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Effectiveness of Acupressure on Stress and Quality Of Life of Patients Undergoing Hemodialysis with End Stage Renal Disease (ESRD)

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Abstract: *The purpose of this study is to assess the effectiveness of acupressure on stress and quality of life patients undergoing hemodialysis with End Stage Renal Disease. It is a quasi-experimental non-equivalent control group pre-test – post-test design. A total of 100 samples were selected for the study using purposive sampling technique and they were assigned to two groups namely group I with 50 samples who received acupressure therapy for 20minutes per day for 2 times a week for 8 weeks and group II, the control group with 50 samples who received routine treatment of the dialysis unit. Outcome variables measured were stress and Quality of Life on 1st week before intervention, end of 4th week and at the end of 8th week after the intervention. Demographic variables, Hemodialysis Stress Scale and Quality of Life Index Dialysis Version III were used to measure the outcome variables. Statistical analysis was done using the chi-square test, Student t-test, repeated measures ANOVA F-test and Karl Pearson's correlation coefficient test. The findings showed that there was a significant reduction in stress score (F=562.33, p=0.001) and improvement in the quality of life score (F=327.66, p=0.001) in the acupressure group while comparing to the control group.*

Keywords*: Stress, Quality of Life, Acupressure, End Stage Renal Disease, Hemodialysis*

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I. Introduction

Kidney disease is a public health issue, and it is affecting over 750 million persons worldwide (1). End-stage renal disease (ESRD) is the last stage of chronic kidney disease (CKD), which means, there is a gradual decrease in kidney function over time. Individuals with ESRD have permanent loss of kidney function and require either a regular course of dialysis (a process that removes nitrogenous waste products from an individual's blood) or a kidney transplant surgery to survive. According to the United States Renal Data System, a total of 703,243 Americans received treatment for ESRD in 2015, compared to 56,434 patients received treatment in 1980. In 2015, there were 124,114 patients newly treated for ESRD, which is known as the incidence of ESRD; in 1980, only 17,903 patients were newly treated (2). For three decades, the number of patients undergoing maintenance hemodialysis worldwide has increased drastically (3).

Hemodialysis is not a curative treatment for ESRD, it keeps the patient alive. However, these sustainable therapies negatively affect patients' quality of life both physically and mentally since they must adjust to a new lifestyle. Also, the majority of patients find it hard to accept new images, habits, complete dependence on the machine for survival, changes in their physical health, limited activities, rigorous treatment plan, and dietary restrictions. Eventually, their functional status, personal relationship, social and economic status are affected considerably (4-6). Patients with ESRD experience different levels of discomfort in response to various types of physiological and psychosocial stressors. However, coping strategies can affect morbidity and mortality. Moreover, what kind of coping strategies the patients use depends on their personal experience, social support system, individual beliefs and availability of resources.

In India, there are very few studies related to physiological and psychosocial stressors among hemodialysis patients and their quality of life despite the increase in the number of patients receiving hemodialysis. Therefore, identifying such stressors is a crucial step to improve the quality of health care offered to these patients. People with a chronic illness, especially ESRD patients, often feel helpless in dealing with their disease and feel that using non-invasive alternative therapies such as acupressure helps them to regain a sense of control over their lives and their health (7) (8). The purpose of this study was to investigate the effect of acupressure therapy on the stress and quality of life of patients undergoing hemodialysis. The findings of this study might provide an interventional model aimed at ESRD patients.

II. Methods

2.1. Sample and Recruitment.

Patients who underwent hemodialysis with ESRD in selected hospital at Madurai were recruited for this study. The sample size was 100. Fifty patients each were selected using a purposive sampling technique for the intervention group and control group.

Ethical clearance was obtained from the institutional ethical committee of the selected hospital. The researcher handpicked the samples who met the following inclusion criteria: clients who were willing to participate, both the gender, aged between 20 -70years and undergoing hemodialysis two times in a week and who know to read and write in Tamil. After explaining the purpose and nature of the study informed consent was obtained from the participation, the confidentiality of the participant was assured.

2.2. Design and Intervention.

The research design selected for the present study was a quasi-experimental non-equivalent control group pre-test – post-test design. There were two groups, the intervention group who received acupressure therapy, and the control group who received routine treatment of the dialysis unit.

2.3. Outcome Measures.

2.3.1. Demographic proforma

It contains 11 items which include age, gender, marital status, educational and occupational status, income, type of family, number of children, locality, duration of ESRD and duration of dialysis therapy.

2.3.2. Stress - Hemodialysis Stress Scale

This is the Stress scale for patients subjected to hemodialysis developed by Kathleen Smith Baldree, Suzanne Pelletier, Murphy, and Marjorie J. Powers (1981). It had been specifically developed for measuring the stressors experienced by the patients subjected to hemodialysis. It contains 32 items and it had been divided into two group's i.e. physical (25items) and psychosocial stressor (7 items). The scores were interpreted as No Stress (0), Mild stress (1-32), Moderate stress (33-64) and severe stress (65-96). The internal consistency Cronbach's alpha for the total stress scales from the previous studies was 0.89 indicating good internal reliability. (9)

2.3.3. Ferrans and Powers Quality of Life Index (QLI) dialysis version III

The Quality of Life Index (QLI) was developed by Ferrans and Powers to measure the quality of life in terms of satisfaction with life. The QLI measures both satisfaction and the importance of various aspects of life. It has two parts such as Part I Satisfaction and Part II Importance, each part has 34 items. Five scores are calculated for the Ferrans and Powers Quality of Life Index: (1) Total Quality of Life Score (2) Health and functioning subscale score- 14 items, (3) Social and economic subscale score,- 8 items (4)Psychological/spiritual subscale score,- 7 items and (5) Family subscale score – 5 items. Internal consistency reliability for the QLI (total scale) was supported by Cronbach's alphas of 0.90 and test-retest correlations of 0.81 among dialysis patients. (10)

2.4. Data Collection.

Group I- (Acupressure therapy) Data collected for the patients in the group I was carried out from August 2018 to October 2018 in the dialysis unit of a selected hospital, Madurai, Tamil Nadu. The investigator explained the purposes of the study and obtained informed written consent after gaining their confidence and cooperation. Data such as demographic variables stress and quality of life were collected by using the structured interview schedule and the standard instruments, which took about 20- 30 minutes for each patient. Following this, Acupressure therapy was given to each patient individually which was carried out by the investigator for about 20 minutes along with routine nursing care of the dialysis unit during hemodialysis therapy. Acupressure therapy was given by the investigator for 2 times a week for 4 weeks. Acupressure therapy protocol was developed by the researcher based on the review of the literature and it was validated by the acupressure therapist. The acupressure points selected were ST36, GB34, SP6, KI1, K3, K10, DU20 and EX 6. These patients were given acupressure therapy on Mondays and Thursdays for 4 weeks. During the 7th and 8th sessions, acupressure techniques and steps were taught to each sample. Doubts were clarified and the patients practiced the Acupressure technique under the supervision of the investigator, and their performance was assessed. Assistance was given to perform Acupressure therapy correctly. The information booklet was given to the patients regarding the location of acupoints and techniques of acupressure therapy. Self-administered acupressure therapy 2 times a week for the next 4 weeks was practiced by the patients (5th week -8th week). The patients were asked to record their performance on the self-diary, which was noted by the investigator during each follow-up. Encouragement during visits and reinforcement through telephonic conversation was

given every week to achieve regular performance. A total of 50 patients were selected. Post-test data were collected using the same tool at the end of the 4th week and the end of the 8th week of intervention.

Group II – (Control Group) Data such as demographic variables, stress, and quality of life were collected by using the structured interview schedule and the standard instruments, which took about 20- 30 minutes for each patient. These patients were given only the routine nursing care of the dialysis Unit during hemodialysis therapy. Post-test data were collected at the end of the 4th week and the end of the 8th week from the pre-test. A total of 50 patients were selected.

2.5. Statistical Analysis.

The data collected from subjects was compiled and analyzed by using statistical tests. The qualitative data were presented as frequency and percentages and the statistical comparison was done using the Chi-square test. While, quantitative variables were presented as Mean ± SD, and the comparisons were done using a Student t-test for two groups, and one way ANOVA test (F test) for more than two groups. Pearson correlation (r) was used to find out the correlation between two quantitative variables. The difference was considered significant at $P \leq 0.05$.

III. Results

Data in Table I shows that the majority of the subjects were between the age group of 60-70 years in the study group (38%) and in the control group (36%). The majority of the subjects were males, 68% and 74% respectively in the study group and control group with no statistical significant differences between the two groups (P=0.50). There were no statistically significant differences between the two groups (P=0.35) in educational status among the two groups. 60 % of the subjects of the study group and 72% of subjects of the control group were from a nuclear family. 34% of subjects from the study group had ESRD with a duration of 3-5 years, whereas only 22% of subjects in the control group had ESRD with a duration of 3-5 years. There were no statistically significant differences between the two groups (P=0.14) regarding duration dialysis.

Table 1: Baseline Characteristic of Participants

Demographic variables		Group				Chi square test
		Acupressure (n=50)		Control (n=50)		
		n	%	n	%	
Age	20-30 years	4	8.00%	6	12.00%	$\chi2$=1.26 P=0.86
	31-40 years	3	6.00%	5	10.00%	
	41-50 years	9	18.00%	9	18.00%	
	51-60 years	15	30.00%	12	24.00%	
	61-70 years	19	38.00%	18	36.00%	
Gender	Male	34	68.00%	37	74.00%	$\chi2$=0.43 P=0.50
	Female	16	32.00%	13	26.00%	
Educational status	Illiterate	2	4.00%	2	4.00%	$\chi2$=6.74 P=0.35
	Primary school	10	20.00%	9	18.00%	
	High school	16	32.00%	17	34.00%	
	Higher secondary	9	18.00%	3	6.00%	
	Diploma	1	2.00%	4	8.00%	
	Graduate	8	16.00%	13	26.00%	
	Post graduate	4	8.00%	2	4.00%	
Marital status	Single	2	4.00%	3	6.00%	$\chi2$=1.20 P=0.54
	Married	47	94.00%	47	94.00%	
	Separated	1	2.00%	0	0.00%	
Number of Children	One	8	16.00%	5	10.00%	$\chi2$=8.69 P=0.07
	Two	16	32.00%	19	38.00%	
	Three	17	34.00%	7	14.00%	
	> Three	6	12.00%	13	26.00%	
	No children	3	6.00%	6	12.00%	
Monthly Income	< Rs.5000	11	22.00%	8	16.00%	$\chi2$=0.98 P=0.91
	Rs. 5001-10000	4	8.00%	3	6.00%	
	Rs. 10001-15000	8	16.00%	8	16.00%	
	Rs. 15001-20000	15	30.00%	16	32.00%	
	>Rs. 20000	12	24.00%	15	30.00%	
Occupation	Skilled worker	6	12.00%	6	12.00%	$\chi2$=6.06 P=0.41
	Unskilled worker	4	8.00%	2	4.00%	
	Professional	4	8.00%	6	12.00%	
	Unemployed	1	2.00%	5	10.00%	
	Retired	15	30.00%	16	32.00%	
	Housewife	11	22.00%	5	10.00%	
	Self employed / Business	9	18.00%	10	20.00%	
Type of	Joint family	20	40.00%	14	28.00%	$\chi2$=1.60

Family	Nuclear family	30	60.00%	36	72.00%	P=0.2
Locality	Rural	16	32.00%	14	28.00%	χ2=1.01 P=0.60
	Urban	26	52.00%	24	48.00%	
	Semi Urban	8	16.00%	12	24.00%	
Duration of ESRD	< 6 month	7	14.00%	15	30.00%	χ2=8.19 P=0.14
	6-12 months	11	22.00%	6	12.00%	
	1- 2 years	8	16.00%	5	10.00%	
	2- 3 years	4	8.00%	8	16.00%	
	3- 5 years	17	34.00%	11	22.00%	
	> 5 years	3	6.00%	5	10.00%	
Duration of dialysis treatment	< 6 month	12	24.00%	19	38.00%	χ2=8.25 P=0.14
	6-12 months	10	20.00%	8	16.00%	
	1- 2 years	6	12.00%	7	14.00%	
	2- 3 years	5	10.00%	6	12.00%	
	3- 5 years	15	30.00%	5	10.00%	
	> 5 years	2	4.00%	5	10.00%	

ESRD - End Stage Renal Diseases

Data in table 2 shows that there is significant reduction in the total stress score as well as physiological and psychosocial stress score in the study group at the end of 4th week P=0.001 and it was maintained at the end of 8th-week evaluation P=0.001, whereas subjects in the control group had higher mean level of stress score in both the evaluation.

Table 2: Comparison of means of Hemodialysis Stress Scale(HSS) scores before and after the intervention

	Stress	Acupressure		Control		Student independent t-test
		Mean	SD	Mean	SD	
Pre test	Physical stress	14.50	2.70	14.62	2.24	t=0.24 P=0.81
	Psycosocial stress	52.40	6.08	52.72	7.35	t=0.25 P=0.80
	Total_stress	66.90	4.28	66.34	7.13	t=0.47 P=0.63
Post test-1	Physical stress	7.88	1.84	14.60	2.42	t=15.56 P=0.001***
	Psycosocial stress	22.92	5.41	51.38	5.89	t=25.16 P=0.001***
	Total_stress	30.80	6.05	65.98	6.85	t=27.21 P=0.001***
Post test-2	Physical stress	7.98	3.28	14.84	3.46	t=11.42 P=0.001***
	Psycosocial stress	23.98	5.25	50.80	6.27	t=23.19 P=0.001***
	Total_stress	31.96	4.84	65.64	6.83	t=28.45 P=0.001***

*** Highly Significant

Data in table 3 shows that there is significant improvement in the overall QOL score as well as Health and functioning subscale score, Social and economic subscale score, Psychological/spiritual subscale score, and Family subscale score in the study group at the end of 4th week P=0.001 and it was maintained at the end of 8th-week evaluation P=0.001, whereas subjects in the control group had lower mean level of QOL score in both the evaluation

Table 3: Quality of life score before-after intervention

	QoL subs scales	Acupressure		Control		Student independent t-test
		Mean	SD	Mean	SD	
Pre test	Health and Functioning	8.46	3.41	7.88	2.38	t=0.98 P=0.32
	Social and economic	12.29	2.12	12.42	2.43	t=0.29 P=0.77
	Psychological and spiritual	9.61	2.42	8.76	2.29	t=1.80 P=0.07
	Family	19.42	4.16	19.36	3.30	t=0.10 P=0.93
	Overall_QoL	12.45	1.56	12.98	1.76	t=1.59 P=0.11
Post test-1	Health and Functioning	20.48	2.30	9.42	3.38	t=19.10 P=0.001***
	Social and economic	19.88	1.96	12.91	3.40	t=12.61 P=0.001***
	Psychological and spiritual	22.37	2.27	9.43	3.16	t=23.51 P=0.001***
	Family	23.15	3.08	21.59	3.45	t=2.39 P=0.02*
	Overall_QoL	21.47	1.99	13.34	1.87	t=21.04 P=0.001***
Post test-2	Health and Functioning	20.51	2.52	9.78	2.86	t=19.90P=0.001***
	Social and economic	19.84	1.86	13.67	3.27	t=11.59 P=0.001***
	Psychological and spiritual	19.65	2.08	9.69	1.87	t=25.17 P=0.001***
	Family	20.11	2.93	21.96	3.90	t=2.68 P=0.01**
	Overall_QoL	20.03	1.89	13.78	2.18	t=15.31 P=0.001***

*** Highly Significant

Data in table 4 shows that there is a significant difference between the level of stress score **(F=562.33P=0.001)** and QoL score (**F=327.66 P=0.001)** of patients at pre-intervention data, 4th week and 8th week of intervention.

Table 4: Stress and QoL before and after the intervention

	ACUPRESSURE group						Mean Difference	Repeated measures ANOVA F-test
	Pre test		Post test-I		Post test-II			
	Mean	SD	Mean	SD	Mean	SD		
Stress	66.90	4.28	30.80	6.05	31.96	4.84	-34.94	F=562.33P=0.001***
QOL	12.45	1.56	21.47	1.99	20.03	1.89	7.58	F=327.66 P=0.001***

*** Highly Significant

Table 5: Correlation between Stress reduction score and Qol gain score

Groups	Correlation	Mean ±SD	Karl Pearson's correlation coefficient	Interpretation
Acupressure	Stress Vs QOL	34.94±4.97 Vs 7.58±2.28	r=-0.38 p=0.001***	Fair correlation
Control	Stress Vs QOL	0.70±0.22 Vs 0.80±0.24	r=-0.15 p=0.39	poor correlation

*** Highly Significant

Considering acupressure therapy, the correlation between Stress reduction score and QOL gain score shows, there is a significant, negative, fair correlation between stress reduction score and QOL gain score. Whereas in the control group, Correlation between Stress reduction score and QOL gain score shows, there is a significant, negative, poor correlation between stress reduction score and QOL gain score

Fig1: Stress score of patients undergoing hemodialysis in the acupressure group

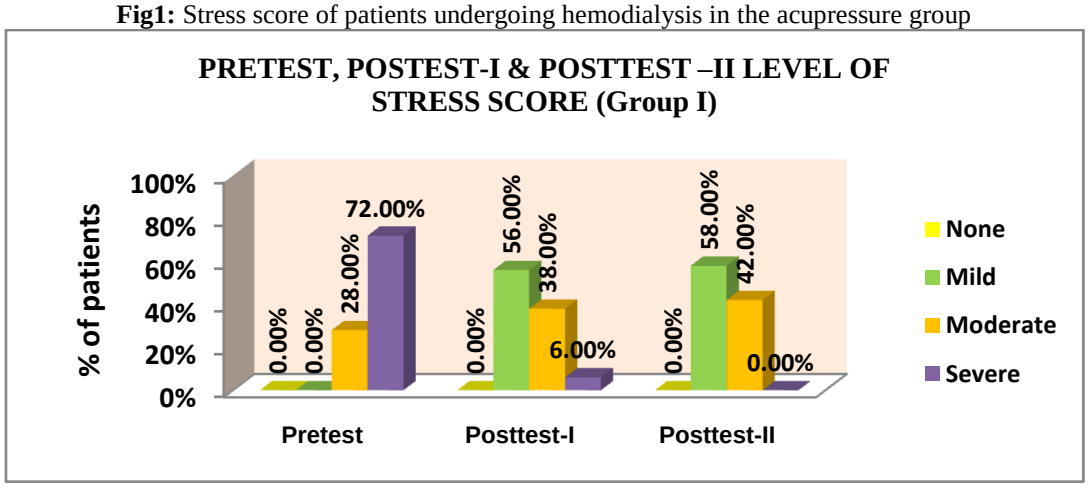

Figure1 shows that stress score of patients undergoing hemodialysis in acupressure group, where the majority of the patients(72%) were having severe stress at pre-test period, whereas after 4 weeks most them had mild stress (56%) and at after 8weeks acupressure therapy majority of the patients had mild stress only.

Fig2: QOL score of patients undergoing hemodialysis in the acupressure group

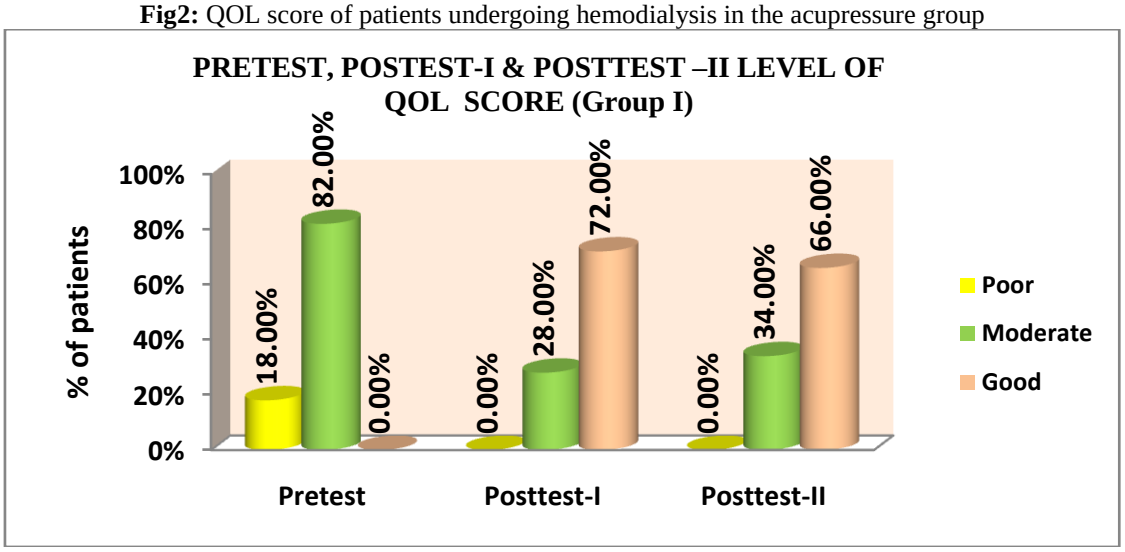

Figure 2 shows that QOL score of patients undergoing hemodialysis in acupressure group, where majority of the patients (82%) were having moderate QOL and 18% had poor QOL at pre-test period, whereas after 4 weeks of acupressure therapy most them had good QOL score (72%) and even after 8weeks of acupressure therapy majority of the patients were having good QOL and no-one experienced poor QOL.

IV. Discussion:

Hemodialysis is a lifelong treatment that significantly affects the patients physically and mentally. (11) Adherence to hemodialysis treatment requires the patients to adapt to several lifestyle modifications such as fluid and diet control, painful fistula cannulation on dialysis days, financial burdens, and frequent hospital admission due to the complications of ESRD and other diseases. All of these factors contribute to psychological disorders and distress. (12) Psychological disorders are highly common problems experienced by patients undergoing hemodialysis. The most commonly reported psychological problems were depression and anxiety with a poor quality of life in patients with hemodialysis. (9) (13)

Acupressure applied manually using the fingertip is a non-invasive and cost-effective intervention that does not require any equipment. It is less likely to cause adverse effects compared to needle acupuncture. Acupressure applied to acupoints may promote relaxation through the stimulation of neurotransmitters, such as serotonin. (14) However, good evidence on the effectiveness of acupressure on psycho-social aspects of health is limited. Hence, this study sought to identify the physiological and psychosocial stressors experienced by patients undergoing hemodialysis and their quality of life.

Regarding the demographic data, in the present study, most of the patients were aged between 61-70 years old, which is consistent with the previous study. (15) Findings of the present study shows that majority patients were males (68%), married and unemployed in both the groups which is consistent with a previous study conducted among 108 patient who underwent hemodialysis, to find out the effects of acupressure on depression, anxiety and stress where the majority of patients were males, married and did not have employment. (16) Most of the present study subjects, completed high school level education and their duration of hemodialysis was between 3-5 years. A randomized controlled trial was conducted in two Australian dialysis units, which conveyed the same result in their study which compared the effectiveness of real acupressure versus sham acupressure therapy in improving sleep quality in patients receiving hemodialysis (HD). (17)

The results of the present study shows that there is a significant reduction in physical and psychosocial stress level of the patients who underwent acupressure therapy for 4 weeks and it was maintained until 8weeks of acupressure therapy when comparing to the patients baseline data ($F= 562.33$, $p=0.001$) and there was a significant difference between the stress level of patients in acupressure group and control group. These findings are consistent with a randomized controlled trial which was conducted to evaluate the effects of acupressure on depression, anxiety, stress, and general psychological distress in patients with hemodialysis. A total of 108 patients with hemodialysis were randomly recruited into the acupressure group ($n = 54$) and the control group ($n = 54$), The outcome measurements were the Depression, Anxiety Stress Scales (DASS-21), and general psychological distress using the General Health Questionnaire (GHQ-28). The acupressure group had significantly lower DASS scores and GHQ scores compared to the control group, also indicated a significant

reduction in stress in patients after receiving four weeks of acupressure 9.63 ±7.48 from 13.04 ± 7.71 at p <0.001. (16).

In a study conducted by Honda et al. (2012), among fifteen male and nine female college students who were randomly assigned to self-acupressure (AG) and control groups (CG) shown that four weeks of self-administered acupressure was able to significantly lower the perceived level of stress in college students. These results indicated that the stress level decreased significantly from baseline to two weeks later in the AG, and it remained constant until the end of the intervention ($p < 0.05$). (18) The results of the current study would support this, in which there was a significant reduction in the stress level of patients who underwent hemodialysis along with acupressure from the baseline to four weeks and it was maintained until the eighth week of data collection ($p < 0.001$).

The present study finding shows that there was significant improvement in QOL of patients, after 4 weeks of acupressure therapy and it was maintained until at end of 8 weeks of acupressure therapy when comparing to the baseline data (F=327.66, P=0.001) and also there was a significant difference between the quality of life of patients in acupressure group and control group. A randomized control trial evaluated the effect of acupoints massage in the quality of life among ESRD patients which conveyed similar findings. Ninety-eight ESRD patients with sleep disturbances were randomly assigned to an acupressure group, a sham acupressure group, and a control group. Acupressure and sham acupressure group patients received acupoints or no acupoints massage 3 times a week for 4 weeks during hemodialysis. The measures included the Pittsburgh Sleep Quality Index, Sleep Log, and the Medical Outcome Study – Short Form 36. Acupressure group experienced an improved quality of sleep at night over the control group. Further, Medical Outcome Study – Short Form 36 data documented that acupressure group patients experienced significantly improved quality of life. (19)

The present study shows that there is a fair negative correlation between the stress reduction score and QOL gain a score of patients with ESRD which is consistent with the two previous studies (20), (21) examined the influence of stress on HRQOL of patients undergoing hemodialysis. Both studies concluded that stress and physical and mental HRQOL are indirectly related.

V. Conclusions:

In conclusion, the present study shows that acupressure therapy is an effective non-pharmacological therapy that significantly reduces the physical and psychosocial stress due to hemodialysis and improves the quality of life of patients undergoing hemodialysis with ESRD. The application of these findings is important for ESRD patients with stress and poor QOL. Assessment of stress level and quality of life are a vital part of nursing practice. Nurses can learn acupressure therapy easily and apply it in clinical practice to promote patients' comfort and reduce distress.

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