THE ASSOCIATION BETWEEN SOCIO-DEMOGRAPHIC DATA AND NURSES’ KNOWLEDGE TOWARD FLUID AND ELECTROLYTE IMBALANCE FOR HEMODIALYSIS PATIENTS AT HABIB BIN MUDAHIR AL ASADI CENTER IN KARBALA

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ABSTRACT

Background: The most common complication of dialysis is fluid and electrolyte imbalance. Therefore, conducting this study paves the way for dialysis nurses to care for dialysis patients according to the latest developments in nursing interventions.

Objectives: To find out the relationship between nurses’ knowledge toward fluid and electrolyte imbalance and some demographical characteristics such as age, gender, marital status, educational level, residence, experience period, Training courses.

Methods: A cross-section design. The study was conducted at Imam Hussein Medical City/ Habib Ibn-Mudahir AL-Asadi center, from (15th November 2020 to 21th February 2021). A probability sample consisted of (27) hemodialysis nurses. The instrument validity was determined through content validity, by a panel of experts. Reliability of the instrument was determined through pilot study. Analysis of data was performed through the application of descriptive statistics and inferential statistics.

Results: that the mostly of the study samples were within age groups (21 - 27) years old and accounted (70.4 %). The majority were female. The higher percentage of the nurses were married. The higher percentage of the nurses in the samples were Nursing College graduate. The greater percentage of the study were have no training courses.

Conclusion: The nurses’ level of knowledge toward fluid and electrolyte disturbance of hemodialysis patients for the sample, was poor. There is a significant relationship between nurses' knowledge about fluid and electrolyte disturbances for hemodialysis patients and their age group, marital status, level of education, years of hospital experience, and source of self-education.

Keywords: Nurses Knowledge, Hemodialysis, fluid and electrolyte disturbance.

I. INTRODUCTION

Renal failure leads to fluid and electrolyte imbalance, all of which are balance in acid-base balance. This careful management, thoughtful evaluation of hydration, treatment plan for fluids according to the patient's condition, frequent and correct re-evaluation of fluid and electrolyte balance, and good prescriptions in the treatment plan in the case of the altered response of the patient with kidney failure. In cases of kidney failure, life-threatening particles of sodium, chloride, potassium, calcium and phosphorous are common and may be threatening. Treatment of metabolic acidosis is often needed.

Patients with renal failure who undergo dialysis carry a large burden of symptoms like other patients with other chronic diseases, and these symptoms cause daily distress and negatively affect their quality of life.
II. METHODOLOGY

A cross-sectional design was conducted to assess the nurses’ knowledge toward fluid and electrolyte Imbalance. It was carried out in order to achieve the early stated objectives. The study began from 15th November 2020 to 21th February 2021. The study was conducted in Holy Karbala Governorate / Karbala health directorate / Imam Hussein Medical City/ Habib Ibn-Mudahir AL-Asadi center for hemodialysis during morning and the interview with nurses took place in the classroom of Habib Ibn Mudahir AL-Asadi Centre in period (15th November 2020 to 21th February 2021), after getting official permission from the hospital administrator. A probability sample of (27) nurses were selected based on the study criteria, and after obtaining a consent from them. Data Collection: The data were collected through the utilization of the developed questionnaire and by means of structured interview method with the subjects who were grouply interviewed in the specialist centers for hemodialysis by using the Arabic version of the questionnaire the time for interview of each sample was 30 to 45 minutes.

Study Instrument: Through review of the related literature and studies, the constructed questionnaire is that is used as a mean of data collection. It consists of (2) major parts;

Part I: Is composed of socio-demographic characteristics.

Part II: Is composed of Five Sections about fluid and electrolyte disturbance of hemodialysis patients.

Validity and Reliability: The content validity of the instrument was established through a panel of (10) experts, the reliability of the items were based on the internal consistency of the checklist was assessed by calculating Cronbach’s Alpha which as= 0.972. Statistical analysis: The statistical data analysis approach by using (SPSS-ver.24) is used in order to analyze and evaluate the data of the study. A descriptive statistical data analysis approach used to describe the study variables: Frequencies and Percentages. Inferential statistical data analysis approach: by used the One Way ANOVA test and independent sample T test.

III. RESULTS

Table (1): Distribution of the Demographical Characteristics of the sample

<table>
<thead>
<tr>
<th>e Groups</th>
<th>Freq.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age 21 – 27</td>
<td>19</td>
<td>70.4</td>
</tr>
<tr>
<td>28 – 34</td>
<td>2</td>
<td>7.4</td>
</tr>
<tr>
<td>35 – 41</td>
<td>4</td>
<td>14.8</td>
</tr>
<tr>
<td>42 – 48</td>
<td>2</td>
<td>7.4</td>
</tr>
<tr>
<td>49 – 55</td>
<td>0</td>
<td>00.0</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td>100.0</td>
</tr>
<tr>
<td>Mean ± SD</td>
<td>28.22 ± 7.143</td>
<td></td>
</tr>
<tr>
<td>Gender Male</td>
<td>12</td>
<td>44.4</td>
</tr>
<tr>
<td>Female</td>
<td>15</td>
<td>55.6</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td>100.0</td>
</tr>
<tr>
<td>Marital status Single</td>
<td>9</td>
<td>33.3</td>
</tr>
<tr>
<td>Married</td>
<td>18</td>
<td>66.7</td>
</tr>
<tr>
<td>Divorcee</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td>100.0</td>
</tr>
<tr>
<td>Residence Urban</td>
<td>21</td>
<td>77.8</td>
</tr>
<tr>
<td>Suburban</td>
<td>2</td>
<td>7.4</td>
</tr>
<tr>
<td>Rural</td>
<td>4</td>
<td>14.8</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Continue…
Variables | Groups | Freq. | %  
--- | --- | --- | ---  
Education level | Nursing Prep graduate | 5 | 18.5  
| Nursing Institute graduate | 9 | 33.3  
| Nursing College graduate | 13 | 48.1  
| Total | 27 | 100.0  
Experience years | 1 – 6 Years | 20 | 74.1  
| 7 – 12 Years | 3 | 11.1  
| 13 – 18 Years | 2 | 7.4  
| ≥ 19 Years | 2 | 7.4  
| Total | 27 | 100.0  
Training courses | No training | 14 | 51.9  
| 1 | 7 | 25.9  
| 2 | 4 | 14.8  
| 3 | 2 | 7.4  
| ≥ 4 | 0 | 0  
| Total | 27 | 100.0  
Self-education | Yes | 24 | 88.9  
| No | 3 | 11.1  
| Total | 27 | 100.0  
Sources of self-education | None | 3 | 11.1  
| Social media(SM) | 14 | 51.9  
| Scientific sites(SS) | 3 | 11.1  
| Books & lectures(B&L) | 3 | 11.1  
| Library | 0 | 0.0  
| (SM) and (SS) | 0 | 0.0  
| (SM), (SS), and (B&L) | 1 | 3.7  
| (SS) and (B&L) | 1 | 3.7  
| All | 2 | 7.4  
| Total | 27 | 100.0  

Freq.: Frequencies, %: Percentages, ≥: more Than or Equal.

According to this Table, the majority of nurses who participated in the sample were between the ages of (21 - 27) years (Mean ± SD 28.22 ± 7.143) and accounted for (70.4%) of the sample. In terms of gender, the majority of participants were female, constituting (55.6%) of the study sample. In addition, the study sample had a higher percentage of married nurses (55.6%). In terms of residence, the majority of nurses in the sample lived in urban areas (77.8%). In terms of educational attainment, the higher percentage of nurses in the sample are (48.1%) Nursing College graduate.

The Experience years was within (1 - 6 years) interval for the vast majority of nurses in the sample (74.1%). In relation to Training courses most of nurses were have no training courses in the study sample (51.9%). Regarding self-education, the majority of the sample carry out the self-education process, and their percentage is (88.9%). Finally, with regard to sources of self-education, social media was the majority of the answers for the study sample, and its percentages were (51.9%).

Table (2). Significant differences in nurses’ knowledge about the major domains of fluid and electrolyte imbalance between the study and control groups at the posttest period.

| No. | Main Domains Related to Nurses’ Knowledge about: | Sample No=27 |
| --- | --- | --- | --- | ---  
|  | | M.S | RII | Ass.  
Kidney failure and the dialysis process | 1.530 | 0.504 | M  
Body fluid disorders in hemodialysis patients | 1.161 | 0.383 | M  
Electrolytes and the appropriate quantities of them for the patients | 1.126 | 0.371 | M  
Electrolyte disorders | 1.177 | 0.388 | M  

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| Total mean | 1.121 | 0.369 | M 2.87 | 1.15 |

No: Number of sample, M.S.: Mean score, L.M.S: low mean score (1 - 1.66), M.M.S: moderate mean score (1.67 - 2.33), H.M.S: high mean score (2.34 – 3.00). RII: Relative Important Index, Ass.: assessment, L: low (RII = 0% – 0.33%), M: moderate (RII= 0.34%-0.66%), H: high (RII= 0.67% – 1%).

According to Table (2), the mean score and Relative Important Index of nurses’ knowledge in all items for the study sample were low according to the mean score and moderate according to the Relative Important Index grades (low, moderate, high).

Table (3) Nurses’ Knowledge score for The Study sample.

<table>
<thead>
<tr>
<th>Period</th>
<th>Assessment</th>
<th>Freq.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>26</td>
<td></td>
<td>96.3</td>
</tr>
<tr>
<td>Moderate</td>
<td>1</td>
<td></td>
<td>3.7</td>
</tr>
<tr>
<td>High</td>
<td>0</td>
<td></td>
<td>0.0</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td></td>
<td>100.0</td>
</tr>
<tr>
<td>X ± S.D</td>
<td>1.150 ± 0.176</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Freq.: Frequencies, %: Percentages, X: Arithmetic Mean, S.D.: Standard deviation.

Table (3) shows high percentile (96.3 %) were poor level score for the study sample with mean score and standard deviation (1.50 ± 0.176).

Table (4): The correlation among nurses’ demographical characteristics in the study sample and their knowledge about fluid and electrolyte imbalance by application one way ANOVA.

<table>
<thead>
<tr>
<th>Predicted variables</th>
<th>X</th>
<th>S.D</th>
<th>DF</th>
<th>betweengroup</th>
<th>withingroup</th>
<th>Tot</th>
<th>F</th>
<th>Sig.</th>
<th>C.S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>21 – 27 76.42</td>
<td>3.776</td>
<td>3</td>
<td>23</td>
<td>26</td>
<td>41.489</td>
<td>.000</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>28 – 34 83.00</td>
<td>4.243</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35 – 41 113.0</td>
<td>12.57</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>42 – 48 96.00</td>
<td>11.31</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>49 – 55 0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td>Single 75.33</td>
<td>2.872</td>
<td>1</td>
<td>25</td>
<td>26</td>
<td>5.167</td>
<td>.032</td>
<td>S</td>
<td></td>
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<tr>
<td>Married 88.00</td>
<td>16.43</td>
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<td></td>
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<td></td>
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<tr>
<td>Divorcee 0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residence</td>
<td>Urban 81.24</td>
<td>11.38</td>
<td>2</td>
<td>24</td>
<td>26</td>
<td>2.257</td>
<td>.126</td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td>Suburban 83.00</td>
<td>7.071</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural 97.50</td>
<td>26.38</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Table (4.9): The correlation among nurses’ demographical characteristics in the study group and their knowledge improvement due to applying for an educational program by application Independent sample T test.

<table>
<thead>
<tr>
<th>Predicted variables</th>
<th>X</th>
<th>S.D</th>
<th>df</th>
<th>t</th>
<th>Sig.</th>
<th>C.S</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>92.50</td>
<td>18.392</td>
<td>25</td>
<td>3.214</td>
<td>.004</td>
<td>S</td>
</tr>
<tr>
<td>Female</td>
<td>76.80</td>
<td>4.280</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Self-education</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>84.92</td>
<td>15.214</td>
<td>25</td>
<td>1.145</td>
<td>.263</td>
<td>NS</td>
</tr>
<tr>
<td>No</td>
<td>74.67</td>
<td>2.887</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
This table demonstrates a significant correlation between nurses' knowledge about fluid and electrolyte disturbances in hemodialysis patients and their age, marital status, level of education, years of experience, and source of self-education. While there was a non-significant correlation between nurses' knowledge about fluid and electrolyte disturbances in hemodialysis patients and their residence, as well as their training courses, in the sample at P ≤ 0.05.

IV. DISCUSSION

Discussion of the Socio-Demographic Characteristics of the hemodialysis unit’s nursing staff:

The study's findings in Table (1) indicated that the majority of the study sample was between the ages of 21 - 27 years. And they account (70.4 %). This finding is consistent with a study conducted by Yousef et al., who found that approximately two-thirds of nurses (62.5 %) were between the ages of 20 and 30, while 25% were over 30, with a mean age of 25.776.32 years. Additionally, this finding corroborates a study conducted by Bakey, who discovered that the majority of the study sample (40%) was composed of youth. This is consistent with Hassan, who stated that the majority of nurses were between the ages of 20 and 30. While this finding contradicts a study conducted by Yousif et al., who discovered that the majority of nurses' staff (72 %) were under the age of 36. According to the researcher, these findings indicate that nurses' age is critical in terms of enhancing their knowledge and practices. Younger nurses have more ambition, exert more effort, are in better physical health, and are more creative in their approach to nursing performance. On the other hand, older nurses rely heavily on younger nurses in the workplace and typically serve only in an administrative capacity.

In terms of gender, the majority of nurse staff in hemodialysis centers were female, accounting (55.6%). This agrees with Mahmood, who found that about half of the sample (53.8%) were females, while the remaining were males. Also, the majority (82.5 %) of nurse staff in hemodialysis are females, according to the study done by Yousif et al. While this finding differs from Bakey, who found in a study conducted in Baghdad Teaching Hospitals on hemodialysis nurses that 53.3% of the study population were males.

The majority of the sample is married, accounting (66.7 %) of the study sample. The findings of this study corroborated Mahmood's findings that the majority (70 %) of the sample was married. This finding corroborates Yousef et al finding that (68.75 %) of staff nurses were married. According to the researcher's perspective, these findings mean the age group are marriage, especially after the completion of the study and appointment in the field of nursing. Where the Iraqi young after graduating from the study and the presence of employment opportunity take the side of marriage. On other hand, single nurses do not have any other interest or attitudes; they are more interested in their job.

In terms of residency, the study sample's highest percentage was urban and these accounted (77.8%) in the study sample. This result is consistent with Hassan S., et al. finding that the majority (69.2 %) of the study sample live in urban areas, but differs from Mahdi's finding that the highest percentage of the study sample live in rural areas.

Regarding the level of education, the majority of Nurses in both groups are college nursing graduate and these accounted (48.1%) in the study sample. This finding agrees with a study done by Soheir T. & Salwa A. who’s indicated that (53.8 %) of staff nurse had nursing Bachelor. Also, this finding is consistent with a study conducted by Yousif KI, et al who showed that seventy-five percent of the nurses were university graduates, and 25% of the participants had Master degrees in nursing.

While this finding contradicts a study conducted by Yousif et al., who found that (68.75%) of staff nurses held a secondary diploma in nursing, (18.75%) of nurses attended a technical institute of nursing, and 12.5 % held a bachelor's degree in nursing. This result also contradicts Mahmood's study, which found that 50% of staff nurses were nursing institute graduates. The result also contradicts a study conducted by Al Qahtani AS et al., which found that the majority of nurses (78.90 %) held a diploma in nursing.

According to the researcher, these findings indicate that dialysis units will be entirely staffed by nurses who have graduated from colleges of nursing, owing to the critical need for theoretical experience in the development of hemodialysis centers, and given that these centers are among the critical places in health institutions for the increasing number of people with kidney failure who are undergoing for hemodialysis.
Regarding to the experience years in hospital, most of the nurses have years of experience ranging between (1-6) years, and formed a ratio (74.1%). According to a study done by Mahmoud (7), out of the sample studied, 46.3% had 1-5 years of hospital experiences. Additionally, this finding corroborates Bakery (8) who finding that the majority (40%) of the nursing staff had (1-6) years of experience working in hospitals.

According to the researcher's perspective, these results suggest that the fact that there is a recurrent rotation from one unit to another within the hospital might explain the few years of nursing experience in hemodialysis units. On the other hand, when nurses are young, the outcome explained would have a greater willingness to improve their skills and practices relative to other nurses in the higher age group.

Regarding to Training courses, the results indicated that the majority of the study sample lacked training courses, accounting for (51.9 %) of the study sample. This finding is consistent with a study conducted by Mahmoud (7), who discovered that more than half of the study sample (66.3 %) did not have the opportunity to participate in hospital-based hemodialysis training sessions. This finding is consistent with Abd-Alfatah et al., (13), who discovered that the majority of studied nurses did not attend dialysis-related training. This may be due to the hospital's emphasis on infection control courses rather than dialysis courses. This result agrees with a study done by Hassan (14) in which the majority of them have no in-service training courses related to dialysis.

Based on the researcher's point of view, all nursing staff in dialysis units should be enrolled in training courses to enhance their awareness and skills in everything related to dialysis. This may be due to the hospital's focus on infection control courses rather than dialysis courses.

In regarding to Self-education, the majority of the study sample are doing self-education in different types and this result accounted (88.9%) for study sample. This result is similar to the results of the study conducted by Dhiraj et al., (15), which indicated that most nurses in dialysis units do self-education. This finding agrees with study Soheir T. &Salwa A. (11), the majority (40%) of nurse staff engage in self-education.

In terms of self-education, the majority of the study sample uses social media to educate themselves and this result accounted (51.9%) for study sample. This result agree with the study conducted by Mona s., et al (16), which indicated that most nurses in dialysis units rely on social networking sites for self-education.

Discussion of the assessment of nurses' knowledge related to the major domains of fluid and electrolyte imbalance for hemodialysis patients.

While Table (2) indicated that the studied nurses had an unsatisfactory level of knowledge regarding fluid and electrolyte imbalance, the mean score and Relative Important Index of nurses’ knowledge for all items for the sample were moderate. The study's findings indicate that Nurses' knowledge about Kidney Failure and Dialysis, Electrolyte Disorders, and the Appropriate Amounts of Electrolytes for Dialysis Patients are inadequate. This means that the researcher claims that nurses lack adequate knowledge and awareness to aid in renal failure, hemodialysis, and fluid and electrolyte imbalance. Soheir T. &Salwa A. (11) mentioned that Before intervention, (61.5 %& 53.8 %) of the studied nurses reported unsatisfactory level of knowledge related to items of general knowledge and (65.3%, 69.2 %, & 76.9 %) related to items of specific knowledge respectively.

Correlation between nurses’ Knowledge and their Demographic data (Age, Gender, Marital status, Residence, Level of Education, years of experience, training courses, self-education, and sources of self-education):

As regards the age, table (4) show the application of one way ANOVA revealed that there is high significant association (0.000) between nurses’ knowledge with their age group in the study sample. This study concurs with Mahmoud (7), who demonstrated a significant relationship between nurses' knowledge and their age at the p (0.01) level. Additionally, this study concurs with Abd-Alfatah et al. (13) who demonstrated a significant relationship between nurse knowledge scores and their age at p value (0.04).

Table (4) also reveals a significant correlation nurses’ knowledge toward fluid and electrolyte disturbance of hemodialysis patients and their marital status for the sample (0.032) by P ≤ 0.05. This finding corroborates Bakey's finding (4) that there was a significant relationship between nurses' knowledge and marital status. Additionally, this study corroborates Al-Hakkak's(17) finding that there was a significant relationship between nurses' knowledge and marital status when they worked in hemodialysis units.

Regarding to residence type table (4) indicate there is no significant correlation nurses’ knowledge toward fluid and electrolyte disturbance of hemodialysis patients and their residence, for the study sample at P ≤ 0.05. This
result agrees with the study done by Stanley M, & Pollard D, (18) who presented that there was no correlation between nurses’ knowledge and where they lived.

Table (4) also reveals a significant correlation nurses’ knowledge toward fluid and electrolyte disturbance of hemodialysis patients and their level of education, for the study sample at P ≤ 0.05. This result is agreeing with study done by Mahmood (7), who showed there is a significant relationship between nurse knowledge and education level at the p (0.05) level.

This table (4) depicts that there is no discernible relationship between nurses' knowledge and their attendance at training courses in hemodialysis for the study at p-value ≤ 0.05. The study confirms AbdAlfatah's(13) finding that there is no statistically significant difference between having completed a training course and having a high knowledge level. This finding contradicts Mahmood’s finding (7) that there is a significant relationship between nurses' knowledge and their participation in training sessions at the p (0.01).

Tables (4) reveals a significant correlation nurses’ knowledge toward fluid and electrolyte disturbance of hemodialysis patients and their experience years, and source of self-education, for the study sample at P ≤ 0.05. This study agrees with Abd-Alfatah, el al. (15), who showed that there is a significant difference in the knowledge scores of nurses according to their experience and knowledge resources. Additionally, this study confirms Hassan’s assertion (14) that there is a statistically significant difference between nurse knowledge scores and experience duration in hospitals.

Table (5) reveals a significant correlation between total nurses’ knowledge and their gender for the study sample at (P ≤ 0.05). This finding contradicts Mahmood's finding (7) that there was no significant relationship at (P ≤ 0.05) level between nurse's knowledge and their gender.

V. CONCLUSIONS

According to the present study findings, the following conclusions have been drawn up:

The study presented that the majority of hemodialysis nurses are female, graduated from nursing college within the age group (21-27) years old. Having (1-6) years of experience hospital and have not attended any training session regarding hemodialysis which established by hospitals, or establish in inside or outside Iraq. Also the study presented that the most of the nurses who participated in the study were married, urban residence, and doing self-education depending on social media.

The nurses’ level of knowledge toward fluid and electrolyte disturbance of hemodialysis patients for the study sample, was poor.

There is a significant relationship between nurses' knowledge about fluid and electrolyte disturbances in hemodialysis patients and their age group, marital status, level of education, years of hospital experience, and source of self-education.

VI. RECOMMENDATIONS

The researcher recommends the following based on the findings and conclusion of this study:

Establishing and expanding the specialized Habib Ibn Mudahir al Asadi Center with the necessary equipment to provide comprehensive health care to hemodialysis patients.

Special and long continuing educational program should be established and applied for nurses who are working in hemodialysis units concerning fluid and electrolyte disturbance of hemodialysis patients.

Designating and distributing a booklet to all nurses, those who work in hemodialysis units, concerning fluid and electrolyte disturbance of hemodialysis patients.

Conducting further research on the application of educational programs that teach the nurse about hemodialysis complication knowledge and practice.

Developing training programs for dialysis care providers who work in specialized hemodialysis centers, and/or training personnel in hemodialysis health education.
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