

## Adverse side effects of hemodialysis in patients with end-stage chronic renal disease at Kassala Dialysis Center, Sudan

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### ABSTRACT

**Background:** Hemodialysis is a treatment for advanced renal failure; however, various complications can arise following the procedure. **Aim:** This study aimed to investigate the incidence of adverse side effects during hemodialysis in patients with chronic renal failure. **Methods:** This descriptive hospital-based study was conducted on 105 patients treated with hemodialysis between November 2020 and January 2021 at the Kassala Dialysis Center in Kassala City, Kassala State, Sudan. Data were collected through interviews using a questionnaire designed to address the research questions. The data were analyzed using the software Statistical Package for the Social Sciences version 16. **Results:** The findings indicated that 61% of this study group were male and 39% were female. The disease duration ranged from 1 to 5 years in 56 patients (53.3%). The age group ranged from 10 to 80 years, with approximately half of the study population in the age groups of 31–40 and 41–50 years. Regarding educational level, the majority were illiterate, representing 45 patients (42.9%). The most common symptoms mentioned by patients included joint pain (56 patients, 53.3%), sleeping problems (34 patients, 32.4%), and muscle cramps (33 patients, 31.4%). The most frequently used medication for symptom relief was paracetamol (46 patients, 43.8%), followed by diclofenac sodium (14 patients, 13.3%). **Conclusion:** The most common adverse effects of hemodialysis are joint pain, sleeping problems, and muscle cramps. Addressing the adverse effect of hemodialysis could lead to comprehensive managing the patients with end-stage chronic renal disease ultimately improving the patient outcome and efficiency of health care delivery.

**Keywords:** hemodialysis, complication, renal failure, Kassala.

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### INTRODUCTION

Hemodialysis is utilized to manage end-stage renal disease (ESRD) by removing waste products from the blood and returning clean blood to the body.

Additionally, the blood is supplemented with the necessary component like plasma, red blood cells, white blood cells, and platelets.<sup>1,2</sup> In some countries, such as

the US, Finland, and China, a higher incidence of ESRD has been observed in females.<sup>3</sup> Moreover, a large percentage of ESRD patients lack access to dialysis therapy due to poverty, ignorance, and inadequate healthcare delivery networks. Even those who can afford maintenance dialysis services often struggle with uremic symptoms due to insufficient treatment.<sup>4</sup> Hemodialysis is the most common form of kidney replacement therapy.<sup>5</sup> Some side effects of hemodialysis include hypotension, muscle cramps, nausea, and vomiting.<sup>6</sup> From 2004 to 2011, there was an increase of up to 8% in the incidence of ESRD.<sup>7</sup> According to statistics, approximately 24,000 patients undergo dialysis in Iran, with 12% (4.5 million) added annually.<sup>8</sup> The leading causes of ESRD include glomerular infection and nephropathic hyperglycemia. A significant percentage of ESRD patients are illiterate, which may contribute to the high incidence of the disease.<sup>9</sup> The duration of dialysis in advanced centers is typically assessed by urea kinetic modeling, with sessions lasting 4 to 5 hours, three times per week.<sup>10</sup> This study aimed to investigate the incidence of adverse side effects during hemodialysis in patients with chronic renal failure.

## MATERIALS AND METHODS

This descriptive hospital-based study was conducted on patients with chronic renal failure at the Kassala Dialysis Center. The study included all 105 patients who had received hemodialysis due to kidney problems at the center. Data were collected using a designed questionnaire with close-ended questions through an interview directly with the patients. The questionnaire included sections for personal, socioeconomic, and clinical data. The data were analyzed using the software Statistical Package for the Social Sciences version 16. The data was recorded, analyzed, and transmitted to a computer. Qualitative data were analyzed using frequencies and percentages, and the results were tabularized and graphed. The Ethical Committee at the Faculty of Medicine, University of Kassala, approved this study. All patients were informed about the research objectives, and verbal consent was obtained before participation.

## RESULTS

This study covered 105 patients who had received hemodialysis at the Kassala Dialysis Center in Sudan

from November 2020 to January 2021. Their ages ranged from 10 to 80 years, with most participants residing in urban areas rather than rural areas. The disease duration varied from months to 20 years; however, most patients had a disease duration of five years or less. In the study group, 61% of the participants were male, and 39% were female (Table 1). Regarding educational level, the majority were illiterate, representing 45 patients (42.9%) (Table 1). The most common symptoms reported by patients included joint pain (56 patients, 53.3%), sleeping problems 34(32.4%), and muscle cramps (33 patients, 31.4%) (Table 5). Table 6 shows that the most commonly used medication for symptom relief was paracetamol (46 patients, 43.8%), followed by diclofenac sodium (14 patients, 13.3%).

**Table 1:** Distribution of the study population by age and gender.

Age group in years	Frequency	Percentage%
10–19	1	1.0
20–30	18	17.1
31–40	27	25.7
41–50	27	25.7
51–60	13	12.4
61–70	12	11.4
71–80	7	6.7
Total	105	100.0
Gender of the study population		
Male	64	61.0
Female	41	39.0
Total	105	100.0
Level of education		
Illiterate	45	42.9
Primary	32	30.5
Secondary	21	20.0
University	7	6.7
Total	105	100.0
Occupation of the study population		
Student	3	2.9
Housewife	39	37.1
Employee	11	10.5
Others	52	49.5
Total	105	100.0

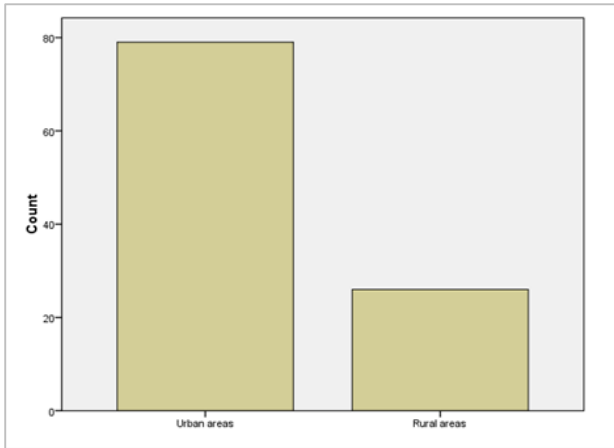


Figure 1: Distribution of the study population according to residence.

Table 2: Distribution of the study participants by disease course.

Duration of the disease in years	Frequency	Percentage%
Less than 1 year	44	41.9
1–5 years	56	53.3
6–10 years	2	1.9
11–15 years	2	1.9
16–20 years	1	1.0
Total	105	100.0
<b>Duration of dialysis</b>		
Less than 1 year	56	53.3
1-5 years	47	44.8
6-10 years	1	1.0
11-15 years	1	1.0
Total	105	100.0

Table 3: Distribution of the study population according to other diseases.

Other diseases	Frequency	Percentage%
Hypertension	55	52.4
Diabetes mellitus	7	6.7
Hypertension and diabetes mellitus	8	7.6
Others	4	3.8
No diseases	31	29.5
Total	105	100.0

Table 4: Distribution of the study population according to smoking practices.

Smoking	Frequency	Percentage%
Yes	12	11.4
No	93	88.6
Total	105	100.0

Table 5: Distribution of the study population according to patient symptoms (n=105).

Symptoms		Frequency	Percentage%
Muscle cramps	Yes	33	31.4
	No	72	68.6
Itching	Yes	28	26.7
	No	77	73.3
Sleeping problems	Yes	34	32.4
	No	71	67.6
History of fracture	Yes	3	2.9
	No	102	97.1
Joint stiffness	Yes	12	11.4
	No	93	88.6
Joint pain	Yes	56	53.3
	No	49	46.7

Table 6: Distribution of the study population according to drug use. (n=105)

Drug		Frequency	Percentage%
Paracetamol	Yes	46	43.8
	No	59	56.2
Diclofenac sodium	Yes	14	13.3
	No	91	86.7
Mefenamic acid	Yes	4	3.8
	No	101	96.2
I do not know	Yes	13	12.4
	No	92	87.6
Others	Yes	10	9.5
	No	95	90.5
No analgesics	Yes	19	18.1
	No	86	81.9

## DISCUSSION

This study was conducted between November 2020 and January 2021 at the Kassala Dialysis Center in Kassala City, Sudan, on 105 patients, aged 10 to 80 years, who were treated with hemodialysis.

The adverse effects of hemodialysis have been documented in various literature reviews. Hypotension was reported by 29 patients (72.5%) experiencing intradialytic symptoms.<sup>11</sup> The prevalence of pruritus among individuals on hemodialysis is decreasing but remains underestimated, with many patients not receiving treatment.<sup>12</sup> Complications associated with hemodialysis, as reported in several studies, include hypotension, fever, back pain, muscle cramps, headache, nausea, and chest pain.<sup>13,14</sup> In a study involving 142 hemodialysis patients, the most frequently reported complications included muscle cramps (72.53%) and bleeding (2.11%).<sup>15</sup> Another study involving 162 patients from three renal dialysis units, found that 62% of the patients were men, and 48% had diabetes. Symptoms such as dry skin, fatigue, itching, and bone and joint pain were reported by more than half of the patients.<sup>16</sup> In 2009, a study conducted in Iran at facilities associated with the Medical University of Hamedan investigated intradialytic complications affecting patients undergoing hemodialysis. Among 192 patients, the most common complications included hypotension (15.1%), muscle cramps (11.5%), nausea (9.4%), headache (7.8%), angina (2.6%), vomiting (2.1%), and itching (1.6%).<sup>17</sup>

A study performed on 80 patients (54 males and 26 females) diagnosed with renal failure at Al-Hussein Teaching Hospital in southern Iraq reported that the most frequently encountered negative consequences of hemodialysis were nausea and vomiting (47.5%), dyspnea (21.25%), and headache (25%). The primary treatments and dietary restrictions for patients in this study included erythropoietin injection (66.25%), protein restriction (86.25%), and fluid restriction (77.5%).<sup>18</sup>

In contrast to the current study's results, the most common symptoms felt by patients following hemodialysis were joint pain (56 patients, 53.3%), sleeping problems (34 patients, 32.4%), and muscle cramps (33 patients, 31.4%), as enumerated in Table 5. The most commonly used medication for these

symptoms was paracetamol (46 patients, 43.8%), followed by diclofenac sodium (14 patients, 13.3%), as presented in Table 6.

Diabetic nephropathy is the leading cause of ESRD (36.5%) in individuals over 40 years of age, followed closely by chronic glomerulonephritis and hypertensive nephrosclerosis, which occur with nearly equal frequency.<sup>19</sup> The high prevalence of these diseases is associated with arterial hypertension (37.5%), type 2 diabetes mellitus (18.75%), and renal stone complications (17.5%).<sup>18</sup> According to a study conducted in Sudan's Khartoum state on 150 patients with ESRD receiving dialysis at 13 specialized renal centers, the most common comorbidities were hypertension (70.7%) followed by diabetes mellitus (15%).<sup>20</sup> Contrarily, the present study found that hypertension was the most prevalent disease among patients with ESRD, representing 55 patients (52.4%), followed by hypertension and diabetes (8 patients, 7.6%) and diabetes mellitus (7 patients, 6.7%), as shown in Table 3.

## CONCLUSIONS

In conclusion, the most significant adverse effects of hemodialysis in patients with chronic renal disease are joint pain (53.3%), infection (35.2%), sleeping problems (32.4%), and muscle cramps (31.4%). Identifying adverse effects can prompt research into alternative or adjunctive therapies that might mitigate these side effects, or novel medications that address dialysis-induced complications.

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