

Effect of Aromatherapy on Uremic Pruritus among Patients Undergoing Hemodialysis

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Abstract: Uremic pruritus is an unpleasant sensation and one of the most common disabling symptoms occurs for patients undergoing hemodialysis. Aromatherapy as a part of complementary and alternative medicine (CAM) has been reported to have multiple beneficial properties for management of uremic pruritus. The aim of the study was to evaluate the effect of aromatherapy on uremic pruritus among patients undergoing hemodialysis. A quasi experimental design (pretest-posttest one control group design) was utilized to achieve the aim of the study. Adult male and female conscious patients diagnosed with chronic kidney disease undergoing hemodialysis were recruited in this study. The study carried out at renal insufficiency and dialysis unit at one of the university hospitals in Cairo governorate. Structured interview questionnaire and 5domain pruritus scale were used for data collection. Results: The study results revealed that (53%) of the study participants were 31-40 years old whereas (47%) of them were from 41-50 years old. Regarding duration of kidney problems, (3.3%) of the studied participants had kidney problems in for less than 3 years, as well as (13.3%) had kidney problems from 3 to 6 years, while (13.3%) and (70%) of them had kidney problems from 6 to less than 9 years and 9 years to 12 year respectively. There was highly statistical significant difference before and after aromatherapy using ($t = 5.81, p = 0.000***$). Conclusion: Aromatherapy can be effective in the treatment of pruritus. It is natural, available, cheap, and with fewer side effects than other medication used for uremic pruritus treatment.

Keywords: Aromatherapy, complementary and alternative medicine, hemodialysis and pruritus.

I. Introduction

Hemodialysis patients face many complications that affect health status, uremic pruritus (UP) is a common complication for hemodialysis patients with multifactorial etiology. The intensity and spatial distribution of pruritus vary significantly over time and patients are affected to a varying degree throughout the duration of renal disease. The intensity of uremic pruritus ranges from sporadic discomfort to complete restlessness during day and night time [1]. Uremic pruritus has significant effect on physical, social and psychological status for most of patients undergoing hemodialysis. Mechanical skin damage as a result of continuous scratching with excoriations, superimposed infections and chronic lesions in the skin occurred which cause sleeping disturbances that cause chronic fatigue, are associated with disturbances of day and night rhythm and they had a negative influence on mental and physical capacity. Uremic pruritus has influence on social relation and work productivity, and also, has effect on mood and cause depression and anxiety [2].

Management of UP includes medical, pharmacological, psychological and complementary therapy. Medical management includes modification of dialysis technique, antihistaminic drugs and ultraviolet irradiation. Complementary and alternative medicine as acupuncture, rubdown with Japanese dry towels, transcutaneous electrical nerve stimulation and herbal remedies as aromatherapy are used to relieve /combat pruritus [3]. Complementary and alternative medicine (CAM) is one line of management for uremic pruritus so it should be offered by well-prepared practitioners as well as nurses to guarantee high standard of holistic care and positive outcomes for the patients. It could be integrated in professional nursing practices to supply the nurses with base line data about its benefits, uses, and side effects to enable them to advocate successfully for CAM [4].

Aromatherapy is one of complementary and alternative medicine; it Aromatherapy is one of the most popular therapies. Aromatherapy is noninvasive nursing intervention to alleviate pruritus in patients undergoing hemodialysis. The basis of aromatherapy is oils, which are chemically active substances with a long history of safe traditional use and a growing evidence base to support using of aromatherapy into nursing care [5].

Different oils such as peppermint and sunflower oils can be used in aromatherapy. Peppermint is plant contains essential oil that its major component is menthol in a concentration of (50-60%). Menthol produces cooling effect on the skin, menthol decreases pruritus that is caused by histamine. It has antipruritic, analgesic and relaxation effects. The researches have shown that menthol inhibits pruritus by activating A-delta fibers and *k*-opioid receptor [6]. Sunflower oil contains chief fatty acids linoleic acid, oleic acid and palmitic acid with concentration (35-62%), (25-42%), (4-7%) respectively in addition to steroids; these substances have anti-inflammatory effect [7].

A multidisciplinary approach is necessary to carry out the management of uremic pruritus for patients undergoing hemodialysis. Nurses have an important and unique role in the treatment and follow-up of dialysis patients. Awareness of nurses about the factors that increase pruritus will help the nurse to plan appropriate nursing activities to minimize the negative effects of pruritus on patients and will enable the nurses to direct patients how to manage pruritus [8]. Nurses should incorporate aromatherapy into nursing practices. Therefore, the investigators were interested to conduct this current study to evaluate the effect of aromatherapy on uremic pruritus among patients undergoing hemodialysis.

1.1. Significance of the study

The prevalence of chronic kidney disease (CKD) on maintenance hemodialysis according to World Health Organization (WHO) is estimated as 8–16% [9]. In Egypt; the prevalence of CKD was 15.6 % [10]. The estimated annual incidence of end stage renal disease (ESRD) is around 74 per million and the total prevalence of patients on dialysis is 264 per million [11]. During the last 2 decades, the annual growth in the number of dialysis patients was 6-12% in many developed countries and the growth rate increase in several developing countries. Nearly 0.5 million patients are treated with dialysis. However, there are a large number of undiagnosed CKD patients access to hemodialysis. Thus, CKD has often been described as a rising global epidemic disease [12].

The prevalence of uremic pruritus, a considerable cause of morbidity in patients ESRD is still tremendously high. Uremic pruritus is a frequent and impairing symptom in haemodialysis patients. Within the last decades, worldwide variations were reported in the prevalence of pruritus in hemodialysis patients 77% [8]. In Egypt, The prevalence of UP for patients under hemodialysis was found that 50 - 90% of hemodialysis patients suffer from pruritus, which does not improve with dialysis [13]. A study done by [14] reported that the most prevalent finding of cutaneous manifestations for hemodialysis patients was UP (55%) [15]. Uremic pruritus has a substantial effect on functional status, as it causes serious discomfort as sleeping disturbance and affects work productivity. Sleeping disorders cause chronic fatigue, are associated with disturbance of day and night rhythm and they have a negative influence on work productivity. Also UP cause mechanical skin damage as a result of continuous scratching with excoriations, superimposed infections and chronic lesions in the skin [2].

II. Material and Methods

The current study aims to evaluate effect of aromatherapy on uremic pruritus among patients undergoing hemodialysis. With this in mind, the following research hypothesis was postulated: Patients who will receive aromatherapy will have less pruritus scores than before

2.1. Design

A quasi experimental design (pretest-posttest one control group design) was utilized in the current study. It is an empirical research methodology used to estimate the causal impact of an intervention on the target population. Quasi-experimental research shares similarities with the traditional experimental design or randomized controlled trial, but they specifically lack the element of random assignment to treatment or control. Quasi-experimental designs typically allow the investigators to control the assignment to the treatment condition, but using some criterion other than random assignment. Pre-test-post-test control group design is known as one of the most common designs; this design is created to strengthen quasi-experimental design [16].

2.2. Setting

The current study was carried out at renal insufficiency and dialysis unit at one of the university hospitals in Cairo governorate: The unit containing six rooms and fifty four hemodialysis machine. The unit work twenty four hours and total number of nurses affiliated to the units were twenty three. Total annually admission number of patients receiving maintenance hemodialysis in 2014 was one hundred and seventy four patients, however, in 2016 was 193 patients, each patient undergoing three dialysis sessions per week.

2.3. Sample:

A purposive sample of 30 adult male and female conscious patients diagnosed with chronic kidney disease undergoing hemodialysis were recruited for the current study. The size of the sample was calculated by power analysis of 95 ($\beta = 1 - .95 = .05$) at alpha .05 (one-sided) with confident level 95% [17]. Inclusion criteria: male or female adult patients, patient's age ranged between 20-50 years old, had chronic kidney disease for more than 6 months, patients with pruritus who had score above 5 in pruritus scale, patients undergoing hemodialysis three times a week for 3-5 hours and accept to participate in the study. Exclusion criteria: patients who have hypersensitivity reaction to aromatherapy use and not willing to participate in the study.

2.4. Data collection tools:

The investigators used two tools to gather data pertinent to the study as follows:

2.4.1. Structured interview questionnaire was developed by the investigators. This tool consisting of two parts: First part: includes demographic data covering questions related to age and gender. Second part: covered the medical related data includes questions related to duration of kidney problem, number of hemodialysis sessions, frequency of hemodialysis session per week and allergy to drugs. .

2.4.2. 5-domain pruritus scale was adapted from [18]. The investigators translate the tool into Arabic language and permission was taken from original authors regarding using the tool. The scale was titled the 5-D pruritus scale. The 5 D pruritus scale consists of 5 domains (Duration, Degree, Direction, Disability and Distribution). The duration, degree and direction domains each included one item, while the disability domain had four items (sleep, leisure/social, housework and work/school). All items of the first four domains were measured on a five-point Likert scale. The distribution domain including 15 body part item. Scoring system :(0-5) indicates no pruritus, (6-14) indicates mild pruritus, (15-24) indicates moderate pruritus and (25-35) indicates severe pruritus.

2.5. Pilot study

Once permission was granted to proceed with the proposed study, a pilot study was conducted on 10% of the sample in the same selected study setting to estimate the needed time for data collection, to judge the feasibility, objectivity, test the ability of the tool to elicit the desired information and to test appropriateness of content, wording and order. No modification was needed; therefore the subjects of the pilot study were included in the actual research subjects.

2.6. Ethical considerations

An official permission to conduct the study was obtained from Research Ethical Committee as well as director of hemodialysis unit. Written consent for patients' agreement was obtained after explanation of the nature and purpose of the study. Each patient was free to either participate or not in the current study and had the right to withdraw from the study at any time without any rationale and it will not affect upon care provided. Also, patients were informed that obtained data will not be included in any further researches. Confidentiality and anonymity of each subject were assured through coding of all data.

2.7. Procedure for data collection:

The current study was conducted on three phases: the preparatory, the implementation and the evaluation phase. Preparatory phase: once official permission was granted to proceed with the proposed study, the study participants were interviewed individually to explain the nature and purpose of current study. The preparation of peppermint oil and sunflower oil done by faculty staff member specialized in herbal medicine department from faculty of Pharmacy Cairo University. Aromatherapy consists of mix between two oils includes peppermint oil and sunflower oil [19]. The total amount after preparation stored in 50 ml plastic clean container .

Implementation phase: It was carried out after obtaining official permission from the Research Ethical Committee in Faculty of Nursing Cairo University, and from the heads of the selected hospital units to proceed in the current study. The investigators met the participants who fulfilled the selection criteria, and agreed to participate in the study to obtain written consent from them. The investigators started data collection through six visits along two weeks following this sequence.

The first visit: the investigators met the participants in hemodialysis unit before starting hemodialysis session. The investigators met each participant individually to keep patient privacy. The first visit took 45 minutes to 60 minutes. The nature and purpose of the study was explained to participants; the data related to demographic and medical related data was obtained through interviewing the participant using the first tool (structured interview questionnaire), then the investigators measured pruritus using the second tool (5 domain pruritus scale). Sensitivity test was performed for the study group before applying aromatherapy to make sure that the participant was not allergic to oils by applying the prepared aromatherapy on small area of skin for a period of

10 minutes and observing it; if the participant didn't develop any sensitivity reaction to aromatherapy in the form of (edema, itching, redness and rash), the participant will be included in the current study and the pruritus area washed with water; if the participant developed sensitivity reaction to aromatherapy the participant will be excluded from the study. The investigators demonstrated the method of topical applications of aromatherapy by applying 1-2 drops of aromatherapy using palm of the hand on itching area for few seconds then ask the participant to re demonstrate application of aromatherapy on itching area. If the itching area was found in covered area such as back and abdomen, the investigators asked the participant to apply aromatherapy with keeping patient privacy through covering the patient with linen. The investigators asked the participant to take aromatherapy container in house and applied it twice a day (at morning and at night) for 2 weeks.

From second to the fifth visit: the investigators during hemodialysis sessions following application of aromatherapy from (2nd to 6th session) was checked for adherence to use aromatherapy, answer the participant questions, encourage the participant to maintain continuation of using aromatherapy for the designed time if had pruritus any time and use it for a long life.

Evaluation phase: the investigators met the participant (6th visit) after 2 weeks to measure the pruritus score by using pruritus scale (tool 2). The 6th visit took 15 minutes to 25 minutes.

2.8. Statistical analysis:

Upon completion of data collection through previously mentioned tools, data were computed and analyzed. Data analyses were carried out using statistical package for social sciences (SPSS), program version 20. All data entries were checked for accuracy against the original raw data of each patient by the investigators; probability level of 0.01 and 0.05 was adopted as the level of significance for all statistical tests done.

III. Results

Results of the study are presented in two major parts; the first part is descriptive statistics that included the description of the demographic data as age and gender and medical related data such as duration of kidney problem, duration of hemodialysis, frequency of hemodialysis session /week, allergy to drugs and using antihistaminic medication, while the second one is inferential statistics that presents results related to hypothesis testing.

Study sample' characteristics: As shown in fig (1), (53%) of the study participants aged 31-40 years old and (47%) of them aged from 41-50 year old with $M + SD = 41.40 \pm 6.20$ years, while fig. (2), displayed that (33%) of the study participants were males and (67%) of them were females.

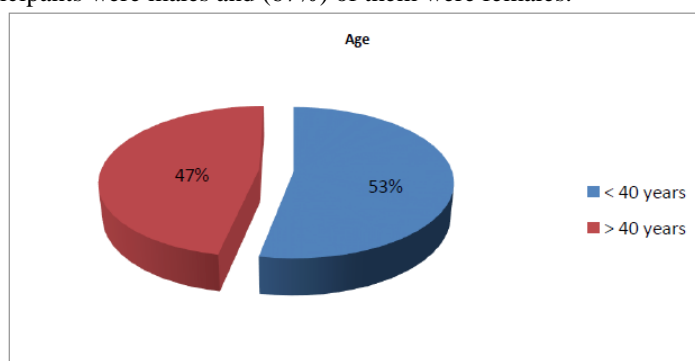


Figure (1): Percentage distribution of age among studied participants (n=30)

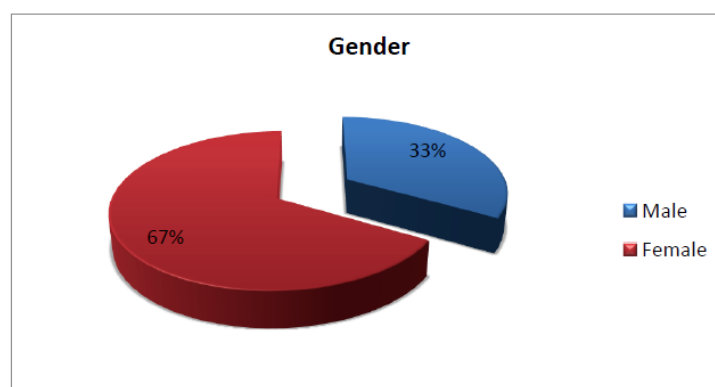


Figure (2): Percentage distribution of gender among studied participants (n=30).

Table (1): illustrated that (3.3%) of the studied participants had kidney problems since less than 3 years, (13.3%) had kidney problems from 3 to 6 year, while (13.3%) and (70%) of them categorized as had kidney problems from 6 to less than 9 year and 9 years to 12 years respectively. As regards duration of hemodialysis session (83.3%) of studied participants took 4 hours in each hemodialysis session while (16.7%) of them took 3 hours in each hemodialysis session. In relation to frequency of hemodialysis session /week (96.7%) are adhere to hemodialysis 3 times per week and (3.3 %) adhere to hemodialysis 4 times per week. As regards allergy to drugs (23.3%) had allergy to drugs and (76.7%) hadn't allergy to drugs. In relation to antihistaminic drugs intake found that (16.7%) take oral medication, (23.3%) take topical ointment and (60%) take intravenous medication.

Table (1): Frequency & percentage distribution of medical data among studied participants (n=30).

Variables	N	%
Duration of kidney problem.		
1year -	1	3.3
3 years -	4	13.3
6 year -	4	13.3
9 years - 12 year	21	70
M±SD	7.96±1.82	
Duration of hemodialysis / session.		
Three hours	5	16.7
Four hours	25	83.3
M±SD	3.63 ±.66	
Frequency of hemodialysis session / week.		
Three times per week	29	96.7
Four times per week	1	3.3
Allergy to drugs?		
Yes	7	23.3
No	23	76.7
Anti histaminic drugs		
Topical ointment	7	23.3
Oral medication	5	16.7
Intravenous medication	18	60

Table (2) showed that (73.3%) of the study participants had severe pruritus and (26.7) had moderate pruritus before aromatherapy use. While after aromatherapy revealed that (33.3%) had mild pruritus and (66.7%) hadn't pruritus. There was highly statistical significant difference between before and after aromatherapy using (t = 5.81, p = 0.000**).

Table (2): Comparison of uremic pruritus severity before and after aromatherapy among study participants (n=30).

Variable	Before aromatherapy		After aromatherapy	
	N	%	N	%
No pruritus	0	0	20	66.7
Mild pruritus	0	0	10	33.3
Moderate pruritus	8	26.7	0	0
Severe pruritus	22	73.3	0	0
M±SD	27.13 ± 4.69		M±SD	5.50 ± 2.11
	t = 5.81	P = 0.000**		

**highly significance

It was apparent from table (3) that there was no statistical significant correlation between severity of pruritus and allergy to drugs r =0. 3 at p =0.09, there was a statistical significant correlation between severity of pruritus and sleep (r = 0.43 at p = 0.001*) and also there was a statistical significant correlation between degree of pruritus and social level disability (r =0. 64 at p =0.000***).

Table (3): Correlation coefficient between allergy to drugs, sleep, social level disability and severity of pruritus among study participants after aromatherapy (n=30).

Variable	R value	P value
Allergy to drugs	0.3	0.09
Sleep	0.43	0.001*
Social level disability	0.64	0.000***

**highly significance

IV. Discussion

As regards participants' characteristics it was observed that more than half of the study participants; age ranged between 31 - 40 years old and more than two fifth of them with age ranged between 41 – 50 years old with a mean $M + SD = 41.40 \pm 6.20$ years. More than two thirds of the study participants were females and approximately one third were males. The current study is congruent with [20] who reported that the majority of study participants were female. Another study done by [21] found that more than half were males and more than one third were females and the mean age was 51.9 ± 15.7 years. Another study done by [8] reported that the majority of patients were males with age range 41- 50 years. In this respect [14] reported that the majority of the samples were males. Moreover [22] found that one hundred sixty-nine patients were males with mean age of 50.58 ± 14.84 years and 131 were females with mean age of 49.82 ± 13.63 years.

As regards duration of kidney problems the current study findings revealed that the majority of the participants having kidney problems from 9 to 12 year with $M \pm SD 7.96 \pm 1.82$ years. This result is in accordance with [23] who reported that high percentage of study participants have kidney problems for 10 years. Moreover [24] reported that more than half of the patients have kidney problems for 9 years. The findings of the current study in the same stream with [25] who reported that the majority of the studied participants had kidney problems from 9 to 11 year, and [26] who reported that high percentage from hemodialysis patients have kidney problems for 12 years.

As regards duration of hemodialysis session the majority of the study participants undergoing dialysis for four hours per session, however, there was only small category under dialysis for three hours per session. The current study findings in the same line with [27] who mentioned that the majority of patients make dialysis for four hours. Moreover [28] reported another regimen for duration of hemodialysis session as where high percentage of hemodialysis patients spend 1.5–2.75 hours six times per week. Another study done by [29] who reported that all participants enrolled in their study were undergoing hemodialysis and spent four hours for three times per week. In relation to frequency of hemodialysis session per week the current study finding reported that approximately all of the study participants adhere to hemodialysis session three times per week. From the investigators' point of view, the schedule of the majority of study participants maintained that make dialysis for four hours in each session three times per week that help the hemodialysis patients to improve the patients clinical outcomes as evidenced by literature. This finding is in the stream with [30] reported that the majority of the study participants adhere to hemodialysis sessions three times per week.

The current study in the same stream with [31] who reported that more than two thirds of hemodialysis patients adhere to hemodialysis three times a week. Moreover, [32] revealed that more than two thirds from hemodialysis patients adhere to hemodialysis session. The current study also in the same stream with [33] who reported that the majority of their participants were on hemodialysis three sessions per week. In relation to allergy to drugs the current study reported that more than two thirds hadn't allergy to drugs. This finding is matched with [34]. As regards antihistaminic drugs intake the current study reported that more than half received intravenous medication. The current study coincides with [35] who reported that more than half take anti histaminic drugs intravenously. Another study done by [36] reported that majority of study participants take antihistaminic drugs intravenously.

As regards duration of pruritus the current study reported that more than one third had pruritus all the day before using aromatherapy, however, almost all study participants had pruritus less than six hours. This finding is in the same stream with [37]. Different studies done for relieving uremic pruritus, indicated that after aromatherapy using the majority of study participants had duration of pruritus less than for six hours. The current study denoted that there was statistical significant difference between aromatherapy use and duration of pruritus ($t = 8.1, P = 0.00^{**}$). From the investigators's point of view, this difference might be attributed to environmental exposures and climatic factors; the current study was done in winter, which aggravates the condition of cutaneous dryness. Alteration of vitamin A metabolism, glycerol deficiency with skin dehydration, barrier dysfunction, chemically induced irritation, functional abnormalities of endocrine sweat glands, and high doses of diuretics might be responsible for xerosis in hemodialysis patients that lead to increase severity of pruritus.

In relation to the severity of pruritus, the current study finding denoted that more than one third of the study participants had severe pruritus and also more than one third of study patient's complained from unbearable pruritus. This finding is matched with [1] reported that more than one third of the studied participants have severe pruritus. Another study done by [38] reported that high percentage from hemodialysis patients had complaint of severe pruritus. The current study showed that there was highly statistical significant difference using aromatherapy and severity of pruritus ($\chi^2 = 3.2, p = 0.00^{**}$).

In relation to direction or prognosis of pruritus the current study revealed that more than half of study participants had worse pruritus before using aromatherapy but after aromatherapy use the majority of study participants completely resolved from pruritus. The current study in the same stream with [39] who reported that after aromatherapy use the pruritus significantly reduced and completely resolved. The current study coincide

with [8] who reported that pruritus improved after aromatherapy use. The current study also showed that there was statistical significant difference after aromatherapy using ($\chi^2 = 1.4$, $p = 0.04^*$).

As regards pruritus related sleep disability, findings of the current study reported that the highest percentage of study participants complained from pruritus that disturb sleep. The current study coincides with [30] who found that the majority of participants reported that they had sleeping problems at night. Moreover [40] reported that nocturnal pruritus is common in patients under hemodialysis and negatively affects sleep quality. Lack of sleep can have both immediate and long-term effects that lead to medical, social and financial status. Another study done by [41] found that pruritus affect the quality of sleep and daily activities. The result of the current study showed that there was highly statistical significant difference between aromatherapy using and pruritus related sleep disability ($t = 31$, $p = 0.000^{***}$). Improvement the patient sleep might be related to wearing cotton at night and patient adherence for using aromatherapy.

The current study revealed that there was highly statistical significant difference between before and after using aromatherapy in regard to severity of uremic pruritus ($t = 5.81$, $p = 0.000^{**}$). These findings congruent with [5] who found that there was a statistical significant difference before and after using aromatherapy ($t = 5.43$, $p = 0.001$). Another study done by [42] reported that the pruritus score had been decreased after using aromatherapy and there was a statistical significant difference before and after using aromatherapy ($t = 5.81$, $p = 0.000$).

To sum up, investigators viewed that high percentage of study participants improved after using aromatherapy might be related to adherence of patients to use aromatherapy, increase self hygiene, wearing cotton cloth and fluid and diet restrictions.

The current study revealed that there was there was no a statistical significant correlation between severity of pruritus and allergy to drugs ($r = 0.3$ at $p = 0.09$), also the current study reported that there was a statistical significant correlation between severity of pruritus and sleep ($r = 0.43$ at $p = 0.001^*$) and also there was a statistical significant correlation between degree of pruritus and social level disability ($r = 0.64$ at $p = 0.000^{***}$). This finding is in line with [43] who reported that pruritus effect on leisure/social level, house work and work disability. In conclusion, the current study could accept the proposed hypothesis that the study group after implementing aromatherapy have less pruritus scores than before.

V. Conclusion

Based on results of the current study, it can be concluded that uremic pruritus are common among majority of hemodialysis patients and have a significant impact on health status. At the same time patients had low awareness about how to prevent pruritus that requires early detection and treatment. So increase awareness and teaching measures for prevention of uremic pruritus is required and should be a part of the care that provided for patients undergoing hemodialysis. Also, it was concluded that using aromatherapy is effective in relieving uremic pruritus among patients undergoing hemodialysis.

VI. Nursing implications and recommendations

1. Patients undergoing hemodialysis should be provided with simple, illustrated guide booklet with pictures and posters regarding measures used to relieve uremic pruritus.
2. Multidisciplinary team should be collaborating in management of hemodialysis patients and helping them to prevent and manage uremic pruritus.
3. Update knowledge of nurses working in hemodialysis units through attending in services training program, seminar, workshop and scientific conference regarding application of evidence based practice while dealing with patients.

Recommendations:

- 1- Replication of the study on larger non probability representative sample to achieve more generalizable results.
- 2- Further researches have to be carried out in order to determine best practice for manage hemodialysis complications.

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