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A comprehensive study of *Peshi Shareera* w.s.r. to Adhoshakhagata Peshi

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ABSTRACT

Peshis are consolidated forms of the Mamsa Dhatu, demarcated from each other. They cover Sira, Asthi, Snayu and Sandhis and provide strength. Sushrutacharya has explained Peshi in detail including the types, location, distribution and importance. The total number of Peshis enumerated are 500. Amongst these, 400 are located in Shakha, 66 in Koshtha and 34 in Greevapratyurdhwa. 100 Peshis of each lower limb divided under 8 regions and categorised under 12 Swaroopas. However, there is no specific identification of different Peshis based on Swaroopa, provided in the Samhita. Objective of this study is to study the literature on Peshi Shareera w.s.r. to Adhoshakhaqata Peshi in the light of modern science by cadaveric study and to categorise the Peshis of lower limbs into 12 Swaroopas. As per literary and cadaveric study, a total of 56 Peshis are found in the lower limbs. 9 of 12 Swaroopa are found to be relevant for categorising the Adhoshakha Peshis. The reason for the difference in the number of Peshis could be inclusion of tendons or aponeurosis, or single muscle observed in two or more regions or 2 heads of origin of a single muscle as two. Hence, the number of *Peshis* in *Adhoshakha*, by cadaver dissection can be interpreted as 91 according to Sushruta and 96 as per Vagbhata's enumeration.

Key words: Adhoshakha, Lower limb, Muscles, Peshi, Swaroopa.

INTRODUCTION

Ayurveda is a human science, which is based on results obtained through different experimentation and studies on almost everything which effects life. It provides the knowledge and understanding of the structural & functional constitution of the human body (Shareera). There are many concepts mentioned in the classics which are worth exploring more and have their own importance. In Ayurvedic classical text, Dhatu is considered as

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nourishing and supporting matter of the body. It undergoes various metabolic changes, giving its own by-products and nourishes the body by providing support throughout life. Mamsa Dhatu is the third Dhatu amongst the Saptadhatus.[1] It is formed by the metabolism of its preceding Dhatu, Rakta Dhatu and is responsible for the nourishment of the succeeding Dhatu, Medo Dhatu as well as Lepana Karma of the body.[2]

Peshi

Peshi is the condensed form of Mamsadhatu which is arranged in various patterns demarcated from each performing *Lepan Karma* along strengthening the body.[3] It wraps the body like a sleeve, covers the Sira, Snayu, Asthi and Sandhi, thus provides the smooth contour to the body. [4]

Formation of Peshi

Peshis are formed by the influence of Vayu and Ushma which enter the Mamsa Dhatu and divide the Mamsa into Peshis.[5]

Mamsadhara Tvak [6]

The seventh layer of the *Tvak* is the *Mamsadhara Tvak*, which supports the *Mamsa*.

Mamsadhara Kala^[7]

Acharya Sushruta explains the unique concept of Kala, where the first Kala to be explained is the Mamsadhara Kala which is explained after the Mamsadhara Tvak. This Mamsadhara Kala is responsible for providing support to the underlying Mamsa, as it transports Sira, Dhamani and Srotas within it.

Number of Peshi

There are totally 500 *Peshis* in the human body with 20 extra *Peshis* in the females. The distribution of *Peshis* according to their location is explained by *Acharyas*. Out of the 500 *Peshis*, 400 are in *Shakha*, 66 in *Koshtha* and 34 in *Greevapratyurdhwa Pradesha*. The 20 extra *Peshis* of females are arranged in the *Stana* and *Yoni Pradesha*.^[8]

The 100 *Peshis* of one *Adhoshakha* are distributed in 8 regions according to different authors (Table no. 1). There is a clear difference in the enumeration of the muscles of lower limb as per contemporary science. According to the modern anatomy, the muscles of the lower limb are 61, categorised into 5 regions, including the gluteal region. [12] Ayurveda includes the *Sphik Pradesha* in the *Madhya Shareera* (trunk region). [13] This study attempts at understanding the structures included under the canopy of *Peshis* in different regions of *Adhoshakha*.

Table 1: Number of *Peshis* in *Adhoshakha Pradesha* according to different *Acharyas*

Regions	Sushruta [8]	Ashtanga Sangraha ^[9]	Ashtanga Hrudaya ^[10]	Bhavaprak asha ^[11]
Padaanguli (Toes)	15 (3x5)	15 (3x5)	15 (3x5)	15 (3x5)
Prapada/P adagra (Forefoot)	10	10	10	10
Padopari Kurcha (Above foot,	10	10	10	10

attached to kurcha)				
Padatala/G ulphatala (Sole of foot)	10	10	10	5
Gulpha (Ankle)	-	10	10	5
Jangha/Gul pha- Janvantare (Leg)	20	20	20	20
Janu (Knee)	5	5	5	5
Uru (Thigh)	20	20	20	20
Vankshana (Groin)	10	-	-	10
Total	100	100	100	100

Swaroopa of Peshi (Types of Peshi)

There are various patterns of *Peshi* differentiated to maintain support and movement of body viz. *Bahala, Pelava, Sthula, Anu, Prithu, Vritta, Hriswa, Dirgha, Sthira, Mridu, Slakshna* and *Karkasha*.^[14]

Dalhana has explained each Swaroopa in his commentary on Sushruta Samhita Shareera Sthana 5th chapter and Ghanekar commentary has given their respective meanings. [15] (Table no. 2)

Table 2: Peshi Swaroopa

SN	Peshi Swaroopa	Dalhana	Meaning By Ghanekar
1.	Bahala	Bahutara	Large
2.	Pelava	Alpa	Small
3.	Sthoola	Vipareeta of Sookshma	Thick
4.	Anu	Sookshma	Thin
5.	Prithu	Visteerna	Flat/Broad
6.	Vritta	Vartula	Dome shaped
7.	Hrisva	Adeergha	Short

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9.

10.

11

12.

Deergha

Sthira

Mridu

Slakshana

Karkasha

Ayata	Long
Kathina	Firm
Komala	Soft
Sparshasukha	Smooth
Vipareeta of	Rough

Though Acharya Sushruta has given the 12 Swaroopa of Peshis, he has not mentioned about which Peshis are categorised under these 12 Swaroopas.

Sparshasukha

This present work has been taken up with an idea to update the concept of *Peshi*, with emphasis on the *Peshis* of *Adhoshakha* as well as their categorisation under the 12 *Swaroopas* of *Peshis* mentioned.

Karma of Peshi (functions)

As per Sushrutacharya, the main function of *Peshis* is to cover the joints, bones, *Siras* and *Snayu* and to keep them in place and to provide strength to these structures.^[16]

Acharya Kashyapa opines just as a plank made of wood tied with grass and ropes is smeared with clay superficially, similarly, in the body the bones are tied together by the *Snayus* and *Snayus* are covered by *Mamsa* and they are nourished by the *Siras*. Skin is spread over these structures.^[17]

Muscles of Lower Limb^[12]

The muscles of the lower limb may be conveniently considered in the following groups:

- 1. Muscles of the iliac region Psoas Major, Psoas Minor, Iliacus.
- Muscles of the gluteal region Gluteus Maximus, Gluteus Medius, Gluteus Minimus, Piriformis, Superior and Inferior Gemelli, Obturator Internus and Externus, Quadratus Femoris and Tensor Fasciae Latae
- 3. Muscles of the femoral region
- Muscles of anterior compartment of thigh -Quadriceps Femoris (Rectus Femoris, Vastus

REVIEW ARTICLE

July 2022

- Lateralis, Vastus Medialis and Vastus Intermedius), Sartorius, Iliopsoas, Articularis Genu
- Muscles of medial compartment of thigh Gracilis, Pectineus, Adductor Magnus, Adductor Longus and Adductor Brevis
- Muscles of posterior compartment of thigh -Semitendinosus, Semimembranosus and Biceps Femoris
- 4. Muscles of the leg
- Muscles of anterior compartment of leg Tibialis Anterior, Extensor Hallucis Longus, Extensor Digitorum Longus and Peroneus Tertius
- Muscles of lateral compartment of leg Peroneus longus and Brevis
- Muscles of posterior compartment of leg -Gastrocnemius, Soleus, Plantaris, Popliteus, Flexor Digitorum Longus, Flexor Hallucis Longus and Tibialis Posterior.
- 5. Muscles of the foot
- Dorsum of foot Extensor Digitorum Longus
- First layer of sole Flexor Digitorum Brevis,
 Abductor Hallucis and Abductor Digiti Minimi
- Second layer Flexor Digitorum Longus, Flexor Digitorum Accessorius, Lumbricals and Flexor Hallucis Longus.
- Third layer Flexor Hallucis Brevis, Flexor Digiti Minimi Brevis and Adductor Hallucis.
- Fourth layer Interosseous Muscles

AIMS AND OBJECTIVES

- To undertake literary study of Peshi Shareera with special reference to Adho Shakhagata Peshi in detail.
- 2. To do a comprehensive cadaveric study on *Adho Shakhagata Peshi*.

METHODOLOGY

 Literature regarding the Vyutpatti, Sankhya, Swarupa, Karya etc. of Mamsa Peshi was collected

from *Bruhatrayees, Laghutrayees* and other Ayurvedic texts, modern textbooks, including journals, presented papers and previous work done, and was correlated as well as analysed, critically.

 Dissection of lower limbs of five cadavers was done in the dissection hall of SDM College of Ayurveda, Udupi, to analyse the number and Swaroopa of Adhoshakhagata Peshi.

DISCUSSION

Peshis are defined as the Mamsavayava Sanghata, i.e., the group of Mamsavayava is called as Peshi and it is said to be Vibhakta (separated) from each other. It is also considered that Peshis are long and thread-like with a central fleshy part. This can be understood as-Each muscle fibre within a fasciculus is separated by an endomysium, each fasciculus is covered by a connective tissue layer called the perimysium and the whole muscle is covered by the epimysium which separates it from other muscles. From this definition of Peshi, it can be considered as a consolidated bundle of numerous myocytes or muscle fibres to form the muscle.

The deep fascia enveloping and supporting the muscle may be considered as *Mamsadhara Kala*; it also transports blood vessels and nerves. The superficial fascia may be considered as *Mamsadhara Tvak*, the last layer of *Tvacha*.

Acharyas categorised the *Peshis* into twelve shapes depending on their region of distribution. They are *Bahala, Pelava, Stoola, Anu, Prithu, Vritta, Hrisva, Deergha, Sthira, Mridu, Slakshna* and *Karkasha*. As per *Acharya* Ghanekar's commentary, these *Peshis* are large, small, thick, thin, flat/broad, dome shaped, short, long, firm, soft, smooth and rough respectively.

This study has attempted to categorise the *Peshis* of the lower limb into these twelve *Swaroopa* as per their region of distribution and function (Table no. 3).

Table 3

Swaroopa	Explanation	Muscles included
Bahala	Large	Gluteus maximus, Adductor magnus

Pelava	Small	Tensor fascia latae, Abductor digiti minimi, Lumbricals, Plantar and Dorsal interossei
Sthoola	Thick	Psoas major, Gluteus maximus, Adductor magnus, Gastrocnemius, Soleus
Anu	Thin	Articularis genu, Peroneus tertius, Crermaster, Abductor digiti minimi, Flexor digiti minimi brevis
Prithu	Flat/broad	Iliacus, Pectineus, Popliteus, Flexor digitorum accessorius, Transversus abdominus, Internal oblique, External oblique aponeurosis
Vritta	Dome shaped	Gastrocnemius, Soleus, Cremaster
Hrisva	Short	Adductor brevis, Peroneus tertius, Peroneus brevis, Plantaris, Popliteus, Extensor digitorum brevis, Flexor digitorum brevis, Extensor hallucis brevis, Abductor hallucis brevis
Deergha	Long	Psoas major, Tensor fascia latae, Sartorius, Rectus femoris, 3 Vasti, Adductor longus, Gracilis, Semitendinosus, Semimembranosus, Biceps femoris, Tibialis anterior, Extensor hallucis longus, Extensor digitorum longus, Peroneus longus, Flexor digitorum longus, Flexor hallucis longus, Tibialis posterior, Plantar and dorsal interossei, Lumbricals
Sthira	Firm	Koshthagata Peshis
Mridu	Soft	Koshthagata Peshis
Slakshna	Smooth	All smooth muscles
Karkasha	Rough	All skeletal muscles

All muscles with 'magnus' and 'maximus' in their names are grouped under *Bahala* group; 'longus' muscles are grouped under *Deergha* category; 'brevis' are categorised under *Hrisva* and 'digiti minimi' under *Anu* group. All skeletal muscles are categorised under the *Karkasha* group. These *Swaroopa* of *Peshis* are for

all *Peshis* of the body, hence, it may be difficult to categorise skeletal muscles into *Sthira* and *Mridu* groups. Some *Koshthagata Peshis* may be considered in these categories.

The number of *Peshis* in *Adhoshakha* are 100 in each lower limb. These *Peshis* are distributed in 9 regions of the limb from *Padanguli, Prapada, Padopari Kurcha, Padatala/Gulphatala, Gulpha,* in between *Gulpha* and *Janu, Janu, Uru* and *Vankshana Pradesha*.

The muscles of lower limb are considered to be 61 including the four muscles of quadriceps femoris, four lumbricals, three plantar interossei and four dorsal interossei. These muscles are divided into 5 regions as muscles of the iliac region, femoral region, gluteal region, leg and foot.

Samhitas mention the ten muscles of Sphik Pradesha (gluteal region) in the Koshthagata Peshis and do not consider these under Adhoshakhagata Peshi.

However, the modern anatomical classification clearly mentions the gluteal region muscles as part of the lower limb. Based on dissection findings, 3 muscles of the gluteal region are found in *Uru Pradesha*.

As per dissection findings, we got 56 *Peshis* in the *Adhoshakha* including the 4 muscles of the anterior abdominal wall and excluding 7 muscles of gluteal region.

The distribution of *Peshis* region wise was found as follows.

- Padanguli Peshi 15 Peshis of Padanguli were difficult to pin point as no muscle is found in the toes. However, 18 tendinous insertions of muscles of anterior and posterior compartments of leg were seen.
- Prapada Peshi It has 10 Peshis according to classical texts. As per dissection findings, 15 muscles were found in this region including the two heads of adductor hallucis, four lumbricals, four dorsal interossei and three plantar interossei muscles as individual muscles along with flexor hallucis brevis and flexor digiti minimi brevis.
- Padopari Kurcha Peshi 10 Peshis of this region were difficult to get as 4 muscles were found in the

dorsum of the foot they are, extensor hallucis longus, extensor hallucis brevis, extensor digitorum longus, extensor digitorum brevis, along with 4 tendons of extensor digitorum brevis may be considered as *Kurcha* (brush-like structure).

- Gulphatala Peshi This region is explained by Acharya Sushruta and Bhavaprakasha. Gulphatala is considered as the heel region and 10 Peshis are distributed here. Bhavaprakasha has considered 5 Peshis in each Gulpha and Tala region. However, dissection findings indicated origins of 5 muscles, including 2 heads of flexor digitorum accessorious, abductor hallucis, flexor digitorum brevis and abductor digiti minimi. 10 Peshis of this region were difficult to find, Acharyas may have taken muscle fasciculi into consideration.
- Gulpha region has been explained by Acharya Vagbhata and it is taken as the ankle region. 10 Peshis have been explained separately in Gulpha and Padatala region. Dissection findings led to tendons of 12 muscles of the leg crossing the ankle joint and 5 muscles in Padatala region.
- Jangha Pradesha Peshi The region between the Gulpha and Janu is called the Jangha and 20 Peshis have been enumerated here. Muscles of the anterior, posterior and lateral compartments of the leg were found in this region, except the plantaris. The tendon of plantaris is traced into the leg with its muscle bulk in the Janu Pradesha. Totally 13 muscles were found in this region, including the two heads of gastrocnemius and excluding the tendon of plantaris.
- Janu Pradesha Peshi 5 Peshis have been enumerated here. Dissection indicated 5 muscles including the two heads of gastrocnemius in the knee joint, plantaris and insertion of sartorius and gracilis.
- Uru Pradesha Peshi Uru pradesha is thigh region and 20 Peshis have been explained here. 20 muscles were found in this region as per dissection findings including the anterior, medial and posterior compartments of thigh; three muscles from the gluteal region, obturator externus, tensor

fascia latae and gluteus maximus, were also traced into the thigh.

Vankshana Peshi - Vankshana Pradesha is described as the root of thigh or junction of the thigh and abdomen and can be considered as the inguinal region. Inguinal region extends from the anterior superior iliac spine to the pubic tubercle. 10 Peshis have been enumerated in this region. Dissection led to finding of 7 muscles in this region from the anterior abdominal wall and posterior abdominal wall due to their attachment and course in this region. They are external oblique aponeurosis, internal oblique, transversus abdominis, cremaster, iliacus, psoas major and pectineus.

CONCLUSION

The total number of muscles of lower limb are 61, including the gluteal region muscles and dissection of Adhoshakha explains 56 muscles excluding 7 muscles of gluteal region and including 4 muscles of anterior abdominal wall. The difference in the enumeration of Peshis as 100 in each Shakha may be because of including two separate heads of a single muscle or tendons and aponeuroses as Peshi depending on location and function or tracing a single muscle in two or more regions and considering these as separate muscles. Considering all above factors and by cadaver dissection, the total number of Peshis in Adhoshakha can be tallied upto 91 as per Sushruta's enumeration and 96 according to Vagbhata's enumeration. Swaroopa of Peshis - 12 Swaroopas of Peshi have been explained depending on their natural shape and size and location. These 12 Swaroopas have been described for all the Peshis of the body. The Sthira, Mridu and Kathina swaroopas are not relevant for the Peshis of Adhoshakha. Acharyas must have considered Peshis of the Koshtha and Shiro-Greeva Pradesha under these categories. The 56 muscles of the Adhoshakha have been categorised under these 9 of the 12 Swaroopas based on their nomenclature, shape, size and structure. Further scope of study could standardisation of these explanations in terms of modern anatomy knowledge for easier access to

understanding ayurvedic viewpoint as well as, updation of our knowledge systems.

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