Therapeutic Adherence among Chronic Kidney Disease Patients under Hemodialysis in Selected Hospitals of Kathmandu Valley

Kopila Luitel,1 Apsara Pandey,2 Bimala Kumari Sah,2 Takma KC2
1Shahid Gangalal National Heart Centre, Kathmandu
2Maharajgunj Nursing Campus, Institute of Medicine, Tribhuwan University, Kathmandu

ABSTRACT

Introduction: Chronic Kidney Disease (CKD) is an emergent public health problem in Nepal. Hemodialysis is the best treatment for this disease to reduce morbidity and mortality. Therapeutic adherence is crucial factor that influences morbidity and mortality among patients under hemodialysis. The objective of the study was to find out the therapeutic adherence among CKD patients under hemodialysis in selected hospitals of Kathmandu valley.

Methods: Descriptive cross-sectional study design was adopted. Altogether 164 patients with CKD under hemodialysis were selected by using non-probability purposive sampling technique. Data were collected through face to face interview using structured interview schedule. Frequency, percent, mean and standard deviations were used for data analysis. Non-parametric Kruskal Wallis test and Mann Whitney U test were applied to measure the mean difference in therapeutic adherence among CKD patients under hemodialysis according to selected variables.

Results: Therapeutic adherence levels were 33.5%, 62.8% and 3.7% for good, satisfactory and unsatisfactory respectively. Concerning about hemodialysis, 92.7% respondents had good, 6.1% had satisfactory and 1.2% had unsatisfactory level of adherence to hemodialysis. Furthermore, it was found that 29.9%, 1.8% and 87.8% respondents had good; and 59.1%, 42.1% and 9.1% had satisfactory level of adherence to diet, fluid and medicine respectively. The results showed that therapeutic adherence was statistically significant with mean difference according to sex (p=0.009), duration of hemodialysis (p=0.001), total session of hemodialysis (p=0.001) and providing health information by dietician and other hemodialysis patients (p=0.001).

Conclusion: Therapeutic adherence was found to be satisfactory but adherence to fluid intake is still unsatisfactory. It is recommended that regular education and counseling should be provided in order to increase level of therapeutic adherence.

Keywords: Chronic kidney disease, patient compliance, renal dialysis

INTRODUCTION

About 400,000 people worldwide are suffering from chronic renal failure, of these; more than 300,000 are under hemodialysis treatment.1 In the USA, it was reported that 64.9% of CKD patients received hemodialysis.2 It is estimated that the number of new cases who need dialysis is about 100 – 150 per million populations per year in developing countries. The population of End Stage Renal Disease (ESRD) patients requiring dialysis in Asia is expanding at a rate higher than elsewhere in the world. In Nepal, the prevalence of CKD is 6.0%.3 It is also estimated that the number of new cases of end-stage renal failure is around 2800-4200 per year needing dialysis or transplantation.4 Government has made dialysis service free however; it does not cover the associated medication cost. Government of Nepal pays NRs 2500 to hospitals per dialysis. The median monthly out of pocket expenditure among hemodialysis patients was NRs. 32,810.5

Adherence by patients to prescribed treatment regimens can be considered as the interface between effective therapy and effective disease management.6 Adherence to drug therapy in CKD patients globally varies from as low as 38.0 to as high as 83.0% in which social factors like age, marital, socio-economic status and level of education may also play a role.7 Poor adherence to treatment is common in patients on hemodialysis which may increase risk for poor clinical outcomes and mortality.8

Non-adherence to chronic drug therapy is known to significantly increase the disease burden in developing economies. The major predictors of the poor adherence include cost of medication, missed appointments, side effect of medication, psychological

Correspondence: Apsara Pandey, Maharajgunj Nursing Campus, Institute of Medicine, Tribhuwan University, Kathmandu, E-mail: pkapsara@gmail.com
problems, treatment complexity, asymptomatic disease, inadequate follow up, poor patient provider relationship, patients’ lack of insight in illness, patients’ lack of belief in benefit of treatment and barrier to access the healthcare facilities. Good adherence to therapeutic regimen reduces morbidity and mortality; and gives longevity of life. Therapeutic adherence is the superior means to control, to avoid from any complications and to maintain quality of life. But very few literatures can be found on this issue in Nepal. Therefore, this study aimed to find out the therapeutic adherence among chronic kidney disease patients under hemodialysis in selected hospitals of Kathmandu valley.

**METHODS**

A descriptive cross-sectional study was conducted to find out therapeutic adherence among CKD patients under hemodialysis in Shahid Dharmabhakta National Transplant Centre (SDNTC), Bhaktapur and Tribhuvan University Teaching Hospital (TUTH), Kathmandu. Those study sites were purposively selected. Altogether 164 adult patients were selected by using non-probability, purposive sampling technique. Both male and female adult patients with 20 years and above age; and diagnosed as CKD and doing hemodialysis at least one month before study were included in the study.

Sample size of this study was 164 which was calculated by using following formula.$^9$

\[ n = \frac{Z^2pq}{E^2} \]

with the desired precision of 6.0% (94.0% confidence limits at an allowable error of 6.0%).

Where,

- \( n \) = the desired sample size
- \( Z \) = the standard deviate (set for a 94.0% CI) = 1.96
- \( P \) = the prevalence of therapeutic adherence is 61.0% = 0.61
- \( q \) = 1 - \( p \) = 1 - 0.61 = 0.39
- Level of significance = 6.0%
- Absolute allowable error (E) = 0.06

\[ n = \left( \frac{1.96^2 x 0.61 x 0.39}{(0.06)^2} \right) = 253 \]

Here,

\( n = 253 \)

For the finite population, sample size could be adjusted by using the formula

\[ n = \frac{n}{1 + \frac{n-1}{N}} \]

Where \( N \) = Known population of given area = 360 (As TUTH hemodialysis department= 60 cases and SDNTC = 300 cases per month). This gives \( n = 149, \) \( n = 149 + 15 \) (Adding the 10.0% non-response rate). So, the final sample size was 164 (57 from TUTH and 107 from SDNTC).

A pretested structured interview schedule and five points Likert Scale developed by researchers were used as data collection tools. Pretesting of the data collection tools were done among 10.0% of sample size (i.e. 16) in SDNTC which were excluded in the final study. Content validity was established from extensive review of available literatures, consultation with panel of nephrologists, nurses working in dialysis and nephrology wards; and dietician of TUTH. Revision was made as per suggested by them. Translation of data collection tools from English to Nepali language and again back translation was done by researchers with the help of nephrologists and dietician. Ethical approval was obtained from Nepal Health Research Council. Respondents were explained about the purpose, technique, duration, risks and benefits of the study; and formal informed consent was obtained from each respondent prior to interview. Confidentiality of the information was maintained. Data were collected by researcher through face to face interview technique. Interview was done during the period of dialysis. Average 5-7 respondents were interviewed per day. The data collection period was from 2 to 28 September, 2018. Data were checked daily for completeness and accuracy. Then data were classified, coded and entered into Microsoft Excel 10.0 and analyzed by SPSS 16.0 version. Frequencies, percentage, mean and standard deviation were calculated to illustrate demographic and clinical characteristics; and level of therapeutic adherence. Therapeutic adherence was calculated based on respondents’ self-reported adherence to hemodialysis schedule, fluid, diet and medicine as per health care provider’s recommendation which was measured with respect to scoring obtained from interview with structured schedule and five points Likert Scale. The quartile was used to categorize the level of treatment adherence as good (>75.0%), satisfactory (50.0-75.0%) and unsatisfactory (<50.0%). Non-parametric Kruskal Wallis test and Mann Whitney U test were calculated to measure the difference in therapeutic adherence among CKD patients under hemodialysis according to selected variables.

**RESULTS**

**Socio-demographic and Clinical Characteristics**

Findings of the study showed that 32.3% respondents were age of above 50 years with mean age was 43.8 years (SD± 14.19). Likewise, 58.5% respondents were male and 79.9% were married. Regarding the level of education, 26.2% respondents received secondary level education. Similarly, 70.1% were unable to work and 75.0% respondents reside outside the Kathmandu valley (Table 1).
Table 1: Socio-demographic characteristics n=164

| Characteristics   | Number | Percent |
|-------------------|--------|---------|
| Age (in years)    |        |         |
| ≤ 30              | 33     | 20.1    |
| 31 – 40           | 43     | 26.2    |
| 41 – 50           | 35     | 21.3    |
| >50               | 53     | 32.3    |
| Mean ±SD: 43.85 ±14.19, Range: 20-89 |        |         |
| Gender            |        |         |
| Male              | 96     | 58.5    |
| Female            | 68     | 41.5    |
| Types of family   |        |         |
| Nuclear           | 84     | 51.2    |
| Joint             | 80     | 48.8    |
| Marital status    |        |         |
| Unmarried         | 25     | 15.2    |
| Married           | 131    | 79.9    |
| Widow/widower     | 4      | 2.4     |
| Separated         | 4      | 2.4     |
| Level of education|        |         |
| Unable to read and write | 30 | 18.7 |
| Informal education| 35 | 21.3 |
| Primary (up to 5) | 17  | 10.4 |
| Secondary (6-10)  | 43    | 26.2 |
| Higher secondary (11-12) | 20 | 12.2 |
| Graduate and above| 19  | 11.6 |
| Occupation        |        |         |
| Service           | 13     | 8.0     |
| Self-employed     | 11     | 6.7     |
| Homemaker         | 14     | 8.5     |
| Retired           | 7      | 4.3     |
| Unable to work    | 115    | 70.1    |
| Business          | 4      | 2.4     |
| Residence         |        |         |
| Outside Kathmandu valley | 123 | 75.0 |
| Inside Kathmandu valley | 41  | 25.0 |

Out of total respondents, 87.2% respondents had family history of CKD and 95.1% had history of other co-morbid diseases. Similarly, 97.7% respondents were suffering from hypertension and 98.8% respondents had done hemodialysis as per prescription. The mean duration of hemodialysis was 2.87 years and mean number of hemodialysis was 353.9. An average number of daily prescribed medicine (pills) was 6.88±3.099 ranging from 1 to 16 (Table2).

Table 2: Clinical characteristics

| Variables                             | Number | Percent |
|---------------------------------------|--------|---------|
| Family history of CKD                 | 21     | 12.8    |
| Co-morbid diseases (n=156)**          | 156    | 95.1    |
| Diabetes Mellitus                     | 24     | 15.3    |
| Hypertension                          | 152    | 97.7    |
| Heart Disease                         | 7      | 4.5     |
| Hypothyroidism                        | 10     | 6.4     |
| Others†                               | 7      | 4.5     |
| Dialysis done regularly as per prescription | 162    | 98.8    |
| Duration of hemodialysis (in year)    |        |         |
| ≤ 2                                   | 70     | 42.7    |
| 2.01 – 4                              | 55     | 33.5    |
| 4.01 – 6                              | 23     | 14.0    |
| ≥6.01                                 | 16     | 9.8     |
| Mean ±SD: 2.87±2.36                   |        |         |
| Total number (session )of hemodialysis|        |         |
| ≤ 350                                 | 96     | 58.5    |
| ≥351                                  | 68     | 41.5    |
| Mean ±SD: 353.90±308.90               |        |         |
| Number of medication taking as prescriptions|        |         |
| ≤ 5                                   | 60     | 36.6    |
| 6 – 10                                 | 85     | 51.8    |
| ≥11                                   | 19     | 11.6    |
| Mean ±SD: 6.88±3.09, Range: 1-16      |        |         |

**Multiple Responses,** others= Glomerulonephritis and Benign prostatic hyperplasia

Level of Therapeutic Adherence

Out of total respondents, 92.7% had good and 1.2% had unsatisfactory level of adherence to hemodialysis. Concerning about diet, fluid and medicine, 59.1% had satisfactory, 56.1% had unsatisfactory and 87.8% had good level of adherence respectively. It was found that 33.5% had good and 62.8% had satisfactory level of therapeutic adherence among the respondents (Table 3).

Table 3: Level of therapeutic adherence n=164

| Variables          | Good Number (% | Satisfactory Number (%) | Unsatisfactory Number (%) |
|--------------------|----------------|-------------------------|---------------------------|
| Adherence to hemodialysis | 152 (92.7)     | 10 (6.1)                | 2 (1.2)                   |
| Adherence to diet   | 49 (29.9)      | 97 (59.1)               | 18 (11.0)                |
| Adherence to fluid  | 3 (1.8)        | 69 (42.1)               | 92 (56.1)                |
| Adherence to medicine | 144 (87.8)   | 15 (9.1)                | 5 (3.0)                  |
| Therapeutic adherence | 55 (33.5)    | 103 (62.8)              | 6 (3.7)                  |
Difference in Therapeutic Adherence according to Different Study Variables

Regarding the difference between therapeutic adherence, there was statistically significant difference in therapeutic adherence with gender (p=0.009). This findings showed that there was more adherence in male (mean score=71.0%) than female (mean score = 67.2%). No statistically significant difference was found among other socio-demographic variables. Similarly, there was statistically significant difference in therapeutic adherence with duration of hemodialysis (p= 0.001) and total number of hemodialysis (p= 0.001) (Table 4).

Table 4: Mean difference in treatment adherence according to socio-demographic and clinical characteristics n=164

| Characteristics                  | Number | Mean score (%) of treatment adherence | Std. Deviation | p-Value  |
|----------------------------------|--------|---------------------------------------|----------------|----------|
| Age                              |        |                                       |                |          |
| ≤ 40                             | 76     | 54.0                                  | 5.3            | 0.135m   |
| ≥41                              | 88     | 55.0                                  | 5.1            |          |
| Gender                           |        |                                       |                |          |
| Male                             | 96     | 71.0                                  | 8.7            | 0.009*m  |
| Female                           | 68     | 67.2                                  | 9.4            |          |
| Type of family                   |        |                                       |                |          |
| Nuclear                          | 84     | 54.6                                  | 5.0            | 0.971m   |
| Joint                            | 80     | 54.5                                  | 5.4            |          |
| Educational status               |        |                                       |                |          |
| Able to read and write           | 134    | 54.8                                  | 5.1            | 0.402m   |
| Unable to read and write         | 30     | 53.7                                  | 5.5            |          |
| Occupation                       |        |                                       |                |          |
| Job holders                      | 38     | 70.0                                  | 9.6            | 0.773m   |
| Dependents                       | 122    | 59.5                                  | 9.0            |          |
| Residence                        |        |                                       |                |          |
| Outside valley                   | 123    | 54.5                                  | 5.4            | 0.708m   |
| Inside valley                    | 41     | 54.9                                  | 4.7            |          |
| Co-morbid diseases               |        |                                       |                |          |
| Hypertension                     |        |                                       |                |          |
| No                               | 12     | 67.6                                  | 12.8           | 0.832m   |
| Yes                              | 152    | 69.6                                  | 8.8            |          |
| Diabetes Mellitus                |        |                                       |                |          |
| No                               | 140    | 69.2                                  | 9.4            | 0.683m   |
| Yes                              | 24     | 70.7                                  | 7.2            |          |
| Heart Disease                    |        |                                       |                |          |
| No                               | 157    | 69.5                                  | 9.2            | 0.929m   |
| Yes                              | 7      | 68.9                                  | 9.8            |          |
| Duration of hemodialysis         |        |                                       |                |          |
| ≤2                               | 70     | 73.0                                  | 7.9            | 0.001*a* |
| 2.01 – 4                         | 55     | 67.4                                  | 8.5            |          |
| 4.01 – 6                         | 23     | 65.5                                  | 9.9            |          |
| ≥6.01                            | 16     | 66.5                                  | 10.6           |          |
| Total number (session) of hemodialysis |  |                                       |                |          |
| ≤ 350                            | 96     | 71.6                                  | 8.4            | 0.001*m  |
| ≥351                             | 68     | 66.4                                  | 9.4            |          |
| No of medicine (pills) prescribed per day |  |                                       |                |          |
| ≤ 5                              | 60     | 68.4                                  | 10.5           | 0.129*k  |
| 6 – 10                           | 85     | 69.4                                  | 8.2            |          |
| ≥11                              | 19     | 73.2                                  | 8.2            |          |

*p -value significant at ≤ 0.05, m= Mann- Whitney U test, k= Kruskal Wallis test.
Respondents were provided health information regarding different therapeutic regimens from different sources. It was found that there was significant difference in therapeutic adherence with various sources of information. Respondents who received health information from other hemodialysis patients and dietitian had high adherence than information provided by other than other hemodialysis patients and dietitian \( (p=0.001) \) (Table 5).

Table 5: Mean difference in treatment adherence according to service related variables \( n=164 \)

| Variables | Number | Mean score (%) of treatment adherence | Std. Deviation | p-value |
|-----------|--------|---------------------------------------|----------------|---------|
| Frequency of professional talk |        |                                       |                |         |
| Always    | 29     | 69.8                                  | 8.1            | 0.514\(^*\) |
| Very often| 76     | 68.4                                  | 9.0            |         |
| Often     | 24     | 71.0                                  | 10.5           |         |
| Seldom    | 32     | 70.5                                  | 9.4            |         |
| Never     | 3      | 69.5                                  | 9.6            |         |
| Times taken to come to the hospital (in a minutes) |        |                                       |                |         |
| \( \leq 30 \) | 70 | 68.8                                  | 9.2            | 0.123\(^*\) |
| 31 - 60   | 66     | 70.6                                  | 9.4            |         |
| 61 -120   | 24     | 67.1                                  | 8.4            |         |
| \( >120 \) | 4     | 75.4                                  | 4.7            |         |
| health information provided by** |        |                                       |                |         |
| Doctor    |        |                                       |                |         |
| No        | 1      | 77.1                                  | 0.451\(^*\)    |
| Yes       | 163    | 69.4                                  | 9.2            |         |
| Nurses    |        |                                       |                |         |
| No        | 1      | 68.4                                  | 0.441\(^*\)    |
| Yes       | 163    | 69.5                                  | 9.2            |         |
| Dietitian |        |                                       |                |         |
| No        | 58     | 73.4                                  | 6.5            |         |
| Yes       | 106    | 67.3                                  | 9.7            | 0.001\(^*\) |
| Other hemodialysis patients |        |                                       |                |         |
| No        | 58     | 73.4                                  | 6.5            | 0.001\(^*\) |
| Yes       | 106    | 67.3                                  | 9.7            |         |
| Booklet/pamphlets/leaflets |        |                                       |                |         |
| No        | 26     | 70.3                                  | 9.3            | 0.473\(^*\) |
| Yes       | 138    | 69.3                                  | 9.9            |         |

**Multiple Response, *p- value significant at \( p \leq 0.05 \), m= Mann- Whitney U test, k= Kruskal Wallis test.**

**DISCUSSION**

This study showed that 87.2% of the respondents had no family history of CKD whereas 12.8% had family history of CKD. Similarly, 95.1% of the respondents had co-morbid diseases with 92.7% were suffered from hypertension and 14.6% were suffered from diabetes. These findings are supported by the study done in Saudi Arabia reported that 93.9% of the respondents had hypertension and 39.6% had diabetes.\(^12\)

In this study, mean duration of hemodialysis was 34.8 months and ranged from 12 months to 168 months. These findings in contrast this finding, finding of study done in Okinawa, Japan reported the mean duration of dialysis was 61.9 months and ranged from 1 to 233 months.\(^13\) This study found that 98.8% of the respondents had regularly done hemodialysis as prescribed by physician. This finding is higher than the study done in California and Malaysia\(^14-15\) where adherence to hemodialysis was 90.7% and 91.5% respectively. Another study done in India reported that an adherence to hemodialysis was 90.0\%.\(^16\) In contrast with this findings, adherence to hemodialysis was only 55.96% in Saudi Arabia.\(^12\) The findings of this study reported that 92.7% respondents had good adherence, 6.1% had satisfactory adherence to hemodialysis and very few (1.2%) had unsatisfactory adherence to hemodialysis. In contrast to these findings, the study done by Deif reported that the level of therapeutic adherence to hemodialysis was good in 76.36%, satisfactory in 23.64%.\(^11\) The probable reason for these variations
could be due to the sample size and methodological difference. This study found that 29.9% respondents had good and 11.0% had unsatisfactory level of adherence to diet. These findings are contradictory with the findings of the study done by Deif who reported that the level of therapeutic adherence was good in 30.91% and unsatisfactory in 18.18% respondents. Likewise, dietary adherence was 88.37% in Saudi Arabia, 8.9% in Iran and 27.7% in Malaysia. In this study, 59.1% of the respondents had satisfactory level of adherence to diet. This finding is also contradictory with the finding of study done in Cairo University Hospitals of Egypt where 50.91% of the respondents had satisfactory level of adherence to diet. This variation also might be due to difference in study setting, sample size and methods.

Concerning about adherence to fluid, the findings of this study reported that 1.8% respondents had good, 42.1% had satisfactory and 56.1% of the respondents had unsatisfactory level of adherence to fluid. Several studies were published from different world regions regarding prevalence of adherence to fluid management among CKD patients under hemodialysis. Studies done in Saudi Arabia, Kenya, Malaysia and China and found that rates of adherence to fluid were 87.78%, 58.9%, 40.3% and 27.7% respectively. These differences in findings might be due to different in population characteristics and study settings.

Regarding adherence to medicine, findings of this study found that level of adherence to medicine was good, satisfactory and unsatisfactory in 87.8%, 9.1% and 3.0% of the respondents respectively. These findings are almost similar with study done in Palestine and Saudi Arabia reported that adherence to medicine was 81.0% and 87.9% respectively. Similar findings are also reported by another one study where the level of adherence was good in 87.27% and satisfactory in 12.73%. In contrast to these findings, study done in Kathmandu found that 28.6%, 35.3% and 36.1% of the respondents had high, medium and low adherence to medicine respectively. Likewise, adherence to medication in USA and Malaysia were 68.2% and 50.5% respectively. Similarly, study done in India reported that medication adherence was high in 7.3%, medium in 55.3% and low in 37.3%. These differences might be due to different motivation level of patients in different set up.

Regarding overall therapeutic adherence, findings of this study showed that level of therapeutic adherence among the respondents was good in 33.5%, satisfactory in 62.8% and unsatisfactory in 3.7%. These findings are similar to the study done in Palestine reported that the level of adherence was good (55.5%) satisfactory (40.5%) and unsatisfactory (4.1%). A similar study done in Ruwanda reported that 51.0% of the respondents had high adherence, 42.0% of the respondents had moderate adherence and 7.0% of the respondents had low level of adherence. These variations might be due to difference in setting, population and sample size.

In this study, there was significant difference in therapeutic adherence with sex. Males had high adherence than females (p=0.009). These findings are supported by the study done in Saudi Arabia showed that males had high adherence than females (p=0.034). Furthermore, findings of this study showed that there was significant difference in therapeutic adherence with total number (session) of hemodialysis (p=0.001); and providing health information by other hemodialysis patients and dietitian (p=0.001). In contrast with these findings, frequencies of education by health care workers about importance of not missing dialysis (p=0.000) was significantly associated with adherence to hemodialysis in the study of Ruwanda.

LIMITATION OF THE STUDY

This study was conducted in small sample size representing only two settings. Data was collected by using face to face interview method which might have introduced information recall biases. Therefore, these findings lack the generalization in other setting and population.

CONCLUSION

Although therapeutic adherence of CKD is dynamic behavior, changed in adherence to different therapeutic regimen is still big concern in Kathmandu valley. Level of therapeutic adherence is satisfactory. But adherence to fluid is not satisfactory which may leads life threatening complications. Therefore, constant monitoring with regular education and counseling are essential to increase level of adherence.

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CONFLICTS OF INTEREST

There is no conflict of interest in this study.

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