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CONCEPTUAL STUDY OF APAN VAYU IN A MODERN PERSPECTIVE.

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ABSTRACT

Ayurved is a science of life. In *Ayurved*, it is said that *'Dosh Dhatu Mal Moolam Hi Shariram'* means these three are the base of our body. In these three *Doshas, Vata* is the first and most important element for our body. Two types of *Doshas* are explained as *Sharirik Dosh* and *Mansik Dosh. Sharirik Doshas* are of three types *Vata*, *Pitta*, and *Kapha*. Mansik *Doshas* are of two types, *Raj* and *Tam*. *Doshas* are believed to be responsible for a person's physiological, mental, and emotional health. Acharya Shushrut also gives first preference to *Doshas* in Swastha definition. This article focuses on *Apan Vayu* which is a type of *Vata Dosh*. It helps in the elimination of *Sameeran* (flatus), *Sakrit* (faeces), *Mootra* (urine), *Shukra* (semen), *Garbha* (featus), and *Artav* (menstrual fluid). All the functions of *Apan Vayu* can be compared with modern medicine science.

Key words: *Apan Vayu, Vata, Dosh, Karma, Niskramana*

INTRODUCTION

According to *Ayurved*a, the world comprises five elements space, Water, earth, fire, and air. These elements combine to form three energies *Vata*, *Pitta*, *Kapha*, Tridosha is a base of *Ayurved*a, *and Vata* the first and most important *dosha*. In five types of Vata *Prana Vayu, Udana Vayu, Samana Vayu, Vyan Vayu & Apana Vayu, Apana Vayu* is responsible for – ejaculation of semen, voiding of urine & stool, elimination of menstrual blood & Parturition of the fetus. Site & Functions of *Apana Vayu* by different Acharya-

Stana (Location)	**Charak Samhita** [1] *Vrishana* (testicles) *Vasti* (Urinary bladder) *Medhra* (Penis) *Nabhi* (Umbilicus) *Uru* (Thighs) *Vakshyana* (Inguinal region and guda)	**Sushrut Samhita** [2] *Pakvadhana* (Large Intestine)	**Astanga Hridya** [3] *Apana desha* (Perineal region) and it traverses along *sroni* (Pelvis) *Vasti* (urinary Bladder) *Medhra* (external genital apparatus of each sex) And *Uru* (Thighs)	**Astanga Sangraha** [4] Rectum, Moves along the urinary bladder Pelvis, Penis, Scrotum, and groin
Karma (Function)	Ejaculation Micturation Defecation Expulsion of menstrual blood and fetus	Elimination *Samirana* (Flatus) *sakrit* (Faeces) *Mutra* (Urine) *Sukra* (Semen) *Garbha* (Fetus) *Artava* (Menstrual Blood)	Expulsion of *Sukra* (Semen), *Artava* (Menstrual Blood), *Sakrit* (Faeces), *Mutra* (Urine), and *garbha* the product of conception that is fetus and placenta	Elimination of faeces, urine, semen, menstrual fluid, and fetus

Materials and methods:

Modern Aspects: -

Sukra Nishkramana –

Emission and ejaculation are the culmination of the male sexual act. When the sexual stimulus becomes extremely intense the reflex center of the spinal cord begins to emit sympathetic impulses that leave the cord at T-12 to L-2 and pass to the genital organ through the hypogastric and pelvic sympathetic nerve plexuses to initiate emission, the forerunner of ejaculation. Emission begins with contraction of the vas deferens and the ampulla to cause expulsion of sperms into the internal urethra. Then, contractions of the muscular coat of the prostate gland followed by contraction of the seminal vesicles expel prostatic and seminal fluid also into the urethra, forcing the sperm forward. All these fluids mix in the internal urethra with mucus which is secreted by the bulbourethral glands to form the semen. The filling of the internal urethra with semen elicits sensory signals that are transmitted through the pudendal nerves to the sacral regions of the cord, giving the feeling of sudden fullness in the internal genital organ. These sensory signals also excite rhythmic contraction of the internal genital organs and cause contraction of the ischiocavernosus and bulbocavernosus muscle that compress the bases of the penile erectile tissue. This effect together causes a rhythmic wave-like increase in pressure in both the erectile tissue of the penis and the genital duct and urethra, which ejaculate the semen from the urethra to the exterior [5].

Mutra Nishkramana Kriya -

Act of Micturation – Urine is voided from the urinary bladder. It is a reflex process. This reflex is elicited by the stimulation of stretch receptors situated on the wall of the urinary bladder and urethra. When about 300-400 ml of urine is collected in the bladder, intravesical pressure increases. This stretches the wall of the bladder resulting in stimulation of stretch receptors and generation of sensory impulses. Sensory impulses from receptors reach the sacral segment of the spinal cord via sensory fibers of the pelvic nerve. Motor (efferent) impulses produced in the spinal cord, travel through motor fibers of the pelvic nerve towards the bladder and inter sphincter. Motor impulses cause contraction of the detrusor muscle and relaxation of the internal sphincter so that urine enters the urethra from the bladder. Once urine enters the urethra, the stretch receptors in the urethra are stimulated and send afferent impulses to the spinal cord via pelvic nerve fibers. Now the impulses generated from spinal centers inhibit the pudendal nerve. So, the external sphincter relaxes, and micturition occurs. Once a micturition reflex begins, it is self-regenerative; the initial contraction of the bladder further activates the receptor to cause a still further increase in sensory impulses from the bladder and urethra. These impulses, in turn, cause a further increase in reflex contraction of the bladder. The cycle continues repeatedly until the force of contraction of the bladder reaches the maximum and the urine is avoided completely [6].

Mala Niskramana –

Act of defecation., When a mass movement forces feces into the rectum, the desire for defecation occurs immediately. Two types of Reflexes are seen –

1) Intrinsic Reflex
2) Parasympathetic Reflex

Intrinsic reflex mediated by the local enteric nervous system in the rectal wall. When feces enter the rectum, there is distention of the rectal wall, Afferent signals are initiated through the myenteric plexus and cause peristalsis from descending colon to sigmoid and rectum. This forces the feces towards the anus. Peristalsis wave approaches the anus and relaxation of the internal anal sphincter, At the same time, if the external anal sphincter is voluntarily relaxed defecation occurs. Another defecation reflex is initiated by the parasympathetic nervous system. After entering fecal matter into the rectum, the nerve ending in the rectum is stimulated than the signal is transmitted to the spinal cord through afferent nerve fiber. Reflex signal via pelvic nerve goes to descending colon, sigmoid, and rectum. These parasympathetic signals traveling in the pelvic nerves now peristalsis greatly intensity and relax the internal anal sphincter. At the same time, if the external anal sphincter is voluntarily relaxed defecation occurs [7].

Artava Niskramana-:

It means menstruation., The cyclic events that take place during the reproduction period of a woman's life are called the menstrual cycle. After ovulation, if pregnancy does not occur, the thickened endometrium is shed or desquamated. This desquamated endometrium is expelled out through the vagina along with blood and fluid called menstruation or menstrual bleeding. It lasts for about 4 to 5 days. Two days before the onset of bleeding that is the 26^{th} or 27^{th} day of the previous cycle, there is a sudden reduction in the release of estrogen and progesterone from the ovary, decreased level of these two hormones is responsible for menstruation. Lack of these hormones causes sudden involution of the endometrium. It leads to a reduction in the thickness of the endometrium up to 65% of the original thickness, during the next 24 hours the tortuous blood vessels in the endometrium undergo severe constriction, endometrial vasoconstriction is because for three reasons –

a) Involution of the endometrium.
b) Actions of vasoconstrictor substances like prostaglandin are released from the tissue of involuted endometrium.
c) Sudden lack of estrogen and progesterone (which are vasodilators) in the endometrium. Necrosis causes rupture of blood vessels and oozing of blood. The outer layer of the necrotic endometrium is separated and passes out along with blood. This process is continued for about 24 to 36 hours within 48 hours after the reduction in the secretion of estrogen and progesterone, the superficial layers of the endometrium are completely desquamated. Desquamated tissues and the blood in the endometrial cavity initiate the contraction of the uterus. Uterine contractions expel the blood along with desquamated uterine tissue to the exterior through the vagina [8].

Garbha Nishkramana –

Garbha *Niskramana* means parturition. Parturition means the birth of the baby. Towards the end of pregnancy, the uterus becomes progressively move excitable, until finally, it develops such strong rhythmic contractions that the baby is expelled. Two factors are responsible for uterine contraction.

A) Hormonal Factor
B) Mechanical Factor

Increased estrogen to progesterone ratio towards the end of the pregnancy is partly responsible for the increased contractility of the uterus. Stimulation of paraventricular nuclei of the hypothalamus causes neurohypophysis to secrete oxytocin hormone which causes uterine contraction. The fetu's pituitary gland secretes oxytocin which plays an important role in uterine excitation. The fetus's adrenal gland secretes a large quantity of cortisol which helps in the stimulation of the uterus. Fetal membrane release prostaglandin which increases the intensity of uterine stretching of smooth muscle organ increase their contractility. Intermittent stretch due to fetal movement can also elicit smooth muscle contraction stretching or irritation of the nerve in the uterine cervix initiate

reflex to the body of uterus which causes uterine contraction. Uterine contraction becomes stronger towards the end of pregnancy. It causes stretching of the cervix and later forces the baby through the birth canal causing parturition. After the birth of the baby for about 10-45 minutes, the uterus continues to contract to a smaller size which causes the removal of the placenta from the walls of the uterus thus causing separation of the placenta from its implantation site [9].

Samirana Nishkramana -:

It means expulsion of flatus through the anus. Flatus can enter the gastrointestinal tract from three sources – 1. Swallowed air

2. Gases formed in the gut as a result of bacterial action. 3. Gases that diffuse from the blood into the gastrointestinal tract. Colon bacilli the bacteria are present in the absorbing colon. An average of 7-10 lit of gases is entering the large intestine each day whereas the average of 0.6 lit is expelled through the anus. The remainder is absorbed through the intestinal mucosa into the blood and expelled through the lungs. Due to bacterial activity vitamin K, Vitamin B_{12}, Thiamine, riboflavin, and various gases like Co_2, Hydrogen gas, and methane that contribute to flatus are produced [10]. Excess expulsion of gas results from irritation of the large intestine, which promotes rapid peristaltic expulsion of gases through the anus before they can be absorbed. Due to the gastrointestinal motility flatus is eliminated through the anus. This gastrointestinal motility is functioning with the help of the myenteric plexus which is stimulated greatly by the sympathetic and parasympathetic nervous systems. The actual odor in the flatus is due to the presence of gases like indole, skatole, mercaptans, and hydrogen sulphide [11].

DISCUSSION

Ejaculation is followed by an erection. It is the distal second set of male sexual acts, which is achieved by the sympathetic discharge from thoracolumbar outflow after intense parasympathetic action. *Sukra Nishkramana* is one of the functions of Apana Vayu and this function is under the control of synchronized action of both parasympathetic sympathetic actions. Parasympathetic stimulation causes excretion of the genital organ, and sympathetic stimulation causes ejaculation. Without an erection, ejaculation is not possible. During intense sexual stimulation means at the peak level of parasympathetic stimulation, sympathetic stimulation begins to discharge sympathetic outflow, and outflow is terminated after ejaculation. So mainly sympathetic part of the autonomic nervous system is responsible for ejaculation and may be compared with the function of *Apana Vayu*. *Artava Nishkramana* is one of the functions of *Apana Vayu*. *Artava Nishkramana* or menstruation occurs due to decreased level of estrogen and progesterone. Involution of corpus luteum ceases the secretion of estrogen and progesterone. Decreased level of hormone prevents the stimulation of endometrial cells causes a reduction of the endometrial vessel. Prostaglandin helps in the constriction of vessels of the endometrium. Uterine constriction is executed by *Vyan Vayu*. *Artava Nishkramana* function of *Apan Vayu* may be compared with the sudden reduction of estrogen and progesterone due to the involution of corpus luteum. The desquamated tissue and the blood in the endometrial cavity are expelled out by the gravitational force. *Mutra Niskramana* and *Sakrit Niskramana* like functions are performed by the collaboration of *Samana Vayu, Prana Vayu, Vyana Vayu* and *Apana Vayu*. *Mutra* and *Mala* are separated by *Samana Vayu* and excreted out by the coordinative function of *Prana* (pontine center for Micturation) *Vyana* (Autonomic function of *Vyan Vayu*) and *Apana Vayu* (parasympathetic action originating from the sacral region). The sensory information for micturition is sent to the brain stem and cortex through ascending tract which is the function of *Vayu Sarvendrinamudhyojaka* and *Sarvendriyanamabhivodha*. *Vyan Vayu* performs its functions by the contraction of the muscle for the movement of waste material and finally, *Apana Vayu* eliminates the feces, urine. Micturition and defecation reflex is performed by the central interacting center in the sacral spinal cord. The influence of higher centers like the brain stem and cortex can be considered as the function of *Prana Vayu*. Parasympathetic action

from the sacral region may be compared with *Mutra Nishkrimana* and *Sakrit Niskramana* function of Apana Vayu Parturition is performed by the coordinative function of *Prana, Apana Vayu*. Oxytocin hormone which is secreted from the posterior pituitary is under the control of *Prana Vayu* which causes contraction of the uterus is executed by *Vyan Vayu*. When the estrogen and progesterone ratio is increased towards the end of pregnancy *Apan Vayu* executes its functions and helps in the elimination of the fetus and placenta. Oxytocin and increased estrogen to progesterone ratio during the last trimester may be compared with the function of *Apan Vayu.* About 7 -10 liters of gases are formed in 24 hours and about 600 ml of flatus elimination is carried out by *Apana Vayu* with the coordination of *Saman* and *Vyan Vayu*. Excess gas causes irritation of the large intestine which promotes rapid peristaltic expulsion of gases. Gastrointestinal motility is caused by the contraction of a muscle under the influence of the mycentric plexus. The contraction and relaxation of the muscle are executed by *Vyan Vayu.* The flatus elimination is coordinatively performed by *Apan, Prana, Samana*, and *Vyan Vayu*. Irritation of the large intestine and stimulation of the mycentric plexus may be compared with the *Samirana Nishkramana* function of *Apan Vayu*.

CONCLUSION

Vata Dosha is involved in all types of systemic activity among five *Vata Dosha Apana Vayu* is responsible for the elimination of waste products as well as the fetus. Excretion is the process by which all waste products are eliminated. It is very important in our life as it helps to promote homeostasis. These functions are regulated mainly by *Apana Vayu* with the coordination of *Samana, Prana, and Vyan Vayu*. It can be concluded that *Apana Vayu* may be correlated with the sympathetic part of the autonomic nervous system, reduction in the secretion of estrogen and progesterone due to involution of corpus luteum. Parasympathetic action from the sacral region, oxytocin hormone, increased estrogen to progesterone ratio during last trimester, irritation of large intestine, and stimulation of mycentric plexus. There is a need for further research to evaluate in detail all other *Vata Dosha, Kshaya, Vriddhi*, and *Avarana* for the betterment of mankind.

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