Dialysis-Related Factors Affecting Activities of Daily Living among Hemodialysis Patients in Erbil City

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ABSTRACT
Background and objectives: Hemodialysis procedure is one of the important replacement therapies for patients with renal failure. Maintenance hemodialysis is associated with many complications that play a significant role in the activities of daily living. The present study aimed to find out the factors affecting activities of daily living among patients with maintenance hemodialysis in Erbil City in the Kurdistan Region of Iraq.

Methods: The cross-sectional study was conducted on 268 patients undergoing maintenance hemodialysis for more than two months, and at least two times per week at two dialysis centres in Erbil City from December 2019 to April 2020. The activities of daily living and complications from the hemodialysis procedure questionnaire to collect research data. The data analysis was conducted using descriptive statistical approach including frequency, percentages, and inferential statistical analysis consisting chi-square test.

Results: According to the findings of the study, the majority of participants were above 51 years of age, able to read and write, with middle income, and from an urban area. Almost half of the study sample were males, and most were on hemodialysis between one and three years. The majority of them had hypertension and complications associated with hemodialysis such as headache and hypotension, and more than half had back pain. A highly significant association was found between dependency in activities of daily living and some socio-economic and clinical variables. Furthermore, a significant association was found between dependency in activities of daily living and some hemodialysis complications with P<0.001.

Conclusion: According to the result of the study, the researchers concluded that participants suffered from chronic diseases, hemodialysis complications and low level of activities of daily living. The complications of hemodialysis treatment were significantly affecting the activities of daily living. Haemodialysis patients need more education and nursing care to reduce treatment complications and to increase their activities.

Keywords: Activities; Daily living; Hemodialysis patient; Complication; Independency; Dependency.

INTRODUCTION
Dialysis is the best technique to remove excess fluid and waste products from the body if the kidneys cannot perform this function. It can also balance acid-base and regulate fluid and electrolytes [1]. The hemodialysis machine (HD) filters and cleans the blood of the patients, usually three times per week, four to six hours at A time [2]. Daily activities like self-care of an individual at home and other individual activities outdoors are called Activities of Daily Living (ADLS). Ability and inability of doing ADLS is an essential measure of the functional status of individual patients [3]. Main types of ADLs are self-care activities such as eating, personal hygiene,
shopping and mobility [4]. Treatment by HD always needs to be done at an HD centre or a hospital because the patients may develop many complications [5]. A study by Kopple et al. (2018) reported that patients with maintenance HD had reduced performance of physical mobility and daily physical activity [6]. Another study that was conducted on physical activity of HD patients revealed that their physical activity was lower than other patients, because of many problems, complications and stressful factors related to the condition and treatment [7]. It is essential to assess and monitor the level of physical activities of all HD patients, especially during the day of HD procedure because they often deal with several problems related to their sedentary lifestyle [8]. The patients should improve their daily activity and self-care to prevent HD complications and to continue the life of health and well-being [9]. The researchers assessed the patients' level of ADLs and determined the main complications and problems that occurred during and after HD. They also identified the main related factors that affected those problems and inactivity.

**METHODS**

The cross-sectional study design was conducted at both Dialysis Centers of Hawler Teaching Hospital in Erbil City in the Kurdistan Region of Iraq. The study sample included all patients with maintenance hemodialysis treatment in both Centers. From 318 HD patients treated in the centres, 268 patients were selected according to the inclusion criteria of the present study. The inclusion criteria encompassed all male and female patients above the age of 18 with chronic renal failure and maintenance HD at least twice a week. Fifty cases were excluded; 12 were under 18 years old, 10 were on HD less than two months, 13 had HD treatment less than one time a week, and 15 refused to participate in the study. The study was conducted during the period of 1st December 2019 to 15th April 2020. The data were collected during one month after approval of the proposal. The researchers collected the data by face to face interviews using a questionnaire, which consisted of three parts based on the proposed research objectives. Part 1 included socio-demographic datasheet; part 2 contained clinical information, and part 3 recorded HD complications that the researchers identified through the literature review. Part 4 was used to assess the ADLs. The concept of the ADLs was first described by Sheldon in the Journal of Health and Physical Education in 1935, as reported by Feinstein et al.[10]. In 1969, Lawton and Brody were the first authors to describe two levels of ADLs as basic and instrumental ADLs, and they considered it to be a valid and reliable scale for health surveys [11]. The ADLs tool was used in many studies such as Singh et al., in 2007, Watanabe et al., in 2018 and Kutsuna et al., in 2019 [12,13,14]. The researchers modified the ADLs tool to achieve the research objectives and included 16 items divided into two domains subscales; basic ADLs (10 items), instrumental ADLs (6 items) and 3 levels of ADLs dependency (independent, requires assistance and dependent). The study was approved by the Scientific and Ethical Committees at the College of Nursing of Hawler Medical University in Erbil. The verbal consent was obtained from each patient with HD before the interview. The data were analysed using the Statistical Package for Social Sciences (SPSS, Version 25), and used two statistical approaches. The descriptive data analysis included frequency and percentage, and inferential data analysis calculated Chi-square test. P-value of ≤ 0.05 was considered statistically significant to find out
Most of the patients (89.6%) had other chronic diseases (73.9% hypertension, 49.3% diabetes mellitus, 14.6% anaemia, 14.2% heart disease and 3.7% hepatitis). Regarding the duration of HD treatment, more than half of the participants (55.2%) received treatment for 1-3 years. A high percentage of them (94.8%) had information about the importance of ADLs. Table 3 demonstrates the overall activities of daily living divided into two main domains, basic and instrumental activities. The maximum percentage of basic ADLs (42.9%) was within the level of independence. However, more than half (52.6%) of the participants were dependent in the instrumental ADLs. In general, the largest proportion of participants (36.6%) was within the level of dependency in both types of ADLs (basic and instrumental).

### Table 1: Socio-economic data of patients with maintenance hemodialysis

| Variables                        | n=268 | F    | (%)  |
|----------------------------------|-------|------|------|
| **Age group**                    |       |      |      |
| (years)                          |       |      |      |
| 18-35                            | 28    | (10.4)|      |
| 36-50                            | 57    | (21.3)|      |
| 51 and above                     | 183   | (68.3)|      |
| **Sex**                          |       |      |      |
| Male                             | 138   | (51.5)|      |
| Female                           | 130   | (48.5)|      |
| **Formal years of education**    |       |      |      |
| Read and/write                   | 164   | (61.2)|      |
| Primary school                   | 71    | (26.4)|      |
| Secondary                        | 9     | (3.4) |      |
| Higher Education                 | 24    | (9)   |      |
| **Marital status**               |       |      |      |
| Single                           | 18    | (6.7) |      |
| Married                          | 188   | (70.2)|      |
| Widower                          | 62    | (23.1)|      |
| **Current occupation**           |       |      |      |
| Employment                       | 25    | (9.3) |      |
| Jobless                          | 120   | (44.8)|      |
| **Economic Status**              |       |      |      |
| Low income                       | 33    | (12.3)|      |
| Middle income                    | 206   | (76.9)|      |
| High income                      | 29    | (10.8)|      |
| **Residential**                  |       |      |      |
| Urban                            | 239   | (89.2)|      |
| Rural                            | 29    | (10.8)|      |

### Table 2: Clinical characteristic of the patients with maintenance hemodialysis

| Variables                        | n=268 | F    | (%)  |
|----------------------------------|-------|------|------|
| **Body Mass Index (BMI)**        |       |      |      |
| Underweight                      | 10    | (3.7) |      |
| Normal Weight                    | 128   | (47.8)|      |
| Overweight                       | 88    | (32.8)|      |
| Obese                            | 42    | (15.7)|      |
| **Associated disease with chronic Renal Failure** | | | |
| Yes                              | 240   | (89.6)|      |
| No                               | 28    | (10.4)|      |
| **Type of chronic disease**      |       |      |      |
| (n=240)                          |       |      |      |
| Hypertension                     | 198   | (73.9)|      |
| Diabetes Mellitus                | 132   | (49.3)|      |
| Anaemia                          | 39    | (14.6)|      |
| Heart Disease                    | 38    | (14.2)|      |
| **Duration of HD treatment**     |       |      |      |
| <1 year                          | 56    | (20.9)|      |
| 1–3 years                        | 148   | (55.2)|      |
| >3 year                          | 64    | (23.9)|      |
| **Information about ADL**        |       |      |      |
| Yes                              | 254   | (94.8)|      |
| No                               | 14    | (5.2) |      |
Table 4 exhibits the common complications and problems that occurred during and after the HD procedure. The most common complications identified through the questionnaire included headache (81.7%) after HD procedure (39.9%), hypotension (72%) during HD procedure (59.3%) and back pain (58.2%) during HD procedure (43.3%). The least common problems and complications that occurred among HD patients included infiltration (4 cases, 1.5%) during HD procedure in all 4 patients (100%), air embolism (4 cases, 1.5%), 3 cases occurred during HD procedure (1.1%), and the least common complication was coma in 5 patients (1.7%), 4 (1.5%) of which occurred during HD procedure. Table 5 demonstrates the association between the ADLs and socio-economic characteristics of the patients. There was a highly significant association between the 'dependent' level of the ADLs and four variables; age group of the participants (46.1% for 56 years and above and 14% for 36 - 55 years, P-value <0.001), marital status (61.3% for a widower and 23.9% for married vs 16.7% for single, P-value <0.001), formal years of education (41.5% for illiterate and can read/ write and 19.7% for primary school graduates vs 16.7% for higher-level education, P-value <0.001), and current occupation (39.8% for housewife and 29.2% for unemployment vs 8% for employment, P-value <0.001).

Dependency was more significant among low income and middle-income participants than in high-income respondents (36.4% and 34%, 13.8% respectively, P = 0.025). Finally, there was no significant association between the ADLs and gender (P = 0.057) and residential area (P = 0.221). Table 6 shows the association between clinical characteristics and ADLs. Dependency of ADLs was significantly associated with the BMI (50% for underweight, 35.2% for normal weight, 27.3% overweight and 28.6% for obese, P-value = 0.020) and duration of HD treatment (33.9% for <1 year and 31.8% for 1–3 years vs 31.3% for >3 year, P-value =0.037). Also, dependency was significantly associated with another chronic disease; hypertension (35.4% hypertension and 22.9% for no hypertension, P-value = 0.004), diabetes mellitus (41.7% diabetes mellitus and 22.8% for no diabetes mellitus, P-value = 0.002), hepatitis (32.9% for no hepatitis and 29.1%, for hepatitis, P-value = 0.029) and heart disease (50% heart disease and 29.1% for no heart disease, P-value = 0.003). Finally, dependency was significantly associated with not being informed about ADLs (35.7%) and (31.9%) (P-value = 0.006). There was no statistically significant association between ADLs and anemia (P-value = 0.062). Final results of the study are demonstrated in Table 7. They illustrate an association between some complications and problems of the HD procedure and overall level of ADLs. From all of 19 complications/ problems, only nine had a statistically significant association with ADLs. The dependent level of the ADLs was significantly higher in patients with nausea (44.4% nausea vs. 29% no nausea, P = 0.004), vomiting (42.3% vomiting vs. 28.4% no vomiting, P = 0.021), restlessness (37.3% no restlessness vs. 29.2% restlessness, P = 0.041), tightness
in the chest (37.2% no tightness in the chest vs. 27.8% tightness in the chest, \( P = 0.003 \)), chills (32.9% no chills vs. 29.1% chills, \( P = 0.049 \)), fever (38.2% no fever vs. 27.9% fever, \( P = 0.026 \)), clotting (38.1% clotting vs. 28.7% no clotting, \( P = 0.043 \)), blood line obstruction (80% blood line obstruction vs. 30.2% no blood line obstruction, \( P = 0.004 \)) and hematoma (33.1% no hematoma vs. 0% hematoma, \( P = 0.003 \)).

### Table 4: Health problems associated with hemodialysis among the study sample

| Complication or Problem       | No (%) | Yes (%) | During procedure | After procedure | Remaining by hours |
|-------------------------------|--------|---------|------------------|----------------|------------------|
| Nausea                       | 214 (79.9) | 54 (20.1) | 48 (17.9) | 5 (1.9) | 1 (0.4) |
| Vomiting                     | 197 (73.5) | 71 (26.5) | 63 (23.5) | 7 (2.6) | 1 (0.4) |
| Restlessness                  | 244 (91) | 24 (9) | 19 (7.1) | 4 (1.5) | 1 (0.4) |
| Headache                     | 49 (18.3) | 219 (81.7) | 95 (35.4) | 107 (39.9) | 17 (6.3) |
| Seizure                      | 258 (96.3) | 10 (3.7) | 5 (1.9) | 5 (1.9) | 0 (0) |
| Coma                         | 263 (98.1) | 5 (1.9) | 4 (1.5) | 1 (0.4) | 0 (0) |
| Hypotension                  | 75 (28) | 193 (72) | 159 (59.3) | 29 (10.8) | 5 (1.9) |
| Back pain                    | 112 (41.8) | 156 (58.2) | 116 (43.3) | 26 (9.7) | 14 (5.2) |
| Tightness in the chest       | 250 (93.3) | 18 (6.7) | 11 (4.1) | 5 (1.9) | 2 (0.7) |
| Shortness of breath          | 215 (80.2) | 53 (19.8) | 44 (16.4) | 8 (3) | 1 (0.4) |
| Chill                        | 213 (79.5) | 55 (20.5) | 46 (17.2) | 6 (2.2) | 3 (1.1) |
| Fever                        | 225 (84) | 43 (16) | 34 (12.7) | 8 (3) | 1 (0.4) |
| Air embolism                 | 264 (98.5) | 4 (1.5) | 3 (1.1) | 1 (0.4) | 0 (0) |
| Clotting                     | 171 (63.8) | 97 (36.2) | 92 (34.3) | 4 (1.5) | 1 (0.4) |
| Blood line obstruction       | 258 (96.3) | 10 (3.7) | 10 (3.7) | 0 (0) | 0 (0) |
| Bleeding                     | 249 (92.9) | 19 (7.1) | 14 (5.2) | 5 (1.9) | 0 (0) |
| Pain                         | 231 (86.2) | 37 (13.8) | 31 (11.6) | 4 (1.5) | 2 (0.7) |
| Infiltration                 | 264 (98.5) | 4 (1.5) | 4 (1.5) | 0 (0) | 0 (0) |
| Hematoma                     | 260 (97) | 8 (3) | 3 (37.5) | 5 (62.5) | 0 (0) |
Table 5: Association between socio-economic data and overall ADLs

| Variables                        | Dependent Requires assistance | Independent F (%) | P-Value |
|----------------------------------|--------------------------------|-------------------|---------|
| **Age group (year)**             |                                |                   |         |
| 18 - 35 (Young Adult)            | 3 (10.7)                       | 3 (10.7)          | 22 (78.6) | <0.001 |
| 36 - 55 (Middle-Aged Adults)     | 12 (14)                        | 18 (20.9)         | 56 (65.1) | <0.001 |
| 56 years old and above (Older Adult) | 71 (46.1)                   | 62 (40.3)         | 21 (13.6) | <0.001 |
| **Sex**                          |                                |                   |         |
| Male                             | 36 (26.1)                      | 47 (34.1)         | 55 (39.9) | 0.057  |
| Female                           | 50 (38.5)                      | 36 (27.7)         | 44 (33.8) |         |
| **Marital Status**               |                                |                   |         |
| Single                           | 3 (16.7)                       | 3 (16.7)          | 12 (66.7) | <0.001 |
| Married                          | 45 (23.9)                      | 60 (31.9)         | 83 (44.1) |         |
| Widower                          | 38 (61.3)                      | 20 (32.3)         | 4 (6.5)  |         |
| **Formal years of education**    |                                |                   |         |
| Illiterate and Can read /write   | 68 (41.5)                      | 58 (35.4)         | 38 (23.2) | <0.001 |
| Primary school                   | 14 (19.7)                      | 21 (29.6)         | 36 (50.7) |         |
| Secondary school                 | 0 (0)                          | 3 (33.3)          | 6 (66.7)  |         |
| Higher Education                 | 4 (16.7)                       | 1 (4.2)           | 19 (79.2) |         |
| **Current occupation**           |                                |                   |         |
| Employment                       | 2 (8)                          | 2 (8)             | 21 (84)  | <0.001 |
| Jobless                          | 35 (29.2)                      | 45 (37.5)         | 40 (33.3) |         |
| Housewife                        | 49 (39.8)                      | 36 (29.3)         | 38 (30.9) |         |
| **Economic status**              |                                |                   |         |
| Low income                       | 12 (36.4)                      | 13 (39.4)         | 8 (24.2)  |         |
| Middle income                    | 70 (34)                        | 63 (30.6)         | 73 (35.4) | 0.025  |
| High income                      | 4 (13.8)                       | 7 (24.1)          | 18 (62.1) |         |
| **Residential area**             |                                |                   |         |
| Urban                            | 74 (31)                        | 73 (30.5)         | 92 (38.5) | 0.221  |
| Rural                            | 12 (41.4)                      | 10 (34.5)         | 7 (24.1)  |         |
Table 6: Association between clinical data and the overall level of ADLs

| Variables                        | Dependent F (%) | Requires assistance F (%) | Independent F (%) | P-Value |
|----------------------------------|-----------------|---------------------------|-------------------|---------|
| **Classification of BMI**        |                 |                           |                   |         |
| Underweight                      | 5 (50)          | 0 (0)                     | 5 (50)            |         |
| Normal Weight                    | 45 (35.2)       | 31 (24.2)                 | 52 (40.6)         | 0.020   |
| Overweight                       | 24 (27.3)       | 39 (44.3)                 | 25 (28.4)         |         |
| Obese                            | 12 (28.6)       | 13 (31)                   | 17 (40.5)         |         |
| **Duration of HD treatment**     |                 |                           |                   |         |
| <1 year                          | 19 (33.9)       | 16 (28.6)                 | 21 (37.5)         |         |
| 1–3 years                        | 47 (31.8)       | 38 (25.7)                 | 63 (42.6)         | 0.037   |
| >3 year                          | 20 (31.3)       | 29 (45.3)                 | 15 (23.4)         |         |
| **Do you have hypertension?**   |                 |                           |                   |         |
| Yes                              | 70 (35.4)       | 66 (33.3)                 | 62 (31.3)         | 0.006   |
| No                               | 16 (22.9)       | 17 (24.3)                 | 37 (52.9)         |         |
| **Do you have Diabetes Mellitus?** |             |                           |                   |         |
| Yes                              | 55 (41.7)       | 39 (29.5)                 | 38 (28.8)         | 0.002   |
| No                               | 31 (22.8)       | 44 (32.4)                 | 61 (44.9)         |         |
| **Do you have anaemia**          |                 |                           |                   |         |
| Yes                              | 17 (43.6)       | 14 (35.9)                 | 8 (20.5)          | 0.062   |
| No                               | 69 (30.1)       | 69 (30.1)                 | 91 (39.7)         |         |
| **Do you have hepatitis?**      |                 |                           |                   |         |
| Yes                              | 1 (10)          | 5 (50)                    | 4 (40)            | 0.029   |
| No                               | 85 (32.9)       | 78 (30.2)                 | 95 (36.8)         |         |
| **Do you have heart disease?**  |                 |                           |                   |         |
| Yes                              | 19 (50)         | 12 (31.6)                 | 7 (18.4)          | 0.003   |
| No                               | 67 (29.1)       | 71 (30.9)                 | 92 (40)           |         |
| **Do you have information about ADLs** |        |                           |                   |         |
| Yes                              | 81 (31.9)       | 80 (31.5)                 | 93 (36.6)         | 0.006   |
| No                               | 5 (35.7)        | 3 (21.4)                  | 6 (42.9)          |         |
Table 7: Association between overall ADLs and complications/problems

| Complications/Problems | Overall ADL levels | \(P\)-Value |
|------------------------|--------------------|-------------|
|                        | Independent \(F\) | \(F\) (%)  | \(F\) (%)  | \(F\) (%)  |             |
|                        | Yes                | (44.4)      | (18.5)     | (37)       | 0.004       |
|                        | No                 | (29)        | (34.1)     | (36.9)     |             |
| Nausea \(*yes=54\)*   | Yes                | 24          | 10         | 20         |             |
|                        | \(*no =214\)*      |             |            |            |             |
|                        | No                 | 62          | 73         | 79         |             |
| Vomiting \(*yes=71\)* | Yes                | 30          | 20         | 21         | 0.021       |
|                        | \(*no=197\)*       |             |            |            |             |
|                        | No                 | 56          | 63         | 78         |             |
| Restlessness \(*yes=219\)* \(*no=49\)* | Yes | 7 | (29.2) | 13 | (54.2) | 4 | (16.7) | 0.041 |
|                        | No                 | 91          | 73         | 80         |             |
| Headache \(*yes=219\)* \(*no=49\)* | Yes | 21 | (42.9) | 9 | (18.4) | 19 | (38.8) | 0.071 |
|                        | No                 | 65          | 74         | 80         |             |
| Hypotension \(*yes=193\)* \(*no=75\)* | Yes | 62 | (32.1) | 58 | (30.1) | 73 | (37.8) | 0.215 |
|                        | No                 | 24          | 25         | 26         |             |
| Back pain \(*yes=156\)* \(*no=112\)* | Yes | 55 | (35.3) | 50 | (32.1) | 51 | (32.7) | 0.101 |
|                        | No                 | 31          | 33         | 48         |             |
| Tightness in the Chest \(*yes=18\)* \(*no=250\)* | Yes | 5 | (27.8) | 12 | (66.7) | 1 | (5.6) | 0.003 |
|                        | No                 | 93          | 74         | 83         |             |
| Chil \(*yes=55\)* \(*no=213\)* | Yes | 16 | (29.1) | 15 | (27.3) | 24 | (43.6) | 0.049 |
|                        | No                 | 70          | 68         | 75         |             |
| Fever \(*yes=43\)* \(*no=225\)* | Yes | 12 | (27.9) | 10 | (23.3) | 21 | (48.8) | 0.026 |
|                        | No                 | 86          | 76         | 63         |             |
| Clotting \(*yes=97\)* \(*no=171\)* | Yes | 37 | (38.1) | 34 | (35.1) | 26 | (26.8) | 0.043 |
|                        | No                 | 49          | 49         | 73         |             |
| Blood line obstruction \(*yes=10\)* \(*no=258\)* | Yes | 8 | (80) | 0 | (0) | 2 | (20) | 0.004 |
|                        | No                 | 78          | 83         | 97         |             |
| Hematoma \(*yes=8\)* \(*no=260\)* | Yes | 0 | (0) | 6 | (75) | 2 | (25) | 0.003 |
|                        | No                 | 86          | 77         | 97         |             |
DISCUSSIONS
This study explored the common complications and problems associated with HD during or after the procedure and factors that affected patients' ADLs. The results revealed that almost half of the participants were dependent in performing instrumental ADLs. In contrast, the maximum percentage of participants were independent in their basic ADLs. The overall level of patients' independence in ADLs was inadequate. According to extensive research data, the activity during the day is essential for all people and especially for patients with chronic kidney disease. In contrast, inactivity is one of the main problems associated with many diseases, complications and mortality as well as the quality of life [15, 16, 17]. The results of low activity in our study could be due to the age of the study participants as the majority of them were more than 51 years old. Low level of education could also contribute, as the activity in the older age group usually declines in the society. This result is supported by the study of Julius et al., which reported the highest dependency in ADLs among older patients, female and less educated [18]. Painter and Marcus found that, generally, participants with renal failure usually had low levels of physical activity [19]. The study of Cook and Jassal also supported this result; the majority of their study group was dependent in most items of basic and instrumental ADLs [20]. Self-care activities can increase if they are designed by educational program and improve patients' knowledge, as found in the quasi-experimental study of Mohamed et al., which was conducted in Egypt. It used Nottingham scale of ADLs and studied the effect of the interventional program on the HD patients and their ability of self-care. The results showed that before the intervention, only 30% of participants were independent in ADLs, while post-intervention, 50% were independent, demonstrating an increased by two-thirds. 66.7% of patients in the study were independent after the follow-up period [21]. The treatment by HD procedure among patients in this study was associated with many complications and problems. The majority of patients had headache, hypotension and back pain. At the same time, the least common complication was a coma, and the least common problems were infiltration and air embolism that occurred during the HD procedure. Those complications or problems were expected as the majority of the study participants had other chronic diseases, and those complications could be due to those conditions. Moreover, the HD procedure is the major invasive procedure that transports the blood from the body of the patients into the dialyser machine through the hollow fibres, and after the filtration returns into the body, which takes 4 to 6 hours. Therefore the HD procedure carries the risk of many complications [22]. The HD patients experience multiple problems and health complications in the community and their daily lives because they have daily treatment as well as the treatment by hemodialysis procedure [23, 24]. The results of this study were supported by the Caplin et al., study that studied 550 HD patients in London, UK. After analysis, they identified the hypotension, headache, backache, pruritus, dizziness and cramps as the main complications of HD [25]. Another retrospective study in the Uttar Pradesh, India; during 11 years assessed 2325 renal failure HD patients and found that the most common intradialytic complications were hypotension, nausea, vomiting, fever and chills [26]. The cross-sectional survey study by Gela and Mengistu conducted in Ethiopia showed that the majority of the participants on HD treatment...
Had anaemia as a complication [27]. Hemodialysis patients often complain about many complications before, during and after HD treatment. By improving nursing interventions, nurses can reduce the risk of complications [28]. The present study identified infiltration and air embolism as problems related to vascular access. The longitudinal cohort study that was conducted in North America observing vascular HD access during 90 days and second time end of the first year revealed many problems [29]. The ADLs of patients were significantly associated with many variables of socio-economic and clinical characteristic. There was a highly statistically significant association with age group, level of education and BMI of the participants, which could be because the majority of the study groups were older adults, and their level of education was low. Furthermore, almost half of the participants had a normal weight, however, the daily accumulation of waste products and excessive fluid led to an increase in their weight affecting their activity. These results are similar to the findings of a study by Johansen et al. in the California, USA, which showed age, level of education, and BMI were significantly associated with physical activity [30]. However, there was a difference with the study by Stack and Murthy, who found that severe limitations in the ADLs among HD patients were negatively related to the age and heart failure [31]. The current occupation and economic status, as well as the duration of HD treatment of the patients in the current study also affected the ADLs. This could be due to the high percentage of housewives and unemployed people in the study sample. Also, a majority of participants had middle income and were dependent on other people for daily income. Additionally, the duration of dialysis in the majority of studied patients was over one year, which may lead to unemployment and inadequate income. All of the above challenges also affected the psychology of the patients and their ADLs [32,33]. This result was supported by Aucella et al. in Italy, whose research concluded that unemployment and age of HD patients affected their activity, and education, duration of dialysis and presence of anaemia were also associated with a low level of energy [34]. This research also agrees with many other studies that showed that occupational status of HD patients was significantly associated with daily activity [35, 36, 37]. The effect of the duration of HD treatment on ADLs in the present study was different from a descriptive study on 138 HD patients in Sivas, Turkey, which found no significant association between the duration of HD and patients' activity [38]. In the present study, the ADLs were positively associated with the income as in the study of Kamble and Shinde in India, in which the monthly income of the family was associated with physical activity [39]. The current study identified a highly significant association between marital status and ADLs as in the study by Julius et al.; in which dependency in ADLs was associated with the marital status and educational level [18]. Furthermore, the dependency in ADLs was significantly associated with the presence of another chronic disease. Thomas et al. in their study demonstrated that some of the chronic kidney diseases were significantly associated with many health complications like anaemia and cardiovascular disease [40]. The dependency in ADLs was significantly associated with some chronic disease like hypertension, diabetes mellitus, hepatitis and heart disease in research by Algarni, in 2014, who stated that the diabetes mellitus and hypertension were the leading causes of renal failure and affected ADLs[41].
This result agrees with many studies that explored diabetes mellitus as the main factors of renal disease which also significantly affected daily activity [42, 43]. Concerning the association of ADLs with heart disease, this study is supported by a cross-sectional study by Cheung et al., in which the majority of HD patients had other cardiovascular diseases, and there was a positive association between activity and all disease categories and age [44]. Another study similar to this research was by Mousa et al., in which the majority of study participants had a chronic disease, and activity of the patients was significantly associated with age, educational level, income, living status, occupation, and HD duration [45]. Further results of the current study illustrated that some of the HD complications or/and problems occurred during or after HD procedure or continued for some time after. The HD procedure is invasive, difficult for the patient to cope with, and carries the risk for myocardial infarction, heart failure, fluid overload and stroke that can also affect ADLs [46]. Furthermore, there could be some hidden problem such as coronary artery disease, aplastic bone disease, high turnover renal bone disease, bleeding diathesis (uremic platelets), and osteomalacia, which can be directly associated with decreased daily activity [47]. This is in agreement with the study of Alhajim, in 2017, found that HD patients often experience many complications such as cardiovascular disease that directly affect their ADLs [48]. This study is also supported by a descriptive and analytical study done in Iran by Asgari et al., which revealed that patients undergoing HD faced severe nausea and vomiting [49]. Another complication was restlessness and tightness in the chest, which were also significantly associated with the dependency in ADLs. This result agrees with a study by Davenport, in 2006, which explored low functional activity among HD patients related to complications of HD procedure such as chest tightness, angioedema with throat and laryngeal oedema, fever, tachycardia, flushing, headache, chest pain, dyspnea, pruritus, anxiety, laryngeal oedema, numbness of the fingers toes and lips, hypotension and hypertension [50]. Moreover, this study was supported by Mehmood et al., who, in 2016, observed an association between complications during hemodialysis and activity like; hypotension, cramps, itching, vomiting and dialysis reaction [51].

CONCLUSION

This study found that the ADLs of hemodialysis patients were low, which could be due to the ageing process, low level of education and the presence of other chronic diseases. The results of the study showed that there was a highly significant statistical association between ADLs and the majority of the socio-economic and clinical characteristics. Most patients suffered from complications and problems of HD during and after treatment, which increased their dependency in ADLs. Nursing care and patient education are essential for hemodialysis patients and can increase functional daily living activity and decrease in HD related complications and problems.

CONFLICTS OF INTEREST

The authors report no conflicts of interest.

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