

Effectiveness of a Multi-Interventional Package on Quality of Life among Chronic Kidney Disease Patients Receiving Hemodialysis

Bariq Athar Masoodi¹, Ibtisam Nazir Khan¹, Pankaj Kaul², Junaid Gulzar Wani¹ and Shahid Nazeer¹

¹Department of Dialysis Therapy Technology, University School of Allied Health Sciences, RayatBahra University, Mohali, Punjab, India

²University School of Allied Health Sciences, RayatBahra University, Mohali, Punjab, India

ABSTRACT

Introduction: chronic kidney disease (CKD) patients undergoing Hemodialysis often experience reduced Health-Related Quality of Life (HRQoL) due to complications such as depression, malnutrition, and physical limitations. Despite the burden, studies examining HRQoL interventions in India remain scarce.

Objectives: This study aimed to (1) assess HRQoL among CKD patients before and after a multi-interventional package, (2) evaluate its effectiveness compared to routine care, and (3) explore associations between HRQoL and demographic variables.

Methods: A quasi-experimental pretest–posttest control group design was conducted among 240 CKD patients on Hemodialysis (120 experimental, 120 control) selected by purposive sampling. HRQoL was assessed using the KDQoL-SF-36 scale. The experimental group received an eight-week multi-interventional package including structured exercise, nutritional supplementation (Neels Nephro Mix), guided imagery, and Benson's relaxation technique, while the control group received routine care.

Results: The majority of participants were aged 46–55 years, with an equal gender distribution and diabetes as the most common comorbidity. Pretest HRQoL scores were poor across groups. After intervention, 97.5% of the experimental group improved to average/good HRQoL, showing a 34% increase

in scores, compared to a 16% improvement in controls. Significant improvements were noted in physical, mental, and ESRD-specific domains ($p < 0.05$). Occupation and education were significantly associated with post-test HRQoL.

Conclusion: The multi-interventional package significantly improved HRQoL among CKD patients on Hemodialysis. Integrating exercise, nutrition, and relaxation strategies with routine care is recommended to enhance patient outcomes and reduce complications.

Keywords: Chronic Kidney Disease, Hemodialysis, Health-Related Quality of Life.

Introduction

Chronic Kidney Disease (CKD) has emerged as a global public health concern, affecting nearly 850 million people worldwide, with prevalence continuing to rise across both developed and developing countries (Cockwell & Fisher, 2024). The Global Burden of Disease Study identifies CKD as the 18th leading cause of mortality and disability, with Disability-Adjusted Life Years (DALYs) attributable to CKD increasing significantly over the past three decades (WHO, 2022). The Kidney Disease Outcomes Quality Initiative (KDOQI) defines CKD as either structural or functional abnormalities of the kidney or a glomerular filtration rate (GFR) less than 60 mL/min/1.73 m² persisting for at least three months (National Kidney Foundation, 2002). As CKD progresses to End-Stage Renal Disease (ESRD), patients require renal replacement therapy in the form of dialysis or kidney transplantation. Among these, hemodialysis remains the most commonly adopted modality worldwide due to the limited availability of donor kidneys. India carries one of the largest burdens of CKD globally, with prevalence estimates ranging between 13–16% of the population, equivalent to more than 130 million individuals (PubMed PMID: 39763170, 2024). The major contributing factors include diabetes mellitus, hypertension, and chronic glomerulonephritis (Indian Journal of Nephrology, 2013). Despite this growing burden, healthcare infrastructure remains inadequate. India has fewer than 1,000 nephrologists and a limited number of dialysis centers, restricting access to renal

replacement therapy. Moreover, the high cost of hemodialysis—ranging from US\$9 to US\$45 per session—further limits affordability, particularly among socioeconomically disadvantaged groups (Singh et al., Nephron Clinical Practice). Although hemodialysis prolongs life, it imposes profound challenges on patients' Health-Related Quality of Life (HRQoL). Patients often endure a heavy symptom burden, including fatigue, pain, sleep disturbances, pruritus, anxiety, and depression [1]. The time-intensive nature of treatment—requiring three sessions per week of 4–6 hours each—contributes to major disruptions in employment, family life, and social functioning [2]. Research consistently shows that HRQoL in hemodialysis patients is significantly lower compared to both healthy populations and kidney transplant recipients [3].

A growing body of evidence suggests that interventions targeting multiple domains simultaneously—physical, nutritional, and psychological—are more effective in improving HRQoL than isolated approaches. Exercise interventions improve physical capacity and reduce fatigue, while nutritional supplementation addresses protein-energy malnutrition, a common complication in dialysis patients [4]. Psychosocial interventions such as guided imagery and Benson's Relaxation Technique have been shown to reduce stress, anxiety, and depression, thereby enhancing mental health outcomes [5]. Despite global evidence on the benefits of integrated interventions, there is a paucity of research from India assessing

Citation: Bariq Athar Masoodi, ibtisam Nazir Khan, Pankaj Kaul, Junaid Gulzar Wani and Shahid Nazeer (2025). Effectiveness of a Multi-Interventional Package on Quality of Life among Chronic Kidney Disease Patients Receiving Hemodialysis.

Journal of American Medical Science and Research.

DOI: <https://doi.org/10.51470/AMSR.2025.04.02.59>

Received 15 July 2025

Revised 18 August 2025

Accepted 07 September 2025

Corresponding Author: **Bariq Athar Masoodi**

Email Address: barik.masoodi123@gmail.com

Copyright: © The Author(s) 2025. This article is Open Access under a Creative Commons Attribution 4.0 International License, allowing use, sharing, adaptation, and distribution with appropriate credit. License details: <http://creativecommons.org/licenses/by/4.0/>.

Data is under the CC0 Public Domain Dedication (<http://creativecommons.org/publicdomain/zero/1.0/>) unless otherwise stated.

the effectiveness of structured multi-interventional packages for CKD patients on hemodialysis. Given the high prevalence of CKD in India, limited healthcare infrastructure, and the profound impact of hemodialysis on patients' quality of life, such research is timely and necessary. Cost-effective and non-pharmacological interventions that combine exercise, nutrition, and stress management can complement routine care, enhance HRQoL, and potentially reduce complications. This study seeks to evaluate the effectiveness of a multi-interventional package—including exercise, nutritional supplementation, guided imagery, and Benson's Relaxation Technique—on the quality of life among CKD patients undergoing hemodialysis and comparative pretest–posttest design, this research also aims to explore associations between HRQoL outcomes and demographic variables. The findings are expected to inform clinical practice and co.

Materials and Methods

This study employed a quantitative quasi-experimental pretest–posttest control group design to assess the effectiveness of a multi-interventional package on the health-related quality of life (HRQoL) of patients with chronic kidney disease (CKD) undergoing hemodialysis. A total of 240 patients were recruited through purposive sampling from dialysis units of tertiary care hospitals in Vadodara, with 120 participants each assigned to the experimental and control groups. The experimental group received an eight-week multi-interventional package comprising (i) structured exercise, (ii) nutritional support with *Neels Nephro Mix*, (iii) guided imagery, and (iv) Benson's relaxation technique. The control group continued to receive routine standard care.

Data were collected using a sociodemographic proforma and the validated Kidney Disease Quality of Life Short Form (KDQoL-SF-36) questionnaire. HRQoL scores were measured at baseline and post-intervention. For analysis, paired and independent *t*-tests were applied to evaluate within- and between-group differences, while chi-square tests were used to examine associations between HRQoL and sociodemographic variables. Statistical significance was set at $p < 0.05$.

Results and Discussion

This section presents the analysis and interpretation of data collected from patients with chronic kidney disease (CKD) undergoing hemodialysis to evaluate the effectiveness of a multi-interventional package on quality of life (QoL). Data analysis aimed to organize and interpret numerical information systematically, using descriptive statistics to summarize and present findings, and inferential statistics to establish relationships and test hypotheses. The data were entered into Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS, Version 17.0).

The results are organized and presented in the following subsections:

Section 4.1: Description of Demographic Variables

This section provides a detailed description of the demographic and clinical characteristics of patients with CKD receiving hemodialysis, including age, gender, educational status, occupation, income, duration of illness, and frequency of dialysis.

Section 4.2: Pre- and Post-Test Quality of Life Scores

The level of QoL among patients with CKD was assessed before and after administration of the multi-interventional package in both experimental and control groups.

- **Experimental group:** Frequency and percentage distribution of pre- and post-test QoL scores are presented to illustrate changes following the intervention.
- **Control group:** Frequency and percentage distribution of pre- and post-test QoL scores are provided to assess changes under routine care.
- **Comparison:** Post-test QoL scores of both groups are compared to highlight differences in outcomes attributable to the intervention.

Section 4.3: Effectiveness of the Multi-Interventional Package

This section evaluates the impact of the intervention on QoL among CKD patients:

- **Experimental group:** Paired *t*-test values were computed to compare pre- and post-test scores, along with mean, standard deviation (SD), and mean percentage.
- **Control group:** Paired *t*-test values and descriptive statistics (mean, SD, mean percentage) were calculated for pre- and post-test scores.
- **Between-group comparison:** An independent (unpaired) *t*-test was conducted to compare post-test QoL scores between experimental and control groups. Descriptive statistics (mean, SD, mean percentage) were also used to illustrate group differences.

Section 4.4: Association of Post-Test QoL with Demographic Variables

Chi-square tests were used to determine associations between post-test QoL scores and demographic variables in both groups:

- **Experimental group:** The relationship between post-test QoL scores and demographic factors (age, gender, education, etc.) was examined.
- **Control group:** Similar associations were explored to identify demographic influences on QoL outcomes under routine care.

Table 4.1.1: Frequency and Percentage Distribution of Samples According to Their Demographic Variables (N = 240)

S. No.	Demographic Variables	Categories	Experimental Group (n = 120)	Control Group (n = 120)	χ^2 (df)	p value
1	Age (years)	18–25	2 (2%)	4 (3%)	1.604 (4)	0.808
		26–35	19 (16%)	21 (17%)		
		36–45	23 (19%)	26 (22%)		
		46–55	45 (37%)	44 (37%)		
		>55	31 (26%)	25 (21%)		
2	Gender	Male	68 (57%)	71 (59%)	0.154 (1)	0.695
		Female	52 (43%)	49 (41%)		
3	Marital Status	Unmarried	2 (2%)	3 (2%)	2.305 (4)	0.680
		Married	98 (82%)	103 (87%)		
		Widow	11 (8%)	10 (8%)		
		Widower	7 (6%)	3 (2%)		
		Divorced	2 (2%)	1 (1%)		
4	Educational Status	No formal education	9 (8%)	13 (11%)	1.350 (4)	0.853

		Primary	30 (25%)	29 (24%)		
		High school	47 (39%)	43 (36%)		
		Higher secondary	22 (18%)	20 (17%)		
		Graduate & above	12 (10%)	15 (12%)		
5	Food Pattern	Vegetarian	9 (8%)	12 (10%)	0.469 (1)	0.493
		Non-vegetarian	111 (92%)	108 (90%)		
6	Religion	Hindu	99 (82%)	97 (80%)	0.412 (2)	0.814
		Muslim	9 (8%)	8 (7%)		
		Christian	12 (10%)	15 (13%)		
7	Type of Family	Nuclear	88 (73%)	94 (78%)	0.986 (2)	0.611
		Joint	30 (25%)	25 (21%)		
		Extended	2 (2%)	1 (1%)		
8	Occupation	Unemployed	33 (27%)	35 (29%)	2.120 (4)	0.714
		Government employee	16 (13%)	20 (17%)		
		Private	38 (32%)	41 (34%)		
		Business	15 (13%)	10 (8%)		
		Laborer (Coolie)	18 (15%)	14 (12%)		
9	Monthly Income (₹)	≤5,000	18 (15%)	14 (12%)	0.813 (3)	0.846
		5,001–10,000	59 (49%)	64 (53%)		
		10,001–15,000	33 (28%)	31 (26%)		
		≥15,001	10 (8%)	11 (9%)		
10	Ill Habits	Smoking	23 (19%)	26 (22%)	0.744 (3)	0.863
		Alcohol	14 (12%)	15 (13%)		
		Tobacco chewing	5 (4%)	3 (2%)		
		None	78 (65%)	76 (63%)		
11	Duration of Kidney Disease	<1 year	18 (15%)	13 (11%)	1.650 (3)	0.649
		1–2 years	29 (25%)	25 (21%)		
		3–4 years	33 (27%)	38 (31%)		
		>4 years	40 (33%)	44 (37%)		
12	Duration of Hemodialysis	≤1 year	36 (30%)	32 (27%)	1.560 (2)	0.459
		2–3 years	68 (57%)	65 (54%)		
		>3 years	16 (13%)	23 (19%)		
13	Number of Hemodialysis Cycles	≤12 cycles	106 (88%)	110 (92%)	0.740 (1)	0.389
		>12 cycles	14 (12%)	10 (8%)		
14	Co-morbidity	Diabetes	50 (42%)	51 (42%)	0.306 (3)	0.959
		Hypertension	41 (34%)	39 (33%)		
		Other	21 (18%)	20 (17%)		
		None	8 (6%)	10 (8%)		
15	Leisure Activities	Watching TV	75 (63%)	81 (68%)	1.470 (3)	0.690
		Reading books	28 (23%)	22 (18%)		
		Chatting	12 (10%)	10 (8%)		
		Others	5 (4%)	7 (6%)		
16	Support System	Family & friends	112 (93%)	115 (96%)	0.732 (1)	0.392
		NGOs	8 (7%)	5 (4%)		

Note. $p < 0.05$ = significant; $p < 0.01$ = highly significant; $p < 0.001$ = very highly significant.

Section 4.1

Description of Demographic Variables of Patients with CKD Receiving Hemodialysis

The demographic profile of the patients in both the experimental and control groups was analyzed across age, gender, marital status, education, food pattern, religion, occupation, monthly income, family type, disease duration, hemodialysis characteristics, lifestyle habits, comorbidity, leisure activities, and support system. In the experimental group, the majority of patients (38.3%) were between 46–55 years, followed by 25% above 55 years, 19.2% between 36–45 years, 15.8% between 26–35 years, and only 1.7% in the 18–25 year age group. The control group showed a similar pattern, with 35.8% aged 46–55 years, 21.7% above 55 years, 21.7% between 36–45 years, 18.3% between 26–35 years, and 2.5% aged 18–25 years. Regarding gender, 56.7% of the experimental group and 59.2% of the control group were male, while females comprised 43.3% and 40.8% respectively. No transgender participants were reported. Most participants were married in both groups (experimental: 81.7%; control: 85.8%). Widows constituted 9.2% in the experimental group and 8.3% in the control group, while widowers accounted for 5.8% and 3.3%, respectively. Only a small proportion were unmarried or divorced. Educational status showed that high school education was most common (experimental: 29.2%; control: 31.7%), followed by primary education (25% and 24.2%, respectively), higher secondary education (18.3% and 16.7%), illiteracy

(17.5% and 15%), and graduates (10% and 12.5%).

Dietary pattern revealed that most patients were non-vegetarians (experimental: 92.5%; control: 90%), with a minority following vegetarian diets. Religion-wise, Hindus were predominant (82.5% and 80.8%), followed by Muslims (10% and 7%) and Christians (7.5% and 12.5%). The majority lived in nuclear families (73.3% and 78.3%), while smaller proportions lived in joint or extended families. In terms of occupation, private employment was the largest group (31.7% experimental; 34.2% control), followed by unemployment (27.5% and 29.2%). Other occupations included government service, business, and daily wage labor. Income levels were concentrated between ₹5,001–10,000 per month (49.2% experimental; 53.3% control). A quarter earned ₹10,001–15,000, while fewer participants earned ≤₹5,000 or ≥₹15,001. Lifestyle characteristics indicated that the majority did not report any ill habits (65% and 63%), while smoking (19.2% and 22%), alcohol consumption (11.7% and 13%), and tobacco chewing (4.2% and 2.5%) were reported by a smaller proportion. Leisure activities primarily included watching television (62.5% experimental; 67.5% control), reading books, chatting, or other activities. Regarding disease history, most patients had kidney disease for more than four years (33.3% experimental; 36.7% control), followed by three to four years, one to two years, and less than one year. The majority had been undergoing hemodialysis for two to three years (57% and 54%), followed by less than one year, and a smaller group for more than three

years. Most patients (88.3% experimental; 91.7% control) received 12 hemodialysis cycles per month, with the remainder receiving more than 12 cycles. In terms of comorbidity, diabetes mellitus was most prevalent (42% experimental; 42.5% control), followed by hypertension (34% and 33%). Some patients reported both diabetes and hypertension, while a small number reported other conditions. Leisure patterns showed television viewing as the most frequent activity, followed by reading, chatting, and other pursuits. Almost all participants reported strong support systems, primarily from family and friends (93% experimental; 96% control). Only a few received support from voluntary agencies, and none reported the absence of a support system.

Section 4.2

Assessment of Quality of Life Before and After Administration of the Multi-Interventional Package Among Experimental and Control Groups

Table 4.2.1 Frequency and Percentage Distribution of ESRD Component QoL Levels in Experimental and Control Groups

Level of ESRD QoL	Experimental Group			Control Group		
	Pre-test	1st Post-test	2nd Post-test	Pre-test	1st Post-test	2nd Post-test
Poor	51 (42%)	–	–	47 (39%)	53 (44%)	56 (47%)
Average	69 (58%)	66 (55%)	2 (2%)	73 (61%)	67 (56%)	64 (53%)
Good	–	54 (45%)	118 (98%)	–	–	–

Amid the ESRD component of quality of life (QoL) scores, the experimental group demonstrated significant improvement over the study period. At pre-test, 57.5% (69) of participants reported an average level of QoL, while 42.5% (51) reported poor QoL. During the first post-test, 55% (66) remained at an average level, whereas 45% (54) had achieved a good level of QoL. By the second post-test, the majority of participants, 98% (118), attained a good level of QoL, with only 2% (2) remaining at the average level, the control group showed minimal improvement and some deterioration over time. At pre-test, 61% (73) of participants had an average QoL, while 39% (47) were at a poor level. During the first post-test, 56% (67) remained at the average level and 44% (53) reported good QoL. By the second post-test, 53% (64) continued at the average level, while 47% (56) remained in the poor category, with no participants reaching a good level of QoL. These findings indicate that the multi-interventional package had a substantial positive impact on QoL in the experimental group, while the control group experienced stagnation or decline in their QoL over the same period (Table 4.2.1).

Table 4.2.2 Frequency and Percentage Distribution of Physical Component Summary (PCS) QoL Scores in Experimental and Control Groups

Level of PCS QoL	Experimental Group			Control Group		
	Pre-test	1st Post-test	2nd Post-test	Pre-test	1st Post-test	2nd Post-test
Poor	120 (100%)	39 (33%)	1 (1%)	120 (100%)	120 (100%)	120 (100%)
Average	–	81 (67%)	110 (92%)	–	–	–
Good	–	–	9 (7%)	–	–	–

The above data illustrates the physical component summary (PCS) scores of quality of life in the experimental and control groups. In the experimental group, all participants (100%, n=120) initially had poor PCS scores at pre-test. Following the intervention, the first post-test showed improvement, with 67% (81) achieving an average level and 33% (39) remaining in the poor category. By the second post-test, 92% (110) of participants reached an average level of PCS, 7% (9) attained a good level, and only 1% (1) remained in the poor category. In contrast, the control group consistently remained in the poor category across all assessments, with 100% (n=120) of participants scoring poor PCS at pre-test, first post-test, and second post-test. These findings indicate that the multi-interventional package had a significant positive impact on the physical component of QoL among patients with CKD receiving hemodialysis, whereas the control group exhibited no improvement (Table 4.2.2).

Table 4.2.3 Frequency and Percentage Distribution of Mental Component Summary (MCS) QoL Scores in Experimental and Control Groups

Level of MCS QoL	Experimental Group			Control Group		
	Pre-test	1st Post-test	2nd Post-test	Pre-test	1st Post-test	2nd Post-test
Poor	120 (100%)	1 (1%)	0 (0%)	120 (100%)	118 (98%)	118 (98%)
Average	–	95 (79%)	11 (9%)	–	2 (2%)	2 (2%)
Good	–	24 (20%)	109 (91%)	–	0 (0%)	0 (0%)

The data indicate the levels of mental component summary (MCS) scores of quality of life in the experimental and control groups. In the experimental group, all participants (100%, n=120) initially had poor MCS scores at pre-test. During the first post-test, 79% (95) achieved an average level, 20% (24) attained a good level, and only 1% (1) remained in the poor category. By the second post-test, the majority, 91% (109), reached a good level, while 9% (11) maintained an average level. In contrast, the control group showed minimal improvement over time. At pre-test, all participants (100%, n=120) had poor MCS scores. During both the first and second post-tests, 98% (118) remained in the poor category, with only 2% (2) achieving an average level. No participants in the control group attained a good level of MCS scores throughout the study period (Table 4.2.3).

Table 4.2.4 Frequency and Percentage Distribution of Overall Quality of Life (QoL) Scores in Experimental and Control Groups

Level of QoL	Experimental Group			Control Group		
	Pre-test	1st Post-test	2nd Post-test	Pre-test	1st Post-test	2nd Post-test
Poor	120 (100%)	–	–	120 (100%)	119 (99%)	119 (99%)
Average	–	117 (98%)	56 (47%)	–	1 (1%)	1 (1%)
Good	–	3 (2%)	64 (53%)	–	–	–

The data present the overall quality of life (QoL) scores in the experimental and control groups. In the experimental group, all participants (100%, n=120) initially had poor overall QoL scores at pre-test. During the first post-test, 98% (117) achieved an average level of QoL, while 2% (3) attained a good level. By the second post-test, 53% (64) reached a good level, and 47% (56) remained at an average level, with no participants in the poor category. In contrast, the control group showed minimal improvement

over time. At pre-test, all participants (100%, n=120) had poor QoL scores. During both the first and second post-tests, 99% (119) remained in the poor category, with only 1% (1) achieving an average level. No participants in the control group attained a good level of overall QoL throughout the study period (Table 4.2.4). These findings clearly indicate that the multi-interventional package substantially improved overall quality of life among CKD patients receiving hemodialysis, whereas the control group exhibited negligible change.

Section 4.3

Effectiveness of the Multi-Interventional Package on Quality of Life Among Patients with CKD Receiving Hemodialysis in Experimental and Control Groups

Table 4.3.2 Mean, SD, and Mean Percentage of Pre- and Post-Test Scores on Quality of Life in the Experimental Group

S. No.	Areas	Max Scores	Pre-test Score	1st Post-test Score	2nd Post-test Score
			Mean	SD	Mean (%)
1	ESRD	30	14.97	6.51	50
2	Physical Components	30	13.42	5.06	45
3	Mental Components	40	31.44	5.47	79
Total	Overall QoL	100	34.62	3.41	34

A comparison of pre-test quality of life (QoL) scores within the experimental group revealed the lowest mean score in the physical component, with a mean of 13.42 ± 5.06 and a mean percentage of 45%. Following the second post-test intervention, the mean score improved to 23.28 ± 2.61 with a mean percentage of 78%, reflecting an increase of 33%. For overall QoL, the pre-test mean score was 34.62 ± 3.41 (34%), which increased to 68.38 ± 6.03 (68%) in the post-test, demonstrating a difference of 34%. These findings indicate a significant improvement in quality of life from pre-test to post-test scores, confirming that the multi-interventional package was effective in enhancing both physical and overall QoL among patients with CKD undergoing hemodialysis (Table 4.3.2).

Table 4.3.4 Mean, SD, and Mean Percentage of Pre- and Post-Test Scores on Quality of Life in the Control Group

S. No.	Areas	Max Scores	Pre-test Score	1st Post-test Score	2nd Post-test Score
			Mean	SD	Mean (%)
1	ESRD	30	14.77	6.36	49
2	Physical Components	30	14.86	4.63	50
3	Mental Components	40	31.83	4.72	79
Total	Overall QoL	100	32.16	3.23	32

A comparison of pre-test quality of life (QoL) scores in the control group revealed the lowest mean score in the physical component, with a mean of 14.86 ± 4.63 and a mean percentage of 50%. Following the second post-test, the mean score improved to 19.93 ± 4.38 with a mean percentage of 66%, reflecting a difference of 16%. For overall QoL, the pre-test mean score was 32.16 ± 3.23 (32%), which increased to 48.03 ± 3.32 (48%) in the post-test, showing a difference of 16%. These findings suggest that, although minor improvements were observed, routine care without the multi-interventional package was not sufficiently effective in enhancing quality of life among patients with CKD receiving hemodialysis (Table 4.3.4).

Table 4.3.1: Paired "t" Test Values of Pre- and Post-Test Scores in the Experimental Group

S. No.	Areas	t' Value	Table Value	Level of Significance
1	ESRD	7.52	1.980	P < 0.05, Significant
2	Physical Components	8.96	1.980	P < 0.05, Significant
3	Mental Components	6.98	1.980	P < 0.05, Significant
Total	Overall QoL	23.46	1.980	P < 0.05, Significant

Notes: Degrees of Freedom (df) = 119; Table value = 1.980; Significance set at P < 0.05

The paired "t" test values of quality of life (QoL) scores in the experimental group demonstrated statistically significant improvements (P < 0.05) across all domains. Specifically, the ESRD component showed a t-value of 7.52, the physical component 8.96, and the mental component 6.98, indicating meaningful clinical improvement in each area. The overall paired "t" test for total QoL scores yielded a t-value of 23.46, further confirming a significant enhancement in quality of life among patients receiving the multi-interventional package (Table 4.3.1).

Table 4.3.3 Paired "t" Test Values of Pre- and Post-Test Scores in the Control Group

S. No.	Areas	t' Value	Table Value	Level of Significance
1	ESRD	4.13	1.980	P < 0.05, Significant
2	Physical Components	6.16	1.980	P < 0.05, Significant
3	Mental Components	4.02	1.980	P < 0.05, Significant
Total	Overall QoL	9.54	1.980	P < 0.05, Significant

Notes: Degrees of Freedom (df) = 119; Table value = 1.980; Significance set at P < 0.05

The paired "t" test values of quality of life (QoL) scores in the control group demonstrated statistically significant changes (P < 0.05) across all domains. Specifically, the ESRD component showed a t-value of 4.13, the physical component 6.16, and the mental component 4.02. The overall paired "t" test for total QoL scores yielded a t-value of 9.54, indicating a significant but comparatively smaller improvement in quality of life among patients receiving routine care alone (Table 4.3.3).

Table 4.3.5 Unpaired "t" Test Values of Post-Test Scores Comparing Experimental and Control Groups

S. No.	Areas	Unpaired t' Value	Table Value	Level of Significance
1	Physiological	3.91	2.828	P < 0.05, Significant
2	Behavioural	6.89	2.828	P < 0.05, Significant
3	Psychological	6.03	2.828	P < 0.05, Significant
Total	Overall QoL	7.56	2.828	P < 0.05, Significant

Notes: Degrees of Freedom (df) = 238; Table value = 2.828; Significance set at P < 0.05

An unpaired "t" test was conducted to assess the effectiveness of the post-test quality of life (QoL) scores between the experimental and control groups across different domains. The overall unpaired t-value was 7.56, which is considerably higher than the table value of 2.828, indicating a statistically significant difference. This result demonstrates that the multi-interventional package was more effective than routine care in improving the quality of life among patients with CKD receiving hemodialysis (Table 4.3.6).

Table 4.3.6 Comparison of Mean, SD, and Mean Percentage of Post-Test Scores on Quality of Life Between Experimental and Control Groups

S. No.	Areas	Max Scores	Experimental Group	Control Group	Difference in Mean (%)
			Mean	SD	Mean (%)
1	ESRD	30	22.35	5.43	75
2	Physical Components	30	23.28	2.61	78
3	Mental Components	40	21.53	2.15	54
Total	Overall QoL	100	68.38	6.03	68

A comparison of the second post-test quality of life (QoL) scores between the experimental and control groups revealed that the experimental group had an overall mean score of 68.38 ± 6.03 with a mean percentage of 68%, whereas the control group had a mean score of 48.03 ± 3.32 with a mean percentage of 48%, indicating a 20% difference. These findings demonstrate a statistically and clinically significant improvement in quality of life in the experimental group, confirming that the multi-interventional package was effective in enhancing the QoL of patients with CKD receiving hemodialysis (Table 4.3.6).

SECTION 4.4

Association Between Post-Test Quality of Life and Demographic Variables of Patients with CKD Receiving Hemodialysis in Experimental and Control Groups

To determine whether demographic variables influenced the post-test quality of life (QoL) among patients with CKD receiving hemodialysis, a chi-square analysis was performed for both the experimental and control groups.

This analysis assessed associations between post-test QoL levels and variables including age, sex, marital status, education, occupation, income, lifestyle habits, duration of disease, duration of hemodialysis, number of dialysis cycles, comorbidities, leisure activities, and support system.

The table presents the frequency and percentage distribution of post-test QoL scores (Poor, Average, Good) across each demographic variable in the experimental group. The chi-square values (χ^2), degrees of freedom (df), and p-values indicate whether the associations were statistically significant.

Table 4.4.1 Chi-Square Analysis of Post-Test QoL Scores and Demographic Variables in the Experimental Group

Demographic Variable	Level of QoL	χ^2 (df)	p-value (N/NS)
Age (years)	18–25: Good = 2 (1.67%), 26–35: Average = 9 (7.5%), Good = 10 (8.33%), 36–45: Average = 10 (8.33%), Good = 13 (10.83%), 46–55: Average = 17 (14.17%), Good = 28 (23.33%), >55: Average = 20 (16.67%), Good = 11 (9.17%)	7.24 (df=4)	0.124 NS
Sex	Male: Average = 30 (25%), Good = 38 (31.67%), Female: Average = 26 (21.67%), Good = 26 (21.67%)	0.409 (df=1)	0.522 NS
Marital Status	Unmarried: Good = 2 (1.67%), Married: Average = 45 (37.5%), Good = 53 (44.17%), Widower: Average = 5 (4.17%), Good = 6 (5%), Widower: Average = 4 (3.33%), Good = 3 (2.5%), Divorced: Average = 2 (1.67%)	4.37 (df=48)	0.358 NS
Educational Status	Illiterate: Average = 4 (3.33%), Good = 5 (4.17%), Primary: Average = 14 (11.67%), Good = 16 (13.33%), High School: Average = 18 (15%), Good = 29 (24.17%), Higher Secondary: Average = 12 (10%), Good = 10 (8.33%), Degree & Above: Average = 8 (6.67%), Good = 4 (3.33%)	3.82 (df=4)	0.431 NS
Food Pattern	Vegetarian: Average = 2 (1.67%), Good = 7 (5.83%), Non-Vegetarian: Average = 54 (45%), Good = 57 (47.5%)	2.34 (df=1)	0.126 NS
Religion	Hindu: Average = 44 (36.67%), Good = 55 (45.83%), Christian: Average = 5 (4.17%), Good = 4 (3.33%), Muslim: Average = 7 (5.83%), Good = 5 (4.17%)	1.14 (df=2)	0.566 NS
Type of Family	Nuclear: Average = 40 (33.3%), Good = 48 (40%), Joint: Average = 14 (11.67%), Good = 16 (13.33%), Extended: Average = 2 (1.67%)	2.34 (df=2)	0.311 NS
Occupation	Unemployed: Average = 16 (13.33%), Good = 17 (14.17%), Government: Average = 12 (10%), Good = 4 (3.33%), Private: Average = 13 (10.83%), Good = 25 (20.83%), Business: Average = 10 (8.33%), Good = 5 (4.17%), Coolie: Average = 5 (4.17%), Good = 13 (10.83%)	12.56 (df=4)	0.014 S*
Monthly Income	≤5000: Average = 5 (4.17%), Good = 13 (10.83%), 5001–20,000: Average = 28 (23.33%), Good = 31 (25.83%), 30,001–35,000: Average = 18 (15%), Good = 15 (12.5%), ≥45,000: Average = 5 (4.17%), Good = 5 (4.17%)	3.46 (df=3)	0.326 NS
Ill Habits	Smoking: Average = 9 (7.5%), Good = 14 (11.67%), Alcoholism: Average = 3 (2.5%), Good = 11 (9.17%), Tobacco Chewing: Average = 3 (2.5%), Good = 2 (1.67%), No habits: Average = 41 (34.17%), Good = 37 (30.83%)	5.55 (df=3)	0.135 NS
Duration of Kidney Disease	<1 year: Average = 14 (11.67%), Good = 15 (12.5%), 1–2 years: Average = 18 (15%), Good = 15 (12.5%), 3–4 years: Average = 18 (15%), Good = 22 (18.33%), >4 years: Average = 6 (5%), Good = 12 (10%)	2.18 (df=3)	0.535 NS
Duration of Hemodialysis	≤1 year: Average = 17 (14.17%), Good = 19 (15.83%), 2–3 years: Average = 34 (28.33%), Good = 34 (28.33%), >3 years: Average = 5 (4.17%), Good = 11 (9.17%)	1.83 (df=2)	0.399 NS
Number of Hemodialysis Cycles	12 cycles: Average = 47 (39.17%), Good = 59 (49.17%), >12 cycles: Average = 9 (7.5%), Good = 5 (4.17%)	1.97 (df=1)	0.160 NS
Co-Morbidity	Diabetes: Average = 28 (23.33%), Good = 22 (18.33%), Hypertension: Average = 14 (11.67%), Good = 27 (22.5%), Others: Average = 9 (7.5%), Good = 12 (10%), None: Average = 5 (4.17%), Good = 3 (2.5%)	5.26 (df=3)	0.154 NS
Leisure Activities	TV: Average = 36, Books: Average = 13, Chatting: Average = 6, Others: Average = 1; TV: Good = 39, Books: Good = 6, Chatting: Good = 4, Others: Good = 0	1.53 (df=3)	0.674 NS
Support System	Family & Friends: Average = 51, Good = 42.5; NGOs: Average = 5, Good = 2.5	0.863 (df=1)	0.353 NS

Note: NS = Not Significant, S = Significant.

The analysis of the experimental group revealed that there was no significant association between post-test quality of life (QoL) scores and several demographic variables. These included age ($\chi^2 = 7.24$), gender ($\chi^2 = 0.409$), marital status ($\chi^2 = 4.37$), educational status ($\chi^2 = 3.82$), food pattern ($\chi^2 = 2.34$), religion ($\chi^2 = 1.14$), type of family ($\chi^2 = 2.34$), monthly income ($\chi^2 = 3.46$), ill habits ($\chi^2 = 5.55$), duration of kidney disease ($\chi^2 = 2.18$), duration of hemodialysis ($\chi^2 = 1.83$), number of hemodialysis cycles ($\chi^2 = 1.97$), co-morbidity ($\chi^2 = 5.26$), leisure activities ($\chi^2 = 1.53$), and support system ($\chi^2 = 0.863$). All of these variables were not statistically significant at $p < 0.05$. However, a significant association was observed between post-test QoL scores and occupation ($\chi^2 = 12.56$, $p < 0.05$), indicating that the type of occupation influenced the effectiveness of the multi-interventional package on quality of life among patients with CKD receiving hemodialysis.

Table 4.4.2: Chi-Square Analysis of Association Between Post-Test Quality of Life Scores and Demographic Variables in the Control Group of CKD Patients Receiving Hemodialysis

Demographic Variables	Poor f (%)	Average f (%)	Good f (%)	χ^2	df	p-value (N/NS)
1. Age in years				4.75	4	0.313 NS
18–25	4 (3.33)	0 (0)	–			
26–35	20 (16.67)	1 (0.83)	–			
36–45	26 (21.67)	0 (0)	–			
46–55	44 (36.67)	0 (0)	–			
>55	25 (20.83)	0 (0)	–			
2. Sex				1.46	1	0.227 NS
Male	71 (59.17)	0 (0)	–			
Female	48 (40)	1 (0.83)	–			
Transgender	–	–	–			
3. Marital Status				0.167	4	0.997 NS
Unmarried	3 (2.50)	0	–			
Married	102 (85)	1 (0.83)	–			
Widow	10 (8.3)	0	–			
Widower	3 (2.50)	0	–			
Divorced	1 (0.83)	0	–			
4. Educational Status				3.16	4	0.531 NS
Illiterate	13 (10.83)	0	–			
Primary	28 (23.33)	1 (0.83)	–			
High School	43 (35.83)	0	–			
Higher Secondary	20 (16.67)	0	–			
Degree & Above	15 (12.50)	0	–			
5. Food Pattern				0.11	1	0.738 NS
Vegetarian	12 (10)	0	–			
Non-Vegetarian	107 (89.17)	1 (0.83)	–			
6. Religion				0.239	2	0.887 NS
Hindu	96 (80)	1 (0.83)	–			
Christian	8 (6.67)	0	–			
Muslim	15 (12.5)	0	–			
Others	0	0	–			
7. Type of Family				0.278	2	0.870 NS
Nuclear	93 (77.50)	1 (0.83)	–			
Joint	25 (20.83)	0	–			
Extended	1 (0.83)	0	–			
8. Occupation				2.45	4	0.654 NS
Unemployed	34 (28.3)	1 (0.83)	–			
Govt Employed	20 (16.67)	0	–			
Private	41 (34.17)	0	–			
Business	10 (8.33)	0	–			
Coolie	14 (11.67)	0	–			
9. Monthly Income				2.89	3	0.408 NS
≤5000	14 (11.67)	0	–			
5002–20000	64 (53.33)	0	–			
30003–35000	30 (25.0)	1 (0.83)	–			
45004	11 (9.17)	0	–			
10. Ill Habits				3.65	3	0.302 NS
Smoking	25 (20.83)	1 (0.83)	–			
Alcoholism	15 (12.50)	0	–			
Tobacco Chewing	3 (2.50)	0	–			
No Ill Habits	76 (63.33)	0	–			
11. Duration of Kidney Disease				2.17	3	0.537 NS
<1 year	13 (10.83)	0	–			
1–2 years	25 (20.83)	0	–			
3–4 years	37 (30.83)	1 (0.83)	–			
>4 years	44 (36.67)	0	–			
12. Duration of HD				0.85	2	0.653 NS
≤1 year	32 (26.7)	0	–			
2–3 years	64 (53.3)	1 (0.83)	–			
>3 years	23 (19.2)	0	–			
13. Number of Hemodialysis Cycles				0.092	1	0.762 NS
≤12 cycles	109 (90.83)	1 (0.83)	–			
>12 cycles	10 (8.33)	0	–			
14. Co-Morbidity				2.09	3	0.553 NS
Diabetes	51 (42.50)	0	–			
Hypertension	38 (31.67)	1 (0.83)	–			
Others	20 (16.67)	0	–			
None	10 (8.33)	0	–			
15. Leisure Activities				4.49	3	0.213 NS
Watching TV	81 (67.50)	0	–			
Reading Books	21 (17.50)	1 (0.83)	–			
Chatting	10 (8.33)	0	–			
Others	7 (5.83)	0	–			
16. Support System				0.043	1	0.834 NS
Family & Friends	114 (95)	1 (0.83)	–			
NGOs	5 (4.17)	0	–			

Control group analysis revealed no significant association between post-test quality of life scores and the following demographic variables: age ($\chi^2 = 4.75$), gender ($\chi^2 = 1.46$), marital status ($\chi^2 = 0.167$), educational status ($\chi^2 = 3.16$), food pattern ($\chi^2 = 0.11$), religion ($\chi^2 = 0.239$), type of family ($\chi^2 = 0.278$), occupation ($\chi^2 = 2.45$), monthly income ($\chi^2 = 2.89$), ill habits ($\chi^2 = 3.65$), duration of kidney disease ($\chi^2 = 2.17$), duration of hemodialysis ($\chi^2 = 0.85$), number of hemodialysis cycles ($\chi^2 = 0.092$), co-morbidity ($\chi^2 = 2.09$), leisure activities ($\chi^2 = 4.49$), and support system ($\chi^2 = 0.043$), when compared to the table value, indicating $p > 0.05$ (Table 4.4.2).

Discussion

The present study evaluated the effectiveness of a multi-interventional package on the quality of life (QoL) among patients with chronic kidney disease (CKD) undergoing hemodialysis. Employing a quasi-experimental pretest-posttest control group design with 240 participants, the findings revealed a statistically significant improvement in QoL scores in the experimental group following the intervention, confirming the package's effectiveness compared to routine care. The multi-interventional package—comprising structured exercise, nutritional supplementation, guided imagery, and Benson's relaxation technique—addressed physical, psychological, and social dimensions of health. This holistic approach aligns with prior evidence indicating that multimodal interventions enhance physical functioning, reduce fatigue, alleviate anxiety, and improve overall well-being in hemodialysis patients. The application of Lydia Hall's Core, Care, and Cure model strengthened the conceptual framework, ensuring that interventions were patient-centered and health-promotive. Demographic analysis indicated that CKD was more prevalent among individuals aged 46–55 years, with diabetes and hypertension being the most common comorbidities—consistent with both global and Indian epidemiological data. These findings reaffirm that CKD risk increases with age and that non-communicable diseases play a central role in its progression [6-8]. Importantly, significant post-intervention improvements in both physical and mental health domains highlight the potential of integrated strategies to mitigate the burden of hemodialysis and enhance patients' overall quality of life.

Conclusion

The study concludes that a structured multi-interventional package is effective in improving the health-related quality of life of CKD patients undergoing hemodialysis. Compared to routine care, the intervention yielded significant benefits in both physical and psychological domains, with patients reporting enhanced well-being, reduced stress, and improved coping mechanisms. Given the rising prevalence of CKD in India and the substantial economic and social burden associated with hemodialysis, cost-effective, non-pharmacological interventions should be integrated into routine patient care. Strategies such as exercise, nutrition support, and relaxation techniques can be feasibly implemented in dialysis centers, potentially reducing complications, improving patient adherence, and decreasing hospitalization rates.

Conflict of Interest: None.

Ethical Considerations: Approval for the study was obtained from the University School of Allied Health Sciences, RayatBahra University, Mohali, Punjab, India.

REFERENCES

1. Levin, A., Tonelli, M., Bonventre, J., Coresh, J., Donner, J. A., Fogo, A. B., ... & Yang, C. W. (2017). Global kidney health 2017 and beyond: a roadmap for closing gaps in care, research, and policy. *The Lancet*, 390(10105), 1888-1917.
2. Reddi, A. S. (2022). Chronic kidney disease. In *Absolute Nephrology Review: An Essential Q & A Study Guide* (pp. 211-270). Cham: Springer International Publishing.
3. Salmhofer, H., Franzen, M., Hitzl, W., Koller, J., Kreymann, B., Fend, F., & Schmaderer, C. (2013). Multi-modal treatment of calciphylaxis with sodium-thiosulfate, cinacalcet and sevelamer including long-term data. *Kidney and Blood Pressure Research*, 37(4-5), 346-359.
4. Brandenburg, V. M., & Ureña Torres, P. A. (2016). Calciphylaxis and Vitamin D. In *Vitamin D in Chronic Kidney Disease* (pp. 379-390). Cham: Springer International Publishing.
5. Biancone, L., Leonardi, G., Gai, M., & Segoloni, G. P. (2016). Secondary Hyperparathyroidism in Adult Predialysis and Dialysis Patients. In *Primary, Secondary and Tertiary Hyperparathyroidism: Diagnostic and Therapeutic Updates* (pp. 201-214). Milano: Springer Milan.
6. Fridlund, Bengt, Ann-Cathrin Jönsson, Ewa Andersson, Sidona-Valentina Bala, Gull-Britt Dahlman, Anna Forsberg, Stinne Glasdam et al. "Essentials of nursing care in randomized controlled trials of nurse-led interventions in somatic care: A systematic review." *Open Journal of Nursing* 4, no. 3 (2014): 181-197.
7. Santos, P. W., & Wetmore, J. B. (2021). Sequential bone scintigraphy and the evolution of warfarin-mediated calcific uremic arteriopathy. *Case reports in nephrology and dialysis*, 11(1), 78-86.
8. Glasdam, S., Sivberg, B., & Wihlborg, M. (2015). Nurse-led interventions in the concept of randomized controlled trials—critical perspectives on how to handle social contexts. *International Journal of Multiple Research Approaches*, 9(1), 1-23.