenix lab, Trivandrum. The qualitative phytochemical analysis was carried out for major compound of interest such as Alkaloids, Flavanoids, Saponins, Phenol, Steroids, Glycosides, Tannins and Terpenoids. The analysis of phytochemicals has

followed by Harborne and Onwukaemeand coworkers, 1999. The Quantitative estimation was done through spectrophotometric method for alkaloids estimation and FolinCio-calteau method for phenols.

C. Antimicrobial assay -
   - Antimicrobial activity was carried out in Biogenix lab, Trivandrum.
     It was done by using Agar well diffusion method.
   - Materials required for this study were,
     - Antibacterial activity - Muller Hinton agar medium(1L), Nutrient broth(1L), Streptomycin(10mg/ml), Culture of test organisms - *E.coli, Pseudomonas aeroginosa, Klebsiella pneumonia, Streptococcus mutans a*nd *Staphylococcus aureus* (growth of culture adjusted according to McFarland Standard, 0.5%)
     - Antifungal activity - Potato Dextrose Agar Medium (1 L), Clotrimazole (standard antifungal agent, concentration: 10mg / ml), Culture of test organisms - *Aspergillus niger, Candida albicans* (growth of culture adjusted according to McFarland Standard, 0.5%)

D. Pharmacological studies - The Haematinic activity of the trial drug in phenylhydrazine induced anaemic rats was done in K.M.College of Pharmacy, Madurai, Tamil nadu.

E. Toxicity study - Acute toxicity and subchronic toxicity of the trial drug is carried out as per OECD-423 guidelines after the animal ethical clearance from Institutional Animal Ethics Committee. Toxicity studies were done in K.M College of Pharmacy, Madurai, Tamilnadu.

4.6 ETHICAL REVIEW

The study was conducted in accordance with the ethical principles that are consistent with Good Clinical Practice guidelines and obtained prior approvals before start of the trial from the Institutional Ethical Committee of GSMCH, Palayamkottai (**GSMC-IV-IEC/2017/Br-I/03/29.05.2017**) and Institutional animal ethical committee (IAEC) of K.M. College of Pharmacy, Madurai (**IAEC/B.MAHESHWARI/ TNMGRMU/MD(S)/321611003/KMCP/25/2018**). The trial was applied and approved in Clinical Trial Registry of India **(CTRI/2018/04/013122)**.

4.7 STUDY ENROLMENT

An open labeled non-randomized phase II clinical trial on **"Pitha Paandu"** was conducted in Government Siddha Medical College and Hospital, Palayamkottai, Tirunelveli. Totally forty cases were selected 20 patients treated as OP remaining 20 patients were treated as IP. The clinical signs and symptoms of **"Pitha Paandu"** of both sexes of different ages were selected and studied under the guidance of the professor, reader and lecturer of P.G. Pothu Maruthuvam Department.

Participants were informed regarding the trial, the expected benefits and their right to opt-out of trial at any time without prejudice. Informed written consent was obtained from each participant, prior to his/her inclusion into the trial. During the visit, body weight, blood pressure, cardiovascular and respiratory system were clinically recorded. At the end of the study period, all the patients were instructed to follow diet. They were also advised to pursue the further treatment in the PG, Pothu Maruthuvam OP for the follow up study.

4.8. WITHDRAWAL CRITERIA

Patients are advised to withdraw in following conditions - Intolerance to the drug and development of any serious adverse effects during the trial. Patients turned unwilling to continue in the course of clinical trial, poor compliance, any other acute illness which needs rescue medication and to follow regular diet schedule. The subjects with history of treatment with other drugs and serious medical or psychological condition are excluded from the study. Any adverse reaction or side effect occurs during the treatment, immediately inform the patient and pharmacovigilence committee.

4.9 STATISTICAL ANALYSIS

All data were analysed using the SPSS 20.0 (IBM). Data were expressed as means and standard deviation. The significance of the difference between the means of the baseline and the final examinations was tested using the paired "t" test. A probability value of <0.05 was considered to be statistically significant.

CHAPTER - 5

RESULTS AND OBSERVATIONS

5.1. PRECLINICAL STUDY

5.1.1. Biochemical analysis

Preparation of the extract:

5gms of the drug was weighed accurately and placed in a 250ml clean beaker then 50ml of distilled water is added and dissolved well. Then it is boiled well for about 10 minutes. It is cooled and filtered in a 100ml volumetric flask and then it is made to 100ml with distilled water. This fluid is taken for analysis.

Table 5.1.1 a) Qualitative Analysis of "THIRIPALAI MATHIRAI"

S.No	EXPERIMENT	OBSERVATION	INFERENCE
01	Test for Calcium	No white precipitate was formed	Absence of Calcium
02	Test for Sulphate	A white precipitate was formed	Presence of Sulphate
03	Test for Chloride	A white precipitate was formed	Presence of Chloride
04	Test for Carbonate	No brisk effervescence was formed	Absence of Carbonate
05	Test for Starch	Blue colour was formed	Presence of Starch
06	Test for Ferric Iron	Blue colour was formed	Presence of Ferric iron
07	Test for Ferrous Iron	Blood red colour was formed	Presence of Ferrous iron
08	Test for Phosphate	No yellow precipitate was formed	Absence of Phosphate
09	Test for Albumin	No yellow precipitate was formed	Absence of Albumin
10	Test for Tannic Acid	Blue black precipitate was formed	Presence of Tannic acid
11	Test for Unsaturation	It does not get decolourised	Absence of Unsaturated compound

12	Test for the Reducing suga	Colour change occurs	Presence of Reducing sugar
13	Test for Amino Acid	No Violet colour was formed	Absence of Amino acid
14	Test for Zinc	No white precipitate was formed	Absence of Zinc

Inference:

The above table indicates the presence of ***sulphate, chloride, starch, ferrous iron, ferric iron, tannic acid*** and ***reducing sugar;*** Absence of ***calcium, carbonate, phosphate, albumin, amino acid, unsaturated compound*** and ***zinc***.

Table 5.1.1 b) Qualitative Analysis of "KARISALAI KUDINEER"

S.No	EXPERIMENT	OBSERVATION	INFERENCE
01	Test for Calcium	No white precipitate was formed	Absence of Calcium
02	Test for Sulphate	A white precipitate was formed	Presence of Sulphate
03	Test for Chloride	A white precipitate was formed	Presence of Chloride
04	Test for Carbonate	No brisk effervescence was formed	Absence of Carbonate
05	Test for Starch	Blue colour was formed	Presence of Starch
06	Test for Ferric Iron	No blue colour was formed	Absence of Ferric iron
07	Test for Ferrous Iron	Blood red colour was formed	Presence of Ferrous iron
08	Test for Phosphate	No yellow precipitate was formed	Absence of Phosphate
09	Test for Albumin	No yellow precipitate was formed	Absence of Albumin
10	Test for Tannic Acid	No blue black precipitate was formed	Absence of Tannic acid

11	Test for Unsaturation	It gets decolourised	Presence of Unsaturated compound
12	Test for the Reducing Sugar	Colour change occurs	Presence of Reducing sugar
13	Test for Amino Acid	Violet colour was formed	Presence of Amino acid
14	Test for Zinc	No white precipitate was formed	Absence of Zinc

Inference:

The above table indicates the presence of ***sulphate, chloride, starch, ferrous iron, unsaturated compound, reducing sugar*** and ***amino acid;*** Absence of ***calcium, carbonate, ferric iron, phosphate, albumin, tannic acid*** and ***zinc***.

5.1.2. Phytochemical analysis of Thiripalai mathirai

The Qualitative phytochemical screening of the aqueous extract of TPT was resulted in the presence of glycosides, alkaloids, flavonoids, saponins, phenols, steroids, terpenoids and tannins

Table 5.1.2 Phytochemical Analysis of THIRIPALAI MATHIRAI

Test	Observation	Inference
Alkaloids	No characteristic change was observed	Presence of alkaloids(+)
Flavanoids	A reddish pink or reddish brown colour was produced	Presence of flavanoids (+)
Saponins	A honey comb like froth was formed	Presence of Saponins(+)
Phenols	A blue or green colour was formed	Presence of phenols(+ +)
Steroids	A red color was produced in the chloroform layer.	Presence of steroids(+)
Glycosides	No characteristic change was observed	Presence of glycosides(+)
Terpenoids	No red colour was produced in the chloroform layer	Presence of terpenoids(+)
Tannins	No yellowish brown precipitate was formed	Presence of tannins(+)

5.1.3. Antimicrobial Analysis

The trial drug *Thiripalai mathirai* has potential antimicrobial activity against both bacteria and fungi.

BACTERIA

GRAM NEGATIVE

Table 5.1.3 a: Organism - *E.coli*

Sample	Concentration (µg/mL)	Zone of inhibition (mm)
Thiripalai mathirai	Streptomycin (100µg)	24
	250	Nil
	500	10
	1000	14

Table 5.1.3 b*:* Organism - *Pseudomonas aeroginosa*

Sample	Concentration (µg/mL)	Zone of inhibition (mm)
Thripalai mathirai	Streptomycin (100µg)	28
	250	Nil
	500	11
	1000	16

Table 5.1.3 c: Organism - *Klebsiella pneumoniae*

Sample	Concentration (µg/mL)	Zone of inhibition (mm)
Thiripalai mathirai	Streptomycin (100µg)	25
	250	Nil
	500	Nil
	1000	12

GRAM POSITIVE

Table 5.1.3 d: Organism - *Staphylococcus aureus*

Sample	Concentration (µg/mL)	Zone of inhibition (mm)
Thiripalai mathirai	Streptomycin (100µg)	15
	250	Nil
	500	Nil
	1000	10

Table 5.1.3 e: Organism - *Streptococcus mutans*

Sample	Concentration (µg/mL)	Zone of inhibition (mm)
Thiripalai mathirai	Streptomycin (100µg)	24
	250	Nil
	500	Nil
	1000	Nil

FUNGI

Table 5.1.3 f: Organism - *Aspergillus niger*

Sample	Concentration (µg/mL)	Zone of inhibition (mm)
Thiripalai mathirai	Clotrimazole	25
	250	Nil
	500	10
	1000	15

Table 5.1.3 g: Organism - *Candida albicans*

Sample	Concentration (µg/mL)	Zone of inhibition(mm)
Thiripalai mathirai	Clotrimazole	20
	250	Nil
	500	10
	1000	15

It was observed that *Thiripalai mathirai* possess maximum activity against the bacteria *E.coli* (Table 5.1.3a), *P.aeroginosa* (Table 5.1.3b), *K.pneumoniae* (Table 5.1.3c), *S.aureus* (Table 5.1.3d) and the fungi *A.niger* (Table 5.1.3f), *C.albicans* (Table 5.1.3g) compared to positive control and the zone of inhibition was 14mm, 16mm, 12mm, 10mm and 15mm respectively. It shows no effect on *S.mutans* (Table 5.1.3e). The trial drug *Thiripalai mathirai* was highly sensitive to 1000µl/ml; Zone of inhibition (ZIC) of anti bacterial, anti fungal was 14, 16 and 15 mm respectively. The results reveal that the activity was higher against Gram -ve strains than Gram +ve pathogens. The antimicrobial activity against pathogens showed results with effective and significant inhibitory action.

5.1.4. Pharmacological activity

5.1.4.1 Haematinic activity of the trial drug Thiripalai mathirai and the adjuvant Karisalai kudineer in phenylhydrazine induced anaemic rats

Phenylhydrazine is used for the induction of haemolytic anaemia and the study of its mechanism in many species including rats. Phenyl free radical produced via the 2- electron oxidation of phenylhydrazine by oxyhemoglobin. This free radical binds with red cell and hemolyzes it rapidly and converts oxyhemoglobin into methemoglobin. Thus, PHZ-induced haemolytic injury seems to be derived from oxidative alterations to red blood cell proteins rather than to membrane lipids. The RBC, Hb, and PCV of rats administered Phenylhydrazine decreased significantly ($P < 0.01$) while the MCV and MCH increased giving rise to macrocytic anaemia ($P < 0.05$). Thiripalai Mathirai and Karisalai kudineer at oral doses of 100 mg and 200 mg

each, showed good percentage of improving in haemoglobin level, which was almost equivalent to standard treated group indicating correction of anaemia induced by Phenyl hydrazine after 14 days treatment. Treatment with Thiripalai Mathirai and Karisalai kudineer each at single oral doses of 100 mg and 200 mg for 14 day is represented in Table 5.1.4.1a and Table 5.1.4.1b respectively. Significant increase in Hb ($p < 0.01$) was observed when compared to positive control and it was comparable to standard drug used in this study. Phenylhydrazine altered the haematological parameters by haemolysis characterized by decrease in haemoglobin concentration, total RBC counts and PCV on day 7. However, the haematological parameters were restored to normal range after treatment with Thiripalai Mathirai and Karisalai kudineer at single oral doses of 100 mg and 200 mg for 14 days. Effective changes were observed after one week of treatment of anaemic rats with Thiripalai Mathirai and Karisalai kudineer reversed the influence of Phenylhydrazine resulting to a significant ($P < 0.05$) increase in RBC, Hb, and PCV. The Hb, RBC and PCV reached near normal at the second week of the treatment. Rats treated with Phenylhydrazine (10mg/kg/day for 7 days) resulted in a marked haemolytic anaemia characterised by decreased RBC, Hb and PCV. The main function of the RBC is the transportation of oxygen in to the tissues of the body. At such, any pathological or physiological condition that affects the RBC alters its function and this may be detrimental to the body. In this study Phenylhydrazine altered the function of RBC by haemolysis characterised by decreased levels of RBC, Hb and PCV. However, this effect was restored after one week of Thiripalai Mathirai and Karisalai kudineer treatment. Also the recovery was progressive such that after 1 week of continuous treatment, the Hb concentration and PCV were higher in the treated groups than in the normal control group.

Table 5.1.4.1a) Results in Hematological Parameters of Rats after treatment with TPM

Parameters	**G1**	**G2**	**G3**	**G4**	**G5**
HB g/dl	13.60±1.22	8.34±0.90**	12.18±1.08**	12.49±1.20**	14.15±1.28**
PCV (%)	48.20±2.05	41.60±1.98	44.38±2.15**	45.22±2.28**	48.40±2.35**
RBC	4.28±0.26	4.12±0.22	4.44±0.56	4.50±0.60	4.68±0.75

MCV	76.15±2.20	92.45±2.98	86.12±2.50**	82.26±2.40**	79.42±2.34
MCH	25.85±2.48	33.90±2.92	31.60±2.82	29.30±2.70	27.44±2.55
MCHC g/dl	33.22±1.20	32.50±1.05	33.40±1.28	34.15±1.41	34.60±1.50

Values are mean ± S.E.M. **P<0.01Vs Control (N = 6)

Table 5.1.4.1b) Results in Hematological Parameters of Rats after treatment with KK

Parameters	**G1**	**G2**	**G3**	**G4**	**G5**
HB g/dl	13.94±1.34	8.22±0.85**	12.36±1.16**	12.58±1.26**	14.22±1.34**
PCV (%)	47.60±2.15	41.55±1.94	44.45±2.28**	45.30±2.34**	48.45±2.85**
RBC	4.34±0.28	4.18±0.20	4.42±0.59	4.54±0.62	4.72±0.78
MCV	77.24±2.24	93.48±3.18	86.24±2.56**	83.08±2.42**	79.36±2.30
MCH	26.25±2.58	34.88±2.86	31.45±2.74	29.25±2.72	27.35±2.50
MCHC g/dl	33.20±1.18	32.45±1.08	33.42±1.30	34.24±1.40	34.62±1.52

Values are mean ± S.E.M. **P<0.01Vs Control (N = 6)

5.1.5. TOXICITY STUDY

5.1.5.1 Acute toxicity study with Thiripalai Mathirai

The acute toxicity of Thiripalai Mathirai was evaluated using OECD- 423 guidelines. There was no mortality or morbidity observed in animals through the 15-days period following single oral administration at all selected dose levels of the Thiripalai Mathirai (Table 5.1.5.1a). The animals did not show any changes in the general appearance during the observation period. Morphological characteristics such as fur, skin, eyes and nose appeared normal. No tremors, convulsion, salivation, diarrhea, lethargy or unusual behaviors such as self mutilation, walking backward and so forth were observed. Gait and posture, reactivity to handling or sensory stimuli, grip strength was also normal.

Table 5.1.5.1a) Acute toxicity study of TPM on experimental mice.

	Dose ($mg.kg^{-1}$)	Sign of Toxicity ($ST.NB^{-1}$)	Mortality ($D.S^{-1}$)
Group I	0	0/3	0/3
Group II	300	0/3	0/3
Group III	2000	0/3	3/3

The acute toxicity of Thiripalai Mathiraion experimental mice was tested using OECD-423 guidelines, where ST- sign of toxicity; NB- normal behaviour; D-died; S- survive. Values are expressed as number of animals (n=3).

Effect of Thiripalai Mathirai in Subacute Toxicity

Thiripalai Mathirai was evaluated for subacute toxicity.

Effect of Thiripalai Mathirai on body weight changes in rats

The effect of Thiripalai Mathirai was observed for their effect on the body weight changes from the study it was observed that, there was significant increase ($p<0.05$) in body weight in all the animals observed. The results are shown in Table 5.1.5.1b.

Table 5.1.5.1b) Effect of TPM on body weight changes in rats.

Treatment	Day 1	Day 5	Day 10	Day 20
Control	187.15±6.8	187.47 ±6.25	196.15 ±6.37	196.7±6.58
Thiripalai Mathirai **50 $mg.kg^{-1}$**	194.30 ±6.4	193.30 ±6.35	198.25 ±6.72	198.30±6.72*
Thiripalai Mathirai **100 $mg.kg^{-1}$**	186.35 ±5.7	189.30 ±6.45	196.55 ±7.12	197.36±6.30*
Thiripalai Mathirai **200 $mg.kg^{-1}$**	195.30 ±7.2	198.15±6.55	198.90 ±7.22**	206.45±7.26**
Thiripalai Mathirai **400 $mg.kg^{-1}$**	190.65 ±6.05	195.15 ±5.65	195.60 ±6.37**	207.66±7.38**

A study on the effects of Thiripalai Mathiraion body weight changes in rats was carried out. where, group I animals (GPI) were treated with normal saline (5 $ml.kg^{-1}$), group II animals (GPII) with 50 $mg.kg^{-1}$ of Thiripalai Mathirai, group III

animals (GPIII) with 100 mg.kg^{-1} of Thiripalai Mathirai, group IV animals (GPIV) with 200 mg.kg^{-1} of Thiripalai Mathirai, group V animals (GPV) with 400 mg.kg^{-1} Thiripalai Mathirai. The values are expressed as mean ± S.E.M. n=6. The results of group I were compared with other groups such as II, III, IV, and V. The statistical analysis was carried out using one way ANOVA method, where **P<0.01 *P<0.05.

Effect of Thiripalai Mathirai on kidney, heart, liver and brain in rats

The effects of Thiripalai Mathirai on kidney, heart, liver and brain of the rats were observed. From the study it was clear that, significant (p<0.01) changes in the weights of various organs of the animals occurred with higher doses of the extract (400 mg.kg^{-1} bwt), but macroscopic examinations did not show any changes in colour of the organs of the treated animals compared with the control. The results are shown in Table 5.1.5.1c.

Table 5.1.5.1c) Effect of TPM on kidney, heart, liver and brain of the rats.

Treatment	Heart (gms)	Kidney (gms)	Liver (gms)	Brain (gms)
Control	0.36± 0.07	0.66± 0.05	3.32± 0.07	0.67± 0.10
Thiripalai Mathirai @ 50 mg.kg^{-1}	0.37± 0.04	0.82± 0.05	3.44± 0.05	0.70± 0.8
Thiripalai Mathirai @ 100 mg.kg^{-1}	0.38± 0.08	0.80± 0.06	3.36±0.04	0.68± 0.7
Thiripalai Mathirai @ 200 mg.kg^{-1}	0.37± 0.06	0.75± 0.04	3.34± 0.04	0.75± 0.10
Thiripalai Mathirai @ 400 mg.kg^{-1}	0.36± 0.05	0.76± 0.05	3.37± 0.05	0.77± 0.10

A study on the effects of Thiripalai Mathirai on kidney, heart, liver and brain of the rats was tested. where, group I animals (GPI) treated with normal saline (5 ml.kg^{-1}), group II animals (GPII) with 50 mg.kg^{-1} of Thiripalai Mathirai, group III animals (GPIII) with 100 mg.kg^{-1} of Thiripalai Mathirai, group IV animals (GPIV) with 200 mg.kg^{-1} of Thiripalai Mathirai, group V animals (GPV) with 400 mg.kg^{-1} Thiripalai Mathirai. The values are expressed as mean ± S.E.M. n=6. The results of group I were compared with other groups such as II, III, IV, and V. The statistical analysis was carried out using one way ANOVA method, where **P<0.01.

Effect of Thiripalai Mathirai on biochemical profiles of rats

The effect of Thiripalai Mathirai on various biochemical parameters of the experimental animal 'rats' were tested. From the study it was evident that, there was significant decrease ($p<0.05$) in the plasma glucose level in treated rats especially at higher dose (400 $mg.kg^{-1}$) compared with control rats. The control rats were administered only with 5 ml of normal saline. Significant decrease ($p<0.05$) in the plasma total cholesterol (TC), triglyceride (TG) and LDL-cholesterol levels were observed. But a significant increase ($p<0.05$) in HDL-cholesterol levels were observed in all the treated animals compared with the control animals. AST, ALT and ALP levels were also normal in the Thiripalai Mathirai treated animals. From the results of biochemical study there was no evidence of severe toxicity associated with the administration of higher concentration of Thiripalai Mathirai. The results are shown in Table 5.1.5.1d and 5.1.5.1e.

Table 5.1.5.1d) Effect of TPM on biochemical parameters such as glucose, cholesterol, triglyceride, HDL and LDL.

Treatment	Glucose ($mg.dl^{-1}$)	Cholesterol ($mg.dl^{-1}$)	Triglyceride ($mg.dl^{-1}$)	HDL ($mg.dl^{-1}$)	LDL ($mg.dl^{-1}$)
Control	94.70± 0.65	39.62± 0.56	28.25± 0.45	135.25± 0.55	84.15±1.72
Thiripalai Mathirai @ 50 $mg.kg^{-1}$	9.55± 0.61	25.85±0.25*	13.22± 0.23*	175.28±0.65*	71.59±1.28
Thiripalai Mathirai @ 100 $mg.kg^{-1}$	97.50± 0.52	26.74±0.26*	15.42± 0.28*	165.18±0.78*	69.84±1.10
Thiripalai Mathirai @ 200 $mg.kg^{-1}$	908.30± 0.58**	33.18± 0.30	17.84± 0.38*	184.30±0.84*	48.60±1.30
Thiripalai Mathirai @ 400 $mg.kg^{-1}$	86.30± 0.48**	32.78± 0.28	19.28± 0.34*	182.2± 0.85*	46.50±0.84

A study on the effect of Thiripalai Mathirai on biochemical parameters such as glucose, cholesterol, triglyceride, HDL and LDL in rats was tested.where, group I animals (GPI) treated with normal saline (5 $ml.kg^{-1}$), group II animals (GPII) with 50 $mg.kg^{-1}$ of Thiripalai Mathirai, group III animals (GPIII) with 100 $mg.kg^{-1}$ of Thiripalai Mathirai, group IV animals (GPIV) with 200 $mg.kg^{-1}$ of, group V animals (GPV) with 400 $mg.kg^{-1}$ Thiripalai Mathirai. The values are expressed as mean ± S.E.M. n=6. The results of group I were compared with other groups such as II, III, IV, and V. The statistical analysis was carried out using one way ANOVA method, where **P<0.01 *P<0.05

Table 5.1.5.1e) Effect of TPM on biochemical parameters such as AST, ALT, ALP, TP and Albumin in rats.

Treatment	AST ($IU.l^{-1}$)	ALT ($IU.l^{-1}$)	ALP ($IU.l^{-1}$)	TP ($g.l^{-1}$)	ALBUMIN ($g.l^{-1}$)
Control	328.5±12.40	71.5±3.18	253.58±8.80	69.85±3.32	39.15±2.35
Thiripalai Mathirai @ 50 $mg.kg^{-1}$	317.0±9.50**	69.5±2.20**	266.10±2.75**	70.30±2.32	36.30±2.65
Thiripalai Mathirai @ 100 $mg.kg^{-1}$	318.3±7.20**	67.1±3.15**	260.18±6.70**	80.15±2.82	38.30±3.05
Thiripalai Mathirai @ 200 $mg.kg^{-1}$	313.4±7.95	62.4±2.90	265.00±5.20	69.25±3.32	40.20±2.75
Thiripalai Mathirai @ 400 $mg.kg^{-1}$	323.2± 8.20	64.3±3.52	269.40± 4.40	74.05±2.58	39.48±2.70

A study on the effects of Thiripalai Mathirai on biochemical parameters such as AST, ALT, ALP, TP and Albumin rats was tested. where, group I animals (GPI)

were treated with normal saline (5ml.kg^{-1}), group II animals (GPII) with 50 mg.kg^{-1} of HAEBD group III animals (GPIII) with 100 mg.kg^{-1} of Thiripalai Mathirai, group IV animals (GPIV) with 200 mg.kg^{-1} of Thiripalai Mathirai, and group V animals (GPV) with 400 mg.kg^{-1} Thiripalai MathiraiThe values are expressed as mean ± S.E.M. n=6. The results of group I were compared with other groups such as II, III, IV, and V. The statistical analysis was carried out using one way ANOVA method, where **P<0.01 *P<0.05.

Effect of Thiripalai Mathirai on haematological parameters in rats

The effects of Thiripalai Mathirai were observed for its effect on haematological parameters on the experimental rats. From the study it was evident that, a significant increase (p<0.01) were observed in the haemoglobin contents and RBC count in the group treated with 200 mg.kg^{-1} body weight of Thiripalai Mathiraiand a significant decrease of the parameters occurred in the group treated with 400 mg.kg^{-1} b.w.t compared with the control. There was no significant change in the calcium level in all the treated animals compared to the control.

Table 5.1.5.1f) Effect of TPM on haematological parameters such as HB, Calcium, RBC and WBC in rats.

Treatment	Haemoglobin (mg.dl^{-1})	RBC (10^6 /mm^3)	WBC (10^6 /mm^3)	Calcium (mg.dl^{-1})
Control	13.35± 0.25	9.12± 0.02	12.4± 0.05	9.45 ±0.02
Thiripalai Mathirai @ 50 mg.kg^{-1}	14.55± 0.26*	9.47± 0.04*	10.5± 0.01*	9.21 ±0.02
Thiripalai Mathirai @ 100 mg.kg^{-1}	14.35± 0.15*	9.52± 0.02*	9.3± 0.32*	9.27 ±0.20
Thiripalai Mathirai @ 200 mg.kg^{-1}	12.75± 0.20*	8.30± 0.12*	11.4± 0.03*	9.61 ±0.13
Thiripalai Mathirai @ 400 mg.kg^{-1}	13.55± 0.35*	8.48± 0.45*	11.5± 0.13*	9.75 ±0.02

A study on the effect of Thiripalai Mathirai on haematological parameters such as Hb, RBC, WBC, and Calcium in rats was tested. where, group I animals (GPI) treated with normal saline (5 $ml.kg^{1}$), group II animals (GPII) with 50 $mg.kg^{-1}$ of Thiripalai Mathirai, group III animals (GPIII) with 100 $mg.kg^{-1}$ of Thiripalai Mathirai, group IV animals (GPIV) with 200 $mg.kg^{-1}$ of Thiripalai Mathirai, and group V animals (GPV) with 400 $mg.kg^{-1}$ Thiripalai Mathirai. The values are expressed as mean ± S.E.M. n=6. The results of group I were compared with other groups such as II, III, IV and V. The statistical analysis was carried out using one way ANOVA method, where *P<0.05.

5.1.5.2 Acute toxicity study with Karisalai Kudineer

The acute toxicity of Karisalai Kudineer was evaluated using OECD- 423 guidelines. There was no mortality or morbidity observed in animals through the 15-days period following single oral administration at all selected dose levels of the Karisalai Kudineer (Table 5.1.5.2a). The animals did not show any changes in the general appearance during the observation period. Morphological characteristics such as fur, skin, eyes and nose appeared normal. No tremors, convulsion, salivation, diarrhea, lethargy or unusual behaviors such as self mutilation, walking backward and so forth were observed. Gait and posture, reactivity to handling or sensory stimuli, grip strength was also normal.

Table 5.1.5.2a) Acute toxicity study of KK on experimental mice

	Dose ($mg.kg^{-1}$)	**Sign of Toxicity ($ST.NB^{-1}$)**	**Mortality ($D.S^{-1}$)**
Group I	0	0/3	0/3
Group II	300	0/3	0/3
Group III	2000	0/3	3/3

The acute toxicity of Karisalai Kudineer on experimental mice was tested using OECD-423 guidelines, where ST- sign of toxicity; NB- normal behaviour; D-died; S- survive. Values are expressed as number of animals (n=3).

Effect of Karisalai Kudineer in Subacute Toxicity

Karisalai Kudineer was evaluated for subacute toxicity.

Effect of Karisalai Kudineer on body weight changes in rats

The effect of Karisalai Kudineer was observed for their effect on the body weight changes from the study it was observed that, there was significant increase ($p<0.05$) in body weight in all the animals observed. The results are shown in Table 5.1.5.2b.

Table 5.1.5.2b) Effect of KK on body weight changes in rats.

Treatment	Day 1	Day 5	Day 10	Day 20
Control	189.00±6.4	185.40 ±6.30	195.00 ±6.30	195.00±6.50
Karisalai Kudineer 50 mg.kg^{-1}	195.00 ±6.9	194.00 ±6.42	199.00 ±6.70	196.00±6.54*
Karisalai Kudineer 100 mg.kg^{-1}	188.00 ±5.6	188.00 ±6.32	195.00 ±6.25	198.00±6.58*
Karisalai Kudineer 200 mg.kg^{-1}	192.00 ±7.4	197.00±6.50	197.00 ±6.45**	204.00±7.35**
Karisalai Kudineer 400 mg.kg^{-1}	185.00 ±5.4	194.00 ±5.60	194.00 ±6.35**	206.00±7.40**

A study on the effects of Karisalai Kudineer on body weight changes in rats was carried out, where group I animals (GPI) were treated with normal saline (5 ml.kg^{-1}), group II animals (GPII) with 50 mg.kg^{-1} of Karisalai Kudineer, group III animals (GPIII) with 100 mg.kg^{-1} of Karisalai Kudineer, group IV animals (GPIV) with 200 mg.kg^{-1} of Karisalai Kudineer, group V animals (GPV) with 400 mg.kg^{-1} Karisalai Kudineer. The values are expressed as mean ± S.E.M. n=6. The results of group I were compared with other groups such as II, III, IV, and V. The statistical analysis was carried out using one way ANOVA method, where **P<0.01 *P<0.05.

Effect of Karisalai Kudineer on kidney, heart, liver and brain in rats

The effects of Karisalai Kudineer on kidney, heart, liver and brain of the rats were observed. From the study it was clear that, significant ($p<0.01$) changes in the weights of various organs of the animals occurred with higher doses of the extract (400 mg.kg^{-1} bwt), but macroscopic examinations did not show any changes in colour of the organs of the treated animals compared with the control. The results are shown in Table 5.1.5.2c.

Table 5.1.5.2c) Effect of KK on kidney, heart, liver and brain of the rats.

Treatment	Heart (gms)	Kidney (gms)	Liver (gms)	Brain (gms)
Control	0.35 ± 0.06	0.67± 0.05	3.30± 0.07	0.68± 0.09
Karisalai Kudineer @ 50 mg.kg^{-1}	0.36± 0.05	0.80± 0.05	3.42± 0.05	0.71± 0.10
Karisalai Kudineer @ 100 mg.kg^{-1}	0.37± 0.06	0.81± 0.06	3.38±0.04	0.69± 0.8
Karisalai Kudineer @ 200 mg.kg^{-1}	0.38± 0.07	0.76± 0.04	3.35± 0.04	0.76± 0.11
Karisalai Kudineer @ 400 mg.kg^{-1}	0.34± 0.04	0.77± 0.05	3.36± 0.05	0.78± 0.12

A study on the effects of Karisalai Kudineer on kidney, heart, liver and brain of the rats was tested. where, group I animals (GPI) treated with normal saline (5 ml.kg^{-1}), group II animals (GPII) with 50 mg.kg^{-1} of Karisalai Kudineer, group III animals (GPIII) with 100 mg.kg^{-1} of Karisalai Kudineer, group IV animals (GPIV) with 200 mg.kg^{-1} of Karisalai Kudineer, group V animals (GPV) with 400 mg.kg^{-1} Karisalai Kudineer. The values are expressed as mean ± S.E.M. n=6. The results of group I were compared with other groups such as II, III, IV, and V. The statistical analysis was carried out using one way ANOVA method, where **P<0.01.

Effect of Karisalai Kudineer on biochemical profiles of rats

The effect of Karisalai Kudineer on various biochemical parameters of the experimental animal 'rats' were tested. From the study it was evident that, there was significant decrease ($p<0.05$) in the plasma glucose level in treated rats especially at higher dose (400 mg.kg^{-1}) compared with control rats. The control rats were administered only with 5 ml of normal saline. Significant decrease ($p<0.05$) in the plasma total cholesterol (TC), triglyceride (TG) and LDL-cholesterol levels were observed. But a significant increase ($p<0.05$) in HDL-cholesterol levels were observed in all the treated animals compared with the control animals. AST, ALT and ALP levels were also normal in the Karisalai Kudineer treated animals. From the results of biochemical study there was no evidence of severe toxicity associated with the administration of higher concentration of Karisalai Kudineer. The results are shown in Table 5.1.5.2d and Table 5.1.5.2e.

Table 5.1.5.2d) Effect of KK on biochemical parameters such as glucose, cholesterol, triglyceride, HDL and LDL

Treatment	Glucose ($mg.dl^{-1}$)	Cholesterol ($mg.dl^{-1}$)	Triglyceride ($mg.dl^{-1}$)	HDL ($mg.dl^{-1}$)	LDL ($mg.dl^{-1}$)
Control	95.65±0.68	40.65±0.55	29.28± 0.48	134.30± 0.58	83.20±1.70
Karisalai Kudineer@ 50 $mg.kg^{-1}$	94.50±0.64	26.80±0.28*	13.28±0.24*	176.30±0.68*	71.62±1.34
Karisalai Kudineer@ 100 $mg.kg^{-1}$	96.28±0.50	26.70±0.24*	15.40±0.30*	165.20±0.80*	68.86±1.25
Karisalai Kudineer@ 200 $mg.kg^{-1}$	97.22±0.62**	33.20± 0.34	16.86±0.40*	184.25±0.86*	48.55±1.32
Karisalai Kudineer@ 400 $mg.kg^{-1}$	90.35±0.35**	32.80± 0.32	17.30±0.36*	182.0± 0.86*	46.45±0.82

A study on the effect of Karisalai Kudineer on biochemical parameters such as glucose, cholesterol, triglyceride, HDL and LDL in rats was tested. where, group I animals (GPI) treated with normal saline (5 $ml.kg^{-1}$), group II animals (GPII) with 50 $mg.kg^{-1}$ of Karisalai Kudineer, group III animals (GPIII) with 100 $mg.kg^{-1}$ of Karisalai Kudineer, group IV animals (GPIV) with 200 $mg.kg^{-1}$ of, group V animals (GPV) with 400 $mg.kg^{-1}$ Karisalai Kudineer. The values are expressed as mean ± S.E.M. n=6. The results of group I were compared with other groups such as II, III, IV, and V. The statistical analysis was carried out using one way ANOVA method, where **P<0.01 *P<0.05

Table 5.1.5.2e) Effects of KK on biochemical parameters such as AST, ALT, ALP, TP and Albumin in rats

Treatment	AST ($IU.l^{-1}$)	ALT ($IU.l^{-1}$)	ALP ($IU.l^{-1}$)	TP ($g.l^{-1}$)	ALBUMIN ($g.l^{-1}$)
Control	330.4±11.25	72.4±3.20	252.60±8.75	68.80±3.25	38.20±2.30
Karisalai Kudineer@ 50 $mg.kg^{-1}$	318.2±9.45**	69.4±2.22**	265.14±2.80**	69.18±2.28	36.23±2.60
Karisalai Kudineer@ 100 $mg.kg^{-1}$	319.5±7.15**	68.2±3.18**	261.20±6.68**	80.24±2.65	37.25±2.18
Karisalai Kudineer@ 200 $mg.kg^{-1}$	313.5±7.90	62.5±2.88	264.15±5.24	69.34±2.34	40.05±2.45
Karisalai Kudineer@ 400 $mg.kg^{-1}$	322.4± 8.22	64.2±3.50	270.38±4.45	73.18±2.56	39.15±2.38

A study on the effects of Karisalai Kudineer on biochemical parameters such as AST, ALT, ALP, TP and Albumin rats was tested. where, group I animals (GPI) were treated with normal saline ($5ml.kg^{-1}$), group II animals (GPII) with 50 $mg.kg^{-1}$ of HAEBD group III animals (GPIII) with 100 $mg.kg^{-1}$ of Karisalai Kudineer, group IV animals (GPIV) with 200 $mg.kg^{-1}$ of Karisalai Kudineer, and group V animals (GPV) with 400 $mg.kg^{-1}$ Karisalai Kudineer. The values are expressed as mean ± S.E.M. n=6. The results of group I were compared with other groups such as II, III, IV, and V. The statistical analysis was carried out using one way ANOVA method, where **P<0.01 *P<0.05.

Effect of Karisalai Kudineer on haematological parameters in rats

The effects of Karisalai Kudineer were observed for its effect on haematological parameters on the experimental rats. From the study it was evident that, a significant increase ($p<0.01$) were observed in the haemoglobin contents and RBC count in the group treated with 200 $mg.kg^{-1}$ body weight of Karisalai Kudineer

and a significant decrease of the parameters occurred in the group treated with 400 $mg.kg^{-1}$ b.w.t compared with the control. There was no significant change in the calcium level in all the treated animals compared to the control.

Table 5.1.5.2f) Effect of KK on haematological parameters such as HB, Calcium, RBC and WBC in rats

Treatment	**Haemoglobin ($mg.dl^{-1}$)**	**RBC (10^6 /mm^3)**	**WBC (10^6 /mm^3)**	**Calcium ($mg.dl^{-1}$)**
Control	13.75± 0.28	9.18± 0.03	12.6± 0.04	9.48 ±0.03
Karisalai Kudineer @ 50 $mg.kg^{-1}$	14.68± 0.38*	9.49± 0.04*	10.2± 0.02*	9.20 ±0.02
Karisalai Kudineer @ 100 $mg.kg^{-1}$	14.22± 0.34*	9.55± 0.03*	9.1± 0.01*	9.29 ±0.04
Karisalai Kudineer @ 200 $mg.kg^{-1}$	13.70± 0.30*	8.34± 0.02*	11.6± 0.03*	9.60 ±0.06
Karisalai Kudineer @ 400 $mg.kg^{-1}$	13.58± 0.29*	8.40± 0.02*	11.4± 0.04*	9.70 ±0.08

A study on the effect of Karisalai Kudineer on haematological parameters such as Hb, RBC, WBC, and Calcium in rats was tested. where, group I animals (GPI) treated with normal saline (5 $ml.kg^{1}$), group II animals (GPII) with 50 $mg.kg^{-1}$ of Karisalai Kudineer, group III animals (GPIII) with 100 $mg.kg^{-1}$ of Karisalai Kudineer, group IV animals (GPIV) with 200 $mg.kg^{-1}$ of Karisalai Kudineer, and group V animals (GPV) with 400 $mg.kg^{-1}$ Karisalai Kudineer. The values are expressed as mean ± S.E.M. n=6. The results of group I were compared with other groups such as II, III, IV and V. The statistical analysis was carried out using one way ANOVA method, where *$P<0.05$.

5.2. CLINICAL STUDY

The results were observed on the basis of the following criteria by conducting clinical study on 20 inpatients and 20 outpatients, totally 40 patients.

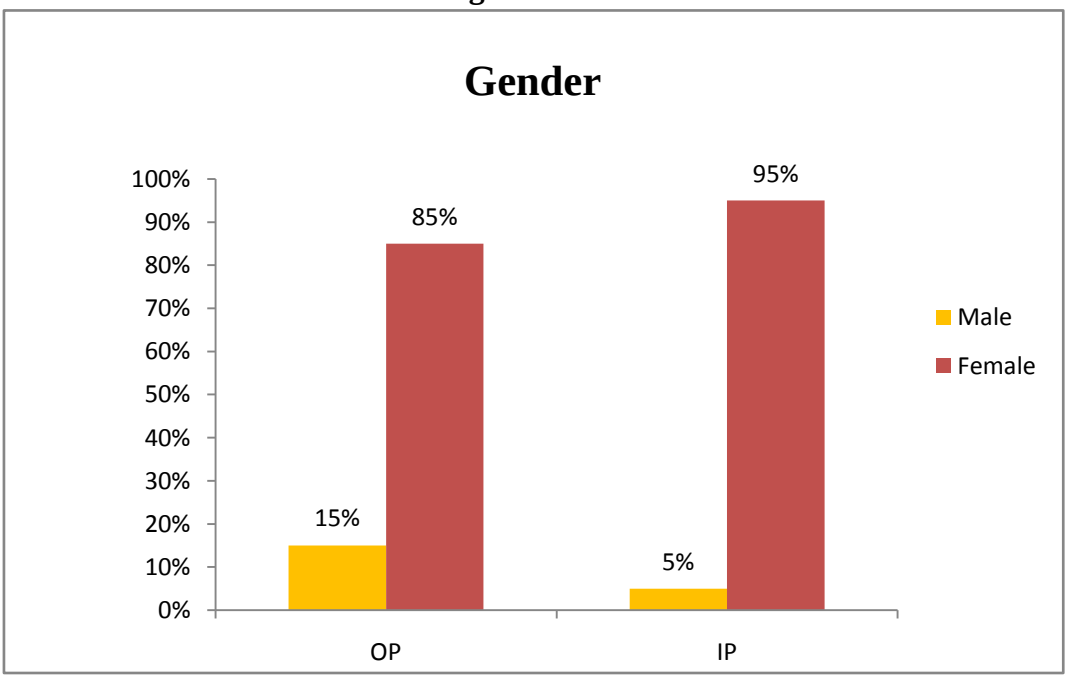
- Distribution of Gender
- Distribution of Age
- Distribution of Occupational status
- Distribution of Socio economic status
- Distribution of Dietary habits
- Distribution of Marital Status
- Distribution of Thegi
- Distribution of Nilam
- Distribution of Kaalam
- Distribution of Paruvakaalam
- Distribution of Imporigal
- Distribution of Kanmendriyam
- Distribution of Kosangal
- Distribution of Mukkutram- Vatham, Pitham, Kabam
- Distribution of Ezhu Udal Thathukkal
- Distribution of Ennvagai Thervu
- Distribution of Naadi
- Distribution of Neikuri
- Distribution of Aetiological factors
- Distribution of Clinical Features and prognosis
- Distribution of Haemoglobin level
- Gradation of Results
- Assessment of results by Laboratory investigation.

5.2.1 Distribution of Gender

Table-5.2.1

S.No	Sex	No. of Cases		Percentage	
		OP	IP	OP	IP
1.	Male	3	1	15	5
2.	Female	17	19	85	95
	Total	20	20	100	100

Figure – 5.2.1



Inference:

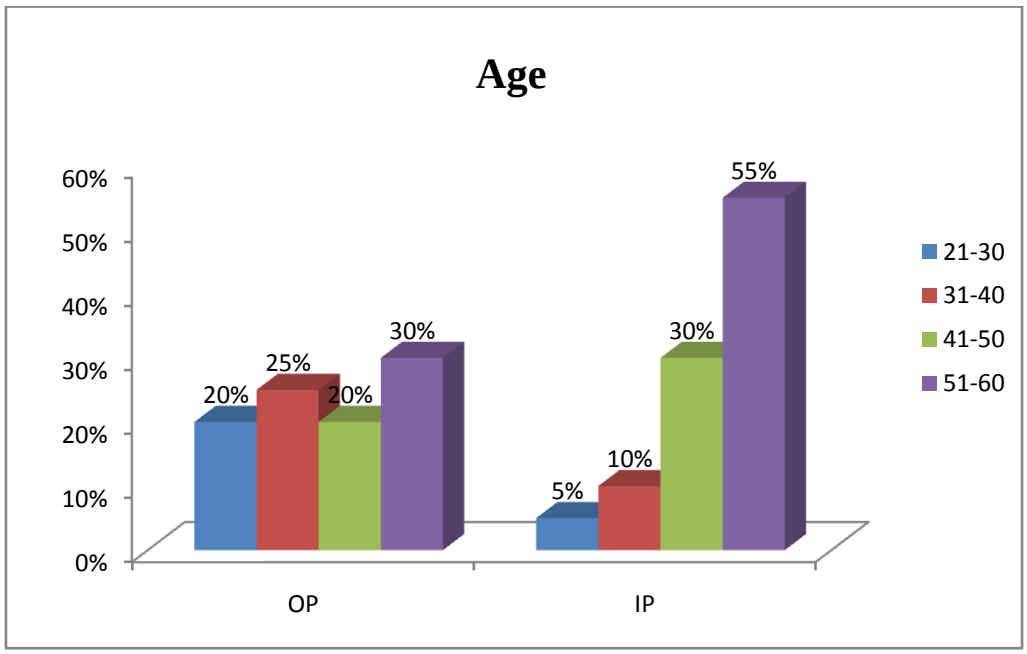
Among the 40 cases of Pitha paandu, 36 patients were females and 4 patients were male.

5.2.2. Distribution of Age

Table – 5.2.2

S.No	Age group in year	No. of Cases		Percentage	
		OP	IP	OP	IP
1.	20-30	5	1	25	5
2.	31-40	5	2	25	10
3.	41-50	4	6	20	30
4.	51-60	6	11	30	55
	Total	20	20	100	100

Figure-5.2.2



Inference :

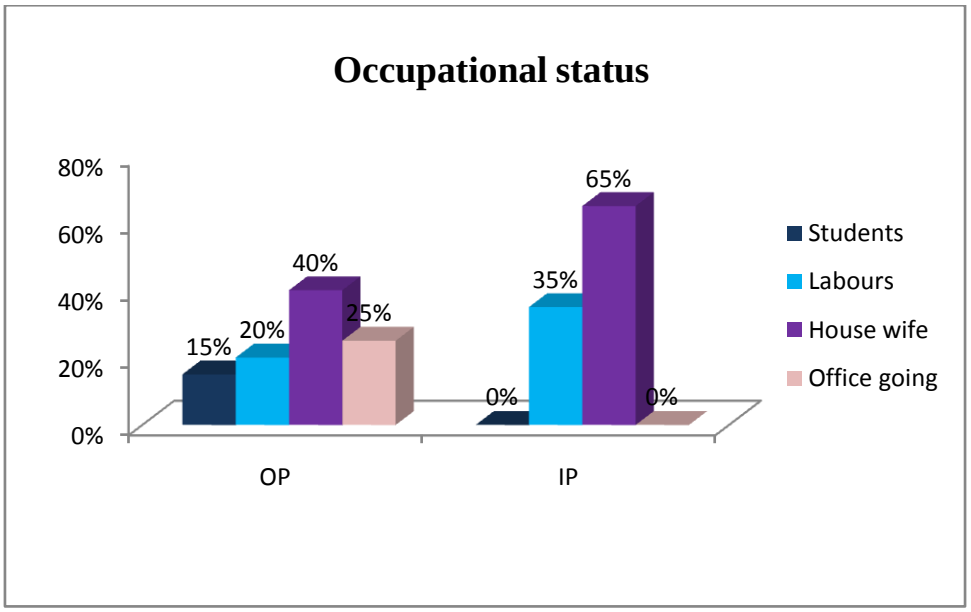
Out of 40 cases, 17 patients were in the age group 51-60, 10 patients in the age group 41-50 years, 7 patients belongs to 31-40 years of age group and 6 patients belongs to 20-30 years of age group.

5.2.3 Distribution of Occupational Status

Table -5.2.3

S.No	Occupational status	No. of Cases		Percentage	
		OP	IP	OP	IP
1.	Students	3	0	15	0
2.	Labours	4	7	20	35
3.	House wife	8	13	40	65
4.	Office going	5	0	25	0
	Total	20	20	100	100

Figure – 5.2.3



Inference:

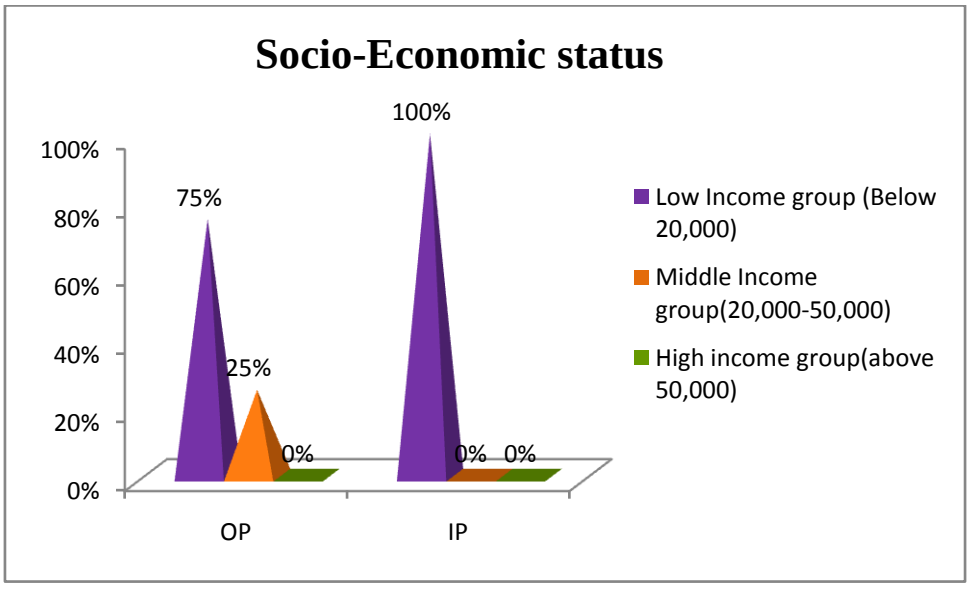
Out of 40 cases, 3 patients were students, 11 patients were labours, 21 patients were House wife and 5 patients were office going.

5.2.4 Distribution of Socio- Economic status

Table -5.2.4

S.No	Socio- Economic Status	No. of Cases		Percentage	
		OP	IP	OP	IP
1.	Low Income group (Below 20,000)	15	20	75	100
2.	Middle Income group (20,000-50,000)	5	0	25	0
3.	High income group (above 50,000)	0	0	0	0
	Total	20	20	100	100

Figure- 5.2.4



Inference:

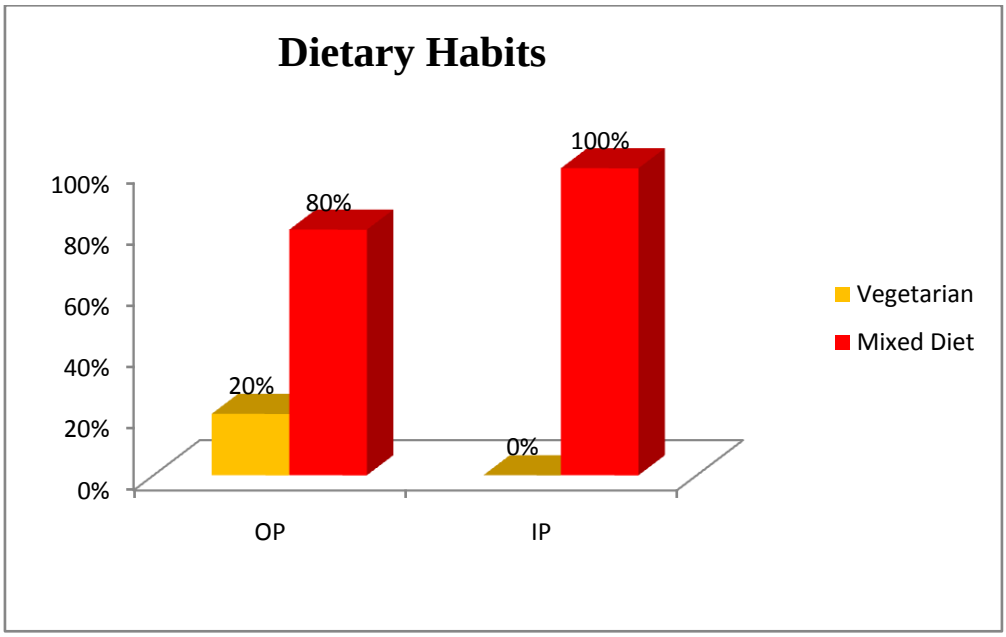
Out of 40 cases, 35 patients belong to low income group and 5 patients belong to middle income group.

5.2.5 Distribution of Dietary Habits

Table -5.2.5

S.No	Dietary Habits	No. of Cases		Percentage	
		OP	IP	OP	IP
1.	Vegetarian	4	0	20	0
2.	Mixed Diet	16	20	80	100
	Total	20	20	100	100

Figure-5.2.5



Inference:

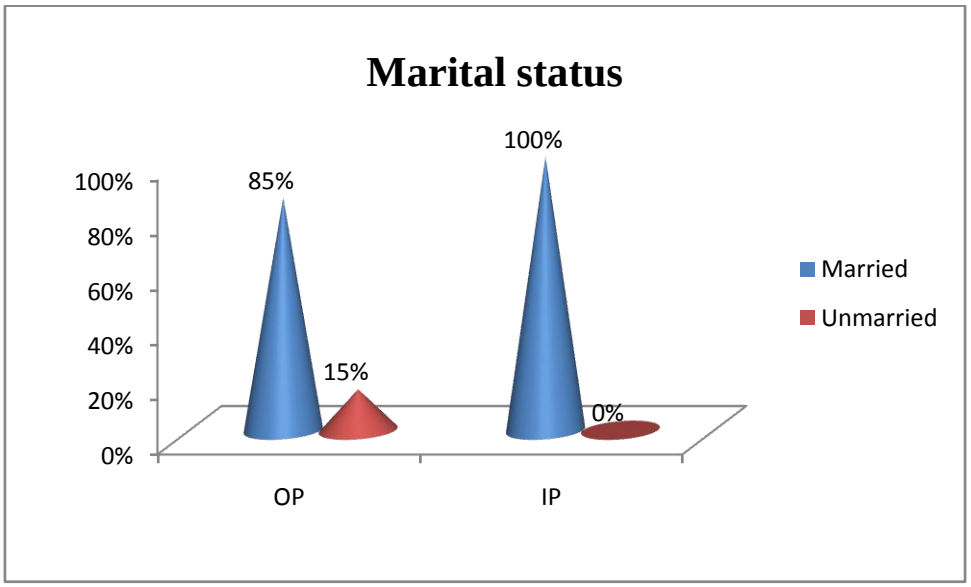
Out of 40 cases, 36 patients were mixed diet and 4 patients were vegetarian.

5.2.6 Distribution of Marital status

Table -5.2.6

S.No	Marital status	No. of Cases		Percentage	
		OP	IP	OP	IP
1.	Married	17	20	85	100
2.	Unmarried	3	0	15	0
	Total	20	20	100	100

Figure-5.2.6



Inference:

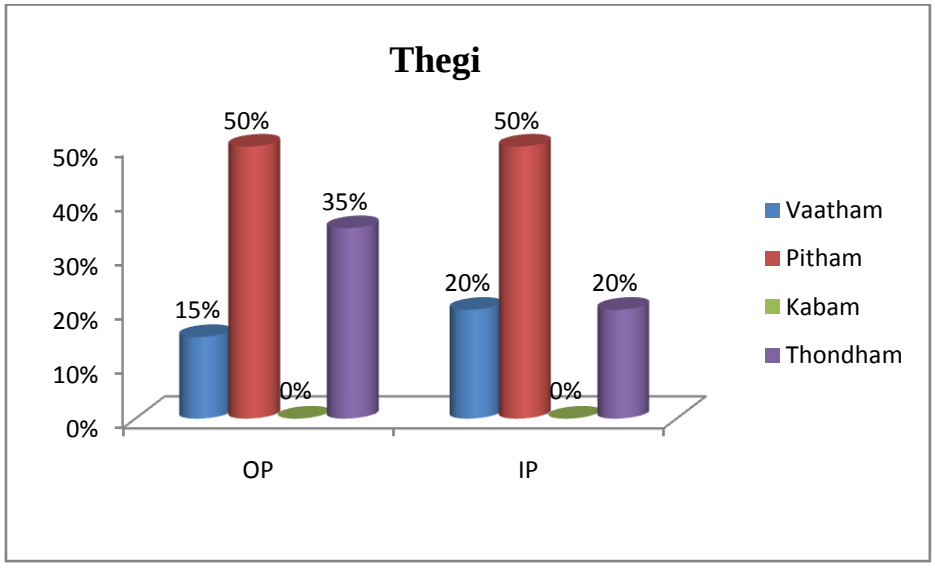
Out of 40 cases, 37 patients were married and 3 patients were unmarried.

5.2.7 Distribution of Thegi

Table -5.2.7

S.No	Thegi	No. of Cases		Percentage	
		OP	IP	OP	IP
1.	Vatham	3	4	15	20
2.	Pitham	10	10	50	50
3.	Kabam	0	0	0	0
4.	Thondham	7	4	35	20

Figure-5.2.7



Inference:

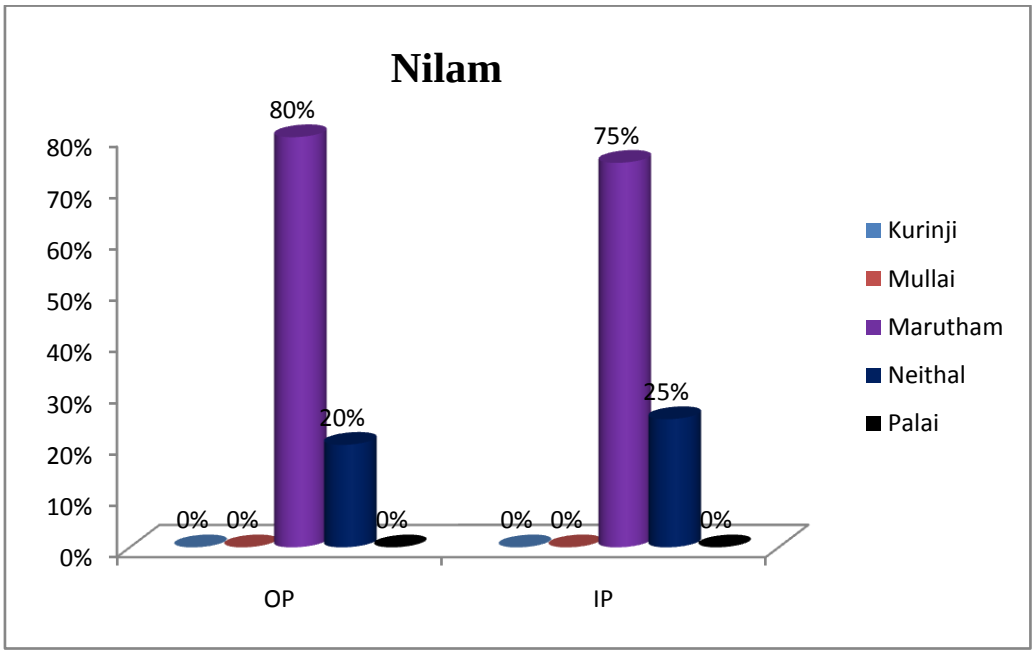
Among 40 cases, 7 patients were vatha thegi, 20 patients were pitha thegi and 11 patients were thontha thegi.

5.2.8 Distribution of Nilam

Table – 8

S.No	Thinai	No. of Cases		Percentage	
		OP	IP	OP	IP
1.	Kurinji	0	0	0	0
2.	Mullai	0	0	0	0
3.	Marutham	16	15	80	75
4.	Neithal	4	5	20	25
5.	Palai	0	0	0	0
	Total	20	20	100	100

Figure -5.2.8



Inference:

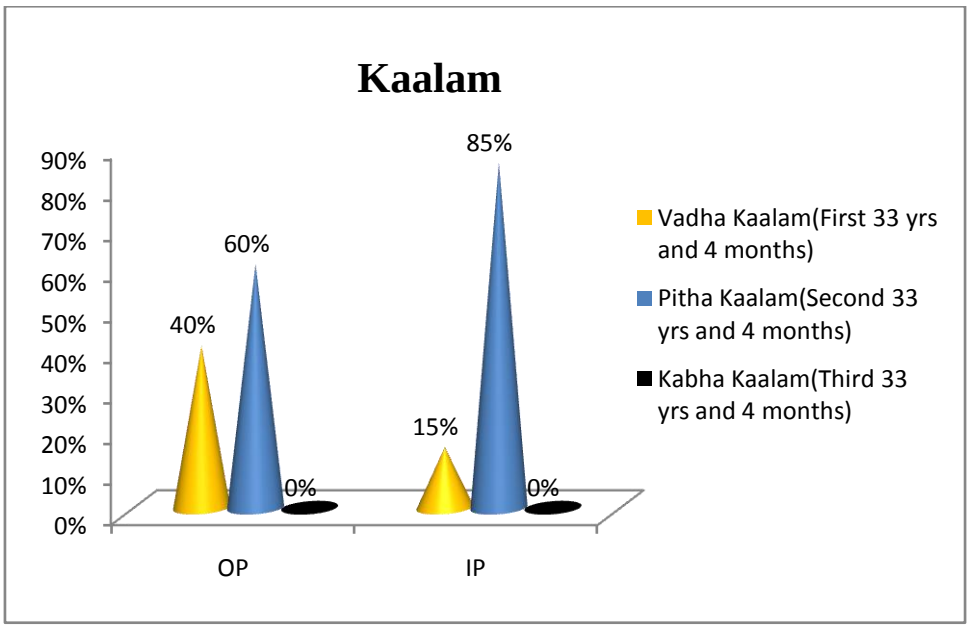
Out of 40 cases, 31 patients come under Marutha nilam and 9 patients come under Neithal nilam.

5.2.9 Distribution of Kaalam

Table – 9

S.No	Kaalam	No. of Cases		Percentage	
		OP	IP	OP	IP
1.	Vadha Kaalam (First 33 yrs and 4 months)	8	3	40	15
2.	Pitha Kaalam (Second 33 yrs and 4 months)	12	17	60	85
3.	Kabha Kaalam (Third 33 yrs and 4 months)	0	0	0	0
	Total	20	20	100	100

Figure –5.2.9



Inference:

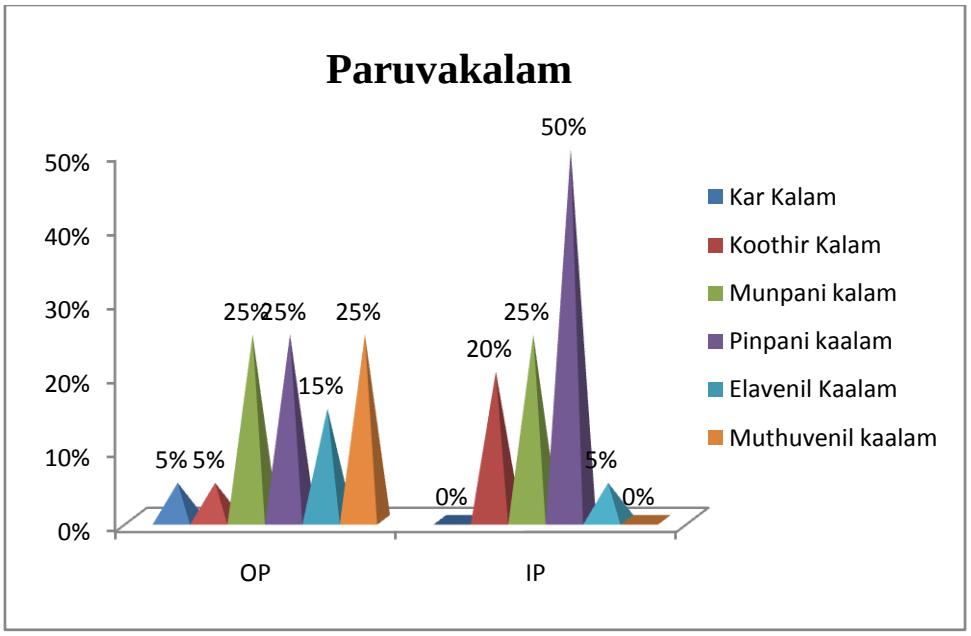
Out of 40 cases, 11 patients were under vathakaalam of their life span, and 29 patients were under pitha kaalam of their life span.

5.2.10 Distribution of Paruvakalam

Table-10

S.No	Paruvakalam	Months	No. of Cases		Percentage	
			OP	IP	OP	IP
1.	Kar Kalam	Aavani- Puratasi	1	0	5	0
2.	Koothir Kalam	Iyppasi - Karthigai	1	4	5	20
3.	Munpani kalam	Markazhi – Thai	5	5	25	25
4.	Pinpani kaalam	Masi- Panguni	5	10	25	50
5.	Elavenil Kaalam	Chithirai - Vaikasi	3	1	15	5
6.	Muthuvenil kaalam	Aani- Aadi	5	0	25	0
	Total		20	20	100	100

Figure -5.2.10



Inference:

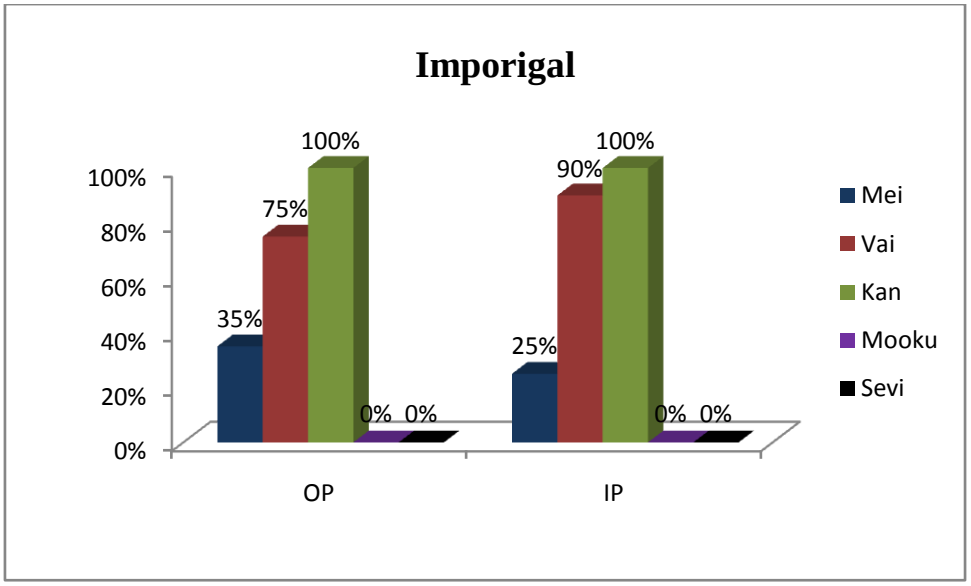
Out of 40 cases, 1 patient comes under Kar kaalam, 5 patients comes under Koothir kaalam, 10 patients comes under Munpani kaalam, 15 patients comes under Pinpani kaalam, 4 patients comes under Elavenil kaalam and 5 patients comes under Muthuvenil kaalam.

5.2.11 Distribution of Imporigal

Table – 5.2.11

S.No	Imporigal	No. of Cases		Percentage	
		OP	IP	OP	IP
1.	Mei	7	5	35	25
2.	Vai	15	18	75	90
3.	Kan	20	20	100	100
4.	Mooku	0	0	0	0
5.	Sevi	0	0	0	0

Figure-5.2.11



Inference:

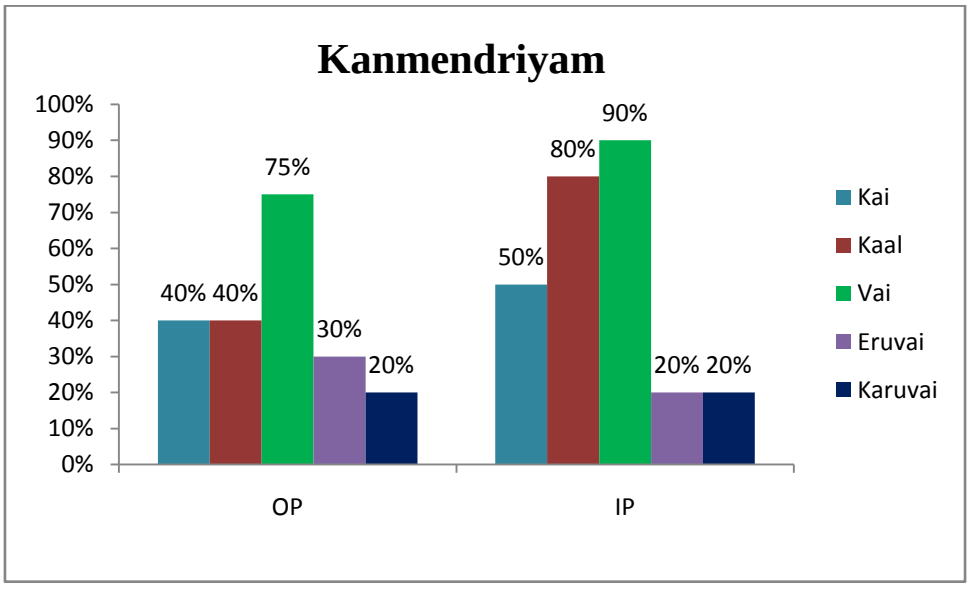
Among 40 cases, Mei was affected in 12 patients, Vai was affected in 33 patients and Kan was affected in all patients.

5.2.12. Distribution of Kanmendriyam

Table – 5.2.12

S.No	Kanmendriyam	No. of Cases		Percentage	
		OP	IP	OP	IP
1.	Kai	8	10	40	50
2.	Kaal	8	16	40	80
3.	Vai	15	18	75	90
4.	Eruvai	6	4	30	20
5.	Karuvai	4	4	20	20

Figure-5.2.12



Inference :

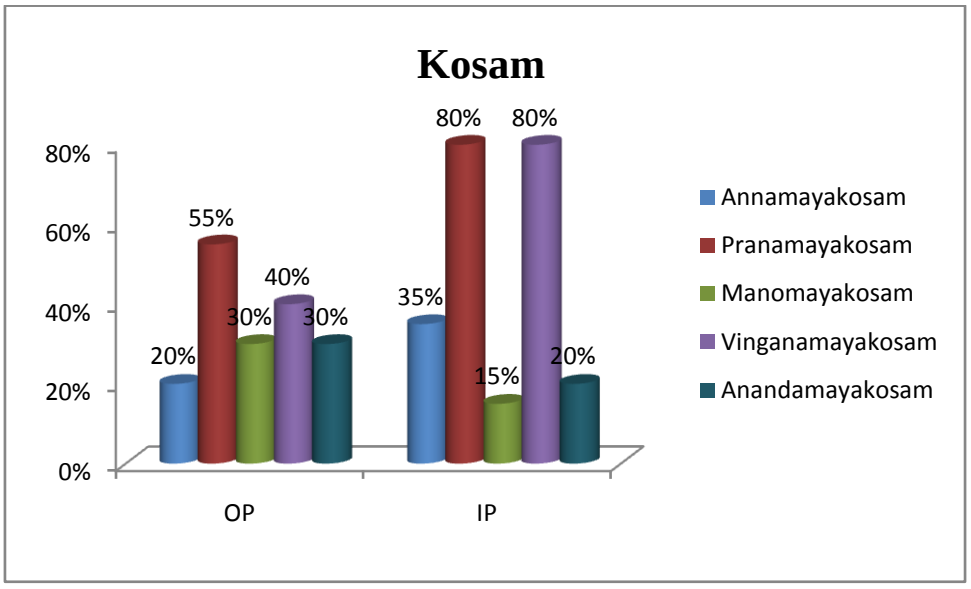
Among 40 cases, Kai was affected in 18 patients, Kaal was affected in 24 patients, Vai was affected in 33 patients, Eruvai was affected in 10 patients and Karuvai was affected in 8 patients.

5.2.13. Distribution of Kosangal

Table – 5.2.13

S.No	Kosam	No. of Cases		Percentage	
		OP	IP	OP	IP
1.	Annamayakosam	4	7	20	35
2.	Pranamayakosam	11	16	55	80
3.	Manomayakosam	6	3	30	15
4.	Vinganamayakosam	8	16	40	80
5.	Anandamayakosam	6	4	30	20

Figure-5.2.13



Inference:

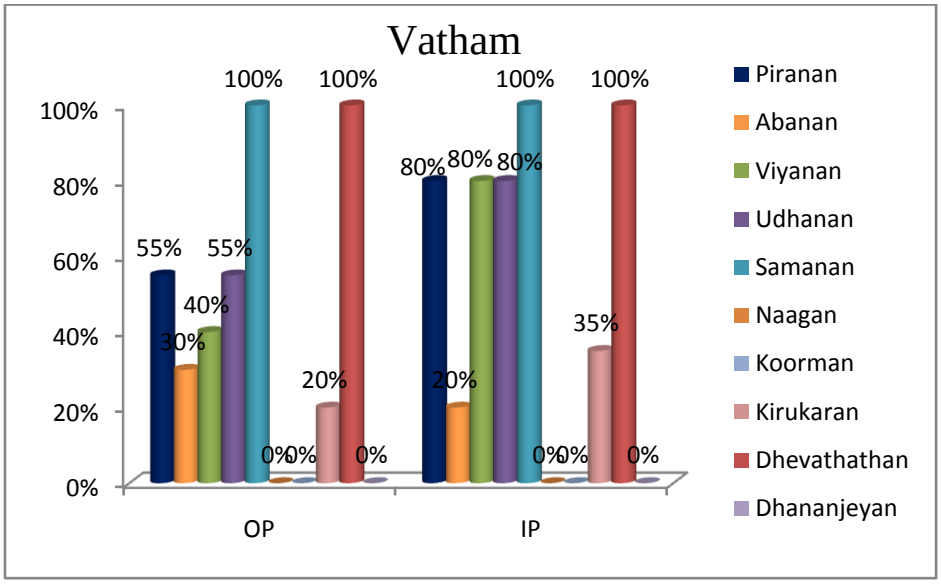
Among 40 cases, Annamayakosam was affected in 11 patients, Pranamayakosam was affected in 27 patients, Manomayakosam was affected in 9 patients, Vinganamayakosam was affected in 24 patients and Anandamayakosam was affected in 10 patients.

5.2.14. Distribution of Vatham:

Table -5.2.14

S.No	Vaatham	No. of Cases		Percentage	
		OP	IP	OP	IP
1.	Piranan	11	16	55	80
2.	Abanan	6	4	30	20
3.	Viyanan	8	16	40	80
4.	Udhanan	11	16	55	80
5.	Samanan	20	20	100	100
6.	Naagan	0	0	0	0
7.	Koorman	0	0	0	0
8.	Kirukaran	4	7	20	35
9.	Dhevathathan	20	20	100	100
10.	Dhananjeyan	0	0	0	0

Figure – 5.2.14



Inference:

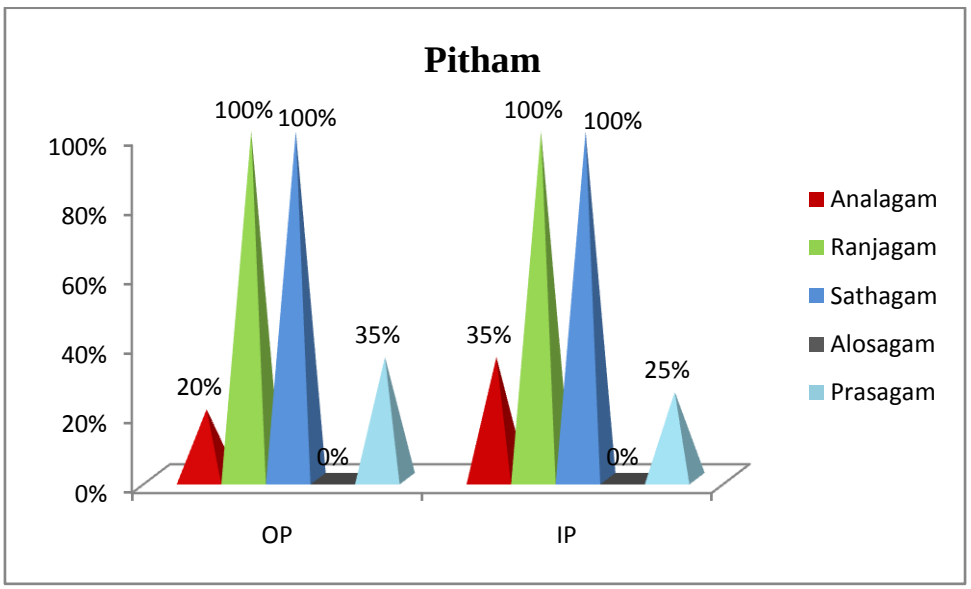
Among the 40 cases of pitha paandu, Samanan, Devathathan were affected in all patients, Piranan was affected in 27 patients, Abanan was affected in 10 patiens and Viyanan was affected in 24 patients, Udhanan was affected in 27 patients and Kirukaran was affected in 11 patients.

5.2.15. Distribution of Pitham

Table -5.2.15

S.No	Pitham	No. of Cases		Percentage	
		OP	IP	OP	IP
1.	Analagam	4	7	20	35
2.	Ranjagam	20	20	100	100
3.	Sathagam	20	20	100	100
4.	Alosagam	0	0	0	0
5.	Prasagam	7	5	35	25

Figure - 5.2.15



Inference :

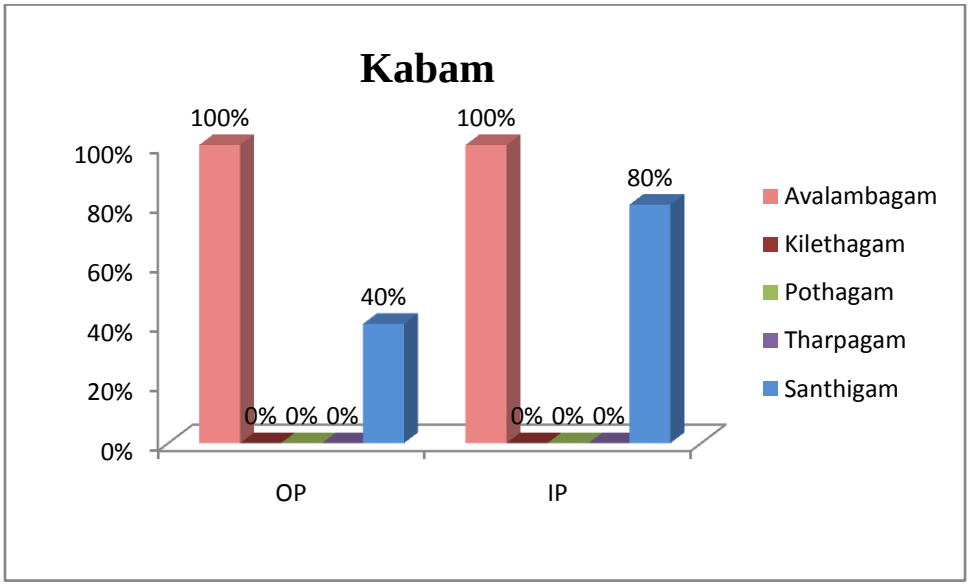
Among 40 cases of pitha paandu, Analagam were affected in 11 patients, Ranjagam, Sathagam were affected in all patients and Prasagam was affected in 12 patients.

5.2.16. Distribution of Kabam

Table -5.2.16

S.No	Kabam	No. of Cases		Percentage	
		OP	IP	OP	IP
1.	Avalambagam	20	20	100	100
2.	Kilethagam	0	0	0	0
3.	Pothagam	0	0	0	0
4.	Tharpagam	0	0	0	0
5.	Santhigam	8	16	40	80

Figure-5.2. 16



Inference:

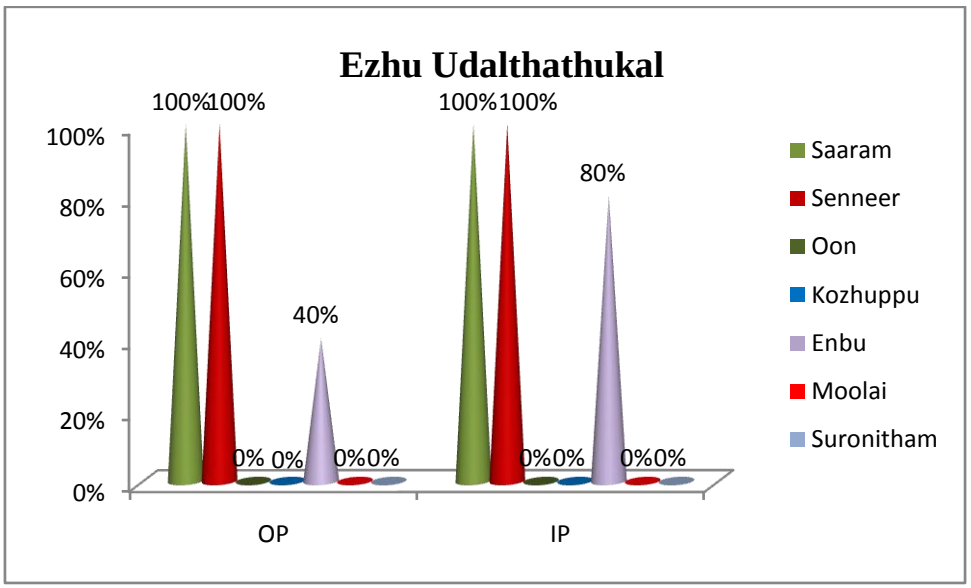
Among 40 cases in pitha paandu, Avalambagam was affected in all patients and Sathigam were affected in 24 patients.

5.2.17. Distribution of Ezhu Udalthathukal

Table -5.2.17

S.No	Ezhu Udalthathukal	No. of Cases		Percentage	
		OP	IP	OP	IP
1.	Saaram	20	20	100	100
2.	Senneer	20	20	100	100
3.	Oon	0	0	0	0
4.	Kozhuppu	0	0	0	0
5.	Enbu	8	16	40	80
6.	Moolai	0	0	0	0
7.	Suronitham	0	0	0	0

Figure-5.2.17



Inference:

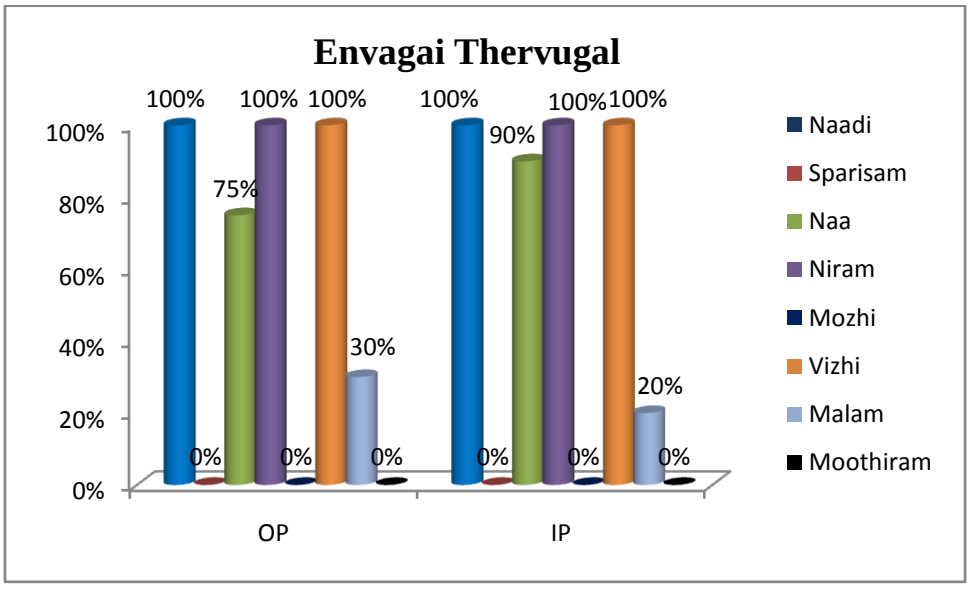
Out of 40 cases in pitha paandu, saaram, senneer were affected in all patients and Enbu affected in 24 patients.

5.2.18. Distribution of Envagai Thervugal

Table -5.2.18

S.No	Envagai Thervugal	No. of Cases		Percentage	
		OP	IP	OP	IP
1.	Naadi	20	20	100	100
2.	Sparisam	0	0	0	0
3.	Naa	15	18	75	90
4.	Niram	20	20	100	100
5.	Mozhi	0	0	0	0
6.	Vizhi	20	20	100	100
7.	Malam	6	4	30	20
8.	Moothiram	0	0	0	0

Figure-5.2.18



Inference:

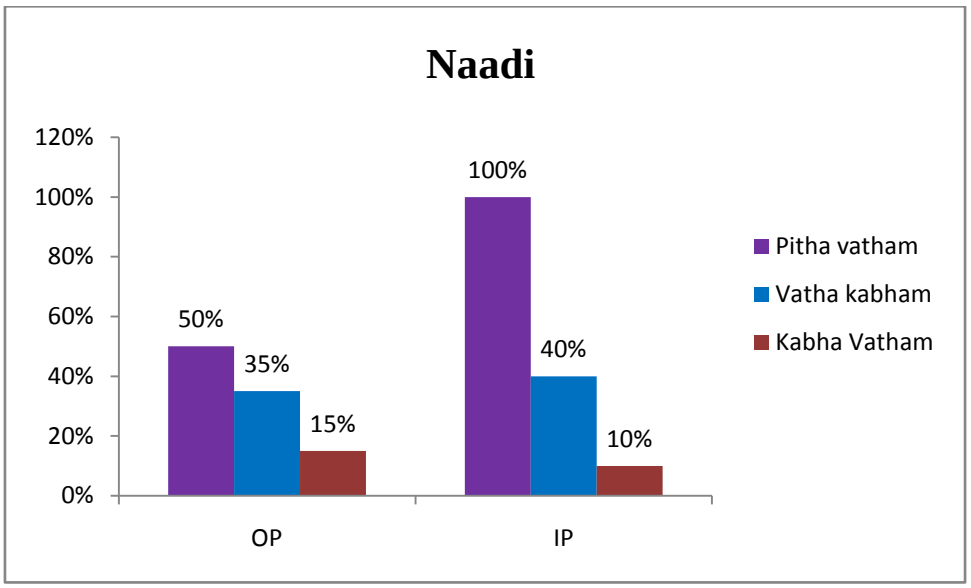
Among the 40 cases, Niram, vizhi, Naadi were affected in all patients, Naa was affected in 33 patients and Malam was affected in 10 patients.

5.2.19. Distribution of Naadi

Table -5.2.19

S.No	Naadi	No. of Cases		Percentage	
		OP	IP	OP	IP
1.	Pitha vatham	10	10	50	100
2.	Vatha kabham	7	8	35	40
3.	Kabha Vatham	3	2	15	10
	Total	20	20	100	100

Figure-5.2.19



Inference:

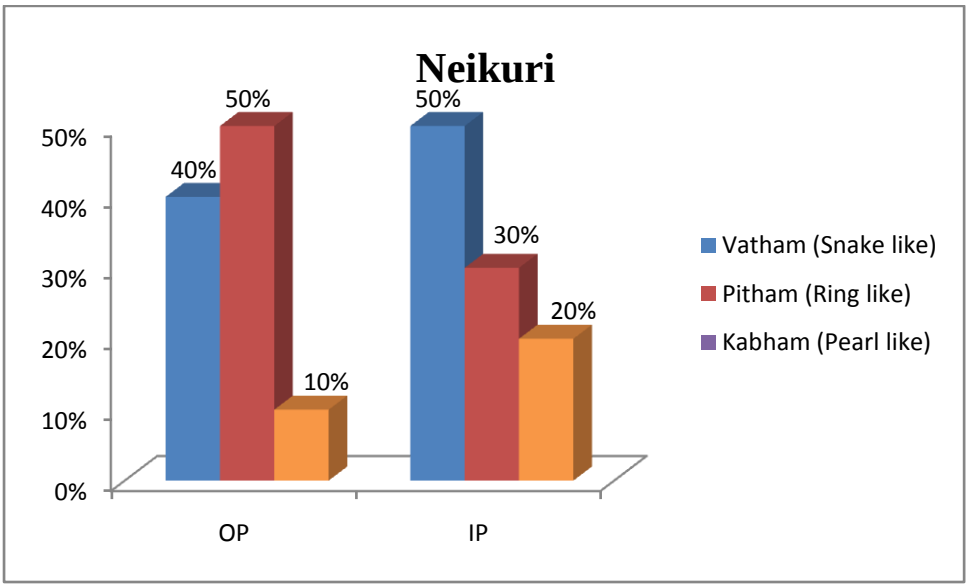
Out of 40 cases in pitha paandu, Naadi was observed in which 20 patients had pitha vatha naadi, 15 patients had vatha kabham naadi and 5 patients had Kabha vatha naadi.

5.2.20. Distribution of Neikuri

Table -5.2.20

S.No	Neikuri	No. of Cases		Percentage	
		OP	IP	OP	IP
1.	Vatham (Snake like)	8	10	40	50
2.	Pitham (Ring like)	10	6	50	30
3.	Kabham (Pearl like)	2	4	10	20
	Total	20	20	100	100

Figure-5.2.20



Inference:

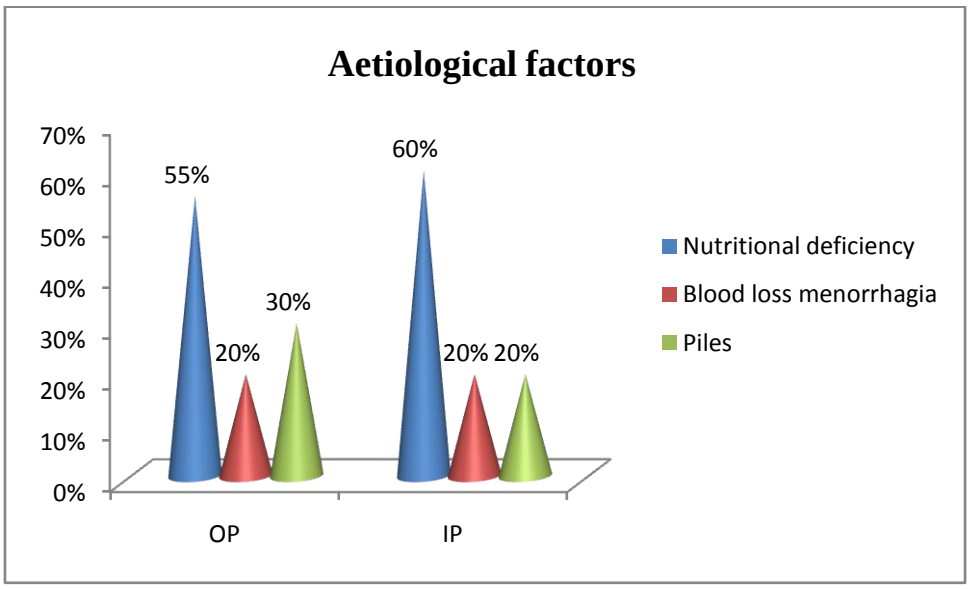
Neikuri were observed in 40 pitha paandu patients. Out of which 18 patients had vatha neer, 16 patients had pitha neer, and 6 patients had kabha neer.

5.2.21. Distribution of Aetiological factors

Table -5.2.21

S.No	Aetiological factors	No. of Cases		Percentage	
		OP	IP	OP	IP
1.	Nutritional deficiency	11	12	55	60
2.	Blood loss menorrhagia	4	4	20	20
3.	Piles	6	4	30	20
	Total	20	20	100	100

Figure-5.2.21



Inference:

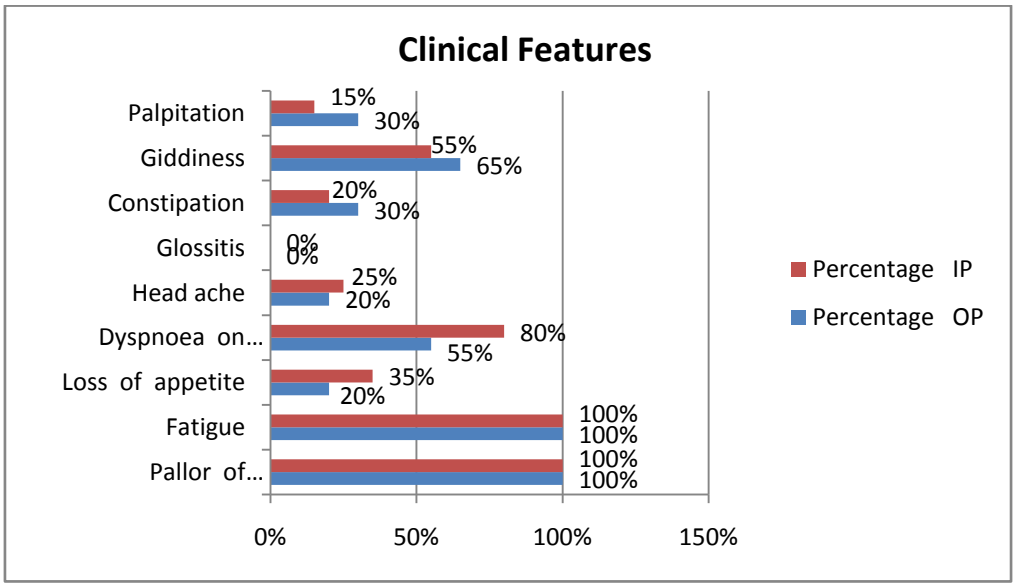
Out of 40 cases with pitha paandu, 23 patients were due to nutritional deficiency, 8 patients were due to blood loss menorrhagia and 10 patients were due to piles.

5.2.22. Distribution of Clinical features

Table -5.2.22

Sl.No	Clinical Features	No. of Cases		Percentage	
		OP	IP	OP	IP
1.	Pallor of conjunctiva and nail bed	20	20	100	100
2.	Fatigue	20	20	100	100
3.	Loss of appetite	4	7	20	35
4.	Dyspnoea on exertion	11	16	55	80
5.	Headache	4	5	20	25
6.	Glossitis	0	0	0	0
7.	Constipation	6	4	30	20
8.	Giddiness	13	11	65	55
9.	Palpitation	6	3	30	15

Figure-5.2.22



Inference:

For 40 cases, clinical features of pitha paandu were reported. All the 40 patients had the symptoms of pallor of conjunctiva and nail bed, fatigue, 11 patients had loss of appetite, 27 patients had dyspnoea on exertion, 9 patients had head ache, 10 patients had constipation, 24 patients had giddiness and 9 patients had palpitation.

RESULTS AFTER TREATMENT

Results were observed on the basis of two main criteria.

Primary Outcome:

Primary Outcome is mainly assessed by comparing the pre and post treatmental Hemoglobin level, of the trial patient.

Secondary Outcome:

Secondary outcome is assessed by comparing the following parameters, before and after the treatment.

1) Reduction of Clinical symptoms
2) Changes in Complete Blood Count

5.2.23. Distribution of Clinical prognosis

Table -5.2.23

Sl.No	Signs & Symptoms	Before Treatment				After Treatment			
		No. of Cases		Percentage (%)		No. of Cases		Percentage (%)	
		OP	IP	OP	IP	OP	IP	OP	IP
1.	Pallor of conjunctiva and nail bed	20	20	100	100	8	9	40	45
2.	Fatigue	20	20	100	100	6	7	30	35
3.	Loss of appetite	4	7	20	35	2	2	10	10
4.	Dyspnoea on exertion	11	16	55	80	6	7	30	35
5.	Headache	4	5	20	25	1	2	5	10
6.	Glossitis	0	0	0	0	0	0	0	0
7.	Constipation	6	4	30	20	2	1	10	5
8.	Giddiness	13	11	65	55	6	4	30	20
9.	Palpitation	6	3	30	15	3	1	15	5

After treatment, in case of pitha paandu - pallor of conjunctiva present in 17 patients, fatigue and dyspnoea on exertion present in 13 patients, loss of appetite present in 4 patients, headache and constipation in 3 patients, Palpitation present in 4 patients and Giddiness in 5 patients.

5.2.24.a) Haemoglobin level of outpatients

Table -5.2.24.a

S. No	O.P. No	NAME	BeforeTreatment (gms/dl)	AfterTreatment (gms/dl)
1.	34708	Subashini	7.0	8.4
2.	40532	Subbulakshmi	7.0	9.0
3.	44599	Najima	10.0	10.1
4.	51619	Ponnu	8.4	9.5
5.	59578	Ponselvi	9.8	11.8
6.	63211	Fouzia	9.6	11.1
7.	65610	Shanmugam	9.7	11.8
8.	67147	Jansi Rani	9.0	10.2
9.	70157	Chellakutty	8.7	10.4
10.	98638	Esakkiammal	7.6	11.0
11.	105310	Sivagami	9.8	11.8
12.	108697	Usha	10	11.6
13.	10281	Kanniga	9.5	10.8
14.	10248	Kavitha	9.7	11.1
15.	13993	Nandhana	9.6	11.6
16.	17049	Murugan	9.2	11.4
17.	22601	Kajara	8.4	10.5
18.	22602	Kannan	7.2	9.4
19.	25079	Subhashini	7.8	9.2
20.	25868	Pitchumani	8.4	8.5

5.2.24.b) Haemoglobin level of In patients

Table -5.2.24.b

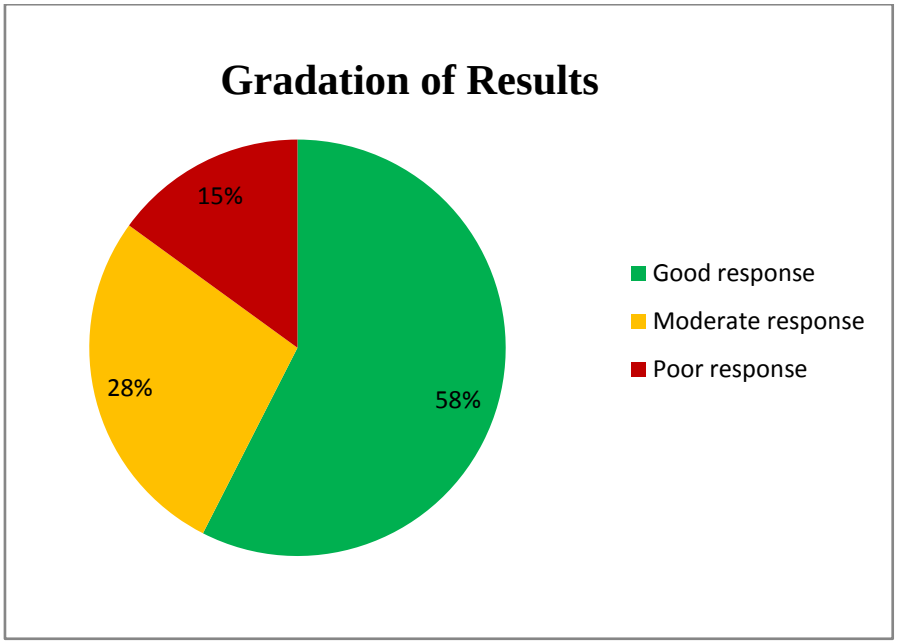
S. No	I.P. No	NAME	BeforeTreatment(gms/dl)	AfterTreatment(gms/dl)
1.	1266	Parvathi	7.6	8.7
2.	2900	Arumugam	7.5	7.8
3.	2901	Sabeena	7.1	9.8
4.	2986	Thangam	9.6	10.5
5.	2990	Naagammal	9.6	11.7
6.	3117	Chandiran	8.2	9.7
7.	139	Bagavathi	7.0	9.2
8.	144	Rajakumari	8.2	10.4
9.	207	Maharasi	9	11.2
10.	211	Thangam	9.1	11.4
11.	441	Vijayalakshmi	9	9.7
12.	558	Arumugam	9.6	11.2
13.	641	Muthulakshmi	9.2	10.3
14.	653	Samuthrakani	10	11.5
15.	660	Subbulakshmi	9.9	11.5
16.	687	Sudamani	10	12.4
17.	707	Vadivu	7.8	9.9
18.	806	Sornam	9.2	11.2
19.	807	Malaiammal	9.9	10.8
20.	908	Velammal	9.1	11.8

5.2.25 Gradation of Results

Table -5.2.25

S.No	Gradation of Result	No. of Cases		Percentage	
		OP	IP	OP	IP
1.	Good response	11	12	55	60
2.	Moderate response	7	4	35	20
3.	Poor response	2	4	10	20

Figure- 5.2.25



Good Response: Increased in Hb 2gm% and above after treatment

Moderate Response: Increased in Hb 1.5gm% after treatment

Poor Response: Increase in Hb 1gm% after treatment

Inference:

Out of 40 cases, 23 patients showed good result, 11 patients showed moderate result and 6 patients showed poor result.

5.2.26 a) CASE SUMMARY OF OUT-PATIENTS

S.No.	OP. No	Name	Age/ Sex	Occupation	Duration of the illness	Starting of Treatment	End of Treatment	No. of days Treated	Results
1.	34708	Subashini	26/F	Student	1Year	16.04.18	15.05.18	30days	Moderate
2.	40532	Subbulakshmi	43/F	Office going	2Years	07.05.18	05.06.18	30days	Good
3.	44599	Najima	40/F	Housewife	1Month	21.05.18	20.06.18	30days	Poor
4.	51619	Ponnu	60/F	Housewife	4Years	18.06.18	18.07.18	30days	Moderate
5.	59578	Ponselvi	58/F	Housewife	6Months	17.07.18	16.08.18	30days	Good
6.	63211	Fouzia	29/F	Office going	1Month	30.07.18	29.08.18	30days	Moderate
7.	65610	Shanmugam	34/F	Office going	6Months	07.08.18	06.09.18	30days	Good
8.	67147	Jansi Rani	20/F	Student	6Months	13.08.18	12.09.18	30days	Moderate
9.	70157	Chellakutty	60/F	Housewife	1Month	23.08.18	22.09.18	30days	Good
10.	98638	Esakkiammal	38/F	Coolie	2Years	28.11.18	27.12.18	30days	Good
11.	105310	Sivagami	43/F	Office going	6Months	20.12.18	19.01.19	30days	Good
12.	108697	Usha	35/F	Housewife	4Months	31.12.18	29.01.19	30days	Good
13.	10281	Kanniga	51/F	Housewife	2Years	28.01.19	27.02.19	30days	Moderate
14.	10248	Kavitha	43/F	Officegoing	1Month	28.01.19	27.02.19	30days	Moderate
15.	13993	Nandhana	23/F	Student	1Week	07.02.19	08.03.19	30days	Good
16.	17049	Murugan	60/M	Coolie	1Year	15.02.19	16.03.19	30days	Good
17.	22601	Kajara	35/F	Housewife	1Year	04.03.19	03.04.19	30days	Good
18.	22602	Kannan	58/M	Coolie	6Months	04.03.19	03.04.19	30days	Good
19.	25079	Subhashini	28/F	Housewife	6Months	12.03.19	11.04.19	30days	Moderate
20.	25868	Pitchumani	46/M	Coolie	1Year	14.03.19	13.04.19	30days	Poor

5.2.26 b) CASE SUMMARY OF IN-PATIENTS

S.No	IP. No	Name	Age / Sex	Occupation	Duration of the illness	Starting of Treatment	End of Treatment	No. of days Treated			Results
								IP	OP	Total	
1.	1266	Parvathi	40/F	Coolie	1Year	10.05.18	11.06.18	30	-	30	Moderate
2.	2900	Arumugam	55/F	Housewife	5Years	27.11.18	27.12.18	30	-	30	Poor
3.	2901	Sabeena	26/F	Housewife	1Year	27.11.18	27.12.18	30	-	30	Good
4.	2986	Thangam	43/F	Housewife	2Weeks	07.12.18	29.12.18	22	08	30	Poor
5.	2990	Naagammal	55/F	Coolie	5Years	07.12.18	02.01.19	26	04	30	Good
6.	3117	Chandiran	55/M	Coolie	2Years	21.12.18	20.01.19	30	-	30	Moderate
7.	139	Bagavathi	42/F	Housewife	1Month	23.01.19	22.02.19	30	-	30	Good
8.	144	Rajakumari	40/F	Housewife	1Year	23.01.19	22.02.19	30	-	30	Good
9.	207	Maharasi	48/F	Coolie	1Year	31.01.19	30.02.19	30	-	30	Good
10.	211	Thangam	43/F	Coolie	2Years	31.01.19	30.02.19	30	-	30	Good
11.	441	Vijayalakshmi	55/F	Housewife	5Years	21.02.19	20.03.19	30	-	30	Poor
12.	558	Arumugam	60/F	Housewife	1Month	05.03.19	04.04.19	30	-	30	Good
13.	641	Muthulakshmi	46/F	Housewife	1Year	12.03.19	11.04.19	30	-	30	Moderate
14.	653	Samuthrakani	60/F	Housewife	1Year	13.03.19	12.04.19	30	-	30	Moderate
15.	660	Subbulakshmi	53/F	Coolie	6Months	14.03.19	13.04.19	30	-	30	Good
16.	687	Sudamani	53/F	Coolie	1Year	18.03.19	17.04.19	30	-	30	Good
17.	707	Vadivu	60/F	Housewife	1Year	20.03.19	19.04.19	30	-	30	Good
18.	806	Sornam	59/F	Housewife	1Year	28.03.19	27.04.19	30	-	30	Good
19.	807	Malaiammal	45/F	Housewife	6Months	28.03.19	18.04.19	22	08	30	Poor
20.	908	Velammal	55/F	Housewife	3Months	09.04.19	09.05.19	30	-	30	Good

5.2.27 a) LABORATORY INVESTIGATION REPORT OF THE OUT PATIENTS

S. no	OP No	Name	Age / Sex	Before treatment				After Treatment				ESR (mm)				Blood Sugar ®(gms/dl)		Urine analysis					
				TC (cu/mm	DC			TC (cu/mm	DC			BT		AT				BT			AT		
					P%	L%	E%		P%	L%	E%	½ hr	1 hr	½ hr	1 hr	BT	AT	Alb	Sug	Dep	Alb	Sug	Dep
1	34708	Subashini	26/F	7610	54	38	1	7800	56	48	1	10	20	9	18	82	78	N	N	FEC	N	N	FEC
2	40532	Subbulakshmi	43/F	7600	63	33	4	8100	62	38	2	18	35	12	22	86	110	N	N	FEC	N	N	FEC
3	44599	Najima	40/F	7500	62	36	2	9300	60	33	7	15	30	23	45	98	82	N	N	NAD	N	N	FP
4	51619	Ponnu	60/F	8500	58	42	0	8300	54	46	2	14	24	11	22	104	98	N	N	FEC	N	N	FEC
5	59578	Ponselvi	58/F	7800	60	38	1	8100	55	42	0	8	16	7	12	96	94	N	N	FEC	N	N	NAD
6	63211	Fouzia	29/F	8000	58	35	7	8200	56	40	2	9	20	8	16	87	91	N	N	NAD	N	N	NAD
7	65610	Shanmugam	34/F	7000	55	32	1	7100	60	35	5	19	38	23	45	90.8	77	N	N	FP	N	N	FP
8	67147	Jansi Rani	20/F	9200	48	47	3	9300	50	44	1	16	30	9	20	82	80	N	N	FEC	N	N	FEC
9	70157	Chellakutty	60/F	7400	62	37	0	7600	60	40	0	10	25	15	30	90	94	N	N	NAD	N	N	NAD
10	98638	Esakkiammal	38/F	7600	50	45	5	7300	64	34	2	7	12	7	14	82	98	N	N	FP	N	N	FP
11	105310	Sivagami	43/F	7600	54	41	4	9000	56	32	6	25	50	10	20	108	90	N	N	NAD	N	N	NAD
12	108697	Usha	35/F	8300	60	35	5	7400	57	33	1	16	30	21	40	140	133	N	N	NAD	N	N	NAD
13	10281	Kanniga	51/F	6300	64	29	7	7100	68	32	2	20	40	12	24	156	120	N	N	NAD	N	N	NAD
14	10248	Kavitha	43/F	7100	66	30	2	7640	65	29	3	15	30	13	25	131	110	N	N	FEC	N	N	NAD
15	13993	Nandhana	23/F	7000	60	37	3	7400	72	40	1	6	13	11	20	94	82	N	N	NAD	N	N	NAD
16	17049	Murugan	60/M	5900	50	49	1	6400	60	54	1	7	14	10	20	99	98	N	N	NAD	N	N	NAD
17	22601	Kajara	35/F	6500	66	30	4	6800	60	36	2	9	16	7	14	96	94	N	N	FP	N	N	NAD
18	22602	Kannan	58/M	6500	60	36	4	7200	65	42	2	20	40	16	30	105	92	N	N	NAD	N	N	NAD
19	25079	Subhashini	28/F	9100	54	42	1	9400	42	47	1	10	18	8	16	88	78	N	N	FEC	N	N	FEC
20	25868	Pitchumani	46/M	8100	73	20	7	7700	67	22	5	38	70	10	22	111	103	N	N	NAD	N	N	NAD

BT – Before Treatment, AT – After Treatment, N – Nil TC – Total Blood Count, DC – Differential Blood Count, P – Polymorphs, L – Leucocytes ,E-Eosinophils
ESR – Erythrocytes Sedimentation Rate, mm , Alb – Albumin, Sug – Sugar, Dep– Deposits, FE – Few Epithelial cells, FP – Few Pus cells

5.2.27 b) LABORATORY INVESTIGATION REPORT OF THE IN PATIENTS

S. no	IP No	Name	Age / Sex	Before treatment				After Treatment				ESR (mm)				Blood Sugar ®(gms/dl)		Urine analysis					
				TC (cu/m	DC			TC (cu/mm	DC			BT		AT				BT			AT		
					P%	L%	E%		P%	L%	E%	½ hr	1 hr	½ hr	1 hr	BT	AT	Alb	Sug	Dep	Alb	Sug	Dep
1	1266	Parvathi	40/F	6100	65	31	4	7300	58	40	2	20	40	30	62	84	83	N	N	NAD	N	N	NAD
2	2900	Arumugam	55/F	7300	58	38	4	6500	68	26	6	15	30	12	26	113	84	N	N	FEC	N	N	FEC
3	2901	Sabeena	26/F	8500	60	36	4	8100	60	38	2	16	32	18	40	74	78	N	N	FEC	N	N	FEC
4	2986	Thangam	43/F	9500	51	45	4	9200	54	46	2	10	20	10	18	88	86	N	N	FP	N	N	FEC
5	2990	Naagammal	55/F	8600	54	38	2	8200	56	41	1	10	18	9	16	88	92	N	N	NAD	N	N	NAD
6	3117	Chandiran	55/M	7500	78	16	3	7600	72	18	2	48	96	42	88	110	104	N	N	FP	N	N	FP
7	139	Bagavathi	42/F	7900	69	27	4	8100	72	24	1	37	70	32	64	111	98	N	N	FP	N	N	FEC
8	144	Rajakumari	40/F	9200	66	30	4	9000	60	38	2	6	12	10	20	92	88	N	N	NAD	N	N	NAD
9	207	Maharasi	48/F	8300	70	23	7	8600	66	23	1	5	11	8	12	90	86	N	N	NAD	N	N	FP
10	211	Thangam	43/F	6500	66	31	3	7100	64	30	2	13	25	15	30	80	78	N	N	NAD	N	N	NAD
11	441	Vijayalakshmi	55/F	6600	57	40	3	8100	64	24	2	22	45	26	50	120	105	N	N	FP	N	N	FP
12	558	Arumugam	60/F	6400	62	30	8	7000	68	29	3	12	25	16	28	116	98	N	N	FP	N	N	NAD
13	641	Muthulakshmi	46/F	8700	73	24	3	8500	57	37	6	16	30	9	16	112	105	N	N	NAD	N	N	NAD
14	653	Samuthrakani	60/F	6500	58	40	2	7000	60	35	1	27	58	19	38	108	86	N	N	NAD	N	N	NAD
15	660	Subbulakshmi	53/F	7600	67	30	1	7400	68	30	2	14	26	10	20	120	122	N	N	FEC	N	N	FEC
16	687	Sudamani	53/F	6900	71	22	7	7200	68	24	4	20	40	15	32	84	92	N	N	NAD	N	N	NAD
17	707	Vadivu	60/F	7400	60	35	5	7200	62	34	2	48	95	42	84	116	108	N	N	FP	N	N	FP
18	806	Sornam	59/F	8700	63	32	5	8200	68	30	3	14	28	15	30	98	90	N	N	NAD	N	N	NAD
19	807	Malaiammal	45/F	8500	57	30	3	8200	62	29	9	25	55	32	66	116	99	N	N	FP	N	N	NAD
20	908	Velammal	55/F	9000	54	34	2	9200	67	27	6	13	25	11	20	98	85	N	N	FEC	N	N	FP

BT – Before Treatment, AT – After Treatment, N – Nil TC – Total Blood Count, DC – Differential Blood Count, P – Polymorphs, L – Leucocytes, E – Eosinophils
ESR – Erythrocytes Sedimentation Rate, mm – Milli meter, Sug-Sugar,Dep- Deposits, FEC – Few Epithelial cells, FPC – Few Pus cells

5.2.28 a) BIOCHEMICAL AND HAEMATOLOGICAL REPORTS OF THE OUTPATIENT

S . No	OP No	Name	Age / Sex	Blood urea		Serum Creatinine		Hb(gms/dl)		RBC (millions/cu.mm)		PCV (%)		MCV (fl)		MCH (pg)		MCHC (%)	
				BT	AT	BT	AT	BT	AT	BT	AT	BT	AT	BT	AT	BT	AT	BT	AT
1	34708	Subashini	26/F	20	21	0.4	0.4	7.0	8.4	4.21	4.5	24.4	28	61	70.1	16.6	22	28.7	31
2	40532	Subbulakshmi	43/F	16	20	0.7	0.8	7.0	9.0	4.1	4.35	26	32	64	75	18	24	26	32
3	44599	Najima	40/F	22	19	0.7	0.8	10.0	10.1	4.2	4.3	30	32	85	88	24	26	26	28
4	51619	Ponnu	60/F	28	30	0.4	0.6	8.4	9.5	3.8	4.2	28	36	76	80	26	28	28	34
5	59578	Ponselvi	58/F	32	34	0.6	0.4	9.8	11.8	4.14	4.26	34	33	80	82	20	24	25	28
6	63211	Fouzia	29/F	16	17	0.7	0.6	9.6	11.1	3.8	4.25	32	33	78	82	24	26	26	27
7	65610	Shanmugam	34/F	16	20	0.6	0.6	9.7	11.8	3.9	4.5	30	33	80	84	21	22.3	21	26
8	67147	Jansi Rani	20/F	26	28	0.4	0.6	9.0	10.2	3.1	4.1	27	30	88	90	29	30	32	34
9	70157	Chellakutty	60/F	20	22	0.7	0.6	8.7	10.4	2.8	3.8	30	32	92	94	30	31	33	34
10	98638	Esakkiammal	38/F	26	24	0.8	0.8	7.6	11.0	3.6	4.12	28	30	66	68	22	23	24	28
11	105310	Sivagami	43/F	30	32	0.6	0.4	9.8	11.8	3.74	4.42	32.2	35.4	86.1	80	23.5	26.6	27.3	33.2
12	108697	Usha	35/F	18	17	0.8	0.9	10	11.6	3.90	3.88	36.1	32.4	92.8	88	25.1	25	27.1	29
13	10281	Kanniga	51/F	32	30	0.6	0.5	9.5	10.8	3.91	4.03	28	33	72	82	26	28	30	31
14	10248	Kavitha	43/F	25	24	0.4	0.6	9.7	11.1	4.45	4.17	36.4	35.8	78	85.9	23	26.6	24	31
15	13993	Nandhana	23/F	26	31	0.6	0.4	9.6	11.6	4.34	4.5	33	30	80	82	24	26	30	33
16	17049	Murugan	60/M	34	32	0.8	0.6	9.2	11.4	3.64	3.8	28	34	80	88	26	29	28	34
17	22601	Kajara	35/F	22	20	0.4	0.6	8.4	10.5	3.7	4.2	30	28	74	76	25	28	26	29
18	22602	Kannan	58/M	23	22	0.4	0.8	7.2	9.4	3.4	4.6	31	36	81	90	22	28	28	32
19	25079	Subhashini	28/F	28	26	0.6	0.8	7.8	9.2	3.61	4.58	26	30.4	62	66.4	19	20.1	25	30.3
20	25868	Pitchumani	46/M	34	31	0.8	0.4	8.4	8.5	3.8	3.9	34	38	76	81	21	23	26	28

BT-BeforeTreatment, RBC-Red Blood Cells, PCV-Packed Cell Volume, MCV-Mean Corpuscular Volume, MCH-Mean Corpuscular Haemoglobin, MCHC-Mean Corpuscular Haemoglobin Concentration

5.2.28 b) BIO CHEMICAL AND HAEMATOLOGICAL REPORTS OF THE IN PATIENT

S.No	IP No	Name	Age / Sex	Blood urea		Serum Creatinine		Hb(gms/dl)		RBC (millions/cu.mm)		PCV (%)		MCV (fl)		MCH (pg)		MCHC (%)	
				BT	AT	BT	AT	BT	AT	BT	AT	BT	AT	BT	AT	BT	AT	BT	AT
1	1266	Parvathi	40/F	24	22	0.7	0.7	7.6	8.7	3.45	4.7	26	32	64	73	21	25	24	30
2	2900	Arumugam	55/F	15	16	0.4	0.7	7.5	7.8	3.3	3.9	30	33	76	78	25	27	25	27
3	2901	Sabeena	26/F	24	20	0.8	0.7	7.1	9.8	3.9	4.2	28	32	68	72	22	24	23	29
4	2986	Thangam	43/F	20	22	0.8	0.6	9.6	10.5	3.84	4.3	35.9	37	93.7	92	25	28	26.7	33
5	2990	Naagammal	55/F	31	28	0.4	0.6	9.6	11.7	3.89	4.5	30	32	78	85	25	29	26	32
6	3117	Chandiran	55/M	25	24	0.9	0.6	8.2	9.7	3.6	4.82	32.5	31	62	68	25.3	26	30	32
7	139	Bagavathi	42/F	27	29	0.8	0.6	7.0	9.2	3.5	4.53	24	28	64	72	18	22	24	29
8	144	Rajakumari	40/F	30	28	0.4	0.8	8.2	10.4	3.8	4.4	29	32	68	75	23	25	23	28
9	207	Maharasi	48/F	34	30	0.3	0.4	9	11.2	4.1	4.6	26	34	72	84	21	27	26	31
10	211	Thangam	43/F	28	29	0.6	0.5	9.1	11.4	4	4.8	30	33	70	72	20	24	25	29
11	441	Vijayalakshmi	55/F	22	24	0.6	0.8	9	9.7	3.9	4.2	28	32	69	71	24	26	27	33
12	558	Arumugam	60/F	18	20	0.6	0.5	9.6	11.2	3.94	4.3	30	33	72	76	28	24	26	30
13	641	Muthulakshmi	46/F	16	20	0.8	0.7	9.2	10.3	3.8	4.1	29	34	68	74	23	26	25	31
14	653	Samuthrakani	60/F	27	25	0.8	0.9	10	11.5	4.2	4.4	30	32	70	78	26	28	27	32
15	660	Subbulakshmi	53/F	16	19	0.6	0.6	9.9	11.5	3.85	4.5	29	32	78	82	24	26	25.1	29
16	687	Sudamani	53/F	16	18	0.7	0.4	10	12.4	4.08	4.45	28	31	68	70	19	24	28	34
17	707	Vadivu	60/F	30	31	0.9	1.0	7.8	9.9	3.4	3.9	25	30	66	72	21	23	24	29
18	806	Sornam	59/F	24	20	0.9	0.6	9.2	11.2	3.8	4.2	28	32	64	78	22	24	30	34
19	807	Malaiammal	45/F	26	29	0.7	0.8	9.9	10.8	3.9	4.6	27	32	68	79	26	29	27	32
20	908	Velammal	55/F	18	20	0.6	0.7	9.1	11.8	3.75	4.7	26	30	64	69	24	26	28	35

BT-BeforeTreatment, AT-After Treatment, RBC-Red Blood Cells, PCV-Packed Cell Volume, MCV-Mean Corpuscular Volume, MCH-Mean Corpuscular Haemoglobin, MCHC-Mean Corpuscular Haemoglobin Concentration

5.3 STATISTICAL ANALYSIS

Table 5.3 Haematogical variables in study patients

Group	Hb (gm/dl)		RBC (cu mm)		PCV (%)	
	Before treatment	**After treatment**	**Before treatment**	**After treatment**	**Before treatment**	**After treatment**
Mean	8.826	10.498	3.804	4.314	29.388	32.350
SD	1.003	1.129	0.326	0.273	3.123	2.297
SEM	0.159	0.179	0.052	0.432	0.494	0.363
t value	-15.029		-8.933		-7.082	
p value	<0.01		<0.01		<0.01	

By Paired‘t’ test, p value followed to be less than 0.01 is considered to be statistically significant.

CHAPTER - 6

DISCUSSION

The Pitha paandu noi (Iron deficiency anaemia) is caused due to the derangement of Pitha thathu. The signs and symptoms of Pitha paandu such as pallor, fatigue, dyspnoea, palpitation, giddiness, pungent taste of tongue etc., are correlated with Iron Deficiency Anaemia (IDA) in Modern Science. The aim of the study was to find the therapeutic efficacy of the herbo mineral Siddha formulation "Thiripalai mathirai" on Pitha paandu noi.

SELECTION OF TRIAL DRUG

The clinical drug **''THIRIPALAI MATHIRAI**" with its reference in **"KADUKKAI VALLARAIYIN THANI MAANBU"**, a Siddha formulary text by the author **Hakkim. P. Mohammed Abdullah Sahib**, which is indicated for ''**Paandu Noi"** (page no: 81).

PRECLINICAL STUDIES

Preclinical studies were carried out and results are discussed below.

Biochemical analysis:

- The result of Biochemical analysis of "Thiripalai mathirai" shows the presence of sulphate, chloride, starch, ferrous iron, ferric iron, tannic acid and reducing sugar. The presence of ferrous iron and ferric iron in Thiripalai mathirai may help hemoglobin synthesis in anaemic patients due to nutritional deficiency.
- The result of Biochemical analysis of "Karisalai kudineer" shows the presence of sulphate, chloride, starch, ferrous iron, unsaturated compound, reducing sugar and amino acid. The presence of ferrous iron in the adjuvant also adds additional nutrition in anaemic patients due to nutritional deficiency.

Pharmacological Studies

Pharmacological studies of Thiripalai mathirai and karisalai kudineer showed significant haematinic activity ($P<0.01$).

Toxicity Studies

The administration of trial drug Thiripalai mathirai with the adjuvant karisalai kudineer in selected patients is considered to be safe since acute and subacute toxicity study in animals showed no morbidity and mortality. And also the effect on haematological parameters showed significant increase in Hb level ($P<0.01$) which is the main objective of this study.

CLINICAL TRIAL

- Totally 40 patients were selected 20 patients were treated in OPD and 20 patients were treated in IPD of PG Pothu maruthuvam Department, Government Siddha medical College and Hospital, Palayamkottai.
- The patients with the complaints of pallor, fatigue, dyspnoea, palpitation, giddiness, loss of appetite, headache, constipation etc., were screened using screening proforma, for Pitha paandu.
- All the patients were administered with the trial drug **"Thiripalai mathirai"** and the adjuvant **"Karisalai kudineer"**.
- The duration of treatment was 30 days and all necessary investigations were carried out to all patients; they were followed up regularly in the OP & IP department.
- The aim of the treatment was to regulate the deranged Pitha dosha, to relieve clinical symptoms and to improve the Hemoglobin level.
- Labarotary investigations were done before and after treatment for the assessment of safety of the patients and efficacy of the drug.
- After the completion of treatment with the trial drug in all 40 cases, highly encouraging results were observed in the following Clinical, Haematological, Stastical parameters as follows,

Incidence according to Sex:

Among 40 cases, 36 Patients (90%) were females and 4 Patients (10%) were males.

Though Pitha paandu affects both sexes, Females are mostly affected than males. This may be due to excessive menstrual blood loss which aggregates the already existing malnutrition.

Incidence according to Age:

Out of 40 patients, 17 Patients (42.5%) were in the age group of 51-60, 10 Patients (25%) were in the age group of 41-50, 7 Patients (17.5%) were in the age group of 31-40 and 6 Patients (15 %) were in the age group of 20-30.

Incidence according to Occupation:

Out of 40 patients, 21 Patients (52.5%) were House wife, 11 Patients (27.5%) were Labours, 5 Patients (12.5%) were office going and remaining 3 Patients (7.5%) are students. Labours were more affected due to malnourished diet.

Incidence according to Socio-economical status:

Out of 40 patients, 35 Patients (87.5%) belongs to low income group, 5 Patients (12.5%) belong to middle income group. Economically low income group were more affected than middle or high income group.

Incidence according to Dietary habits:

Out of 40 patients, 36 Patients (90%) were mixed diet and 4 Patients (10%) were Vegetarian.

Incidence according to marital status:

Out of 40 patients, 37 Patients (92.5%) were married and 3 Patients (7.5%) were Unmarried.

Incidence according to Thegi:

Out of 40 patients, 7 Patients (17.5%) were Vaatha thegi, 20 Patients (50%) were Pitha thegi and 11 Patients (27.5%) were Thontha thegi.

Incidence according to Nilam:

Out of 40 patients, 31 Patients (77.5%) come under Marutham and 9 patients (22.5%) come under Neithal.

Incidence according to Kaalam:

Out of 40 patients, 11 Patients (27.5%) comes under Vatha Kaalam and 29 Patients (72.5%) comes under Pitha Kaalam.

Incidence according to Paruvakaalam:

Out of 40 patients, 1(2.5%) Patient comes under Kar, 5(12.5%) Patients come under Koothir, 10(25%) Patients come under Munpani, 15 Patients (37.5%) come under Pinpani, 4 Patients (10%) come under Elavenil, and 5 Patients (12.5%) come under Munpani kaalam.

Incidence according to Imporigal:

Among 40 cases, Mei was affected in 12 Patients (30%) denotes pallor and dryness, Vai was affected in 33 Patients (82.5%) denotes glossitis, bitter or pungent taste, dryness, pallor, fissured and coated tongue, Kan was affected in all patients (100%) denotes pallor.

Incidence according to Kanmendriyam:

Among 40 cases, Kai was affected in 18 Patients (45%) denotes pain, Kaal was affected in 24 Patients (60%) denotes pain and pedal edema, Vai was affected in 33 Patients (82.5%) denotes glossitis, bitter or pungent taste, dryness, pallor, fissured and coated tongue, Eruvai was affected in 10 Patients (25%) denotes constipation and Karuvai was affected in 8 Patients (20%) denotes menorrhagia.

Incidence according to Kosangal:

Among 40 cases, Annamayakosam was affected in 11 Patients (27.5%) noted as loss of appetite, Pranamayakosam was affected in 27 Patients (67.5%) noted as dyspnoea, Manomayakosam was affected in 9 Patients (22.5%) noted as palpitation, Vinganamayakosam was affected in 24 Patients (60%) noted as pain and Anandamayakosam was affected in 10 Patients (25%) noted as menorrhagia and constipation.

Incidence according to Mukkutram:

Vatham:

- Pranan was affected in 27 patients (67.5%), noted as dyspnoea on exertion.
- Abanan was affected in 10 patients (25%) noted as constipation and menorrhagia.
- Viyanan was affected in 24 patients (60%), noted as headache and joint pain.
- Udhanan was affected in 27 patients (67.5%), noted as breathlessness.
- Kirukaran was affected in 11 patients (12.5%), noted as loss of appetite.
- Samanan was affected in all patients 100%, noted as loss of appetite.
- Devathathan was affected in all patients 100%, noted as fatigue.

Pitham:

- Analagam was affected in 11 patients (12.5%) producing loss of appetite.
- Ranjagam was affected in all patients (100%) resulting in pallor of conjunctiva and nail bed.

- Sathagam was affected in all patients (100%) resulting in fatigue
- Pirasagam was affected in 12 patients (30%) resulting in pallor of skin (Hb below 8gms/dl).

Kabham:

- Avalambagam was affected in all patients (100%) resulting in dyspnoea on exertion.
- Santhigam was affected in 24 cases (60%) resulting pain in knee joints.

Incidence according to Ezhu udal thathukkal:

- Saaram was affected in all patients (100%) causing tiredness.
- Senneer was affected in all patients (100%) producing pallor of conjunctiva and nail bed.
- Enbu was affected in 24 patients (60%) causing joint pain.

Incidence according to Ennvagai thervugal:

- In all patients (100%) Naadi, Niram and Vizhi were affected, noted as pallor of conjunctiva and nailbed.
- Naa was affected in 33 patients (82.5%) due to pallor.
- Malam was affected in 10 patients (25%) due to constipation.

Naadi:

20 cases (50%) had Pitha Vatha Naadi, 15 cases (37.5%) had Vatha Kabha Naadi and 5 cases (12.5%) had Kabha Vatha Naadi.

Neikuri:

Out of 40 patients, 18 patients (45%) had Vatha Neer, 16 patients (40%) had Pitha Neer and 6 patients (15%) had Kabha Neer Neikuri.

Incidence according to Aetiological factors:

Out of 40 patients, 23 patients (57.5%) were due to nutritional deficiency, 8 patients (20%) were due to blood loss - menorrhagia and 10 patients (25%) were due to piles. So it is evident that nutritional deficiency plays a major role in causing Iron deficiency Anaemia.

Investigations:

TC, DC, ESR, Hb, PCV, MCV, MCH, MCHC, Blood sugar, Blood urea, Serum creatinine and routine urine test were taken and recorded before and after treatment.

Incidence according to Prognosis Assessment and Efficacy of Trial drug Thiripalai mathirai with the adjuvant Karisalai kudineer

After confirming the diagnosis of Pitha Paandu, all the patients were treated with Thiripalai mathirai 1 tablet twice a day with Karisalai kudineer 100 ml of for an average of 30 days. The observation of the signs and symptoms were followed as long as in the hospital as outpatients and inpatients. The prognosis was clearly recorded. When symptoms disappeared the patients were discharged by examination of the systemic signs and symptoms, haematological parameters once again. As the trial drug has significant haematinic activity, the aim was attained. Vitamin C is essential for iron absorption and the presence of kadukkaithol, nellikkai, vallarai in the trial medicine enhances the absorption

Clinical symptoms:

Out of 40 patients, 40 patients (100%) had Pallor of conjunctiva and nail bed, Fatigue, 11 patients (27.5%) had Loss of appetite, 27 patients (67.5%) Dyspnoea on exertion, 9 Patients (22.5%) had Headache, 10 patients (25%) had Constipation, 24 patients (60%) had Giddiness and 9 patients (22.5%) had Palpitation.

Clinical Prognosis:

After 30 days of treatment Pallor of conjunctiva and nail bed and Fatigueness present in 17 patients(42.5), Dyspnoea on exertion present in 13 patients(32.5%),Loss of appetite and palpitation present in 4 patients(10%), Headache and constipation present in 3 patients (7.5%), Giddiness present in 5 patient(12.5%).

Haemoglobin level:

After treatment 23 patients (57.5%) show increase in Hb 2gms/dl, 11 patients (27.5%) show increased in Hb 1.5 gms/dl and 6 patients (15%) show increase in less than 1gm/dl.

Grading of results:

Among 40 patients, 23 cases (57.5%) showed good result, 11 cases (27.5%) showed moderate result, 6 cases (15%) showed poor result.

STATISTICAL ANALYSIS

Paired‘t’ test was used to test the significance of treatment before and after using the data on haematological parameters. The level of significance probability 0.05 was used to test the difference and the values are statistically significant.

Statistical analysis of Haemoglobin level

The mean value of Hb before treatment is 8.826 and after treatment is 10.498 and t value is -15.029 which is statistically significant ($p<0.01$).

Statistical analysis of RBC

The mean value of RBC before treatment is 3.804 and after treatment is 4.314 and t value is -8.933 which is statistically significant ($p<0.01$).

Statistical analysis of PCV

The mean value of PCV before treatment is 29.388 and after treatment is 32.350 and t value is -7.082 which is statistically significant ($p<0.01$)

CHAPTER - 7

SUMMARY

Pitha paandu Noi **(**Iron deficiency anaemia), a type of clinical condition is the most common and widespread nutritional disorder in the world affecting a large number of children and women in developing countries. It is the only nutrient deficiency which is significantly prevalent and hence taken for this study.

The various Siddha literature collections has clearly mentioned the etiological factors, classifications of the disease and symptoms, complications, diet etc., according to their views. I have chosen my clinical drug as ‘‘THIRIPALAI MATHIRAI” with its reference in “KADUKKAI VALLARAIYIN THANI MAANBU”, a Siddha formulary text by the author Hakkim. P. Mohammed Abdullah Sahib, which is indicated for ‘‘Paandu Noi”. The efficacy of this medicine was studied and observed during this research work.

In every aspect, Anemia with symptoms of pallor, anorexia, loss of appetite, lassitude, giddiness, constipation, palpitation discussed in the modern medicine text books is similar to the clinical features of paandu noi in Siddha medicine. The feasibility of considering **Pitha paandu noi** as **Iron Deficiency Anaemia** is observed after considering the Siddha etiological factors which coincides with the modern aspects.

In this study 20 patients of both sexes of different age groups with classical clinical symptoms were selected as inpatients and another 20 patients were taken as out patients in post graduate department of Maruthuvam, Government Siddha Medical College and Hospital, Palayamkottai.

A total of 40 patients were treated in the OPD & IPD. The clinical and pathological assessment was carried out on the basis of both Siddha and modern aspects.

All the 40 patients were administered with THIRIPALAI MATHIRAI - 1 Tablet (130mg) with the adjuvant KARISALAI KUDINEER – 100ml twice a day after food. The duration of the treatment was 30 days. The responses were assessed and recorded.

Socio-economical status plays an important role in this ailment. Well balanced diet is essential for overcoming this disease. The poor unhygienic people with the usage of contaminated food and water were more prone to worm infestation causing the disease.

The trial medicine is less cost effective and is easily acceptable by patients without any side effects. Bio-chemical and pharmacological studies reveal that the trial medicine has significant haematinic effect which promotes cure of the disease.

Both Hematological and Clinical improvement of the patient was noted. In this Clinical study, the efficacy of the drug in increasing the Hb level was noted in all patients. No adverse effects were reported during or after the course of treatment.

The Statistical analysis showed the data obtained from the Hematological parameters were statistically significant ($p<0.01$).

CHAPTER - 8

CONCLUSION

My study on open labeled non randomized phase-II clinical trial of "THIRIPALAI MATHIRAI" (INTERNAL) in the treatment of "PITHA PAANDU (IRON DEFICIENCY ANAEMIA)" concluded the clinical and therapeutic efficacy of Thiripalai mathirai for Pitha paandu by showing improvement in clinical and haematological parameters. No adverse effects were reported during the clinical study, so the trial drug appears to be safe. The dissertation medicine "Thiripalai Mathirai" is proved to be a potent drug in treating Pitha paandu noi (Iron Deficiency Anemia).

The trial medicine (TPM) was found to neutralize the deranged humors there by regulizing the udal thathus and proved the effective management of Pitha paandu. Bio statistical analysis of pharmacological study showed the significant haematinic action (p value<0.01). The acute and subacute toxicity study showed the good safety profile of the trial drug.

The clinical studies in both OP & IP gave hope in the management of Pitha paandu. The gradation of result revealed that among 40 patients, 20 cases (50%) showed good improvement, 11 cases (27.5%) showed moderate improvement and 9 cases (22.5%) showed poor improvement. Both objective and subjective improvements were observed in the sample of 40 patients.

The trial medicine is less cost effective and free from side effects, so they are suitable for long term use. It was therapeutically effective to the patients and there was no recurrence of symptoms. This is only a preliminary study and further more studies will be undertaken to assess the effect of Thiripalai mathirai. The significant results were obtained pre clinically and clinically, it is concluded that Thiripalai mathirai is therapeutically effective in the management of Pitha paandu.

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ANNEXURE - I

PREPARATION OF THE TRIAL MEDICINE

Drug : **THIRIPALAI MATHIRAI (Internal)**

Reference : **KADUKKAI VALLARAIYIN THANI MAANBU**
Third Edition:1992, Page No:81.
Author: Hakkim. P. Mohammed Abdullah Sahib

Dosage : 1 Tablet (130mg) twice a day after food

Adjuvant : Prepared drug is administered with **KARISALAI KUDINEER** (decotion of Karisalai ver, Keezhanelli ver, Neermulli ver)

Duration :30 days

INGREDIENTS OF THIRIPALAI MATHIRAI

SL. NO	**DRUGS**	**BOTANICAL NAME(FAMILY)/ CHEMICAL NAME**	**PART USED**
1.	MANJAL KADUKKAITHOL	*Terminalia chebula (combretaceae)*	Outer covering of dried fruit
2.	NELLIMULLI	*Emblica officinalis (Euphorbiaceae)*	Dried fruit pulp
3.	THAANRIKKAI THOL	*Terminalia bellirica (Combretaceae)*	Outer covering of dried fruit
4.	VALLARAI	*Centella asiatica (Apiaceae)*	Leaf juice
5.	NELLIKKAI	*Emblica officinalis (Euphorbiaceae)*	Fruit pulp
6.	ANNABEDHI CHENDURAM	*Ferri sulphas, Green vitriol, Iron Sulphate*	-

INGREDIENTS OF KARISALAI KUDINEER

SL. NO	DRUGS	BOTANICAL NAME(FAMILY)	PART USED
1.	KARISALAI	*Eclipta prostrate (Asteraceae)*	Root
2.	KEEZHANELLI	*Phyllanthus amarus (Euphorbiaceae)*	Root
3.	NEERMULLI	*Hygrophila auriculata (Acanthaceae)*	Root

Purification of raw drugs:

Raw drugs are purified as mentioned as below,

1. Manjal Kadukkai thol-cleaned and dried in sun light.
2. Thanrikkai thol-cleaned and dried in sunlight.
3. Nellimulli-cleaned and dried in sunlight.
4. Vallarai-Fresh leaves of valarai is washed and cleaned thoroughly.
5. Annabedhi-The required amount of Annabedhi is taken and dissolved in water, sulphuric acid is added and filtered and boiled until the salt crystals are formed.
6. Karisalaiver, Keezhanelliver, Neermulliver-cleaned and dried in sunlight.

Method of preparation:

1. Preparation of THIRIPALAI MATHIRAI:

The above drugs 1,2,3 are taken in required quantity, powdered separately and sieved by sieving cloth. Then all powdered drugs are mixed and taken as a compound preparation.

Preparation of Annabedhi chenduram:

The purified Annabedhi is ground in mortar by adding lemon juice little by little and the paste is made into a cake and dried.Then the cake is kept in a mudpan,

covered with another mudpan, sealed with mudseal and put into puda process. After cooling there will be a fine chenduram.

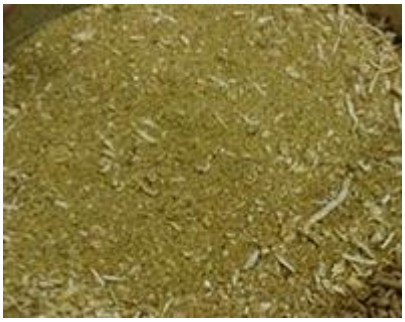
Preparation of mathirai:

The prepared Annabedhi chenduram and the powdered drugs are mixed and ground in a mortar for one hour. Then vallarai juice is added in a required quantity, ground and then dried and again the dried paste is ground with required vallarai juice and dried. This process is done 7 times. Likewise, the drug is to be ground with Nellikkai juice for 7 times. Finally the paste is prepared into tablets of kundrimani size (130mg) and dried.

2. Preparation of adjuvant – KARISALAI KUDINEER:

Karisalaiver, Keezhanelliver, and Neermulliver are taken in equal quantity, cleaned, dried and made into a coarse powder. For the preparation of decoction, 25 grams of the powder is boiled with 500 ml. of water till reduced to 100 ml. of decoction.

KARISALAI KUDINEER



Drug storage and Dispensing:

The prepared trial drug Thiripalai mathirai is stored in clean and dry air tight containers.

The prepared adjuvant Karisalai kudineer chooranam is stored in clean and dry air tight containers.

The trial drug is dispensed in tablet form–10 tablets in a packet. 1 tablet of Thiripalai mathirai twice a day for 5 days is given. For Outpatient 1packet is given for 5 days. It has been advised for twice a day.

The adjuvant Karisalai kudineer is dispensed in chooranam form - 25grams in a packet. 25gms of kudineer chooranam for 100 ml of kudineer twice a day for 5 days is given. For outpatient 10 packets are given for 5 days. The preparation of kudineer is well explained to the patients.

For Inpatient every day the mathirai and kudineer will be dispensed in person.

GOVERNMENT SIDDHA MEDICAL COLLEGE
PALAYAMKOTTAI

SCREENING COMMITTEE

Name of the Candidate:**Dr.B.Maheshwari**

Registration No:

DEPARTMENT OF POTHUMARUTHUVAM

This is to certify that the dissertation topic **PITHA PAANDU (IRON DEFICIENCY ANAEMIA)with "THIRIPALAI MATHIRAI"**has been approved by the screening committee.

Branch	Department	Name	Signature
1	Pothu Maruthuvam	Dr.A.Manoharan. MD(S)., Professor	
2	Gunapadam	Dr.A.Kingsly MD(S)., Associate Professor	
3	Sirappu Maruthuvam	Dr.A.S.Poongodikanthimathi MD(S)., Professor	
4	Kuzhandhai Maruthuvam	Dr.D.K.Soundararajan. MD(S)., Professor	
5	Noi Nadal	Dr.S.Victoria MD(S)., Professor	
6	Nanju Nool Maruthuvam	Dr.M.Thiruthani. MD(S)., Professor	

Place: Palayamkottai

Date: 26.05.2017

PRINCIPAL
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CERTIFICATE OF APPROVAL

Address of Ethical Committee	Government Siddha Medical College, Palayamkottai, Tirunelveli (627002) district.
Principal Investigator	**Dr.B.MAHESHWARI,**MD(s) First year, Department of Pothu Maruthuvam, Reg. No:
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Guide	**Dr.T.KOMALAVALLI, MD(S), Ph.D,** Associate Professor, Department of Pothu Maruthuvam, Government Siddha Medical College and Hospital, Palayamkottai - 627002, Tirunelveli District. komalaarumugam1@gmail.com
Dissertation Topic	A prospective open labelled non-randomized phaseII clinical trial to evaluate the therapeutic efficacy of the Siddha medicine "Thiripalai Mathirai" (Internal) for the treatment of Pitha Paandu (Iron Deficiency Anaemia)
Documents Filed	(1)Protocol (2)Data Collection Forms (3)Patient Information Sheet (4)Consent Form (5)SAE (Pharmacovigilance)
Clinical/Non Clinical Trial Protocol (Others-Specify)	Clinical Trial Protocol-yes
Informed Consent Document	Yes
Any other Document	Case Sheet/Investigation Documents
Date of IEC Approval & its Number	29.05.2017, GSMC-IV-IEC/2017/Br-I/03/29.05.2017

We approve the trial to be conducted in its presented form.

The Institutional Ethical Committee expects to be informed about the process report to be submitted to the IEC at least annually of the study, any SAE occurring in the course of the study, any changes in the protocol and submission of final report.

Chairman

(Prof.Dr.M .Murugesan M.D(s).,)

Member Secretary

29/5/17

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

GOVERNMENT SIDDHA MEDICAL COLLEGE

PALAYAMKOTTAI

Certificate of Botanical Authenticity

Certified the following plant drugs used in Siddha formulation (Internal) **"THIRIPALAI MATHIRAI"** for **PITHA PAANDU** (Iron deficiency Anaemia) taken up for Post-Graduation Dissertation Studies by Dr.B.MAHESHWARI PG Scholar MD siddha, Department of Pothu Maruthuvam are correctly identified and authenticated through Visual inspection / Organoleptic Characters / Experience, Education & Training Morphology Microscopically and Taxonomical methods.

Table 1: Ingredients of Thiripalai Mathirai

SL. NO	DRUGS	BOTANICAL NAME	FAMILY	PART USED
1.	MANJAL KADUKKAI THOL	*Terminalia chebula*	*Combretaceae*	Outer covering of dried fruit
2.	NELLIMULLI	*Emblica officinalis*	*Euphorbiaceae*	Dried fruit pulp
3.	THAANRIKKAI THOL	*Terminalia bellirica*	*Combretaceae*	Outer covering of dried fruit
4.	VALLARAI	*Centella asiatica*	*Apiaceae*	Leaf
5.	NELLIKKAI	*Emblica officinalis*	*Euphorbiaceae*	Fruit pulp

Table 2: Ingredients of Karisalai Kudineer (*Adjuvant*)

SL. NO	DRUGS	BOTANICAL NAME	FAMILY	PART USED
1.	KARISALAI	*Eclipta prostrata*	*Asteraceae*	Root
2.	KEEZHANELLI	*Phyllanthus amarus*	*Euphorbiaceae*	Root
3.	NEERMULLI	*Hygrophila auriculata*	*Acanthaceae*	Root

Station: Palayamkottai

Date: 28/7/17

28/7/17

Authorized Signature

Dr. S. SUTHA, M.Sc., M.Ed.,Ph.D.,
Associate Professor
Dept. of Medicinal Botany
Govt. Siddha Medical College
Palayamkottai, Tirunelveli - 2.

GOVERNMENT SIDDHA MEDICAL COLLEGE

PALAYAMKOTTAI

Certificate of Gunapadam Authentication

Certified the following Thathu (Mineral) drug used in Siddha formulation (Internal) **"THIRIPALAI MATHIRAI"** for **PITHA PAANDU** (Iron deficiency Anaemia) taken up for Post-Graduation Dissertation Studies by Dr.B.MAHESHWARI, PG Scholar MD siddha, Department of Pothu Maruthuvam (Government Siddha Medical College, Palayamkottai), are correctly identified and authenticated through Visual inspection , Experience, Education and Training Morphology, Biochemical Methods.

ANNABEDHI CHENDURAM

SL. NO	Name	Chemical Name
1.	ANNABEDHI	*Ferri sulphas, Green Vitriol, Iron Sulphate*

Station: Palayamkottai

Date: 14.3.18

Authorized Signature 14/3/18

Dr. A. KINGSLY MD (S)
Reader
Head of the Department
PG Gunapadam
Govt. Siddha Medical College
Palayamkottai.

Clinical Trial Details (PDF Generation Date :- Thu, 20 Jun 2019 15:44:03 GMT)

CTRI Number	CTRI/2018/04/013122 [Registered on: 09/04/2018] - **Trial Registered Prospectively**
Last Modified On	06/04/2018
Post Graduate Thesis	Yes
Type of Trial	Interventional
Type of Study	Siddha
Study Design	Single Arm Trial
Public Title of Study	A clinical trial to study the effect of Siddha drug Thiripalai mathirai in Pitha Paandu (Iron deficiency anaemia)
Scientific Title of Study	A prospective open labelled non-randomized phaseII clinical trial to evaluate the therapeutic efficacy of the Siddha medicine "Thiripalai Mathirai" (Internal) for the treatment of Pitha Paandu (Iron Deficiency Anaemia)

Secondary IDs if Any

Secondary ID	Identifier
NIL	NIL

Details of Principal Investigator or overall Trial Coordinator (multi-center study)

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K.M. COLLEGE OF PHARMACY – MADURAI

IAEC – CERTIFICATE

This is to certificate that the project title A PROSPECTIVE OPEN LABELLED NON-RANDOMIZED PHASE-II CLINICAL TRIAL TO EVALUATE THETHERAPEUTIC EFFICACY OF THE SIDDHA MEDICINE **"THIRIPALAI MATHIRAI" (**INTERNAL) FOR THE TREATMENT OF **"PITHA PAANDU (IRON DEFICIENCY ANAEMIA)"** has been approved by the **IAEC/B.MAHESHWARI/TNMGRMU/MD(S)/321611003/KMCP /25/2018.**

Dr. N. CHIDAMBARANATHAN

Name of the Chairman / Member Secretary IAEC:

Dr. P. THIRUPATHY KUMARESAN

Name of the CPCSEA Nominee

Signature with Date 1/5/18

I. A. E. C. CHAIRMAN
INSTITUTIONAL ANIMAL ETHICAL COMMITTEE
K. M. COLLEGE OF PHARMACY
MADURAI-625 107.

1/5/18

CPCSEA NOMINEE
INSTITUTIONAL ANIMAL ETHICS COMMITTEE
K M. COLLEGE OF PHARMACY
MADURAI-625 107

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/~~Mr/Mrs~~.....B. MAHESHWARI.....

for participating as ~~Resource Person~~ / Delegate in the XXIII Workshop on

"RESEARCH METHODOLOGY & BIOSTATISTICS"

Organized by the Department of Siddha,

The Tamil Nadu Dr. M.G.R. Medical University from 6th to 10th March 2017.

Dr. N. KABILAN, M.D.(Siddha)
PROF & HEAD
Dept of Siddha

Dr. T.BALASUBRAMANIAN M.S.,D.L.O.,
REGISTRAR

Prof. Dr. S.GEETHALAKSHMI, M.D.,Ph.D.,
VICE CHANCELLOR

Pre – Siddha Day Seminar on

Scope of Clinical Practice in Siddha System of Medicine

This certificate is proudly presented to Dr/~~Mr/Mrs/Ms~~.....MAHESHWARI. B.....

for Participating / ~~Presenting~~ ~~Poster~~ ~~entitled~~".....—.....

....." in the **Pre – Siddha Day Seminar on** "Scope of Clinical Practice in Siddha System of Medicine" organized by Siddha Clinical Research Unit, Palayamkottai, a peripheral unit of Central Council for Research in Siddha(CCRS), Chennai with the support of Ministry of AYUSH held on 19th December 2018 at Govt. Siddha Medical College Auditorium, Palayamkottai.

P. Elankani

Dr P.Elankani
Organizing Secretary
Research officer(S) Sci ii i/C
SCRU, Palayamkottai

K. Sivaranjani

Dr K.Sivaranjani
Convener
Research officer(S)
SCRU, Palayamkottai

Siddha Clinical Research Unit
Government Siddha Medical College campus, Palayamkottai
Central council for Research in Siddha, Ministry of AYUSH, Govt of India

International Day of Yoga - 21st June 2019

Certificate of Appreciation

Certificate No: 33

This certificate is proudly presented to Dr/~~Mr~~/Mrs/~~Miss~~ B. MAHESHWARI for Participating in the Continuing Medical Education programme on " **Prevention and Management of Life Style Disorders through Yoga**" jointly organized by Department of Siddhar Yoga Maruthuvam, GSMCH, Palayamkottai and Siddha Clinical Research Unit, Palayamkottai, a peripheral unit of Central Council for Research in Siddha(CCRS), Chennai with the support of Ministry of AYUSH held on 21st June 2019 at Special Therapy Wing Auditorium, GSMCH, Palayamkottai.

21/6/19

Prof.Dr A.S.Poongodi Kanthimathi
HOD, Dept. Of Sirappu Maruthuvam
GSMCH, Palayamkottai

P. Elankani

Dr P.Elankani
Research Officer(S) Sci II I/C
SCRU, Palayamkottai

Prof.Dr R.Neelavathy PhD
Principal
GSMCH, Palayamkottai

International Journal of Reverse Pharmacology & Health Research

INTERNATIONAL JOURNAL OF REVERSE PHARMACOLOGY AND HEALTH RESEARCH

ISSN 2589 - 3343 *A Peer Reviewed Interdisciplinary Medical Journal*

CERTIFICATE OF PUBLICATION

The board of "International Journal of Reverse Pharmacology and Health Research"
(ISSN 2589-3343, www.ijrphr.com) is herby awarding this certificate to

Maheshwari B

in recognition of the publication of the Research/Review Paper entitled

Estimation of Phytochemical compounds and Antioxidant potential of Siddha drug "Thiripalai Mathirai"

Published in Volume **2** , Issue **1** , Jan-Mar, **2019**

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Research article

Estimation of Phytochemical compounds and Antioxidant potential of Siddha drug *"Thiripalai Mathirai"*

[1*]Maheshwari.B, [2]Manoharan.A, [3]Komalavalli.T

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Abstract

Background: Thiripalai Mathirai (Tablet) (TPT) is a Siddha formulation, which consists of three fruits (Thiripala), namely Terminalia chebula (Retz.), Terminalia Belerica (Gaertn.)Roxb. & Emblica officinalis (Gaertn.) used for the treatment of Iron deficiency anaemia (Pitha pandu), Hyperlipidemia, Hepato Tonic, Antioxidant and Antidiabetic activity (Nadkarni, 1976). It was evaluated for Quantitative, Qualitative estimation of Phytochemical constituents and antioxidant activity. The antioxidant activity is confirmed by total phenol estimation by using FollinCio-caiteau method. The test drug was referred in the classical siddha text *"Kadukkai Vallaraiyin Thani Maanbu"* (Hakkim.P.Mohammed Abdullah Sahib).

Objective: The objective of this study is to determine the antioxidant potential and phytochemicals in Thiripalai mathirai (TPT).

Methods: The qualitative phytochemical analysis were carried out for major compounds, such as alkaloid, phenols etc. The phytochemical analysis is detected by using Harborne and Onwukaemeand co-workers, 1999 methods. The Quantitative estimation were done through spectrophotometric methodology, detection of alkaloids and phenol estimation is using FolinCio-calteau methodolgy.

Results: The end of result concluded the presence of glycosides, alkaloids, flavonoids, phenols, terpenoids, steroids and tannins in the Thiripalai mathirai (TPT). The aqueous extract of alkaloid and total phenolic compound present in the sample was 3.2604mg and 0.52mg in 10mg respectively, which are expressed in caffeine units.

Conclusion: The presence of phytochemicals in quantitative estimation may scavenge the free radicals and it has synergetic activity as antioxidant which serves for the mankind.

Keywords: Thiripalai mathirai, Terminalia chebula, Siddha drug, Iron deficiency anaemia

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Introduction

Thiripalai mathirai (TPT) is a Siddha formulation, which is prepared by equal ratio of three medicinal plants and *Annabedhi chenduram (Iron sulphate). It* is used in Siddha medicine for treating various clinical conditions. Traditionally, *Thiripalai* have been used in treating Jaundice, Obesity, Cardiac diseases, UTI, Aneamia, Tuberculosis and Venereal disease (Yoga narasimhan, 2000).

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CERTIFICATE FROM EDITOR

It is hereby certified that Article entitled **"*IN VITRO* ANTI MICROBIAL ACTIVITY OF *THIRIPALAI MATHIRAI* AGAINST- HUMAN PATHOGENS"** Manuscript No. EJPMR/6725/6/2019, Author name: ***Maheshwari B. and Manoharan A.,** received for publication in *European Journal of Pharmaceutical and Medical Research*, (ISSN No: 2394-3211) and has been published (Volume 6, Issue 6.) after getting reviewed by three reviewers.

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EJPMR

IN VITRO ANTI MICROBIAL ACTIVITY OF *THIRIPALAI MATHIRAI* AGAINST-HUMAN PATHOGENS

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ABSTRACT

Thiripalai Mathirai (TPM) is a herbomineral formulation and prepared from three herbs namely Terminalia chebula (Retz.), Terminalia belerica (Gaertn.)Roxb., Emblica officinalis (Gaertn.) (thiripala), one mineral and two herbal extractions. Thiripalai mathirai is used in various diseases particularly in anemia. In Siddha it was termed as *Paandu noi* in Tamil. In the present study the anti microbial and anti fungal activity of *Thiripalai mathirai* was determined. The aqueous extract of *Thiripalai mathirai* was tested for antibacterial activity against selected human pathogens viz. *E.coli, P.aeroginosa, K.pneumoniae, S.aureus, S.mutans* and antifungal activity against *C.albicans, A.niger*, it was confirmed by the standard control drugs. The result of antimicrobial study revealed that the extract of TPM was highly sensitive and showed good inhibitory activity against the pathogens.

KEYWORDS: Herbomineral, Siddha, Thiripalai mathirai, Antimicrobial, Antibacterial, Antifungal.

INTRODUCTION

According to World Health Organization, medicinal plants are the best source for the invention of herbal drugs. About 80% of individuals from developed countries use traditional systems of medicine, which has compounds derived from medicinal plants. Therefore, such medicinal formulations should be investigated to understand their properties, safety and efficacy. Microorganisms are the causative agents of almost all kinds of acute and chronic diseases. Plants based antimicrobials have a great therapeutic potential. They are effective in the treatment of infectious diseases while simultaneously mitigating many of the side effects that are often associated with synthetic antimicrobials. In this present study, Thiripalai mathirai a herbo-mineral formulation taken from the reference book "Kadukkai vallaraiyin thani maanbu" is used. Since no scientific studies have been found in this formula the authors decided to assess its efficacy through antibacterial and antifungal sensitivity studies. It was evaluated by standard antimicrobial potential test for selected human pathogens which was carried out in gram negative bacteria such as E.coli, Pseudomonas aeroginosa, Klebsiella pneumoniae, gram positive bacteria such as Staphylococcus aureus, Streptococcus mutans and fungi namely Candida albicans, Aspergillus niger.

MATERIALS AND METHODS

The raw drugs for preparation of *THIRIPALAI MATHIRAI* (TPM) are purchased form a traditional siddha drug store and are identified, authenticated by the Medicinal Botanist and Gunapadam experts at Govt. Siddha Medical College & Hospital, Palayamkottai. The chemical compound was identified by related specialty experts. The medicine was prepared in the P.G. Gunapadam practical hall of Govt. Siddha Medical College & Hospital, Palayamkottai. TPM contains five herbals and one mineral, totally six ingredients for this preparation (**Table 1**). All the herbal drugs were purified, cleaned and dried in sun light. The mineral drug (Annabedhi) was dissolved in water; sulphuric acid was added, filtered and boiled until the salt crystals were formed, finally taken for the preparation.

URKUND

Urkund Analysis Result

Analysed Document:	Maheshwari.docx (D54181882)
Submitted:	6/27/2019 10:30:00 AM
Submitted By:	jeromstat@gmail.com
Significance:	6 %

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