

“A CRITICAL REVIEW ON THE PATHOLOGY OF CKD IN THE LIGHT OF AYURVEDA”

DR. RAJSHEKAR N. SHETTAR¹ , DR. PRASHANTH .A. S.² , DR. MADHUSUDAN K.³

¹PG Scholar, ²Guide, ³Associate Professor Department Of Kayachikitsa, Ayurveda Mahavidyalaya & Hospital, Hubballi, Karnataka, India.

Abstract

CKD encompasses a spectrum of pathophysiologic processes associated with abnormal kidney function and a progressive decline in the glomerular filtration rate (GFR). As the definition of healthy person according to *Ayurveda* is, the one who has balanced *Doshas*, balanced *Agni*, properly formed *Dhatus*, proper elimination of *Malas*¹. Well functioning of bodily processes & whose mind, soul, senses are full of bliss. So elimination of *Malas* from the body is also a inductive of good health. There are totally three *Malas* explained by the *Samhitas* namely *Purisha*, *Mutra* & *Sweda*². In Chronic Kidney Disease (CKD) where there is a less formation of *Mutra*, the *Karma* of *Mutra* is removing *Kleda*(waste products) from the body³. So the *Kleda* which resides in the body causes *Pratiloma gati* of *Vata* leading to different variety of diseases which involves *Dusti* of *Rakta*⁴. Therefore use of *Mutrala* & *Raktashodhaka Dravyas* may be helpful in the subjects of CKD. There is no availability of direct description of CKD in *Ayurvedic* science, so we can study the disease with *Ayurvedic* concepts on the basis of general signs & symptoms.

Key words – *Vrikka roga*, *Kleda*, *Mutra*, *Rakta*, GFR, ESRD, CKD.

INTRODUCTION

A condition in which hampering of normal kidney functions is called as CKD. Hemodialysis is most common form of the treatment in the

conventional medicine. Renal replacement is another option which may offer endurance of some years in patients with ESRD⁵. Though both these treatments are effective, they

are not affordable and approachable, hence not acceptable by Indian population. Etiology of CKD in India is diabetic nephropathy(31.2%), undetermined (16.4%), chronic glomerulonephritis(13.8%), hypertension(12.8%), tubulointestinal disease(7%), obstructive uropathy(3.4%), autosomal dominant polycystic kidney disease(2.5%), renovascular diseases(0.8%), kidney transplant graft loss(0.3%), others(11.7%). Mostly diabetes mellitus and hypertension together account for most of the patients being treated for ESRD. Clinical manifestation of CKD include fluid, electrolyte and acid base disorders, distributed potassium homeostasis, metabolic acidosis, disorders of calcium and phosphate metabolism, cardiovascular abnormality include ischemic heart diseases, heart failure, hypertension, left ventricular failure & pericardial diseases. Hematological abnormalities include anemia, neuromuscular abnormalities, GIT & nutritional abnormalities, endocrine and metabolic disturbances etc⁶.

STAGES OF CHRONIC KIDNEY DISEASE⁷.

CKD stage 0: GFR is above 90ml/min per 1.73m², with risk factors for CKD.

CKD stage 1: GFR is above or equal to 90ml/min per 1.73m². With demonstrated kidney damage (eg. Persistent proteinuria, abnormal urine sedimentation, abnormal blood & urine chemistry, abnormal imaging study)

CKD stage 2: GFR is 60-89ml/min per 1.73m².

CKD stage 3: GFR is 30-59ml/min per 1.73m².

CKD stage 4: GFR is 15-29ml/min per 1.73m².

CKD stage 5: GFR is less than 15ml/min per 1.73m².

According to *Ashtanga Hridayakara*, there are 2 types of pathology for *Mutra Rogas* i.e. *Mutra Apravruttijannya* and *Mutra Atipravrutijannya Vikaras⁸*. By seeing all the symptoms of CKD, we can incorporate it into *Mutra Apravruttijannya Vikara*. 8 types of *Mutrakrichra*, 13 types of *Mutraghata*, 4 types of *Ashmari* are also included under the same. In both *Mutrakrichra* & *Mutraghata*, *Krichrata* & *Mutra-Vibandhata* are simultaneously present. But 20 types of *Prameha* are included under *Mutra*

Atipravruttijannya Vikara due to its *Prattyatma Lakshana "Prabhuta Avila Mutrata"*.

EMBRYOLOGICAL DEVELOPMENT OF KIDNEY

In embryo, nephrogenesis (nephron development) occurs through several stages involving classical epithelial/mesenchyme type of interactions. Nephrogenesis continues into the late fetal period (GA week 34-35) and while the fetal kidney does produce urine, not until after birth does the glomerular filtration rate (GFR) increases rapidly due to a postnatal drop in the kidney vascular resistance and an increase in renal blood flow. The urinary system is developmentally and anatomically associated with genital development, often described as the "Urogenital System". Nephron development involves 3 pairs appearing in sequence within intermediate mesoderm during development namely Pronephros, Mesonephros and Metanephros⁹.

ANATOMY OF URINARY SYSTEM IN AYURVEDA:

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

<i>Basti</i> (Urinary bladder)	<i>Mutravaha Srotansi</i> (Nephrons)
<i>Vrikka</i> (Kidney)	<i>Mutravaha Nadies</i> (Nerves of urinary system)
<i>Gavini</i> (Ureters)	<i>Mutravaha Dhamanis</i> (Arteries of urinary system)
<i>Mutrapraseka</i> (Urethra)	<i>Mutravaha Sira</i> (Veins of urinary system)

1. **BASTI (URINARY BLADDER):**

The description about *Basti* (Bladder) is present in most of the *Ayurvedic* texts. There is no doubt that structure of *Basti* (Bladder) and urinary bladder is one and the same. According to *Shabdakosha*¹⁰, 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.

2. **VRIKKA (KIDNEY):**

It is derived from the root "*Vrikkadane*" means to take. 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 *Koshtha* (Abdominal cavity)¹¹. 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)¹².

4. MUTRAPRASEKA (URETHRA):

Mutrapraseka are to be protected from any injury at the time of performing surgery for *Mutrashmari* (Bladder calculus)¹³. It is the outlet of the *Basti* (Bladder), Which is two *Angulas* (Almost width of 2 fingers) in females and Twelve *Angulas* in males¹⁴. In male it carries both *Shukra* (Semen),

and *Mutra* (Urine), while in female only *Mutra* (Urine)¹⁵.

5. MUTRAVAHA SROTAS (NEPHRONS):

According to *Charaka*, meaning of the word *Srotas* (Body channels) is 'Sraanat *Srotamsi*'¹⁶. which means, where there is a continuous circulation takes place. So this way the channels which carry *Mutra* (Urine) can be considered as *Mutravaha Srotas* (Nephrons). He says that *Mutravaha Srotas* (Nephrons) has its origin from *Basti* (Bladder) and two *Vankshanas* (Inguinal region)¹⁷. Whereas *Susruta* believes *Basti* (Bladder) and *Medhra* (Penis) as the roots of *Mutravaha Srotas* (Nephrons)¹⁸.

6. MUTRAVAHA NADIS (NERVES OF URINARY SYSTEM):

Mutravaha Nadis are lakhs together in number and are situated in between *Pakvashaya* (Large intestine) and *Basti* (Bladder)¹⁹. The functions of these *Nadis* (Nerves) are *Mutra Nishyandana* (Filtration of urine) during the state of awakening or sleep, and carrying the *Mutra* (Urine) from *Pakvashaya* (Large intestine) to *Basti* (Bladder), like the rivers fill the ocean with water²⁰.

7. MUTRAVAHA 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 Vibhajana* (Dividation between essence and fecal matter of food) and to transport *Mutra* (Urine), *Purisha* (Feaces), *Shukra* (Semen), *Artava* (Ova/Menses), *Apana Vata* (Flatulence) etc. downwards²¹. *Adhogami Dhamani* (ten in numbers) are further subdivided into three parts, thus total number becomes 30²². These same *Dhamanis* (Arteries) taking part in the *Sara-Kitta Vibhajana* (Dividation between essence and fecal matter of food) process, out of which two are said to be the *Mutravaha Dhamanis* (Arteries of urinary system) going to the *Mutrabasti* (Urinary bladder), the functions of which stated are *Dharana* (Holding) and *Yapan* (Nourishing) of *Mutra* (Urine) and *Basti* (Bladder)²³. *Dalhan* further says that these are further divided into countless branches²⁴.

8. MUTRAVAHA SIRAS (VEINS OF URINARY SYSTEM):

In *Charaka* and *Susruta Samhita*, description about *Mutravaha Sira* (Veins of urinary system) is not available. *Ashtanga Hridaya* has first time described concept of *Mutravaha Sira*²⁵. *Mutravaha Sira*'s are regarded as minute channels carrying *Mutra* (Urine) to *Basti* (Bladder). This *Mutravahi Sira* opens in the lateral side of *Basti* (Bladder) and fills the *Basti* (Bladder) with *Mutra* (Urine) continuously by the process of *Nishyandana* (Filtration)²⁶.

Sarangdhara describes that the *Maladrava* (Liquid part of stool) of digested food i.e. *Mutra* (Urine) is transported to *Basti* (Bladder) by *Siras* (Veins)²⁷. *Adhamalla* in his commentary on *Sarangdhara* says that the *Siras* (Veins) are concerned with *Aharajala* (Liquid part of food) transported to *Basti* (Bladder) through *Mutravaha Siras* ((Veins of urinary system)²⁸.

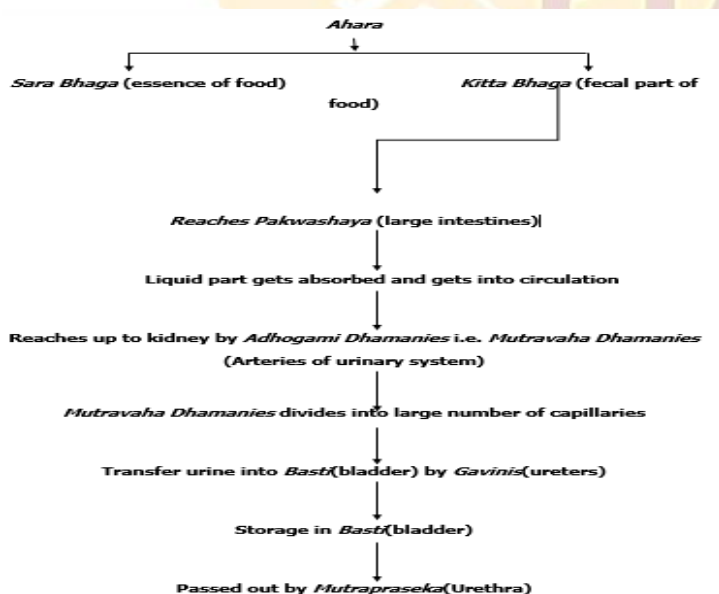
So we find that *Nadis* (Nerves), *Dhamani* (Arteries) and *Siras* (Veins) of *Mutravaha* have close relation with the urinary system.

PHYSIOLOGY OF MUTROTPATTI (URINE FORMATION) IN AYURVEDA

First description about formation of urine is present in 'Atharvaveda'. 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)²⁹.

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)³⁰.

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



URINE FORMATION ACCORDING TO SUSHRUTA IN AYURVEDA

Urine is produced in *Pakwashaya* and fill the urinary bladder like the river drains into the ocean. *Mutravaha Nadies* are very minute and they are not visible to our naked eyes. This process takes place continuously day and night. Arrangement for conveying urine from intestine to urinary bladder is made by two vessels called *Gavini*. By reviewing literatures of *Ayurveda* it is clear that urine is formed from intestines not from kidneys³¹.

PATHOLOGY OF CHRONIC KIDNEY DISEASE IN THE LIGHT OF AYURVEDA

In *Ayurveda* CKD can be included under *Mutravaha Srotus*. All the *Tridoshas*, *Saptadhatu*s, & *Mutra* are involved in the disease. In *Srotus*, morbid changes due to accumulation of *Doshas* in them leading to the blockage, which can be responsible for the reduced kidney functions like filtration, reabsorption & secretion depending on the involvement of Glomerular apparatus & renal tubules. By the analysis of the clinical picture of

CKD involvement of the *Dushyas* can be understood. In CKD, *Dushti* of *Rasavaha Srotus* can be understood as fluid & electrolyte imbalance. Cardiovascular complications, reduced immunity, anemia & other serological impairments are caused by *Rakta Dushti*. Mayopathy torches on *Mamsa Dushti*. Dislipidaemia due to *Medas dushti*. Osteodystrophy due to involvement of *Asti Dushti*. Neuropathy will make us to keep a note on *Majja Dushti*. Sexual dysfunction & LOL indicates the *Dushti* of *Shukra*. Overall *Mutra & Rakta* are the most commonly affected *Dushyas* in the CKD.

Mutravaha Srotodushti is indicated by oliguria, decreased GFR & proteinuria. *Raktavaha Srotodushti* is indicated by increased serum creatinine, blood urea, serum uric acid. Decreased GFR & oliguria are suggestive of vitiation of *vata* & increased levels of serum creatinine which is a waste product of body indicates *Malasanchaya Ama*.

So, conclusion of involvement of *Doshas, Dhatus & Malas* as per the symptoms are

DOSHA - Vata Kapha Pradhana Tridosha

DUSHYA - Saptadhatu

AGNI - Jatharagni Mandyata & Dhatvagnimandyata

UDBHAVASTHANA - Pakvashayajanya

SANCHARASTHANA- Rakta & Mutra

VYAKTASTHANA- Vikka, Rakta.

SROTUS - Raktavaha & Mutravaha

SROTODUSHTI KARANA - Sangha & Vimargagamana

MALA - Mutra

SWABHAVA- Chirakari

SADHYASADHYATA - Krichrasadya

CONCLUSION

In CKD, we come across reduced formation of Urine (*Mutra*), because of which the excessive *Kleda* is not evacuated out and resides in *Basti* causing *Pratiloma Gati* of *Vata* and leading to the *Dushti* of *Rakta*. If we look into the renal function test, serum creatinine & urea amount is markedly raised in CKD. Serum creatinine & urea can be taken as *Malaroopi Kleda* which is causing damage to *Rakta* and other *Dhatus*.

In *Vrikka Roga Prakarana* (~Kidney disorders) of *Bhaishajya Ratnavali* while explaining about *Chikitsa*, patient is advised to undergo *Virechana, Swedana* & drugs which are having *Mutrala* properties & *Raktashodhaka* properties³².

REFERENCES

1. Edited by Vaidya Jadavji Trikamji Acharya, Sushruta Samhita by Sushruta, Nibandha Sangraha Commentary of Shri Dalhanacharya. Chaukhambha Orientalia Varanasi, 2014 reprint edition, sutrasthana 15th chapter shloka no. 41, page no- 284.
2. Author Dr. Anna Moreshwar Kunte & Krishna Ramachandra Shastri Navre, edited by Pt. Hari Sadashiv Shastri Paradkar, *Ashtanga Hridaya* of *vagbhatta* with the commentaries *Sarvangasundara* of *Arunadatta* & *Ayurveda Rasayana* of Hemadri, *Sutrashtana*, chapter 1, shloka 13: choukamba samskrita samsthana Varanasi. Page no- 10.
3. Author Dr. Anna Moreshwar Kunte & Krishna Ramachandra Shastri Navre, edited by Pt. Hari Sadashiv Shastri Paradkar, *Ashtanga Hridaya* of *vagbhatta* with the commentaries *Sarvangasundara* of *Arunadatta* & *Ayurveda Rasayana* of Hemadri, *Sutrashtana*, chapter 11, shloka 5: choukamba samskrita samsthana Varanasi. Page no- 183.
4. Edited by Vaidya Jadavji Trikamji Acharya, Sushruta Samhita by Sushruta, Nibandha Sangraha Commentary of Shri Dalhanacharya. Chaukhambha Orientalia Varanasi, 2014 reprint edition, nidanashtana 3rd chapter shloka no. 27, page no- 315.
5. <http://www.kidneyfund.org/kidney-disease/chronic-kidney-disease-ckd/>
6. Antony S, Fausi, Eugene Braunwald, Dennis L, Kasper, Stephen L, Hausery Dan L, Longo, J.Larcalzry jaameson, Joseph Loscalzo, Harrison's Principle of Internal Medicine, volume 2, 17th edition page number 1763-1768.
7. Janne M. Bargman, Karl Skorecki, Fauci, Braunwald, Kasper, Hauser Longo, Jameson, Loscalzo, Harrison's Principle of Internal Medicine, 17th edition, volume 2, Part 12:274, Chronic kidney disease, Page no:-1762.
8. Author Dr. Anna Moreshwar Kunte & Krishna Ramachandra Shastri Navre, edited by Pt. Hari Sadashiv Shastri Paradkar, *Ashtanga Hridaya* of *vagbhatta* with the commentaries *Sarvangasundara* of *Arunadatta* & *Ayurveda Rasayana* of Hemadri, *nidashtana*, chapter 9, shloka 40: choukamba samskrita samsthana Varanasi. Page no- 501.
9. https://embryology.med.unsw.edu.au/embryology/index.php/Renal_System_Development

10. Shabdakosha, first chapter 1/3/9.
11. Edited by Vaidya Jadavji Trikamji Acharya, Sushruta Samhita by Sushruta, Nibandha Sangraha Commentary of Shri Dalhanacharya. Chaukhambha Orientalia Varanasi, 2014 reprint edition, nidanasthana 9th chapter shloka no. 18, page no- 303.
12. Atharvaveda 1/3/6.
13. Edited by Vaidya Jadavji Trikamji Acharya, Sushruta Samhita by Sushruta, Nibandha Sangraha Commentary of Shri Dalhanacharya. Chaukhambha Orientalia Varanasi, 2014 reprint edition, chikitsasthana 7th chapter shloka no. 38, page no- 438.
14. Edited by Vaidya Jadavji Trikamji Acharya, Sushruta Samhita by Sushruta, Nibandha Sangraha Commentary of Shri Dalhanacharya. Chaukhambha Orientalia Varanasi, 2014 reprint edition, sharirasthana 4th chapter shloka no. 21, page no- 357.
15. Edited by Vaidya Jadavji Trikamji Acharya, Sushruta Samhita by Sushruta, Nibandha Sangraha Commentary of Shri Dalhanacharya. Chaukhambha Orientalia Varanasi, 2014 reprint edition, sharirasthana 4th chapter shloka no. 22, page no- 357.
16. *Charaka Samhita* of Agnivesha, By Vaidya H.C.Kushwaha Edited with '*Ayurveda Deepika*' Hindi Commentary ,2nd volume, Chaukhambha Orientalia, Varanasi. 2012 ,sutrasthana 30st chapter , shloka no.12
17. *Charaka Samhita* of Agnivesha, By Vaidya H.C.Kushwaha Edited with '*Ayurveda Deepika*' Hindi Commentary ,2nd volume, Chaukhambha Orientalia, Varanasi. 2012 ,vimanasthana 5st chapter , shloka no. 7, page no: 563.
18. Edited by Vaidya Jadavji Trikamji Acharya, Sushruta Samhita by Sushruta, Nibandha Sangraha Commentary of Shri Dalhanacharya. Chaukhambha Orientalia Varanasi, 2014 reprint edition, sharirasthana 9rd chapter shloka no. 12, page no- 387.
19. Edited by Vaidya Jadavji Trikamji Acharya, Sushruta Samhita by Sushruta, Nibandha Sangraha Commentary of Shri Dalhanacharya. Chaukhambha Orientalia Varanasi, 2014 reprint edition, nidanasthana 3rd chapter shloka no. 22, page no- 279.
20. Edited by Vaidya Jadavji Trikamji Acharya, Sushruta Samhita by Sushruta, Nibandha Sangraha Commentary of Shri Dalhanacharya.

- Chaukhambha Orientalia Varanasi, 2014 reprint edition, nidanashtana 3th chapter shloka no. 22, page no- 279.
21. Edited by Vaidya Jadavji Trikamji Acharya, Sushruta Samhita by Sushruta, Nibandha Sangraha Commentary of Shri Dalhanacharya. Chaukhambha Orientalia Varanasi, 2014 reprint edition, sharirasthanana 9th chapter shloka no. 6-7, page no- 384.
22. Edited by Vaidya Jadavji Trikamji Acharya, Sushruta Samhita by Sushruta, Nibandha Sangraha Commentary of Shri Dalhanacharya. Chaukhambha Orientalia Varanasi, 2014 reprint edition, sharirasthanana 9th chapter shloka no. 6-7, page no- 384.
23. Edited by Vaidya Jadavji Trikamji Acharya, Sushruta Samhita by Sushruta, Nibandha Sangraha Commentary of Shri Dalhanacharya. Chaukhambha Orientalia Varanasi, 2014 reprint edition, sharirasthanana 9th chapter shloka no. 6-7, page no- 384.
24. Edited by Vaidya Jadavji Trikamji Acharya, Sushruta Samhita by Sushruta, Nibandha Sangraha Commentary of Shri Dalhanacharya. Chaukhambha Orientalia Varanasi, 2014 reprint edition, sharirasthanana 9th chapter shloka no. 8-9, page no- 385.
25. Author Dr. Anna Moreshwar Kunte & Krishna Ramachandra Shastri Navre, edited by Pt. Hari Sadashiv Shastri Paradkar, *Ashtanga Hridaya* of *vagbhatha* with the commentaries *Sarvangasundara* of *Arunadatta* & *Ayurveda Rasayana* of Hemadri, *nidashtana*, chapter 9, shloka 2: choukamba samskrita samsthana Varanasi. Page no- 498.
26. Author Dr. Anna Moreshwar Kunte & Krishna Ramachandra Shastri Navre, edited by Pt. Hari Sadashiv Shastri Paradkar, *Ashtanga Hridaya* of *vagbhatha* with the commentaries *Sarvangasundara* of *Arunadatta* & *Ayurveda Rasayana* of Hemadri, *nidashtana*, chapter 9, shloka 2-3: choukamba samskrita samsthana Varanasi. Page no- 498.
27. Author Murthy Chandra, Himasagara. P, Adhamalla commentary on Sarangdhara Samhita, Choukhambha Sanskrit Series Office, Varanasi. Edition I, (2001), Purva Khanda chapter 5 shloka 23.
28. Author Murthy Chandra, Himasagara. P, Adhamalla commentary on Sarangdhara Samhita, Choukhambha Sanskrit Series Office, Varanasi.

Edition I, (2001), Purva Khanda chapter 2 shloka no.2.

29. Atharvaveda 1/3/6.

30. Edited by Vaidya Jadavji Trikamji Acharya, Sushruta Samhita by Sushruta, Nibandha Sangraha Commentary of Shri Dalhanacharya. Chaukhambha Orientalia Varanasi, 2014 reprint edition, nidanasthana 3rd chapter shloka no. 20-21, page no- 385.

31. Edited by Vaidya Jadavji Trikamji Acharya, Sushruta Samhita by

Sushruta, Nibandha Sangraha Commentary of Shri Dalhanacharya. Chaukhambha Orientalia Varanasi, 2014 reprint edition, nidanasthana 3rd chapter shloka no. 20-21, page no- 385.

32. Dr. Kanjiv lochan, *Bhaishajya Ratnavali* of Govinda dassji bhisagratna commented upon vaidyashree ambikadatta shastri, 3rd volume, 93rd chapter *Vrikka Roga Chikitsa*, shloka 14, choukamba samskrit samsthan Varanasi, page no; 649.

Corresponding author:

DR. RAJSHEKAR N. SHETTAR

PG Scholar, Department Of Kayachikitsa, Ayurveda Mahavidyalaya & Hospital, Hubballi, Karnataka, Email: rajshekharshettar@gmail.com

Source of Support: NIL

Conflict of Interest : None declared