

AN AYURVEDIC APPROACH ON “ARAGVADHADI ARKA”, A TRADITIONAL FORMULAE IN THE MANAGEMENT OF CHRONIC KIDNEY DISEASE (CKD) - A REVIEW

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ABSTRACT

Chronic kidney disease is an important public health hazard and it has been defined as, “abnormalities of kidney structure or function, present for more than three months with implications for health”. In Sri Lanka traditional authentic text “*Sinhala arka prakaranaya*” has mentioned “*Aragvadhadi Arka*” with *vedi lunu* (KNO₃) used for “*vastigata roga*”. The objective of the study is focused to find out pharmacodynamics and pharmacokinetic potential of the “*Aragvadhadi Arka*” in the management of CKD. The Data was gathered from traditional books, Ayurveda authentic text, research articles, journals, web sources, monographs and dictionaries. Results revealed that, ingredients of “*Aragvadhadi Arka*” having *deepana*, *pachana*, *vishahara*, *rasayana* and *vrushya* properties. Further, this formulation has anti-pyretic, anti-inflammatory, anti-oxidant, cytoprotective, anti-aging, anti-cancerous, anti-mutagenic, immunomodulatory, anti-allergic and anti-diabetic potentials. In view of the above ingredients of the “*Aragvadhadi Arka*” showed valuable pharmacodynamics and pharmacokinetic potential for the management of Chronic Kidney Disease.

Keywords: Chronic Kidney Disease, Pharmacodynamic, Pharmacokinetic, *Aragvadhadi Arka*

INTRODUCTION

Non communicable diseases (NCDs) are the most common causes of premature death and morbidity. Cardiovascular disease, cancer, diabetes and chronic respiratory disease has been prioritized in the global NCD action plan endorsed by the world health assembly.¹ Chronic kidney disease (CKD) is an important public health problem and it has been included in the list of non-communicable diseases investigated by the Global burden of Disease study

(GBD) since 1990 (Kitty & Simon, 2017) and it is closely linked with the other major NCDs such as diabetes, hypertension and cardio vascular disease. CKD is associated with an eight to ten fold increase in cardiovascular mortality and is a risk multiplier in patients with diabetes and hypertension.² Global Burden of Disease Study identified in 2015, Kidney diseases were the 12th most common cause of death and it was approximately 1.1 million deaths

worldwide and in last 10 years CKD mortality has increased by 31.7% and it identified as one of the fastest rising major causes of death.³ It remains a significant cause of mortality ranking 13th in 2013 compared to 27th in 1990, signifying a rise of 134% over this period. Also CKD has a strong impact on morbidity and non-fatal outcomes such as disability. The total number of global disability adjusted life years (DALYs) associated with CKD has increased 19 million in 1990 compared to 33 million in 2013.⁴ WHO statistical profile said that, in Sri Lanka top 10 causes were identified as the most common causes for death in 2012 and kidney disease was ranking as the 7th cause for death and it was 2.5%.⁵ During the recent past, high prevalence of chronic kidney disease was observed in some geographic areas of Srilanka. Especially north central province (NCP) was noted as an endemic area for CKD. Outbreak and prevalence of CKD among male farmers in the age category of 15 – 70 years engaged in agriculture in the north central province (NCP) was first recognized in early 1990's and now it also apparent in both females and children. It was first found in Padaviya and it is spreading to neighboring districts in the north western, Eastern and UVA as well as Northern and Central provinces. Unfortunately official statistics on the incidence are unavailable.⁶ The kidneys are two bean shaped organs of the body, each about the size of a fist and it plays very important roles of the body that filter the blood and removing waste products from the body. According to the official journal of the international society of nephrology- KDIGO (Kidney Disease Improving Global outcome) 2012 clinical practice guidelines for the evaluation and management of chronic

kidney disease, CKD is defined as, “abnormalities of kidney structure or function, present for more than three (3) months with implications for health”.⁷ Kidneys consist with about a million of tiny filters, called nephrons. When nephrons are damaged, blood purification process reduces gradually and kidney functions fall below a certain point and it is called as kidney failure. International Federation of Kidney Foundations data said, between 8-10% of the adult population have some form of kidney damage, and every year millions die prematurely of complications related to chronic kidney diseases (CKD).⁸ Also according to the KDIGO guidelines, following criteria's identified for CKD (either of the following present for more than three months). Decreased GFR (GFR<60 ml/ min/1.73 m²), Albuminuria (AER > 30 mg/24 hours, ACR > 30mg/g), urine sediment abnormalities, Electrolyte and other abnormalities due to tubular disorders, abnormalities detected by histology, structural abnormalities detected by imaging and History of kidney transplantation.⁹ Usually kidney diseases starts slowly and silently and progresses over a number of years and KDIGO recommended that CKD is classified based on cause, GFR category and albumin category (CGA). Based on GFR CKD is categorized in to five stages, as G₁- ≥ 90 (Normal or high), G₂- 60-89 (Mildly decreased), G_{3a} -45-59 (Mildly to moderately decreased), G_{3b} -30-44 (moderately to severe decreased), G₄ – 15-29 (severely decreased) and G₅- <15 (Kidney failure). G₅ is also known as End stage renal disease (ESRD). Also assign Albuminuria categories as, A₁- < 30 (Normal to mildly increased), A₂= 30-300 (moderately increased) and A₃= > 300 (severely increased).¹⁰

Table 1 GFR categories in CKD

GFR Category	GFR (ml/ min/1.73m ²)	Terms
G ₁	≥ 90	Normal or high
G ₂	60-89	Mildly decreased
G _{3a}	45-59	Mildly to moderately decreased
G _{3b}	30-44	Moderately to severely decreased
G ₄	15-29	Severely decreased
G ₅	<15	Kidney failure

Source: Kidney International supplements (2013)

Table 2 Albuminuria categories in CKD

Category	AER (mg/ 24 hours)	ACR (Approximate equivalent)		Terms
		(mg/mmol)	Mg/g	
A ₁	<30	<3	<30	Normal to mildly increased
A ₂	30-300	3-30	30-300	Moderately increased
A ₃	>300	>30	>300	Severely increased

Source: Kidney International supplements (2013)

In Ayurvedic point of view, the term *vasti* represents the unit of urinary system.¹¹ Also *vasti* is one of the most important vital organs (*marma*) of the body and aggravation of *vatadi dosha* strongly effects for the *marmaghata*¹². So, its normal functioning is compulsory for the maintenance of life. In Ayurveda authentic text the term CKD is not mentioned. But, diseases of the urinary system are explained as, *muthraghata*, *mutrakruchcha* and *mutrasmari* and *prameha*. The disease defined by “*muthraghata*”, “*mutrakshaya*” is nearly similar to the CKD and *vasthi marmabhighata lakshana* is nearly similar with clinical features of CKD.¹³

According to Allopathic system consequence of CKD is the risk of developing progressive loss of kidney function that can lead to kidney failure (End stage renal disease- ESRD). In ESRD, chronic dialysis therapy or kidney transplantation is needed for survival. Further, CKD increases the risk of premature death from associated cardiovascular diseases (Ischemic heart diseases and cerebrovascular events). Also Ayurveda has emphasized the importance of *vastimarma* and *vastimarmabhighata* as they are associated with significant mortality. In allopathic medicine there is no cure for CKD and the treatments can only slow or halt the progression of the disease. The main treatments are risk factor control and treatment of etiology. Dialysis treatment or kidney transplantation recommended. The prevalence of kidney disease is increasing dramatically and the cost of treating this growing epidemic represents an enormous global burden. Especially, Low and middle income countries struggle to meet this health

care costs. Further, CKD patients need lifelong care as they are prone for cardiovascular events.

If the efficacy of traditional Ayurvedic medicines is proven, it will be hugely important to find out new effective treatments for management of early stages of renal disease and recover the renal cellular damage. According to WHO, more than 70% of the world’s population used traditional medicine to satisfy their principal health needs and in developing countries and 80% population are using traditional medicine for primary medical problems.^{14,15} So it is very important to find out the effective herbal formularies which are readily available and cost effective.

Aragvadhadi arka is a traditional formula selected from the *Sinhala arkaprakaranaya* for the management of CKD. “*Sinhala arkaprakaranaya*”, one of the ancient books which has mentioned several efficacious formularies for various diseases and “*Aragvadhadi Arka*” recommended to use with *vedilunu* (KNO₃) for “*vastigata roga*” when the state of waste materials (*mala* and *mutra*) associated with blood.¹⁶

The clinically proven studies on the use of traditional medicines in the management of CKD are unavailable. Therefore the purpose of this study is to identify the effective traditional dosage form (*Arka kalpana*) in the management of patient suffering from CKD.

METHODOLOGY

In view of the above this study will be designed to evaluate the pharmacodynamics and pharmacokinetic properties of the *Aragvadhadi arka* in the management of CKD. The Data was

gathered from Ayurveda authentic text, traditional books, research articles, journals, web sources, monographs and dictionaries during the period of three months.

RESULTS & DISCUSSION

“Aragvadhadi Arka” consist with “Ehelakaral mada- (fruit pulp of *Cassia fistula*), Kaladuru ala- (Rhizome of *Cyprus rotundus*), Velmee- (stem of *Glycerrhiza glabra*), Sevendara mul- (roots of *Vetiveria zizanoides*), Aralu- (peri cap of *Terminalia chebula*), Kaha- (Rhizome of *Curcuma longa*), Venivelgeta (*Getakaha*)- (stem of *Coscinum fenestratum*), Patola patra- (leaves of *Trichosanthes cucumerina*), Kohomba pothu- (Bark of *Azadirachta indica*), Rasakinda- (stem of *Tinospora cordifolia*),

and *Katukarosana- (Picrorhiza kurroa)* ” as ingredients¹⁷.

These ingredients mainly have *kapha pittahara, deepana, vishahara* and *rasayana* properties. Also having *kapha vatahara, tridosha shamaka, pachana, vrushya, jvarahara, shothahara, mehanut, panduhara, bhedhana, lekhana, sthambhana & muthra kruchchra hara* properties.¹⁸

All these ingredients have anti-pyretic, anti-inflammatory and anti-oxidant properties. Also, *Coscinum fenestratum* cytoprotective, anti-aging, anti-cancerous, anti-mutagenic, immunomodulatory, anti-allergic, anti-diuretic, properties available. Especially *Coscinum fenestratum* and bark of *Azadirachta indica* have capability to clear clogged pores (cleansing of the channels), and remove harmful toxins and dead cells.

Table 3: Pharmacokinetic & Pharmacodynamic potentials of *Aragvadhadi Arka*

Ingredients	Rasa	Guna	Veerya	Vipaka	Dosha	Pharmacological actions
<i>Ehela karal mada-</i> (fruit of <i>Cassia fistula</i>)	Madhura	Mrudu (soft), guru (heavy), snighdha (unctuous, oily)	Sheeta (cold)	Madura (sweet)	Kapha pitta hara	Antipyretic, anti-inflammatory, anti-oxidant, anti-diabetic ¹⁹
<i>Kaladuru ala-</i> (Rhizome of <i>Cyprus rotundus</i>)	Tikta, katu, Kashaya	Laghu, rooksha	Sheeta	Katu	Kapha pittahara Deepana Pachana	Anti-inflammatory, cyto protective, anti-mutagenic, anti-oxidant, anti-pyretic, apoptotic, analgesic ²⁰
<i>Velmee-</i> (stem of <i>Glycerrhiza glabra</i>)	Madhura	Guru, Snighdha	Sheeta	Madhura	Tridosha hara, Rasayana, vrushya, Visha hara	Anti-inflammatory, anti-oxidant, anti-carcinogenic, anti-allergic, most potent anti-pyretic, anti-diuretic (high) ²¹
<i>Sevendara mul-</i> (roots of <i>Vetiveria zizanoides</i>)	Tikta, Madhura	Ruksha, Laghu	Sheeta	Katu	Kapha pittahara Pachana, Sthambana Jvaraghna, Mutrakruchcha	Analgesic, anti-inflammatory, anti-oxidant ²²
<i>Aralu-</i> (fruits of <i>Terminalia chebula</i>)	Five properties (except salt)	Laghu, Rooksha	Ushna	Madhura	Tridosahara Natural detoxifying, shotanut (relive inflammation), deepana, Rasayana Useful in diabetic and Urinary tract	Anti-inflammatory, anti-oxidant, anti-tumor, anti clastogenic, immunomodulatory, anti-aging, cytoprotective anti-aging, anti lithiatic activity, anti-nociceptive activity ²³

					disorders	
<i>Kaha-</i> (Rhizome of <i>Curcuma longa</i>)	<i>Tikta, Katu</i>	<i>Rooksha, Laghu</i>	<i>Ushna</i>	<i>Katu</i>	Balance <i>kapha vata hara, Vishanut</i> (for toxic condition), <i>Mehanut</i> (diabetic and UTI), <i>Panduhara, vishotajith</i> (anti-inflammatory)	Anti-inflammatory, anti-oxidant, anti-mutagenic, anti-diabetic, anti-cancerous, hepato protective ²⁴
<i>Venivel geta</i> (<i>Geta kaha</i>)- (stem of <i>Coscinum fenstratum</i>)						Anti-inflammatory, it has the capability to clear clogged pores, Remove harmful toxins and dead cells ²⁵
<i>Patola patra-</i> (leaves of <i>Trichosanthes cucumerina</i>)	<i>Tikta, Katu</i>	<i>Laghu, Ruksha</i>	<i>Ushna</i>	<i>Katu</i>	<i>Kapha pitta hara, Vrusya, Dipana</i>	

<i>Kohomba pothu-</i> (Bark of <i>Azadirachta indica</i>)	Bitter	<i>Sheeta, Ruksha, Laghu</i>	<i>Sheeta</i>			
<i>Rasakinda-</i> (stem of <i>Tinospora cordifolia</i>)	<i>Tikta, Kashaya</i>	<i>Guru, Snigdha</i>	<i>Ushna</i>	<i>Madhura</i>	<i>Tridosha shamaka, rasayana, Dipaniya, jvara hara,</i> Especially useful in <i>visha roga</i>	Anti-inflammatory, diuretic, analgesic, anti-oxidant, anti-pyretic, anti-allergic ²⁶
<i>Katukarosana-</i> (<i>Picrorhiza kurroa</i>)	<i>Tikta</i>	<i>Ruksha, Laghu</i>	<i>Sheeta</i>	<i>Katu</i>	<i>Kapha, Pitta hara, bhedhana, Lekhana, Dipana,</i>	Suppressed inflammatory edema, anti-inflammatory, diuretic activity, cholerectic and laxative activity ²⁷
<i>Wedilunu</i> (Pottasium Nitrate – KNO ₃)	<i>Lavana, Katuka</i>	<i>Theekshna</i>	<i>Sheeta</i>	<i>Katu</i>	<i>Visha, Yakrut dosha, Agni mandya, Mutra dosha hara and Pleeha vrudhahara.</i>	Diuretic, hypotensive, Anti-inflammatory ²⁸

According to the Ayurvedic point of view these formula consisted with *kapha pittahara, kapha vatahara* and *tridosha shamaka* properties and it can pacify the *doshic imbalance*. *Deepana, pachana* and *vishahara* properties help to remove the *ama* and

visha (toxic impurities) from the body. *Vrushya* and *Rasayana* properties recover the damage cells and rejuvenate the organs. *Jvarahara* and *shotahara* properties can control the *shotha*. *Bhedhana, lekhana* and *mutrakruchchra hara* properties can

control the *mutra roga*. *Panduhara* properties can control the *pandu tatva* of the CKD patients.

Also according to the modern approach these ingredients consisted with anti-pyretic and immunomodulatory activities and it can control the recurrent kidney infections. Anti-inflammatory action can control the inflammation of the kidney tubules and surrounding structures. Anti-oxidant, Anti-allergic and Anti-toxic activities can remove the harmful toxins from the body. Cytoprotective, Anti-mutagenic and Anti-cancerous properties helps to reduce the damage of the renal tissues, prolonged obstruction of the urinary tract in conditions such as kidney carcinoma. Anti-aging properties helps to regenerate the cells and prevent the cell damage and apoptosis. Diuretic properties, anti-diabetic properties controlled the hypertension and diabetes. Clear clogged pores (cleansing of the *srotas*) and remove dead cells helps to clear the obstructed pores in micro channels of the kidney.

Use of Wedilunu (Potassium Nitrate – KNO₃) as Anupana

According to the Sri Lankan Ayurveda Pharmacopeia Potassium Nitrate effectively control the *Visha*, *Yakrut dosha*, *Agni mandya*, *Mutra dosha*, *Pleeha vrudhi*.²⁹ Animal studies showed that, NO (Nitrous oxide) deficiency contribute to pathogenesis of CKD through development of hypertension and glomerular ischemia.³⁰

CONCLUSION

Based on the above facts this formula consisted with effective pharmacokinetic and pharmacodynamics properties which can positively respond to the following conditions that cause CKD.

- Reduce the inflammation of the kidney tubules and surrounding structures (*shotha hara*)
- Control the recurrent kidney infections (*mutrakruichhra hara*)
- Clear the obstructed pores in micro channels of the kidney (*srotas shodhana*)
- Control the diabetic and hypertension (*madumeha and atiraktachapa*)

- Regenerative properties and remove harmful toxins and dead cells (*rasayana, vrushya and vishahara*)
- Reduce the prolonged obstruction of the urinary tract, due to kidney stones and some cancers (*mutraashmari hara*)
- Also administration of nitrate and nitrite supplement reduced the blood pressure and improvement of ischemia perfusion injury.

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