

ORIGINAL ARTICLE

## Non-Compliance of Hemodialysis and Related Factors among End-Stage Renal Disease Patients

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### ABSTRACT

**Objective:** This cross-sectional study was conducted to find out the frequency and factors responsible for treatment non-compliance among patients with End-Stage Renal Disease (ESRD) on hemodialysis.

**Methods:** This cross-sectional study was conducted at Sindh Institute of Urology and Transplantation (SIUT) Karachi, Pakistan from March 2014 to July 2015. ESRD patients of either gender aged 18 to 60 years, who were on maintenance hemodialysis were included. The missing of at least one hemodialysis sessions per month was labeled as non-compliance. Moreover, detrimental factors like age, gender, duration of dialysis, lack of family support, lack of transport facility, and financial constraint were observed.

**Results:** Out of 952 patients, 238 (25%) were non-compliant. A significantly higher rate of non-compliance was reported in patients with more than 40 years of age (p-value <0.001) and those on dialysis for more than 12 months (p-value <0.001). Among the non-compliant patients, lack of transportation 56.3% (134/238) was the most common reason followed by lack of family support 35.7% (85/238) and financial constraint 11.76% (28/238). The financial constraint as a reason for compliance was significantly related to gender (p<0.001) and duration of dialysis (p 0.035) while the absence of transportation facilities as the reason for non-compliance was associated with age (p-value <0.001) and dialysis length (p-value <0.001). Whereas the absence of family support was associated only with dialysis duration (p-value <0.001).

**Conclusion:** Missing of dialysis treatment sessions affects a big proportion of maintenance hemodialysis patients. Lack of transportation was reported as the most common reason for non-compliance.

**Keywords:** Dialysis, compliance, ESRD, Hemodialysis.

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### INTRODUCTION

Patients with end-stage renal disease (ESRD) on maintenance hemodialysis usually require three treatment sessions per week to prevent complications of renal failure including azotemia/uremia and fluid overload.<sup>1</sup> However, some patients miss their hemodialysis sessions with consequent increased risk for hospitalization or mortality. This missing of dialysis sessions is termed as non-compliance and usually defined as skipping one or more hemodialysis sessions in a month, shortening by 10 or more minutes one or more hemodialysis sessions in a month, an interdialytic weight gain of more than 5.7% of dry weight, or a serum phosphate of greater than 7.5 mg/dL.<sup>2</sup> The underlying reasons of missing treatment sessions is not fully understood but include some contributing factors like depression, unreliable transportation, financial constraints, demographic factors, lack of social/family support and lack of motivation.<sup>3</sup> Missed dialysis treatment (non-compliance/absenteeism) is universal but it is more common in United States (US) than

Japan<sup>4</sup> and it is probably rampant in Pakistan.<sup>5-7</sup>

Dialysis centers are often far away in Pakistan and patients have to travel to bigger cities for dialysis. Longer the distance from dialysis facility, the more it becomes cumbersome for patients to reach there. Furthermore, travel time to the dialysis facility of more than 1 hour is strongly associated with missed treatment.<sup>8</sup>

We frequently come across patients who miss their treatment sessions and present in emergency with fluid overload or uremic symptoms. This happens despite free of cost services at our institution. Therefore, we conducted this study to find out the frequency and factors which are responsible for non-compliance among hemodialysis patients at our institution. This study may provide basis for more detailed work on this issue.

### METHODS

This cross-sectional study was conducted at hemodialysis unit, department of Nephrology, Sindh Institute

of Urology and Transplantation, Karachi, Pakistan from March 2014 to July 2015. The participants of the study were selected by non-probability consecutive sampling. ESRD patients of either gender aged 18 to 60 years, who were on maintenance hemodialysis (thrice weekly) for at least 6 months were included. Patients with psychiatric illness, terminally / seriously ill patients and those unable to give consent were excluded from the study.

An informed consent was taken from each participants after explaining about the purpose of study. The most commonly used definition of non-compliance has 4 components: skipping one or more hemodialysis sessions in a month, shortening by 10 or more minutes one or more dialysis sessions in a month, an interdialytic weight gain of more than 5.7% of dry weight, or a serum phosphate of greater than 7.5 mg/dL.<sup>2</sup> Presence of any one of these four parameters fulfils criteria of non-compliance. For this study, we defined non-compliance as missing at least one hemodialysis sessions per month without information/or rescheduling. If patient comes for dialysis on the next day of missing the dialysis then it was not considered non-compliance.

Non-compliant patients were interviewed by the researchers to evaluate the cause of non-compliance with treatment schedule. Data were recorded using structure proforma.

All the data were analyzed on Statistical Package for Social Sciences (SPSS version 17.0). Mean  $\pm$  standard deviation (SD) was calculated for continuous variables like age and duration of disease. Frequencies and percentages were computed for gender, non-compliance and reasons for non-compliance. Stratification was done with regard to age, gender and duration of dialysis dependency to see the effect on outcome through chi-square test. P-value  $\leq$  0.05 was considered significant.

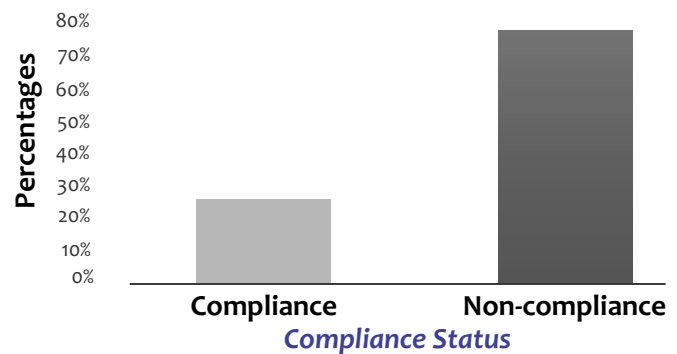
The study was conducted as per the national and International ethical standards as described in the Helsinki Declaration of 1975, as revised in 2008. Moreover, all institutional protocols were followed while conducting the study.

## RESULTS

A total of 952 patients with end stage renal disease on maintenance hemodialysis participated in the study. The average age of the patients was  $34.38 \pm 12.79$  years. Mean duration of hemodialysis was  $12.79 \pm 5.81$  months. Out of 952 patients, 695 (73%) were males and 257 (27%) were females.

Frequency of non-compliance in ESRD patients was 25%

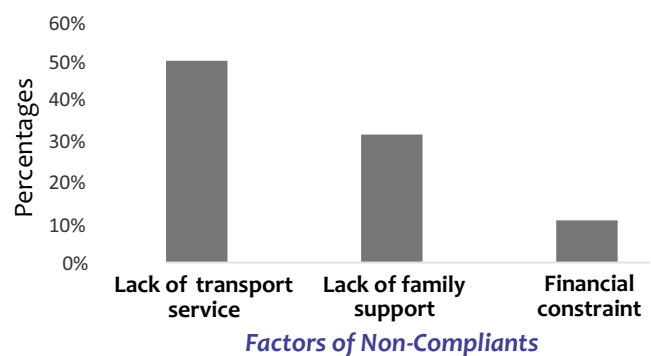
(238/952) as shown in figure 1. The comparison of compliance with demographic and clinical characteristics showed significant association with age (p-value <0.001), duration of dialysis (p-value <0.001), presence of AV fistula (p-value <0.001), mean arterial pressure (p-value <0.001), and albumin level (p-value 0.003). (Table 1)



**Figure 1: Frequency of non-compliance to hemodialysis among ESRD patients (n=952)**

Among these non-compliant patients, lack of transportation 56.3% (134/238) was the commonest reason of non-compliance followed by lack of family support 35.7% (85/238) and financial constraint 11.76% (28/238) cases. (Figure 2) Most of the patients (228/238, 96.0%) described that they have not experienced any immediate detrimental effects (dyspnea, lethargy) of missing the dialysis treatment session.

The financial constraint as reason for compliance was significantly associated with gender (p-value <0.001) and duration of dialysis (p-value 0.035). The lack of transportation services was associated with age (p-value <0.001) and duration of dialysis (p-value <0.001) whereas, lack of family support was significantly associated with duration of dialysis (p-value <0.001) only (Table 2).



**Figure 2: Reason of non-compliance to hemodialysis (n=238)**

## DISCUSSION

Provision of renal replacement therapy/hemodialysis services is a big challenge for developing countries. Its cost is increasing day by day as the number of patients requiring hemodialysis is on rise, beside the rising cost of supplies and maintenance of dialysis units.

Twenty-five percent of our study participants were non-compliant with their treatment schedule which is less than the earlier data from Pakistan.<sup>7</sup> According to Renal Registry of Pakistan, out of 7260 dialysis dependent patients, only 1537 patients were receiving thrice weekly treatment while 66% (4841) had twice weekly

**Table 1: Comparison of complaints with demographic and clinical characteristics of the patients (n=952)**

	Compliant (n=714)		Non-compliant (n=238)		p-value
Total	n (%)	n (%)	n (%)		
<b>Age, years</b>					
≤40	367	301 (82)	66 (18)	<0.001	
>40	587	413 (70)	173 (29)		
<b>Gender</b>					
Male	695	514 (74)	181 (26)	0.221	
Female	257	200 (78)	57 (22)		
<b>Duration of dialysis, months</b>					
≤12	526	438 (83)	88 (17)	<0.001	
>12	426	276 (65)	150 (35)		
<b>Urea reduction ratio</b>					
<65	326	235 (72)	91 (28)	0.135	
≥65	626	479 (77)	147 (23)		
<b>AV fistula</b>					
Yes	595	479 (80)	116 (20)	<0.001	
No	357	235 (66)	122 (34)		
<b>Mean arterial pressure</b>					
<105	760	607 (80)	153 (20)	<0.001	
≥105	192	107 (56)	85 (44)		
<b>Hb, gm/dl</b>					
≤10	235	157 (22)	78 (33)	<0.001	
>10	717	557 (77)	160 (22)		
<b>Phosphate, mg/dl</b>					
<5.5	704	535 (76)	169 (24)	0.224	
≥5.5	248	179 (72)	69 (28)		
<b>Albumin, gm/dl</b>					
≤3.5	143	93 (65)	50 (35)	0.003	
>3.5	809	621 (77)	188 (23)		
<b>Potassium, mmol/dl</b>					
<6	140	100 (71)	40 (29)	0.291	
≥6	812	614 (76)	198 (24)		

All data presented as number (%), chi-square test applied, p-value <0.05 taken as significant

**Table 2: Reasons of non-compliance with respect to demographic characteristics of the patients (n=952)**

	Total	Financial Constraints			Lack of Transportation Facility			Lack of Family Support		
		Yes (n=28)	No (n=924)	p-value	Yes (n=134)	No (n=818)	p-value	Yes (n=85)	No (n=867)	p-value
<b>Age, years</b>										
≤40	367	9 (2)	358 (96)	0.480	29 (8)	338 (92)	<0.001	28 (7)	339 (92)	0.266
>40	585	19 (3)	566 (97)		105 (18)	480 (82)		57 (10)	528 (90)	
<b>Gender</b>										
Male	695	28 (4)	667 (96)	<0.001	96 (14)	599 (86)	0.702	66 (10)	629 (90)	0.312
Female	257	0 (0)	257 (100)		38 (15)	219 (85)		19 (7)	238 (93)	
<b>Duration of dialysis, months</b>										
≤12	526	10 (2)	516 (98)	0.035	49 (9)	477 (91)	<0.001	29 (6)	497 (95)	<0.001
>12	426	18 (4)	408 (96)		85 (20)	341 (80)		56 (13)	370 (87)	

All data presented as number (%), Chi-square test applied, p-value <0.05 taken as significant

dialysis and 12% (882) patients reported irregular dialysis sessions.<sup>5</sup> A study from Abbottabad (Pakistan) found that nearly 2/3<sup>rd</sup> of ESRD patients were non-compliant and missed their treatment sessions and reported back only when symptomatic.<sup>7</sup>

Lack of transportation was major reason of non-compliance followed by lack of family support and financial constraints. It concurs with findings of Chenitz KB et al, who found that most common barrier to hemodialysis was inadequate or unreliable transportation.<sup>9</sup> Most of the patients in our study were from middle class and poor socioeconomic status with private transport/vehicles and rely on public transport. A study has reported most of ESRD patients as young to middle age and mostly sole bread-earner of the family with poor social and community support.<sup>10</sup> Males were significantly more affected by financial constraints than females while females were significantly more affected by lack of transportation. This could be due to the reason that males usually earn, and females are usually dependent on males for travel and transportation.<sup>11</sup>

In contrast to other study findings, missing of treatment sessions was more frequent among patients with above forty years of age.<sup>3,12</sup> Patients on maintenance hemodialysis for more than 12 months were more likely to be non-compliant as compared with those whose duration of dialysis dependency was 6 months to 1 year. Saran R et al.<sup>3</sup> found that time on dialysis increases the odds of being non-adherent to treatment time. This phenomenon of increasing absenteeism with longer duration of dialysis may be due to loss of interest in self-care with time, depression, lack of social and family support, decreasing attention

/ education by staff of dialysis unit and false over-confidence of being able to cope the effects of missing the treatment. Most of the patients were not concerned about the effects of missing dialysis session as they did not feel any immediate ill effect. This findings of our study is similar to a number of findings previously reported.<sup>13</sup>

In the current study, there was statistically significant difference in prevalence of arterio-venous fistula between the two groups (compliance/non-compliance) of the patients. As patients missed dialysis sessions, they also missed the opportunity to get rid of vascular catheters and remain on catheters for longer period of time. These catheters have high risks of infection and inflammation.<sup>14</sup> Low serum albumin carries risk of increased mortality especially among Pakistani dialysis patients.<sup>15,16</sup> Serum potassium was higher among patient who missed the treatment sessions but this difference is not statistically significant. High mean arterial pressure (MAP) among those missing treatments may be reflecting retention of salt and water as well as non-compliance with anti-hypertensive drugs and may be a contributing factor in morbidity and mortality.<sup>17</sup> The proportion of patients with serum phosphate above 7.5 mg/dl was significantly high among non-compliant patients. High serum phosphate among patients missing dialysis sessions denotes inadequate dialytic removal of phosphate, and non-compliance to dietary restrictions and phosphate binders can be a contributing factor.<sup>18</sup> Lower hemoglobin among patients missing dialysis is multifactorial including missing erythropoietin and parenteral iron, presence of inflammation due to

catheters and loss of blood in catheter care. Patients who missed dialysis are more likely to have poor control of their anemia, bone mineral milieu and blood pressure, more severe fluid and electrolyte imbalance resulting in cardiovascular morbidity and mortality.<sup>19</sup>

This high frequency of missed treatments and its adverse impact occurring in an institution where patients get free treatment dictates that more and more efforts are needed to improve compliance of patients. Provision of dialysis services close to patients' home especially in small cities and rural areas is need of hour and requires political commitment and community mobilization.<sup>20,21</sup>

## CONCLUSION

Missing of dialysis treatment sessions affects a big proportion of maintenance hemodialysis patients. Lack of transportation is the major reason behind missing of dialysis treatment sessions. Provision of cheap and reliable transportation facility and establishment of dialysis facilities close to patients' home (rural areas, small cities) may improve compliance of the patients.

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