



## Research Article

# Knowledge and Practice Regarding Hemodialysis Procedure Among Nurses Working at the Dialysis Centers, in Khartoum, Sudan: A Cross-sectional Study

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### Abstract

**Background:** Hemodialysis procedures is considered as a supportive management for kidney failure. Nurses play a major role in hemodialysis procedures, because most of the complications facing patients during dialysis as hypotension, cramped muscles, and weak pulse, need nurses with knowledge and practical experience. The current study aimed to assess nurses' knowledge and practice about hemodialysis procedures.

**Methods:** This is a cross-sectional study, which included 103 nurses who worked in dialysis centers in Khartoum State in Sudan, from February to May 2022. A self-administered questionnaire and observational checklists were used to collect the data and was analyzed using the statistical program for social science (SPSS) version 23, the knowledge and practice score was calculated, and the mean was obtained.

**Results:** The results of our study showed the mean scores of the participant knowledge 11.3, and practice 13.6, and also showed statistical significance regarding the relationship between the level of education and knowledge of nurses regarding hemodialysis procedure; p-value = 0.01.

**Conclusion:** The study concluded that there is sufficient knowledge and practice of nurses in dialysis centers, and there is also a relationship between educational level and knowledge, so the study recommends conducting continuous training for nurses in dialysis centers.

**Keywords:** Nurses' knowledge, Practice, Hemodialysis procedure

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## 1. Introduction

Hemodialysis procedure is a must for patients with kidney failure, nurses in dialysis centers play a critical role in enhancing patient care, and reducing potential complications [1]. Hemodialysis, peritoneal dialysis, and kidney transplantation are the three methods of renal replacement therapy that are now available for end-stage renal failure [2-4].

Renal replacement therapy, hemodialysis is the most routinely utilized [5]. The number of people with end-stage renal disease is rising all around the world, and the number of people who need hemodialysis is rising as well [6]. End-stage renal disease is led to the accumulation of toxins and waste in the body and may lead to reduced appetite, weight loss, puffy eyes, difficulty sleeping, decrease in urination, dry skin, itching, fatigue, swelling of the ankles, feet, and an increase in electrolytes, the most dangerous of which is an increase in potassium, the consequences of hyperkalemia are also influenced by other factors, such as the presence of heart disease or another blood electrolyte (calcium and magnesium) disorders that can increase the risk of arrhythmias [7, 8]. New treatments, such as high-flux dialysis and hemodiafiltration, have been used in clinical practice to improve the removal of moderate to large-sized molecular poisons, and small to medium-sized molecules can be eliminated with high-flux hemodialysis [9]. The glomerular filtration rate per 1.8 m<sup>2</sup> of end-stage renal illness is less than 20 ml/min. Kidney replacement therapy, such as dialysis or renal transplantation, is required because the renal function has gotten so bad that it can no longer sustain life over the long term. Renal dialysis is needed; nevertheless if the glomerular filtration rate is less than 8% and the amount of uremia is high [10].

Kidney illness raises your risk of having a heart attack or stroke because the kidneys are damaged and unable to properly filter blood. Additionally, waste builds up in the body due to kidney illness. Important risk factors for kidney disease include hypertension, diabetes, and a family history of renal impairment, around 662,000 Americans have kidney disease, with 470,000 receiving dialysis and 190,000 receiving a functioning kidney transplant [11, 12].

Hemodialysis procedure requires trained nursing staff as they have special training of the procedure to achieve satisfactory results without complication [13]. The period of stay for kidney failure patients to receive dialysis is the worst experience during their stay in the hospital [14]. There is a limitation of data on dialysis unit nurses experiences with hemodialysis procedures with adults and the errors that can occur during the procedure, their experiences will be essential in developing future linked interventions with specific instructional activities aimed at reducing possible complications.

## 2. Materials and Methods

### 2.1. Study design, setting, population and period

This was a cross-sectional analytical study among nurses working in dialysis centers in Khartoum State in Sudan, from February to May 2022. These dialysis centers were:

Hemodialysis center at Omdurman Hospital, Hemodialysis center at Ahmed Qasem Hospital, and Dialysis Center Ibn Sina Hospital.

## 2.2. Inclusion and exclusion criteria

The inclusion criteria were as follows, registered nurses working in hemodialysis units and collaborators nurses in hemodialysis units who have spent more than six months, and those who agreed to participate in the study. Exclusion criteria are students in the training period and collaborators with less than six months experience.

## 2.3. Study sample

A total coverage sampling composed of 103 nurses was included in the study from dialysis centers in Khartoum State in Sudan, mentioned above in the population section.

## 2.4. Data collection instrument

The data were collected by using a questionnaire and observational checklists, the questionnaire contains two main parts, the first is demographic data of the participants (age, gender, level of education, years of experience, and previous training courses, and the second part of the questionnaire to assess participants' knowledge about hemodialysis procedure, contains 15 questions regarding the protocols used in dialysis and the care of patients during it. A reliability test for the questionnaire was made, and the reliability of the questionnaire was 0.88 for the Cronbach Alpha of the program, the questionnaire questions were designed from previous studies [15]. To suit the environment and place of study.

## 2.5. Study score

Knowledge and practice score, a score of one was awarded for a correct response, and zero degrees was a score for an incorrect response in the scoring system for overall knowledge of hemodialysis. For producing the mean score, a percent score was calculated from these scores, if the nurse obtains a score of knowledge 75% or more then it was considered satisfactory, and less than 75% was considered unsatisfactory. Participants' observation checklists, to assess participants' practice with hemodialysis procedure, contains the steps involved in the dialysis, a score of one was provided for totally completing (competent) certain nursing practice stages, while a score of zero was given for not completing them (incompetent). The grades were converted into a

percentage, giving a mean score for the part and those who got 75% or more were considered competent whereas less than 75% were considered incompetent.

## 2.6. Statistical analysis

The study data were analyzed by statistical program for social science (SPSS) version 23. The variables that were entered for analysis are demographic data, level of knowledge, and practice toward hemodialysis procedure, a set score of one was awarded for a correct response and zero degrees was a score for an incorrect response, p-value of <0.05 was considered statistically significant for Chi-square test to assess the relationship between variables.

## 3. Results

### 3.1. Demographic characteristics

Table 1 Showed the demographic variables that the study participants had (68%) of the participants were female, (83%) of the participants had a bachelor's degree, and only (2%) had a PhD, most of the subjects (71%) were between 28–33 years old, (46%) of the participants had experience ranging from (1-4 years), and (87%) of the participants had attended a special training course about hemodialysis.

TABLE 1: Demographic characteristics of the study participants ( $n = 103$ ).

Variable		Frequency (no.)	Percentage (%)
<b>Sex</b>	Male	33	32%
	Female	70	68%
<b>Educational qualification</b>	Diploma	11	10.7%
	Bachelor	85	82.5%
	Master's	5	4.9%
	PhD	2	1.9%
<b>Age (yr)</b>	22–27	21	20.4%
	28–33	71	68.9%
	>34	11	10.7%
<b>Experience (yr)</b>	1–4	67	67.3 %
	4–7	24	21%
	>8	12	11.7%
<b>Special training course about hemodialysis</b>	Yes	87	84.5%
	No	16	15.5%

### 3.2. Knowledge regarding hemodialysis among study participants

Table 2 shows the responses of the study participants where all aspects of the hemodialysis procedure were satisfactory, the result of the mean value of the participants correct knowledge regarding hemodialysis was (73%) while the incorrect knowledge of the participants was (27%), a significant difference was observed at ( $P$ -value < 0.05).

TABLE 2: Knowledge regarding hemodialysis among study participants ( $n = 103$ ).

Knowledge about hemodialysis procedure	Correct no. (%)	Incorrect no. (%)	P-value
Definition of hemodialysis?	89 (86)	14 (14)	0.01
Indication of hemodialysis?	71 (69)	32 (31)	0.02
When is dialysis needed?	75 (73)	28 (27)	0.02
What are the benefits of hemodialysis?	91 (88)	12 (12)	0.01
What are the types of dialysis?	66 (64)	37 (36)	0.03
How many dialysis in a week?	86 (83)	17 (17)	0.00
How long is a dialysis session?	81 (79)	22 (21)	0.01
Hemodialysis benefits for patients with kidney failure?	80 (78)	23 (22)	0.01
What are the side effects of hemodialysis?	61 (59)	42 (41)	0.03
Complications of hemodialysis?	71 (69)	32 (31)	0.02
Why does blood pressure drop during diagnosis?	59 (57)	44 (43)	0.03
<b>Overall knowledge score about hemodialysis</b>	<b>75 (73)</b>	<b>28 (27)</b>	<b>0.01</b>

### 3.3. Practice regarding hemodialysis among study participants

Table 3 shows the responses of the study participants regarding the practical aspect of performing hemodialysis, the results of the study showed the efficiency of nurses in most of the procedures, and the overall practical score for hemodialysis was (78%).

Table 4 shows statistical significance at a  $P$ -value < 0.05 of nurses, regarding the relationship between the level of education and knowledge of hemodialysis procedures.

Table 5 shows there is statistical significance at a  $P$ -value < 0.05 regarding the relationship between age and knowledge of the participants about hemodialysis procedures.

Table 6 shows there was no statistical significance at a  $P$ -value < 0.05 about the relationship between sex and knowledge of the participants about hemodialysis.

Table 7 shows the students' sources of information regarding hemodialysis, (50%) of the participants got information through workshops and seminars, (30%) by searching online, and about (13%) obtained information through the exchange of experiences with colleagues.

TABLE 3: Practice regarding hemodialysis among study participants ( $n = 103$ ).

Practice about hemodialysis procedure	Competent no. (%)	Incompetent no. (%)	P-value
Setup I initiate dialysis machine	103 (100)	0 (0)	0.00
Take steps to infection control	95 (92)	8 (8)	0.01
General assessment of the patient (vital signs)	77 (75)	26 (25)	0.02
Checks for machine (alarm settings)	89 (86)	14 (14)	0.01
Assess and monitor patient and equipment during dialysis	71 (69)	32 (31)	0.02
Checks access to hemodialysis.	91 (88)	12 (12)	0.01
Checks equipment of hemodialysis (water system, dialysate, dialyzer)	87 (84)	16 (16)	0.01
Checks if medications are given during diagnosis?	67 (65)	36 (35)	0.02
Size of a dialysis catheter?	61 (59)	42 (41)	0.03
Type of catheter used for hemodialysis?	59 (57)	44 (43)	0.04
<b>Overall practice score about hemodialysis</b>	<b>80 (78)</b>	<b>23 (22)</b>	<b>0.02</b>

TABLE 4: Relationship between the knowledge of the participants about hemodialysis procedure and educational qualification ( $n = 103$ ).

Educational qualification	Educational qualification	Knowledge		P-value
		Satisfactory no. %	Unsatisfactory no. %	
	Diploma	7 (6.8)	4 (3.9)	0.01
	Bachelor	73 (70.9)	12 (11.6)	
	Master's	5 (4.8)	0 (0)	
	PhD	2 (1.9)	0 (0)	

\*There is a significant difference at the 0.05 level.

TABLE 5: Relationship between the knowledge of the participants about hemodialysis procedure and age ( $n = 103$ ).

Age category	Age category (yr)	Knowledge		P-value
		Satisfactory no. %	Unsatisfactory no. %	
	22–27	15 (14.6)	6 (5.8)	0.01
	28–33	58 (56.3)	13 (12.6)	
	>34	11 (10.7)	0 (0)	

\*There is a significant difference at the 0.05 level.

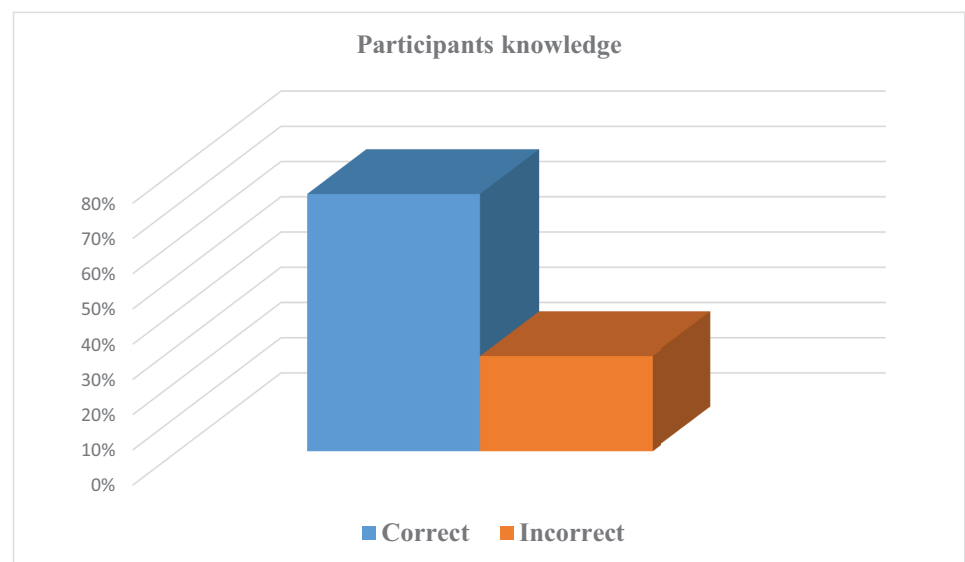
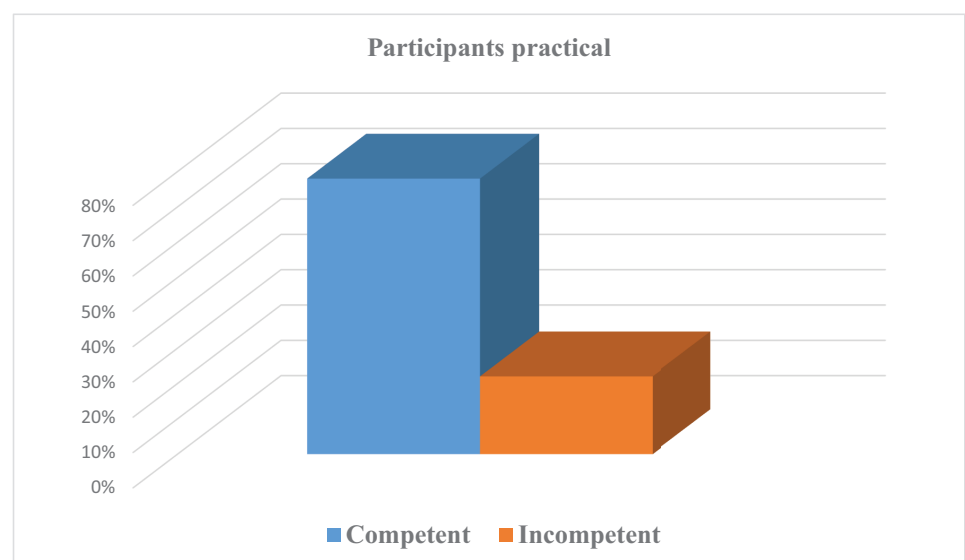
TABLE 6: Relationship between the knowledge of the participants about hemodialysis and sex ( $n = 103$ ).

Sex	Sex	Knowledge		P-value
		Satisfactory No. %	Unsatisfactory no. %	
	Male	28 (27.2)	5 (4.8)	0.06
	Female	46 (44.7)	24 (23.3)	

\*There was no significant difference at the 0.05 level.

TABLE 7: Sources of information about hemodialysis ( $n = 103$ ).

Sources of information about hemodialysis	Frequency (no.)	Percentage (%)
Through workshops and seminars	51	49.5%
Through the period of study and training	10	9.7%
By searching on the internet	29	28.2%
Through the experiences of colleagues	13	12.6%
Total	103	100%

Figure 1: The percentage of participants in the study knowledge ( $n = 103$ ).Figure 2: The percentage of participants in the study practical experience ( $n = 103$ ).

## 4. Discussion

The objective of this study was to describe the nurses' knowledge and practice regarding hemodialysis procedures, which is a significant challenge for nurses working in dialysis centers. The complications that occur during hemodialysis sessions, such as hypotension are one of the biggest problems when facing patients, this consequence was supported by a study that found that hypotension, or low blood pressure, is one of the most prevalent complications during the patients first session of hemodialysis [16].

Table 5 states the significant association between the age of participants and their mean knowledge and practice score ( $p$ -value=0.01). This result was supported by a study conducted about the experience of nurses in hemodialysis care, naturally, we found that nurses with higher degrees and practical experiences were more knowledgeable [22].

Regarding the demographic characteristics of the participants in the study Table 1. (68%) of them were females, this result is consistent with a study conducted in Sudan, the results of which were also (70%), the highest percentage of participants were females [17]. The study also showed that (82%) of them hold a bachelor's degree also in agreement with the previous study [17], in the percentage of educational qualifications for the study group. It was found that 69% of the participants were aged between (28-33 years), and this result is similar to a study conducted in Assiut Egypt on the knowledge and practice of nurses about dialysis [18].

This study shows that 67% of the participants in the study had experiences between 1-4 years a similar study was held in Porur, Chennai [19]. It was found that 74% had less than five years of experience in dialysis units, the reason that most nurses working in dialysis units are recent graduates with a desire to work in specialized units.

Regarding special training courses about hemodialysis, the results of the study showed that (85%) of the nurses had attended training courses and workshops on hemodialysis. This result differs from a study conducted to measure the knowledge of nurses in hemodialysis units, where it was found that (61%) of them did not receive any training courses [20]. But recently, the dialysis units went to hold training courses for the medical staff constantly, which had a positive impact on the outputs of the work of the hemodialysis units and reduced the complications arising from it.

Regarding the total knowledge level of the participants in the study, we found that most of them (73%) had sufficient knowledge about hemodialysis in all its aspects. This result was in agreement with many other studies on dialysis, including studies [20, 21] about nurses' knowledge of hemodialysis, and the results were good (72%, 74%). This is due to the aforementioned reason that the dialysis units have continuous courses and workshops, and also because the results showed that most of the medical staff are recent graduates and therefore, they have recent information.



Regarding the total practice level of the participants in the study, we found that majority of nurses (78%) had competent practice about hemodialysis in all its aspects, this result is in agreement with a study on the practice of nurses about hemodialysis, which found that (60%) of them had satisfactory practical experience [20].

## 5. Conclusion

Since the study was conducted in the kidney centers in the state of Khartoum; therefore, the results of the study cannot be generalized to every kidney center in Sudan, it is good that in the future more studies will be conducted on this matter, we also recommend that there should be continuous training courses for nurses in dialysis centers, most of the participants had adequate knowledge toward hemodialysis procedure.

## Acknowledgements

None.

## Ethical Considerations

None.

## Competing Interests

The authors declare that they have no conflict of interest.

## Availability of Data and Material

Anonymous data are available.

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None.

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