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ASSESSMENT OF FATIGUE IN DIALYSIS [PERITONEAL AND HEMODIALYSIS] AND NON-DIALYSIS PATIENTS OF CHRONIC KIDNEY DISEASE

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Keywords:

Chronic kidney disease, Fatigue, Dialysis, End stage Renal Disease, Fatigue severity scale

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ABSTRACT: Background: Fatigue is a common symptom in patients with advanced kidney disease, with implications for quality of life and clinical outcome. Fatigue is one of the most frequent complaints of dialysis patients and is associated with impaired health related quality of life (HRQOL). **Aim:** To monitor and measure the severity of fatigue in dialysis and non-dialysis patients of chronic kidney disease. **Methodology:** This prospective study was performed in the Department of Nephrology in SVIMS, Tirupati, over a period of 6 months. In this study, Fatigue Severity Scale was used with help of questionnaire form. **Results:** A total of 30 patients were recruited in this study based on their type of dialysis and we categorized subjects based on Gender, Age, Occupation, CKD Stage, dialysis per week, family history, complications and duration of CKD. We found that average fatigue score in Non-Dialysis subjects is 4.80±1.989, Hemodialysis subjects is 4.20±1.033, Peritoneal dialysis is 2.80±1.476. **Conclusion:** Our study concludes that patient having comorbidity condition like only Hypertension and Hypertension with Diabetes mellitus were mostly prone to fatigue. Our study also concludes that the patients receiving medication therapy i.e. Non-dialysis patients are more prone to fatigue than patients receiving Peritoneal and Hemodialysis.

INTRODUCTION: Fatigue is defined as a subjective sense of weakness lack of energy, and tiredness [1]. It's considered as a traditional phenomenon given that it follows prolonged physical or mental activity, and resolves completely with rest [2]. The factors contributing to fatigue will be categorized as physiological, psychological and socio demographic all of which have multiple complex and reciprocal interactions with fatigue [1].

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Epidemiology: in step with a study fatigue is most typical in developed countries. A British survey states that ladies are more prone than men (10-2% men and 10-6% women has the substantial fatigue in a very month [3]. Approximately 70% of patients with CKD report fatigue, with up to 25% reporting severe symptoms.

Patient-reported fatigue is related to death, dialysis initiation, and hospitalization among individuals with CKD [4] Treatment. In non-dialysis patients non pharmacological interventions targeting nutrition, sleep hygiene, stress management and depression may potentially decrease fatigue. Some small studies indicate that acupressure may help to boost fatigue. In dialysis patients, both aerobic and resistance exercises are related to improvements in muscle structure and performance, cardiac

function, pressure level, psychological adaptation, and QoL [7]. Intravenous levocarnitine infusion has also been shown to effect fatigue. Psycho-stimulants like methylphenidate have shown significant improvement in cancer related fatigue and will be useful in ESRD patients, although evidence supporting this is often lacking [5]. Cognitive-behavioural therapy (CBT) for sleep disturbances in dialysis patients has shown promising effects on fatigue, with modest but significant reductions in fatigue scores after intervention [8].

Background: Fatigue may be a common symptom in patients with advanced nephritis, with Implications for quality of life and clinical outcome [4]. The prevalence of fatigue ranges from 42% to as high as 89% in line with the treatment modality and therefore the measurement instruments used. The association between fatigue and psychological factors, like depression and anxiety, behavioural factors like sleep and nutrition corroborates the view of fatigue as a multidimensional and multifactorial problem [5].

Fatigue is one among the foremost frequent complaints of dialysis patients and is related to impaired health related quality of life (HRQOL) [6]. additionally to recognizing fatigue and its severity, it's important to contemplate the socio-demographic, physiological, and psychological correlates of fatigue in chronic kidney disease(CKD), end–stage renal disease (ESRD), and kidney transplantation.

Need of the Study: It is the first on-going study on assessing severity of fatigue in India. Usually fatigue is not considered in comorbid and chronic illness patients.

AIM and Objectives:

AIM: The current study is aimed to monitor and measure the severity rate of fatigue in dialysis and non-dialysis patients of chronic kidney disease.

Objectives:

- ✓ To measure the severity of fatigue in CKD patients.
- ✓ To evaluate the severity of fatigue using fatigue severity scale.

MATERIALS AND METHODS: This prospective non- randomized study was conducted for a period of 6 months (December 2020-May 2021) in the department of Nephrology at Sri Venkateswara Institute of Medical Sciences Tirupathi. The protocol of the study was approved by the Institutional Ethics committee bearing the number 1157. In this study the sample size was taken as 150 which is equally divided into three groups i.e. Hemodialysis, peritoneal dialysis and non- dialysis subjects. The study criteria includes subjects who are diagnosed with Chronic Kidney Disease aged 18 years and above, both dialysis and non-dialysis patients taking treatment in the Nephrology department and excluded the subjects diagnosed with Acute Kidney Injury and Non-CKD patients.

In this study we have assessed the fatigue severity by using the Fatigue Severity Scale with the help of questionnaire after taking the consent from the subjects in the informed consent form. Our data collection Proforma includes demographic details, past medical history, medication history, dietary habits, lifestyle and habits of patients, laboratory reports and treatment chart, complications after dialysis, Stage of CKD and type of dialysis.

Statistical Analysis: The collected data was saved to Microsoft Excel software and the entire data including demographic details, past medical history, stage and duration of CKD, family history, dialysis per week, complications after dialysis are analyzed using mean $\pm$ SD. The graphical representations were done by using pie-chart, bar graph for visual interpretation to analyze the data. For continuous variables data has been presented by Results: $p<0.05$ was considered as significant. F value and chi-square test were also done. Data was analysed using Statistical package of social and sciences (SPSS).

RESULTS: A prospective observational comparison study was conducted for 6 months (Dec- 2020 To May -2021) in department of Nephrology in Sri Venkateswara Institute of Medical sciences (SVIMS), Tirupati. A total of 150 subjects were taken but only 30 CKD patients were recruited in to the study based on inclusion and exclusion criteria upon receival of ICF.

A total 30 patients were recruited in to three groups i.e. 10 patients were Non-dialysis, 10 patients were Hemodialysis and10 patients were peritoneal dialysis based on their type of Dialysis.

Demographic Details of Study Subjects:

Gender: Out of 30 patients 18 were males and 12 were females. **Fig. 1** explains the distributions of gender in three groups from the total study Sample.

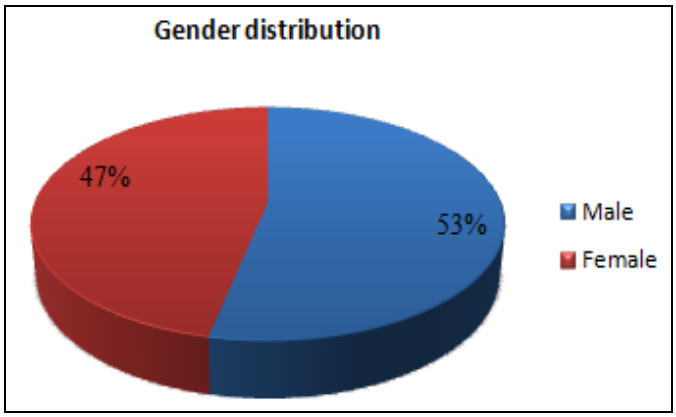

FIG. 1: PATIENTS DISTRIBUTION ON GENDER

Age wise Distribution: We categorized the patients to their age groups. The average age of the total study population is 52 years and the average age of Non dialysis, Hemodialysis and Peritoneal dialysis is found to be 52.50, 53.40, and 51.10 years respectively. **Fig. 2** Explains about the average age groups of patients according to type of dialysis.

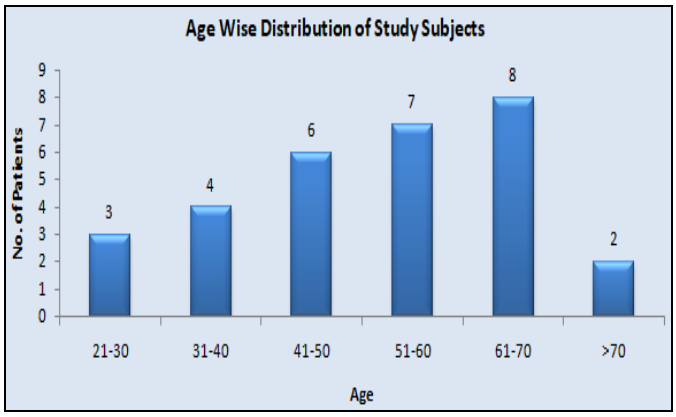

FIG. 2: PATIENTS DISTRIBUTION ON AGE GROUPS

Occupation: We have assessed the occupation of study subjects. Out of 30 subjects 12 (40%) were from government sector, 5 (17%) were from non-government sector, 7 (23%) were Agriculture & Labor families and 6 (20%) were others (Non-working) which is explained in the **Fig. 3.**

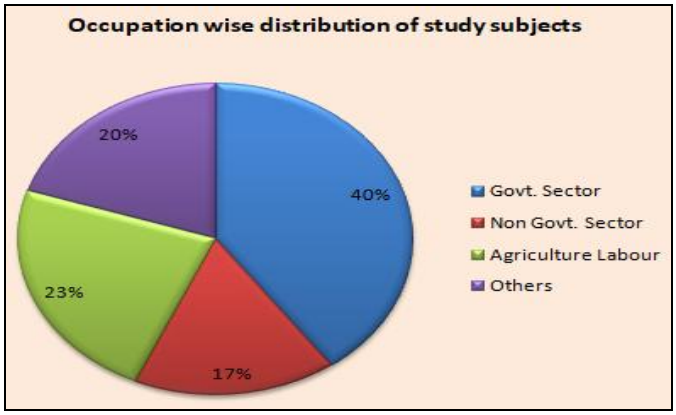

FIG. 3: DISTRIBUTION BASED ON OCCUPATION

Stages of CKD: We have assessed the subjects based on their stages of CKD and the results is found to be Chi-square χ^2 = 24.588**; (p = 0.000); df= 6 and p- value is found to be significant at 0.01 level (P<0.01). **Table 1** explains about the distribution of subjects respective of their fatigue based on CKD stages and **Table 2** explains the average fatigue score based on CKD stage. The total Mean± S.D for the comparison of subjects based on their CKD stages is 3.93 ± 1.721 and P-value is 0.009 respectively.

TABLE 1: PATIENTS DISTRIBUTION OF TYPE OF DIALYSIS BASED ON CKD STAGES

Stage of CKD	Fatigue						Total		Chi-square
	Non-dialysis		Hemodialysis		Peritoneal dialysis				
	No. of Patients	Percent %	No. of Patients	Percent %	No. of Patients	Percent %	No. of Patients	Percent (%)	
Stage I	0	0.0	0	0.0	0	0.0	0	0.0	$\chi2$ =
Stage II	7	70.0	0	0.0	0	0.0	7	23.3	24.588**;
Stage III	2	20.0	0	0.0	1	10.0	3	10.00	(p = 0.000) ;
Stage IV	1	10.0	1	10.0	1	10.0	3	10.0	df= 6;
Stage V	0	0.0	9	90.0	8	80.0	17	56.7	
Total	10	100.0	10	100.0	10	100.0	30	100.0	

**significant at 0.01 level (P<0.01).

TABLE 2: COMPARISON OF FATIGUE BASED ON CKD STAGE

Stage of CKD	N	Mean ± S.D	Std. Error	*F*-value	*p*-value
Stage II	7	5.57 ± 1.512	.571	4.738**	0.009
Stage III	3	3.67 ± 2.309	1.333		
Stage IV	3	4.67 ± 1.528	.882		
Stage V	17	3.18 ± 1.286	.312		
Total	30	3.93 ± 1.721	.314		

**significant at 0.01 level; (P<0.01).

Dialysis per Week: We have categorized the patients according to episodes of dialysis per week categorizing into non-dialysis, hemodialysis and peritoneal dialysis subjects and the results are Chi-square χ^2 = 40.000**; p = 0.000; df= 6 and p value is significant 0.01 level. **Table 3** explains about the distribution of subjects respective of their fatigue based on No. of dialysis per week.

TABLE 3: PATIENTS DISTRIBUTION OF TYPE OF DIALYSIS BASED ON NO. OF DIALYSIS PER WEEK

Dialysis Per week	Fatigue								Chi-square
	Non-dialysis		Hemodialysis		Peritoneal dialysis		Total		
	No. of Patients	Percent (%)	No. of Patients	Percent (%)	No. of Patients	Percent (%)	No. of Patients	Percent (%)	
Non –Dialysis	10	100.0	0	0	0	0	10	33.3	$\chi2$ =
1 Time / week	0	.0	0	0	2	20.0	2	6.7	40.000**;
3 Times / week	0	.0	10	100.0	5	50.0	15	50.0	(*p* =
Daily	0	.0	0	.0	3	30.0	3	10.0	0.000);
Total	10	100.0	10	100.0	10	100.0	30	100.0	df= 6;

**significant at 0.01 level; (p<0.01).

Table 4 explains the average fatigue score based on number of dialysis per week. The total average fatigue score is 3.93 ± 1.721 and the *p*-value is 0.135. The result is found to be significant at 0.01 level; (P<0.01).

TABLE 4: COMPARISON OF SEVERITY OF FATIGUE BASED ON NUMBER OF DIALYSIS PER WEEK

No. Dialysis per week	N	Mean ± S.D	Std. Error	*F*-value	*p*-value
No Dialysis	10	4.80 ± 1.989	.629	2.026[@]	0.135
1 time /week	2	3.00 ± .000	.000		
3 Times /week	15	3.33 ± 1.543	.398		
Daily	3	4.67 ± .577	.333		
Total	30	3.93 ± 1.721	.314		

**significant at 0.01 level; (P<0.01).

Family History: We have categorized the study subjects to their family history and the results are Chi square $\chi^2 = 16.636^{@}$; (p = 0.276); df= 14 and P value is found to be not significant. **Table 5** explains about the distribution of subjects respective of their fatigue based on Family History.

TABLE 5: PATIENTS DISTRIBUTION OF TYPE OF DIALYSIS BASED ON FAMILY HISTORY

Family History	Fatigue				Chi-square
	Non-dialysis	Hemodialysis	Peritoneal dialysis	Total	
Nothing Significant	7	6	9	22	$\chi2 = 16.636^{@}$;
Both parents had HTN, DM	1	0	0	1	(p = 0.276) ;
Both Parents Have DM	0	1	0	1	df= 14;
Father had HTN	0	2	0	2	
Grand Mother has bone Cancer	0	0	1	1	
His brother had DM	1	0	0	1	
His brother had HTN	1	0	0	1	
Mother had HTN	0	1	0	1	
Total	10	10	10	30	

@ - Not significant (P>0.05).

Complications: We have categorized the study subjects to their complication after dialysis and the results are Chi square $\chi^2 = 13.000^{@}$; (p = 0.224); df= 10. **Table 6** explains about the distribution of subjects respective of their complications in to non-dialysis, hemodialysis and peritoneal dialysis patients respectively.

TABLE 6: PATIENTS DISTRIBUTION OF TYPE OF DIALYSIS BASED ON COMPLICATIONS

Complications	Fatigue				Chi-square
	Non –dialysis	Hemodialysis	Peritoneal dialysis	Total	
Fits	0	0	1	1	$\chi2 = 13.000^{@}$;
Headache	0	1	0	1	(p = 0.224) ;
Leakage of Fluid After Dialysis	0	0	1	1	df= 10;
Muscle Cramps	0	2	0	2	
Muscle Cramps, Chest Pain	0	1	0	1	
Stomach Pain	0	0	2	2	
Stomach Pain Headache	0	1	0	1	
Stomach Pain Vomiting	0	0	1	1	
Vomiting Body Pains	0	0	1	1	
Vomiting, Stomach Pain Back Pain	0	0	1	1	
Vomiting's	0	0	1	1	
Total	0	5	8	13	

Duration of CKD: We have categorized the study subjects to their duration of CKD and the results are Chi square $\chi^2 = 13.250^{@}$; (p = 0.039); df= 6 and P value is found to be significant at 0.05 level; (P<0.05)

Table 7 and **Table 8** explain the average score of fatigue and interpretation and duration of CKD for three groups separately. The total average score of fatigue is 3.93 ± 1.721 and the *P*- value is found to be 0.336. The result is found to be not significant.

TABLE 7: PATIENTS DISTRIBUTION OF TYPE OF DIALYSIS BASED ON CKD DURATION

Duration CKD (in years)	Fatigue								Chi-square
	Non-dialysis		Hemodialysis		Peritoneal dialysis		Total		
	No. of patients	%	No. of patients	%	No. of patients	%	No. of patients	%	
< 1	3	30.0	0	.0	3	30.0	6	20.0	$\chi2$ =
2 - 4	5	50.0	2	20.0	6	60.0	13	43.3	13.250*;
5 – 7	1	10.0	6	60.0	1	10.0	8	26.7	(p =
> 7	1	10.0	2	20.0	0	.0	3	10.0	0.039);
Total	10	100.0	10	100.0	10	100.0	30	100.0	df= 6

*significant at 0.05 level; (P<0.05).

TABLE 8: INTERPRETATION OF SEVERITY OF FATIGUE BASED ON DURATION OF CKD CONDITION

Fatigue Score	N	Mean ± S.D	Std. Error	*F*-value	*p*-value
Below 1 Year	6	4.17 ± 1.941	.792	1.182[@]	0.336
2 - 4 Years	13	3.54 ± 1.984	.550		
5 - 7 Years	8	4.75 ± 1.165	.412		
> 7 Years	3	3.00 ± .000	.000		
Total	30	3.93 ± 1.721	.314		

@ -Not significant.

Co-morbidity Condition: We have assessed the co-morbidity condition of study subjects and the results are Chi square χ^2 = 13.250[@]; (p = 0.540); df= 16 and P-value is found to be not significant. **Table 9** explains about the distribution of comorbidity conditions of study subjects.

TABLE 9*:* PATIENTS DISTRIBUTION OF TYPE OF DIALYSIS BASED ON COMORBIDITY CONDITION

Medical History	Fatigue				Chi-square
	Non-dialysis	Hemodialysis	Peritoneal dialysis	Total	
HTN	4	6	6	16	$\chi2 = 13.250^{@}$;
DM	0	1	0	1	(p = 0.540) ;
HTN and DM	3	2	2	7	df= 16;
HTN, DM,COPD, CAD and Hypothyroidism	1	0	0	1	
HTN, Left Frontal Temporal, Subdural Hematoma	0	1	0	1	
HTN, DM, Asthma, CVA	1	0	0	1	
HTN And Asthma	0	0	1	1	
HTN, DM And PTB	1	0	0	1	
Thyroid and Asthma	0	0	1	1	
Total	10	10	10	30	

@ - Not Significant.

Fatigue: We have categorized the study subjects to their fatigue severity and the results are explained in the **Table 10.** The total average fatigue score is found to be 3.93 ± 1.721, *F*-value is 4.389* and the p-value is 0.022.The result is found to be significant at 0.05 level; (P<0.05).

TABLE 10: COMPARISON OF FATIGUE BASED ON TYPE OF DIALYSIS PATIENTS

Fatigue	N	Mean ± S.D	Std. Error	*F*-value	*p*-value
Non-dialysis	10	4.80 ± 1.989	.629		0.022
Hemodialysis	10	4.20 ± 1.033	.327	4.389*	
Peritoneal dialysis	10	2.80 ± 1.476	.467		
Total	30	3.93 ± 1.721	.314		

*significant at 0.05 level (P<0.05).

DISCUSSION: In our study we have categorized the patients according to their age groups and found those 61-70 age groups were prone to fatigue, in our study. It is supported by Micol Artom *et al* (2014) according to this study in renal patients with those over 60 years of age reporting higher levels of fatigue. This is also supported by Ummuhan Akturk and Ebru Gul (2018) according to this study the increase in the level of fatigue in accordance with the increase in the age of CKD patients can be interpreted by the decrease in physical activity caused by the physiological changes as a result of the progression of the age and the increase in the number of chronic diseases due to age and the psychosocial effects of these diseases [5 & 9]. We have categorized the patients according to their gender and found that males are more prone to fatigue than females. While other studies seem that the females are more prone than the males [11, 12 & 13]. We have observed that the patients with HTN and both HTN and DM are more prone to fatigue, in our study. It is supported by Chia-Ter Chao *et al* (2016) according to this study among their cohort, half were found to have DM. No significant differences were found between ESRD patients with and without DM regarding demographic profiles, body mass index, and comorbidities including heart failure [10]. We have categorized patients according

to their dialysis sessions per week and found that the patients who undergo dialysis 3 times/week are more prone to fatigue, in our study. It is supported by Manisha Jhamb *et al* (2008) according to this study longer post-dialysis fatigue (i.e. for 3 times/week for several months like 18 months) has been associated with shorter survival. This suggests that patients with longer recovery time may have a greater degree of underlying inflammation, which could contribute to a higher incidence of coronary artery disease and mortality [1].

We have categorized patients according to their mode of dialysis like hemodialysis, peritoneal dialysis and non-dialysis patients and found that non-dialysis patients are more prone to fatigue, in our study. It is supported by L. Parker Gregg *et al.* (2019) according to this studythe 2/3 of CKD non dialysis patients were known to be affected by fatigue which is also associated with unemployment, comorbidities, Anaemia and use of antidepressant medication [11].

We have categorized the patients according to their duration of CKD and found that the patients having CKD for more than 2-4 years are more prone to fatigue, in our study. This is supported by Ummuhan Akturk and Ebru Gul (2018) according to this study it was determined that the duration of treatment of CKD patients increased as fatigue levels increased. Depending on the progress of the HD treatment, the burden increases as a result of changes in the physical, mental, and social lives of the patients, and the inability to cope with this situation and the burnout may lead to increased fatigue in the patients [9].

We have categorized patients according to their occupation and found that patients working in government sector are more prone to fatigue than patients working in private sector, agriculture labors and others. While other studies seem that the unemployed patients are more prone to fatigue than the employed patients [10 & 14]. We have categorized patients according to their stages of CKD and found that patients who are diagnosed with stage V of CKD(57%) are more prone to fatigue than other patients of stages –I, II, III and IV of CKD. We have categorized patients according to their family history and found that patients having no family history [nothing significant-(73%) are more prone to fatigue than the other patients who have family history in our study.

CONCLUSION: Based on results of our study, we concluded the majority of patients in this study were between the age group of 61-70 years and the highest percentages of patients were males. The patients working in government sector, patients having no family history and having comorbidity condition like Hypertension and both Hypertension and Diabetes mellitus were mostly prone to fatigue. Among the patients receiving dialysis for 3 times/week, diagnosed with Stage V of CKD and patients who have CKD for more than 2-4 years are more likely prone to fatigue. Our study also concludes that the patients receiving medication therapy i.e. Non-dialysis patients are more prone to fatigue than patients receiving Peritoneal and Hemodialysis.

Further prospective and multi – center studies are required to delineate this problems.

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