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NURSE-LED INTERVENTION TO IMPROVE THE QUALITY OF LIFE AMONG ADULTS WITH TYPE 2 DIABETES UNDERGOING HEMODIALYSIS

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ABSTRACT

Aim: Chronic kidney disease is a progressive decline in renal function with a reduced glomerular filtration rate and proteinuria. The study evaluates the nurse-led intervention to improve the quality of life among adults with type 2 diabetes on hemodialysis. **Methods:** The study was a randomized controlled trial with a pre-test and post-test in a tertiary hospital. A random sample of 110 adults with type 2 diabetes (T2D) and end-stage renal disease (ESRD) in the intervention and 100 adults in the control group was selected for the study in 2017. General linear model and Repeated measures were done to determine the effects of the group. **Results:** A statistically significant main effect (between-groups), within-group (time) and interaction effects for intervention were detected in all the parameters across time from T2 to T3 in the intervention group. C**onclusion:** Nurse-led intervention had a positive effect on the kidney disease, physical and mental health among the adults with T2D and end-stage renal disease.

Keywords: End Stage Renal Disease, Type-2 Diabetes, Hemodialysis, Nursing, Nurse-Led Intervention, Quality of Life

INTRODUCTION

Long-term chronic kidney disease (CKD) leads to life-threatening metabolic disorder (Barasch & Barasch, 2012) and end-stage renal disease (ESRD) (Ibrahim, 2015). CKD has the high prevalence in the general population due to aging, hypertension, glomerulonephritis (Shaw *et al.*, 2013), diabetes mellitus (Gilg, Rao & Fogarty, 2013), renal impairment and recurrent infection (Navaseelan, Judenimal & Dioso, 2017). Hyperglycemia and HbA1c were high, dyslipidemia is associated with increased triglycerides, decreased LDL and HDL (Yanjmaal *et al.*, 2018).Intake of energy drinks is a major determinant of developing kidney failure among the younger adults due to taurine that accumulates in the kidneys (Suliman *et al.*, 2002), exceeding the recommended dosages of drinks, mixing energy drinks with alcohol or consuming after exercise may be harmful (Hanly, 2014). Adults with T2D and ESRD are at high risk for fatigue, weakness, and nutritional problems, poor social interaction and low quality of life (Horigan, Rocchiccioli & Trimm, 2012). Adopting a healthy renal diet, learning to cope with illness, and compliance with dialysis may assist to improve their quality of life (QOL).

Quality of life refers to the adult's functioning, well-being, and health perception in physical, psychological, and social domains among adults with T2D and ESRD. Adults with type 2 diabetes (T2D) and ESRD are associated with high complications, poor QOL and lack of adherence to the renal replacement therapy (Fresenius Medical Care, 2013). Activity levels, functional ability, health status, and psychological status affect QOL among adults with ESRD (Fayers & Machin, 2013). Hence adherence, compliance, exercise and engagement

in activities pose challenges to adults with ESRD (Karolich & Ford, 2010). Studies have shown that QOL is lower among adults with ESRD in comparison to the general population affected by dialysis efficiency, duration of dialysis, medical conditions, hemoglobin, anxiety, and depression.

Adults with T2D and h ESRD must adapt and cope with various stresses related to self-care management of their symptoms, illness, dialysis and change in activities of daily living, mobility, eating, medications and follow-up. These changes influence their physical, psychological and social health and well-being. In our study, the nurse-led intervention was developed for adults with T2D and ESRD taken from hospital to home so as to care to improve and sustain with positive effects for adults with T2D and ESRD. There is a great need for nurse-led interventions to enable the capabilities of adults with T2D and ESRD, to make informed decisions and confidence in their self-care management. The aim of this study is to examine the effectiveness of a nurse-led intervention (NLI) designed to support adults with T2D to improve their quality of life.

RESEARCH METHODOLOGY

Design

The study was a randomized controlled trial with a pre-test and post-test. The renal dialysis unit of a local, regional hospital and community in India participated in the study. The study set up consisted of two groups: an intervention group using the nurse-led intervention and the control group receiving the usual care in the hospital and community.

Population and sample

Adults with T2D and ESRD accessing the renal dialysis unit of the regional hospital with 30 beds were recruited for the study. The inclusion criteria consisted of adults over 18 years, willing to volunteer and consent, able to understand the local language and English, ready to commit to the study needs and objectives, diagnosed with T2D and ESRD and undergoing hemodialysis and willing to adopt the nurse-led intervention. Patients with intermittent peritoneal dialysis, kidney transplants and life-threatening complications, neurological disorders like stroke, degenerative diseases and cognitive impairment were excluded from the study. The target population was adults with T2D and ESRD undergoing hemodialysis, who were admitted from 1st January 2017 to 30th July 2017 in the hospital.

Sample size and power

Based on Repeated measures analysis of variance, an estimated sample size of 210 (110 in the intervention group and 100 in the control group) was considered adequate to validate the effects of the nurse-led intervention (Figure 1). A total of 225 adults were allotted to the intervention and control group to reduce attrition and mortality. The design achieved 90% power with an alpha <0.01 (1% level of significance) and 0.80 effect size (Cohen, 1992).

Measurements

The primary outcome of the study is the quality of life measured by the Kidney Disease Quality of Life-Short form (KDQOL-SF) instrument. It is a self-report measure developed for individuals with kidney disease and on dialysis comprising of 79 items in the generic and kidney-targeted areas of QOL for adults with ESRD (Hays *et al.*, 1997). It includes 43 kidney-disease targeted items and 36 items of SF that provide a generic score and an overall health rating item. It has 19 subscales and one free-standing question on overall health rating. The 8 subscales for the SF-36 are Physical functioning (10), Role-physical (4), Bodily pain (2), General health (5), Vitality (4), Social functioning (SF) (2), Role-emotional (RE) (3), and Mental health (5) and General QOL. The 11 subscales for kidney disease-specific focus on Symptoms/Problems (12), Effects of kidney disease on daily life (8), Burden of kidney disease (4), Work status (2), Cognitive function (3), Quality of social interaction (3), Sexual function (2), Sleep (4), Social support (2), Dialysis staff encouragement (2), adult satisfaction (1) (KDQOL-SF 1997). The reliability of the KDQOL-SF in this study was r=0.90.

Demographic variables were prepared consisting of age, gender, educational status, occupation, and family monthly income. Clinical variables include physical activity. The classification of ESRD (Kidney disease outcomes quality initiative) is based on the glomerular filtration rate (mL/min/1.73m^2) as mild: 60-89 mL/min/1.73m^2, moderate: 30-59 mL/min/1.73m^2 and severe: 15-29 mL/min/1.73m^2 by the KDQOL. Anemia was classified as < 80 g/L as severe, 80-109 g/L as moderate and 110-119 g/L (females) or 110-129 g/L (men) as mild (Benoist *et al.*, 2008). Body mass index was categorized as normal: 18.5-24.9, pre-obesity: 25-

29.9 and obesity class I: 30-34 (World Health Organization, 2004).

Randomization

Blocked randomization was used for blind selection of adults to the allocated treatment across the intervention and control groups. The selected adults in the intervention group were given nurse-led intervention at two-time intervals within a period of 6 weeks after the baseline data (pretest T1) was gathered and the consecutive 6 weeks after the posttest T2. The adults in the nurse-led intervention were asked to maintain the confidentiality of the intervention for the study purpose.

A triple blinding technique was used to maintain the confidentiality of the data outcome measures. Both the intervention and the control group were treated equally regarding the selection, randomization, administration of the data collection instruments and ethical protocol, except for the nurse-led intervention. Randomization took place daily in the dialysis center until the total sample size was reached in the intervention group and the control group after the baseline data (T1).

Quality and Rigor of the Intervention

A nurse-led intervention (NLI) protocol was developed by the researchers and validated by the renal specialist nurses, physicians, psychologists and counselors. Adults with T2D and ESRD in the intervention group received a comprehensive NLI for 4 hours in first 6 weeks (total of 24 hours) after the pretest T1 and a repeat of the NLI of 4 hours duration in the consecutive 6 weeks nurse-led intervention. A total of 48 hours of NLI was delivered using a structured video, interactive discussion, concept mapping, problem-solving and a motivation interview. The nurse led intervention was initiated face to face with the intervention group after the pretest T1 for 6 weeks and after the posttest T2 for the consecutive 6 weeks (a total of 12 weeks).

The nurse-led intervention included a discussion about self-care management, psycho-educational and counseling on lifestyle, activities of daily living, identifying symptoms, effects on kidney disease and complications, changes in adjusting to working, diet, exercise, pain, medication adherence. The NLI included discussion about the energy conservation, gradual improvement in activities, coping skills, interpersonal, family and social interactions, changes in sexual life, sleep management, psychosocial and emotional support, quitting smoking and alcohol to maintain a near healthy lifestyle. NLI was carried out by two trained renal nurse specialist in the local vernacular Kannada and Konkani language before the dialysis for adults with T2D and ESRD in the hospital.

The motivational interview checklist was used to understand the adults' perspectives, follow up on the NLI and confidence and autonomy of managing self-care using the NLI was done. A realistic nurse-led intervention was planned to incorporate adult's preferences, exercise, medication, fluid and diet adherence behaviors, technical procedures for dialysis and avoidance of infection. Family participation was encouraged to support and perform roles as caregivers in the recovery process. The NLI was videotaped with informed consent for quality, consistency, validity, rigor and documentation.

Adults in the control group received routine hospital care, regular discharge care, standard information, and a printed book. The control group received the usual hospital care, and they did not have any access or knowledge of the nurse-led interventions in the study. They were provided with the nurse-led intervention only on completion of the study to maintain the ethics.

Data collection

The data were collected from 1st January 2017 to 30 July 2017 at three-time intervals (T1 as a baseline on day 0, T2 at the end of 6 weeks and T3 at the end of 12 weeks) using a structured self-report questionnaire and face-to-face interview. Outcome data collected at T1provided the baseline for comparison, T2 to determine the immediate intervention effects and T3 data to detect sustaining results of the nurse-led intervention. The purpose of the study, the right to participate or withdraw from the study was explained using written and verbal documents. Informed written and verbal consent was obtained from the selected adults.

Ethical considerations

The study was approved by the Hospital and Medical Ethics Board of the study. The permission to research dialysis unit was obtained from concerned authorities. The eligible adults were identified from the

hospital medical records after securing agreement. Human ethical principles were adhered to the study.

Analysis

Comparisons were made between the two groups of adults with T2D and ESRD. Descriptive statistics were compared for demographic variables. SPSS version 21 was used to perform statistical analysis. Paired and independent *t*-test was applied to determine the effectiveness of the nurse-led intervention. Test of homogeneity indicated no significant difference between the groups in the demographic and clinical variables. A general linear model was used to determine the between-group (intervention), within-group (times) and interactions (time–group) effect to identify statistically significant differences in patterns between groups over time. When a statistically significant ($p<0.05$) difference was found, Repeated measures were performed to determine which group contributed to the effects.

RESULTS

A total sample of 250 adults with T2D and ESRD who met the selection criteria was randomly selected for the study. Among these, a total of 225 adults with T2D and ESRD were recruited into the study and they were randomly assigned to the intervention group (n=113) and the control group (n= 112).110 adults in the intervention group and 100 adults in the control group completed the study and were analyzed (Figure 1).

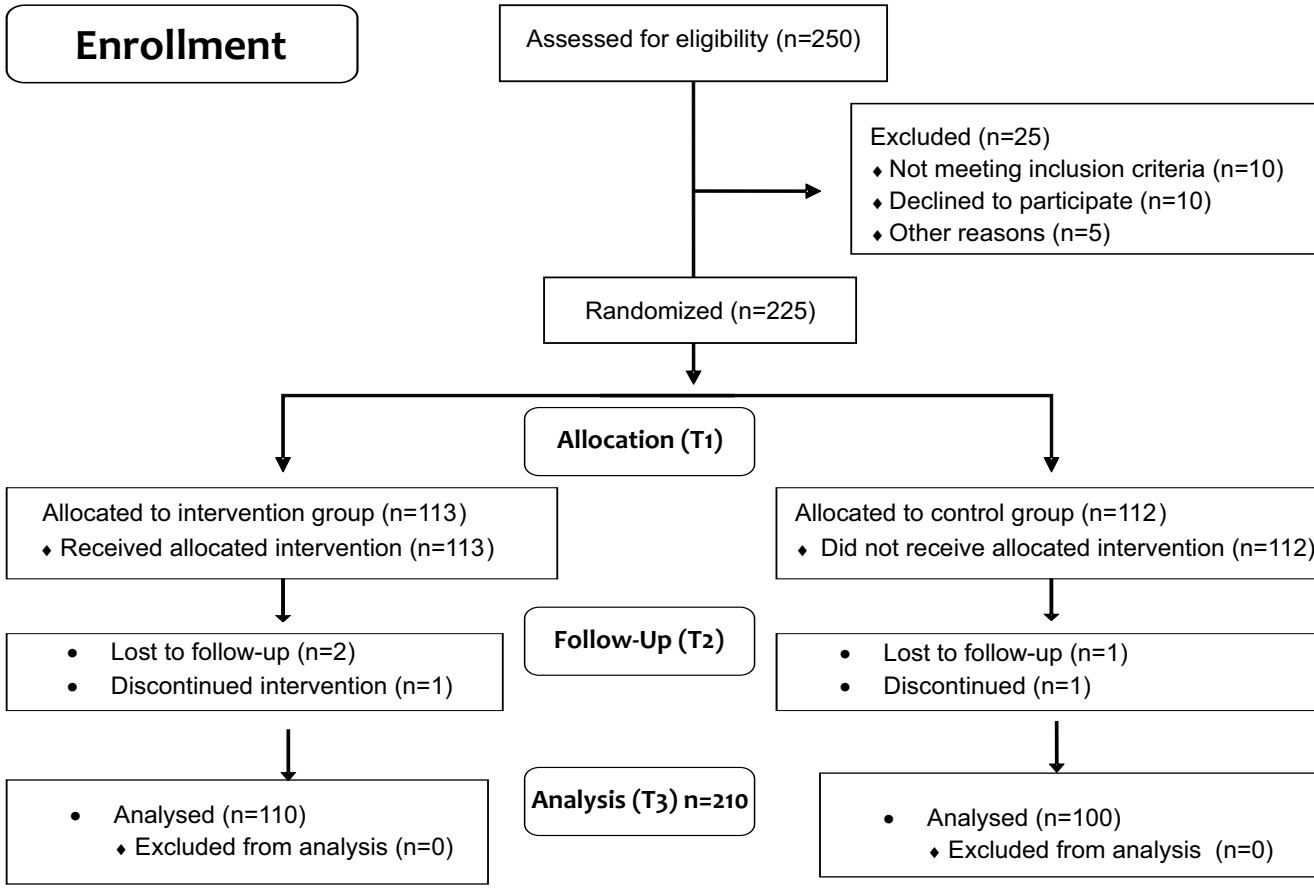

Figure 1: CONSORT flow diagram for renal study

Chi-square comparison and *t*-test showed no significant differences among the demographic and clinical characteristics between the intervention and control group (Table 1 and Table 2 respectively). This association confirms the randomization and homogeneous characteristics among the adults with T2D and ESRD in the intervention and control groups.

Table 1: Demographic Characteristics among Adults with End Stage Renal Disease

Variable/ Categories	Intervention Group F (%), N=110	Control Group N F ((%), N=100	χ^2/ *t*-test *P* value
Age (in years)			0.23#
20 to 34 years	14 (12.7)	9 (9)	
35 to 49 years	37 (33.6)	39 (39)	
50 to 64 years	48 (43.6)	41 (41)	
Above 65 years	11 (10.1)	11 (11)	
Gender			0.46*
Male	62 (56.4)	61 (61)	
Female	48 (43.6)	39 (39)	
Educational status			0.62*
Primary school	34 (30.9)	35 (35)	
SSLC	41 (37.3)	33 (33)	
Bachelor	25 (22.7)	23 (23)	
Master	10 (9.1)	9 (9)	
Occupation			0.19*
Unskilled	38 (34.6)	34 (34)	
Skilled	58 (52.7)	53 (53)	
Professional	14 (12.7)	13 (13)	
Income in USD (INR)			0.69*
< 156.9 (10,000)	37 (33.6)	41 (41)	
157-624.9 (10,001–40,000)	48 (43.6)	45 (45)	
625 (> 40,001)	25 (22.8)	14 (14)	

**Pearson chi-square test<0.05 using 95% confidence interval;#Independent sample t-test*

Table 2: Clinical Characteristics among Adults with End Stage Renal Disease

Variable/ Categories	Intervention Group N=110 (%) N (Percentage)	Control Group N=100 (%) N (Percentage)
Physical activity		0.47*
Sedentary	24 (21.8)	30 (30)
Moderate	51 (46.4)	40 (40)
Heavy	35 (31.8)	30 (30)
Anemia(g/L)		0.57#
< 80 g/L	14 (12.7)	17 (17)
80-109 g/L	52 (47.3)	43 (43)
110-119 g/L or 110 -129 g/L (men)	44 (40)	40 (40)
Glomerular filtration rate (mL/min/1.73m^2)		0.59#
Mild: 60-89 mL/min/1.73m^2	53 (48.2)	45 (45)
Moderate: 30-59 mL/min/1.73m^2	37 (33.6)	36 (36)
Severe: 15-29 mL/min/1.73m^2	20 (18.2)	19 (19)
Body mass index		0.68#
Normal: 18.5-24.9	41 (37.3)	33 (33)
Pre-obesity: 25-29.9	44 (40)	46 (46)
Obesity class I: 30-34.9	25 (22.7)	21 (21)

**Pearson chi-square test,P<0.05 using 95% confidence interval, Independent sample t-test*

The significant variables were Symptoms, Effects of kidney disease, Burden of kidney disease, Work status, Cognitive function, Quality of social interaction, Sexual function across T2 and T3 in the intervention group (Table 3). Repeated measures were used to determine the attribution of time effects from the two groups separately for the groups at the three-time intervals. Intervention group adults showed marked improvements after the intervention, with the effect of improvement in the following six weeks. There was a marked decrease in the mean scores of the various KDQOL dimensions in T2 from T1 and later the mean scores remained slightly higher or similar after 12 weeks among the control group. The control group did not display any improvement during the first 12 weeks or the in the consecutive weeks and had a lesser degree of change.

Effect of intervention over time and outcome measures

Table 3: Kidney disease Quality of Life in intervention group (N=110) and control group (N=100): Mean score and change over time

Time	Pre-test (T1)			Post-test I (T2)			Post-test II (T3)		
Group Outcome measures	Intervention Group	Control group	Independent *t* test	Intervention Group	Control group	Independent *t* test	Intervention Group	Control group	Independent *t* test
KDQOL	Mean (SD)	Mean (SD)	*P* value	Mean (SD)	Mean (SD)	P value	Mean (SD)	Mean (SD)	*P* value
Symptom/ problem list	62 (12.5)	59 (7.9)	0.23	83 (8.9)	37(6.6)	0.000***	92 (6.4)	54(13.5)	0.000***
Effect of kidney disease	57 (14.2)	55 (8.9)	0.46	75 (9.3)	47(13.2)	0.000***	89 (7.4)	49(14.2)	0.000***
Burden of kidne Ydisease	44 (13.1)	40 (12.7)	0.38	70 (14.1)	18(9.3)	0.000***	64 (9.3)	36(16.1)	0.000***
Work status	35 (15.7)	45 (13.6)	0.04	40 (13.9)	25(15.7)	0.000***	52 (5.9)	27(15.7)	0.000***
Cognitive function	67 (14.4)	66 (12.3)	0.19	85 (11.8)	40(11.2)	0.000***	83 (8.2)	59(17.4)	0.000***
Quality of social interaction	69 (11)	64 (14.3)	0.06	74 (10.3)	27(10.6)	0.000***	82 (7.3)	61(18.0)	0.000***
Sexual function	53 (17)	63 (12.4)	0.11	74 (8.5)	43(14.0)	0.000***	78 (7.7)	45(17.0)	0.000***
Sleep	52 (12.8)	50 (11.1)	0.19	65 (10.1)	42(14.8)	0.000***	72 (9)	44(13.8)	0.000***
Social support	73 (14.7)	66 (13.8)	0.20	83 (12.2)	63(14.7)	0.000***	99 (5.1)	65(14.7)	0.000***
Dialysis staff encouragement	70 (14.6)	70 (15.3)	0.36	86 (14.6)	60(14.6)	0.000***	93 (4.2)	62(14.6)	0.000***
Overall health	59 (17)	57 (14.2)	0.47	70 (11.6)	49(15.0)	0.000***	75 (4.6)	51(16.0)	0.000***
Patient satisfaction	82 (13)	79 (13.2)	0.54	94 (10.8)	72(14.0)	0.000***	99 (3.8)	74(13.0)	0.000***

****Statistically significant at P<0.001 using 95% confidence interval, Kidney Disease Quality of Life (KDQOL)*

Table 4: General Linear Model among adults with the end-stage renal disease between the intervention and control group KDQOL

Outcome measures	Between-group		Within-group		Interaction effect	
KDQOL	F	*P* value	F	*P* value	F	*P* value
Symptom/ problem list	0.53	0.46	4.38	0.01*	0.36	0.03*
Effect of kidney disease	0.11	0.54	3.48	0.03*	0.67	0.05*
The burden of kidney disease	0.10	0.43	1.03	0.05*	1.02	0.04*
Work status	0.53	0.46	0.82	0.45	0.26	0.78
Cognitive function	2.14	0.32	0.27	0.76	0.27	0.58
Quality of social interaction	0.91	0.56	1.29	0.05*	0.46	0.73
Sexual function	0.56	0.48	2.73	0.23	1.82	0.45
Sleep	0.12	0.54	3.28	0.04*	1.67	0.74
Social support	0.91	0.76	0.37	0.47	0.83	0.71
Dialysis staff encouragement	2.18	0.28	0.27	0.04*	9.45	0.05*
Overall health	0.18	0.45	0.38	0.05*	0.75	0.05*
Patient satisfaction	0.31	0.32	0.38	0.03*	0.54	0.04*

****Statistically significant at P<0.001 using 95% confidence interval, Kidney Disease Quality of Life (KDQOL)*

A statistically significant main effect (between-groups), within-group (time) and interaction effects for intervention were observed in all the parameters across time from T2 to T3 in the intervention group (Table 4).

Table 5: Independent t-test among the Intervention and Control group General QOL among adults with ESRD

Time	Pre Test (T1)			Post Test I (T2)			Post Test II (T3)		
Group	Intervention Group	Control Group	Independent *t*-test	Intervention Group	Control Group	Independent *t*-test	Intervention Group	Control Group	Independent *t*-test
General QOL	Mean (SD)	Mean (SD)	*P* value	Mean (SD)		*P* value	Mean (SD)	Mean(SD)	*P* value
Physical functioning	50(12.36)	45(15.56)	0.298	72(14.74)	32(15.16)	0.000***	92(10.22)	42(12.23)	0.000***
Role physical	45(14.07)	40(14.63)	0.503	82(14.64)	27(19.21)	0.000***	93(13.41)	37(14.07)	0.000***
Pain	65(15.31)	60(14.27)	0.258	83(13.04)	39(14.06)	0.000***	90(12.2)	57(15.31)	0.000***
General Health	53(14.29)	51(13.81)	0.224	60(12.88)	30(11.83)	0.000***	67(9.63)	43(16.05)	0.000***
Emotional well being	64(13.7)	60(15.23)	0.107	68(13.51)	38(13.14)	0.000***	72(8.03)	56(13.7)	0.000***
Role emotional	57(17.23)	49(19.82)	0.119	88(16.07)	32(10.49)	0.000***	99(7.83)	49(17.23)	0.000***
Social function	64(16.66)	60(16.4)	0.237	81(15.7)	33(12.45)	0.000***	85 (10.18)	56(16.66)	0.000***
Energy/Fatigue	54(13.39)	55(15.24)	0.62	61(11.92)	49(10.58)	0.000***	67(11.49)	46(14.39)	0.000***

****P<0.001 using 95% confidence interval*

The significant variables were Physical functioning, physical role, Pain, General Health, Emotional well-being, Role-emotional, Social interaction and Energy across T2 and T3 in the intervention group (Table 5). Repeated measures were used to determine the attribution of time effects from the two groups separately for the groups at the three-time intervals from T1 to T2 and T3. Intervention group adults showed marked improvements after the intervention, with the effect of improvement in the following six weeks, and the consecutive 12 weeks. Mean scores of the various QOL dimensions decreased during the first six weeks and the consecutive 12 weeks among the control group. The control group did not display any improvement during the first 12 weeks or the in the successive weeks and had a lesser degree of change in T2 and T3.

Table 6: General Linear Model for the Intervention and Control group General QOL across changes in time

Outcome measures	Between group		Within-group		Interaction effect	
General QOL	F	*P* value		*P* value		*P* value
Physical functioning	0.00	0.30	0.83	0.04*	2.36	0.04*
Role physical	0.27	0.35	4.57	0.00*	1.27	0.02*
Pain	0.82	0.47	4.27	0.05*	1.28	0.03*
General Health	0.73	0.38	0.56	0.73	1.28	0.24
Emotional well being	0.29	0.54	4.38	0.01*	0.17	0.28
Role emotional	0.82	0.38	1.04	0.00*	4.38	0.02*
Social function	0.34	0.43	4.78	0.02*	3.48	0.01*
Energy/Fatigue	1.00	0.28	1.28	0.32	0.35	0.04*

**P<0.05; 95% confidence interval*

A statistically significant main effect (between-groups), within-group (time) and interaction effects for intervention were observed in all the parameters across time from T2 to T3 in the intervention group (Table 6). The significant differences in the intervention group contributed to within-group (Physical functioning, physical Pain, Emotional well-being, Role-emotional and Social function) and interaction effects (Physical functioning, Role physical, Pain, Role-emotional, Social function and Energy). The interaction effect for Physical functioning (p=0.04), Role-physical (p=0.02), Pain (p=0.03) and Energy (p=0.04) showed a trend towards statistical significance indicating that rates of improvement between the two groups across time were highly significant. This implies that the effect size of the nurse-led intervention was clinically significant within-group and interaction effects were observed for QOL scores from T1 to T3 among adults with T2D and ESRD in the intervention group.

Table 7: Association between demographic and clinical characteristics using Chi square

Variables	Intervention group	Control group
Age	0.001*	0.001*
Gender	0.001 *	0.001 *
Educational status	0.001 *	0.622
Occupation	0.579	0.501
Income	0.503	0.401
Frequency of dialysis per week	0.358	0.778
Physical activity	0.408	0.812
Hemoglobin	0.002*	0.002*
Glomerular filtration rate level	0.033*	0.023*
Body mass index	0.011*	0.111

**Significant at p<0.05*

Higher age group, male gender, higher hemoglobin and lower glomerular filtration rate were significantly associated with KDQOL mean scores among adults in the intervention and control groups (Table 7).

DISCUSSION

The study confirmed that QOL among adults with T2D and ESRD in the intervention group was higher than the control group, with 75% of the KDQOL taking into consideration such symptoms like effect of kidney disease, the burden of kidney disease, staff encouragement, overall health and adult satisfaction. Nurse-led interventions were associated with improved symptoms like sleep, staff encouragement, pain, general health perception, energy/fatigue, overall health and mental component summary after six weeks of the intervention. These interventions focused on personal, physical and psychosocial dimensions of the QOL. There was continuity of nursing from the hospital, to the community and home care for an adult with ESRD in the intervention group. Self-management support and telephone-guided access (Blakeman *et al.*, 2014) showed higher mean HRQOL in the intervention group (1.85, 95% CI =1.25, 2.72). Adults exposed to Psycho-educational interviewing had higher levels of adherence (Garcı´a-Llana *et al.*, 2014; Kutner, 2012). This shows that adults with ESRD have reported better social and role functioning and emotional well-being in the intervention group.

Within the general dimensions of KDQOL-SF, the intervention group experienced higher QOL and reported a better Physical functioning, Role physical, less Pain, improved Role emotional, fewer problems with Social function, and more Energy as compared to control group. Early detection and intervention for sleep disorder among adults helped to reduce the sleep-related illness so as to promote better QOL. Pain reduction and adherence to medication and medical treatment among adults with T2D and ESRD are due to effective nurse-led interventions. Pain reduction among these adults' causes less interference with normal work activities resonates with the improvements in emotional well-being and social functioning. Low mean scores of anxiety and depression occurred in the intervention group exposed to the Fordyce Happiness program (Mehrabi, Ghazavi & Hahgholian, 2017). Dialysis and the multidisciplinary team helped adults to improve health outcomes (Strand & Parker 2012; Chen *et al.*, 2016). Informed adults have reported fewer symptomsas well as more confidence in their ability to manage the symptoms they do have.

From the study, it was evident that exercise modified symptoms like reducing sleep disturbances, depression and pain and improved QOL among adults with T2D and ESRD. Pain reduction leads to less limitation in daily activities and better social functioning and emotional well-being. In this study, Nurse-led intervention (NLI) included adult education, counseling for various sleep disturbance and follow-up to monitor effectiveness. Diet and medication adherence lead to improved hemoglobin levels with improved QOL. Higher health status leads to higher well-being and increases in QOL. NLI is adult-centered goals and needs to identify problems and find mutually acceptable solutions to improve the QOL. Exercise is useful to improve the physical function and health self-perception and in alleviating symptoms such as fatigue, sleep disturbances, anxiety, depression and pain (Tao, Chow & Wong, 2015). Exercises enhanced physical, mental health and general QOL among adults with ESRD. Sports therapy (Riyahi *et al.*, 2012), Tai Chi exercise (Shahgholian, Eshghinezha & Mortazavi, 2014) and Physical exercise (Bayoumi & Al Wakeel, 2015) improved physical dimensions among adults on hemodialysis. Encouragement from family members and hospital staff members helped to increase autonomy and participation in their self-care management.

In our study better QOL mean scores were observed among middle age, men with higher income and undergoing dialysis more than once/week, which was significantly associated with higher QOL after an intervention. Adults with T2D and ESRD with good hemoglobin level elevated glomerular filtration rate, and low BMI were associated with higher QOL after intervention at six weeks and 12 weeks in the intervention group. Men who are independent, self-controlled, having good family support and good biochemical control have better QOL in the intervention group. Cognitive function and quality of social interaction and QOL were associated with older age among adults on hemodialysis (Brown *et al.*, 2010). Education influenced the physical and social domains of QOL as they are aware of the quality of service and individual rights (Bayoumi & El-Fouly, 2010).

In this study, physical composite scores (PCS) were correlated with age, hemoglobin and comorbidity and mean PCS was lower in adults with healthy weight or

moderately high BMI. QOL of the intervention group was higher than the control group in 50% of the dimensions in KDQOL and reported better emotional state, less bodily pain, improved social functioning. QOL increased by 20% with regards to coping among adults with hemodialysis (Barahimi *et al.*, 2015). Here, the intervention group had higher general QOL and KDQOL compared to control group, except for energy fatigue, emotional well-being, social function and energy fatigue, work status, quality of social interaction, and social support. Physical and mental composites of general QOL were higher in the intervention group compared to the control group. In this study, a lower reduction in KDQOL was observed among elderly adults with T2D and ESRD compared to the younger adults. Change in perceptions of adult's functional ability predicted their QOL which influenced of subdomains of QOL differently.

The nurse-led intervention was associated with improved QOL regarding symptoms, sleep, pain, staff encouragement, energy/fatigue, mental well being and physical component with self-care management and adjustments. The intervention group demonstrated higher QOL with respect to psychosocial concerns, feeling more energetic and a better lifestyle to delay disease progression. The NLI included motivational interviewing before and after discharge by responding to adult's experiences of illness and integrating the demands of therapeutic regimens into their lifestyles. The results of this study are useful for evaluating the effectiveness of NLI based on mutually agreed goals to improve QOL among adults with ESRD and hemodialysis. It has been proven that nurse-led intervention is beneficial and it helps to improve the QOL among adults with T2D and ESRD.

The limitation of this study was a small sample size, data analysis for the integrated nurse-led interventions along with short time duration and intervals of the responses and interventions (total of 6 hours before the 6 and 12 weeks) and effect of the nurse-led interventions on outcomes over time (T2 and T3).

CONCLUSION

A nurse-led intervention was shown to be a positive predictor of physical and mental health for people with T2D and ESRD as they have reported fewer symptoms and an increase in the confidence level to manage the symptoms. NLI was associated with improvement in the self-efficacy, self-care behaviors by encouraging adult's autonomy and increasing rapport between the nurses and client to engender behavioral change and improved QOL. NLI have an impact on adults QOL changes with education and exercise, encouragement and engagement and enables them to accept responsibility for their health. Adults with T2D and ESRD can take more accountability for things they can control like exercise, active involvement in life and a meal plan to positively affect their participation in a productive life. Adults with T2D and ESRD on hemodialysis are encouraged and reinforced to learn about their self-care for improved quality of life. Encouragement and counseling, especially from inter-professional dialysis team, can increase autonomy, control and participation. Interactive adult learning goals, choices, medications, and the diet can help adults with T2D and ESRD to maintain a sense of control, a factor linked to improved QOL.

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