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# Bodhi

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## MVR AYURVEDA MEDICAL COLLEGE
## PARASSINIKKADAVU

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# FORWARD

Chairman Advisory Board Publication Division:

**E. KUNHIRAMAN**

Director

MVR Ayurveda Medical College , Parassinikkadavu

We are happy to introduce the new issue of E-bodhi. This magazine stands as the shining beacon of our institution, embodying our commitment to bridging the gap between ancient wisdom and modern science in the realm of Ayurveda. Its insightful articles, collaborations among departments, and dedication to exploring Ayurveda not only reflect the institution's pride but also serve as a testament to its continuous pursuit of excellence in promoting Ayurveda MVR group of institutions is going to delve into the groundbreaking innovations shaping the landscape of Ayurveda, from traditional roots to modern applications.

We uncover the fusion of ancient wisdom with cutting-edge technology, witnessing how Ayurvedic principles are being redefined for the contemporary world.Moreover, we unravel the intricate web of scientific research that validates the efficacy and relevance of Ayurveda. We showcase the rigorous studies, trials, and discoveries that are bridging the gap between ancient knowledge and empirical evidence, paving the way for wider acceptance and integration into mainstream healthcare.Finally, we gaze into the horizon of possibilities that lie ahead for Ayurveda. From personalized medicine to holistic wellness approaches, we explore the potential avenues where Ayurveda could revolutionize healthcare, emphasizing preventive measures and holistic well-being.In this Issue, the contributions from the Shareera Rachana and Shareera Kriya departments are sure to offer a profound insight into the structural and functional aspects of the human body according to Ayurveda.

Join us as we navigate through these exciting chapters, unlocking the doors to a future where Ayurveda not only sustains its rich heritage but also emerges as a beacon of hope and healing for generations to come.

Warm regards,

**Prof. E. Kunhiraman**

Director, MVR Group of Institutions

# EDITORIAL

Chief Editor:
**PROF. DR. A.K MURALEEDHARAN MD (AYU)**
PRINCIPAL
MVR Ayurveda Medical College, Parassinikkadavu

Dear Readers,

Welcome to this edition of E Bodhi, where we delve into the wisdom of Ayurveda. The recent Global Ayurveda Festival served as a melting pot of knowledge, experiences, and advancements in the field. It was a platform where experts congregated to exchange ideas, discuss breakthroughs, and envision the future of Ayurveda. The festival's discussions and dialogues have paved the way for a deeper understanding and appreciation of Ayurveda's potential in today's healthcare landscape.As we navigate the future, the opportunities for Ayurveda are abundant. The integration of traditional practices with modern medical approaches presents an exciting trajectory for Ayurveda's expansion. The world is increasingly recognizing the holistic benefits that Ayurveda offers, and this recognition opens doors to collaborations, research endeavors, and global outreach.In this edition of E Bodhi, curated by the Departments of Kriya Shareera and Rachana Shareera, we embark on an exploratory journey into the intricate aspects of Ayurvedic physiology and anatomy.The amalgamation of Kriya Shareera (Physiology) and Rachana Shareera (Anatomy) forms the very foundation of Ayurveda's understanding of the human body. This edition aims to unravel the depths of these fundamental principles, illuminating the interconnectedness between bodily functions and structural integrity as perceived in Ayurvedic wisdomWe present scholarly articles and insights, from the Departments of Kriya Shareera and Rachana Shareera. This edition aims to bridge the gap between tradition and modernity, showcasing how these departments are at the forefront of integrating ancient wisdom with contemporary scientific methodologies.In this edition we have a guest article by a renowned author, Dr. Vishnu Damodar MD (Ay), Assistant professor, Dept of Rachana Shareera, Vaidyaratnam Ayurveda College, Ollur. We invite you to immerse yourselves in this edition, where the amalgamation of Kriya Shareera and Rachana Shareera unveils the profound insights and timeless wisdom of Ayurveda's understanding of the human body.Happy Reading!

Warm regards,
**Dr. Muraleedharan A K**
Principal, MVR Ayurveda Medical College Parassinikkadavu

# INDEX

**Dr. VISHNU DAMODAR**
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# A CRITICAL REVIEW ON PRAKRUTI PAREEKSHA AND DERMATOGLYPHIC OBSERVATION - AN IMPORTANT TOOL FOR THE EXAMINATION

## ABSTRACT

Prakruti pareeksha plays a very important role for the examination of patient, for the preventive and curative aspect of many disorders. As Prakruti is the inherent property of an individual it refers to the genetically determined physical and mental make-up of the individual. Even if we go by the theory of heredity or genetics it also says that an individual's behavior or psyche is decided even before he is born. In this way these lines and symbols on the palms and soles may be helpful for the determination of the Prakruti and can be understood and evaluated in more appropriate and scientific method. The character and temperament might be well correlated to dermatoglyphic observation. Here an attempt was made to correlate Prakruti pareeksha with dermatoglyphic observation as a tool for the examination.

**Key words:** Prakruti pareeksha; Dermatoglyphic observation; Ayurveda.

## INTRODUCTION

Prakruti pareeksha is on the basis of a susceptibility of a particular disease to a particular type of man, by knowledge of Prakruti the equilibrium of various fundamental constituents of human body can be maintained to keep him in a state of perfect health. Dermatoglyphics is the study of the patterns of epidermal ridges of fingers, palms, toes and soles. Each individual has unique finger prints. This uniqueness is based on the genetical characteristics of each individual which are transferred genetically from one generation to others.

In our classics and the hastasamudrika (hastharekha sastra) it is said that the study of different shapes and lines of our palms and soles indicate the course of life, span of the life , health, wealth, abilities, talents and weakness of an individual. The detailed description of palms and fingers ridges pattern could be found in many Sanskrit literatures on palmistry, a science of prophecy and fortune telling. This ancient literature on palm history describes the figures of chakra, shanka and Padma on human palms, soles, fingers and toes. The same is studied these days as loops, whirls and arches respectively. These lines contain certain characteristics that are explained in the form of code; Dermatoglyphics helps to unlock these secret codes and helps for understanding human potential and examination of patient.

Medical research shows that health trends can be perceived on our palms and this Dermatoglyphics relates to many physical, emotional and mental health conditions of an individual. The assessment of the Prakruti by this Dermatoglyphics study we may get to know the span of the life, behavior and health condition of the person as it is said the life span, health, wealth behavior differ from one Prakruti to another.
The simple inexpensive and noninvasive method of performing Dermatoglyphics study has thus become a useful tool in the hands of clinicians for comparisons and diagnosis of many disorders. Thus examination of palmer prints may soon become part of the general physical examination.

## METHODOLOGY

Ayurvedic literatures, puranas, historical literatures, journals etc were reviewed to arrive at a conclusion

**Review of literature**

On cliff of Nova Scotia, papillary ridges like carvings of pre historic age have been discovered. Use of fingerprints was practiced in official documents of China, dating as back as 3000 B C. It was also in use in ancient Indian documents. It is from the ancient period that the study of creases commenced, dating from Vedic period. This is evident by the study of carvings and paintings of the palms and soles on the walls of the caves. The dimension and purposes of these uses are of course not clear.[1]

In Garuda Purana in Purvakanda or Acharakanda chapter 63 and 64 they explained predictions based on physical traits, predictions of age by palm history etc. In garuda Purana Lord Vishnu, continuing with his narration told Lord Shiva that the age of person could be predicted by the lines found on his palms. If the life line reaches the base between index and middle fingers then the concerned person lives for a century. If the line is long, clear and without intersection from other line then the concerned person lives for a 100 years. A woman having a cobweb of lines on her palms is sure to lead a torturous and painful life whereas palm with few lines indicate that she would be poor. If the lines are pink then they indicate happiness, prosperity and good health whereas blackish line indicates that she would live a life of slavery. Any woman having " a chakra" ," a hook "or an earring mark on her hand indicates that she would get worthy sons and rule like a queen.[2] In bhavishyapurana in chapter 27 while explaining the shubha ashubha lakshana of the man, the lord Brahma said that the person having matsya rekha indicate success in all the fields, person will be rich and has good offspring. The person one who has the sign of dhwaja or shank indicates richness.[3] In our ancient Hindu literature, folklore and history are replete with references to palm history or astrology. Durvassa, in mahabharatha saw the forehead and hands of Kunti and predicted that she would marry a man in capable of producing children. However, he said she was destined to give birth to sons, who shall rule the world. Kunti later married Pandu who as foretold was impotent.[4]

In kashypa samhita in lakshan adhyaya sloka 6-7 he explained different lines and shapes like swastika, Padma, chakra and auspicious signs on the feet denoting the life span, health, wealth and the luck of the individual. He explained the feet which are corpulent, well formed with upward lines are of good longevity prosperous and administrators. The mark of swastika, plough, lotus, conch shell, wheel, horse, elephant, chariot, weapon and other auspicious signs of kings, coppery and smooth sole are of lucky persons. Upward bent are of persons with medium wealth and longevity, white color denotes poor, without lines denotes servants, so many lines denotes ill health.[5]

The scientific study of papillary ridges of the hands and feet is credited as beginning with the work of Joannes Evangilesta Perkinje, a Czech physiologist and biologist in 1823 and he also classified different finger prints into nine types.[6]

Sir Edward Henry of Bengal in 1890 classified the finger print patter and found the first finger print bureau of Kolkata, his classification of fingerprints is known as henry's system. Sir Edward Henry also studied the applied aspect of Galtons observation and recommendation.[7]

The basic methods and principles of dermatoglyphics study were laid down in 1892 by Sir Francis Galton an anthropologist from London, he classified epidermal patterns under Galton's system and gave a detail account of morphology, inheritance and racial variations of ridges.[8]

Sir Herold Cummins Prof. of Anatomy at Tulane University in 1926 was the one to name this study of pattern of ridges as dermatoglyphics and published a book called "An introduction in dermatoglyphics". He was the first to link dermatoglyphics peculiarities to genetics.[9]

Sarah B Holt (1961) and L S Penrose (1968) found ideal values of correlation between finger ridge counts of relatives. A new scientifically found type of palmistry called dermatoglyphics arouse from a German measles epidemic of 1964. Palm prints studies of babies who born to woman who caught German Measles during their pregnancies have revealed to Dr. Ruth and Dr. Rita Blarper of Brooklyn that certain loops and creases are characteristics of the consequent chromosomal damage. Fuller in 1973 analyzed variety of dermatoglyphic data in various diseases to know whether it can be used as diagnostic aid.[10]

In India Srinivas Murthy of genetics and srivastav,Bhanu and Umapathi of Anthropology contributed a lot to dermatoglyphics. Samudrik Thilak M Katakkar also wrote "An Encyclopedia of Palm and Palm Reading" after many years of practice and in 1992 his work discussed the loops, arches, tempted arches whorls and composites from both health and character aspect.[11]

In 1993 Rita Robinson published her dermatoglyphic observations as "health in your hands". She recognized a number of shapes: a simple arch, a sharp arch, a left loop that leans towards the little finger (radial loop) a right loop that leans towards the thumb (ulnar loop), double loops.[12]

## HISTORICAL REVIEW OF PRAKRUTI

In Bhagavat Geeta Lord Sree Krishna has said Vedas are not outside the three gunas attributes of the non self Prakruti he said "Traigunya Vishayo Vedo Nistraiyai Gunyo Bhavarjuna".[13] In Mahabharata tama,vykta, shiva, rajayoni, trigunatmaka are mentioned which can be considered as synonyms of Prakruti.[14]

In Hithopadesha the word Prakruti is used as the termination of existence.[15] Mandukopanishat prakruti is referred which is self-evident, self-existent, innate and is not a byproduct of another thing and one which never loses its originality.[16] "Shleshmala pramada priya" means shleshmala prakruti persons like more towards pramada mentioned in Bruhath jathaka.[17]

## REVIEW ON DERMATOGLYPHICS

Dermatoglyphics pronounced as der-mah-to- glif-iks is a Greek word used to denote study of the patterns of ridges of skin of fingers, palms, toes, and soles. The surface of the palms, fingers, soles and toes have a series of ridges and grooves. They appear either as straight lines or as a pattern of loops and whorls, as on the tips of the digits. The ridges increase the surface area of the epidermis and thus increase the grip of the hand or foot by increasing friction because the ducts of sweat glands open on the tops of the epidermal ridges as sweat pores, the sweat and ridges from fingerprints upon touching a smooth object. The epidermal ridge pattern is generally determined and is unique for each individual. Normally the ridge pattern does not change during life, except on enlarge and thus can serve as the basis for identification through fingerprints or footprints.[18]

Development of dermatoglyphic pattern is under genetic control. This is evident from the clear resemblance of dermatoglyphics among related persons (Schumann and Alter 1976).[19] Dermatoglyphics as a diagnostic aid is now well establishes in a number of diseases which have a strong hereditary basis.

## DERMATOGLYPHICS FEATURES[20] UNIQUENESS

There are no two identical finger prints. One's 10 fingers are not the same. Dermatoglyphics style, striae, height, density, quantity and location of the point are not the same for everyone. No individual has ever displayed the same fingerprint from another digit even if taken from the same hand.

## INVARIANCE

The raised pattern network of life time from birth to death will not change even if it is due to the regeneration of the labor, dermatoglyphics style, quantity and profile shape which is determined the same later.

## HEREDITARY

According to science statistics, immediate family members will be more or less the same between the striae. Normal human cells have 23 pairs of chromosomes. If the chromosomes of the tree or structure are changed, it will cause the corresponding striae mutation. Therefore, the striae have inherited the mutation.

## APPLICATION OF DERMATOGLYPHICS[21]

At a conference on the state of dermatoglyphics (1991), various researches laid out their vision of the future. The good news is that several possible applications of dermatoglyphics seem quite promising. For instance: Dermatoglyphics may be in position to become the primary means of assessing complex genetic traits. Because fingerprints and line formations form during vital stages of fetal development, dermatoglyphic studies are in a unique position to evaluate the effect of toxins on the intrauterine environment(over 20% of all pregnancies never come to term).

Dermatoglyphics are still useful for the evaluation of children with suspected genetic disorders and diseases with long latency, slow progression and late onset.

The new findings that rats have deramtoglyphic patterns (Bonnevie, with all her detailed research had missed this [rat dermatoglyphics are quite small] and until recently, no one had looked) opens up a whole new realm of experimental possibilities.

## DERMATOGLYPHIC ANALYSIS [22][23][24]

The study of dermatoglyphics is mainly concerned with epidermal ridges of fingers, palms etc.

## RIDGES

These are epidermal lines which lies parallel on the surfaces of stratum cornium. Along the ridges lie the pores of ducts of sweat glands. Furrows are the depression between the ridges. The ridges run parallel or they may diverge and surround empty area.

Types of ridges

1) **Short Ridge:** These are small size, short length and bear 2-5 sweat pores.
2) **Long Ridge:** These are of long length; they are more in number and more than 7 sweat pores.
3) **Interstitial Line or Ridge:** It is not exactly a ridge because it has no pores: size is different from a ridge. It is not considered in ridge counting.

1) **Fork:** It is the bifurcation of long ridge.
2) **Enclosure:** It is formed by connection of 2 forks.
3) **Islands:** These are small circular or square independent ridges with one or no pores.

**Dermatoglyphic landmarks:** The study of these helps in better understanding of the patterns and classification of same.

1) Delta (Trirarihis): In the true sense the delta is a triangular plot or area formed by the two diverging ridges and the first ridge in front of them.
2) Tri radial point: This is the center point of the tri radius which provides landmark for ridge counting and ridge tracing.
3) Core: It is central part of a pattern. The type of core varies according to the pattern. It may appear as island, straight line, staple or hook.
4) Inner terminus: It is fixed point on the core.

## CLASSIFICATION OF FINGER PATTERNS

Sir Francis Qalton sorted 3 classes of patterns (Arch, loop, and whorl). Out of 9 patterns classified by Dr. Evanijelist purkingee. Sir Edward. R. Henry modified Galtons arch, loop, whorl system and classified them into four main types.

1. Arches
2. Loops
3. Whorls
4. Composite

Henry system is more widely used than any other system and hence this is preferred in the present study of dcrmaloglyphic analysis.

## 1) ARCHES

This is simplest and easiest to find of all the patterns found on the finger tip. Arches are formed successive parallel lines form on the finger tips. One border of the finger to the other and forms gentle curve with concavity facing proximally. Depending upon the height of curves, arches arc divided into low arch or tented (high) arch. These two arc plainly denoted by the letter A some limes a high tented Arch is denoted by T. The point of confluence is called Tri radius. Arches are the least common of the three general patterns and are subdivided into two distinct groups. Plain (simple or low arch) and tented arch.

### PLAINARCHES

The Plain Arch is the simplest of all fingerprint patterns and is formed by ridges entering from one side of the print and exiting on the opposite side. These ridges tend to rise in the center of the pattern, forming a wave- like pattern.

### THE TENTED ARCH

The Tented Arch is similar to the Plain Arch except that instead of rising smoothly at the center, there is sharp up thrust or spike, or the ridges meet at an angle less than 90 degrees i.e. is making an acute angle at the curving point.

## 2) LOOPS

This is a pattern in which a series of ridges enter the pattern area on one side and then recurve abruptly and leaves the pattern area on the same side, thus enclosing a core.

**ULNAR LOOP:**

If the ridges start and terminate at medial side of the finger, then it is called ulnar loop.

**RADIAL LOOP:**

If the ridges starts and terminate at lateral side then it is called Radial loop. The loop is characterized by having only one tri radius, present on the opposite side of opening of the loop. Loop is more frequently encountered of all patterns and approximately 65% of all linger prints.

## 3) WHORLS:

These display ridge formation in which one or more ridges make a complete curvature or circuit around the core. They may be circular, spiral, or oval.

**Circular or concentric whorl:** The small circles from the center, expanding bigger like circles attached to one another

**Spiral whorl:** A small siring from the center, going outwards layer by layer like screws. Arranged spirally they may be clockwise or anticlockwise type.

## 4) COMPOSITE:

It means a combination of two or more patterns either of the same or different types in one print i.e. either a combination of whorl and loop patterns, or two different loop patterns, or two whorl patterns or an arch and a loop. These are 4 chief types.

**Central pocket loon:** These are essentially whorls of reduced size lying in the interior of the pattern area.

**Lateral pocket loon:** These are like twin loops out in this the core lines have their exits without being divided by either of the deltas,
i.e. on the same side of deltas.

**Twin loops:** Loops patterns open in opposite direction then it is called twin loop.

**Accidental:** These are combination of two or more patterns. The accidental patterns are complex patterns formed by combination of two or more unusually unrelated configurations a whorl and loop, tented arch and loop, loops.

According to Frager and Nora (1975). Arches and radial loops have the lowest overall frequency and when present they occur, most often on digit 2 especially the radial loops.
1.ulnar loops are most frequent than any other type.

Normal females have slightly more arches and few whorls. There are also racial differences in pattern frequencies. For example Orientals have a higher frequency of whorls than Europeans and Americans (Holt1968).

Verma (1970) while studying the dermal pattern in India reported that there is no truly Indian pattern as India is composed of many ethnic groups. Ulnar loops are most common, whorls second in frequency. Distribution of whorls varies from country to country. Ridge count was high in Indian children as compared to the British population.

Chakraborti and Magotra (1976) in his study the ulnar loops are dominant in all digits and arches are much less in frequency. According to the percentage of their distribution in whole population of the world, these fingerprints are- Loop - about 65%: Whorl - about 25%: Arch - about 7%: Composite - about 2-3%. (Table 1)

## RIDGE COUNT

The ridge count is being given by counting the total intersected when a line is drawn from the central point of a pattern to its nearest tri radius. Such patterns can vary from digit to digit in any individual but, in the hand, loops are the most common and arch the least; with toes the converse is true. These variable features provide an astronomical number of possible combinations, so that each individual is almost certain to have a unique set of patterns.[25] The counting of a ridge begins from the center of core of the pattern to the triradius. The size of pattern in determined by counting the number of ridges. Whorls have the highest ridge count Arch has 0 ridge count because it has no tri radius. Total ridge count is obtained by adding up the count on each of 10 digits. TFRC count of males is usually higher than females.[26] Holt 1968 french population has ridge count of 132 for males and 121 for females. British populations 145 males 127 females. Chakraborti and Magotra in 1976 said 133 for males and 118 for females.[27] According to verma (1970) ridge count shows an interesting co relation with the number of chromosomes present. The ridge count goes on increasing along with number of chromosomes present as in Kleinfelters and Turners Syndrome.

## PALMAR PATTERN[28]

Concurrent with the study of fingerprint patterns, the study of the line formations of the palm is also part of the field of dermatoglyphics. However, unlike the fingerprint patterns, the line formations keep altering throughout a person's life and have shown themselves to be much more difficult to categorize. Nonetheless, numerous studies have found correlation between line patterns and different diseases and psychological conditions. Fere in 1900 is normally cited as the beginning point in the scientific study of line formations. His system merely noted the presence or absence of six different line formations which he then compared with different population samples, comparing the lines for bimanual differentiation, sexual differences, etc. Poch, 1925 went a step further. He analyzed the intersections of lines as well as whether or not they were present. Poch used his system to correlate the relationship between embryonic disturbances and affect on line formation. Wurth 1937 was the first to note that lines form before the fetal hand can move. Cummins had previously noted the difference between lines that "represent firmer attachment of the skin to underlying structures." and those created later by "buckling of the skin," but Wurth proved that the so called flexion creases could not be formed merely by flexing the hand.Wendt, 1958 added a seventh line to the previous system (the line in palmistry that corresponds to the line of intuition), but there remained little consensus on a line classification system.

| Finger prints | Prints | Features | Characteristics |
|---|---|---|---|
| simple arch (SA) |  | It's like small mounds build-up slowly from the heart point. | Simple, settled; practical, and stubborn. Tend to have things done by steps. Repressive of emotions. |
| Tented arch (TA) |  | It's like small mounds build-up slowly from the heart point, looked more sloop with smaller cissoids. | Simple, settled-practical. Easily inconsistent in doing things. Idealistic. Impulsive. High degree of emotional elasticity, high strung nervous system, to sensitive. |
| Ulnar loop (UL) ( Place palms down and UL goes towards little finger) |  | Every print is like a bendy stream way which goes parallel in the same direction. Place palms down and UL goes towards little fingers. | Perceptual and romantic. Enjoy life in the meantime. Keen of observation. Easygoing and Sympathetic. |
| Radial loop (RL) (Place palms down and RL goes towards thumbs.) |  | Every print is like a bendj stream way which goes parallel in the same direction. Place palms down and RL goes towards thumbs. | Perceptual and romantic. Enjoy life in the meantime. Keen of observation. Easy going and sympathetic. Naturally rebellious. Tend to use critical thinking. |
| Concentric whorl (WL) |  | Prints start with small circles from the center, expanding bigger like circles attached to one another. | Goal-oriented, aggressive, decent and serious about images. Emulous with strong self-consciousness and eager to win. |
| Spiral whorl (SW) |  | Prints start with a small string from the center, going outwards layer by layer like screws. | Goal-oriented, aggressive, decent and serious about images. Emulous with strong self-consciousness and eager to win in a lower degree comparing with CW. |
| Press whorl (PW) |  | Prints are also like screws, going outwards layer by layer, compressed in a longer and Hatter shape. | Goal-oriented, aggressive, decent and serious about images. Emulous with strong self-consciousness and eager to win. Focus on precision and details with carefulness. Very accurate. |

| | | | |
|---|---|---|---|
| Composite whorl (CW) |  | Prints in the middle of the center look like) two hookers combining with each other, going separately outwards in the same or reversed directions. | Multi-goals oriented. Two various thinking models coexist with strong integrative ability and accumulation |
| Double loop (DL) |  | Prints in the middle of the center look like two hookers climbing with each other, going separately outwards in the same or reversed directions. But the ends of each ones are like stream ways, running to oceans by themselves. | Multi-goals oriented. Two various thinking models coexist. Think in different ways more perceptually. |

The ones in use seemed both to simple and too difficult to apply -Several new systems appeared that attempted to correct this deficiency. Hutchinson also explored the meaning of special palmer patterns. This was not an attempt to gain insight into the possible of any of the origins and endings of main lines used in the regular course of dermatoglyphic studies, but it was an attempt to make use of any unusual dermatoglyphic patterns that appeared on the palm. The most widely quoted expert on line formations is Milton Alter, PHD. Finding all other line classifications inadequate, he invented his own system that seemed at once more simple yet more comprehensive and scientific. Starting with four categories (the major lines all together, the distal transverse crease [the heart line], the proximal transverse crease [the head line] and the thenar crease [the life line]) he broke each into a few sub-categories and statistically compared males and females, left and right hands. However, Alter's approach ran into difficulty. Line formations can be complex and different observers using Alter's system don't agree on the presence or absence of lines.The palm is divided into Thenar, Hypothenar and four interdigital area.Thenar there are four digital tri radii located in the proximal relation to the base of the digits II, III, IV and V. In radio ulnar sequence they are denoted by a, b. c and d. Thus the two distal radiant of each tri radius enclose the area below the root of the finger that is called digital area. The proximal radiant is directed towards the interior of the palm, and when it is fully traced it is called the palmer main line. Thus four main lines are traced from the four digital tri radii (a, b. c, d) and these lines are denoted by letters A B C D in radio ulnar sequence.

## AXIAL TRIRADIUS[29]

It is the tri radius present at the base of the palm between the thenar and hypothenar areas. It is usually proximal but may be present or displaced distally. This is-measured by comparing the distance from crease of middle finger and the wrist crease. Depending on the positions of the tri radius it is designated as:t in the proximal margin, t' midway between the center of the palm and root of the palm, t' at the midpoint of the palm.

## ATD ANGLE[30]

It is the angle found by joining 3 tri radial points. First point at the base of index finger a, Second point at the base of little finger d. Third point at the axial triradiust.Thus depending upon the measurement of ATD angle, the position of the triradius is designated as The angle less than 43 is proximal triradius. The angle between 44 and 56

is intermediate Triradius. The angle more than 56 is distal triradius. The size of the angle is age dependent. It becomes smaller (angle is reduced) with advancing age, because the palm slightly elongates.

## TRI RADII

Tri-radii also occur on the palms and soles, including the bases of each digit except the thumb; a characteristic tri- radius is also present on the proximal edge of the hand in the midline above the flexor retinaculum (the axial tri- radius).The precise positions, numbers and ridge-counts associated with tri-radii have an inherited basis but in general the genetics are multifactorial and too complex at present to be clinically useful.[31]
Jaegers also considered the significance of triradii in her 1974 book, You and Your Hand"'. She located seven positions for the triradius, one under each finger that we described above as a, b, c, and d, one along the thenar side of the palm below the distal transverse crease, one in the general area that we have formally described ATD and one at the center base of the palm that. We have described as t. She considered the td location as the normal placement of the axial triradius. She indicated that the axial triradius at this location evidenced a "normal correspondence between the conscious and subconscious" and "normal prenatal existence the higher location, under the distal transverse crease, would indicate to her prenatal or later life heart problems and an enhanced tactile, sensual or emotional memory.

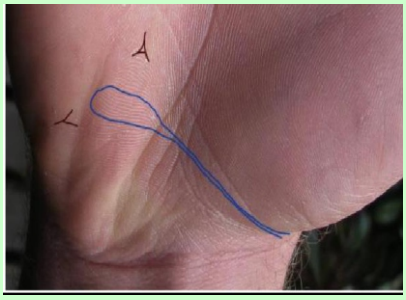
She illustrated some unfamiliarity with the scientific studies of dermatoglyphics when she discussed the normal placement of the axial triradius at or below where we show td "Although this placement does not seem to have come to the attention of the scientists, it has been my observation that this particular placement has been found exclusively on the hands of psychics." She felt this corroborated the findings of astrologers. Perhaps Palmists are fortunate she published after the Penrose letter of 1973. She voiced a desire to be better informed of the work in scientific studies of the hand.[32]

## HASTHAREKHA RELATED TO DERMATOGLYPHICS

The hand (Hasta) has been lot of importance in the Hindu culture, in dinacharya it has been mentioned to recite the slokha which denotes that all the devatas are situated on the hand."[33]

Figure 1: ATD angle

Figure 2: Locations of Triradii



There is a long history in India and China of the use of fingerprints as indications or attributes or character traits. Folk lore from both India and China has traditions of reading certain attributes or abilities from fingerprints. Before we become amused at the tendency to find significance in the counted number of prints, we note that such an approach is often used in scientific studies of the searching for meaningful relationships of fingerprints as genetic and/or chronic health markers. The hand on which the fingerprint will be found will dictate the area of life the behavioral reaction is more likely to be displayed, with the left hand markings relating more to the personal,

sensitive, home, and sentimental, nurturing family areas of life (except perhaps in some left handed and mixed handed people) while the right will probably relate more to the activities of the subject connected to his or her survival and security, including nest building.

In Hitopadesha by Narayana it has been said that the period of life, the kinds of action one has to perform, the amount of wealth to be acquired, the degree of knowledge to be attained and the time of death all these five are created or determined while man is yet in the womb.[34]

Hindu folk fingerprint formulae [35]

The Hindu formula concerns three types of prints: the Shankh which resembles the ulnar and radial loop; the Chakra or whorl; and the Shakti resembling the composite. These are the ridge patterns recognized in the Hindu school of palmistry according to Dr. M. Katakkar, one of the leading contemporary authorities on that school of palmistry.

When the loop is found on

One finger, the subject is happy; But on two Fingers, it is not a favorable sign; and On three fingers it is a bad sign; When found only on four fingers it is not a good omen: When found on five fingers it is not auspicious; But it is a sign of prowess if found on six fingers; and When placed on seven fingers live in kingly comfort; While on eight fingers one is as noble as a king; and On ten fingers one must live happily

When the whorl is found on

Two fingers indicate honors in the courts of kings: Three fingers is a sign the subject will become wealthy; but Four fingers the subject will become a pauper; Five fingers indicate a hedonist; Six fingers indicates passion satisfied; while Seven fingers is a sign of virtue: Eight fingers indicate one prone to disease; Nine fingers predicts the rise of a king; while Ten fingers are the sign of the higher man, the Brahman who realizes self.

When composites arc found on

One finger such a person is very happy; On two fingers the subject is an orator; On three fingers we find a very rich subject; while Virtuous is the subject with the Shakti on four fingers; The philosopher is found when five composites are seen; and if found on six fingers, such a subject possesses high level thinking ability; Should it be found on seven or more fingers, they arc the sign of success in life.

## DISCUSSION

As per the study, the below mentioned points observed are considered for discussion which throw light precisely on authenticity of relation between dermatoglyphics and prakruti. It can be said that the description of the creases commenced from the Vedic period. Description of these lines and shapes are found in our Hindu literature, in purana like Garuda purana and Bhavishya purana, and in Mahabharata. It is said that the scientific study of papillary ridges was first done by sir Jonnes. Gradually there was development of this science, the greatest

contribution to this field is by sir Harold Cummins called as father of dermatoglyphics and he was the first to link the dermatoglyphic to genetics and he was the first to coin term dermatoglyphics.

This Dermatoglyphics in modern science pronounced as der- mah-to-glif-iks is a Greek word used to denote the study of the patterns of ridges of skin of fingers, palms, toes and soles. After considering literature available and opinion of various authors it is understood that both line and epidermal ridge patterning in the fetus may be strongly dependent upon the highly conserved genes that belong to the developmental pathways which function as a variety of diverse cells at different developmental stages.

So the development of dermatoglyphic pattern can be considered under genetic control having three specific features i.e. Uniqueness, invariance and hereditary by this the dermatoglyphic study may be helpful or used to assess the complex genetic traits, genetic disorders, effect of toxins on the intrauterine life etc. Therefore Dermatoglyphics as a diagnostic tool is now well established in a number of diseases which have a strong hereditary basis.

There are different systems of classification of pattern like Galtons system, Henry's system etc. Henry system is more widely used than any other system, the Henry's system of finger patterns are classified mainly as 4 types Arches, Loops, Whorls and Composite. The analysis of the dermatoglyphic pattern is mainly based on epidermal ridges which are of 6 types short ridge, long ridge, interstitial line or ridge, fork enclosure, islands.

It can be said that the ridges are not influenced by bones, muscles or movements of hands. The thick skin bears few ridges and they form arch and small loops where as the thin skin bears more ridges which form whorls and large loops, even the symmetry or asymmetry of the volar pads will results in formation of different patterns, the symmetrical forms whorls, asymmetrical forms loops and weak pads develop into arch. There are many explanations regarding the different qualities of different finger pattern i.e. for whorls, arch, loops etc.

After going through the available literature regarding finger patterns as per the different authors and analyzing and understanding it thoroughly I am of opinion that a person with Loop: will have mental and emotional elasticity with possible lack of concentration, adaptable, emotionally responsive, adaptable, and versatile. Arch: Self contained, repressive, secretive, suspicious, and hesitant. Tented arch: Nervous activity, responsive to emotional stimulation, artistic i.e. too easily affected by musical tunes, idealistic. Whorl: Independence in thought and action, original in ideas and independent, self-confident subjects, secretive in their expression and selfish. Composite: Practical, good judgment, materialistic, lack of common sense, lack of mental elasticity and are narrow minded.

The explanation about shanka (ulnar or radial loop), the chakra or whorl, Shakti resembling the composite was also available and discussed in Hindu literature. Depending on the different patterns and number of the patterns on the digits the future of the person was predicted. All the authors who had commented on dermatoglyphics were of opinion that the ridge count for arch and Composite are zero, where as there are different opinion regarding the TFRC. It can be said the TFRC commonly seen in Indian population may be nearly 133 for males and nearly 118 for females, according to Chakraborti and Magotra, according to Santosh kumar 145 for males and 134 for females.

From the palmer pattern we can study the axial triradius, aid angle which tells us about the angle available in the palm which can also considered as an important landmark for assessment of prakruti.

## CONCLUSION

Prakruti and Dermatoglyphics can be considered under genetic control as prakruti is formed at the time of conception, it refers to genetically determined physical and mental makeup of the individual, where as the dermatoglyphic markings correspond to the neurophysiologic development and it relates to physical, emotional and mental health condition.

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# THE PHYSIOLOGY OF SPEECH: UNLOCKING THE SECRETS OF HUMAN COMMUNICATION

## INTRODUCTION

Speech and language functions are fundamental aspect of human civilization, enabling us to convey thoughts, emotions, and ideas. One of the most important differences between human beings and lower animals is that human beings can communicate by language both in writing and speaking with one another. While we often take our ability to speak for granted, the physiology behind this complex process is a marvel of nature. The production of speech involves a coordinated effort of various anatomical structures and physiological processes. In this article, we will delve into the fascinating world of the physiology of speech, exploring how the human body produces the sounds that define our language and enable us to communicate effectively.

## UNIQUENESS OF SPEECH

Speech is a systematic articulated pattern of sounds made to express the thoughts or ideas in the form of verbal or written words. It is complex to understand the physiology of language and speech because of the intricate central mechanisms involved in integration of this unique function. Most of our present knowledge of language processing is based on the clinical data by analysing patients with speech problems that develop following diseases affecting the cerebral cortex and cerebral damage due to brain injury or neurosurgery.

## THE PERIPHERAL SPEECH APPARATUS

Respiratory System: The process of speech production begins with the respiratory system. We inhale air into our lungs, which serves as the power source for speech. When we speak, we exhale air in a controlled manner. The diaphragm and intercostal muscles play a crucial role in regulating the flow of air.

Phonatory System: Located in the larynx, the phonatory system is where sound is generated. The larynx contains the vocal cords, which are composed of muscle and connective tissue. When we speak, the vocal cords vibrate as air passes through them, producing sound. The pitch and loudness of speech are controlled by the tension and length of the vocal cords.

Articulatory System: The articulatory system encompasses the structures involved in shaping the sound produced by the vocal cords into recognizable speech sounds. This includes the tongue, lips, teeth, alveolar ridge, and palate. By manipulating the positions and configurations of these structures, we create different speech sounds. For example, the position of the tongue against the palate or teeth determines whether a sound is "dental" or "alveolar."

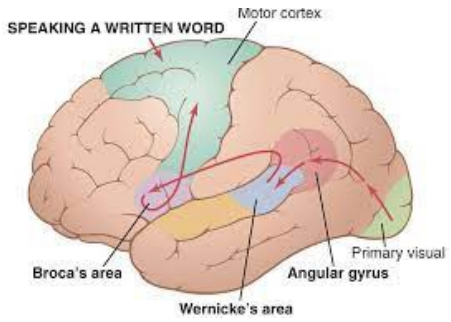
Resonatory System: Sound produced by the vocal cords is further shaped and modified as it passes through the oral and nasal cavities. The size and shape of these cavities influence the timbre or quality of the sound produced. For instance, the nasal cavity contributes to the nasality of certain sounds.

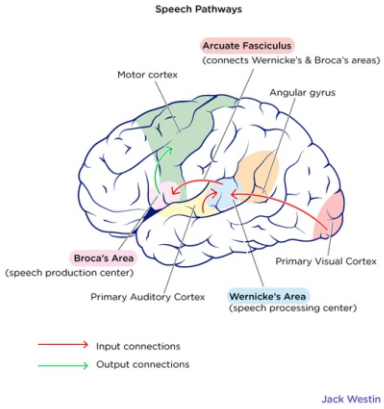
## CENTRAL SPEECH APPARATUS: LANGUAGE AREAS IN THE BRAIN

There are 4 main areas in the brain that play important role in the processing of language and speech. These 4 areas collectively known as language zone that are present around the sylvian fissure. Two are called receptive areas and two are called executive areas. Receptive areas are responsible for sensory aspect (language input) of communication and executive areas responsible for motor aspect (language output).

Receptive area includes the auditory association area (area 42), visual association area (areas 18&19), Wernicke's area and Angular gyrus (area 39). Auditory association area interprets the meaning of sounds that reach area 41. Visual association area interprets the meaning of the various symbols that reach the primary visual area. Wernicke's area concerned with comprehension,recognition, and construction of words and language. Angular gyrus or Degerine's area subserve the perception of written language.

Executive areas are also called motor speech area includes the Broca's area (area 44&45) and Exner's writing area. Broca's area concerned with motor aspects of speech hence called motor speech area. This area regulates functions of the muscles of lips,tongue,pharynx and larynx and helps in proper planning of speech. Exner's writing area or hand skilled area concerned with proper planning of writing movement.




## SPEECH PATHWAY

The various steps that are involved in communication through speech in response to hearing are

1. Reception of sound signals by primary auditory area 41
2. Interpretation of the words in Wernicke's area 22
3. Wernicke's area decides the choice and sequence of words to be spoken.
4. This information is transmitted from Wernicke's area to Broca's area via the arcuate fasciculus
5. Activation of Broca's area for word formation
6. Broca's area in turn transmits appropriate signals to motor cortex that control speech muscles.
7. Speech

## THE PHYSIOLOGY OF ARTICULATION

Speech articulation is a highly intricate process. Here's a simplified breakdown:

**Consonants:** Consonant sounds are produced by obstructing or constricting the airflow at different points in the vocal tract. For instance, a "p" sound is created by briefly blocking airflow with the lips and then releasing it.

**Vowels:** Vowel sounds, on the other hand, are created by shaping the oral cavity without significant constriction or closure. The position of the tongue, the shape of the lips, and the openness of the jaw all play roles in producing different vowel sounds.

**Coarticulation:** In natural speech, sounds don't occur in isolation but rather influence one another. This phenomenon, known as coarticulation, means that the position of the articulatory organs for one sound may begin to anticipate or follow the position for another sound. This seamless transition between sounds is crucial for fluent speech.

**Speech Disorders and Physiology**

Understanding the physiology of speech is essential in diagnosing and treating speech disorders. Conditions that affect the respiratory system, vocal cords, articulatory structures, or resonatory system can lead to speech difficulties. Speech therapists and healthcare professionals use this knowledge to develop therapeutic techniques to help individuals overcome these challenges.

Speech disorders encompass a range of communication challenges that affect an individual's ability to produce speech sounds correctly or fluently. These disorders can occur in both children and adults and may result from various causes, including developmental factors, neurological conditions, physical abnormalities, or injuries. Here are some common types of speech disorders:

**Articulation Disorders or Dysarthria :** Articulation disorders involve difficulties in pronouncing speech sounds correctly. Defect in articulation of speech with intact mental function and comprehension of spoken language.This occur purely due to disorder of muscles of articulation which may be due to flaccid or spastic paralysis. Dysarthria is caused by damage of brain or the nerves that control the muscle involved in speech.it occurs in conditions like stroke,brain injuries,degenerative disease like Parkinson disease.

**Phonological Disorders or Dysphonia:** Phonological disorders involve in the impairment of phonation.It is characterised by hoarseness and a sore or dry throat. It occurs due to paralysis of vocal cord. Other causes are trauma of vocal cord,lumps on vocal cord,hypothyroidism etc.Children with phonological disorders may exhibit consistent sound pattern substitutions, such as replacing all "k" sounds with "t" sounds.

**Fluency Disorders:** Fluency disorders affect the rhythm and flow of speech. Stuttering or stammering is the most well-known fluency disorder, characterized by repetitions, prolongations, or blocks in speech sounds or syllables.

**Voice Disorders:** Voice disorders affect the quality, pitch, or volume of the voice. Conditions like vocal nodules, vocal cord paralysis, or laryngitis can lead to voice disorders. They may result in hoarseness, breathiness, or complete loss of voice.

**Apraxia of Speech:** Apraxia of speech is a motor speech disorder where the brain has difficulty in coordinating the movements required for speech. This disorder can lead to distorted or inconsistent speech sound production.

**Developmental Language Disorders:** While not speech disorders per se, developmental language disorders affect the ability to use and understand language. They can include difficulties with vocabulary, grammar, and comprehension.

**Aphasia:** Aphasia is a language disorder often caused by brain injuries, such as strokes or head trauma. It impairs an individual's ability to use and understand language. Different types of aphasia can affect speaking, listening, reading, and writing abilities.

A) **Broca's Aphasia:** It is the non-fluent speech problem-lesion in left frontal lobe
B) **Wernicke's aphasia:** Speech without any meaning-Lesion in left temporal lobe
C) **Global aphasia:** Combined features of Broca's area and Wernicke's aphasia
D) **Nominal aphasia:** Inability to name the familiar objects.
E) **Motor aphasia:** Difficulty in uttering individual words
F) **Agraphia:** Inability to write

Treatment for speech disorders typically involves speech therapy or other forms of intervention. Speech-language pathologists (SLPs) are trained professionals who assess and treat speech disorders. Treatment approaches may include exercises to improve articulation, language therapy to address comprehension and expression, and strategies to improve fluency. In some cases, medical interventions, such as surgery or medication, may be necessary to address underlying causes of speech disorders.

Early intervention is crucial for children with speech disorders, as it can significantly improve their chances of developing effective communication skills. In adults, speech therapy can help improve communication and quality of life. Overall, speech disorders are diverse and varied, and treatment plans are tailored to individual needs and goals.

## CONCLUSION

The physiology of speech is a remarkable feat of human biology. It involves a coordinated effort of the respiratory, phonatory, articulatory, and resonatory systems. By precisely controlling these systems, humans can produce an astonishing array of sounds and communicate with one another. Understanding the intricate processes behind speech production not only deepens our appreciation for this skill but also provides valuable insights for improving speech therapy and addressing speech-related challenges. It's a testament to the remarkable capabilities of the human body in facilitating one of the most fundamental aspects of human interaction—communication through speech.

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# A COMPARATIVE STUDY OF LAYERS OF TWAK w.s.r TO LAYERS OF SKIN

## ABSTRACT

'Twak' as per Ayurvedic science means which encloses the whole body. Joseph listre said 'Skin is best dressing '. Twak is updhatu of Mamsa which forms outer covering of the body and protects the body from external factors and protects the body from external factors such as heat, cold. It is an important organ of integumentary system which envelops underlying tissues & organs. Ayurveda mention twak as sparshanaindriya and different layers of twak are mentioned by Acharyas. But understanding each layer is not so much clear with reference to layers of Skin mentioned by contemporary science. There is a need to understand the different layers of twak & skin, their structural, functional and developmental interpretation to correlation in between them.

**Keywords: Twak, Sparshanaindriya, Updhatu**

## INTRODUCTION

In Ayurveda the word Twak is used for Skin. Twak is called because it covers the body.
Acharya Sushruta described the process of formation of Twak in developing foetus. After fusion of Shukra and Artava, twak develops just as layer of Santanika (Scum) appears in the boiling milk which gradually increase in thickness, in similar manner the seven layers of skin are formed over surface of foetus of body. [1]
During the formation of Garbha, differentiation of the layers of the skin takes place and is produced by all the three doshas, particularly by the Pitta dosha. Charaka described twak as the Matruja Bhava (maternal factor) which is one of the six Bhava essential in the development of foetus. Whereas Vagbhatta opinion is that Twak is derived from Rakta by action of rakta dhatwagni, it gets dried up to form the skin, like the deposition of cream on the surface of boiling milk.

**Acharya Charaka** mentioned six layers of twak. Only first two layers are named such as Udakadhara and Asrugdhara. Other four layers of skin are mentioned with respect to diseases affecting them. [2]

**Acharya Sushruta** has described seven layers of Twak along with specific names. He mentioned the thickness of each layer along with the conditions affecting those layers. [3]

**Acharya Vagbhata** has mentioned seven layers of twak similar to Sushruta. He has not given any description regarding it, commentator Arunadatta and Hemadri have named them according to Sushruta. [4]

**Sharangadhara** has mentioned seven layers of twak along with diseases affecting them. The first six layers are same as that of Sushruta but a seventh layer is named as Sthula which is site of Vidradhi. [5]

There is different opinion regarding the number of layers of twak. The layers of twak explained by different Acharyas have been tabulated below.

| Layers | Charaka[6] | Sushruta[7] | Vagbhata[8] | Arunadatta[8] | Sharangadhara[9] | Bhavaprakasha[10] |
|---|---|---|---|---|---|---|
| Prathama | Udhakadhara | Avabhasini | 1st | Bhasini | Avabhasini | Avabhasini |
| Dwitiya | Asrugdhara | Lohita | 2nd | Lohita | Lohita | Lohita |
| Tritiya | Sidhma, Kilasa sambhava adhistana | Shwetha | 3rd | Shwetha | Shwetha | Shwetha |
| Chaturtha | Alaji, Vidradhi sambhava adhistana | Tamra | 4th | Tamra | Tamra | Tamra |
| Panchami | Dadru, Kushta sambhava adhistana | Vedini | 5th | Vedini | Vedini | Vedini |
| Shashthi | If this layer is injuired, leads to Andhatwa and Tama pravesha | Rohini | 6th | Rohini | Rohini | Rohini |
| Sapthami | | Mamsadhara | 7th | Mamsadhara | Sthula | Sthula |

The skin is the largest organ of the body with total area of 20 sq feet and weighs 4.5 – 5 kg and about 7% of total body wt. Skin is known as 'The First line of Defence' as it protects us from microbes and other invading elements. It is part of integumentary system that contributes to homeostasis by protecting the body and helping to regulate body temperature. It allows us to sense pleasurable, painful and other stimuli in the external environment. Skin and its components are entirely derived from ectoderm & mesoderm. Skin is composed of three layers outer Epidermis, Dermis & Hypodermis.[11]

| Layer of Skin | Sub layers | Thickness |
|---|---|---|
| Epidermis | Stratum Corneum | 10-30 mm |
| Thin skin – 4 layers, 0.1 mm thick | Stratum Lucidum | 100 mm |
| Thick skin – 5 layers 1-2 mm thick | Stratum Granulosum | 100mm |
| | Stratum Spinosum & S. Basale | 100mm |
| Dermis | Papillary layer | 100 mm |
| | Reticular layer | |

## DISCUSSION

Acharya Sushruta, Vagbhata, Bhavprakasha & Sharangadhara had mention seven layers of twak. While Acharya Charaka, Bhela & Astanga Sangraha mentioned six layers of twak. There is difference in opinion regarding layers of twak due to prospective vision of surgeon & physician.

## PRATHAMA AVABHASINI

Acharya Sushruta called outermost layer of Twak as Avabhasini with thickness 18/20th of vreehi and is seat of diseases like Sidhma & Padmakantaka. Dalhana mentioned first layer is responsible for exhibition of Gaura, Shyamadhi Varna & fives types of Prabha (glory) & Chaya (shades) of body with help of Bhrajaka Pitta. Acharya Charaka & Vrddha Vagbhatta named outer layer as Udakadhara. As name suggest it holds Udaka dhatu. Indu depicts that this layer carries Udakadhatu & prevents outflow & maintain ardratabhava i.e moisture content of twak on its surface. Vagbhatta stated that 1st layer as Bhasini which is similar feature as explained by Astanga Sangraha & Charaka.

As the layers superficial to Malpighi are opaque, exhibition of complexion is done by Stratum Corneum, hence Avabhasini may be correlated with Stratum Corneum. The Corneum layer made up of scale like flatened epithelium which consist of keratin filaments this make it highly resistant to permeation by water. So as the result it prevent the water loss from body and due to this reason Acharya Charaka called it Udakadhara.

## DWITIYA LOHITA

Sushruta named second layer of twak as Lohita having thickness 16/20th of Vreehi, and is adhistana of Tilakalaka, Nyaccha & Vyanga. Charaka & Vriddha Vagbhatta called second layer as Asrugdhara. Indu explains this layer as Rudhantva Asram i.e it holds the blood and prevents outflow of Rakta dhatu from the body. Hemadiri describes this layer as Lohini.

Stratum Lucidum layer consist of homogenous distributed cell layers with indistinct cell boundary which give it clear/lucid appearance. The change in amount of Hb%, bilirubin is reflected through this layer as the pallor or icteric look of skin. So Acharya has opinion as Lohita and / or Asrgdhara for this layer.

## TRITIYA SHWETA

Sushruta called third layer as Shweta, it is having thickness of 12/20th of Vrihi and is adhisthana for Charmadala, Ajagalika and Mashaka. Charaka & Vrdhha Vagbhata mentioned third layer is seat of Sidhma & Kilasa. Astanga Hrudaya describes third layer as site of Sidhma & Shwitra.

Underneath the Stratum lucidum is Stratum granulosum, it is made up of 2-5 layers of flattened cells containing the granules in their cytoplasm. The keratohyaline granules are numerous in this layer which binds the keratin filaments in thick layer.

## CHATURTHI TAMRA

Sushruta mentions the fourth layer of twak as Tamra. It lies beneath the Shweta and having thickness 8/20th of Vreehi. It is seat of Kusta and Kilasa. Charaka mentioned fourth layer as Dadru kushta adhistana. Astanga Sangraha & Hrudaya stated the fourth layer as adhistana of Sarva kushta. Sarangadhara and Bhavaprakasha stated Tamra as site for Kilasa kushta.

The chaturthi layer we can take both Stratum Spinosum and Stratum Basale because below the Shweta (S. granulosum) is S. Spinosum. Melanin pigment released by melanocytes which lies in S. basale & scattered in S. spinosum which determines the complexion of an individual. So Acharya opines 5th layer as Tamra with S. spinosum & S. basale.

## PANCHAMI VEDINI

Sushruta mention fifth layer as Vedini. As name suggests, it is concerned with perception of touch, pain, heat and cold. It is about 5/20th of Vreehi in thickness. It is adhistana for Kusta & Visarpa. Charaka & Vagbhata describes 5th layer as adhistana for Alaji & Vidradhi. Hemadiri state this layer as Twagvedini as well as Rogakarini. Sharangadhara & Bhavaprakasha describes these layer as site for Sarvakushta & Visarpa.

This layer is responsible for perception exterioceptive information, since it is incorporated with many receptors such as meissner's corpuscles, Pacinian corpuscle, Ruffinis corpuscles, free nerve ending etc. Kushta and Visarpa affecting this layer also produce in organization of papillary layer of dermis. So the Acharya opines this layer as Vedini which corresponds to papillary layer of dermis.

## SHASTHI ROHINI

Sushruta state 6th layer of Twak as Rohini which is equal to 1 Vreehi in thickness. It is adhistana for Granthi, Apachi, Galaganda, Arbuda & Shleepada. Charaka mentioned these layer as Arumshi adhistana. Chakrapani described that sudden injuiry to this layer leads to Tamayathi andha evaie feeling of darkness in front of eye due to sudden loss of consciousness. Acharya Vagbhata state 6th layer as Pranadhara. Indu stated that any injuiry to this layer leads to life threatening condition Tama Pravesha i.e feeling of blindness for short period, it is prime location of Arumshi i.e small boils, blackish red in appearance commonly found in small joints and very difficult to treat.

Rohini name suggest that is responsible for wound healing process i.e Vrana Ropana Karma, this layer plays major role in formation of granulation tissue, fibrous tissue during the wound healing. Due to this Acharya opines this layer as Rohini corresponds to Reticular layer of dermis in contemporary science.

## SAPATAMI MAMSADHARA

Acharya Sushruta mention 7th layer as Mamsadhara. It is thickest layer measuring about 2 Vreehi. It is adhistana for Bhagandhara, Vidradhi, Arsas. Sarangadhara & Bhavaprakasha describes 7th layer as Sthula, having thickness of two vreehi, it is site of Vidradhi. Adhamalla mentioned Sthula, it is site for Vidradhi, Bhagandhara and Arshas.

Mamsadhara Twak explained by Sushruta can be correlated with hypodermis as it comprises of blood vessels, lymphatics and adipose tissue. It is the superficial fascia which envelopes the underlying muscle and does the dharana of the muscle, so called Mamsadhara.

| Layers | Twak layer | Subdivision of layer of Skin | Skin layer |
|---|---|---|---|
| Prathama | Avabhasini | Stratum Corneum | Epidermis |
| Dwitiya | Lohita | Stratum Lucidum | |
| Tritiya | Shweta | Stratum Granulosum | |
| Chaturthi | Tamra | Malpighian layer | |
| Panchami | Vedini | Papillary layer | Dermis |
| Shasthi | Rohini | Reticular layer | |
| Saptami | Mamsadhara | Subcutaneous tissue and Muscular layer | Hypodermis |

## DISCUSSION ON THE FORMATION OF TWAK

Twak is the Upadhatu of Mamsa.[12] Sushruta described that after fertilsiation of Sukra & Shonita, Twak develops just as Santanika which forms in layer wise and gradually increase in thickness, in the similar way seven layers of the Twak are formed and deposited rapidly in the same manner as the layers of Scum are formed and accumulates on the surface of the boiling milk.[13] Vagbhata opinion that the twak is formed from the Rakta. After the Paaka of Rakta by its Dhatwagni, it gets dried up to form the skin, like deposition of scum on the surface of boiling milk.[14]

Out of two layer of skin, the epidermis is a superficial epithelial tissue that is derived from surface ectoderm & dermis is a deeper layer composed of dense irregularly arranged connective tissue that is derived from mesenchyme. Skin structure vary from one part of the body to another. The embryonic skin at 4-5 weeks consists of a single layer of surface ectoderm overlying the mesoderm. During the first & second trimesters of pregnancy there is increment in epidermal thickness. The cells of surface ectoderm proliferate and form a layer of Squamous

epithelium, the periderm and basal layer.The cells of the periderm continually undergo keratinization and desquamation and are replaced by cells arising from the basal layer. Replacement of peridermal cells continue till 21st week, thereafter, the periderm disappears and the Stratum corneum forms. Proliferation of cells in the S. germinative also forms epidermal ridges, which extend into the developing dermis. The transformation of the surface ectoderm into a multi-layered epidermis results in formation of different layer of epidermis. Skin is classified as thick or thin based on the thickness of the epidermis.[15]

Melanoblasts are derived from neural crest & migrate in S. basale; Lanerhans cells are derived from the bone marrow and migrate into the epidermis. Merkel cells are of uncertain origin and is associated with free nerve endings.[16]

The dermis mostly develops from mesenchyme which arises from the somatopleuric layer of lateral mesoderm plate; however some of it is derived from the dermatomes of the somites. By 11th weeks, the mesenchymal cells produce collagenous and elastic fibres. As the epidermal ridges form, the dermis projects into epidermis, forming dermal ridges that interdigitate with the epidermal ridges. Sensory nerve ending, tactile receptors and vascular element develops in the ridges.[17]

The layer of skin derived gradually in layer wise during intrauterine life of foetus. These develop two types of skins in foetus body, thick skin covers the palms & soles; it consists of 5 layers in epidermis, it lacks hair follicle, arrector muscles of hairs and sebaceous glands, but it has sweat glands. & thin skin covers most of the rest of the body; it lacks the S. lucidum layer in epidermis; it contains hair follicles, arrector muscles of hair, sebaceous glands & sweat glands.

## DISCUSSION ON THE MEASUREMENT OF LAYER OF TWAK

Dalhana describes the total thickness of Twak as Angustha Udara Pramana which is equal to Shad Yava Pramana i.e thickness of six barley grains together.

The parameter for thickness is applicable for fleshy area not for bony are like Sukshma Anguli and Lalaata (forehead). The motive behind describing thickness of each layer of twak is for performing various surgical interventions such as abdominal tapping should be done in Angusta Udara Pramana by Vrihimukha Yantra in Jaludhara.

The classical description regarding the pramana of each layer of Twak, on adding the pramana of each layer we get 6 yava. But to match with contemporary science is difficult. Also the diseases which has its seat in different layer is also difficult to correlate with contemporary science. So it can be a subject further study.[18]

## CONCLUSION

On the basis of comparative study, the seven layer of Twak namely; Avabhasini, Lohita, Sweta, Tamra, Vedini, Rohini & Mamsadhara respectively can be correlated with S. Corneum, S. Lucidum, S. Granulosum, S. Malpighan, Papillary layer of Dermis, Reticular layer of dermis & Hypodermis on the basis of simily of their structure functional and applied aspect. Regarding the formation of the Twak the all layer of Twak does not appear at once rather they appear layer by layer during intrauterine life of the foetus which is similar to appearance of cream in the boiling milk as mentioned by the Acharyas.

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# PHYSIOLOGY OF CIRCADIAN RHYTHM

## ABSTRACT

Circadian physiology refers to biological processes that are rhythmic with the time scale of a day. Circadian physiology is an overall feature of life & is well conserved during evolution from unicellular to multicellular organisms. These endogenous rhythms have a period length of approximately 24hr, they are thus called circadian rhythm. The circadian rhythm influences variety of behavioural & autonomic functions. In normal life circadian rhythms are synchronized with environmental cycles.

## INTRODUCTION

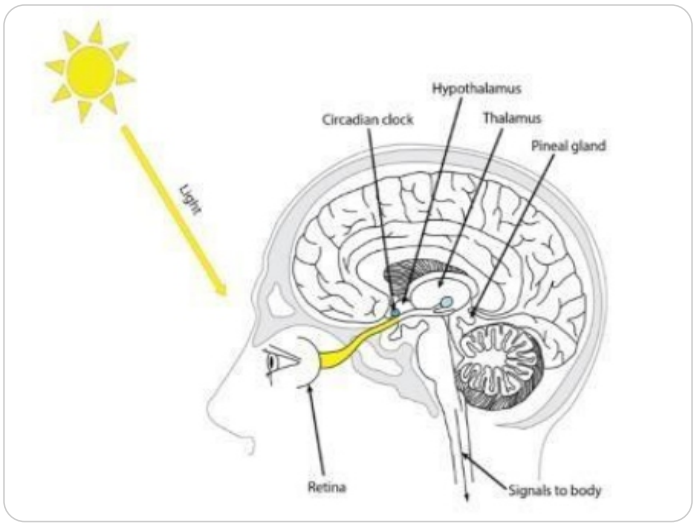
Circadian rhythm refers to the rhythmic fluctuations in certain physiological parameters of the body. These are called circadian rhythm because they often show 24 cycles. Circa means around, dies means day. Many of the rhythms are coordinated with each other.

## COMMON RHYTHMIC VARIATION ARE

Rhythmic secretions of ACTH
Rhythmic secretions of GH
Rhythmic secretions of melatonin
Sleep-wake cycles
Body temperature rrhythm
Rhythmic GnRH secretions

## BASIS

The circadian rhythms are internally driven. The suprachiasmatic nuclei of hypothalamus are the main site of most circadian rhythms in the body. These are believed to contain the biological clock, which regulates the circadian rhythm according to the 24hr light-dark cycles. The suprachiasmatic nuclei receive inputs from the eyes, via, retinohypothalamic fibres & lateral geniculate nuclei. During the light cycles, axons from the retinal ganglionic cells deliver signals that activate the suprachiasmatic nucleus via cranial nerve 2, optic nerve. The suprachiasmatic nucleus then delivers a signal via, the inhibitory neurotransmitter GABA that inhibits the paraventricular nucleus. Axons subsequently sends impulses through the intermediate lateral column to inhibit the superior cervical ganglion, thus inhibiting the sympathetic nervous system. As a result melatonin does not get released from the pineal gland into circulation. As night approaches the departure of light signals the retinal ganglionic cells to inhibit the suprachiasmatic nucleus activating the paraventricular nucleus which then sends axons through the intermediolateral nucleus to the superior cervical ganglion stimulating the sympathetic nervous system which induces sleepiness. The pineal gland is mobilized to secrete melatonin in to circulation.




## EFFECT OF ENVIRONMENTAL FACTORS

The environmental factors such as light-dark cycles, temperature, meal timings etc only provide hints & are required only to set a circadian rhythm cycle of 24hr.otherwise the circadian rhythms are internally driven & can occur in the absence of environmental factors. Eg. Normally the rat show locomotor activity in the dark & inactivity in day time. These cycles of activity & inactivity continue even when the rats are put permanently in darkened laboratory for a few days with no exposure to light.

## PHYSIOLOGICAL SIGNIFICANCE

The circadian rhythm enables hemostatic mechanism to be utilized immediately & automatically. Eg.-There is a rhythm in the urinary excretion of ACTH. The circadian rhythm have effects on the body's resistance to various drugs. For eg, difference in the sensitivity of dose of a potentially lethal drug depends markedly on the time the drug is given.

## JET LAG

Disturbance of circadian rhythm can occur during high speed jet travel. One may travel several thousand kilometers with in a few hrs. As a result, the traveller's external clock(day/night) does not coincide with the internal biological clock That is, the body may be in rest(night phase) while it is day time in the country destination.It results in irritability, mental depression or even physical illness. The symptoms subside in a few days This condition is called jet lag.

## ROLL OF CELLS

Cells in our brain respond to light & dark. Eyes capture such changes in the environment & then send signals to different cells about when it is time to be sleep or awake.

## HORMONES

Hormones like melatonin & cortisol may increase or decrease as part of our circadian rhythm. Melatonin is a hormone that makes sleepy & body releases more at night & suppress it during the day. Cortisol can make more alert & body produces more in the morning.

Other hormones that play role in alertness & circadian rhythm include vasopressin, Acetylcholine, insulin, leptin.

Body temperature & metabolism are also part of circadian rhythm. Temperature drops during sleep& rises during awake hrs. Rhythm may adjust based on our work hours, physical activity, stress.

Age is another factor that influences circadian rhythm. Infants, teens& adults all experience circadian rhythm differently.

Newborns do not develop a circadian rhythm until they are a few months old. Their circadian rhythm develops as they adapt to the environment & experiences changes to their bodies.

Adults should have a pretty consistent circadian rhythm if they practice healthy habits. Their bed time & wake times should remain stable if they follow a fairly regular schedule.

Older adults may notice their circadian rhythm changes with age & they begin to go to bed earlier than they used to. In general this is a normal part of aging.

## WHAT CAN DISRUPT CIRCADIAN RHYTHM

Disruption to circadian rhythm can occur over the short or long term. Experts have identified a number of types of circadian rhythm sleep-wake disorders.

Jet lag disorder

Shift-work disorder

Advanced sleep phase disorder

Delayed sleep wake phase syndrome

Non 24hr sleep wake disorder

Irregular sleep wake rhythm disorder

## HOW TO MAINTAIN A HEALTHY CIRCADIAN RHYTHM

Seek out sun

Follow a constant sleep schedule

Get daily exercise

Avoid caffeine

Limit light before bed

Keep naps short & early in the afternoon

Make the bedroom conducive to sleep.

These steps to improve sleep hygiene can be an important part of supporting a healthy circadian rhythm.


## CONCLUSION

We all live our lives by rhythms and patterns, but the circadian rhythm is one of the most important, and often the most neglected. Sleeping in line with your natural circadian rhythm will lead to deeper rest and faster recovery. You'll wake up feeling recharged and be more productive during the day. Be sure to dim the lights when the sun goes down, and get plenty of bright light during the day. Your master circadian clock will thank you and help you feel more alert during the day, more sleepy at night, and generally more well-rested.

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# ANALYSIS OF DHATUMALA (METABOLIC WASTE PRODUCTS)

KEYWORDS: Dhatumala, Dhatuagnipaka, Mahakoshta, Sara, Kitta.

## ABSTRACT

Ayurveda imparts a great emphasis upon the maintenance of positive health of a person. According to WHO, health is a complete state of physical, mental, social, spiritual well being and not merely the absence of disease. Sushrutha's concept of Swastha is exactly same which was told many decades back. Healthy body is the outcome of healthy food and lifestyle and it is the basis for health and disease. Nutrient rich diet which is consumed in proper time and amount will help the body which contributes it to maintain the homeostasis. Food has to be properly digested for the nourishment and formation of healthy Dhathu. Digestion takes place in Mahakoshta and as a result of this, food is converted into Prasadamsa and Kittamsa. Dhatus are formed in a series from Rasa to Shukra from this Prasada portion. Dhatus after their Dhatuagni paka is divided into Sara and Kitta bhaga, and from this Kitta bhaga dhatu malas are formed. Malas represent a wide variety of substances produced by the body through different Pakas conducted in the body. Removal of metabolites and waste products are the basic physiological functions of body. Mala are the waste products that need to be eliminated from the body periodically. Scope of the experiment: Here in this article the physiological interpretation of Dhatumala and its need to be flushed out on regular basis is explained. Physiological view point of Dhathumala will help to understand what it is and how it is formed in the body in a better way to the present generation.

## INTRODUCTION

Dhathus are the entities which support and nourish the body, and proper diet is very essential for that. Food is one among the sub pillars of the body and it has to be properly digested for the nourishment and formation of healthy Dhatu. This process is called Ahara Parinama. The action of Jadaragni converts food into Sara and Kitta portions. Prasada bhaga will be Annarasa and Kitta bhaga will produce Purisha and Mootra. Dhatus are formed one after the other from Annarasa by the action of the respective Dhatuagni. Dhatus are maintained in its normal state by the action of Dhathuagni situated in each Dhatu. Dhatugni residing in Rasa dhatu will be acted upon the Annarasa and results in the production of Prasada amsa and Kittamsa. Kittamsa will form the Dhathumala. Prasada amsa is having Sthoola bhaga and Sookshma bhaga. In Sthoolamsa the said Dhathu (Sthayi dhatu) get nourished or formed as in case. The Sookshma bhaga, again divided into two parts which leads to the formation of Upadhatu and the other part becomes subsequent Poshaka rasa in which the subsequent Dhatuagni act to form the next Dhatu.

## MATERIALS AND METHODS

Ayurvedic references regarding Dhatumala (metabolic waste products) Dosha, Dhatu, and Mala concept is unique. Malas are the substances produced in the body through different pakas undergoing in subsequent stages. In Ayurveda for the bioconversion of food Agni is the main entity. After the action of Agni on digestive system the end product which is absorbable is Sara and the one which is separated from body is called as Kitta. Kitta or Mala is again divided into Brihath mala and Kshudra mala. Dhatumalas are Kshudramalas and are formed by the action of Dhatuagni on Dhatus.

Table 1: Name of Dhatu and its Dhatumalas mentioned in various Samhitas

| S. No | Name of Dhatu | Charaka, Ashtanga Sangraha | Sushrutha, Ashtanga Hridaya | Sarangadhara |
|---|---|---|---|---|
| 1 | Rasa | Kapha (Ch), Kapha, Lasika (AS) | Kapha | Jihwa, Netra, Kapolanam jalam |
| 2 | Rakta | Pitta | Pitta | Ranjaka Pitta |
| 3 | Mamsa | Kheshumala (Ch) Karna nasa aasya romakoopa prajanana mala (AS) | Kheshumala | Karna vit |
| 4 | Meda | Sweda | Sweda | Danthakakshamedrarasana mala |
| 5 | Asthi | Kesa, Roma Ch) Sweda Nakha, Roma (AS) | Nakha, Roma | Nakha, Netramala |
| 6 | Majja | Akshimala, Twakmala (Ch) Akshimala, Twaksneha (AS ) | Akshimala, Twaksneha | Vaktrasnigdatwam |
| 7 | Shukra | NA | Ojas (AH) | Pindika |

## FORMATION OF DHATUMALA

Food intake in the form of Charvya (chewable), Chooshya (mastication), Lehya (licked) and Peya (drunk) are digested by Jadaragni and results in the breakdown of complex particles into their elemental forms which is non homologous to body. Bhoothagni paka convert them to prehomologous substances, on which Dhatuagni will act and results in the production of Prasadakhya and Malakhya Dhathus. Dhatuagni when acted upon the concerned nutrients circulating as Poshakamsa in the diet and results in the production of Prasadakhya Dhatu and Kitta. The Kitta fraction contributes in part to the formation of various kinds of excrements and impart to the nourishment and synthesis of such structures of the body as hair, nails.

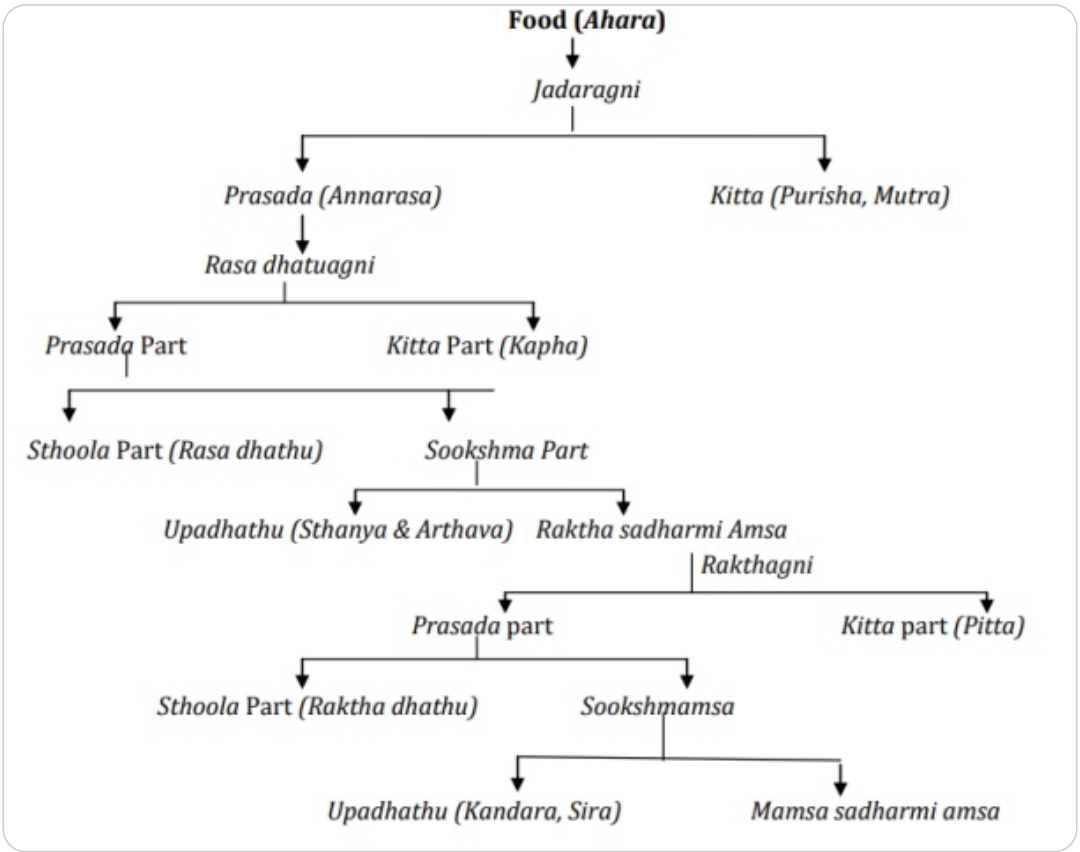

Table 2: The following table shows the action of different Dhatuagni upon the food

| No | Name of the *Dhatuagni* | Fraction on which *Agni* acts | Formation of *Sthira Dhatu* | Formation of *Upadhatu* | Formation of *Malas* |
|---|---|---|---|---|---|
| 1 | *Rasangni* | *Anna rasa* | *Rasa* | *Sthanya, Arthava* | *Kapha* |
| 2 | *Raktagni* | *Rakta sadarmi amsa* | *Rakta* | *Kandara, Sira* | *Pitta* |
| 3 | *Mamsagni* | *Mamsa sadarmi amsa* | *Mamsa* | *Vasa, Twak* | *Khamala* |
| 4 | *Medogni* | *Medosadarmi amsa* | *Medas* | *Snayu* | *Sweda* |
| 5 | *Asthyagni* | *Asthi sadarmi amsa* | *Asthi* | - | *Kesa, Loma, Nakha, Smasru* |
| 6 | *Majjagni* | *Majja sadarmi amsa* | *Majja* | - | *Snehamsa* of *Akshi, Vit, twak* |
| 7 | *Shukragni* | *Shukra sadarmi amsa* | *Shukra* | - | *Oja* and *Pindika* |

## RESULT AND DISCUSSION

Rasa

Rasa Dhathu is the first and foremost Dhathu formed from Ahara rasa and is circulating through Rasavaha srotas to supply nutrition to entire body. Functional aspect of Rasa dhathu is related to growth and development of body. Rasa Dhathuagni (Metabolic process) acts on Anna Rasa and form the metabolic waste products which is to be eliminated from the body for maintaining the homeostasis. According to classical reference the following are the Dhathu malas.

- Kapha
- Kapha, Lasika
- Jihwanetrakapolanam Jalam

Here Kapha (Dhathumala), mentioned in all Brihathtrayis is different from the Prakrutha Kapha Dosha. Kapha dosha and Kapha as Dhathu mala, both are having different origin and function. The production of Tridoshas from food takes place during three Avasthapaaka. A perfectly ingested food contain 6 Rasas, is converted into Madhura Rasa in Amasaya. The food becomes frothy in this stage and Kapha dosha is produced. Dhathumala Kapha is formed in Rasavaha srotas. So here Kapha may be compared to mucous or phlegm which is secreted to avoid tissue damage. Mucous membrane or mucosa is a membrane lines various cavities in the body and secrete mucus, a thick protective fluid. Mucus serves to protect epithelial cells in different systems. phlegem is a specialized term for mucus that is restricted to the respiratory tract where it protects the lungs by trapping foreign particles that enter through nose, and discard them. The presence of mucus in the nose and throat is normal, but increased quantities can impede comfortable breathing and must be cleared by expectorant it as sputum from the throat. Similarly in GIT the layer of mucus lining the inner walls of stomach is vital to protect the cell linings of that organ from the highly acidic environment within. In female reproductive system, cervical mucus prevents infection. Polyelectrolyte effect in mucus (polymers with charged molecules) controls the influx and outflex of water within mucus. Ashtanga Sangrahakara has given Lasika (Serum) as the Mala of Rasa dhathu. That which oozes from Vrana (ulcer) may be compared to Lasika. Serum is a clear fluid that, oozes from the site of injury, and is to be discarded from the site of injury, proves it is Mala. Jihwa, Kapola (Tongue, cheeks) and Netrajala (tear) are the Dhathumala according to Sarangdhara. Saliva contributes to the digestion of food and to the maintenance of oral hygiene. Saliva coats the oral mucosa and lubricates mouth by its secretion. Excess salivary secretion results from poor oral hygiene, sinus, throat and peritonsillar infection flush the exogenous and endogenous microorganism and their product into the gut or outside through mouth. Netra jala means fluid present in eyes. Here the lacrimal secretions which cleanses and protects the eye's surface may be taken. Tear produced from Lacrimal gland lubricate and

the cornea and eyeball from injury which may result from small particles such as dust.

**RAKTHA**

Raktha dhathu is formed from Rasa dhathu as a part of Dhathuparinama process, and characterized by its colour.

**Pitta, Ranjaka pitta**

Mala roopi pitha is the Kitta of Raktha dhathu, which is nothing but the Achapitta. The ingested food, undergo digestion and attain acidic nature, thereafter in the small intestine release of Acha pitta (liquid bile) takes place. The bilirubin formed in the macrophages after degradation of hemoglobin enters the liver (hepatic cell) and conjugated with uridine diphosphate glucuronic acid (UDP-glucuronic acid) converts it into water soluble conjugated bilirubin. Most of the conjugated bilirubin is excreted into the bile and enters the intestine. Stercobilin and urobilin is then excreted out of the body as Mala. Ranjaka pitta is the one which gives colour to Raktha dhathu, and may be haemoglobin the colouring pigment of blood can be incorporated here.

**MAMSA**

**Kheshu mala, Karna nasa aasya romakoopa prajanana mala , Karna vit**

Mamsa dhathu mala is Kha mala, which is produced in the open spaces especially Bahirmukha srotas. All Bahirmukha srotas as have direct contact with the environment and tend to accumulate dirt if proper hygiene is not maintained. The exocrine gland situated near these areas secretes the products which along with dirt forms the Kha mala.

**MEDA**

**Sweda , Dantha Kaksha Medra Rasana mala**

Sweda is the mala of Medo dhathu, which is produced as a result of Paka happened in Medo dhathu. The main function of adipose tissue is insulation of heat. Physical exercise to burn fat will produce excess amount of sweat which can be related to fat mobilization from adipose tissue. The process of sweating at the time of fat mobilization can be taken as the Paka taking place in Medo Dhatu.

**ASTHI**

**Kesa Roma, Nakha Roma**

Asthi dhathu includes all those structures of the body, which resist easy degradation. Nails, hair and hair follicle are included in Asthi dhathu mala. It is called as integumentary system and serves various functions. A healthy finger nail has the function of protecting the distal phalanx, the finger tip and the surrounding soft tissue from injuries. Hair follicle is a sensitive touch receptor and produce oily secretion to help condition the hair and surrounding skin. All Asthi dhathu mala grows continuously and this is to be cut and maintained properly.

**MAJJA**

**Akshimala Twakmala, Akshimala Twaksneha, Vaktrasnigdatwa**

Majja is the sixth Dhathu which is developed from Asthi dhathu. Extreme unctuousness is its chief property, which is capable of offering strength to the body. Rheum is the thin mucus, naturally discharged from eyes during sleep. Rheum dries and gathers as a crust in the corners of eyes. It is formed by the combination of mucus, blood cells, skin cells or dust. When individual is awake, due to continuous blinking of eyelids causes rheum to be washed away with tears through nasolacrimal duct. Absence of this action results in accumulation of dry rheum. Here may be rheum can be compared to Akshimala and it is the product of Majja paka by Majja dhatwagni. Rheum is a waste product and

it contains the different types of cells present in bone marrow. Twakmala or Twak sneha is nothing but the sebaceous secretions of skin. Sebum is a complex mixture of fatty acids (57%), wax esters (26%), squalene (12%) and cholesterol (4.5%). The oily nature of skin is because of the mixture of sweat, dead skin cells and sebum. Sebum is also having antimicrobial action. The one which is giving moistness, acting as antimicrobial and discarded from body is Twaksneha. Vaktra snigdatwa is maintained by salivary secretion. The flushing out effect of saliva is very important because it effectively removes exogenous and endogenous microorganisms and their products into the gut and also supplies continuous presence of immune factors in the mouth. Majja dhathu is the site where homeopathic stem cells are produces and they functions as the immune system.

**SHUKRA**

**Ojas, Pindika**

Shukra dhathu is the seventh Dhathu which is related to sexual and reproductive function. Here Ojas and Pindika/Mukhadooshika are considered as the Mala of Shukra dhathu. Shukra dhathu will be active only when the person attains puberty. Puberty is the physiological transition from childhood to reproductive maturity. It is associated with a growth spurt and development of secondary sexual characters. Acne is the localized inflammatory condition of the skin, characterized by pimples on face, chest and back, due to over activity of sebaceous gland. It develops during adolescence. Testosterone increases the secretary activity of sebaceous gland. So at the time of puberty, when body is exposed to sudden increase in testosterone secretion, the excess secretion of sebum leads to development of acne on the face. Ojas is nothing but the essence of Saptha Dhathu. If proper functions are maintained it will nourish the body or it will harm the system.

## CONCLUSION

The concept of Dhathumala depicts the ancient knowledge of the tissue metabolism. The waste products formed after metabolism is to be eliminated for maintaining equilibrium. As it is told in our classics Dosha- dhathu-mala mulam hi sareeram, normal homeostatic mechanism is very essential to maintain the equilibrium. All Dosha, Dhathu and Malas are doing their respective functions in our body in order to keep it healthy. Malas are the important entity in our body and its importance in clearing out in regular basis is explained in this article along with its physiological importance.

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# UNDERSTANDING CEREBRAL DOMINANCE: UNRAVELING THE MYSTERIES OF BRAIN HEMISPHERES

## INTRODUCTION

Cerebral dominance, often referred to as lateralization of brain function, is a fascinating aspect of neuroscience that explores the specialization of the two hemispheres of the brain—left and right. This phenomenon plays a crucial role in shaping human cognition, behavior, and overall functioning. In this article, we will delve into the concept of cerebral dominance, its historical context, and its implications on various aspects of human life.

## HISTORICAL PERSPECTIVE

The study of cerebral dominance has a rich history that dates back to the 19th century. Early observations suggested that the left and right hemispheres of the brain are not identical in function, leading researchers to explore the idea of lateralization. However, it wasn't until the mid-20th century that advancements in neuroimaging techniques, such as the split-brain studies conducted by Roger Sperry, provided substantial evidence supporting the concept of specialized hemispheric functions.

## LEFT AND RIGHT HEMISPHERE FUNCTIONS

LEFT HEMISPHERE

- **Speech**
- **Language**
- **Reading**
- **Express positive emotions**
- **Mathematical calculations**
- **Produce written and spoken language**
- **Analytical**
- **Controls muscles on right side of body**

LEFT HEMISPHERE

- **Music**
- **Artistic abilities**
- **Spatial relationship**
- **Face recognition**
- **Express negative emotions**
- **Understands non verbal communication**
- **Colour**
- **Controls muscles of left side of body**

## FACTORS DETERMINING THE CEREBRAL DOMINANCE

- Although both hemispheres are almost identical in structure, in majority of adult populations, handedness, perception of language, speech, spatial judgment and areas of behavior are controlled by one hemisphere and not the other.

- More than 90% of people are right handed and the control resides in the left hemisphere.

- In 95% of individuals, speech and understanding of spoken and written language are controlled by the left hemisphere. Thus, in most adults the left cerebral hemisphere is the dominant. Hence it is called the dominant or categorical hemisphere. The right hemisphere is called representational hemisphere.

The functional areas which are highly developed in the dominant hemisphere are -

- **Wernicke's area**
- **The angular gyrus**
- **Motor speech area**
- **Motor control area**

It is argued by some that it is more efficient and requires less energy conception for the brain to process fine motor skill functions in the left hemisphere of the brain. Hence majority have left hemisphere dominance.

## BRAIN HEMISPHERE DIFFERENCE

**RIGHT HANDERS BRAIN**

Left brain is physically larger and more developed. Particularly Broca's area and Wernicke's area.
The Primary motor cortex is bigger, denser & more sensitive.
The central sulcus is more deeper and more folded in the left hemisphere.
Greater cell packing and neural links are more tightly connected.

**LEFT HANDERS BRAIN**

The hemispheres tend to be much more symmetrical and balanced than those of right handers.
The motor cortex is large in the right hemisphere.
The central sulcus is deeper in the right hemisphere than left.

## REASONS FOR THE DOMINANCE OF ONE HEMISPHERE

- The attention of the mind seems to be directed to one principal thought at a time.
- The left posterior temporal lobe at birth is usually slightly larger than the right, the left side normally begins to be used to a greater extent than the right.
- Because of the tendency to direct ones attention to the better developed region, the rate of learning in the cerebral hemisphere that gains the first start increases rapidly whereas in the opposite, less used side learning remains slight.. Therefore the left side normally becomes dominant over the right.

## CLINICAL IMPLICATIONS

Understanding cerebral dominance has significant implications in clinical contexts. Certain neurological conditions, such as stroke or traumatic brain injury, can disrupt the balance of hemispheric functions, leading to cognitive deficits. Additionally, researchers are exploring the role of cerebral dominance in conditions like dyslexia, autism, and schizophrenia, aiming to develop targeted interventions based on an individual's hemisphericstrengths.

## CONCLUSION

A clear knowledge about the functional areas together with the knowledge of Cerebral Dominance and understanding of the brain works, in turn is of much importance in the field of clinical practice.

The lateralization of speech area has sparked a new knowledge in providing an insight for the prognosis of diseases like Aphasia.

The ability to generalize motor skills is of practical importance for development training methods and rehabilitation. This in turn indicates the role of Cerebral dominance.

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