A STUDY ON
PATHACHAKKARAM

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INTRODUCTION

Siddha system is one of the Ancient systems of medicine in India. The system has been developed with philosophy or “Thathuvam” as its base. Siddhars had given equal importance to “Vedantha” and “Siddhantha”. This could be known by Thayumanavar’s Lines which says,

“என்றுரிக்க உடனே மையம் சபைத்து விளை
தூரை பின்னாக கனவு”

Thd Siddha system flourished in south, Ayurvedha in north. The origin of the Siddha system and the usage of medicinal plants belongs to the age of the sangam literatures as early as 3000 B.C. Tholkappiam and Thirumanthiram stand as a proof to this. It believes that all subjects in the universe are composed of 5 basic elements (Pancha boothangal) namely Earth, Water, Fire, Air and Sky. The diet is considered to be the basic building material.

Siddhars had written their works on subjects, namely.

- Alchemy (Rasavadham)
- Medicine (Maruthuvam)
- Surgery (Aruvai maruthuvam)
- Asanam (Yoga)
- Philosophy(Gnanam)
They had also strictly emphasized on hygienic principles which were neatly quoted in “Padarthaguna sinthamani”. With regard to Ivagai nilam, Kalam, and Pozhuthu. According to this system “Mukkutram” is considerable to be responsible for any disease.

Disease is classified as,

i. Disease involves gross body (Udarpini)

ii. Disease involving subtle body (Manapini).

In siddha system the diseases are classified broadly as 4,448 diseases by siddhars, based on the “Tridoshic theory”

Aetiology (or) the cause for any disease is said to be diet and day today activities. According to Thanvantri Vaithiyam “PATHACHAKKARAM” – பாத்தைச்சக்கரம் Comes under the 9 types of Patha rogangal.

The author of this dissertation work has selected PATHACHAKKARAM” – one of the complications of the disease “Madhumegam”. Improper treatment or improper diet of a madhumegam patients leads to form “PATHACHAKKARAM”.

The word “Madhumegam” in Siddha terms correlates with that of “Diabetes mellitus” in modern terms.
Twenty varieties according to the nature of urine have “been described in the ancient siddha texts under the subject “meha Neer”. Depending upon, which of the three body humours is deranged four varieties by Vali, six due to Azhal, and ten due to Iyam. One among in Azhal is called Madhumegam (honey-Urine) or Kshaudra meham in Ayurvedha. Shushrutha (600 BC) classified in to two, one congenital and the other is due to impudicity feeding and irregular way of living.
**SIDDHA - PHYSIOLOGY**

The science of the functions of the living organisms, its compounds, the physical and chemical factors and processes involved is known as physiology.

"சி஦்சரம் பராச்சிரம் தொகுகம்சமூந்தும் ஆர்கள முற்பாகத்து என்று என்று என்று
ஞியுறைந்த அமரநாயகள் காஸ்வீன் குரோம்”

- புரிபாகள் கல்வெளியுள்ள சிவகாசியில் - 800

The height of the human body is 96 inches or 8 saans of their own hands.

**The siddha Physiology involves the basis of**

- **Thathuvas** - ‘96’ Basic elements
- **Udal Kattugal** - ‘7’ Somatic compounds
- **Vegams** - ‘14’ Reflexial functions
- **Suvaigal** - ‘6’ tastes
- **Udal Thee** - ‘4’ Body fires
- **Udal Vanmai** - ‘3’ Immunities.

The living and non living things which are present both in the microcosm has 96 basic elements. These elements are responsible for the creation, protection and destruction of life which is mediated through the

“**Pancha Poothic”** and “**Mukkutra”** theory.
According to the “Yugi Vaidhya Chinthamani and Sathaga Naadi Nool” the 96 Thathuvas are explained as follows.

96 Basic Factors:

"நூலின் புத்தக நூலக்கூற்று

பார்க்கும் பாடு கொண்டு பரவலாகவும்

நோக்கப்படும் கூற்று விளக்கியும்

குறளான வரலாற்று நிறுவனம்

சிற்றியக்கு விளக்கம் அளவு குறந்து

சிற்றியரா ஆறிக்குள்ளான குழுவாகம்

முன்னேறும் மந்தபதி பட்டி மற்றும்

சுருக்கான மந்தபதி கைக் கூறு

அடையாளம் பக்தர் முழு மற்றும்

அரிய மன்னர் அறுநாறு முன்னூர்க்கு

சுருக்கானம் மூலங்கள் மூன்று விளக்கம்

தொன்றிய ஜனாடியா விளக்கம் பரவலாக

வேளாண்மையுடன் விளக்கம் பரவலாக

நூலின் காசு இளமையான மூடு

மாணவர் நிற்கும் காசு கால்கள் நிறையான விளக்கமும்

தொடால் நூலெழுமாய்க்கும் விளக்கும் பொருளினால்

எழும் புரட்சி புலர்ந்தது விளக்கம்.”

- சிற்றியரா ஆறுக்குள்ளாந் சோதனை.
Pancha Pootham – five basic elements

The fundamental principle of siddha science involves the five basic elements namely.

1. Mann - Earth
2. Neer - Water
3. Thee - Fire
4. Vayu - Air
5. Aagayam - Ether

As per the siddha concepts, not only the universe but also the human body is formed by the above mentioned “Five Poothas”.

It is well explained by “Sattamuni” as

“அசைக்குறிக்கையானதாக விளக்கம்

சைக்குறிக்கையானதாக விளக்கம்”

Moreover any changes that occur in the universe has its impair also in the body.

According to “Sathaga Naadi Nool” the Panchapoothic parts of human body are explain as follows:

“அருமையாயத்தாக உண்டு, நீர்வாயு

பரந்து காரணம் வாழ்ச்சிகாரியம்

வழிப்பான செய்து வாழ்ச்சிகாரியம்

ஜெய்சுவாமியின் காரணம் வாழ்ச்சிகாரியம் பாவங்களை

வரும்பான அமைப்பில் வாழ்ச்சிகாரியம்

நிலையில் காப்பில் வாழ்ச்சிகாரியம்

சுருக்கப்பட்டு கூடும் வாழ்ச்சிகாரியம்

மாறு விளக்கம் நிலையில் யார்கையானதாக

அத்தடு வாழ்ச்சிகாரியம் அனல்லதாக விளக்க

அத்தடு வாழ்ச்சிகாரியம் அனல்லதாக

அத்தடு வாழ்ச்சிகாரியம் அனல்லதாக விளக்கம்”. 
### Table No: 1

<table>
<thead>
<tr>
<th>S.No.</th>
<th><strong>Pancha Pootham</strong></th>
<th><strong>Panchapootha and Human Constitution</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Mann</td>
<td>Hair, skin, Bone, muscle and Nerve</td>
</tr>
<tr>
<td>3.</td>
<td>Thee</td>
<td>Fearness, Anger, Idleness, Sleeping and sexual intercourse.</td>
</tr>
<tr>
<td>4.</td>
<td>Vayu</td>
<td>Sitting, standing, waking, running and lying</td>
</tr>
<tr>
<td>5.</td>
<td>Aagayam</td>
<td>Sex, Hardeners, stingyness, lust and pride.</td>
</tr>
</tbody>
</table>

2. **Five sense organs (Porigal)**

1. Skin
2. Tongue
3. Eye
4. Nose
5. Ear

3. **The five object of sense (Pulankal)**

1. Touch
2. Taste
3. Vision
4. Smell
5. Auditory
4. The five organs of action (Kanmaenthirum)

1. Hands
2. Legs
3. Mouth
4. Anus
5. Genitalia

5. The five organ of perception (Gnanaenthirum)

1. Speech
2. Flexion and extension of Lower limb
3. Flexion and extension of Upper limb
4. Motion voided
5. Semen / ovum voided.

6. The four Intellectual Faculties (Karanam)

1. Mind
2. Research
3. Action
4. Finalizing
7. The Ten nerves (Naadi)

1. Idakalai - From right big toe runs opposite side to the left nostril.
2. Pinkalai - From left big toe, runs opposite side to the right nostril.
3. Suzumunai - Passes through both nostrils.
4. Sikuvai - For swallowing of food and water in the uvula.
5. Puruden - It locates at right eye
6. Kanthari - It locates at left eye
7. Atthi - It locates at right ear
8. Alambudai - It locates at left ear
9. Sangini - Vagina or tip of the penis
10. Kuru - It locates Anus.

8. Vayu - Ten vital air forces

1. Pranan
2. Udhanan
3. Vyanan
4. Abanan
5. Samanan
6. Nagan
7. Koorman
8. Kirukaran
9. Devadhathan
10. Dhananjeyan

9. Aasayam - Five visceral cavities

1. Amarvasayam - Stomach
2. Pahirvasayam - Liver, small intestine
3. Malavasayam - Rectum, large intestine
4. Salavasayam - Urinary bladder
5. Sukkila vasayam - Seminal vesicles (or) ovary

10. Kosam

1. Annamayakosam - Made up of seven udal thathukkal
2. Pranamayakosam - Conjunctions of pranan and Kanmenthiriyam
3. Manomayakosam - Conjunction of manam and Gnanenthiriyam
4. Vingnanamayakosam - Conjunction of Suzhuthi and Gnanenthiriyam
5. Anandha Maya kosam - Conjunction of Pranan and Suzhuthi.
11. Six stations of the soul (Aatharam)

1. Moolathaaram
   
   It is a place of Kundalini a vital force.

2. Swathitanam

   It is the place of earth.

3. Manipooragam

   It is the place of water.

4. Anaagatham

   It is the place of fire.

5. Vishuthi

   It is the place of air.

6. Aakinai

   It is the place of space.

12. Mandalam

   1. Agni mandalam   - The area between mooladharam and naabhi kamalam.

   2. Gnayiru mandalam - The area between the chest and the neck

   3. Thingal mandalam  - The central area of the skull.
13. Malam

The three principles of moral exits

1. Motion
2. Urine
3. Sweat

14. Three humours (Thodam)

The physiological functions of the body are mediated by this three humours which made up to five elements. These three functional factors maintain the integrity of the human body.

These are

1. Vali - 10 types
2. Azhal - 5 types
3. Iyam - 5 types

Vali

The term Vali denotes vayu, pain, dryness and flatulence, vatham and responsible for expiration and control of all movements.

Locations

Abanan, Faeces, Idakalai, Pelvic bone, Spermatic cord, Skin, Nerves, Joints, Hair and Muscles.
Character

It governs the other two basic elements and responsible for all physical process in general, for this reason, disturbance in Vali tend to have more severe complication than the other two humors and other attach the mind as well as entire physical body and also responsible for respiration.

Functions

Pain in the whole body, twitching, pricking pain, inflammation, reddish complexion, roughness of skin, hardness of limbs, astringent sense of taste in the mouth, constipation, oliguria, blackish discolouration of the skin, stool, urine and muddy conjunctiva.

Qualities Produced by Increased Vali

1. Vncious - Pasumai
2. Hot - Akkini
3. Solid - Katti
4. Soft - Miruthu
5. Stable - Sthiram
6. Heavy - Paluvu
Opposite Qualities That reduces the Increased Vali

1. Dry - Varatchi
2. Cold - Kulirchi
3. Light - Elesu
4. Rough - Kadinam
5. Unstable - Asaithal
6. Subtle - Anuththusvam

AZHAL

Location

Pirana Vayu, Bladder, Moolagni, Heart, Unbilical region, Abdomen, Sweating, Saliva, Blood, Eyes and Skin.

Characters

It gives digestion, hear, visual perception, hunger, thirst, luster, complextion, understanding, intelligence, courage and softness of the body.

Functions

Acidity, burning sensation in the thorax, yellowish discolouration of the skin, eye, urine, sense of defaecation, profuse sweating and dizziness.
### Qualities

<table>
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<tr>
<th>Qualities</th>
<th>Opposite Qualities</th>
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<tbody>
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<td>Hot</td>
<td>- Akkini</td>
</tr>
<tr>
<td>Mobile</td>
<td>- Oodurval</td>
</tr>
<tr>
<td>Acute</td>
<td>- Kururam</td>
</tr>
<tr>
<td>Liquid</td>
<td>- Salaroopam</td>
</tr>
<tr>
<td>Sour</td>
<td>- Pulippu</td>
</tr>
<tr>
<td>Pungent</td>
<td>- Kaaram</td>
</tr>
</tbody>
</table>

### IYAM

Iyam is life representation of Appu and Mann Pootham. It is responsible for maintenance of body structure and also responsible for the defence mechanism.

### Location

Samanan, Suzhumunai, Vinthu, Head, Fat, Bone narrow, Blood, Nose, Colon, Joints, Chest and Tongue.

### Characters

It givens stability, lubrication, holding together of the joints, ability to hope with hunger, thirst, worry, etc.

Fair complexion, Itching, dullness, cold, heaviness, loss of sensation, and sweetness in mouth and indigestion etc.
<table>
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<tr>
<th>Qualities</th>
<th>Opposite Qualities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Unctious - Eeram</td>
<td>1. Hot - Veppam</td>
</tr>
<tr>
<td>2. Sweet - Inippu</td>
<td>2. Pungent - Kaaram</td>
</tr>
<tr>
<td>3. Heavy - Paluvu</td>
<td>3. Light - Lesu</td>
</tr>
<tr>
<td>4. Cold - Kulirchi</td>
<td>4. Dry - Varatchi</td>
</tr>
<tr>
<td>5. Smooth - Miruthu</td>
<td>5. Rough - Kodinam</td>
</tr>
<tr>
<td>7. Viscid - Valavaluppu</td>
<td>7. Sandy - Kasakasappu</td>
</tr>
</tbody>
</table>

15. **Edanai - 3**

1. Porul Pattru - Material bindings
2. Puthalva pattru - Offspring bindings
3. Ulaga pattru - Worldly bindings

16. **Two deeds (Vinai)**

1. Nal vinai - Good deeds
2. Thee vinai - Bad deeds.

17. **Three cosmic Qualities (Gunam)**

1. Sathuva Gunam - Goodness (or) virtue
2. Raasatha Gunam - Manifestation of passion, pride, courage, zeal etc.
3. Thamatha Gunam - Ignorance manifested in torpor, sleep, lust, anger etc.
18. Five states of consciousness (Avathai)

1. Nanavu - Weak fullness
2. Kanavu - Dream
3. Urakkam - Sleep
4. Perurakkam - Stupor
5. Uyirppadakkam - State of samathy

Seven Constituent Elements (Seven Udal Thathukkal)

The seven thathus are responsible for the entire structure of the body.

"சூரும் மீது மகிழ்ச்சியான வெளியும்
நோயும் மற்றும் பெரும் வெளியும்
மெற்புச் சதுக்கும் பூச்சியும் வெளியும்
நோயும் மற்றும் பெரும் வெளியும்"

- கிருஷ்ணகிருஷ்ண 2086.

Saaram, Senneer, Oon, Kozhuppu, Enbu, Moolai, and Sukkilam (or) Suronitham.

Functions of the udal thathukkal

1. Saaram

It strengthens the body and mind.

2. Senneer

It gives power, knowledge, and boldness to making
3. *Oon*:

It gives the structures and shape to the body and is responsible for the movement of the body.

4. *Kozhuppu*

It lubricates the joints and facilitates their functions.

5. *Enbu*

It forms skeleton of the body, protects, viscera’s and concerned with body movement.

6. *Moolai*

It is present in the bones and gives strength.

7. *Sukkilam (or) Suronitham*

Mean for reproduction

14 - VEGANGAL – URGES

"புதியியாரணி விளைய உரக்கான்
பாறுறிதுவில் அம்ததற்கு உரியது
முதல்வழி முறை சுற்று
முனையில் மாணிக்க லட்சி
சுற்று லட்சியின் துணையானது
டிக்குறி மாணிக்க நடுவானது
நிகழ்த்தும் பத்தான விளையாட்டு
யாத்துண்டியவுடன் செயல்படும்.”
The 14 Reflexes are,

- Flatus  - Cough
- Sneezing  - Relaxation
- Urine  - Sleep
- Faeces  - Vomit
- Yawning  - Tear
- Hunger  - Semen
- Thirst  - Breath

If we control (or) repress any one of the above 14 urges, it will create the diseases.

ARU SUVAIGAL

It is the peculiar sensation caused by the contact of soluble substances with the tongue. These must be taken in a correct proportion for healthy living since these have impact over the humours of the body.

Suvai are more related with the Udal Thathukkal and Uyir Thathukkal

Table - 2

<table>
<thead>
<tr>
<th>Suvai</th>
<th>Bootham</th>
<th>Increased Uyirthathu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inippu (Sweat)</td>
<td>Water + Earth</td>
<td>Iyam</td>
</tr>
<tr>
<td>Pulippu (Sour)</td>
<td>Fire + Water</td>
<td>Azhal, Iyam</td>
</tr>
<tr>
<td>Uppu (Salt)</td>
<td>Fire + Earth</td>
<td>Azhal, Iyam</td>
</tr>
<tr>
<td>Kaippu (Pungent)</td>
<td>Either + Ear</td>
<td>Vali</td>
</tr>
<tr>
<td>Kaarppu (Pingent)</td>
<td>Air + Fire</td>
<td>Vali, Azhal</td>
</tr>
<tr>
<td>Thuvarppu</td>
<td>Air + Earth</td>
<td>Vali, Iyam</td>
</tr>
<tr>
<td>(Astringent)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Udal Vanmai

Udal Vanmai is of three types, namely,

Iyarkai Vanmai

Seyarkai Vanmai

Kala Vanmai

Four Body Fires

1. Samakkini

Usual Routine activities of samana vayu are called “Samakkini”. It is concerned with proper digestion of food.

2. Vishamakkini

It delays digestion of ingested foods and facilitates indigestion.

3. Dheeksanakkini

It facilitates digestion of improperly cooked foods, ingested by individual.

4. Mandakkini

It delays digestion of food stuffs, ingested with satiety, favours, belching, flatulence, gurgling, and distention of abdomen.
SIDDHA PATHOLOGY

PATHOLOGY

The medical science and speciality practice that deals with all aspects of disease but with special reference to the essential nature. The cause and development of abnormal conditions as well as the structure and functional changes that result from the disease processes is termed as pathology.

BASICS OF SIDDHA PATHOLOGY

According to siddha pathology the human body is made of pancha boothams. These boothams are grown in body by food, mediated through the “Aru - suvaigal”. So that it is proved the “suvaigal” has got unique place in the body system.

The five basic elements are taking part in the body through “Uyir thathukkal.” These three types, of essential humours are formed by the combination of

Idakalai + Abanan - vali
Pinkalai + pranan - Azhal
Suzhumunai + Samanan - Iyam

Functions of Uyir Thathukkal are,

- Creation
- Protection
- Destruction
These vali, Azhal, Iyam humours will be in the proportion of 1: 1/2: 1/4 respectively.

Uyirthathukkal is responsible for Udal Thathukkal

The above basic structures of the body system are interlinked with one another. These basic structures are affected by dietic factors, physical activities, and environmental factors resulting the disease.

Noi – (Disease)

The disease is a disorder with a specific cause and recognizable signs and symptoms, and bodily abnormality or failure to function properly except that resulting directly from physical injury.

As per “Siddha Maruthuvanga Surukkam” it is defined as follows.

"சுழல் உடலுறவை விந்து அடுத்துருவது தொட்டு உரைக்குறிகள் மன்னர் உரைக்குறிகள் விருதுள்ள உரைக்குறிகளானால்".

Classification of diseases

Siddhar’s have identified 4,448 diseases. They have classified the diseases mainly on the basis of three humors and its thontha states.

The diseases are diagnosed by the classical method of diagnosis called “Envagai thervugal” and other specific parameters which are explained in our siddha science.
General Aetiological factors

In siddha system of medicine, the common aetiological factors are generally explained in three ways.

1. Agakkaaranam - Intrinsic factors
2. Purakkaaranam - Extrinsic factors
3. Kanmam - Genetic factors
THE SCHEMATIC DIAGRAM FOR THE FORMATION OF DISEASE

Intrinsic Factors
- Diet
- Derangement of mukkuttram
- Alteration of udal kattugal
- Suppression of 14 vegangal

Extrinsic Factors
- Environmental Changes
- Seasonal Changes
- Nilam
- Occupation
- Ozhukkam
- Omission of preventive aspects

Genetic factors
- Uyirthathukkal (3 Humours)
- Udal Thathukkal (7 Physical Constituents)
- Noi Nilai (Disease)
The changes in any one of the above basic structures, from the basis of pathology. This can be explained, briefly as follows.

**Intrinsic Factors**

1. **Diet**

   Increased Inippu suvai is responsible for obesity, indigestion, diabetes, cervical adenitis, increased lyam and its disease.
2. **Pulippu (Sour)**

Increased Pulippu suvai is responsible for body weakness, dull vision, giddiness, anaemia, dropsy, and feverishness, dryness of the tongue, herpes, scabies and blister.

3. **Uppu (Salt)**

Increased Uppu suvai is responsible for ageing, falling of hair and progressive weakness of the body.

4. **Kaippu (Bitter)**

Increased Kaippu suvai is related to Vali disorders of physical constituents.

5. **Kaarppu**

Increased Kaarppu suvai is related to excessive dryness of the tongue, defect in spermatogenesis, general malaise, lassitude, tremors and back pain.

6. **Thuvarppu**

Increased Thuvarppu suvai is related to abdominal discomfort, heart disease, tiredness, vascular constriction and constipation.
“புனிதமான விகிதநிலையான மருந்துக்கள் மாடு 
தொண்டும் இலக்கியப் பிள்ளையான குழந்தை - கிருட்டியும் 
குருவிகள் முதல் விளக்கம் முதல் எவும் குச்சந்த 
சேர்ந்த புலியான இந்தசராணரிகள்”

It is of 3 types namely:

★ Vali
★ Azhal
★ Iyam

These Vazhi, Azhal, Iyam humours will be in the proportion of 1:1/2: 1/4 If there is any change (increase or decrease) from above, caused by aetiological factors. (Diet, physical activities, environmental factors etc.,) it will result the disease. This can be quoted in the following schedule.
### Signs and Symptoms

<table>
<thead>
<tr>
<th>Quantitative</th>
<th>Vali</th>
<th>Azhal</th>
<th>Iyam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Character</td>
<td>Wasting, blackish discolouration, tremors</td>
<td>Yellowish discoloration of eyes, skin</td>
<td>Loss of appetite, excessive salivation</td>
</tr>
<tr>
<td>Increased</td>
<td>Distended abdomen, constipation, weakness, Insomnia, Lack of Inspiration.</td>
<td>Polypahgia, burning, sensation all over the body, sleeplessness.</td>
<td>Diminished activity, heaviness, cough, dyspnoea, excessive sleep.</td>
</tr>
<tr>
<td>Decreased</td>
<td>Body pain, feeble voice, diminished capacity of brain, syncope.</td>
<td>Decreased appetite, symptoms associated with defective growth of Iyam.</td>
<td>Giddiness, dryness of the joints prominence of bones, dry cough, lightness, palpitation excessive sweating</td>
</tr>
</tbody>
</table>

The human body is built up by the 7 Udal thathukkal which are present in certain fixed proportions in every body. If there is any change in the proportions the diseases will occur.

**SAARAM**

**Increased Features**

Features identical to those encountered in increased Iyam occurs eg: Loss of appetite.
Decreased Features

- Dryness of skin
- Loss of weight
- Tiredness
- Diminished activity of sense organs

SENNEER

Increased features

- Boil and tumours in different parts of the body.
- Splenomegaly, hypertension
- Reddish eye and skin
- Jaundice and haematuria

Decreased Features:

- Tiredness
- Dryness
- Lasstitude
- Anaemia

OON

Increased Features

Tumours or extra growth around neck, face, abdomen, thigh, genitalia etc.,
Decreased features

- Muscle wasting
- Lethargic of sense organs

KOZHUPPU

Increased Features

Features of increased Oon, associated with dyspnoea on exertion.

Decreased Features

- Joint pain
- Emaciation

ENBU

Increased Features

Excessive ossification and dentition

Decreased Features

- Weak bone, nails and teeth
- Associated with splitting of hairs, nails.

MOOLAI

Increased Features

- Heaviness of body
- Swollen of interphalangeal joints
- Oliguria
- Non healing ulcers
Decreased Features

- Osteoporosis and sunken eyes.

SUKKILAM OR SURONITHAM

Increased Features

- Increased sexual activity
- Urinary calculi.

Decreased Features

- Pain in the Genitalia accompanied by inability to reproduce.

14 - VEGANKAL

The person who is trying to control or suppress the 14 vegams (reflexes) he will be affected by the following diseases.
<table>
<thead>
<tr>
<th>Vegams</th>
<th>Causing the diseases</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Vatham</td>
<td>Chest pain, peptic ulcer, abdominal pain, body ache, constipation, oliguria, and indigestion.</td>
</tr>
<tr>
<td>2. Thummal</td>
<td>Headache, Facial pain, back pain, pain in the sense organs etc.</td>
</tr>
<tr>
<td>3. Siruneer</td>
<td>Ulcers in the urethral orifice, joints pain, urinary tract infection.</td>
</tr>
<tr>
<td>4. Malam</td>
<td>Calf muscle pain, headache, general debility, flatulence and other disease</td>
</tr>
<tr>
<td>5. Kottavi</td>
<td>Indigestion, contractures in the face.</td>
</tr>
<tr>
<td>6. Pasi</td>
<td>Constipation, of the body is totally disturbed, emaciation.</td>
</tr>
<tr>
<td>7. Neervetkai</td>
<td>Constipation, of the body is totally disturbed, emaciation.</td>
</tr>
<tr>
<td>9. Ilaippu (Rest)</td>
<td>Ulcer and other mega diseases.</td>
</tr>
<tr>
<td>10. Nithirai</td>
<td>Heaviness of the head, eye pain, deafness, speech disturbances.</td>
</tr>
<tr>
<td>11. Vaanthi</td>
<td>Urticaria, skin disease, toxic manifestations, anaemia, eye diseases.</td>
</tr>
<tr>
<td>12. Kanneer</td>
<td>Eye disease, head ache, sinusitis, and heart diseases.</td>
</tr>
<tr>
<td>13. Sukkilam</td>
<td>Joints pain, fever, chest pain, difficulty in micturition.</td>
</tr>
</tbody>
</table>
Extrinsic Factors

Environmental Factors


Nilam

Kurinji - Fever, anaemia, Liver enlargement, iyaa disease, etc.

Mullai - Vali and Azhal diseases are predominant

Marudham - Favourable places for Living

Neidhal - Vali diseases, elephantiasis, Hepatomegaly

Palai - Abode of all ailments

Seasonal Changes

Kurinji - Fever, anaemia, Liver enlargement, iyaa disease, etc.
<table>
<thead>
<tr>
<th>குறிப்பிட்டு</th>
<th>பதிப்பு</th>
<th>ரீதியாயமான இலக்கியம்</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>சேர்க்கலம்</td>
<td>மேல் ↑ ↑</td>
</tr>
<tr>
<td></td>
<td>கொட்டம்</td>
<td>மேல் ↑</td>
</tr>
<tr>
<td>2.</td>
<td>கொட்டிக்கலம்</td>
<td>மேல் --</td>
</tr>
<tr>
<td></td>
<td>கொட்டம்</td>
<td>மேல் ↑</td>
</tr>
<tr>
<td>3.</td>
<td>சேர்க்கலம்</td>
<td>மேல் --</td>
</tr>
<tr>
<td></td>
<td>கொட்டம்</td>
<td>மேல் --</td>
</tr>
<tr>
<td>4.</td>
<td>சேர்க்கலம்</td>
<td>மேல் ↑</td>
</tr>
<tr>
<td>5.</td>
<td>சேர்க்கலம்</td>
<td>மேல் ↑</td>
</tr>
<tr>
<td>6.</td>
<td>சேர்க்கலம்</td>
<td>மேல் ↑</td>
</tr>
</tbody>
</table>

↑↑ - கதைசாவால் மங்கலக்கை
↑ - வேதாய்த்தியல் மங்கலக்கை
- - கதைசாவால் அந்தம்

↑↑ - வேதாய்த்தியல் மங்கலக்கை
↑ - கதைசாவால் மங்கலக்கை
- - கதைசாவால் அந்தம்
In this modern world, there is a wide opportunity for the human to
derail from the disciplined path. It is caused dreadful diseases to enter
into the man.

Omission of Preventive aspects

"தேவாலய மறுவழாதாரத்தின் செய்யும் செயற்கைக்கூற்று அருள்பார்க்க வேண்டும்
மார்க உண்பாக வேண்டுதேயிலே விளக்கக்கூறு ே தோல்நிலக்கன
திறனாகத் தொக்கு தோல்நிலக்கூறு பத்துவாக்கு
திறனாகத் தொக்கு வேண்டுதேயிலே".

"பெருவொட்டிகள்: தம்தமலாணை - பாழின் திறகாயில்கு சலிப்பேறு:
பெருவொட்டிகள்: பாழின் சிறு முறை
சதுமறை அரங்கியார் பல்வேறு விளக்கப்படுத்து
சிறுசிறு விளக்க: பழந்த விளக்க: சிறந்த பல்வேறு
சதுமறை கரு விளக்க, முழு - துழ்ந்தமலாணை:
சுள்ளகர்கள் கூடுதல்கள் பல்வேறு விளக்கம்:
சதுர்கர்கள் முழுதலை பல்வேறு முழுதை
துணைவுக்கு உடனுறை முழுதை விளக்கம்"
III Kanman – Genetic factor

Kanmavinai mentioned as an important cause for disease.

"கல்விகள் விளைவாக குரலில்
பலவாயிலிலிருந்த குண்டு நீக்க வசூரத்
குரலைகள் விளைவாணி விளையாடும் வசூரத்
துப்புறமும் தீமச்சு தீமச்சு வசூரத்
பலவாயிலிலிருந்து பற்றிய குண்டு நீக்க
பலவாயிலிலும் பலவாயிலாக குரலில்
குரலைகள் விளைவாணி விளையாடும் வசூரத்
குரலைகள் விளைவாணி விளையாடும் வசூரத்
குரலைகள் விளைவாணி விளையாடும் வசூரத்
- செய்யும் அமாவசை குடும்ப

GENERAL CAUSES FOR DISEASE

According to “Theran Karisal”

"தொன்பதியை பதிகைகள் விளையாடும் கூட்டிகள்
தொன்பதியில் மீச்சார்கள் தொன்பதியில்
தொன்பதியில் மீச்சார்கள் கார்கள் தொன்பதியி
தொன்பதியில் மீச்சார்கள் தொன்பதியில்
தொன்பதியில் மீச்சார்கள் தொன்பதியில்
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தொன்பதியில் மீச்சார்கள் தொன்பதியில்
தொன்பதியில் மீச்சார்கள் தொன்பதியில்
தொன்பதியில் மீச்சார்கள் தொன்பதியில்
- செய்யும் அமாவசை குடும்ப
1. Kanma vinai
2. Dietic factor
3. Hat redness with other things
4. Emotion and excitement
5. Starvation and fasting
6. Improper intake of water
7. Directly seeing the sun with naked eye
8. Always speaking with high pitched tone
9. Sexual contact with diseased lady
10. Idleness
11. Psycho somatic problems
12. Wearing wet cloths
If there is any changes (increased or decreased) in the basic structure mentioned in the basic of siddha pathology, resulting in disease.

This is quoted in the above “Thirukural”
PINIYARI MURAIMAI – DIAGNOSIS

Pini yari muraimai means method of finding out the diseases. The following three words are combined to form this word piniyarimuraimai.

**Piniyari Muraimai**  -  **Pini + Yari + Muraimai**

**Pini** means  -  The disease which catch the body  
**Yari** means  -  Identifying the diseases  
**Muraimai** means  -  Rules and methods  

As per siddha literature, the diagnosis is based upon three main principles.

1. **Poriyal arithal**
2. **Pulanal arithal**
3. **Vinaathal**

**Poriyal arithal and pulanal arithal**

**Poriyal** means five organs of perception **pulangal** means five objects of the sense organs.

<table>
<thead>
<tr>
<th>Porigal</th>
<th>Pulangal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Nose</td>
<td>Smell</td>
</tr>
<tr>
<td>2. Tongue</td>
<td>Taste</td>
</tr>
<tr>
<td>3. Eyes</td>
<td>Vision</td>
</tr>
<tr>
<td>4. Skin</td>
<td>Touch</td>
</tr>
<tr>
<td>5. Ear</td>
<td>Sound</td>
</tr>
</tbody>
</table>

The application of poriyalarithal and pulanalarithal form the fundamental step in the diagnosis of a disease.
Vinaathal

It is asking questions concerned with the history of disease, and its clinical symptoms etc., to the patient (or) asking to his neighbour, when the patient is not able to speak, or the patient to be a child. These three principles are affected through the Envagai thervugal.

ENVAGAI THERVUGAL

Envagai thervugal are having a broad and important role in diagnosing the particular disease. It is very much needed to have a thorough knowledge in it. According to siddha medical science without having knowledge in envagai thervugal, we can’t diagnose the diseases.

“Theriyar” mentions the Envagai thervugal as follows.

"நோக்கத்தில் விளக்கம் புற்றிட்டு விளக்கத்தில் கக்கும்"

According to the “Noi - naadal” the eight types of Investigations are quoted as below.

"ராச்சு பற்றிய திறன்களுக்கு திறன்
மறு செய்திகள் உறுதியான பதவியும்"

1. Naadi - Pulse
2. Sparisam - Palpation
3. Naa - Tongue
4. Niram - Colour
5. Mozhi - Speech
6. Vizhi - Eye
7. Malam - Motion
8. Moothiram - Urine

1. Naadi (signs in hand pulse)
   Is nothing but the vital energy that sustains the life in our body. It has been considered for assessing the prognosis and diagnosis of the disease. Any variation that occurs in the three humours is reflected in the naadi. It serves as a good indicator of all ill health. It can be perceived by feeling it at the appropriate sites.

2. Sparisam
   Reveals that the structural and sensational changes present through the body.

   eg:
   
   - Skin temperature (Heat or cold)
   - Sweat
   - Dryness
   - Tenderness
   - Swellings
   - Nourishment etc.,

3. Naa (Tongue)
   It reveals that structural changes, colour changes in the tongue, any ulceration, deviation etc.,
4. **Niram (Colour)**

    It reveals that any change in the colour of the skin, nails, hairs, conjunctiva teeth, mucous membrane. Etc.

5. **Mozhi (Sound and speech variation)**

    It reveals that means the quality of sound the made of speech, and intelligence is to be assessed.

6. **Vizhi (Eye)**

    It reveals that the systemic changes in the organs, by changes in its colour, structure of the eye and any discharge in the eye. It is also reveals the function of the eye.

7. **Malam (faeces)**

    The colour, amount, and consistency of the faeces will reflect the pathological condition of the body.

8. **Moothiram (Urine)**

    Urine is a fluid excreted by the kidney, which contains many of the body’s metabolic end products, In modern aspect, biochemical analysis of urine is commonly used in the diagnosis of the diseases and in pregnancy test.
In siddha system of medicine examination of urine by neerkuri and neikkuri are more useful to diagnose the disease.

"அதைத் தர்க்கம் சவரினர்
நான்கு வகைப்படுத்தியது
மருத்துவம் மறு குறிப்பிட்டு
வியல் வேறுபாட்டிலும்
நீர்குரி பயனுள்ள அம்மை
நீக்குரி கீழ்த்து வல்லறை
வித்தியாசம் வருமான விளக்கம்
பராமரிகள் கூறும் மேம்பானக்"

முடியும்:

பாரதீசியவன் மாணவர்கள், நிதியாள கதவுப்புறம் விளக்கமில்லை
காட்சியும் சிக்கு வெளியே செய்யள்ளியே விளக்கம்.

Collection of urine for Neerkuri and Neikkuri

"அதைத் தர்க்கம் சவரினர்
அ:கவு அம்மையும் அகரவும் தவிர்க்கும்
சுருக்கங்களும் நேர்மை கான்களும்
நூற்று குறுக்கு கருவியக்கும்
நீர்குரி கீழ்த்து வல்லறையோடு
வித்தியாசம் வருமான விளக்கம் காட்சியும்"

- சுத்தியமை

Prior to the day of urine, examination, the patient should be advised to take a balanced diet and should have good rest. The very first
urine of the patient is collected in a glass or a porcelain container. Through the urine should be examined only according to the rules and regulations, at times of emergency they can be relaxed which is quoted as,

"அருட்சு தியங்க காணும் விளக்கம்"

Neerkuri

"சுருக்கு கொண்டு சொல்ல அல்லது வருமளவில்து
சுருக்கு விளக்கம் விளக்கம்"

Colour, quantity, odour, frothy appearance constituents, specific gravity of urine. Are physical findings.

1. Niram

   It indicates the colour of urine, voided it may be yellow, red, green, black, crystal and smoky etc.

2. Edai

   It indicates the specific gravity of urine (increased (or) decreased quantity)

3. Manam

   It indicates the smell of urine, such as pleasant, foul smelling, honey smell, fruit smell, and fish smell.

4. Nurai

   It indicates the frothy nature of urine
5. Enjal

It indicates the inorganic and organic deposits like salts, crystals, etc, and amount of urine extracted.

Neikuri

"பிறந்துமுடிக்காது நிறையமென்னும் பிறந்தும் மட்டும் பேராயாது
பக்தவை கையில் வேகமாகவே வலமுள்ளில் கூடிய விளக்கனே”
அதுவே நிற்காது குழுத்தாது கிளர்ச்சியும் மூழ்கலிட்டு
குறலமான பிங்கு தரமான் தலையை கற்று இவறே".

A drop of gingili oil is dropped in to the centre of a upper surface of the urine, if the oil spreads like snake indicates Vali, spreads like ring indicates Azhal, remains floating as a pearl indicates Iyam, mixed reaction of any two indicates thontham.

Basically siddha aims to maintain the equilibrium, between the five elements deposit our constant interaction with the outer world.

The five elements, which work as and vital forces in the body and perform all physical and mental functions are constantly affected by time space and nutrition.
AIM AND OBJECTIVES

The author had selected the disease “PATHACHAKKARAM” for dissertation work, because,

“Pathachakkaram” is a complication of Madhumegam (Diabetes mellitus). The diabetes mellitus is an outstanding problem facing the world nowadays affecting the both rich and poor societies. The rate, of complication like diabetic foot is a guilt dread, of disability, long stretches of hospitalization, mounting impossible expenses, with the ever changing end result of on amputation. This makes the diabetic foot the most feared and devastating complication of diabetes.

Aim

To study the disease on the basis of Siddha physiology and Siddha pathology, emphasizing more importance to Mukkutram, Suvaigal, Panja bootha theory, Udal thathukkal and diagnose the patient on the basis of envagai thervugal and confirm the prognosis on the basis of “Neikuri”

Objectives

❖ To fullfil the aim the following objectives has been drawn.

❖ To collect all Literary evidences about Patha rogangal diseses in detail

❖ Aetiology, and Clinical presentation of the disease
- Pathology of the disease
- Changes in the Mukkutram
- To study in detail about the incidence of the disease with age, sex, socio-economic status, habits and prevalence.
- To bring forth the high lights of Siddha system of diagnosis, Envagai thervu and modern aspects.
- To confirm the diagnosis in Siddha system with the help of modern parameters.
- The complication of the diseases is also dealt with.
ELUCIDATION ABOUT PATHACHAKKARAM

"காலாந்தர் வரும் நீர் நோய்ப்பிலும் பாதுகாப்பு

செய்யும் விதத்தில் குள்ளேறிய பாதுகாப்பு பாதுகாப்பு

வெளியில் வல்லாக வெள்ளாக வாக்குறை

சிறுகாற்றி திறன் பாதுகாப்பு குள்ளேறிய பாதுகாப்பு

குற்றதில் விளையாட்டிட பாதுகாப்பு குள்ளேறிய பாதுகாப்பு

நூற்றாண்டில் அணிகிம் II முடி பாதுகாப்பு

பாதுகாப்பு சந்தை புறம் - பாதுகாப்பு சந்தை புறம் - A kind of festering sore in the foot.

திண்ணம் - என்றாங்கியில் பாதுகாப்பு, குள்ளேறிய, பாதுகாப்பு -

Numbness

நிறைமுக - நிறைமுக, உயிரிய - Burning Sensations

வேளை - வேளை, பாதுகாப்பு குள்ளேறிய - Heaviness

பொழி - Pain

நட்டை காரணம் - நட்டை காரணம் - Plantor region

நூற்றாண்டி - ஆர்க்காப்பு - Increased in size

நுழை - நுழை - Callus

பீடம் (பீடம்) - பீடம், பீடம் - Fissure

சிற்றறி - சிற்றறி - Itching

திண்ணமும் - Whoozing
The features of peripheral neuropathy are mentioned in the first 2 lines of the poem.

They are,

- Numbness, which is different from normal person.
- Burning sensation in the foot.
- Heaviness in the foot.
- Pain in the foot.

The formation of ulcer is described in next two lines of the poem.

- They are callus formation.
- Fissure in the callus.
- Itching and oozing from the ulcer,
- Then the ulcer become reddish in appearance.
DETAILED PATHOLOGICAL VIEW OF
DISSERTATION TOPIC

SIDDHA VIEW

As per Siddha system, our human body works under the principle of 96 Basic principles, any disturbances in the harmony of this 96 principles leads to changes in the homeostatic mechanism of 3 humours and 7 Udal Kattugal and leads to disease.

Pathachakkaram, one among the 9 types of patha diseases as given in the Patharoga Nithaanam, taken from the Thanvanthri vaithiyam. Part-II.

"..." - Thanvanthri vaithiyam –II part.
Each patha diseases and their symptoms are being illustrated by the author in separate poems.

Pathachakkaram is a complication of Madhu megam (Diabetes mellitus)

Basic etiology of Mega noi is

"பாத பாத இழிப்பு மறுத்து இழிய காணியார்".

- விளக்கம்

So the basic cause is disturbance of Azhal humour. Intrinsic and Extrinsic factors which affects the Azhal humors.

"தொன்றும் காண வாங்குகிற
tொன்றும் மைச்சுகிற வாங்கு
பாதும் விதமும் பாதும்
பாதும் மைச்சும்
பாதும் பாதும் பாது
பாதும் மைச்சும் மைச்சு
பாதும் மைச்சும் மைச்சு
மைச்சும் மைச்சும்
மைச்சும் மைச்சும்
மைச்சு மைச்சு மைச்சு
மைச்சு மைச்சு மைச்சு
பாதும் பாதும் பாதும்

- Agasthiyar - 1200
From the above causes, the Azhal Kuttram is increased.

"அழ்லிக்குழ் பாதிக்கவாழ் காதலூற் காட்டை
உறைக்கி வெளிப்படையக் குற்றாக விடுத்து
அழ்லிக்குழ் பாதிக்கவாழ் காதலூறம்
அழ்லிக்குழ் பாதிக்கவாழ் காதலூறம்
அழ்லிக்குழ் பாதிக்கவாழ் காதலூறம்
அழ்லிக்குழ் பாதிக்கவாழ் காதலூறம்.

- Yugi Vaithiya cinthamani

The above stanza says that, increased Azhal kuttram – increases the moolakkanal, resulting in constant elimination of all the essential nutrient from the body through urine.

Primarily, due to intrinsic and extrinsic factors, the Azhal thathu in the body gets vitiated initialy. This is followed by the derangement of metabolic energy (Moolakkanal) caused by involvement of vali force, ultimately the function of Vali and Iyam also become altered resulting in disturbance in homeostatic mechanism and functions of all the seven Udal Kattugal.
Gradually the Vital energy building factors essential for physiological, psychological and social well being and are being eliminated or excreted through urine due to increase in moolakkanal. As a result of this vital energy loss, the humours gets disturbed.

So in this disorder all “The three thodams, major subdivisions of vali, and their functions and all the seven Udal kattugal are simultaneously affected.”

This is indicated clinically by the weakness of seven UdalKattugal and other complications, associated with this disease.

"அஹாய்கை விளக்கங்கள் வங்குலகை வாழ்க
குழந்துக் கோள்கை வாழ்கயவ் கைனும் வேகம்."

- Pathinen siddhar naadi nool

The above stanza says that the metabolic fire become acute, resulting in depletion of vital factors from the tissues leading to constant elimination of all the essential nutrient from the body through copious secretion and elimination of urine.
The symptoms of Pathachakkaram

"பாதச்சக்கரம் மருட் நடு தோற்றம்படும்
enc jednoc நுழை செய்ததின் புருந்து வாகினாக்கண்
நல்நடுவின் பல்கி விலை தமக்கு வரக்குறை
திருத்தாணி இரு பட்படு விழுமான்றுசெய்கின்
திறந்து பிள்ளை விளைந்த மக்கள் குறுக்குறை

நுலகத்திலும் நமது மருத்துவம் விளைந்தது மாறு விளைந்தது.

- Thanvanthri Vaithiyam – II part

In Agasthiyar naadi book

"சுமங்கலம் ஆடாது விளைந்தது
தின்நடுவின் பல்கி விளைந்தது
மேய்ப்படுத்து நூற்றாண்டு தொடுகிறது மாறு விளைந்தது.

In Pathachakkaram patients degenerative changes first occur in the peripheral nerves of the foot.

Abnormality in Azhal humour disturbs the normality of Vali humour, there by alters the neural mechanism in the body leading to degenerative changes in the peripheral nerves leading to Peripheral neuropathy, following the features of,

- Numbness in the foot
- Burning sensation in the foot
- Heaviness of the foot
- Pain in the foot
Normally Vali is living in the nerves and its maintaining the normal physiological function of the body. It maintains both sensory and motor activities of the body. This concept is quoted as.

"ஏற்கனூட்டு பெருநோக்கு செய்கிறது"

So any alteration in vatham, degenerative changes occurs in nerves. It is quoted as.

"ஏற்கனூட்டின் வெளியிலும் பெருநோக்கின் செய்வதே கூறுகிறது"

The last line of the poem describes the following line,

"சாறிகளில் நீக்க வாத்து சிரமாண்டிக்கு வெளியில் பெருநோக்கின் செய்வதே கூறுகிறது"

The increased foot pressure causes the following features,

- Callus formation
- Fissure in the callus
- Itching and whoozing
- Erythematous ulcer formed
MODERN VIEW

“கார்கல்குடு என்று தெய்ய நெருப்பா செற்றுவி என்று சொல்ளி மாற்றியார்.”

“மாற்றம் என்று சொல்ளி சுருள் என்று விளையாட்டிய
சிற்றுயிர் நெருங்கு வெறும் வெங்கும் இயல்களே.”

❖ In this poem the author Thanvanthri has explained the ailment in
the 2 steps

❖ In first 2 lines the author explain about the feature of Peripheral
Neuropathy and in the next following 2 lines about the
complication of Peripheral Neuropathy.

Features of Peripheral Neuropathy

"கார்கல்குடு என்று தெய்ய நெருப்பா செற்றுவி
சொல்ளி என்று சொல்ளி சுருள் என்று விளையாட்டிய.

திரிநி - Numbness
தங்கும் - Burning Sensation
கரைம் - Heaviness
மரை - Pain
சேர்த்து - Plantar region.
The above abnormal sensory phenomenon is divided into two main categories.

- Negative phenomenon
- Positive Phenomenon

The most common type of diabetic neuropathy affects the nerves in the leg and usually known as Peripheral Neuropathy. It affects mainly the sensory nerves although the Motor and Autonomic nerves can also be involved with important consequences.

**Negative phenomenon - குறை, குறை**

Negative phenomenon is Numbness and Heaviness. It represents loss of sensory function and are characterized by diminished or absent feeling, often experienced as numbness.

In contrast to positive phenomena, negative phenomena are accompanied by abnormal findings on sensory examinations. In disorders affecting peripheral sensation, It is estimated that at least half the afferent axons innervations a given site are lost or functionless before Sensory deficit can be demonstrated by clinical examination. This estimate probably varies according to how rapidly sensory nerve fibers have lost function. Sensory Symptoms may be either positive or negative. But sensory signs on examination are always a measure of negative phenomena.
Positive phenomenon - விபத்து, மெரு

Positive Phenomenon is tingling (pins-and-needles). In addition the tingling it include other altered sensations that are often described as, Burning, pricking, band like, lancinations, aching, knifelike, twisting, drawing, pulling, electrical or raw feelings. These descriptors are frequently the actual words used by patients. Such sensations may or not be experienced as painful.

- Both this positive and negative phenomena causes, the patient feels, the heaviness of foot
- People with poorly controlled diabetes for a long time are more likely to get chronic painful neuropathy.
- A number of theories have been suggested, for the symptom. It is thought that,
  - High blood glucose causes changes to the nerve fibers which results in abnormal nerve signals.
  - High blood glucose causes changes to blood vessels which supply the nerves.
  - Unknown factors release chemicals, that irritate the nerves and active pain receptors.
Complication of Peripheral Neuropathy the Foot Ulcer

“சிவார் முறையில் வழுந்து பொன்னுடன் மெய்திக்கும்”

சோதனை - Increase in size

அடைய - Callus formation

விளை - Fissure

தீசார்கி தூரி - Itching and whoozing

மூழுந்த - Erythematous ulcer.

Formation of Callus – குழி

Callus is a cellular proliferation of epidermis produced by repeated pressure of friction. It presents with firm, raised, superficial, less demarcated, sis with localized area of compact scales.

Motor neuropathy leads to atrophy of the small muscles of the foot, with an imbalance between flexors and extensors. These changes result in clawing of the toes, prominent metatarsal heads, and forward migration of the fibro fatty pads. As a result, high pressure develop is under the metatarsal heads, both during standing and walking leads to
Callus Formation.

Fissure Formation – மண்டுக

High foot pressure combined with a dry, brittle skin (as a result of autonomic neuropathy) leads to callus formation, which act as a foreign body and can cause tissue damage and forms fissures leading to foot ulceration.

Causes for itching and whoozing - பகையும் நீங்கும்

A combination of Neuropathy, hyperglycemia and ischemia worsen the situation by reducing the defense mechanism. The diabetic foot ulcer is easily infected.

Foot has several compartments which are inter-communication and lack of pain due to neuropathy allows the patient to continue ambulation, facilitating spread of infection from one compartment to another.

So, infection of foot ulcer cause Itching And Whoozing from the ulcer.

Erythematous Ulcer - முல்லை உலர்

Continued presence of infection, inside the foot leads to pressure effects on capillaries and neurovascular bundles causing further damage of tissues. It leads to reddish appearance of ulcer.
ANATOMY

As Pathachakkaram has Peripheral Neuropathy as cause of its occurrence, here in this dissertation anatomy of both sole and Neuron are described.

Anatomy of the Sole of foot

Muscles are arranged in four layers with the neurovascular bundles between first and second layers and then between third and fourth layers. There is only one plantar arch in the sole. All the intrinsic muscles, i.e. muscles confined to the sole only are supplied of either of the two plantar nerves. The extrinsic muscles of the sole are supplied by the nerve of the respective compartment. The tendon and muscles of the sole maintain, the arches of the foot.

The structure of the sole

- Skin
- Superficial Fascia
- Muscles
- Vessels and nerves

Skin

The skin of the sole, like that of the palm is

- Thick for protection.
- Firmly adherent to the underlying plantar aponeurosis creased.
- These features increase the efficiency of the grip of the sole on the ground.
**Nerve supply**

The skin is supplied by three cutaneous nerves

- The medial calcanean branches of the Tibial Nerve to the posterior and medial portions.
- Branches from the Medial plantar nerve to the smaller anterolateral portion including the lateral one and half a digits.
- These nerves are derived from spinal nerves L₄, L₅ and S₁
- In eliciting the plantar reflex, the area supplied by segment S₁ is stimulated.

**Superficial Fascia**

The superficial fascia of the sole is fibrous and dense. Fibrous bands bind the skin to the deep fascia or plantar aponeurosis, and divide the subcutaneous fat into small and tight compartments, which serve as water - cushions and reinforce the spring-effect of the arches of the foot during walking, running and jumping. The fascia is very thick and dense over the weight-bearing points. It contains cutaneous nerves and vessels.

**Deep Fascia**

The deep fascia of the sole is specialized to form

- The plantar aponeurosis in the sole.
- The deep transverse metatarsal ligaments between the metatarso phalangeal joints.
- The fibrous flexor sheaths in the toes.
Layers of the foot

The muscles of the sole are arranged in 4 layers.

I. First Layer

3 Short muscles lie side by side along the sole of the foot.

1. Flexor digitorum brevis

Action

It flexes the proximal interphalangeal and the metatarso phalangeal. Its of the lateral 4 toes, and helps to reinforce the longitudinal arch of the foot.

Nerve supply - Median plantar Nerve.

2. Abductor hallucis

Action - It moves the big toe away from the second toe.

Nerve supply - Medial plantar nerve.

II. Second layer

This consists of the long flexor tendons and their connections in the sole. These are

- Tendon of flexor hallucis longus.
- Tendon of flexor digitorum longus.

Flexor accessories

Action

By pulling on the tendons of flexor digitorum longus, It provides a means of flexing the lateral four toes in any position of the ankle joint, particularly in full plantar flexion.
Lumbrical muscles

Nerve supply  
Median plantar N.
Lateral plantar N.

Action
It maintains extension of the digits at the interphalangeal joints, while the flexor digitorum longus tendons, are flexing the toes, so that in walking and running the toes do not buckle under.

III. Third Layer  It consists,

1. Flexor hallucis brevis

Action - To flex the proximal phalanx of the big toe.

Nerve supply - Medial plantar nerve.

2. Adductor hallucis

Action
The muscle draws the big toe towards the axis of the metatarsus and thus assists in maintaining the transverse arch.

Nerve supply - Lateral plantar nerve

3. Flexor digiti minim brevis

Action - To assist in flexing the little toe.

Nerve supply - Superficial branch of the lateral plantar nerves.

IV. Fourth layer
It consists of the interossi in the intermetatarsal spaces.
**Interosseous muscle**

**Action**

The adducting and abducting actions of the interossi are of little significance in the human foot. It is more important that; like their companions in the hand, they assist the lumbricals in extending the interphalangeal joints and flexing the metatarso phalangeal joints.

**Nerve supply:** Lateral plantar nerve.

**Plantar vessels:**

The chief arteries of the sole are the

- Median plantar artery.
- Lateral plantar artery.

They are terminal branches of the posterior tibial artery

**Median plantar artery**

*Table - 6*

<table>
<thead>
<tr>
<th>Branches</th>
<th>Structure supplied by them</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Cutaneous branches</td>
<td>Supplying the overlying skin and toe the adjoining muscles.</td>
</tr>
<tr>
<td>2. Muscular branches</td>
<td></td>
</tr>
<tr>
<td>3. Three small superficial digital branches</td>
<td></td>
</tr>
</tbody>
</table>
Lateral plantar Artery

Table – 7

<table>
<thead>
<tr>
<th>Branches</th>
<th>Structures supplied by them</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Muscular branches</td>
<td>Supply the adjoining muscles</td>
</tr>
<tr>
<td>2. Cutaneous branches</td>
<td>Supply the skin and fasciae of the lateral part of the sole.</td>
</tr>
<tr>
<td>3. Anastamotic branches</td>
<td>Reach the lateral border of the foot and anastamose with arteries on the dorsum of the foot.</td>
</tr>
<tr>
<td>4. Calcaneal branches</td>
<td>Is occasionally given off to the skin of the heel.</td>
</tr>
</tbody>
</table>

Plantar Nerves

The chief nerves of the sole are the,

- Medial plantar nerve
- Lateral plantar nerve

They are terminal branches of the tibial nerve.
**Median plantar nerve:**

*Table – 8*

<table>
<thead>
<tr>
<th>Branches</th>
<th>Structures supplied by them</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Articular branches</td>
<td>c. Flexor hallucis brevis.</td>
</tr>
<tr>
<td></td>
<td>Skin of the medial part of the sole.</td>
</tr>
<tr>
<td></td>
<td>Medial 3½ of toes through four digital arteries.</td>
</tr>
<tr>
<td></td>
<td>Joints of the tarsus and metatarsal.</td>
</tr>
</tbody>
</table>

**Lateral plantar nerve**

*Table – 9*

<table>
<thead>
<tr>
<th>Branches</th>
<th>Structures supplied by them</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Main trunk</td>
<td>Flexor digitorum accessorius.</td>
</tr>
<tr>
<td></td>
<td>Abductor digiti minimi.</td>
</tr>
<tr>
<td></td>
<td>Skin of the sole.</td>
</tr>
<tr>
<td>a) Superficial branch</td>
<td>Flexor digiti minimi brevis</td>
</tr>
<tr>
<td></td>
<td>3rd plantar interossi</td>
</tr>
<tr>
<td></td>
<td>4th dorsal interossi</td>
</tr>
<tr>
<td></td>
<td>skin on the lateral side of the little toe.</td>
</tr>
</tbody>
</table>
(A). ANATOMY OF THE NEURON

The peripheral nervous system is formed by neurons and their processed present in all regions of the body. It provides the links from and to the real world. Its ghostly white nerves thread through virtually every part of the body enabling the CNS to receive information and carry out its decisions. It includes all neural structures outside the brain and spinal cord that is the sensory receptors, peripheral nerves and their associated ganglia and efferent motor endings. Neurons or nerve cells are structural and functional unit of the nervous system.

Structure of neuron

The nerve cell is like any other cells in the body having almost all the organelles in the cytoplasm. However it is different from other cells because of the presence of the processes and absence of centrosomes (centrosome function is formation of cilia and flagellae and it forms the spindle of fibrillar protein during mitosis.) The neuron is made up of.
1. Nerve cells

2. Dendrite

3. Axon

The nerve cell body is also called as soma or perikaryon. The dendrite and axon together form the processes. Each neuron has only one axon. The axon arises from axon Hillock of soma.

The dendrites may be absent or if present it may be one or many in number. In general, the dendrites are short processes and the axons are long processes. The dendrites and axons are usually called nerve fibers.

1. Nerve cell body

The nerve cell body is irregular in shape and like any other cell it is constituted by a mass of cytoplasm called neuroplasm covered by a cell membrane. The cytoplasm contains a large nucleus, Nissl bodies, neurofibrils, mitochondria and golgi apparatus.

(i) Nucleus

Each neurons has only one nucleus in the nerve cell body. It is located in the central part. It has one or two nucleoli which are prominent. The nucleus does not contain centrosome. So the nerve cell can not multiply like the other cells.
(ii) **Nissl bodies**

Nissl bodies or granules are basophilic in nature. These granules are present throughout soma except axon Hillock. These bodies are responsible for spotted appearance of soma after suitable staining. The nissl granules flow into the dendrites from soma. But not into axon. By this axons can be distinguished from the dendrites.

The nissl bodies are organelles responsible for synthesis of proteins. The formed proteins in soma are transported to the axon by axonal flow.

The number of nissl bodies varies with the condition of the nerve. During fatigue of injury of neuron, these bodies fragment and disappear by a process called chromatolysis.

**Neurofibrills**

These are thread like structures present in the form of network in soma and the processes. These consist of microfilaments and microtubules.

**Mitochondria**

It form the powerhouse of the nerve cell where ATP is produced which is energy rich compound.

Golgi apparatus is concerned with package of proteins into granules.
2. **Dendrite**

   The dendrites are the branched processes of the neuron and are branched repeatedly. The dendrites may be present or absent. The dendrites have nissl granules and neurofibrils.

   Dendrites are conductive in nature and transmit impulses towards the nerve cell body.

3. **Axon**

   The axon is the longer process of the nerve cell. This arises from axon Hillock of the nerve cell body and is devoid of nissl granules. The axon may extend for a long distance away from the nerve cell body. The length of the longest axon is about one metre.

   (i) **Structure of axon**

   Within a nerve, each axon is surrounded by a delicate layer of loose connective tissue called endoneurium, which also encloses the fiber’s associated myelin and/or neurilemma sheath. Group of fibers are bound into bundles or fascicles by a coarser connective tissue, wrapping the perineurium. Finally, all the vesicles are enclosed by a tough fibrous sheath, the epineurium, to form the nerve.

   Neuron processes constitute only a small fraction of a nerve’s myelin and the protective connective tissue wrappings. Blood vessels and lymphatic vessels and also found within a nerve.
Internal structure of axon

Axis cylinder

The axon has long central core of cytoplasm called axoplasm. The axoplasm is covered by membrane called axolemma. Axoplasm contains mitochondria, neurofibrils and axoplasmic vesicles. Most of the axons are insulated by myelin sheath called as myelinated nerve fiber. Those, without myelin are called non-myelinated nerve fibers.

Myelin sheath

It does not form a continuous sheath and is absent at regular intervals. The area where myelin sheath absent is called node of Ranvier. It is responsible for white colour of nerve fibers.

Neurilemma

Surrounding the myelin sheath, there is thin membrane called as neurilemmal sheath. This is also called as neurilemma or sheath of schwann. This contains schwann cells which have flattened and elongated nuclei. One nucleus is present in each internode of axon. The nucleus is situated between myelin sheath and neurilemma.

In central nervous system, the schwann cells, neurilemma are absent. Myelinated axons are thicker in diameter and have their origin from neurous in the posterior root ganglia and anterior horn cells of spinal cord. Where as non-myelinated axons arise from neurons in posterior root ganglia and in autonomic ganglia.
**PHYSIOLOGY**

**PHYSIOLOGY OF THE FOOT**

The function of the foot as a supporting structure, which has to carry considerable static loads in standing and even greater loads at the point of application of severe thrust forces e.g. in kicking, pushing off in running, and landing on the feet when jumping from a height.

When standing, the weight is supported on the heel and on the heads of the metatarsal (mainly the first metatarsal) and to a lesser extent on the lateral border of the sole of the foot.

When the foot is used in thrusting, the force is carried principally on the head of the first metatarsal and the big toe. The remaining metatarsals and toes are relatively weak and can be looked upon as a stabilizing flat. Without them the foot would have an unstable, two-point contact, with the ground on the, calcaneus and the ball of the great toe. The arched shape of the foot has the added advantages of giving protecting to the structures in the sole which would otherwise be subjected to pressure. One special development to resist the pressure on the head of the first metatarsal, e.g, running, is the presence on its plantar surface of two sesamoid bone. These transmit the pull of the small muscles of the big toe without subjecting them to pressure, and also make
a tunnel between them through which the long flexor tendon can reach the toe.

B) PHYSIOLOGY OF THE NEURON

Nervous system controls all the activities of the body. It is quicker than the other control system in the body namely the endocrine system. Primarily, the nervous system is divided into central and peripheral nervous system. The central nervous system includes brain and spinal cord.

Peripheral nervous system consists of cranial nerves arising from brain and spinal nerves arising from spinal cord. This is again divided into somatic and autonomic nervous system. The somatic nervous system controls the movements of the body by acting on the skeletal muscles. The autonomic or involuntary nervous system is concerned with regulation of visceral or vegetative functions. It consists of sympathetic and para-sympathetic division. Groups of neuronal cell bodies in peripheral nervous system are called as ganglia.

Classification of neuron

The neurons can be classified by 3 different methods which are,

1. Depending upon the number of poles, divided into unipolar, bipolar and multipolar neurons.

2. Depending upon the function, divided into motor and sensory neurons.
3. Depending upon the length of axon, divided into golgi type I neurons and golgi type II neurons.

**Classification of nerve fibers**

The dendrites and axons are usually called nerve fibers. Following are the various methods of classification of nerve fibers.

1. Depending upon the structure, classified into myelinated nerve fibers and non-myelinated nerve fibers.

2. Depending upon the chemical neurotransmitter, divided into adrenergic and cholinergic nerve fibers.

3. Depending upon the diameter and conduction, divided into alpha, beta and delta fibers.

**Properties of nerve fibers**

1. Excitability

2. Conductivity

3. Refractory period

4. Summation

5. Adaptation

6. Infatigability

7. All or none law
1. **Excitability**

   Excitability is defined as the physiochemical change that occurs in a tissue when a stimulus is applied. Depending upon the strength of the stimulus, two types of responses occur which are action potential and electrotonic potential.

2. **Conductivity**

   The action potential is transmitted through the nerve fiber as nerve impulse.

3. **Refractory period**

   It is the period at which the nerve does not give any response to a stimulus.

4. **Summation**

   The subliminal stimuli are summed up together. This is known as summation.

5. **Adaptation**

   The excitability of the nerve fiber is decreased when there is slow increase in the strength of the stimulus. This is known as adaptation.

6. **Infatigability**

   A nerve fiber can not be fatigued, even if it is stimulated continuously for a long time. The reason for this is, the nerve fiber can conduct only one action potential at a time.
7. All or none law

If the strength of the stimulus is above the sub-threshold level, the amplitude of action potential remains the same. This character is called as all or none law.

Myelin sheath

In a myelinated nerve fiber, the axis cylinder is covered by thick tubular sheath called myelin sheath. It is responsible for the white colour of the nerve fibers. It is mainly formed by the concentric layers of proteins alternating with lipids. It’s function is for faster conduction of impulse through the nerve fibers. It also has a high insulating capacity. Because of this, the myelin sheath restricts the nerve impulse within the single nerve fiber and prevents the stimulation of neighbouring nerve fibers.

Surrounding the myelin sheath, there is neurilemmal sheath or sheath of Schwann. It is necessary for myelinogenesis. Nerve fibers in the peripheral nervous system transmit signals between central nervous system and all other parts of the body. The nerve fiber is surrounded by a Schwann cell which is analogous to an oligodendroglial cell of the central nervous system. Some of the fibers are wrapped in layers of Schwann cell membrane. These tightly wrapped membranes from the myelin sheath and other fibers are unmyelinated. Synapse is the junction
point from one neuron to the next and therefore it is an advantageous site for control of signal transmission.

When a peripheral nerve fiber is cut, the degenerative change occurs in the nerve cell body and in the nerve fiber. The regeneration of injured nerve fiber can occur only under favourable condition. Through the anatomical regeneration occurs in the nerve, the functional recovers occur after a long period.
PATHOLOGY

Diabetic foot

The Diabetic Foot is a most feared and devastating disease. Diabetic foot is a quiet of disability, long stretches of hospitalization, mounting impossible expenses, with the ever dangling end result of an amputation.

Diabetes mellitus

Diabetes mellitus is a group of metabolic disorders characterized by hyperglycemia resulting from defects in insulin secretion, insulin action or both. The hyperglycemia of diabetes is associated with long-term damage, dysfunction and failure of various organs, especially the eyes, kidneys, nerves and blood vessels.

Clinical Diagnosis of Diabetes mellitus

The clinical diagnosis of diabetes is often prompted by signs and symptoms such as

- Polydypsia.
- Polyureia.
- Unexplained weight loss.
- Undue tiredness.
- Tingling (or) numbness in the extremities.
- Burning feet.
- Balanitis.
- Vaginitis.
Etiology of Diabetes mellitus:

- Genetic Factors
- Obesity (≥ 20% desire body weight)
- Age - ≥ 45yrs.
- H/o – Gestational diabetes mellitus.
- Hypertension – BP ≥ 140/90mmHg.
- HDL Cholesterol Level - ≤ 35mg/dl (or) Triglycerides Level ≥ 250mg/dl.
- Polycystic ovary syndrome.

Classification of Diabetes mellitus:

I Type I diabetes:

- Immune mediated.
- Idiopathic

II Type 2 diabetes:

III Gestational diabetes:

IV Other specific Types:

- Genetic defects in β cell function (MODY)
- Genetic defects in insulin action (Lipoatrophi diabetes)
- Diseases of exocrine pancreas (Fibrocalculous pancreato pathy)
- Endocrinopathies (Cushing’s syndrome)
- Drug induced (glucocorticoids)
Infections (congenital rubella)

Uncommon form of immune mediated diabetes (“stiff-man” syndrome)

Other genetic syndromes (Turner’s syndrome)

Foot ulcers of infections are also a major source of morbidity in individual with diabetes mellitus.

Other complications of Diabetes

A. Infections.

B. Metabolic.

- Hypoglycemia (mainly a complication of drug therapy of diabetes).
- Ketoacidosis.
- Hyper osmolar non ketotic coma.
- Lactic acidosis.

C. Angiopathic complications.

Microangiopathic (involving small vessels).

- Retinopathy.
- Neuropathy.
- Nephropathy.

Macroangiopathic (involving large vessels).

- Coronary artery disease.
- Cerebro vascular disease.
- Peripheral vascular disease.
The Diabetic Foot

Diabetic Foot cause more leg amputations than any other pathology, 85% of leg amputations in diabetes are preceded by a trivial look foot ulcer. All leg amputations are not inevitable.

![Pathological Triad of Diabetic Foot](image)

**Classification**

Two types,

1. **Neuropathic foot** – in which Neuropathy dominates

2. **Neuro ischaemic foot** – in which occlusive vascular disease is the main factor. (Although Neuropathy also may be present in varying degrees).

Another classification quoted commonly is the **Wagner’s Classification**. It is more specific for Neuropathic foot with or without secondary infection.
Wagner’s classification of diabetic foot

Grade 0   : No ulceration in a high risk foot.
Grade 1   : Superficial ulceration.
Grade 2   : Deep ulceration that penetrates up to tender, done or joint.
Grade 3   : Osteomyelitis or deep abscess.
Grade 4   : Localized gangrene.
Grade 5   : Extensive gangrene requiring major amputation.

NEUROPATHY

“Sensations are important, If they are lost, the entire charm in the life is lost”

Diabetic Neuropathies are a group of heterogeneous syndromes with considerable morbidity. At least 50% of diabetic patients, develops neuropathy with 10 - 25 yrs of diagnosis. The prevalence of neuropathy is difficult to document as it varies with the sensitivity of the method used. The gross disparity is also due to general lack of agreement regarding the standard definition of diabetic neuropathy.

The neuropathic disorder includes manifestations, in the somatic and autonomic parts of the peripheral nervous system.
**Clinical classification of diabetic neuropathy**

1. Bilaterally symmetrical peripheral polyneuropathy.
   a. Sensory polyneuropathy
   b. Motor polyneuropathy
   c. Mixed sensory motor polyneuropathy.

2. Symmetrical (or) Asymmetrical proximal mononeuropathy.

3. Mononeuropathy.
   a. Cranial neuropathy
   b. Peripheral neuropathy

4. Abdominal polyradiculopathy

5. Autonomic neuropathy.

**Neuropathy in Diabetic foot:**

Diabetic mellitus is one of the commonest cause of disabling polyneuropathy. Neuropathic changes in the diabetic foot are a heterogeneous mixture of disorders including distal neuropathy, which is usually progressive, Ischaemic neuropathy, Diabetic amyotrophy, and Neuro arthropathy. The progressive is a loss of touch, vibration, pain, and temperature sensation.

**Neuropathy involved in foot ulcer’s**

- Sensory neuropathy.
- Motor neuropathy.
- Mono neuropathy (or) peripheral neuropathy.
- Autonomic neuropathy.
Sensory Neuropathy

Somatic sensory neuropathy involves both large fibres. Such as those serving modalities of joint position, and vibration, and contributing to that of touch and small fibres. Which serve as pain and sensory as well as contributing to touch.

This type of neuropathy is almost always largely symmetrical and affects predominantly the leg.

It is responsible for the loss of tendon jerk first at the ankles.

Motor Neuropathy

Motor neuropathy affects nerves asymmetrically and usually involves part of the femoral plexus.

It reduces the nerve conduction velocity and may partially impair muscle function.

Motor defects causing foot deformity, produce abnormal pressure points on weight bearing areas.

Mono Neuropathy

Mono neuropathy can result from pressure palsy or from a vascular accident to a nerve. Both motor and sensory nerves are unduly vulnerable to pressure in diabetes. Occasionally clinical episodes occur that suggests a stroke affecting a peripheral nerve, with excruciation short lived pain followed by interrupted nerve function. Mononeuropathy may be multiple, giving the clinical picture of mononeuritis multiplex, with interruption of more than one peripheral nerve trunk.
**Autonomic Neuropathy**

In diabetic foot autonomic neuropathy has several common manifestations, first denervation of dermal structures leads to decreased sweating.

This cause only skin and fissure formation, which predispose the skin to infection.

Such a foot is at risk of complications like.

- Neuropathic ulcer.
- Neuropathic oedema.
- Fissures
- Bullae
- Neuropathy charcot joint.

**Etiology of Diabetic Neuropathy:**

**A) Metabolic**

- Hyperglycemia.
- Lipid disturbances.

**B) Vascular**

**C) Others**

- Mechanical factors.
- Stress.
- Autoimmunity.
- Hereditary.
PATHOGENESIS OF DIABETIC NEUROPATHY

Multiple pathogenetic mechanisms interact to varying degrees in producing a clinical picture of neuropathy which differs from patient to patient.

Multifocal ischaemic neuropathy with distal summation of axonal loss may be important in elderly patients. However, it is likely that diffuse consequences of the metabolic disturbance are more prominent in causing the polyneuropathy of younger patients.

Pathological Process of Diabetic Neuropathy

➤ Persistent Hyperglycemia

Accumulation of

1. Sugar,

2. Sorbitol and

3. Glycogen causing osmotic damage to the nerves.

It may activate the polyol pathway in nerve causing sorbitol accumulation as a result of enhancing aldose reductase activity.

Proposals that this might inhibit myoinositol uptake by nerve fibres, resulting in altered impulse conduction due to reduced Axolemmal Na+K+ Atpase activity have been contra indicated by the demonstration that myoinositol is not decreased in diabetic nerve.
The levels of glucose and fructose are increased in diabetic nerves and correlate with morphometric estimates of the severity of neuropathy. Accumulation of these sugars can promote non-enzymatic glycosylation of peripheral nerve proteins, probably altering their function.

Slow axonal transport of microtubule and neurofilament cytoskeletal proteins to the distal axon is reduced. This could alter the structural integrity of the distal axon and account for the axonal length related neuropathy of diabetes.

➤ **Lipid disturbances**

Accumulation inhibitory defect with lipid accumulation of fate material in the schwann cell that interferes with their activity.

Cofactor deficiency, enzymatic inhibition, or enzymatic deficit, which affects the transformation of lipids and proteins.

➤ **Ischaemia**

Ischaemia is due to Atherosclerosis or diabetic microangiopathy.
PATHWAY LEADING TO FOOT ULCERATION AND AMPUTATION IN DIABETIC FOOT ULCER

Somatic Neuropathy

* Reduced perception
* Diminished proprioception
* Clawing of toes

Increased foot pressure

connective tissue changes

* Limited joint mobility
* Orthopaedic disorders

Autonomic neuropathy

* Absent Sweating
* Dry skin fissures
* Altered blood flow
* Cold extremities
* Distended foot veins
* Charcot neuropathy

Callus Formation

Peripheral vascular Disease

* Claudication, pain
* Cold extremities
* Reduced foot pulse

Foot ischaemia

Foot ulceration

Infection

Gangrene

Amputation
PATHOGENESIS OF DEVELOPMENT OF ULCER

Foot ulcers and infections are also a major source of morbidity in individuals with DM. The reasons for the increased incidence of these disorders in Diabetes mellitus are complex and involve the interaction of several pathogenic factors.

- **Neuropathy.**
- **Abnormal foot Bio-mechanics.**
- **Peripheral vascular disease.**
- **Poor wound healing.**
- **Infection.**

**Neuropathy**

The peripheral sensory neuropathy interferes with normal productive mechanisms, and allows the patient to sustain major (or) repeated minor trauma to the foot, often without knowledge of the injury.

Disordered proprioception causes abnormal weight bearing while walking and subsequent **formation of callus (or) ulceration.**

Autonomic neuropathy results in anhydrosis and altered superficial blood flow in the foot, which promote drying of the skin and fissures formation.
Abnormal foot Biomechanics

Motor and sensory neuropathy leads to abnormal foot muscle mechanics and to structural changes, in the foot.

These are,

- Hammer toe.
- Low toe deformity.
- Prominent metatarsal heads.

Peripheral Vascular Disease

Peripheral vascular disease and poor wound healing impede resolution of minor breaks in the skin allowing them to enlarge and to become infected.

Foot infection

Foot infections in diabetic patients are classified into two categories:

1. Non-limb-threatening infections, (superficial, lack systemic toxicity, minimal cellulites, less than 2cm, ulceration not extending fully through the skin, lack of significant ischaemia).

2. Limb threatening infections, (extensive cellulites, lymphangitis, ulcers penetrating through the skin into the subcutaneous tissues, prominent ischaemia).

Polymicrobial infections are common staphylococcus aureus, group-B streptococci, enterococcus and facultative gram negative bacilli along with anaerobes are commonly implicated.
**Factors contributing to foot ulceration**

**Table – 10**

<table>
<thead>
<tr>
<th><strong>Intrinsic Factors</strong></th>
<th><strong>Extrinsic Factors</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>❖ Bony Prominence</td>
<td>❖ In appropriate Foot wear</td>
</tr>
<tr>
<td>❖ Limited joint mobility</td>
<td>❖ Walking bare Foot</td>
</tr>
<tr>
<td>❖ Deformities</td>
<td>❖ Falls and accidents</td>
</tr>
<tr>
<td>❖ Callous Formation</td>
<td>❖ Objects inside shoe</td>
</tr>
<tr>
<td>❖ Previous Foot ulcer</td>
<td>❖ Thermal trauma</td>
</tr>
<tr>
<td>❖ Neuro arthro pathy (charcot)</td>
<td>❖ Activity level</td>
</tr>
</tbody>
</table>

**Classification of Diabetic Foot**

The diabetic foot is classified into two types.

❖ **Neuropathic Foot** – in which neuropathy dominates.

❖ **Neuroischaemic Foot** – in which occlusive vascular disease is the main factor, neuropathy also present in varying degree.

❖ Hence peripheral neuropathy is viewed as a primary underlying disturbance of diabetic foot lesions and vascular insufficiency is an important secondary factor.

The ulcers are painless, with a punched out appearance, foot is characteristically warm and pulses are easily felt. Secondary infection is common and may lead to wet gangrene.
## Clinical Features of Diabetic Foot

### Table - 11

<table>
<thead>
<tr>
<th>Primarily Neuropathic</th>
<th>Primarily ischaemic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warm</td>
<td>Cold</td>
</tr>
<tr>
<td>Bounding Pulses</td>
<td>Absent Pulses</td>
</tr>
<tr>
<td><strong>Diminished Sensations</strong></td>
<td>Sensation intact</td>
</tr>
<tr>
<td>Pink skin</td>
<td>Skin blanches on elevation</td>
</tr>
<tr>
<td>Anhydrosis</td>
<td>--</td>
</tr>
<tr>
<td><strong>Callous Formation</strong></td>
<td>--</td>
</tr>
<tr>
<td><strong>Cracks and Fissures</strong></td>
<td>--</td>
</tr>
<tr>
<td>Painless ulceration</td>
<td>painful ulceration</td>
</tr>
<tr>
<td>Digital ulceration</td>
<td>digital gangrene</td>
</tr>
<tr>
<td><strong>Reddish appearance</strong></td>
<td>Blackening of ulcer</td>
</tr>
<tr>
<td>Charcot’s joint</td>
<td>--</td>
</tr>
<tr>
<td>Wasting of interosseous muscles</td>
<td>--</td>
</tr>
<tr>
<td>Clawed toes</td>
<td>--</td>
</tr>
<tr>
<td><strong>Neuropathic Oedema</strong></td>
<td>oedema associated with cardiac</td>
</tr>
<tr>
<td></td>
<td>decompensation</td>
</tr>
</tbody>
</table>
EVALUATION OF THE DISSERTATION TOPIC

Materials & Methods

The pathological evaluation on Topic “PATHACHAKKARAM” was carried out in the Post – graduate Department of Noi – Naadal branch in Government Siddha Medical College, Palayamkottai.

Selection of cases

The author has selected 20 cases with similar symptoms of “Pathachakkaram” from the Out Patient Department of Govt. Siddha Medical College, Shifa Hospital, Velaudhan Pillai Hospital and the cases were followed by the author whose work was under close supervision of the professor and faculties, of the Post graduate department of Noi - Naadal.

Clinical Features of pathachakkaram.

- Numbness in the foot
- Burning sensation in the foot
- Heaviness in the foot
- Callus formation of the foot
- Fissuring in the callus
- Itching and whoozing from the ulcer
- Reddish ulcer
Evaluation of Clinical parameters

The detailed history and Clinical features of the patients were taken carefully.

The clinical history contains,

- Detailed history of past and present illness
- Family History
- Age and Sex distribution
- Personal history
- Dietary habits
- Occupational history
- History of improper management of diabetes.

Study on Siddha Clinical Diagnosis

The following Siddha parameters, such as Poriaal arithal, Pulanaal arithal, and Vinaathal, were adopted to assess the pathology.

- Mukktra Nilai
- Udal Kattugal Nilai
- Envagai Thervugal

The Clinical Investigation

The author used the following modern investigatory parameters for further detailed study about this disease.
**Haematological**

- Total count of RBC
- Differential count of WBC
- HB
- ESR

**Bio Chemical**

- Blood sugar
- Urine analysis
- Motion test

**Specific Test**

- Bio – Thesiometer,
- Doppler study
- Podia scan
STATISTICAL ANALYSIS AND INTERPRETATIONS

The study subjects were analysis based on the statistics mean, median, percentage and standard deviation (S.D). The inferences were attained by students ‘t’ test. The risk factors of the diseases were inference by odds ratio since the study is Epidemiological related.

OBSERVATION AND RESULTS

AGE AND SEX

Age and sex are vital independent variables related to human studies. The analysis and interpretations of the age of the study subjects with reference to sex are posted in the below table.

Age and sex wise distribution of the patha chakkarm subjects

Table-12

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Sex</th>
<th>Age group</th>
<th>Total</th>
<th>Mean</th>
<th>S.D</th>
<th>‘t’</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>30-39</td>
<td>40-49</td>
<td>50-59</td>
<td>60-69</td>
<td>70-79</td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Male</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>6</td>
<td>2</td>
<td>18</td>
</tr>
<tr>
<td>2.</td>
<td>Female</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>3.</td>
<td>Total</td>
<td>3</td>
<td>3</td>
<td>6</td>
<td>6</td>
<td>2</td>
<td>20</td>
</tr>
</tbody>
</table>

The mean age of the male subjects $55.6 \pm 11.1$ years and the same of the female is $46.5 \pm 12$ years. The observed differences of mean age is
not statistical significant, since the ‘$t$’ = 1.09 and $P > 0.05$. The differences may be due to sampling size. So the sexes are having the same age group. The mean age of pathachakkaram population will be 49.7 to 59.7 years at 95% confidence interval.

**ETIOLOGICAL FACTOR**

Etiological Factors of pathachakkaram

**Table-13**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Etiological Factors</th>
<th>n</th>
<th>Cases affected</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>No. of cases</td>
</tr>
<tr>
<td>1</td>
<td>H/O diabetes mellitus</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>Evidence Neuropathy</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>Callus at Pressure points</td>
<td>20</td>
<td>15</td>
</tr>
</tbody>
</table>

The history of diabetes mellitus and Neuropathy observed cent percent and callus at Pressure points is 65%.

**RISK FACTORS**

Some habits may be the risk Factors of the disease since the Diabetes and Hypertension prevalence is cent percent in the study subjects.
### Risk Factors Related to Diabetes and Hypertension

#### Table -14

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Risk Factors</th>
<th>n</th>
<th>Odds ratio</th>
<th>Significance</th>
<th>Risk Fold</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Alcohol with Smoking</td>
<td>16</td>
<td>115.5</td>
<td>Significant</td>
<td>115 times risk</td>
</tr>
<tr>
<td>2.</td>
<td>Intake of alcohol and excessive sweets</td>
<td>3</td>
<td>1</td>
<td>Not significant</td>
<td>No risk</td>
</tr>
<tr>
<td>3.</td>
<td>Obesity and High fatty diet</td>
<td>6</td>
<td>49.58</td>
<td>Significant</td>
<td>50 times risk</td>
</tr>
<tr>
<td>4.</td>
<td>Excessive sexual act and alterations of sleeping rhythm</td>
<td>5</td>
<td>0.56</td>
<td>Not significant</td>
<td>No risk</td>
</tr>
</tbody>
</table>

The above table clearly illustrates that the risk factor of Alcohol usage with smoking is 115 times risk than the either smoking or Alcohol intake and those who are not using both. The intake of Alcohol and excessive sweets take is not having any risk than the using of either of them.

The risk of obese population are taking high fatty diet is 50 time risk than those who have obese and not taking high fatty food. The risk of Excessive sexual act and alterations of sleeping rhythm is not any risk with diseases. Since the pathachakkaram subjects are cent percent
diabetes and hypertensive the analysed risk factors may also be an etiology to pathachakkaram diseases.

**MUKKTRA NILAIGAL**

*Distribution of mukktra nilaigal*

**Table - 15**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Component</th>
<th>n</th>
<th>Types</th>
<th>Affected cases</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No of cases</td>
<td>% of cases</td>
</tr>
<tr>
<td>1.</td>
<td>Vali</td>
<td>20</td>
<td>Pranan</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Abanan</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Viyanan</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Uthanan</td>
<td>19</td>
<td>95</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Samanman</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Nagan</td>
<td>11</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Koorman</td>
<td>15</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Kirukaran</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Devathaththan</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Dhananjeyan</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2.</td>
<td>Azhal</td>
<td>20</td>
<td>Anal pitham</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ranjaga pitham</td>
<td>18</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sathaga pitham</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Aalosaga pitham</td>
<td>11</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Prasaga pitham</td>
<td>20</td>
<td>100</td>
</tr>
</tbody>
</table>
From the above table, mukkutra nilaigal namely pranan, Abanan, Viyanan, Samanan, Kirukaran and Devaththan are affected cent percent of the cases under Vali. In respect of Azhal, Anal pitham, Sathaga pitham and Prasaga pitham are affected cent percentage of the subjects. Avalampagam and Kilethagam of Iyam are affected cent percent of the patha chakkaram trials. The remaining types of mukkutra nilaigal affected and their percentage are noted against them.
**UDAL THATHUKKAL**

Percentage distribution of subjects affected by Udal Thathukkal

*Table-16*

<table>
<thead>
<tr>
<th>S.No</th>
<th>Udal Thathukkal</th>
<th>N</th>
<th>Affected cases</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>No of cases</td>
</tr>
<tr>
<td>1.</td>
<td>Saaram</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>2.</td>
<td>Senneer</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>3.</td>
<td>Oon</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>4.</td>
<td>Kozhuppu</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>5.</td>
<td>Enbu</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>6.</td>
<td>Moolai</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>7.</td>
<td>Sukkilam/ Suronitham</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

From the above table, the cent percentage of affected Udal thathukkal are Saaram, Senneer, Oon and Kozhuppu. The Enbu and Moolai are affected 75% of each. The Sukkilam/ Suronitham is affected only in 50% of the subjects.
MANIKADAI NOOL

The Viralkadai alavu of the diseases are enumerated in the below table

Distribution of Viralkadai alavu of the subjects.

Table - 17

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Viralkadai alavu</th>
<th>n</th>
<th>Affected cases</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>No of cases</td>
</tr>
<tr>
<td>1.</td>
<td>7 ¾</td>
<td>20</td>
<td>12</td>
</tr>
<tr>
<td>2.</td>
<td>7 ½</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>3.</td>
<td>7 ¼</td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

The Viralkadai alavu of 7 ¾ is seen in 60% of affected cases. 7 ½ viralkadai alavu is present in 30% of affected cases.
The Siddha Diagnostic rule of eight is posted in the table 

Ennvagai thervugal of the trials.

Table-18

<table>
<thead>
<tr>
<th>S.No</th>
<th>Ennvagai thervugal</th>
<th>n</th>
<th>Types</th>
<th>Cases affected</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No of cases</td>
</tr>
<tr>
<td>1.</td>
<td>Naadi</td>
<td>20</td>
<td>Iya Vali</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Azhal Iyam</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Vali Iyam</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Iya Azhal</td>
<td>5</td>
</tr>
<tr>
<td>2.</td>
<td>Sparisam</td>
<td>20</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>3.</td>
<td>Naa</td>
<td>20</td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>4.</td>
<td>Niram</td>
<td>20</td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>5.</td>
<td>Vizhi</td>
<td>20</td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>6.</td>
<td>Malam</td>
<td>20</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>7.</td>
<td>Moothiram</td>
<td>20</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>8.</td>
<td>Mozhi</td>
<td>20</td>
<td></td>
<td>-</td>
</tr>
</tbody>
</table>

The moothiram is affected in cent percent of cases. The indications of Naa, Niram and vizhi are affected 55% each. The malam indicates in 30% of cases.
**CLINICAL FEATURES**

**Clinical features of the study trials**

*Table - 19*

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Clinical features</th>
<th>$n$</th>
<th>Affected cases</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>No of cases</td>
</tr>
<tr>
<td>1.</td>
<td>Numbness in the foot</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>2.</td>
<td>Burning sensation</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>3.</td>
<td>Heaviness of the foot</td>
<td></td>
<td>19</td>
</tr>
<tr>
<td>4.</td>
<td>Pain in the foot</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Callus formation</td>
<td></td>
<td>13</td>
</tr>
<tr>
<td>6.</td>
<td>fissure</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Itching and oozing</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Erythematous</td>
<td>17</td>
<td></td>
</tr>
</tbody>
</table>

Numbness and Burning sensation in the foot are observed in cent perent of the cases.80% of the cases are affected with fissure,Itching and symptoms. The oozing is observed in 80%of the cases.95% of the cases are having Heaviness of the foot.
**Related Laboratory investigation**

**Table -20**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Laboratory investigation</th>
<th>Male n = 18</th>
<th>Female n= 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td>1.</td>
<td>Hb</td>
<td>7</td>
<td>38.8</td>
</tr>
<tr>
<td>2.</td>
<td>Urine albumin</td>
<td>13</td>
<td>72.2</td>
</tr>
<tr>
<td>3.</td>
<td>Urine Sugar</td>
<td>4</td>
<td>22.2</td>
</tr>
</tbody>
</table>

**Table -21**

*Significance of the Bio-chemical variable glucose and Hb*

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Bio chemical</th>
<th>Sex</th>
<th>Mean of normal</th>
<th>Sample mean</th>
<th>S.D</th>
<th>‘t’</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Hb</td>
<td>male</td>
<td>15mgms</td>
<td>18</td>
<td>12.6</td>
<td>0.95</td>
<td>10.718</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Female</td>
<td>13.25mgms</td>
<td>2</td>
<td>12.0</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>2.</td>
<td>Fasting sugar</td>
<td>both</td>
<td>90mgms%</td>
<td>20</td>
<td>192.1</td>
<td>58.2</td>
<td>7.845</td>
</tr>
</tbody>
</table>
The above table clearly shows that the study male subjects are having the low Hb level than the normal mean Hb level of 15mgms %. The difference of the Hb level is statistically Significant. The females are having only 12mgms% and the same is not significantly differed with normal mean of 13.25mgms%. The Fasting sugar of both the sexes is greater than the normal mean of 90mgms. The mean sugar of the study subjects 192.1 + 58.2mgm% is highly Significant with the normal fasting mean sugar 90 + 10mgs%.
DISCUSSION

In Thanvanthri Vaithiyam, “Pathachakkaram” is described under “Patha roga nithaanam”. The Name “Pathachakkaram” means - A kind of festering sore in the foot.

Patients with foot ulcer were interrogated thoroughly and their history, ailments characters of signs and symptoms were noted in materials and method.

The observed results and other Entities that have been studied are discussed under the following headings.

1. Age and Sex distribution

   In this male were predominantly affected and the incidence is high in the age group above 30 years.

2. Family History

   There is no specific relation with family history.

3. Personal Habits

   High intake of sweets, fatty diet can induce this disease.

4. Residential area

   There is no direct relationship with the residential area.

   Irrespective of their residing place, the food habit, will lead to the disease soon.
5. Paruvakalangal

There is no direct relationship with seasonal Variation.

6. History of Diabetes Mellitus

Direct relationship with Diabetes Mellitus

7. Improper Foot care

Predisposes the disease

8. History of Past and Present illness

A detailed history of all drugs used within the previous 2 years and possible chemical exposure, Dietary habits, previous surgical procedure and alcohol intake, Leprosy, Syphilis should be evaluated.

Siddha parameters

Mukkutram

Vali, Azhal, and Iyam constitutes the mukkutrangal and the affected thodams are,
### Derangement in Vali

**Table – 22**

<table>
<thead>
<tr>
<th>Types</th>
<th>Changes</th>
<th>Character</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piranan</td>
<td>Affected</td>
<td>Increased appetite</td>
</tr>
<tr>
<td>Abanan</td>
<td>Affected</td>
<td>Increased Urine output</td>
</tr>
<tr>
<td>Viyanan</td>
<td>Affected</td>
<td>Numbness, Burning, Sensation, pain, Heaviness in the foot.</td>
</tr>
<tr>
<td>Uthanan</td>
<td>Affected</td>
<td>Increased Thirst</td>
</tr>
<tr>
<td>Samanan</td>
<td>Affected</td>
<td>Increased appetite</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Increased Thirst</td>
</tr>
<tr>
<td>Nagan</td>
<td>Affected</td>
<td>cataract formation</td>
</tr>
<tr>
<td>Koorman</td>
<td>Affected</td>
<td>Increased Sleep</td>
</tr>
<tr>
<td>Kirukaran</td>
<td>Affected</td>
<td>Increased appetite</td>
</tr>
<tr>
<td>Thevathathan</td>
<td>Affected</td>
<td>Restlessness, Tiredness</td>
</tr>
<tr>
<td>Thenanjayan</td>
<td>Not affected</td>
<td></td>
</tr>
</tbody>
</table>
## Derangement of Azhal

### Table - 23

<table>
<thead>
<tr>
<th>Types</th>
<th>Changes</th>
<th>Character</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analpitham</td>
<td>Affected</td>
<td>Increased appetite</td>
</tr>
<tr>
<td>Prasagam</td>
<td>Affected</td>
<td>Ulcer in the fool</td>
</tr>
<tr>
<td>Ranjaga pitham</td>
<td>Affected</td>
<td>Fatigue</td>
</tr>
<tr>
<td>Alosagam</td>
<td>Affected</td>
<td>Cataract formation</td>
</tr>
<tr>
<td>Sathagam</td>
<td>Affected</td>
<td>Restricted movement</td>
</tr>
</tbody>
</table>

## Derangement of Iyam

### Table - 24

<table>
<thead>
<tr>
<th>Types</th>
<th>Changes</th>
<th>Character</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avalambagam</td>
<td>Affected</td>
<td>Balancing function</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Affected</td>
</tr>
<tr>
<td>Kilethagam</td>
<td>Not Affected</td>
<td>-</td>
</tr>
<tr>
<td>Pothagan</td>
<td>Not Affected</td>
<td>-</td>
</tr>
<tr>
<td>Tharpagam</td>
<td>Not Affected</td>
<td>-</td>
</tr>
<tr>
<td>Santhigam</td>
<td>Affected</td>
<td>Restricted movement</td>
</tr>
</tbody>
</table>
### Table - 25

<table>
<thead>
<tr>
<th>S.No</th>
<th>Types</th>
<th>Changes</th>
<th>Character</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Saaram</td>
<td>Affected</td>
<td>Tiredness</td>
</tr>
<tr>
<td>2</td>
<td>Senneer</td>
<td>Affected</td>
<td>Fatigue</td>
</tr>
<tr>
<td>3</td>
<td>Oon</td>
<td>Affected</td>
<td>Ulcer in the foot</td>
</tr>
<tr>
<td>4</td>
<td>Kozhuppu</td>
<td>Affected</td>
<td>Weight loss</td>
</tr>
<tr>
<td>5</td>
<td>Enbu</td>
<td>Affected</td>
<td>Charcot joint, osteomyelitis</td>
</tr>
<tr>
<td>6</td>
<td>Moolai</td>
<td>Affected</td>
<td>Non healing Ulcer</td>
</tr>
<tr>
<td>7</td>
<td>Sukkilam</td>
<td>Affected</td>
<td>Loss of libido</td>
</tr>
</tbody>
</table>

**Inter predation of Envagai Thervugal**

Among the envagai thervugal, meikuri, Niram, Moothiram, and naadi were affected and reflects the characteristic picture of “Pathachakkaram”

**a. Meikuri**

The changes of meikuri in this disease is, Numbness, Burning sensation, Heaviness in affected area, and Ulcer formation in the foot.
b. Niram

The Niram shows the changes in Erythematous (or) Reddish Ulcer in the affected area (Foot).

c. Neerkuri, Neikuri References

Table - 26. Neerkuri

<table>
<thead>
<tr>
<th>S. No</th>
<th>Types</th>
<th>Characters of urine</th>
<th>Patient state</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Niram</td>
<td>Specific change in colour</td>
<td>Affected Clear nad White</td>
</tr>
<tr>
<td>2</td>
<td>Manam</td>
<td>Changes in smell</td>
<td>Affected Like honey</td>
</tr>
<tr>
<td>3</td>
<td>Edai</td>
<td>Changes in specific gravity</td>
<td>Affected Thick Consistency</td>
</tr>
<tr>
<td>4</td>
<td>Nurai</td>
<td>Abnormal frothy</td>
<td>Present</td>
</tr>
<tr>
<td>5</td>
<td>Enjal</td>
<td>Deposits</td>
<td>Affected Large quantity</td>
</tr>
</tbody>
</table>

Neikuri

The neikuri is aravil muthu, mellana parval

C. Naadi

The “Kai Naadi” – In patha chakkaram is “Azhal Iyam.”

The other parameters of Envagai thervugal are explained below as follows.
Table - 26

<table>
<thead>
<tr>
<th>S.No</th>
<th>Type</th>
<th>Changes</th>
<th>Character.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Meikuri</td>
<td>Affected</td>
<td>Ulcer in the foot</td>
</tr>
<tr>
<td>2.</td>
<td>Niram</td>
<td>Affected</td>
<td>Erythematous ulcer in the foot</td>
</tr>
<tr>
<td>3.</td>
<td>Naa</td>
<td>Not affected</td>
<td>-</td>
</tr>
<tr>
<td>4.</td>
<td>Vizhi</td>
<td>Not affected</td>
<td>-</td>
</tr>
<tr>
<td>5.</td>
<td>Mozhi</td>
<td>Not affected</td>
<td>-</td>
</tr>
<tr>
<td>6.</td>
<td>Malam</td>
<td>Not Affected</td>
<td>-</td>
</tr>
<tr>
<td>7.</td>
<td>Moothiram</td>
<td>Affected</td>
<td>Increased urinary output</td>
</tr>
<tr>
<td>8.</td>
<td>Kaikuri</td>
<td>Azhal Iyam</td>
<td>-</td>
</tr>
</tbody>
</table>

**INTERPRETATION OF MODERN PARAMETERS**

After examination of clinical features by Ennvagai Thervugal, the patient was subjected to laboratory investigations, which include haematological, urine and stool examination and specific examination like Doppler study of lower limb, Bio-Thesio meter, Podiascan.

Haematological examination shows increased blood glucose level.

Urine examinations show glucose.

Doppler study of lower limb shows Mild microangiopathies.

Bio-Thesio meter study show severe Neuropathy

Podiascan show high foot pressure
**Highlights of the Dissertation Topic**

Patha Chakkaram comes under the patha rogangal in Thanvanthri vaithiyam – II part.

According to Siddha Literatures, “Patha – Chakkaram” means - A kind of festering sore in the foot the important and major aetiological factors of Patha Chakkaram is Madhu Megam (Diabetes mellitus) so, in this disorder all the mukkuttrangal, major subdivisions of vayu, and their function, and all the seven Udal kattugal are simultaneously affected.

The disease is characterized by the presence of Numbness of the foot, Burning sensation of the foot, heaviness of the foot, pain in the foot, followed by callus formation in the foot, fissure in the foot, itching, whoozing, and erythematous ulcer in the plantar aspect of the foot.

The underlying pathogenesis for the Pathachakkaram is the Peripheral Nerve damage resulting in increased foot iressure and its leading to (erythematous) ulcer in the plantar aspect of the foot as seen in “Diabetis Mellitus.”
CONCLUSION

The clinical study on Pathachakkaram mainly based on siddha diagnostic methods said by siddhars.

The study on Pathachakkaram was carried out in this dissertation giving importance to the changes in Udal Thathukkal, Uyir thathukkal etc.

The changes in the Udal Thathukkal and Uyir thathukkal were assessed by siddha parameters like Envagai thervugal, Poriyaal arithal, Pulanaal arithal, and Vinaathal and prognosis was assessed by Nei-kuri.

A parallel modern diagnosis was arrived through routine blood tests, Urine tests, Stool examination, Biothesio-meter and Doppler study.

The aetiological factors for PathaChakkaram are mainly due to altered food habits and improper life style and improper foot care. This is also stressed in modern aspects, Peripheral Neuropathy with foot ulcer.

Paraesthesia is a frequent feature in peripheral neuropathy. These are usually tingling in nature, but may involve thermal sensation, most often with a burning quality.

The neuropathy causes, increased foot pressure, and callous formation, fissure in the callus, itching and whoozing from the fissure, and then develops into ulcer the ulcer, become reddish in appearance.
The author has seen various types of Neuropathic foot ulcers such as

**Diabetic** - reddish and punched out ulcer

**Leprosy** - pale colour – dry ulcer

**Syphilis** - Washleather slough appearance

Out of these the Diabetic foot ulcer which was taken as dissertation topic has shown typical erythematous appearance,

Which coincides with symptoms in Thanvanthri vaithyam for “Patha Chakkaram.”

So, the study on Pathachakkaram concludes that,

**Pathachakkaram, is an Neuropathic foot ulcer as a complication of Diabetes mellitus.**

The Pathogenesis of Patha Chakkaram involves the vitiation of Azhal, Vali, Iyam in various degrees.

The signs of the disease are clearly depicted by the Udal Thathukkal.

It is essential to know the Pathogenesis of the disease for proper diagnosis and treatment, to save the leg from amputation and also to advice the patient to control the blood sugar level, proper foot care like callus removal, eradication and redistribution of the weight bearing forces, and prevent infection of foot ulcers.
A Study to Diagnose Pathachakkaram through Siddha Diagnostic Methodology

SELECTION PROFORMA


11. Address:

   ..............................................................
   ..............................................................
   ..............................................................

12. Complaints and duration:

   ..............................................................
   ..............................................................
   ..............................................................

13. History of present illness:

   ..............................................................
   ..............................................................
   ..............................................................

14. Past history:

   ..............................................................
   ..............................................................
   ..............................................................

15. Family History:

   ..............................................................
   ..............................................................
   ..............................................................
<table>
<thead>
<tr>
<th>Habits</th>
<th>1. Yes</th>
<th>2. No</th>
</tr>
</thead>
<tbody>
<tr>
<td>16. Betelnut chewer</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>17. Tea</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>18. Coffee</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>19. Tobacco chewer</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>20. Smoking</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>21. Alcohol</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>22. Food habits</td>
<td>☐</td>
<td>☐</td>
</tr>
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</table>

**GENERAL ETIOLOGY FOR PATHACHAKKARAM**

<table>
<thead>
<tr>
<th></th>
<th>1. Yes</th>
<th>2. No</th>
</tr>
</thead>
<tbody>
<tr>
<td>23. High fatty diet</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>24. Heavy intake of sweets</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>25. Heavy intake of non-vegetarian</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>26. Obesity</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>27. Increased intake of alcohol</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>28. Indulging excessively in sexual act</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>29. Indulging sexual act with diseased women</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>30. Alterations in sleeping rhythm</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>31. Fickleness of mind</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>32. Evidence of neuropathy</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>33. Callus at pressure points</td>
<td>☐</td>
<td>☐</td>
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</table>
### GENERAL EXAMINATION

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>34.</td>
<td>Weight (kg)</td>
<td></td>
</tr>
<tr>
<td>35.</td>
<td>Temperature (°F)</td>
<td></td>
</tr>
<tr>
<td>36.</td>
<td>Pulse rate/minute</td>
<td></td>
</tr>
<tr>
<td>37.</td>
<td>Heart rate/minute</td>
<td></td>
</tr>
<tr>
<td>38.</td>
<td>Respiratory rate/minute</td>
<td></td>
</tr>
<tr>
<td>39.</td>
<td>Blood pressure</td>
<td>mm/Hg</td>
</tr>
</tbody>
</table>

### Vital Signs

<table>
<thead>
<tr>
<th>40.</th>
<th>Pallor</th>
<th>1. Yes</th>
<th>2. No</th>
</tr>
</thead>
<tbody>
<tr>
<td>41.</td>
<td>Jaundice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>42.</td>
<td>Cyanosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>43.</td>
<td>Lymphadenopathy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>44.</td>
<td>Pedal edema</td>
<td></td>
<td></td>
</tr>
<tr>
<td>45.</td>
<td>Clubbing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>46.</td>
<td>Jugular venous pulsation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### VITAL ORGANS EXAMINATION

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>1.Normal</th>
<th>2.Affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>47.</td>
<td>Heart</td>
<td></td>
<td></td>
</tr>
<tr>
<td>48.</td>
<td>Lungs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>49.</td>
<td>Brain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50.</td>
<td>Liver</td>
<td></td>
<td></td>
</tr>
<tr>
<td>51.</td>
<td>Kidney</td>
<td></td>
<td></td>
</tr>
<tr>
<td>52.</td>
<td>Spleen</td>
<td></td>
<td></td>
</tr>
<tr>
<td>53.</td>
<td>Stomach</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SIDDHA SYSTEM OF EXAMINATION
ENNAGAI THERVUKAL

NAA

54. Maa Padinthiruthal
   1. Present
   2. Absent

55. Niram
   1. Karuppu
   2. Manjal
   3. Velluppu

56. Suvai
   1. Pulippu
   2. Kaippu
   3. Inippu

57. Vedippu
   1. Present
   2. Absent

58. Vai neer ooral
   1. Normal
   2. Increased
   3. Reduced

59. NIRAM
   1. Karuppu
   2. Manjal
   3. Velluppu

60. MOZHI
   1. Sama oli
   2. Urattha oli
   3. Thazhnta oli

VIZHI

61. Niram
   1. Karuppu
   2. Manjal
   3. Sivappu
   4. Velluppu

62. Kanneer
   1. Present
   2. Absent

63. Erichchal
   1. Present
   2. Absent

64. Peelai seruthal
   1. Present
   2. Absent
<table>
<thead>
<tr>
<th><strong>MEI KURI</strong></th>
<th>65. Veppam</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>66. Viyarvai</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. Normal</td>
<td>2. Increased</td>
</tr>
<tr>
<td>67. Thodu vali</td>
<td>1. Present</td>
<td>2. Absent</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>MALAM</strong></th>
<th>68. Niram</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Karuppu</td>
<td>2. Manjal</td>
</tr>
<tr>
<td></td>
<td>3. Sivappu</td>
<td>4. Velluppu</td>
</tr>
<tr>
<td>69. Sikkal</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. Present</td>
<td>2. Absent</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>MOOTHIRAM</strong></th>
<th>70. Siruthal</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Present</td>
<td>2. Absent</td>
</tr>
<tr>
<td>71. Kalichchal</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. Present</td>
<td>2. Absent</td>
</tr>
<tr>
<td>72. Seetham</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. Present</td>
<td>2. Absent</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>NEER KURI</strong></th>
<th>73. Vemmai</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Present</td>
<td>2. Absent</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>74. Niram</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>75. Manam</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. Present</td>
<td>2. Absent</td>
</tr>
</tbody>
</table>
76. Nurai
1. Nil  □  2. Increased  □  3. Reduced  □

77. Edai(Ganam)
1. Normal □  2. Increased  □  3. Reduced  □

78. Enjal(Alavu)
1. Normal □  2. Increased  □  3. Reduced  □

79. NEI KURI
1. Aravam □  2. Mothiram □
3. Muthu □  4. Aravil Mothiram □
5. Aravil Muthu □  6. Mothirathil Aravam □
7. Mothirathil Muthu □  8. Muthil Aravam □
9. Muthil Mothiram □  10. Asathiyam □
11. Mellena paraval □

NAADI(KAI KURI)

1. Naadi Nithanam
80. Kaalam
1. Kaarkaalam □  2. Koothirkaalam □
3. Munpanikaalam □  4. Pinpanikaalam □
5. Ilavenirkaalam □  6. Muthuvenirkaalam □

81. Desam
1. Kulir □  2. Veppam □

82. Vayathu
1. 1-33yrs □  2. 34-66yrs □
3. 67-100yrs □

83. Udal Vanmai
1. Iyalbu □  2. Valivu □  3. Melivu □
84. Vanmai
   1. Vanmai  2. Menmai

85. Panbu
   1. Thannadai  2. Puranadai  3. Illaitthal
   13. Pakkanokku

86. Naadi nadai
   7. Azhal Iyam  8. Iya vali  9. Iya Azhal

87. MANIKKADAI NOOL (Viral Kadai Alavu)

IYMPORIGAL / IYMPULANGAL

<table>
<thead>
<tr>
<th>1. Normal</th>
<th>2. Affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>88. Mei</td>
<td></td>
</tr>
<tr>
<td>89. Vaai</td>
<td></td>
</tr>
<tr>
<td>90. Kan</td>
<td></td>
</tr>
<tr>
<td>91. Mookku</td>
<td></td>
</tr>
<tr>
<td>92. Sevi</td>
<td></td>
</tr>
</tbody>
</table>
### KANMENTHIRIYANGAL / KANMAVIDAYANGAL

<table>
<thead>
<tr>
<th>1. Normal</th>
<th>2. Affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>93. Kai</td>
<td></td>
</tr>
<tr>
<td>94. Kaal</td>
<td></td>
</tr>
<tr>
<td>95. Vaai</td>
<td></td>
</tr>
<tr>
<td>96. Eruvaai</td>
<td></td>
</tr>
<tr>
<td>97. Karuvaai</td>
<td></td>
</tr>
</tbody>
</table>

#### 98. YAAKAI

|------------|-----------|-----------|

#### 99. GUNAM

|------------------|---------------|---------------|

### UYIR THATHUKKAL

#### 1. Vali

<table>
<thead>
<tr>
<th>1. Normal</th>
<th>2. Affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>100. Uyirkkaal (Praanan)</td>
<td></td>
</tr>
<tr>
<td>101. Keelnokkukkaal (Abaan)</td>
<td></td>
</tr>
<tr>
<td>102. Paravukaal (Viyaanan)</td>
<td></td>
</tr>
<tr>
<td>103. Melnokkukkaal (Udhaanan)</td>
<td></td>
</tr>
<tr>
<td>104. Nadukkaal (Samaanan)</td>
<td></td>
</tr>
<tr>
<td>105. VaanthikKaal (Naahan)</td>
<td></td>
</tr>
<tr>
<td>106. Vizhikkaal (Koorman)</td>
<td></td>
</tr>
<tr>
<td>107. Thummikkaal (Kirukaran)</td>
<td></td>
</tr>
<tr>
<td>108. Kottavikkaal (Devathathan)</td>
<td></td>
</tr>
<tr>
<td>109. Veengukkaal (Dhananjeyan)</td>
<td></td>
</tr>
</tbody>
</table>
### II. Azhal

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>110. Aakkanal (Analapitham)</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>111. Ollolithe (Prasakapitham)</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>112. Vannaeri (Ranjakapitham)</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>113. Nokkazhal (Aalosakapitham)</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>114. Aatralangi (Saathakapitham)</td>
<td>☐</td>
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</table>

### III. Iyam

<table>
<thead>
<tr>
<th></th>
<th>Normal</th>
<th>Affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>115. Aliiyam (Avalambagam)</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>116. Neerpipiyyam (Kilethagam)</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>117. Suvaikaaniyam (Pothagam)</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>118. Niraivuiyam (Tharpagam)</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>119. Ondriiyam (Santhigam)</td>
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### UDAL THATHUKKAL

<table>
<thead>
<tr>
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<th>Affected</th>
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</thead>
<tbody>
<tr>
<td>120. Saaram</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>121. Senneer</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>122. Oon</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>123. Kozhuppu</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>124. Enbu</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>125. Moolai</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>126. Suronitham/ Sukkilam</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>MUKKUTRA MIGU GUNAM</td>
<td>1. Present</td>
<td>2. Absent</td>
</tr>
<tr>
<td>---------------------</td>
<td>------------</td>
<td>-----------</td>
</tr>
<tr>
<td>I. Vali Migu Gunam</td>
<td>127. Emaciation</td>
<td>□</td>
</tr>
<tr>
<td></td>
<td>128. Blackish colouration of the body</td>
<td>□</td>
</tr>
<tr>
<td></td>
<td>129. Desire to take hot food</td>
<td>□</td>
</tr>
<tr>
<td></td>
<td>130. Tremors</td>
<td>□</td>
</tr>
<tr>
<td></td>
<td>131. Abdominal distension</td>
<td>□</td>
</tr>
<tr>
<td></td>
<td>132. Insomnia</td>
<td>□</td>
</tr>
<tr>
<td></td>
<td>133. Weakness</td>
<td>□</td>
</tr>
<tr>
<td></td>
<td>134. Weakness of sense organs</td>
<td>□</td>
</tr>
<tr>
<td></td>
<td>135. Giddiness</td>
<td>□</td>
</tr>
<tr>
<td></td>
<td>136. Sluggishness</td>
<td>□</td>
</tr>
<tr>
<td></td>
<td>137. Constipation</td>
<td>□</td>
</tr>
<tr>
<td>II. Azhal Migu Gunam</td>
<td>138. Yellowish discolouration of the skin</td>
<td>□</td>
</tr>
<tr>
<td></td>
<td>139. Yellowish discolouration of the eye</td>
<td>□</td>
</tr>
<tr>
<td></td>
<td>140. Yellowish discolouration of urine</td>
<td>□</td>
</tr>
<tr>
<td></td>
<td>141. Yellowish discolouration of faeces</td>
<td>□</td>
</tr>
<tr>
<td></td>
<td>142. Increased appetite</td>
<td>□</td>
</tr>
<tr>
<td></td>
<td>143. Burning sensation in the body</td>
<td>□</td>
</tr>
<tr>
<td></td>
<td>144. Insomnia</td>
<td>□</td>
</tr>
<tr>
<td>III. Iyam Migu Gunam</td>
<td>145. Excessive salivation</td>
<td>□</td>
</tr>
<tr>
<td></td>
<td>146. Eraippu (dyspnoea)</td>
<td>□</td>
</tr>
<tr>
<td></td>
<td>147. Heaviness of the body</td>
<td>□</td>
</tr>
<tr>
<td></td>
<td>148. Whiteness of the body</td>
<td>□</td>
</tr>
</tbody>
</table>
149. Chillness of the body
150. Reduced appetite
151. Cough
152. Increased sleep
153. Sluggishness

154. NOI UTRA KAALAM
   1. Kaarkaalam
   2. Koothirkaalam
   3. Munpanikaalam
   4. Pinpanikaalam
   5. Ilavenirkaalam
   6. Muthuvenirkaalam

155. NOI UTRA NILAM
   1. Kurinji
   2. Mullai
   3. Marutham
   4. Neithal
   5. Paalai

156. Date of Birth
157. Time of Birth
158. Place of Birth
159. NATCHATHIRAM

00. Not known  □

160. RAASI

00. Not known  □

EXAMINATION OF ULCER:

161. Inspection:

1. Size :

.................................................................

.................................................................

2. Shape :

.................................................................

.................................................................

3. Colour:

.................................................................
4. Number: ........................................................................................................
........................................................................................................

5. Position: ...................................................................................................
........................................................................................................

6. Edge: ...........................................................................................................
........................................................................................................

7. Floor: .........................................................................................................
........................................................................................................

8. Discharge: ..................................................................................................
........................................................................................................

9. Surrounding area: ......................................................................................
........................................................................................................

162. Palpation:

1. Tenderness: ............................................................................................... 

2. Depth: ........................................................................................................

3. Relations with the deeper structure: .........................................................

4. Surrounding skin: .....................................................................................
INVESTIGATION

BLOOD

163. TC (Cells/cumm) : 


165. Hb (gms%) : 

166. E.S.R. (mm/hr) : 1.1/2hr  2.1hr

167. Blood Sugar (F) (mgs%) :

URINE

168. Albumin : 0.Nil  1.Trace  2.+  3.++  4.+++ 

169. Sugar : 0.Nil  1.Trace  2.+  3.++  4.+++ 

Deposits 1. Yes 2. No

170. Pus cells :

171. Epithelial cells :

172. RBCs :

173. Crystals :

MOTION TEST 1. Yes 2. No

174. Ova 

175. Cyst 

176. Occult blood
177. **Biothesio - Meter:**

………………………………………………………………………………………..……

…………………………………………………………………………….

178. **Doppler study:**

……………………………………………………………………………………………

………………………………………………………………………………

**CLINICAL SYMPTOMS OF PATHACHAKKARAM:**

<table>
<thead>
<tr>
<th>Symptom</th>
<th>1. Present</th>
<th>2. Absent</th>
</tr>
</thead>
<tbody>
<tr>
<td>179. Numbness of the foot</td>
<td></td>
<td></td>
</tr>
<tr>
<td>180. Burning sensation of the foot</td>
<td></td>
<td></td>
</tr>
<tr>
<td>181. Heaviness of the foot</td>
<td></td>
<td></td>
</tr>
<tr>
<td>182. Pain in the foot</td>
<td></td>
<td></td>
</tr>
<tr>
<td>183. Callus formation in the foot</td>
<td></td>
<td></td>
</tr>
<tr>
<td>184. Fissure In the Callus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>185. Itching</td>
<td></td>
<td></td>
</tr>
<tr>
<td>186. Whoozing in the ulcer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>187. Erythematous Ulcer in the foot</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
A STUDY TO DIAGNOSE “PATHACHAKKARAM“ THROUGH SIDDHA DIAGNOSTIC METHODOLOGY

By
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DEPT OF NOI NAADAL,
G.S.M.C. PALAYAMKOTTAI.

1. BACKGROUND
PATHACHAKKARAM

It denotes the chronic ulceration of the Foot. The chronic ulceration is caused by the damage of peripheral nerves in the Foot, as a complication of Diabetes mellitus.

In Thanvanthri vaithyam explained. “Pathachakkaram” as mentioned below.

“கால்நிலையக்கு முன் மற்றும் புல்ளித்தாழ்வில் வேறுபாற்றும் வகையில் முதல் முரயோக் காத்தாகவும் முயல்வெளியல் வேகமாக விளையாடும் கால்நிலையம் முதல் புல்ளித்தாழ்வில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகை�ில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறுபாற்றும் வகையில் வேறு
3. POPULATION AND SAMPLE

PATHACHAKKARA M (as explained above under the song)
Patient satisfying the inclusion and exclusion criteria mentioned below.

The samples of pathachakkaram patient and selected from O.P and I.P. Departments of Govt, Siddha medical College, Palayamkottai under the guidance of faculties, Head of the Department of post graduate - NOI Naadal Department.

4. SAMPLE SIZE

A sample size of 20 patients will be taken for detailed study

5. INCLUSION CRITERIA

1. Age – above 15 years.
2. Complaints - more than 6 months.
3. Willing to give blood and urine specimen for Investigations whenever required.

6. EXCLUSION CRITERIA:-

1. Tuberculoid ulcer.
2. vericose ulcer.
3. Arterial ulcer.
4. Lepromatic ulcer.

7. CONDUCT :-

PATHACHAKKARAM patients Satisfying the inclusion and exclusion criteria will be included in this study. Siddha diagnostic Procedure such as Envagai thervu, manikadai nool, Nilam, Kaalam and sothidam of the patients will be noted.

8. FORM

Form diagnostic proforma for pathachakkaram.
BIOLOGIOGRAPHY

1. Thanvanthri Vaithiyam
2. Yugi Vaithiya Chinthaaamani - 800
3. Siddha Maruthuvanga Churukkam - Dr.K.S. Uthamarayan H.P.I.M.,
4. Udal Thathuvam - Dr. P.M. Venugopal H.P.I.M.,
5. Noi – Naadal NoiMudhal Naadal - Dr.M. Shanmugavelu H.P.I.M.,
6. Noilla Neri - Dr. Durairasan H.P.I.M.,
7. Siddha Maruthuvam - Dr. Kuppusamy Mudhaliyaar
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9. Theran Karisal
10. Agasthiyar 1200
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