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Review Article on Comprehensive Study of Pelvic Floor Muscle W.S.R To *Sushira Snayu*

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ABSTRACT:
Snayu which is described as the most important structure amongst *peshi, sira, asthi* & Sandhi in Rachana Sharir. It forms a part of musculoskeletal system along with bones & joints. There are different opinions about the modern anatomical correlation of *Snayu*. Here the question arises what is snayu. As it is describable word ,not carrying a particular anatomical structure. It has wide range of meanings. It can be considerd as peshi, jala (Retinaculum) ,ligaments, tendons as per their allocated specific areas and according to functions of snayu. Function of snayu is bandhan i.e to tie .There are 4 main types of *Snayu* named according to their shapes & they are located in certain areas. These are *Pratan, Vrutta, Pruthu & Sushir*. Muscles are also categorized according to their shape & function. Skeletal muscles have both origin and insertion, Smooth and Cardiac Muscles have origin but no insertion. But all these performs action like contraction and relaxation. In this study, the comparison between types of *snayu* & types of muscles is done to find out whether these two entities can be correlated.

KEYWORDS*: Snayu, Pratan, Pruthu, sushir, vrutta*

Introduction:
The main function of Snayu is Bandhan which means tie or joint one or more structures and control actions of respective structures. The Vaidyas who having good knowledge of external and internal Snayu will be able to remove the deep penetrated shalyas from any part of the body. Mainly four types of Snayu present in body i.e Pruthu, Vritta, Pratan, Sushira Snayu. Sushir Snayu is one among the four types of Snayu which is not related to locomotive system but sustain the function of snayu i.e bandhan. Sushir snayu located at end of orifices of Aamashya, pakwashya and basti. So here the function of sushir snayu is bandhan (Tie) of mukh of respective organ.

This function of sushir snayu is different while comparing it with other type of Snayu. Any deformity in sushir snayu hampers the functions of all these organs.
Sushir snayu prakara means *Sachhidra* (salmon) *Snayu* or *Snayu* type with gap. They were there at the end of *Amashya pakwashaya* and *Basti*. *Sushir snayu* examines *Ampakwashaya* and last part of *Basti*. It sounds a lot like a pelvic floor. The pelvic floor mediates the urethra, vagina and anus. In women, the urethra and vagina pass through the anterior urogenital part of the pelvic floor and the posterior part of the rectum. The anal canal passes through the anterior part of the rectum.

There are 4 types of *Snayu*

1. *Pratan* (The one which spread like tentacles)
These are present in the limbs & joints. These are long and spread all over the limb like a vine[3]

Here the muscles present in upper limb and lower limb ,helps in flexion,extension,abduction ,adduction etc., have origin and insertion along with power of contraction and relaxation can be consided as pratan snayu.

2. *Vrutta* (Rounded oval cord like)
All the kandara(tendons) are mentioned under this type.
Hard cord like long structures ending at the nails of upper & lower limb, also present at the back passing from the shoulder girdle to pelvic girdle[4]. The kandara at the front of the body travels between the neck & the root of penis[5]☐

3. *Pruthu* (Broad, larger in size & flat)

Present on the lateral side of body, thorax, back & head region[6]. They are flat, large & broad. They form the body wall of trunk & cover the head[7].

***4. Sushir* (Forming Ring like Openings/sphincters) :-** Sushir means which form an opening or ring structure[8].

Location :- *Acharya Sushruta* explains that *Sushira Snayu* is present in the terminal part of regions like *Amashaya* (stomach, *Pakvashaya* (large intestine), *Basti*(urinary bladder)[9] .

***Sushir Snayu* Functions:[10]**

Sushira means porous, hollow, cavity etc. *Acharya Sushruta* explains that *Sushira Snayu* is present in the terminal part of regions like *Amashaya, Pakvashaya, Basti* etc. so these are structures which are porous like in nature and also present in the openings of hollow organs and hold these hollow organs (viscera).

so the structures which resemble *Sushira Snayu* are sphincters and visceral ligament. In the context of *Snayu Prayojan* (function of *Snayu*) Sushruta mentioned that *Snayu* is like ropes in our body. Like the rope holds the wooden planks together, *Snayu* holds the body together making it capable of weight bearing. So long as the joints are fastened tightly by *Snayu* in many ways.

In the end it can be correlate the ligament because ligament also firmly attached to the joints, fixed and support the joint and make a joint weight bearing part of body[11].

1. Pakwashyagata Sushir Snayu :- Anatomy Of Pelvic Floor :

The pelvic floor is made up of a layer of muscles covering the bottom of the pelvis that support the bladder and bowel in men and bladder, bowel and womb in women. These structures that sit on top of the pelvic floor are known as our pelvic organs. The muscles run like a hammock from the front of the pelvis to the tailbone (coccyx) at the back, and side-to- side from one sitting bone to the other. The pelvic floor is a funnel-shaped structure covering the base of the pelvis from the pubic symphysis anteriorly to the coccyx posteriorly and stretches from one ischial tuberosity to the other. It consists of two main muscles, the levator ani, and the coccygeus.

The levator ani muscle is a broad thin muscle that is made up of a group of 3 muscles**, pubococcygeus, puborectalis and iliococcygeus**. The muscles join in the middle of the pelvis except at the prostrate in males and vagina and urethra in females.

Pubococcygeus originates from both sides of the body of the pubis lateral to the puborectalis muscle and anterior to the obturator canal at the tendinous arch. It travels posterior and medial to insert onto the perineum, coccyx and anococcygeal ligament.

Puborectalis is a U-shaped muscle that originates on both sides on the pubic body just lateral to the pubic symphysis. The muscle runs posterior and encircles the rectum so both sides join together. Some fibers join the external anal sphincter. The contraction of this muscle causes the anorectal junction to bend 90 degrees. This maintains facal continence during contraction and enables defecation on relaxation. Some fibers may extend towards the urethra in both male sand females and to the vagina in females, aiding with urinary continence. Iliococcygeus originates from the ischial spines and posterior portion of the obturator internus. It travels posterior and medially and inserts onto the anococcygeal ligament and coccyx. ☐

Coccygeus is also known as the ischiococcygeus muscle. It is a small muscle that makes up the posterior portion of the pelvic floor. It originates from the sacrospinous ligament and ischial spine and inserts on to the lateral borders of inferior sacrum and superior coccyx.

Urogenital Diaphragm: Deep transverse perineal, Sphincter urethrae Sphincters and erectile muscles of the urogenital and intestinal tract: External anal sphincter, Bulbospongiosus, Ischiocavernosus, Superficial transverse perineal.

uscles of Male Pelvic Floor:

The male pelvic floor muscles make up a dome-shaped structure in the pelvis, similar to a hammock. The male pelvic floor is made up of three layers: deep, middle, and superficial, and has a complex relationship with the surrounding bony pelvis, fascia, ligaments and nerves.

Superficial Layer of the Male Pelvic Floor

The muscles of the superficial layer include the bulbospongiosus, ischiocavernosus, and superficial transverse perineal. The external anal sphincter is also found in this layer. The superficial muscles are particularly involved in ejaculation as well as urinary and faecal continence.

Middle Layer of the Male Pelvic Floor

The middle layer is comprised of the perineal membrane, the deep transverse perineals, the sphincter urethrae and the compressor urethrae. This layer is particularly responsible for urinary continence when there is increased intra- abdominal pressure (eg. coughing or sneezing).

Deep Layer of the Male Pelvic Floor

The muscles of the deep layer include: the levator ani, iliococcygeus, pubourethralis, and ischiococcygeus. These muscles are particularly responsible for the support of pelvic organs and maintenance of continence. The deep layer is also known as the pelvic diaphragm.

In males also, levator ani is composed of three muscles: puborectalis, pubococcygeus, and iliococcygeus. The puborectalis forms a U-shaped sling around the rectum and, through a sphincter-like action on the anorectal junction, contributes to faecal continence. Of clinical relevance for activities of daily living: sitting with a forward lean and legs supported in a squat-like position is the ideal positioning for defecation due to this anatomical sling.

Micturition cycle

A sphincter is a cylindrical muscle that closes around a structure. The two sphincters of the male pelvic floor which control urinary continence are made up of the pelvic floor muscles where they encircle the urethra as it travels through the prostate. Between the bladder and the prostate is the internal urethral sphincter, which is made of smooth muscle and is under autonomic control. Below the prostate is the external urethral sphincter which is made of skeletal striated muscle and is under voluntary control. Micturition occurs when the bladder detrusor contracts and the internal sphincter relaxes through involuntary autonomic nervous control. The muscles of the pelvic floor voluntarily relax to open the external sphincter and allow urine to flow out of the body. The coordination of these muscular actions for sphincter control is essential for urinary continence. □

Muscles of female Pelvic Floor:

The pelvic floor muscles act to close off the bony outlet, which they do so completely apart from specific openings:

The urogenital hiatus:

ontains the urethra and vagina in women Positioned anteriorly

The anal hiatus: Contains the anal canal Positioned posteriorly

The muscles of the pelvic floor are divided into three layers

1. **Deep Layer -** Pelvic Diaphragm

The deepest layer of the pelvic floor muscles is known as the pelvic diaphragm. It is a broad, funnel-shaped sling of fascia and muscle suspended from bony anchor points in the lesser pelvis (i.e. the area of the pelvic cavity below the linea terminalis)

The muscles of the pelvic diaphragm are:

Ischococcygeus muscle (also known as the coccygeus muscle) Originates from the ischial spine and inserts into the lateral aspect of the coccygeal vertebrae

Levator ani

A composite muscle that is traditionally divided into three parts: **Pubococcygeus:** originates from the internal surface of the pubic ramus and inserts into the lower sacral and coccygeal vertebrae

Illiococcygeus: originates at the arcus tendinous levator ani (ATLA) and fuses with the pubococcygeus

Puborectalis: originates at the inner surface of the right and left sides of the pubic bone. The two muscles meet behind the rectum and form a continuous sling

In this deep part of the pelvic floor, it is also possible to palpate the obturator internus and piriformis muscles. These muscles are not, however, considered to be part of the pelvic diaphragm. Instead, they are rotators of the hip.

2. **Middle Layer - Urogenital Diaphragm / Perineal Membrane**

The middle layer has traditionally been called the urogenital diaphragm, but is often now referred to as the perineal membrane**.**

There is controversy over whether this layer contains:

A transverse sheet of muscle called the deep transverse perinei muscle which is between an inferior and superior fascia OR three joined muscles and an inferior fascial layer (i.e. the perineal membrane) However, the middle layer stretches across the urogenital triangle (see below) and in women, houses the urethral and vaginal sphincters (i.e. the sphincter urethrovaginalis, the external urethral sphincter, and the compressor urethrae). These sphincters close the urethra and vagina, and maintain continence. The entire perineal layer provides additional support for the deeper pelvic floor structures.

3. **Superficial Layer:**

This layer consists of Bulbocavernosus and ischiocavernosus: These muscles assist with clitoral function during arousal and climax

Superficial transverse perineal muscles (paired):-

Provide additional support for the urogenital diaphragm

External anal sphincter:

A circular, layered muscle that closes off the anal canal.The perineum (perineal body) and superficial transverse perineal muscles divide into two triangles:

Anterior triangle (Urogenital triangle):

Makes up the anterior half of the perineum, which is diamond shaped. the corners of the triangle are the pubis symphysis anteriorly and the ischial tuberosities anterolaterally

Posterior triangle (Anorectal triangle):
Makes up the posterior half of the perineum. the corners of this triangle are the tip of the coccyx posteriorly and the ischial tuberosities anterolaterally

The external urethral sphincter (EUS) in males:
is a circular muscle that surrounds the membranous urethra. It helps maintain bladder control and allows for urine flow.

Location:
Located below the pelvic diaphragm, between the pudendal canals

Originates at the ischiopubic ramus
Inserts into the perineal body anteriorly, and the anococcygeal ligament posteriorly

Function:
Contracts to close the membranous urethra, contributing to urinary continence Relaxes during micturition (urinating)

Relationship to other muscles: Continuous with the isthmus of the prostate

Posterior ends of the muscle extend to form large, ring-shaped structures with the external anal sphincter. Connected to the levator and superficial transverse perineal muscles

Clinical significance: Damage or scarring of the EUS can lead to urinary incontinence, which is the inability to control the flow of urine

The female external urethral sphincter:-is a muscle that controls urine flow and is located between the vaginal orifice and clitoris. It's also known as the urogenital sphincter.

Function: Helps maintain bladder control when filling and helps facilitate urine flow when voiding.
Structure:
Made of striated (skeletal) muscle
Has an inner mucosa with a urothelial lining Has a spongy mucus-producing submucosa
Has a layer of smooth muscle
Has an external sheath of fibroelastic connective tissue
Control:
Controlled voluntarily by the somatic nervous system
Can be exercised and strengthened with pelvic floor exercise.
Comparison with male sphincter:
The female external urethral sphincter is more complex than the male external urethral sphincter. Females are more at risk of urinary continence problems because they have a short urethra and only one bladder neck sphincter

Related conditions: Loss of EUS function and sarcopenia are associated with aging

MODERN LITERATURE REVIEW:

Pelvic Floor Muscle Functions[2]:
The pelvic floor serves many important functions, from being a hammock to hold our organs to stopping us from leaking and even improving your sexual experience and function. The picture and paragraph below run through some of the main functions of your pelvic floor in more detail.

Main Pelvic Floor Muscle Functions:

Support internal pelvic organs in the correct positions (Bladder, bowel and womb) Allows self-control of bladder and bowel habits using the sphincter muscles. This allows us to control the release of urine, faeces, and gas. This allows us to delay emptying until a convenient time when a toilet is available. This works by the pelvic floor muscles tightening and lifting the pelvic organs up while the sphincter tightens around the openings of the urethra and anus.

When they relaxed, they allow the passage of urine and faeces out of the body.

Sexual Function:

In males the pelvic floor muscles are important in maintaining an erection during sex and preventing early ejaculation.

In female awareness of the tightening of the pelvic floor muscles can contribute to sexual sensation and orgasm.

The pelvic floor muscles play a role in breathing by relaxing and increasing the space the lungs have to expand.

During pregnancy, the pelvic floor offers support to the baby and also assists in childbirth

Strong pelvic floor muscles are important when we cough, laugh, sneeze and during lifting activities as there is extra force added to the abdomen and pelvic floor. If these muscles are weak, stretched or not working as they should, pelvic floor dysfunction may occur and lead to the signs and symptoms mentioned below. Some of these symptoms may be pressure felt in the pelvic region and/or bladder or bowel leaking occurring during laughing, coughing, sneezing or lifting.

DISCUSSION:

On the premise of anatomical structure, and clinical indications the term Snayu is exceptionally near to ligament/tendon/aponeurosis/fascia etc. in modern science.

Tendon: A tiny ponder of anatomical structure of ligament appears that it may be a fibrous band of connective tissue serving as a interfacing component for the connection of muscle to the bone and other parts[12]. On the premise of similitudes
between structure and capacities of Vritta Snayu and tendon , Vritta snayu as
kandra mentioned by Acharyas
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Ligament: On the premise of tiny consider it is characterized as the sinewy band of a few thick customary connective tissues which is organized in frame of parallel bundles and is profoundly received for standing up to the strain. The quality of these filaments bundle is named as tendon. It is one of the foremost mechanical variables that hold bones near together in a synovial joint. A tendon is the sinewy connective tissue that interfaces one bone to other bone conjointly known as articular tendon sinewy tendon or genuine tendon. Tendons are comparative to ligaments and fasciae as they all are made up of connective tissue. The contrasts in them are within the association that they make. Tendons interface one bone to another bone. Ligaments interface muscle to bone. Fasciae
interface one muscle to another muscle[13].

Aponeurosis: On the introduce of modest consider it is characterized as the strong band of a number of thick standard connective tissue which is organized in outline of parallel bundles and is significantly gotten for standing up to the strain. The quality of these fibers bundle is named as ligament. It is one of the first mechanical factors that hold bones close together in a synovial joint. A ligament is the strong connective tissue that interface one bone to other bone conjointly known as articular ligament strong ligament or veritable ligament. Ligaments are comparative to tendons and fasciae as they all are made up of connective tissue. The contrasts in them are inside the affiliation that they make. Ligaments interface one bone to another bone. Tendons interface muscle to bone. Fasciae
interface one muscle to another muscle[14].

Fascia: A sheet or band of stringy connective tissue isolating or authoritative together muscles and organ etc.

Anatomy of pelvic floor muscle and structure of sushira snayu is same and also main functions of pelvic floor muscles and sushir snayu are quietly similar to each other so we can consider from all of this that pelvic floor muscle is nothing but Sushir Snayu in structure and function in ayurvedic manner.

Applied Anatomy

The injury of tendon and ligament produces side effects like inflammation, swelling, tearing alongside severe pain development in specific portion of body. Extreme harm few times may causes halfway or total misfortune of work and organ etc

Anatomy of pelvic floor muscle and structure of *sushira snayu* is same and also main functions of pelvic floor muscles and *sushir snayu* are quietly similar to each other so we can consider from all of this that pelvic floor muscle is nothing but *Sushir Snayu* in structure and function in ayurvedic manner.

CONCLUSION:

Pelvic Floor muscle from modern concept and *Sushir Snayu* from Ayurvedic concept both are same. Pelvic floor consists of muscles and connective tissues that support important organs in your Pelvis are bladder, bowel (large intestine) and internal reproductive organs Pelvic floor muscles hold these organs in place. Pelvic floor muscles help stabilize your core while assisting bodily functions like Urination, Defecation, Sexual Intercourse.

Acharya Sushruta explains that *Sushira Snayu* is present in the terminal part of regions like *Amashaya, Pakvashaya, Basti* etc. The pelvic floor mediates the urethra, vagina and anus. So we can say that Pelvic floor muscle and *Sushir Snayu* have resembles in their structures as well as in function also.

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