

Effect of Aromatherapy Massage on Restless Leg Syndrome and Quality of Life among Patients undergoing Hemodialysis

Tawheda Wagdy Elkady¹, Gehan H. Soliman²,
Sanaa Ibrahim Abd El- Ghafar³, Shaimaa A. Shaala⁴

¹B.Sc. Nursing Science,

²professor of Medical Surgical Nursing,

³Assistant Professor of Medical Surgical Nursing,

⁴lecturer of Medical Surgical Nursing,

^{2,3,4}Faculty of Nursing, Menoufia University

Abstract: Background: Restless leg syndrome stands as a prevalent neurological complication within hemodialysis patients which often neglected in clinical practice and negatively affects the physical and mental health of patients and leads to a reduced quality of life. As a non pharmacological intervention, aromatherapy massage is considered to show fewer restless leg syndrome symptoms, decrease restless leg syndrome severity, allow more effective and efficient hemodialysis sessions, and improve patients' quality of life. **Purpose:** To determine the effect of aromatherapy massage on restless leg syndrome and quality of life among patients undergoing hemodialysis. **Design:** A quasi-experimental research design was utilized. **Setting:** The study was conducted at Hemodialysis units at Menouf General Hospital and Fever Hospital, Menoufia governorate, Egypt. **Sampling:** A consecutive sample of 64 adult hemodialysis patients with restless leg syndrome was selected randomly and divided alternatively into two equal groups, 32 patients for each group. **Instruments:** Three instruments were used for data collection: Structured interview questionnaire, International restless leg syndrome severity rating scale, and World Health Organization quality of life-bref questionnaire. **Results:** There were significant improvement in total restless leg syndrome severity score among study group than control group at post intervention ($P < 0.02^*$). Also, there were significant improvement in quality of life for study group (100%) had high quality of life compared to control group (87.4%) who had moderate quality of life. **Conclusions:** Aromatherapy massage has a significant effect on reducing severity of restless leg syndrome and improving quality of life among patients undergoing hemodialysis. **Recommendations:** Patients undergoing hemodialysis should be engaged in practicing the aromatherapy massage that reduce severity of restless leg syndrome and improve their quality of life.

Keywords: Aromatherapy massage, hemodialysis, restless leg syndrome, quality of life.

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Introduction

Restless leg syndrome, also known as Willis-Ekbom disease, is a common neurological and sensorimotor disease which mostly appear or deteriorate during periods of rest or inactivity (Mogavero et al., 2024). CKD patients receiving HD treatment commonly suffered from RLS because each HD treatment session required longer inactivity time. Hence, it was also named uremic RLS (Safarpour et al., 2023). Studies reported that the incidence of RLS is between 6.6 and 70% among patients undergoing HD. In addition, RLS was associated with increased severity of fatigue, increased incidence of sleep disorder, and poor quality of life (QoL) (Yaseen et al., 2021). It is noted that, currently, RLS has been a top research priority for patients with CKD. Meanwhile, studies also indicated that RLS may be associated with increased risk of morbidity and mortality (Xia et al., 2022).

It is often accompanied by uncomfortable and varied limb sensations that may be described as creeping, itching, or pulling; these occur or worsen in the evening when at rest and may resolve after movement. RLS is often accompanied by periodic limb movements at night, which can result in disturbed sleep architecture and frequent awakenings (Izadi et al., 2024). In general, two clinical forms of RLS are described; primary and secondary. Although primary RLS has a familial component, the underlying mechanism is still not fully understood but seems to be related to abnormalities in the dopaminergic and

glutamatergic pathways of the central nervous system. The secondary forms of the syndrome are associated with iron deficiency, renal failure, pregnancy, diabetes mellitus, peripheral neuropathy, and several rheumatologic disorders such as rheumatoid arthritis (RA) and systemic lupus erythematosus (SLE) (Yilmaz, 2023).

Essential criteria for diagnosis of RLS according to the International Restless Legs Study Group includes a desire to move one's legs brought on by or stems from uncomfortable sensations through the legs up to the feet, when the urge to move the legs is present; it may or may not be accompanied by unpleasant sensations in the arms, the urge to move the legs may be present while sleeping or inactivity, the restlessness may or may not be entirely relieved by movement, and the urge to move or unpleasant sensations may be worse at night than during the day or only occur at night (Ratnani & Harjpal, 2023).

A variety of treatment regimens can be chosen to initially relieve symptoms of patients currently with RLS (Yeh et al., 2023). Among available regimes, pharmacological treatments are mainly selected for cases with severe RLS, which, at times, lead to serious complications (Kouri et al., 2023). Consequently, non-pharmacological treatments have been increasingly reported to be useful for the treatment of the syndrome and have fewer unpleasant adverse events (İsmayilov & Değirmenci, 2023). Also, among existing non pharmacological treatments is aromatherapy massage

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which is frequently prescribed for the management of several complications associated with diseases or treatments (van Veen et al., 2024).

Aromatherapy massage combines the therapeutic benefits of massage with the aromatic properties of essential oils. It can be used to alleviate muscle tension, improve circulation, and promote relaxation, while simultaneously incorporating essential oils chosen for their specific therapeutic properties. These oils are usually diluted in a carrier oil before being applied to the skin or dispersed into the air through a diffuser. The combination of touch and scent can create a deeply calming and rejuvenating experience for the patient, offering not only physical but also mental and emotional benefits. Different essential oils are believed to have different effects, such as lavender for relaxation, peppermint for invigoration, or eucalyptus for respiratory support (Vora et al., 2024). Aromatherapy massage with lavender oil is often recommended as a complementary therapy for individuals with restless leg syndrome (RLS). Lavender oil is known for its relaxing and calming properties, which can help soothe the muscles and promote better sleep quality, both of which are beneficial for managing RLS symptoms. (Beerappa et al., 2023).

Nurses are an integral member of the healthcare team responsible for providing care for patients on the dialysis apparatus (Thomas et al., 2024). They also play a part in a variety of other activities as protecting, monitoring and training the patient and

his family concerning complications of dialysis and how they can be prevented or reduced such as RLS, inadequate ultrafiltration, hypotension, air emboli, and vomiting (Supramanian et al., 2024). Also, (Chowdhury & Kumar, 2023) added that hemodialysis nurses are in unique position to assist in the monitoring, evaluation, and management techniques of patients with RLS.

Significance of the study

The global prevalence of ESRD has been reported to be 8–16%. Among advanced ESRD treatment modalities, hemodialysis was found to be the primary approach of dialysis treatment for kidney failure, and around 90% of all patients undergoing dialysis received hemodialysis (Lee & Son, 2021). According to Egyptian renal data system, it is estimated that in Egypt there are about 3393 patients with ESRD on hemodialysis treatment from 80 dialysis units and from 18 Egyptian governorates (Hassaballa et al., 2022).

Restless leg syndrome (RLS) is a common neurological sensorimotor disorder that impairs sleep, mood, and quality of life. Of particular note, patients on hemodialysis (HD) for ESRD are amongst the groups most at risk for RLS with the prevalence of 6.6 % to 80 %. It is often neglected in clinical practice, which negatively affects the physical and mental health of patients and leads to a reduced quality of life as it associated with a variety of physical and psychological disorders including an increased risk of

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cardiovascular events (Aini et al., 2024; and Liu et al., 2023).

Restless leg syndrome (RLS) is a common neurological sensorimotor disorder that impairs sleep, mood and quality of life (Chenini et al., 2023). Of particular note, patients on hemodialysis (HD) for ESRD are amongst the groups most at risk of RLS with the prevalence of 6.6 % to 80 % in hemodialysis patients and 7 %–24.1 % in the non-dialysis population (Aini et al., 2024). It is often neglected in clinical practice, which negatively affects the physical and mental health of patients and leads to a reduced quality of life (Liu et al., 2023).

Several studies have suggested a link between RLS and cardiovascular disease, although the exact mechanisms behind this association are not fully understood. One proposed explanation is that the sleep disturbances caused by RLS may lead to hypertension and other cardiovascular risk factors. Additionally, RLS has been linked to conditions such as obesity and diabetes, which further elevate cardiovascular risk (Sarode & Nikam, 2023).

Furthermore, the chronic discomfort and sleep disturbances associated with RLS can contribute to psychological disorders such as anxiety and depression, which seriously affect patients' prognosis and quality of life and even lead to an increased risk of cardiovascular events and death (Li et al., 2024). Nonpharmacological therapy is essential for reducing and treating RLS as well as minimizing the

harmful effects of pharmacotherapy. Aromatherapy massage also is considered a suitable option to modulate RLS symptoms (Ghasemi et al., 2021).

So, this must take researcher's attention to manage it and prevent complications that result from it as there are various methods used to treat it. In this study aromatherapy massage will be used to reduce severity of RLS and improve QoL, which is available to all people, low cost and don't produce allergy.

Recently at menoufia governorate there were rare nursing research as regard application of aromatherapy massage to hemodialysis patients with RLS. So, the aim of the study is to determine the effect of aromatherapy massage on restless leg syndrome and quality of life among patients undergoing hemodialysis.

Purpose of the study

To determine the effect of aromatherapy massage on restless leg syndrome and quality of life among patients undergoing hemodialysis.

Research hypotheses

- 1) Study group patients who receive aromatherapy massage, are expected to exhibit lower intensity of restless leg syndrome than patients who don't (control group).
- 2) Study group patients who receive aromatherapy massage, are expected to exhibit better quality of life than patients who don't (control group).

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Operational definitions

▪ **Aromatherapy massage:**

The soft tissue manipulation, using lavender oil on both lower leg areas using effleurage massage, for 10 min on each leg, for 4 weeks, three times a week, during the second to third hours of hemodialysis session.

▪ **Restless Leg Syndrome (Willis-Ekbom Disease (WED)):**

Is a clinical entity characterized by sensory-motor manifestations commonly observed in end-stage renal illness accompanied by an uncomfortable sensation in the legs that occurs in the evening or night and is partially or totally relieved by movement.

▪ **Quality of life (QoL):**

A sense of well-being related to a person's health perception and ability to function and improvement of health outcomes (physical, psychological state, level of independence, sociality and environmental factors) and be active in the community.

Methods

Design:

A quasi-experimental research design was utilized to achieve the aim of this study.

Setting

The current study was conducted at hemodialysis unit in both Menouf General Hospital, and Menouf Fever Hospital, Menoufia governorate, Egypt.

Sampling:

A consecutive sample of sixty-four hemodialysis patients with restless leg syndrome was assigned randomly and

divided alternatively into two equal groups (32 patients for each group).

Sampling criteria include

- Adult patients (18 – 60 years old) of both sexes.
- Scheduled for maintenance hemodialysis 3 times per week.
- Having the ability to communicate verbally.
- Having the physical and mental ability.
- Having diagnostic criteria for RLS according to International Restless Legs Syndrome Study Group (IRLSSG) scale which are the tendency to move the legs often associated with unpleasant sensation in the legs, induction or exacerbation of symptoms with rest, relief of symptoms in activity, and daily fluctuations in symptoms with exacerbation in the evening and nighttime hours.
- Willing to participate in the study.
- Lack of wounds and redness of the limbs.

Exclusion criteria include

- Allergic reaction to lavender to avoid allergic contact dermatitis.
- Hemodynamic instabilities during the intervention (aromatherapy massage) because it may affect the patient's hemodynamic indices such as pulse, blood pressure, and respiration by stimulating sensory perceptions and creating a relaxation effect.
- Presence of any type of skin infection or open wounds that would hinder massage therapy.
- Vascular problems in lower limbs (such as deep vein thrombosis and varicose vein) because massage therapy may aggravate the situation such as losing blood clot.

Sample size:

The sample was calculated using the following equation: Based on Aliasgharpour et al., (2016) who

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showed that the expected effect size improvement after using the aromatherapy massage on restless legs syndrome symptoms is 6.65 between study and control groups. To achieve 95% power to detect this difference with a significance level of 5% using the equation $n = \frac{2\sigma^2(Z_{crit} + Z_{pow})^2}{D^2}$ it is estimated that 25 subjects per group would be required. With a withdrawal subject rate of 20% a total of 32 per group subjects will be recruited leading to a total required sample size of 64 subjects, where n is the sample size for each group, σ^2 is the variance of either group (assumed to be equal for both groups), and D is the minimal detectable difference between the two means. The zcrit and zpow are the standard normal deviates at a level of significance and power, respectively. A standard normal deviate is a realization of a standard normal random variable. The zcrit is 1.96 at 5% level of significance for two-sided tests. The zpow is 0.84 at 80% power and 1.96 at 95% power.

Instruments of the study:

three instruments were used in this study:

Instrument one: Structured Interview Questionnaire

It was developed by the researcher to assess baseline patient's sociodemographic and medical characteristics as well as knowledge. It comprised of three parts as the following:

- **Part 1: Characteristics of patients:** It comprised of seven questions about patient's age, gender, marital status, educational level, profession, place of residence, and monthly income.

- **Part 2: Medical data:** It comprised of questions related to past and present medical history such as history of chronic or hereditary diseases, smoking, current medications, and the start of dialysis treatment.

- **Part 3: Patient's knowledge:** It comprised of 15 multiple choice questions; 5 questions about renal failure, 4 questions about hemodialysis, and 6 questions about restless leg syndrome.

Scoring system of patient's knowledge

- Completely correct answers were scored 2.
- Incomplete correct answers were scored 1.
- Incorrect answers or didn't know were scored 0.

Total score for knowledge was classified as follows

- Good knowledge: 70-100%.
- Fair knowledge: 50- < 70%.
- Poor knowledge: 0- < 50%.

Instrument two: International Restless Leg Syndrome Severity Rating Scale (IRLSSRS):

It was developed by the International Restless Leg Syndrome Intervention Group (IRLSIG), (2003) to rate severity of a patient's RLS.

Scoring system: The scale consists of ten questions; each question was rated from 0 (none) to 4 (very severe). The measurement was ranged from zero to 40 (Bahgat & Algendy,2019).

Total score for RLS severity was classified as follows

- None RLS: Zero.
- Mild RLS: 1-10.
- Moderate RLS: 11-20.
- Severe RLS: 21-30.

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- Very severe RLS: 31-40.

Instrument three: World Health Organization Quality of Life-Bref (WHOQOL) questionnaire:

It was developed by the WHO (1998) to assess patient's quality of life (QoL). It consists of 26 questions as a total. These questions included two items on the overall QoL, and general health, added to 24 items of satisfaction that are divided into four domains: physical health with 7 items, psychological health with 6 items, social relationships with 3 items, and environmental health with 8 items. Each item of the WHOQOL-BREF is scored from 1 to 5 on a response scale, which is stipulated as a five-point ordinal scale. Scores on the response scales are reversed, summed and scaled to range from 1 to 130.

Total score of (WHOQOL) scale was classified as follows

- Poor quality of life less than 52.
- Moderate quality of life (53 - 78).
- Good quality of life (79 to 130).

Validity of the Instruments

All instruments will be tested for its content validity by jury of five experts of Medical Surgical Nursing, and Hemodialysis fields, (Two experts in Nephrology, Faculty of Medicine, Menoufia University and Three experts in Medical Surgical Nursing, Faculty of Nursing, Menoufia University). Modifications were done accordingly to ascertain relevance and completeness.

Reliability of the Instruments

- The reliability co-efficient regarding structured interview questionnaire revealed 0.84.
- Reliability of the second instrument (International Restless Legs Syndrome Severity Rating Scale), was tested by Bahgat & Algendy (2019) and it was found that the Cronbach's Alpha Statistical Test reported as 0.88.
- Reliability of the third instrument (World Health Organization Quality of Life) -BREF Questionnaire, has been proven as a valid and reliable questionnaire, and all of the domains met the reliability criteria (Cronbach α was ≥ 0.6) (Pio et al., 2022).
- Test-retest method used to ascertain reliability of all instruments, the period between both tests was 2 weeks.

Pilot Study:

A pilot study was conducted prior to data collection on 10% of the study sample (8 patients) to test the feasibility, clarity and applicability of the instruments as well as to estimate the time needed for data collection then necessary modifications were done so these patients were excluded from the study sample.

Ethical Considerations

A written approval was obtained from ethical and research committee of the Faculty of Nursing, Menoufia University (15/03/2023, NO. 943). A written consent to participate in this study was obtained from all subjects who met the inclusion criteria after explanation of the purpose, procedure, and benefits of the study. Participants

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were informed that participation in the study was entirely voluntary and informed that they can withdraw from the study at any time without penalty. Confidentiality and anonymity of participants were assured through coding of all data and put all papers in a closed cabinet. Moreover, they were assured that the nature of questionnaires didn't cause any physical or psychological harm.

Procedure

A written official letter was sent from the Dean of the Faculty of Nursing, Menoufia University to the directors of Menouf General Hospital and Menouf Fever Hospital including the purpose and methods of data.

- **Study group (I):** Included patients who received aromatherapy massage along with routine hospital care.
- **Control group (II):** Included patients who only received routine hospital care (e.g, assessing the needs of patients and creating care plans for them, making sure patients receive the correct medication on time by preparing the dialysis machines and medication, monitoring patients and assessing their health throughout treatment, recording treatment received and checking whether care plans need altering, educating patients so that they can gain a better knowledge of their health and take responsibility for their wellbeing, and providing emotional support to patients.
- **Study period:** Data collection was extended over a period of 6 months from the first of July 2023 to the end of December 2023. The researcher

dealt with the control group (II) firstly then the study group (I) to avoid the contamination of data collection. The researcher interviewed the studied sample three days per week mutually in hemodialysis units at both menouf general hospital and menouf fever hospital during the hemodialysis sessions at the morning and afternoon shifts during the dialysis sessions .The study was conducted in four consecutive phases: Assessment, planning, implementation and evaluation.

Assessment phase:

The first interview was conducted at hemodialysis units in Menouf General Hospital and Menouf Fever Hospital. It took about 1 hour for each patient in both groups (study and control groups). Assessment of sociodemographic characteristics, medical data as well as knowledge was done by using instrument one. Also, they were assessed for restless leg syndrome and quality of life using instrument two and instrument three.

Planning phase:

Based on assessment phase the plan of aromatherapy massage on restless leg syndrome was developed according to Ammirati 2020; Akbaş et al., 2021; and Vora et al., 2024.

Implementation phase:

The researcher applied the aromatherapy massage in 13 sessions; 1 session for theoretical part (in which the previously prepared booklet was distributed by the researcher then the researcher gave information about

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renal failure, hemodialysis, and restless leg syndrome and then allowed each subject to ask questions and provided them with question's answers. This session took about 45-60 minutes according to subject's level of understanding), and 12 sessions for aromatherapy massage. Patients in the study group were interviewed three days per week in the morning and the afternoon shift during the dialysis sessions.

During massage sessions, the researcher refreshed the previous learnt knowledge and then applied aromatherapy massage using the effleurage massage with lavender oil and sesame oil as a carrier oil to dilute the lavender oil on both lower leg areas.

The researcher applied the effleurage massage by using a gentle, whole hand movement in contact with the legs and in the direction of blood flow to the heart from the ankles to the knees. The amount of oil used for each massage therapy session was 10 cc, and each foot was massaged for 10 min during the second to third hours of hemodialysis session. Effleurage massage performed three times weekly over 4 weeks covering a total 12 days during hemodialysis.

Evaluation phase:

Posttest was done after four weeks of applying aromatherapy massage using instrument one part three, instrument two and three.

Statistical Analysis:

Data were collected, tabulated, and statistically analyzed using an IBM personal computer with Statistical

Package of Social Science (SPSS) version 25 (SPSS, Inc, Chicago, Illinois, USA). Descriptive statistics was used for quantitative data in the form of mean, standard deviation (SD), and qualitative data were presented in the form of numbers and percentages. Analytical statistics (Chi squared test χ^2) was used to find out the possible association between the study factors and the targeted variables. Student t-test was used to compare between means. A statistically significant difference was considered if $P \leq 0.05$ indicates significant, a highly statistically significant difference was considered if $P \leq 0.01$ and a very highly statistically significant difference was considered if $P \leq 0.001$

Results

Table 1 shows that about one third of both study and control groups (28.1% & 34.5% respectively) were 45 - < 55 years. Half of study group (50%) and nearly two thirds of control group (59.4%) were females. About two thirds of both studied groups (62.4% & 65.6% respectively) were married. As regards level of education, half of study group (50%) and about one third of control group (34.4%) had secondary education. More than one third of study and control groups (40.6% & 34.4% respectively) were employees. Concerning place of residence, more than two thirds of both study and control groups (71.9 & 71.9 respectively) lived in village. More than two thirds of study group (71.8%) and nearly two thirds of the control group (59.4%) had not enough monthly income. There were no statistically

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significant differences between characteristics of patients in the study and control groups.

Table 2 shows that more than three quarters of study group (81.2 %) and nearly two thirds of control group (59.4 %) were suffered from chronic diseases. More than half of study group (53 %) and one quarter of control group (25%) had hypertension. Concerning hereditary diseases, more than half of study group (56.2 %) and more than three quarters of control group (81.2%) had a hereditary disease. Hypertension was the highest percentage regarding family hereditary disease for both study and control groups (34.4% & 28.2% respectively). Concerning duration of dialysis, nearly half of study group and more than half of control group (46.9% & 53.1% respectively) were started dialysis 1 year - < 5 years. All studied subjects (100%) received three dialysis sessions per week. In relation to smoking, more than three quarters of both study and control groups (78.2% & 81.2 % respectively) didn't smoke. Regarding current medications, the most of both study and control groups (78.1% & 87.5% respectively) were taking nutritional supplements, hypertensive or diabetic medications. In relation to practicing exercises, the majority of study group (96.9%) and all patients of control group (100%) didn't practice exercises. There were no statistically significant differences between both studied groups regarding all medical data.

Table 3 shows that the majority of both study and control groups (81.2 % & 90.6 % respectively) had poor total

knowledge score at pre intervention. While post intervention, study group shows significantly improvement (71.9%) had good total knowledge score compared to control group.

There were very highly statistically significant improvement among study group than control group post intervention regarding score of total knowledge ($P < 0.001^{**}$).

Figure 1 shows that the mean total knowledge score in study and control group were $10.87 + 3.85$ and $11.18 + 2.481$ respectively at pre intervention. Meanwhile, mean total knowledge score were highly statistically significant increased to $22.40 + 3.73$ in the study group post intervention versus control group who didn't increase. Moreover, there were highly statistically significant increase in mean total knowledge score post intervention ($22.40 + 3.73$) versus pre intervention ($10.87 + 3.85$) among study group.

Figure 2 shows that nearly three quarters of study group (71.9%) and nearly half of control group (46.9%) had severe RLS at pre intervention compared to post intervention where study group (53.1%) significantly improved to mild RLS than control group (46.9%) who didn't improve.

Figure 3 shows that the mean scores of restless leg syndrome in study and control groups were $28.75 + 3.06$ and $25.90 + 4.88$ respectively at pre intervention. Meanwhile, the mean score of restless leg syndrome highly significantly very decreased to $10.18 + 6.54$ for the study group post intervention compared to control group ($25.06 + 4.41$). In addition, there was

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reduction in mean score of restless leg syndrome post intervention 10.18 ± 6.54 versus pre intervention 28.75 ± 3.06 among study group).

Table 4 shows that the majority of both study and control groups (87.4% & 84.3% respectively) had moderate quality of life pre intervention. While post intervention, study group showed highly significantly improvement (100%) had high quality of life compared to control group (87.4%) who had moderate quality of life. Moreover, study group showed highly significantly improvement post intervention to 100% had high quality of life compared to pre intervention (87.4%) who had moderate quality of life.

Figure 4 shows that the mean scores of total quality of life in the study and control groups were 72.18 ± 4.56 and 79.68 ± 7.54 at pre intervention. Meanwhile, the mean scores of total quality of life were significantly increased to 100.31 ± 5.82 for study

group post intervention compared to control group (85.87 ± 4.62). In addition, there was an increase in mean score of quality of life post intervention (100.31 ± 5.82) versus pre intervention (72.18 ± 4.56) among study group ($P < 0.001^*$).

Table 5 shows that there was a negative correlation between total knowledge and total restless legs syndrome among study and control groups pre and post intervention. Meanwhile, there was a positive correlation between total knowledge and quality of life among study and control groups pre and post intervention. Moreover, there were very highly statistically significantly negative correlation between total restless legs syndrome and quality of life pre and post intervention. Moreover, there was highly statistical negative correlation between total restless legs syndrome and quality of life pre and post intervention in control group.

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Table (1): Distribution of studied patients according to their characteristics (n = 64)

Sociodemographic characteristics	Studied subjects (n = 64)				Test of significance	
	Study group (n=32)		Control group (n=32)		X ²	P-value
	No	%	No	%		
Age						
18 <25	4	12.5	2	6.2	1.151	0.540
25 < 35	8	25.0	5	15.6		
35 < 45	7	21.9	9	28.1		
45 < 55	9	28.1	11	34.5		
55 – 60	4	12.5	5	15.6		
Gender						
Male	16	50.0	13	40.6	0.567	0.451
Female	16	50.0	19	59.4		
Marital status						
Single	6	18.8	3	9.4	1.310	0.519
Married	20	62.4	21	65.6		
Widow	6	18.8	8	25.0		
Educational level						
Illiterate	2	6.2	5	15.6	5.630	0.344
Read and write	2	6.2	4	12.5		
Basic education	7	21.9	3	9.4		
Secondary education	16	50.0	11	34.5		
University qualification	4	12.5	7	21.8		
Postgraduate studies	1	3.2	2	6.2		
Occupation						
Manual work	5	15.6	5	15.6	0.367	0.947
Employee	13	40.6	11	34.4		
Does not work	5	15.6	5	15.6		
Housewife	9	28.2	11	34.4		
Place of residence						
Village	23	71.9	23	71.9	0.000	1.000
City	9	28.1	9	28.1		
Monthly income						
Enough	9	28.2	13	40.6	1.108	0.292
Not enough	23	71.8	19	59.4		

X²: chi-square test

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Table (2): Distribution of studied patients according to their medical data (n=64)

Medical data	Studied subjects (n = 64)				Test of significance	
	Study group (n=32)		Control group (n=32)		X ²	P-value
	No	%	No	%		
Presence of chronic disease						
Yes	26	81.2	19	59.4	3.668	0.055
No	6	18.8	13	40.6		
Types of chronic disease	(n= 26)		(n= 19)			
Diabetes	0	0	7	21.9	14.707	0.012
Hypertension	17	53.0	8	25.0		
Heart diseases	3	9.4	0	0		
Liver diseases	0	0	1	3.1		
Asthma	3	9.4	1	3.1		
Others	3	9.4	2	6.3		
Presence of hereditary disease						
Yes	18	56.2	26	81.2	4.655	0.031
No	14	43.8	6	18.8		
Types of hereditary disease	(n= 18)		(n= 26)			
Diabetes	6	18.7	8	25.0	5.893	0.207
Hypertension	11	34.4	9	28.2		
Heart diseases	0	0.0	1	3.1		
Liver diseases	1	3.1	5	15.6		
Asthma	0	0.0	3	9.3		
Duration of dialysis						
< 1 year	8	25.0	0	0.0	2.805	0.707
1 year - < 5 years	15	46.9	17	53.1		
5 years - < 10 years	8	25.0	11	34.4		
10 years - < 15 years	1	3.1	4	12.5		
Dialysis sessions received per week						
3 sessions	32	100.0	32	100.0	-	-

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Cont. Table (2): Distribution of studied patients according to their medical data (n=64)

Medical data	Studied subjects (n = 64)				Test of significance	
	Study group (n=32)		Control group (n=32)		X ²	P-value
	No	%	No	%		
Smoking						
Yes	7	21.8	6	18.8	0.097	0.756
No	25	78.2	26	81.2		
Current medications						
Nutritional supplements (calcium, iron, or vitamin D (one alpha))	3	9.4	1	3.1	1.313	0.519
Hypertensive medications	2	6.2	1	3.1		
Diabetic medications	2	6.2	2	6.2		
All of the above	25	78.2	28	87.6		
Practicing exercise						
Yes	1	3.1	0	0	1.016	0.313
No	31	96.9	32	100.0		

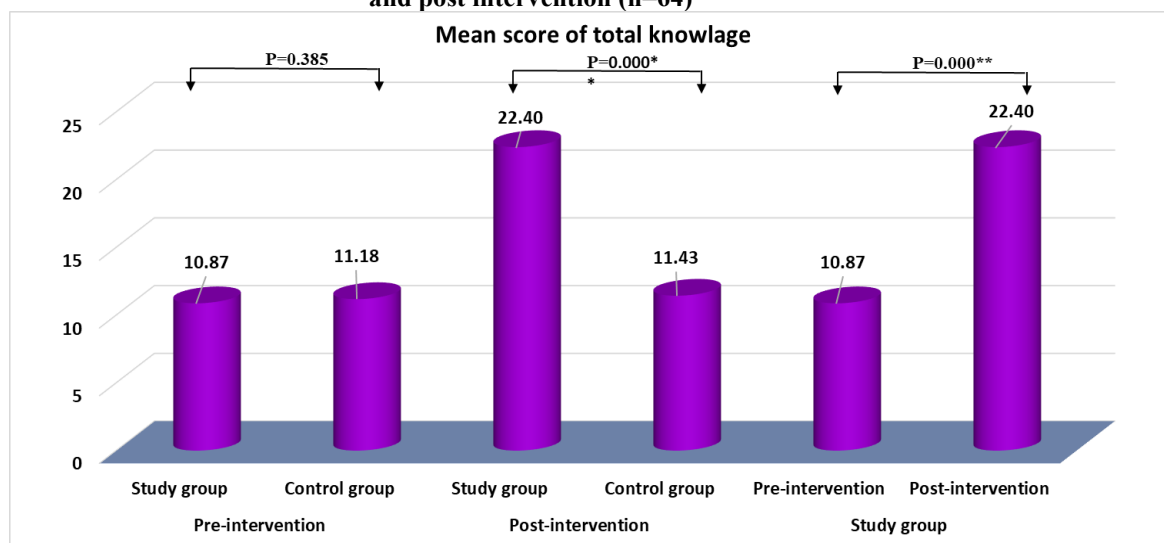
Table (3): Distribution of studied patients according to their level of knowledge pre and post intervention (n=64)

Total knowledge level	Pre-intervention						Post-intervention					
	Study (n=32)		Control (n=32)		Test of significance		Study (n=32)		Control (n=32)		Test of significance	
	No	%	No	%	X ²	P-value	No	%	No	%	X ²	P-value
Poor (<50%)	26	81.2	29	90.6	1.164	0.281	0.0	0.0	26	81.2	49.600	<0.001**
Fair (50-<75%)	6	18.8	3	9.4			9	28.1	6	18.8		
Good (>75%)	0.0	0.0	0.0	0.0			23	71.9	0.0	0.0		

X²: chi-square test

**Highly significant at <0.001

Figure (1): Distribution of studied patients according to their mean score of knowledge pre and post intervention (n=64)



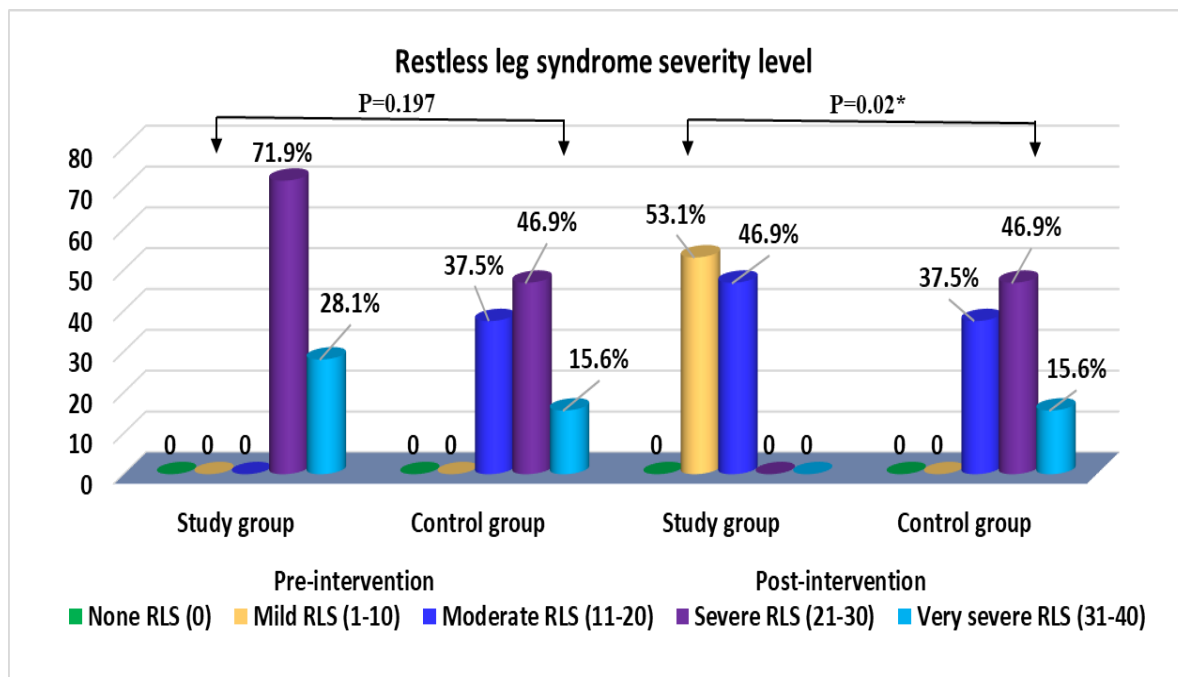
t- test 1/p-value between study and control pre- intervention (0.385/0.701).

t- test 2/p-value between study and control post intervention (11.405/0.000**).

Paired t- test 3/p-value between pre and post intervention among study group (14.681/0.000**).

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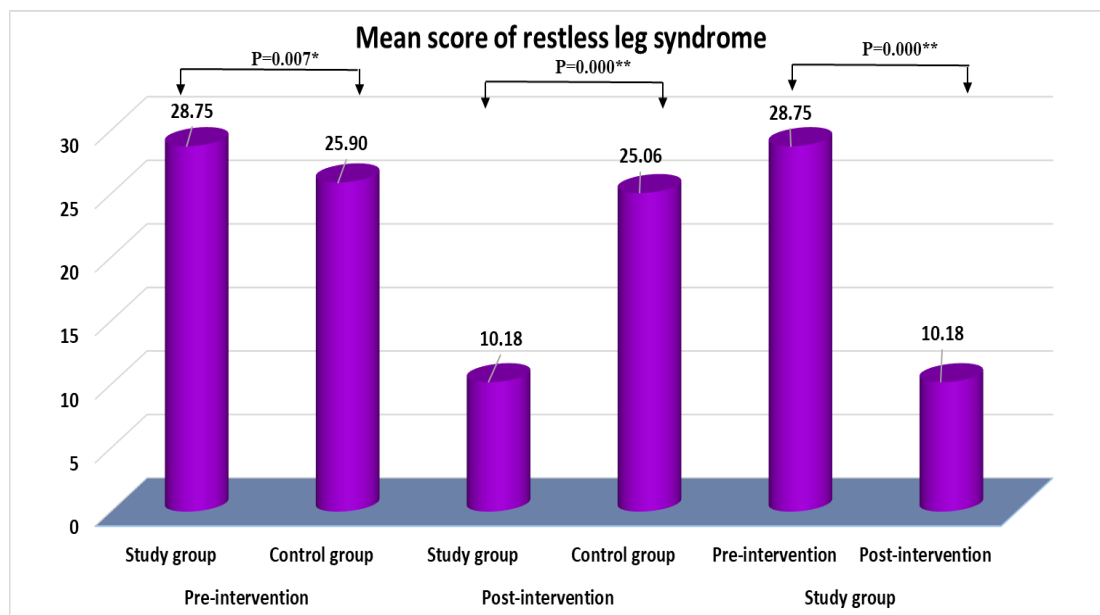
Figure (2): Distribution of studied patients according to their restless leg syndrome severity level pre and post intervention (n=64)



X²1/p-value between study and control pre- intervention (8.539/0.197)

X²2/p-value between study and control post intervention (3.362/0.02*)

Figure (3): Distribution of studied patients according to their mean score of restless leg syndrome pre and post intervention (n=64)



t-test 1/p-value between study and control at pre- intervention (2.787/0.007*)

t-test 2/p-value between study and control at post intervention (10.657/0.000**)

paired t-test 3/p-value between pre and post intervention among study group (15.126/0.000**)

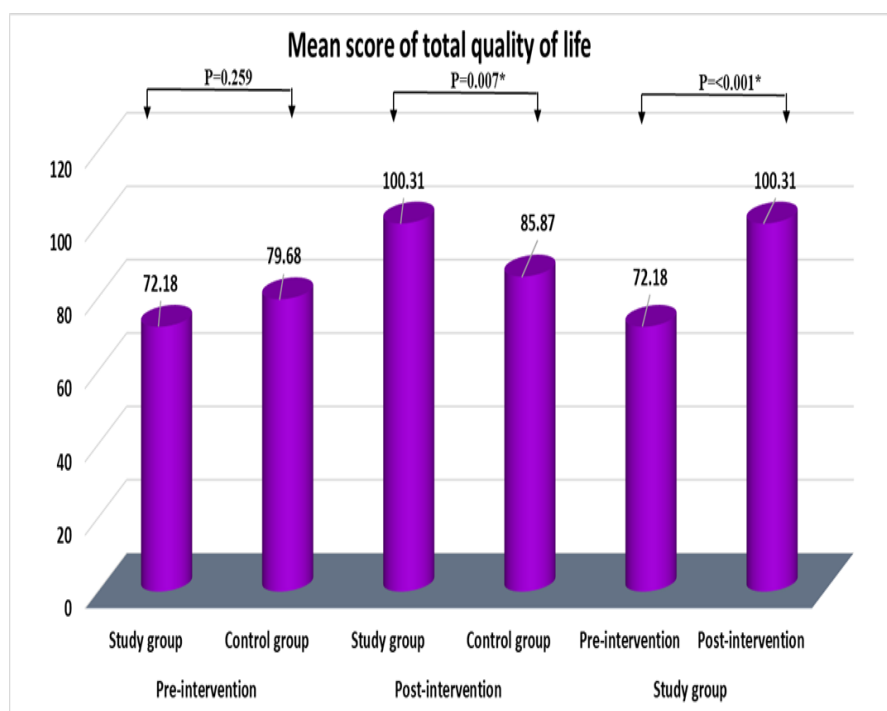
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Table (4): Distribution of studied patients according to their total quality of life level pre and post intervention (n=64)

Quality of life level	Pre-intervention						Post-intervention					
	Study n=32		Control n=32		Test of significance		Study n=32		Control n=32		Test of significance	
	No	%	No	%	X ²	P-value	No	%	No	%	X ²	P-value
low Quality of Life (<52%)	2	6.3	4	12.5	1.000	0.217	0.0	0.0	3	9.4	0.217	<0.001**
Moderate Quality of Life (53-78%)	28	87.4	27	84.3			0.0	0.0	28	87.4		
High Quality of Life (79-130%)	2	6.3	1	3.2			32	100.0	1	3.2		

** High significant

Figure (4): Distribution of studied patients according to their mean score of world health organization quality of life- bref (WHOQOL) domains pre and post intervention (n=64)



t- test 1/p-value between study and control at pre- intervention (10.982/0.259)

t-test 2/p-value between study and control at post intervention (4.810/0.007*)

paired t-test 3/p-value between pre and post intervention among study group (25.706/<0.001*)

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Table (5): Correlation between total knowledge, total restless leg syndrome, and total quality of life among the studied subjects pre and post intervention (n=64)

Variable			Study group (n= 32)			Control group (n= 32)		
			Total knowledge	Total restless leg syndrome	Total quality of life	Total knowledge	Total restless leg syndrome	Total quality of life
Pre intervention	Total knowledge	r		-0.166	0.169		-0.139	0.172
		p-value		0.363	354		0.447	0.347
	Total restless leg syndrome	r	-0.166		-0.404	-0.139		-0.309
		p-value	0.363		0.022*	0.447		0.086
	Total quality of life	r	0.169	-0.404		0.172	-0.309	
		p-value	354	0.022*		0.347	0.086	
Post intervention	Total knowledge	r		-0.065	0.079		-0.005*	0.093
		p-value		0.725	0.599		0.980	0.612
	Restless leg syndrome	r	-0.065		-0.524	-0.005*		-0.421
		p-value	0.725		0.002*	0.980		0.066
	Total quality of life	r	0.079	-0.524.		0.093	-0.421	
		p-value	0.599	0.002*		0.612	0.066	

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Discussion

For total knowledge level, the findings of the present study revealed that pre intervention minority of both the study and control groups had good total knowledge level that was significantly increased among study group (more than control group post intervention). These findings were consistent with the study done by Hamza et al., (2022) in Assuit University, Egypt to assess the effect of educational program for hemodialysis patients regarding their knowledge and practice. Also, these findings were in the line with Fadlalmola and Elkareem, (2020) who conducted a study to assess the impact of an educational program on knowledge and quality of life among hemodialysis patients in Khartoum state. They found that there was an improvement in patients' knowledge from the pre to post intervention. From the researcher's point of view, this difference in knowledge score may be related to aromatherapy massage program that was provided by the researcher to study group and supported by illustrated colored booklet.

Regarding the severity of restless leg syndrome, the current findings of the study showed that the severity of restless leg syndrome among the study and control groups pre intervention was high. There was highly statistically significant reduction in the severity of restless leg syndrome among patients in the study group post intervention. This improvement stresses the effect of

aromatherapy massage. These findings were in accordance with Izadi et al., (2024) who studied the effect of aromatherapy with lavender on pain of needle insertion and severity of restless legs syndrome in hemodialysis patients in Iran and revealed that aromatherapy with lavender oil reduced the average severity of RLS compared to the control group.

Also, it was consistent with Amrollahi et al., (2022) who conducted a study to assess the effects of aromatherapy massage on the severity of restless legs syndrome in hemodialysis patients in Iran and noticed that the aromatherapy massage with lavender oil significantly reduced the severity of RLS in patients undergoing HD, and patients reported relief of symptoms. In the same line, these findings were in agreement with Zhang et al., (2023) who conducted a study in China to assess effect of aromatherapy on quality of life in maintenance hemodialysis patients and illustrated that aromatherapy treatment led to a statistically significant decrease in the symptoms of RLS in the experimental group.

As regards the restless leg syndrome mean score, the results of the current study stated that there were highly statistically significant improvement in restless leg syndrome mean score post intervention than pre intervention among study group. These findings were supported by Ghasemi et al., (2021); and Syam et

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al., (2022) who mentioned that there was highly statistically significant difference in restless leg syndrome mean score between pre and post intervention among the study group. Moreover, these findings were in accordance with Oshvandi et al., (2021) who studied the effects of foot massage on hemodialysis patients' sleep quality and restless leg syndrome in Iran. It was revealed that the mean score of sleep quality and RLS in the intervention groups were significantly different compared with the control group.

Similarly in a study done by Xia et al., (2022) in China to assess the clinical efficacy and safety of massage for the treatment of restless leg syndrome in hemodialysis patients and suggested that there was a statistically significant difference in RLS scores compared to route care. From the researcher's point of view, this may be due to that aromatherapy massage applied by the researcher which in turn, increases plasma serotonin level which probably inhibits the transmission of harmful signals to the brain. Massage causes comfortable sleep leading to reduced pain sensation since somatostatin is normally released during deep sleep without which pain is felt. This in addition to the sedative, analgesic, and anticonvulsant effects of the lavender oil.

Concerning the quality of life level, the present study showed that more than three quarters of both study and control groups had moderate quality of life pre intervention while there

was highly statistically significant improvement post intervention in all study group who had high quality of life compared to control group. These findings are consistent with Döner & Taşçı, (2022) who mentioned that studied participants had mild and moderate quality of life pre intervention, but post intervention there was high quality of life. Also, these findings are in agreement with Ozturk & Bashan, (2021) who investigated the effect of aromatherapy with lavender oil on the health-related quality of life in patients with fibromyalgia and showed that after four weeks of lavender oil treatment, improvements were detected in all subscales of the short form 36 health survey questionnaire (SF-36).

In relation to mean score of quality of life the present study showed that there were highly statistically significant differences between mean score of the study group pre and post intervention regarding all subdomains of quality of life as well as total mean score of total quality of life. These results come in agreement with Döner & Taşçı, (2022) who stated that there was a significant difference between the initial and final follow-ups in the study group in terms of physical and mental component, disease burden, symptom, and effect of the disease on daily life activities subscale scores and total scale scores.

In the same line, these results were in agreement with pourhodki et al., (2021) who stated that there were highly statistically significant

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differences between mean score of the study and control groups regarding all quality-of-life domains post intervention. From the researcher's point of view, the improvement of quality of life may be due to the effectiveness of aromatherapy massage intervention in reducing severity of RLS.

In contrast, these findings are inconsistent with Dehkordi et al., (2021) who conducted a study in Iran for comparing the effects of massage therapy and aromatherapy on knee pain, morning stiffness, daily life function, and quality of life in patients with knee osteoarthritis and showed that there is no significant difference between the groups at all times of interventions. From the researcher's point of view, this discrepancy in results may be due to differences in massage techniques, type of used oil, and number of massage sessions.

Correlations between total knowledge, total restless leg syndrome, and total quality of life among studied patients pre and post intervention

Regarding correlation between knowledge and quality of life, the findings of the present study revealed that, there were positive correlation with no significance between total knowledge and quality of life among study and control groups pre and post intervention. These findings are supported by Alikari et al., (2019) who mentioned that there was no statistically significant correlation between the knowledge and QoL pre and even

after the intervention. Also, these findings are in accordance with Abdelal et al., (2021) who studied effect of web-based education on quality of life and anxiety level among patients undergoing hemodialysis during covid-19 lockdown in Egypt and revealed that there were significant positive linear correlations between knowledge and QOL. From the researcher's point of view, increased knowledge level improves the patient's understanding of his disease condition and thus enhance the patient's compliance of treatment and self-care activities so complications will be prevented or reduced resulted in improved QoL.

Regarding correlation between restless leg syndrome and quality of life, the findings of the present study showed that there were significant negative correlation between total restless leg syndrome and quality of life among study group post intervention .These findings are consistent with Jamal et al., (2023) who conducted a study in Pakistan to assess difference in quality of life parameters between hemodialysis patients with and without restless legs syndrome and stated that patients on hemodialysis have a poorer quality of life due to restless legs syndrome with considerable negative effects on their physical and psychological wellness.

In the same line, these findings are consisted with the study done by Xu et al., (2023) in China about restless legs syndrome in end-stage renal disease patients on maintenance hemodialysis: Quality of life and

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sleep analysis who stated that all quality of life dimensions were significantly linked with RLS patients. From the researcher's point of view, this may be due to that RLS has negative effects on physical and psychological health such as increased pain or discomfort, disturbance of sleep quality, anxiety, and depression which that impeded quality of life. On the other hand, these findings were not supported by Yaseen et al., (2021) who investigated the association of quality of life, anxiety, and depression with restless leg syndrome in the hemodialysis patients in Pakistan and stated that there was no significant correlation between RLS and QOL among hemodialysis patients.

Conclusions

Based on the findings of this study, it can be concluded that:

The present study aims to determine the effect of aromatherapy massage on restless leg syndrome and quality of life among patients undergoing hemodialysis. Based on the findings of this study, it can be concluded that:

- The severity of restless leg syndrome has been significantly reduced among study group than control group after application of aromatherapy massage.
- Quality of life has been significantly improved among study group than control group after application of aromatherapy massage.

Recommendations

Based on the findings of the present study, the following recommendations are derived and suggested:

A. Recommendations for patients

- Supervised health teaching programs should be carried out for hemodialysis patient at hemodialysis units about the importance of aromatherapy massage to help them to reduce severity of restless leg syndrome and improve their quality of life.
- Hemodialysis patients should be encouraged to practise aromatherapy massage.
- An illustrative colored booklet about disease, restless leg syndrome, quality of life, and aromatherapy massage should be made available and distributed to all hemodialysis patients.

B. Recommendation for further research

- Replication of the study using a large probability sample from different geographic areas is required to ensure the generalizability of the results.

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