

A CRITICAL STUDY OF “PESHI” AS DESCRIBED IN SUSHRUT SAMHITA

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ABSTRACT

Ayurveda is a human science. It provides knowledge of the structural and functional constitution of the human body. *Sushrut*, “Father of Surgery” according to Ayurveda, describes the human body to be made up of 6 major parts – *Shadanga* – 4 *Shakhas* (extremities), *Madhya* (middle part/trunk) the fifth and *Shira* (head) the sixth. These parts are further subdivided into *Pratyangas* (sub-parts) like *Sira* (veins), *Dhamani* (arteries), *Srotas* (channels), *Asthi* (bones), *Sandhi* (joints), *Avayava* (organs), *Kala* (membrane) etc. *Peshi* is one of the *Pratyangas* described by *Sushrut*. *Peshi* is developed from *Pishit* (*Mamsa* / muscle) and is present in close relation to *Sira*, *Snayu* (ligaments), *Asthi* and *Sandhi* enveloping and protecting them. The information available regarding the *Peshi* evokes the curiosity to determine the anatomical structural entity described in the classics. This study, therefore, analyses the information and tries to correlate it with the most suitable anatomical structure with logical interpretation.

Keywords: *Peshi*, *Pishit* (*Mamsa* / muscle), *Sira*, *Snayu*, *Sandhi*

INTRODUCTION

In Ayurveda, the cadaveric dissection is explained by *Acharya Sushrut*. *Sushrut* was a physician who considered Surgery the first and foremost branch of medicine.¹ He stated that Surgery has the superior ad-

vantage of producing instantaneous effects using surgical instruments and appliances. He gave a detailed account of surgeries like Plastic surgery, Dental surgery, Cataract surgery etc. He even developed a

unique method of dissection known as "Mrut-sanshodhan Paddhati" which is explained in V chapter of *Sharirsthana* in *Sushrut Samhita*.²The observations of the anatomical structures found in dissection are noted in the form of verses by *Sushrut* in *Sushrut Samhita* and these are considered to be the best available descriptions of anatomical structures from Ayurvedic point of view. One of these structures is *Peshi*. Description of *Peshi* is available regarding its *utpatti* (development), *sankhya* (number), *sthaan* (location), *karya* (function) & *swaroop* (appearance). But still the available information fails to explain the exact anatomical structure of *Peshi*, which leads to many unanswered queries regarding *Peshi* such as - Is 'Peshi' an independent structure? What is the structural difference between the terms *Peshi*, *Pishit*, *Mamsa* and *Snayu* according to *Sushrut Samhita*? Though the development of *Peshi* is mentioned from *Pishit* in *Sushrut Samhita*, is there any functional difference between *Peshi* & *Pishit*?

AIM & OBJECTIVES

- 1) To determine the structure of *Peshi* with the help of its clinical aspect explained in *Sushrut Samhita*.
- 2) To enlist the clinical application of *Peshi* explained in *Sushrut Samhita*.

METHODS

- (A) LITERATURE STUDY
- (B) CADAVERIC STUDY - Macroscopic Study and Microscopic Study

MATERIALS

- (A) FOR LITERATURE STUDY
 - 1) Classical text of Ayurveda - *Sushrut Samhita*.
 - 2) Modern review - Books on Anatomy.
 - 3) Various articles (related to the topic) were published in national and international journals both online and offline.
- (B) FOR CADAVERIC STUDY
 - 1) Human cadaver
 - 2) Facility for cadaver preservation and dissection

- 3) Instruments for dissection
- 4) Specimen jar to collect a sample and send it to the lab for microscopic study

(A) AYURVEDIC LITERATURE STUDY - FUNDAMENTALS OF Peshi

Different views

- According to commentator *Dalhana*, the compact form of *Mamsa* get differentiated to make up the structure of *Peshi*.³
- Commentator *Indu* elaborates that *Peshi* is having muscular composition along with a shape corresponding to that of *Snayu*.⁴
- *Acharya Gananath Sen* has elaborated that morphologically *Peshi* is mostly like structure as of a rope being thick at the centre and thin at end parts. Some are also of different structure like *ko-shakara*, *nalakakara*, *sutrakara*, *rajjavakara*, *talavrntakara* and *sharapunkhakara*. These *rajjavakara*, *talavrntakara* and *sharapunkhakara* have two ends. These ends may be *snayumaya*.⁵

Formation / Development⁶ - According to *Acharya Sushrut*, during embryological development, *ushma* (*pitta*/heat) *yukta vayu* (*vata* combined with heat) enters *Pishit* (*Mamsa* / *flesh*) and develops *Peshi*.

Function⁷ - *Sira* (vessels), *Snayu* (ligaments), *Asthi* (bones) & *Parwa sandhi* (small & big joints) are *Sanvritani* (covered / enveloped) by *Peshi*. Therefore, *Peshi* exists along *Sira-Snayu-Asthi-Sandhi* as their covering. Covering or ensheathing by *Peshi* is important for maintaining *bala* (strength) of *Sira*, *Snayu*, *Asthi* & *Sandhi*.

Peshiswaroop / Types⁸ - While covering joints, bones, blood vessels and ligaments, *Peshi* become naturally, according to place, thick or thin, big or minute, stout/thick or round/circular, short or long, stable, hard or soft, smooth or rough (coarse).

Total no. of Peshi⁹ - *Peshi* is 500 in number. Of these, 400 are in *shakhas* (extremities), 66 in *koshtha* (trunk) and 34 in the *greeva* (neck) and the region above it.

Table 1: SHAKHAGATA PESHI (100)

| Sr. No. | Region | No. of Peshi | Sr. No. | Region | No. of Peshi |
|---------|--|--------------|---------|---------------------------------|--------------|
| 1 | <i>Padanguli</i> (fingers) | 5 X 3 =15 | 5 | <i>Gulpha janu antare</i> (leg) | 20 |
| 2 | <i>Prapad</i> (forefoot) | 10 | 6 | <i>Janu</i> (knee joint) | 05 |
| 3 | <i>Kurcha sannivishtha</i> (near tarsal) | 10 | 7 | <i>Uroo</i> (thigh) | 20 |
| 4 | <i>Guphatala</i> (Ankle) | 10 | 8 | <i>Vankshane</i> (hip joint) | 10 |

Table 2: KOSHTHAGATA PESHI (66)

| Sr. No. | Region | No. of Peshi | Sr. No. | Region | No. of Peshi |
|---------|------------------------------------|--------------|---------|--|--------------|
| 1 | <i>Payu</i> (Anus) | 03 | 8 | <i>Nabhi</i> (umbilicus) | 01 |
| 2 | <i>Medhra</i> (Penis) | 01 | 9 | <i>Prusthordhwa sannivishtha</i> (upper portion of back) | 05+05= 10 |
| 3 | <i>Sevani</i> (raphe) | 01 | 10 | <i>Parshwa</i> (lateral sides) | 06 |
| 4 | <i>Vrushana</i> (testicles) | 02 | 11 | <i>Vaksha</i> (chest) | 10 |
| 5 | <i>Sphik</i> (buttocks) | 05+05=10 | 12 | <i>Akshak-ansa samantat</i> (around clavicle and shoulder) | 07 |
| 6 | <i>Bastishir</i> (urinary bladder) | 02 | 13 | <i>Hriday-aamashaya</i> (heart and stomach) | 02 |
| 7 | <i>Udara</i> (abdomen) | 05 | 14 | <i>Yakrut-pleeha-unduk</i> (liver-spleen-caecum) | 06 |

Table 3: GREEVA AND SHIROGATA PESHI (34)

| Sr. No. | Region | No. of Peshi | Sr. No. | Region | No. of Peshi |
|---------|--|--------------|---------|---------------------------|--------------|
| 1 | <i>Greeva</i> (neck) | 04 | 7 | <i>Nasa</i> (nose) | 02 |
| 2 | <i>Hanu</i> (mandible / jaw) | 08 | 8 | <i>Netra</i> (eyes) | 02 |
| 3 | <i>Kakalak – gala</i> (uvula and throat) | 01+01=02 | 9 | <i>Gand</i> (cheeks) | 04 |
| 4 | <i>Talu</i> (palate) | 02 | 10 | <i>Karna</i> (ear) | 02 |
| 5 | <i>Jeevha</i> (tongue) | 01 | 11 | <i>Lalaata</i> (forehead) | 04 |
| 6 | <i>Oshtha</i> (lips) | 02 | 12 | <i>Shir</i> (head) | 01 |

Additional Peshi in female body¹⁰ - There are 20 additional *Peshi* present in the female body. 05 are present in each breast which develops during puberty (05x02=10), in *Apatyapathe* (vaginal track) – 04, *Garbhachhidra sanshrit* (at cervical opening) – 03 and *Shukra-artava praveshinya* (for the passage of *shukra* and *artava*) - 03

OBSERVATION ON CLINICAL ASPECTS / APPLICATIONS OF PESHI

1) As the development of *Peshi* is from '*Pishit*' which is a synonym of *Mamsadhatu*, the functioning of *Mamsadhatu* will invariably affect the *Peshi* which will lead to *Prakrut*(normal) or *Vikrut*(abnormal) *sanvritatva* (ensheathing/covering) by *Peshi*. This type of ensheath-

ment is responsible for providing *Prakrut*(normal) or *Vikrut*(abnormal) *bala* (strength) to *Sira*, *Snayu*, *Asthi parwa* and *Sandhi*.^{6,7}

2) *Mamsagata shalya* (foreign body lodged in *Mamsa / muscle*) shows *Shopha abhivridhi* (increase in swelling), *Shalyamarganupasamroha* (non-healing of foreign body entry site or appearance of new growth in the path), *Peedanasahishnuta* (tenderness), *Chosha* (sucking heat) and *Paka* (inflammation/formation of pus). *Peshigata shalya* (foreign body lodged in *Peshi*) shows the same symptoms except sucking pain and swelling.¹¹

- 3) In *Mamsagata vrana* (wound residing in *Mamsa* / muscle), the *vransrava* (exudate) resembles *sarpi* (ghee), *sandra* (thick), *shweta* (white) and *pichhil* (slimy).¹² There is no mention of exudate in case of *Peshigata vrana* (wound in *Peshi*).
- 4) Foreign bodies either big or small, when present in persons whose body is pure (shuddha / unvitiated by aggravations of *doshas*) and when it has stayed in the directions of the hair (*Anulomagati*), then it shows significant healing of the *sashalya* site, especially those present in passages / hollow spaces like *Kantha* (throat), *Sira* (blood vessel), *Asthi* (bone) and *Peshi*.¹³
- 5) Determination of *Peshi pranashtha shalya* (foreign body lost/concealed) site can be done by making it *prachalit* (loose/non-sticky) using *snehana-swedana* kriya (oleation – sudation and other therapies) so that the site gives rise to redness and swelling or pain and makes it easier to find.¹⁴

All these observations show that *Peshi* and *Mamsa* are different structures. *Peshi* is something that is developed from *Mamsa*.

DISCUSSION

DISCUSSION ON THEORETICAL DETERMINATION OF *PESHI*

For any structure to be labelled as *Peshi*, it must fulfil certain criteria like - the structure should be situated about *Sira*, *Snayu*, *Asthi*, *Sandhi* independently or united. Also, the structure should have the capability to form *vivarayukta rachana* (hollow structure) as per the need of *Sanvritatva* (ensheathing / covering) at the location where it is situated. At the same time, it should have 'darun' (tough) texture as compared to *Pishit* i.e. *Mamsa*, since *Peshi* is developed as a result of *daran karma* by *vata* with heat. Lastly, after being embedded by a foreign body, the structure should have the capability to produce symptoms like tenderness, inflammation/pus formation and non-healing of the wound without producing symptoms like sucking heat and morbid swelling at the site.

After interpreting the above-mentioned points, it can be said that:- "There is the structural difference be-

tween *Pishit* i.e. *Mamsa* and *Peshi* which is found described in *Sushrut Samhita* as

- 1) The term '*Mamsa*' is used for the entire musculature with a muscular appearance. Hence, its number is not found described. Functionally, the term '*Mamsa*' is used to describe the *kriyavyapar* of *Mamsadhatu* and *Mamsa* (i.e. tissue with muscular appearance).
- 2) The term '*Peshi*' is found described for the tissue type other than the tissue of muscular appearance. Maybe, **a tissue with fibrous appearance** having the characteristics of covering or ensheathing the *Sira*, *Snayu*, *Asthi* and *Sandhi*."

STUDY OF MODERN LITERATURE

To find a tissue with a fibrous appearance, a review of the types of tissues is required. There are 4 different types of tissues in human beings – epithelial, muscle, nervous and connective.¹⁵

Epithelial Tissue - Epithelial tissues are widespread throughout the body. They form the covering of all body surfaces, line body cavities and hollow organs and are the major tissue in glands. They perform a variety of functions that include protection, secretion, absorption, excretion, filtration, diffusion and sensory reception.¹⁶

Muscle - Muscles are the largest soft tissues of the musculoskeletal system. The muscle cell, muscle fibre, contains protein filaments of actin and myosin that slide past one another, producing contractions that move body parts, including internal organs. Associated connective tissue binds muscle fibres into fascicles or bundles, and these associated connective tissues also convey nerve fibres and blood vessels (capillaries) to the muscle cells.¹⁷

Nervous Tissue - It is found in the brain, spinal cord and nerves. It is responsible for coordinating and controlling many body activities. It stimulates muscle contraction, creates an awareness of the environment and plays a major role in emotions, memory and reasoning. The cells in the nervous tissue communicate with each other by way of electrical nerve impulses. The cells in the nervous tissue that generate and conduct impulses are called neurons or nerve cells. Nervous tissue also includes cells that do not transmit

impulses but instead support the activities of the neurons.¹⁸

Connective Tissue - Tissue that supports, protects and gives structure to other tissues and organs in the body. Connective tissue also stores fat, helps move nutrients and other substances between tissues and organs, and helps repair damaged tissue. Connective tissue is made up of cells, fibres and a gel-like ground substance.¹⁹

The connective tissues differ considerably in appearance, consistency and composition in different regions of the body according to local functional requirements. Depending upon the type of cells, concentration, arrangement and types of fibre and character of ground substance, connective tissues can be classified into regular and irregular:-

- a) **Regular connective tissue** includes those highly fibrous tissues with fibres regularly oriented, either to form sheets such as fasciae and aponeuroses or thicker bundles such as ligaments or tendons.
- b) **Irregular connective tissue** can be further subdivided into – loose, dense, and adipose.

LOOSE (AREOLAR) CONNECTIVE TISSUE - It is extensively distributed, and its chief use is to bind parts together, though allowing a considerable amount of movement to take place because of its elasticity. It consists of a meshwork of thin collagen and elastin fibres interlacing in all directions to give a measure of both elasticity and tensile strength. The large meshes contain soft, pliable, semifluid ground substances composed of proteoglycans, the different connective tissue cells scattered in the mesh. Occasional adipocytes are seen particularly around blood vessels.

DENSE IRREGULAR CONNECTIVE TISSUE - It is found in regions that experience considerable me-

chanical stress and where protection is given to ensheathed organs. The matrix contains a high proportion of collagen fibres which form thick bundles interweaving in three dimensions and giving considerable strength. Active fibroblasts are few and most are flattened with heterochromatic nuclei. The vascular supply is limited, as might be expected. Examples may be found in the reticular layer of the dermis, the connective tissue sheaths of muscle and nerves and the adventitia of large blood vessels. The capsules of various glands, the coverings of various organs such as the penis and testis, the sclera of the eye and periosteal and perichondria are all composed of dense irregular connective tissue.

ADIPOSE TISSUE - A few fat cells appear in loose connective tissue in most parts of the body. However, in adipose tissue, they occur in great abundance and constitute the principal component. Adipose tissue occurs in only certain regions and this selective distribution suggests that the fat is deposited in genetically determined sites. It occurs in abundance in subcutaneous tissue, around kidneys, in the mesenteries and omenta, in the female breast etc.²⁰

After going through the description of tissues, it was found that the description of 'Peshi' is anatomically similar to the description of Dense Irregular Connective Tissue (D.I.C.T.) which is present in the coverings of various organs, in the periosteum and perichondrium.

(B) CADAVERIC STUDY

Cadaveric study for the determination of *Peshi* was carried out by following the guidelines of Cunningham's Manual of Practical Anatomy. The view of *Sushrutacharya* was also considered during the study.

Macroscopic study – As it was necessary to study *Peshi* thoroughly as an anatomical structure, it was done by dissection of *Mamsa*.

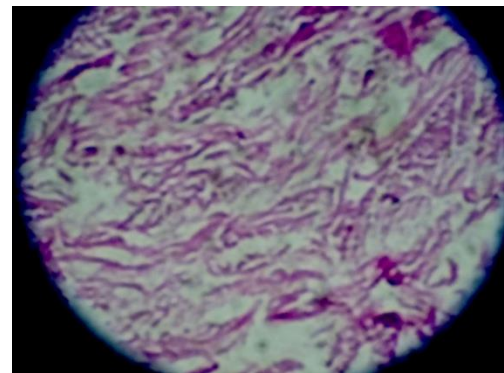


FIG. 1: Peshi COVERING SHOULDER JOINT WITH HUMERUS BONE



FIG. 2: Peshi COVERING QUADRICEPS FEMORIS TENDON AND LIGAMENTUM PATELLAE

Microscopic study - As it was determined in the literary study that, *Peshi* is capable of forming *Vivaryukta* (hollow) *rachana* and it is of *Darun* texture (rough or hard texture) though it is developed from *Mamsa* (Muscle/flesh), 2 samples were taken from sclera and bone under the guidance of Pathologist and sent for microscopic study. The stain used was H&E stain.



The microscopic study confirmed the structural component i.e. the type of tissue present in *Peshi* is Dense Irregular Connective Tissue (D.I.C.T.)

CONCLUSION

After the theoretical and cadaveric study, it can be concluded that 'Peshi' is an independent structure and is structurally different from *Mamsa* (muscle/flesh) from which it develops. The probable anatomical structure which is expected to be described by *Acharya Sushrut* under the terminology of 'Peshi' is made up of tissue type other than muscular appearance. It is a tissue with a fibrous appearance having characteristics of covering or ensheathing *Sira*, *Snayu*, *Asthi* and *Sandhi*. The tissue fulfilling all the prior said requisites is an irregular connective tissue of dense variety. Hence structurally, *Peshi* is Dense Irregular Connective Tissue (D.I.C.T.).

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