ABSTRACT

Background: Ayurveda is the science of life and an Upanga (Branch) of Atharvaveda. The Ayurvedic master’s have described in details about various bodily systems in relation to their anatomy, physiology and pathology etc. The Mutravaha Samsthana (Urinary system) is one of them and meant for the formation and excretion of Mutra (Urine) and in unfavorable conditions, developed many ailment related to Basti (Bladder). Objective: There are many diseases described in Ayurvedic classics which have the presentation similar to that of urinary disorders but these are not related with urinary system and have different pathology, Mutra Roga (Urinary system) which includes Mutraghaat (Obstruction), Mutrakricchra (Urinary tract infection), Ashmari (Urolithiasis) and Prameha Roga (Diabetes insipidus). Thus the Objective of this article is the description of, anatomy, embryological development and physiology of Mutravaha Samasthan (Urinary system) by Ayurvedic master’s of India. Material and methods: The Mutra Rogas (Urinary diseases) are prevalent since the Vedic period. Our ancient Ayurvedic master’s had detail knowledge about their etiopathogenesis and management. The description about the urinary system is collected from the various ancient text books including Veda (Atharvaveda), Purana, Samhita (Charak, Susruta, Vagbhatta) and Samgraha (Madhva, Chakradatta, Sarangdhar, Bhav Prakash) etc. Conclusion: The present work is organised systematically, initiated with the review of literature of ancient science for anatomical concept, which helpful in the understanding of urinary system mentioned in Ayurveda and their related diseases. The references is used as a back bone of this study included in the last of the article.

KEYWORDS: Mutra Roga, Ayurveda, Basti, Urinary system etc.

INTRODUCTION: Ayurvedic Samhita’s, a treatise’s on principles of Ayurveda, is one of the traditional books present in India. Ayurveda texts are composed following organs related to urinary system mentioned in this classical text books in Sanskrit, which is brilliantly described and very closely to the organs mentioned in modern medicine. Basti (Bladder) is a Marma, Anga (Vital organ) mentioned in various ancient text book which shows their importance in the proper functioning of the body.

Anatomy of urinary system in Ayurveda: The following is the description of Mutravaha Samasthan (Urinary system) given in ancient classics:-

1. Basti (Urinary bladder): - The detail description about Basti (Bladder) is present in all Ayurvedic texts. There is no doubt that structure Basti (Bladder) and urinary bladder is one and the same. According to Shabdakosha,[2] the root "Vas" is used as "Vas Acchadane". Its different meanings are, to cover, base, store house and reservoir.

In Ayurvedic texts though no clear cut definition of Basti (Bladder) has been given, but from the grammatical derivations, it can be defined as a store house which acts as a reservoir of urine.

Embryological development: According to the fundamental principles of Ayurveda the human body is constituted on the basis of the Panchbhautika (Five elements) and the Tridosha (Three Bio-elements) at the time of combination of Shukra (Sperm) and Shonita (Ova). These eight factors are responsible for the production of each and every organ during the fetal life. The Basti (Bladder) is a hollow structure made by the Vayu (Airy bio-element) entering in the combination of
essence of Raktā (Blood), Kapha (Watery bio-element) and Pitta (Fiery bio-element). It has been said by all the Acharyas (Saints) that Basti (Bladder) is derived from Matrija Bhava- the maternal constituents.[5]

Site: Basti (Bladder) has been accepted one among the Koshthangas (Organs of the hollow cavity) by all the Acharyas (Saints).[6] Susruta states that Basti (Bladder) is surrounded by Nahbi (Umbilicus), Kati (Waist), Mushka (Scrotum), Gada (Rectum), Vakshanas (Inguinal region) and Sepha (Penis/Vagina).[7] It is of the Snayu Marmas (A Type of vital point) type with area of four fingers.[8]

2. Vrikka (Kidney): It is derived from the root "Vikkadane" means to take. The detail Ayurvedic anatomy of Vrikka (Kidney) is present in all Ayurvedic texts. The position, development and its functions are well described all over but no direct reference of Vrikka’s (Kidney’s) relation to urine formation or blood purification is found in either of the Ayurvedic classics. Vrikka (Kidney) are two in numbers and are situated in the lumbar regions on either side in the posterior abdominal wall in Koshta (Abdominal cavity).[9] The Ayurvedic scholars in 20th century described Vrikka (Kidney) which closely resembles with kidney, but from references available in Samhita and their commentaries it cannot be interpreted that Vrikka is kidney.

3. Gavini (Ureters): They are two in number, situated one on each side of Basti (Bladder), receiving Mutra (Urine) from the Antras (Alimentary canal) and sending it further to the Mutrashaya (Urinary bladder).[10]

4. Mutraprāṣeika (Urethra): It is one among the eight important organs, which are to be protected from any injury at the time of performing surgery for Mutrasharī (Bladder calculus).[11] It is the outlet of the Basti (Bladder), Which is two Angulas (A type of length measurement) in females and Twelve Angulas in males.[12] In male it carries both Mutra (Urine) and Shukra (Semen), while in female only Mutra (Urine).[13]

5. Mutravahā Srotas (Nephrons): According to Charaka, the definition of the word Srotas (Body channels) is 'Sravanat Srotam'.[14] which means, where from something oozes out. On this way the channels which carry Mutra (Urine) can be considered as Mutravahā Srotas (Nephrons). He says that Mutravahā Srotas (Nephrons) has its origin from Basti (Bladder) and two Vankshanas (Inguinal region).[15] Whereas Susruta believes Basti (Bladder) and Medhra (Penis) as the roots of Mutravahā Srotas (Nephrons).[16] & any trauma to this Mutravahā Srotas (Nephrons), leads to acute retention of urine, distension of urinary bladder and painful erection of the penis, ultimately leading to death of the patients.[17]

6. Mutravahā Nadis (Nerves of urinary system): Mutravahā Nadis are thousand in number and are situated in between Pakvashaya (Large intestine) and Basti (Bladder).[18] The functions of these Nadis (Nerves) are Mutra Nishyandana (Filtration of urine) whether in state of awakening or sleep, and carrying the Mutra (Urine) from Pakvashaya (Large intestine) to Basti (Bladder), like the rivers fill the ocean with water.[19]

7. Mutravahā Dhamanis (Arteries of urinary system) Susruta while describing the Dhamanis (Arteries) has narrated one variety of Dhamani, termed as 'Adhogami Dhamani (Arteries which move downwards)' which are meant for Sara-Kitta Vībhajana (Division between essence and fecal matter of food) and to transport Mutra (Urine), Purisha (Feaces), Shukra (Semen), Artava (Ova/Menses), Apanā Vata (Flatulence) etc. downwards.[20] Adhogami Dhamani (ten in numbers) are further subdivided into three parts, thus total number becomes 30.[21] These same Dhamanis (Arteries) taking part in the Sara-Kitta Vībhajana (Division between essence and fecal matter of food) process, out of which two are said to be the Mutravahā Dhamanis (Arteries of urinary system) going to the Mutrabasti (Urinary bladder), the functions of which stated are Dhāranā (Holding) and Yapan (Nourishing) of Mutra (Urine) and Basti (Bladder).[22] Dalhan further says that these are further divided into countless branches.[23]

8. Mutravahā Siras (Veins of urinary system): In Charaka and Susruta Samhita, description about Mutravahā Siras (Veins of urinary system) is not available. Ashhtanga Hridaya has first time described concept of Mutravahā Siras.[24] Mutravahā Siras are regarded as minute channels carrying Mutra (Urine) to Basti (Bladder). This Mutravahā Siras opens in the lateral side of Basti (Bladder) and fills the Basti (Bladder) with Mutra (Urine) continuously by the process of Nishyandana (Filtration).[25]

Sarangdhara describes that the Maladrava (Liqid part of stool) of digested food i.e. Mutra (Urine) is transported to Basti (Bladder) by Siras (Veins).[26] Adhamalla in his commentary on Sarangdhara says that the Siras (Veins) are concerned with Aharajala (Liquid part of food) transported to Basti (Bladder) through Mutravahā Siras (Veins of urinary system).[27]

So we find that Nadis (Nerves), Dhamanis (Arteries) and Siras (Veins) of Mutravahā have close relation with the urinary system.

Physiology of Mutropatī (urine formation) in Ayurveda
There are evidences which prove that concept of formation of urine is known since Vedic period. First description about formation of urine is present in ‘Athravaveda’. In Atharvaveda it is clearly mentioned that, Mutra Nirman (Urine formation) takes place in Antras (Alimentary canal) and it is transferred through Gavini (Ureters) and reaches Basti (Bladder).[28]
Formation of urine in Ayurveda is related to ‘Ahara (Food)’. When food gets completely digested liquid portion enters into Pakvashaya (Large intestine). Liquid portion absorbed from Pakvashaya (Large intestine) is transported to Basti (Bladder) by help of two Nadi’s (Nerves).[29]

Considering all the facts about anatomy and physiology of urine formation we can summarize the process of urine formation as follows:

CONCLUSION[30]: On the basis of anatomical position, shape, surrounding structures and its relations, it is clear that Basti is urinary bladder. From the various references mentioned regarding anatomy and physiology of urine, some concepts can be accepted while some can be purely considered as hypothesis. The following ideas related to urine formation in Ayurveda are valid till now:

- Basti (Bladder) is reservoir of urine.
- Division of food into stool & urine occurs at the level of alimentary canal.
- Stool is propelled further through anal canal.

Due to lack of advanced techniques, they could not find out what happens to liquid part absorbed through alimentary canal. They thought that there must be interlinking system between alimentary canal and urinary bladder. They were unable to find any gross interlinking anatomical organ so they concluded that there might be numerous, invisible structures which are carrying urine directly from alimentary canal to bladder and they named these structures as ‘Mutravaha Nadi’s (Nephrons)’. Fact has been proven on scientific grounds today that absorption occurs mainly at the level of alimentary canal and absorbed products are transported to bladder via kidney. The only reason why Ayurvedic scholars have not described kidney as an important organ of urine formation can be attributed to lack of technical advancements.

Some recent scholars have correlated Mutravaha Srotas as Nephrons when used in plural form. This interpretation can’t be accepted as no reference is present which suggests that knowledge about role of kidney was known to ancient Ayurvedic scholars.

Further, on the basis of anatomy we can say Vrikka as kidney but based on physiological consideration we can’t say Vrikka is kidney. Like Basti, Vrikka is also a maternal contribution derived from essence of Rakta (Blood) and Meda (Fat).[31] So far as the function is concerned, Sarangdhara has considered the Vrikka’s as the nourishers of the abdominal fats.[32]

In the concept of Gavini, during making of Basti Yantra (An instrument for giving enema) there is some clue about two opening in bladder which should be ligated during procedure of Basti therapy? So hypothetically Gavinis may be correlated with Ureters.

There are lots of controversies about Mutrapraseka. It has various synonyms some of which resembles penis. But considering its course, its length and functional aspects it can be correlated with urethra.

According to the above mentioned materials, it can be concluded that above stated organs take an active part in the transportation of urine in one or the other way.

FINANCIAL SUPPORT AND SPONSORSHIP: Nil.

CONFLICTS OF INTEREST: There are no conflicts of interest.

ACKNOWLEDGMENT

I am thankful to my wife for their kind cooperation and helping me in the preparation of the manuscript

REFERENCES

6. Charaka Samhita Vimana Sthana 5/34 with English translation by Dr. Ram Karan Sharma and Vaidya

www.ejpmr.com

203
10. Atharvaveda 1/3/6.