

## Characteristics of Dialysis Patients in Hemodialysis Centers in Isfahan

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### Abstract

**Background:** Chronic kidney disease is a health problem in today's world and hemodialysis is an alternative method for patients with chronic renal failure. Preparing provincial and national information on the situation of patients can play a significant role in improving the quality of services provided to patients undergoing hemodialysis.

**Objective:** This study aimed to investigate the characteristics of patients on dialysis in hemodialysis centers in Isfahan and some other centers (up to 30 km distant).

**Methods:** This cross-sectional study was conducted on 1,024 patients on dialysis in 13 dialysis centers in the early part of 2013. Studied variables were collected using a researcher-made questionnaire with Cronbach's alpha coefficient of 0.86. Data was analyzed using descriptive statistics and Chi-square test by SPSS version 22 software.

**Results:** The results of 1024 patients undergoing hemodialysis includes the following: 60% (610 people) were male with a mean age of 54±17.67 years, and 92% (867 patients) had a private house. The family history of hemodialysis was positive in 24% (229 patients). In this study, 38% of patients (365 patients) were illiterate and the most common cause of kidney disease was diabetes in 42% (436) of the patients. Vascular access was venous-arterial fistula in 52% (519 people) with a mean hemodialysis of 52 months. Chronic renal failure was estimated at 300 per one million inhabitants in Isfahan Province (based on the last census in 2011 with the population estimated at 4,815,863 persons).

**Conclusion:** Majority of the studied population variables was somewhat similar to the studies conducted in other provinces; the only major difference was the most common cause of chronic renal failure leading to dialysis.

**Keywords:** Demography, Chronic Renal Failure, Hemodialysis

### 1. Background

Chronic kidney disease is a term commonly used to identify end-stage renal disease (ESRD). In fact, ESRD is the end-stage chronic kidney disease (CKD) and clinical status associated with uremic syndrome that has a very poor prognosis for patients [1]. ESRD is an irreversible reduction of kidney function, which leads to death in the absence of dialysis or kidney transplant [2]. The REFLE criteria is used when dialysis is needed for more than 3 months [3].

The importance of CKD is its dynamic nature over time. The disease progresses over time and is associated with new complications or worsening previous symptoms for the patient. On the other hand, there are measures that can have a significant impact on the course of the disease and its complications [4-6].

The main threat of this disease is its clandestine nature at the early stage, and the diagnosis requires screening at the community level [7]. This disease is only treatable when detected at an early stage. Raising the awareness of clinicians, policy makers, and the public to effectively fight against the disease is of considerable importance. Chronic kidney disease is a threatening situation to the health, economic and social status of patients, family, community and health system, and have attracted a lot of attention in the last few years, especially in developed countries [8].

In 2006, Fox published the prevalence of CKD in Framingham's study [9]. According to the sixth generation of the Framingham study, the prevalence of CKD is estimated to be 8.6% [10]. Also, in other studies conducted exclusively in elderly Americans, the prevalence of CKD was estimated to be in a range of 32.4 to 43.3%. In other countries, the prevalence of CKD was as follows: Italy 6.4%, Norway 4.7%, Switzerland 8.1%, Spain 5.1%, Netherlands 4.2% and Iceland 7.2%. The remarkable point was the mean age of the disease in Europe; in the Netherlands, in a sample population older than 55 years with a mean age of 69.6, the incidence of CKD was 44.9%; in Finland, in a sample population older than 65 years with a mean age of 74, it was reported to be 35.8%. It was estimated in a meta-analysis conducted in 2008 that the prevalence of CKD in patients more than 30 years was about 7.2% and in people older than 65 years, it was about 35% [11]. Safarinejad published the results of a study in 2009 that was conducted from 2002 to 2005. This study was conducted in 30 provinces of Iran on 16354 people of more than 14 years with a mean age of 51 years, to assess the prevalence of CKD. According to the results, 12.6% of the study population were diagnosed with CKD. Also, according to the published results, the prevalence in Khuzestan was estimated to be 12-14% [12]. In Europe, the

mean annual incidence of ESRD was 171 people per million [13] and in the United States, 336 people per million per year [14]. According to the results predicted in 2008, it has been shown that more than 24,000 people had ESRD in Iran [15].

## 2. Objective

In today's categorization, the patients on hemodialysis are categorized as special patients. This group of patients suffer from problems due to specific problems of the disease and its chronicity which usually continues until the end of their lives. Considering the fact that the number of patients on hemodialysis is increasing, the aim of this study was to make managers aware of the characteristics of these patients, resulting in a correct programming of their issues, like number of hemodialysis beds, equipment and devices, efficient use of the established departments of dialysis, required staffing, training and general help to correct policies in this area, and create an appropriate comfort for these patients. Accordingly, this study examined the characteristics of patients on dialysis in hemodialysis centers in Isfahan and its suburbs.

## 3. Methods

This is a cross-sectional study carried out in 2013 with the aim of investigating the characteristics of patients on dialysis in dialysis centers. The study population consisted of all patients on dialysis in Isfahan and suburbs in 13 public and private hospitals. In total, 1024 patients on dialysis were studied in hemodialysis centers of Isfahan (604 people) and centers within 30 km (420 cases) as a census. The inclusion criteria consisted of patients undergoing hemodialysis who underwent at least six sessions while the exclusion criteria included patients under hemodialysis from other provinces or patients requiring emergency hemodialysis.

A researcher-made questionnaire was used to collect information. The questionnaire consisted of two parts; the first part: personal characteristics such as age, sex, blood type, employment status, education level, and place of residence while the second part consisted of the reason for the advanced kidney disease, duration of hemodialysis, vascular access and family history of hemodialysis. The validity of the questionnaire was approved by ten members of the faculty and professor of nephrology. The Cronbach's alpha coefficient used to verify the reliability of the questionnaire was equal to 0.86.

Questionnaires were completed using medical records and in cases where records had defects through interviews with patients, their nurse or physician. Data was analyzed by SPSS software version 22. Descriptive statistics were used to describe quantitative variables and the Chi-square test was used to analyze the data. For ethical considerations, informed consent was obtained from all patients in the study and the collected information was analyzed as

confidential and anonymous.

## 4. Results

A total of 1024 patients on dialysis were enrolled from thirteen hemodialysis centers of Isfahan University of Medical Sciences in 2013 (eight centers are located in the city while the remaining five are located 30 km away from the city); 610 were men (60%) and the mean age of patients was  $54 \pm 17.67$  years. **Table 1** shows the demographic data.

On average, the studied patients were on hemodialysis for 52 months. **Table 2** shows the frequency distribution of hemodialysis in patients.

Chronic renal failure was estimated at 300 per one million inhabitants in the Isfahan Province (based on the last population census in 2011 which is 4,815,863 persons) in 2013. The most common causes of chronic renal failure leading to dialysis, diabetes and 436 cases (42%), followed by hypertension, 343 patients (33%).

**Table 1.** Demographic data of patients on hemodialysis in hospitals in Isfahan City and the neighboring area

Variable	n (%)
<b>Gender</b>	Male 610 (60)
	Female 414 (40)
<b>Age</b>	Below 30 114 (11.47)
	31-60 460 (46.28)
	Over 61 years 420 (42.25)
<b>Residence</b>	Personal house 942 (92)
	Leased property 82 (8)
	Unemployed 69 (7)
<b>Occupation</b>	Employee 146 (14.2)
	Worker 85 (8.3)
	Housewife 355 (34.5)
<b>Educational level</b>	Self-employed 308 (30)
	Other 61 (6)
	Illiterate 365 (38)
Non-academic education	539 (56)
	University education 61 (6)

**Table 2.** Duration of dialysis in patients undergoing hemodialysis in hospitals of Isfahan and neighboring areas

Duration of Dialysis (Years)	n (%)
Under 3 years	563 (55)
3-6	287 (28)
Over 6 years	174 (17)

**Table 3.** Primary causes of chronic renal failure in patients on hemodialysis in hospitals of Isfahan and nearby areas according to sex

Primary Causes of Chronic Renal Failure	All Patients	Male	Female	P Value
	n (%)	n (%)	n (%)	
Diabetes	436 (42)	250 (48)	186 (35.2)	
Hypertension	343 (33)	133 (26)	210 (40)	
Polycystic kidney	31 (3)	15 (2.8)	16 (3)	
Renal stone	29 (8.2)	19 (3.6)	10 (1.8)	
Urologic problems	21 (2)	12 (2.3)	9 (1.7)	
Glomeronephritis	20 (2)	13 (2.5)	17 (3.2)	
Genetic disorders	14 (1.4)	5 (0.9)	9 (1.7)	
Lupus	9 (1)	5 (0.9)	4 (0.7)	
Other factors	107 (10)	50 (9.6)	57 (10.7)	0.210
Unknown	29 (2.8)	18 (3.4)	11 (2)	

**Table 4.** Family history of hemodialysis and vascular access in patients on hemodialysis in hospitals of Isfahan and neighboring areas

Variable	n (%)
Family history of hemodialysis	Positive 229 (24)
	Negative 795 (76)
Vascular access	Arterial-venous fistula 519 (52)
	Premucot 414 (42)

**Table 5.** Primary causes of chronic renal failure in patients on hemodialysis in hospitals of Isfahan and neighboring area according to age

Primary Causes of Chronic Renal Failure	<11 n (%)	21-40 n (%)	41-60 n (%)	61-80 n (%)	81< n (%)	P Value
Diabetes	2 (0.41)	23 (4.74)	209 (43.10)	236 (48.65)	15 (3.10)	
Hypertension	8 (2.10)	53 (13.58)	160 (41)	155 (39.74)	14 (3.58)	
Polycystic kidney	3 (9.37)	6 (18.75)	16 (50)	7 (21.87)	0 (0)	
Renal stone	2 (5.41)	6 (16.21)	12 (32.43)	16 (43.25)	1 (2.7)	
Urologic problems	2 (10)	9 (42.85)	5 (23.8)	5 (23.80)	0 (0)	
Glomeronephritis	6 (3.57)	6 (31.57)	4 (21.05)	3 (15.81)	0 (0)	0.003
Genetic disorders	4 (40)	4 (40)	1 (10)	1 (10)	0 (0)	
Lupus	1 (7.7)	10 (77)	2 (15.3)	0 (0)	0 (0)	
Other factors	34 (21.8)	44 (28.2)	39 (25)	38 (24.3)	1 (0.7)	
Unknown	1 (3.2)	12 (38.7)	7 (22.5)	8 (25.8)	3 (9.8)	

According to Table 3, the difference in the frequency of chronic renal failure in patients according to sex was not statistically significant. The family history of vascular access in hemodialysis is also shown in Table 4.

The distribution of the causes of chronic renal failure in patients by age is statistically significant ( $P<0.05$ ). Diabetes (92%) and hypertension (81%) in the age group 41 to 80 years are the leading causes of chronic renal failure. In patients under 11 years of age, congenital and hereditary diseases are the major causes (Table 5).

## 5. Discussion

In this study, 1024 patients undergoing hemodialysis were studied with a mean age of  $54\pm17.67$  years, which is in line with the study of Maghreb [16] ( $54.35\pm17.46$ ), Shariati [17] ( $51\pm18$ ) and Global Dialysis Report with 56.2 years. In the research of Nazemian [18], mean age was  $31.91\pm3.12$  and in the research of Garshad, [19], the mean age was ( $48\pm16$ ), which was lower than that of the present study. With the beginning of dialysis in the fourth decade of life, it seems that the etiology of dialysis should be investigated, so that it would not cause disability during the efficient years of life. The higher frequency of patients with low education level and illiteracy confirms this. In the study of Mogharab [16], the educational level of most patients were, illiterate and primary education. Also, in a review by Hadian-Jazi [20], the level of education was 68% for high school diploma and illiterate. In the present study, 77% of the patients were diploma holders and illiterates.

In total, 610 persons were male (60%) while 414 were female (40%). In Levey's study [8], 58.7% of the patients were male, also in the study of Hadian-Jazi [20], 64% of the patients were male. But in Hassanis' study [21], 43% of the patients were male and 57% female. In a study by Malekmakan [22], 53.2% of the patients were male. According to studies, paying attention to preventive measures in the field of advanced renal failure is necessary for men and women of different ages.

With regards to occupation, 7% of the patients were unemployed before the disease, 20% were self-employed (NGOs), 11% were employees, 8.8% were workers, 6.5% were drivers, 5% were farmers, 4% military officers, 0.20% mullah and 37% of the patients were housewives. The study of Hadian-Jazi [20] showed that 36% were unemployed, 36% housewives, 4% employees and 24% were self-

employed. In Maghreb's study [16], 26.7% were unemployed before the illness. According to the investigations, hygiene and preventive activities, proper nutrition, activity (exercise) and rest, drinking sufficient water is necessary in all jobs. The important point is that dialysis should not affect one's job, should not make the person unemployed or cause depression and reduced quality of life. In the study of Hassan [21], 50% of the patients were housewives, 14.43% unemployed, 14.43% retired and 7.16% were employed after chronic renal failure.

According to the available data, the risk of chronic kidney disease is estimated to be 300 per one million inhabitants in Isfahan Province in 2013 (based on the last population census in 2011 which is 4,815,863 people). According to Iran's consortium of dialysis, the number of patients on dialysis ranged from 86 – 400 persons per one million in different cities in the end of 2013; the number of patients on dialysis in Semnan was 415 per million, 412 in Mazandaran, and the mean in all cities was 324 persons per million. Regarding the daily increase in the number of patients on dialysis, studying the susceptible areas and the related risk factors are essential and can be helpful in preventing chronic kidney disease and reducing patients or allocating more resources to these areas in this field.

In the present study, mean duration of hemodialysis in patients on hemodialysis was calculated to be 52 months. In Baraz-Pardenjani's study [23], the duration of hemodialysis was 4.9 years. Also, in Zhang's study [11], mean duration of dialysis treatment was calculated to be  $5.9\pm3.79$  years. Therefore, it is necessary to pay attention to quality of hemodialysis services, training nursing staff and calibrating the instruments to provide better service and increase the mean duration of hemodialysis in patients needing hemodialysis. On the other hand, by paying attention to transplant ward and strengthening kidney transplant from brain deaths, mean duration of hemodialysis can be reduced in patients prone to graft.

Vascular access was venous-arterial fistula in 52% of patients and permuket in 42%. In Garshad's [19] review, 90.3% had fistula access to the artery and 4.8% had graft. A total of 87.5% of patients in Oshvandi's study [24] had fistula vascular access. Due to the use of fistulas for dialysis in most patients, it is essential for patients and staff to be educated on the ways to maintain it.

The most common cause of chronic renal failure leading

to dialysis was diabetes (42%), followed by hypertension (33%), other factors (10%), polycystic kidney (3%), kidney stones (2.8%), unknown factors (2.8%), urologic diseases (2%), glomerulonephritis (2%), congenital and hereditary diseases (4.1%) and systemic lupus erythematosus (1%). In Shariati's study [17], 53% of the patients had simultaneously underlying disease of diabetes and hypertension. In the world's dialysis report of 2013, the causes of end stage renal failure were as follows: 52.1% diabetes, 20.9% glomerulonephritis, 16.7% hypertension, and 14% other unknown reasons.

Diabetes is known to be an effective cause of chronic renal failure in patients which can be due to lifestyle and nutrition of people in the central region of Iran. Thus, the implementation of preventive services such as blood glucose testing and blood pressure control can prevent further consequences of these diseases.

In this study, 92% of patients undergoing hemodialysis had private houses. In Baraz-Pardenjani's study [23], 85% of the patients had private houses. Also, 76% of the patients had no family history of hemodialysis. In Garsgad's study [19], 90% of the participants had no family history of dialysis in their first-degree relatives.

## 6. Conclusion

Patients undergoing hemodialysis require physical and emotional care. By knowing the characteristics and risk factors for these patients, high-risk patients can be identified and treated in the early stages. Also, the number of beds required in each section, the type of device used for hemodialysis and policy to provide equipment in hemodialysis department such as powder, set and the filter are to be managed. A study of catheterization, educating nurses, patients and even their parents during and after dialysis can be of great help in reducing the risk of patients' infection. On the other hand, one of the important criteria for accrediting hospitals is the ability to record patients' medical records correctly and perform proper documentation. During data collection, the questionnaire revealed many shortcomings of medical records and heads of departments tried to complete them. Training dialysis nurses and fulfilling accreditation standards helps in improving the quality of hemodialysis for patients and will prevent the waste of resources in this section.

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## Authors' Contributions

MS contributed to study design, the literature review,

article preparation, article review and correspondence. SS contributed to the quality assessment, data extraction, data interpretation, article review and scientific correspondence. DST contributed to study design, the literature review, quality assessment, data extraction, data interpretation and correspondence.

## Conflict of Interest

There were no external funding sources for this study.

## References

- Bash LD, Erlinger TP, Coresh J, Marsh-Manzi J, Folsom AR, Astor BC. Inflammation, hemostasis, and the risk of kidney function decline in the Atherosclerosis Risk in Communities (ARIC) Study. *Am J Kidney Dis.* 2009;53(4):596-605. [\[DOI\]](#)
- Bond M, Pitt M, Akoh J, Moxham T, Hoyle M, Anderson R. The effectiveness and cost-effectiveness of methods of storing donated kidneys from deceased donors: a systematic review and economic model. *Health Technol Assess.* 2009;13(38):iii-iv, xi-xiv, 1-156.
- Kallel S, Triki Z, Abdennadher M, Frika I, Jemel A, Karoui A. [Acute renal failure after cardiac surgery: evaluation of the RIFLE criteria]. *Nephrol Ther.* 2013;9(2):108-14. [\[DOI\]](#)
- Udani SM, Koyner JL. Effect of blood pressure lowering on markers of kidney disease progression. *Curr Hypertens Rep.* 2009;11(5):368-74. [\[DOI\]](#)
- Bolignano D, Palmer SC, Navaneethan SD, Strippoli GF. Aldosterone antagonists for preventing the progression of chronic kidney disease. *Cochrane Database Syst Rev.* 2014;4:CD007004. [\[DOI\]](#)
- Shahbazian H, Shahbazian H, Feghhi M, Ehsanpour A. A study on the effect of dual blockade of rennin and angiotensin systems in control of diabetic nephropathy in patients with type 2 diabetic patients. *Sci Med J Ahvaz Univ Med Sci.* 2008;7(1):85-91. Persian
- Organization WH. Preventing chronic diseases: a vital investment: WHO global report. 2005.
- Levey AS, Coresh J. Chronic kidney disease. *Lancet.* 2012;379(9811):165-80. [\[DOI\]](#)
- Fox CS, Larson MG, Vasan RS, Guo CY, Parise H, Levy D, et al. Cross-sectional association of kidney function with valvular and annular calcification: the Framingham heart study. *J Am Soc Nephrol.* 2006;17(2):521-7. [\[DOI\]](#)
- McClellan W, Warnock DG, McClure L, Campbell RC, Newsome BB, Howard V, et al. Racial differences in the prevalence of chronic kidney disease among participants in the Reasons for Geographic and Racial Differences in Stroke (REGARDS) Cohort Study. *J Am Soc Nephrol.* 2006;17(6):1710-5. [\[DOI\]](#)
- Zhang Q-L, Rothenbacher D. Prevalence of chronic kidney disease in population-based studies: systematic review. *BMC Public Health.* 2008;8(1):117. [\[DOI\]](#)
- Safarinejad MR. The epidemiology of adult chronic kidney disease in a population-based study in Iran: prevalence and associated risk factors. *J Nephrol.* 2009;22(1):99-108.
- El Nahas AM, Bello AK. Chronic kidney disease: the global challenge. *Lancet.* 2005;365(9456):331-40. [\[DOI\]](#)
- Collins AJ, Foley RN, Chavers B, Gilbertson D, Herzog C, Ishani A, et al. US Renal Data System 2013 Annual Data Report. *Am J Kidney Dis.* 2014;63(1 Suppl):A7. [\[DOI\]](#)
- Nafar M, Mousavi SM, Mahdavi-Mazdeh M, Pour-Reza-Gholi F, Firoozan A, Einollahi B, et al. Burden of chronic kidney disease in Iran: a screening program is of essential need. *Iran J Kidney Dis.* 2008;2(4):183-92.
- Mogharrab M, Hedayati H, Najafi R, Safari M, Amiri S, Adhami S. Prevalence of depression and life events in hemodialysis patients in Vali-Asr hospital in Birjand (2010). *Mod Care J.* 2011;8(3):125-34.
- Shariati A, Asayesh H, Nasiri H, Tajbakhsh R, Hesam M, Mollaee E, et al. Comparison of dialysis adequacy in patient's that referred to Golestan province hemodialysis centers. *J Health Promot Manag.* 2012;1(3):55-63.
- Nazemian F, Gafari F, Fotokian Z, Porgaznain T. Stressors and coping strategies with stress in hemodialysis patients. *Med J Mashhad Univ Med Sci.* 2006;49(93):93-8. Persian
- Garshad A, Hashemi M. Assessing the adequacy of dialysis and some biochemical factors related to it in patient under hemodialysis in dialysis ward of Emam-Ali hospital of Bojnourd. *J North Khorasan Univ Med Sci.* 2012;4(4):671. Persian

20. Hadian-Jazi Z, Aliasgharpour M. Evaluating the effects of designed exercise program on mean of activity tolerance in hemodialysis patients. *J Sharekord Univ Med Sci*. 2012;13(14):5. Persian
21. Hassani P, Otaghi M. Roy adaptation model in hemodialysis patients: a mixed method research. *J Urmia Nurs Midwifery Faculty*. 2012;10(5):610-20. Persian
22. Malekmakan L, Sayadi M, Pakfetrat M. Assessment of pruritus status and its relation to dialysis adequacy and laboratory factors among hemodialysis patients. *J Jahrom Univ Med Sci*. 2013;11(1):55-49. Persian
23. Baraz-Pardenjani S, Mohammadi E, Boroumand B. The effect of self-care teaching by video tape on physical problems and quality of life in dialysis patients. *Iran J Nurs*. 2008;21(54):121-33.
24. Oshvandi K, Kavyannejad R, Borzoo R, Gholyaf M, Salavati M. Dialysis adequacy with high flux membrane in hemodialysis patients at Shahid Beheshti hospital, Hamadan. *J Urmia Nurs Midwifery Faculty*. 2012;10(4):540-8.