



## COMPARATIVE COST ANALYSIS OF CKD PATIENTS ON AYURVEDIC TREATMENT AND CONVENTIONAL TREATMENT

Gaikwad Sarita alias Sonale Sarita\*

AYUSH, Pune region, Pune and  
Department of Ayurved, Sassoon General Hospitals, teaching hospital of B.J. Medical College, Pune

### ARTICLE INFO

#### Article History:

Received 11<sup>th</sup> June, 2017  
Received in revised form 13<sup>th</sup>  
July, 2017 Accepted 22<sup>nd</sup> August, 2017  
Published online 28<sup>th</sup> September, 2017

#### Key words:

Ayurvedic, Management, CKD, Dialysis, Cost analysis, Cost effective

### ABSTRACT

**Background:** Incidence of Chronic Kidney Disease is increasing rapidly. It is documented that patients present very late when the damage to kidney is already occurred. When ESRD is set Renal Replacement Therapy is the only treatment available. The most common form of RRT available in India is Haemodialysis. It is an irony that though RRT is cheapest in India, 90% of patients do not afford it. **Aim:** To develop an alternative easily administered acceptable, affordable, and cost effective line of treatment of CKD. **Material & methods:** A clinical trial on 50 CKD study subjects was conducted. Average Cost of the conventional treatment was noted from the subject in last 6 months. Cost of Ayurvedic treatment including other costs during 6 months of treatment was compared with the cost of conventional treatment. Most of the study subjects 39 (78%) were having CKD stage 5, 9 (18%) study subjects having CKD stage 4 & 2 (4%) study subjects with CKD stage 3B. These subjects were effectively managed by Ayurvedic line of treatment. **Results:** This study established that subjects on dialysis were maintained without dialysis in due course of treatment. There were 2036 sessions of dialysis avoided (96.68%), saving a cost of Rs. 30.54 lacs in 39 study subjects with CKD- stage 5. Ayurvedic treatment was found to be 11.16 times cheaper than the conventional treatment. The cost of treatment for stage 4 & 3B was many folds less than the cost of the treatment of stage 5. **Conclusion:** Therefore, if we could detect and treat the subjects in stage 4 or 3B, lot of cost could be saved. Ayurvedic treatment was definitely cheaper, cost effective and a suitable alternative to conventional treatment of CKD.

Copyright©2017 Gaikwad Sarita alias Sonale Sarita. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

### INTRODUCTION

Chronic Renal Failure is a syndrome affecting the kidneys, in which there is a progressive and irreversible decline in kidney function due to slow destruction of renal parenchyma, eventually terminating in to death when sufficient numbers of nephrons have been damaged. [1]. CRF corresponds to stage 3-5 stages of CKD in which GFR is  $< 60 \text{ ml/min/1.73 m}^2$ . It is a global threat to health in general and for developing countries in particular, because therapy is very expensive and life-long [2]. Suresh M *et al* [3] mentioned that Kidney diseases is ranked 3<sup>rd</sup> amongst life threatening diseases in India, after Cancer and Heart disease. About 200,000 persons go into terminal kidney failure every year. Out of them, it is the documented that, 90% never see a nephrologist [2].

In India, diagnosis of CRF is made very late and failure to institute measures to slow the progression of renal failure have resulted in a predominantly young ESRD population, with a median age of 44 years.

\*Corresponding author: Gaikwad Sarita alias Sonale Sarita  
AYUSH, Pune region, Pune and  
Department of Ayurved, Sassoon General Hospitals,  
teaching hospital of B.J. Medical College, Pune

These people are the bread earners of the family & when they suffer from CRF, there are devastating effects on the entire family. Only 10% ESRD patients afford RRT in India [4]. In the RRT, there are two options Dialysis & Kidney transplantation. Haemodialysis is the most preferred RRT in India. Those who start haemodialysis, 60% are lost to follow-up within 3 months [5] [6]. These study subjects drop out of therapy, because they realize that dialysis is not a cure and has to be performed over the long-term, ultimately causing impoverishment of their families [7]. They prefer to die rather than putting their families in financial crisis. Modern Medicine has very limited options to treat ESRD but Ayurveda has the potential to treat CRF to restore kidney function & that too at a much lesser cost. Therefore it was decided to devise an alternate line of treatment in the interest of people at large that will obviate the need for RRT.

**Aim of the study:-** To develop an alternative, easily administered, acceptable, affordable, and cost effective line of treatment of CKD.

### MATERIAL AND METHODS

**Place of Study:-** This Clinical Trial was conducted at Seth Tarachand Hospital of Tilak Ayurved College, Pune.

## Comparative Cost Analysis of Ckd Patients on Ayurvedic Treatment and Conventional Treatment

Type of Study:-Clinical trial:- Open labelled Prospective study design- a systematic non randomized clinical trial Phase- I

Period of study- July 2012 to Aug 2016

Sample size: 50, as approved by ethical committee of Tilak Ayurved College, Pune.

Case definition:- A case was labelled as C.R.F. when Serum Creatinine value was > 1.8 gm/dl & Blood urea > 50 mg/dl and the values were raised for at last 6 months.

The inclusion and exclusion criteria, demographic information of study subjects, the treatment in the form of Deepan-Pachan, Virechan, Shaman-Chikitsa, Basti chikitsa, and results e.g. the reduction in values of Serum Creatinine, Blood urea, Proteinuria, severity of symptoms have been mentioned in paper published in Indian Journal of Applied Research Aug 2017 [8].

In the present study the details of direct cost of treatment i.e. cost of medicines, laboratory costs, dialysis cost, transportation cost for last 6 months were collected from study subjects,

### Statistical analysis

Confidence interval for population mean was used to calculate the Average expenditure per patient per month.

The  $(1-\Gamma)$  % confidence interval for large sample & for population mean,  $\bar{x}$  is given by

$$\left( \bar{X} - Z_{r/2} \frac{s}{\sqrt{n}}, \bar{X} + Z_{r/2} \frac{s}{\sqrt{n}} \right)$$

where  $\bar{X}$  = Mean of difference,  $\frac{s}{\sqrt{n}}$  = Standard error of

mean,  $Z_{0.025} = 1.96$

Paired 't' test was applied to compare cost of conventional treatment for 6 months to that for Ayurvedic treatment.

## RESULTS

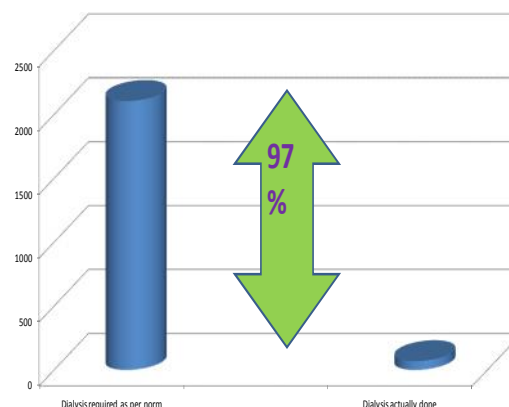
**Table No. 1** Demographic & clinical details of study subjects

Sex	Male -30 (60%) Mean age 49.87±15.16 Female - 20 (40%) Mean age 49.69±15.45
Education	Below 10 <sup>th</sup> -19 (38%) SSC/HSC-12 (24%) Graduate-15 (30%) Post graduate- 4 (8%)
Socio-economic status	Upper class 18 (36%) Upper middle 29 (58%) Middle-6 (12%)
Domicile status	Urban -29 (58%) Rural-21 (42%)
Diabetics	24 (48%)
Hypertensives	32 (62%)
On dialysis	24 (48%)
Duration of dialysis (n=24)	< 6 months -11 (45.83%) 6 month - 1 yr -9 (31.03) 1-2 yrs -3 (12.5%) > 2 yrs -1 (4.17%)
CRF since	6 months-1yr 17 (34%) 1-5 yrs -29 (58%) > 5 yrs-4 (8%)
CKD stage status (EPI) n=50	3B-2 (4%) 4 -9 (18%) 5-39 (78%)

This table gives information about demographic & clinical details of study subjects.

There were 24 study subjects undergoing dialysis 2-3/ week for a period from minimum 2 weeks to maximum 3 years. The average period on dialysis was 8.54 months. There were 7 study subjects who were advised to start dialysis but did not start it. Instead of starting dialysis they participated in the present study. Further there were another 8 subjects who were in CKD stage 5, who would have required to start dialysis, had Ayurvedic treatment not initiated to them, thus there were 39 study subjects in CKD stage 5 requiring dialysis. As it takes some response time, for the Ayurvedic treatment to increase the GFR, the dialysis has to be continued increasing the period between two sessions of dialysis. Therefore, out of 24 study subjects already on dialysis 11 subjects were required to undergo dialysis during Ayurvedic treatment. They had to undergo dialysis 70 times & then they were maintained without dialysis. All other subjects did not require any dialysis. It is summarized in the table no. 2 and graph no.1.

Graph no. 1: Dialysis prevented



Thus, there were 2106 sessions of dialysis would have been required in 39 subjects in CKD stage 5. Out of them 11 study subjects had to undergo dialysis for 70 sessions (3.32%) in all. Thus 2036 sessions (96.68%) of dialysis were prevented. If we calculate the cost saved for avoiding dialysis, assuming that conservative cost of one dialysis session is around Rs. 1500/-, that is inclusive of dialysis charges, cost of variables for dialysis & travelling cost to dialysis centre. This cost does not include cost of costly Inj. Erythropoietin, Inj. Iron sucrose, that is required to be given frequently, cost of frequent blood transfusions, loss of earning etc. then :-

**Table No.2** No. of dialysis sessions prevented in CKD stage 5 study subjects and cost saved

Category CKD 5	No.	No. of Dialysis sessions required as per norm 2-3/wk in 6 months	No. of Dialysis sessions done	No. of Dialysis sessions avoided	Cost saved @ Rs 1500/- per session of dialysis
Under dialysis	24	1326	70	1256	1884000
Dialysis advised but not willing @ 2/week	7	364	0	364	546000
CKD stage 5 not yet on dialysis but required as per norm @ 2/week	8	416	0	416	624000
Total	39	2106	70	2036	3054000
		100%	3.32%	96.68%	

Total cost saved on dialysis = 2036 x 1500 = Rs.3054,000/-

Average cost saved per subject= 3054000/39= Rs. 78307.69

**Table No. 3** Cost of ayurvedic treatment per month

Item	Form	Quantity	No. of days	Quantity per month gm	Cost/kg	Cost Rs. per month
Punarnava	Bharad	3	5	21	200	4.2
Pashanbhed	Bharad	3	5	21	200	4.2
Guduchi	Bharad	3	5	21	150	3.15
Musta	Bharad	3	5	21	150	3.15
Milk	Liquid	96	7	672	38	25.54
Kasni	Choorana	1	5	30	350	10.5
Sariva	Choorana	1	5	30	550	16.5
Punarnava	Choorana	1	30	30	250	7.5
Gokshur	Choorana	1	30	30	250	7.5
Amra haridra	Choorana	1	30	30	200	6
Amalki	Choorana	1	30	30	200	6
Palash	Choorana	1	30	30	250	7.5
Kasni	Bharad	3	30	90	300	27
Ashmantak	Bharad	3	30	90	200	18
Fuel	LPG	50	30	1500	50	75

Total cost/ month = Rs. 221.74/- Rounded to Rs 222/- per month

Cost of 6 months Ayurvedic treatment =Rs 1332/-

The average expenditure per patient (as per 95% confidence interval) for 6 months of Ayurvedic treatment including other costs was Rs. 9740.67 to Rs. 11764.67 treatment.

The average expenditure per patient (as per 95% confidence interval) for 6 months of conventional treatment in the population was Rs. 108727 to 142026. Minimum value for conventional treatment for 6 months- Rs. 108727/- Minimum value for Ayurvedic treatment including other cost for 6 months- Rs. 9740.67/-. 108727/ 9740.67=11.16

**It means that Ayurvedic treatment was 11.16 times cheaper than conventional treatment**

Alternatively we can compare the costs by comparing the mean cost of both line of treatment as mentioned below.

The mean values suggest that Cost of conventional treatment for 6 months if Ayurvedic treatment not taken was significantly higher (>11 times) than Total Ayurvedic treatment.

**Table No.4** Paired sample statistics for cost analysis

	n	Mean	Std. Deviation	't' value	P value (2-tailed)
Pair 1	50	64182.00	±60057.72	7.096	0.000
	50	5536.00	±3650.27		

df= 49 p value < 0.001.

**Analysis of CKD stage 5:** There were 16 females & 23 males in CKD stage 5. As per modern science CKD 5 stage patients have to be placed on dialysis ideally for 4 hours every time for thrice weekly but patients compromise it to twice weekly due to financial reasons. Average monthly cost of conventional treatment data was received from study subject, multiplied by 6 gives expected expenditure of conventional treatment. The cost of Ayurvedic treatment for one month was Rs 222/- & for 6 months was Rs. 1332/- only. (Please see table no. 3. However there were other costs like cost of treatment of Hypertension/ Diabetes, expenditure of dialysis during Ayurvedic treatment; all such costs were included in other costs. Both sets were compared with statistical test-paired 't' test.

**Gender: Female:** There were 16 females in CKD stage 5 at the beginning of the study. To test whether there is statistically significant difference in Cost of conventional treatment for 6 months if Ayu treatment not taken & Total Ayurvedic treatment cost including other cost for 6 months.

**Table No.5** Paired sample statistics of cost analysis for females with CKD stage 5

	N	Mean	Std. Deviation	t value	p value (2-tailed)
Pair 1	16	57375.00	±39903.01	5.351	0.000
	16	5982.00	±3366.11		

D.F. =15

Ayurvedic treatment for females from CKD stage 5 was 9.69 times cheaper than conventional Haemodialysis. There is

statistically highly significant difference between the costs. (p< 0.001)

**Gender: Males in CKD stage 5**

There were 23 males having CKD stage 5. Such patients require dialysis sessions two/ three times weekly. Average monthly cost of conventional treatment data was received from study subject, multiplied by 6 gives expected expenditure of conventional treatment. The cost of Ayurvedic treatment for 6 months was Rs. 1332/- only. However there were other costs like cost of treatment of Hypertension/ Diabetes, expenditure of dialysis during Ayurvedic treatment; all such costs were included in other costs. Both sets were compared with statistical test- paired ‘t’ test.

**Table No. 6** Paired sample statistics for cost analysis in males with CKD stage 5

	N	Mean	Std. Deviation	t value	p value	
Pair 1				6.146	0.000	
	Cost of conventional treatment for 6 months if Ayu treatment not taken	23	92739.13	±69277.58		
	Total Ayu treatment cost including other cost	23	6088.52	±4364.933		

Df=22

Ayurvedic treatment was 15.23 times cheaper in males from CKD stage 5. There is statistically highly significant difference between the costs.( p value < 0.001).

**Table No. 7** CKD-EPI stage wise Avg cost of conventional treatment/ month of study subjects with Diabetis ( N=24)

	Stage 5 n=18	Stage 4 n=5	Stage 3B n=1
Avg Expenditure/month	12361.11±11592	1800 ±273.86	1500

This table gives information about cost of conventional treatment/ month in Diabetic study subjects with different CKD-EPI stages. There were total 24 diabetic study subjects, out of them the majority 18/24 (75%) were from stage 5. Their average expenditure/ month was Rs. 12361.1, while the expenditure for those in CKD stage 4 was Rs. 1800 ±273.86 month and for stage 3B it was Rs. 1500/ month.

**DISCUSSION**

Khanna U [9] pointed out that, the cost of each haemodialysis (HD) session in India ranges from Rs 150 in government hospitals to Rs 2000 in some corporate hospitals. The monthly cost of HD in most private hospitals average Rs 12000 and the yearly cost of dialysis is Rs 1, 40000, equivalent of \$3000, which is in sharp contrast to an annual cost of \$60,000 in the US and UK [9]. So we are the cheapest in the world and yet irony is that still more than 90% of Indians cannot afford it.

The cost of an AV fistula construction is Rs 6000 to Rs 20000/- from a government hospital to varying grades of private hospitals. The average cost of erythropoietin per month is Rs 4000/- (bio similar) to Rs 10000/- (the pioneer brand) [9].

Kulkarni Eknath [10] reported that the cost of Dialysis was Rs. 310-350/- per session in Govt. / charitable institute while that was in private hospital was Rs. 800/- to 1000/- [10].

These figures were for the year 2008, obviously the cost have been almost doubled by now.

Alireza Arefzadeh, Mahboub Lessanpezeszki, *et al* [11] reported the estimated cost of each HD session was about 74 US dollars by which an annual cost of \$11549 could be estimated for each patient. If we convert it in to Indian rupees it will be around Rs 5000/- per dialysis session. Thus cost of Haemodialysis is cheapest in India.

In the present study, there were 39 study subjects in stage 5. As per modern medicine, these subjects have to be treated by RRT- (dialysis or kidney transplantation). In the table No.2 details of cost saved has been worked out. Average cost saved per subject was Rs. 78307.69. This cost did not include cost of costly Inj. Erythropoietin that is required to be given frequently, cost of frequent blood transfusions, etc. Thus, there is enormous cost saved per subject to the tune of more than Rs.78000/ in 6 months. The side effects of dialysis like Rullhas/ Nausea, Chhardi/Vomiting, giddiness, weakness, blood loss were avoided as subjects were maintained without dialysis. Thus subjects were saved/ spared of these side effects. The cost analysis of sparing of these side effects could not be quantified in terms of money.

There were 50 study subjects whose cost of last 6 months of conventional treatment data was received from study subjects. The cost of Ayurvedic treatment for 6 months was Rs. 1332/- only. However there were other costs like cost of treatment of Hypertension/ Diabetes, expenditure of dialysis during Ayurvedic treatment; all such costs were included in other costs. Both sets were compared with statistical test- paired‘t’ test.

Hence average expenditure per patient for 6 months of conventional treatment in the population is in Rs. 108727 to 142026 taking in to consideration 95% C.I. This cost is comparable to the annual cost reported by Khanna as Rs.1,40,000/-.[9]

Similarly, it was reported that cost of treating Diabetic nephropathy with ESRD was Rs 5 lacs for 2 years (Rs 20833/- per month) and Diabetes with CKD 1-4 stages was 1 lac for 2 years (4167/-per month) [13] [14]. In the present study the monthly cost of conventional treatment was found to be less i.e. Rs 12361/-for diabetic nephropathy subjects with CKD stage 5 and the monthly cost of treatment for CKD stags 4 was Rs 1800/- and that for CKD stage 3B was Rs 1500/-. This shows that cost of treating subjects in CKD stage 4 & 3B was much lower than the subjects in CKD stage 5.It is clear from the table No.7 that mean cost of treatment for CKD stage 4 was 6.87 times lower than that of for CKD stage 5, while that for CKD stage 3B was 8.24 times cheaper. Therefore if we could detect and treat the subjects in stage 4 or 3B, lot of cost could be saved. We can arrest the progression of disease and even there was reversal in stages from CKD stage 5 to stage 4,3B and 2 due to Ayurvedic line of treatment [8].

Mitra Mahdavi- Mazdeh [12] mentioned that HD patients receive on an average 4 hour treatments, 3 times per week. However between 9-40% of dialysis patients receive less frequent dialysis in Iran. In the present study it was observed that 5/24 (20.83%) were only undergoing dialysis 3 times in a week. All the rest were undergoing dialysis biweekly. This implies that nearly 80% of subjects were undergoing less

frequent dialysis than the prescribed norm. This is a commonly observed finding in most of the dialysis subjects; they prefer to undergo two sessions of dialysis instead of three per week due to cost constraints [7].

The side effects of dialysis like Rullhas/ Nausea, Chhardi/Vomiting, giddiness, weakness, blood loss were avoided as subjects were maintained without dialysis. Thus subjects were saved of these side effects. The cost analysis of this could not be quantified in terms of money. Though 94% study subjects belonged to Upper and Upper middle class, the cost of conventional treatment had drained out most of their financial resources. It was a sense of great relief to them for saving huge expenditure due to successful Ayurvedic treatment.

Limitations of study: It has to be admitted here that we relied on the expenditure as informed by the study subject. There may be recall bias. Further, we did not go in to details of indirect costs like loss of wages of study subjects and the accompanied relatives.

## CONCLUSIONS

1. Ayurvedic treatment was found to be 11.16 times cheaper than conventional treatment.
2. 2036 sessions (96.68%) of dialysis were prevented. Average cost saved per CKD stage 5 subject was Rs. 78308/-
3. The cost of treatment for CKD stage 4 and stage 3B was many folds less than that for CKD stage 5. Therefore if we can diagnose the disease earlier we can save lot of money from the pocket of patient with better prognosis.
4. Ayurvedic treatment was found to be highly cost effective than the conventional treatment.

## References

1. Harsh Mohan.: Textbook of Pathology. 7<sup>th</sup> edition. JP Brothers Medical publishers, New Delhi. (2015): 641
2. Suresh Chandra Dash and Sanjay K. Agrawal :Incidence of Chronic Kidney Disease in India; Nephrology Dial Transplant (2006) 21 (1): 232-233
3. Suresh M, Mallikarjuna Reddy N, *et al*: Hematological changes in Chronic Renal Failure. *Int J Scientific & Research Publications*, Sep 2012 Vol. 2, Issue 9,: 1-4
4. Sakhuja and Kohli: ESRD in India & Pakistan - Ethnicity & Disease, Spring 2006 *Q J Med*; (2006) Vol. 16, 64 (245):729-737
5. Noberto Perico and Giuseppe Remuzzi: Chronic Kidney Disease: a research and public health priority; Nephrology Dial Transplantation (2012) 27 (Suppl 3): iii 19-26
6. Jha V: End stage renal disease in developing countries: the India experience *Ren Fail* (2004) 26(3) 201-8
7. Arrigo Schieppati and Giuseppe Remuzzi: Chronic renal diseases as a public health problem: Epidemiology, social, and economic implications. *Kidney International* (2005) S7-S10
8. Ayurvedic management of Chronic Renal Failure-A non randomized Ayurvedic clinical trial. *Ind J Appl Res.*(2017). 7 (8): 88-94.
9. Khanna Umesh: The economics of dialysis in India. *Indian Journal of Nephrology*. (2009) Jan; 19(1): 1-4.
10. Kulkarni Eknath: Dialysis prakriya; Ayurved patrika: 11 Aug (2008):43-45
11. Alireza Arefzadeh, Mahboub Lessanpezeski, Sepideh Seifi : Cost of Haemodialysis in Iran. *Renal data from Asia- Africa*. (2009); Vol.20 (2): 307-311
12. Mitra Mahdavi-Mazdeh: Cost of Haemodialysis in Iran. *Saudi J Kidney Dis Transpl* (2009); 20 (4): 675-676
13. Satyavani K, Kothandan H *et al*: Direct costs associated with chronic kidney disease among type 2 diabetic study subjects in India. *Indian Journal of Nephrology*, (May 2014). Vol 24 (3): 141-147
14. Dasgupta I. Cost of treating diabetic disease. Editorial. *Indian Journal of Nephrology*. (May 2014). 24 (3):139-40

### How to cite this article:

Gaikwad Sarita alias Sonale Sarita (2017) 'Comparative Cost Analysis of Ckd Patients on Ayurvedic Treatment and Conventional Treatment', *International Journal of Current Advanced Research*, 06(09), pp. 6061-6065.  
DOI: <http://dx.doi.org/10.24327/ijcar.2017.6065.0866>

\*\*\*\*\*