

Non-adherence to Treatment Among Iranian Dialysis Patients, A Systematic Review

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Keywords. non-adherence, dialysis, patient, compliance

Non-adherence to treatment is a common problem among hemodialysis (HD) patients and was considered as a reliable factor in patients deteriorating, increasing admission chance and inappropriate responding to HD treatment. According to multiple factors related to Non-adherence with HD treatment and its importance in patients' quality of life, this study aims at a systematic reviewing of Non-adherence to treatment among Iranian dialysis patients. Treatment with adherence status is one of the problems that patients encounter during dialysis. This study aims at detecting the most important causes of Non-adherence in patients on dialysis according to previous studies. First, all of the studies related to our title were searched using main keywords (dialysis, hemodialysis, adherence, and non-adherence) for English and Persian databases; Iranmedex, Magi ran, SID, Iran doc, Google, Google scholar, PubMed, Embase, CINAHL, PsycInfo, and Cochrane Database of Systematic that covering the period from 2010 to 2018 was reviewing following a predefined inclusion and exclusion criteria. As a result, 40 papers related to inclusion and exclusion criteria were identified and analyzed. Data were collected according to study features, measures of Non-adherence, prevalence rates and factors related to Non-adherence. The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines were followed to conduct this systematic review. According to the results of present study six main categories were found. The main reasons for Non-adherence with treatment in dialysis patients listed in the papers included: Patient related factors, socioeconomic factors, psychological factors, health care related factors, therapy related factors and disease-related factors.

Trying to improve adherence is very important and can play a significant role in increasing the health status among patients on dialysis.

IJKD 2019;13:347-61
www.ijkd.org

INTRODUCTION

Non-adherence to treatment is a common problem among hemodialysis (HD) patients and was considered as a reliable factor in patients deteriorating, increasing admission chance and inappropriate responding to HD treatment. Kidney failure patients with low health literacy

are at increased risk in terms of poor self-care and negative health outcomes.¹ The high prevalence of kidney disease (KD) is considered as a main public health problem.²

In Iran, by the end of 2016, the population of patients with chronic renal failure who are treated by renal replacement therapy were about 58000,

among them 29200 (94%) were being treated by HD and 1624 used peritoneal dialysis.³ The reports express that, the rate of non-adherence to treatment was different from 2 to 87%.⁴ on-adherence to the treatment is one of the most expensive processes which requires an annual 100 billion \$ costs.⁵

Non-adherence to extensive management of Chronic Kidney Disease (CKD) is a significant barrier to manage this population effectively. Interventions to improve adherence need to target the contributing factors to improve the quality of life.⁶ Patients who are treated for Chronic Kidney Disease (CKD) are required to follow comprehensive treatment that is complicated and difficult to understand. Extensive management of CKD patients includes dialysis, medication, fluid and dietary restriction.⁷

Providing CKD extensive patient care in terms of dialysis plan, medication, fluid and dietary restriction is important to slow down the progression and complications of CKD. However, evidence indicated that a substantial proportion of CKD patients were observed to deviate from prescribed dialytic, medication, dietary and fluid recommendations causing progress challenges for health care providers. Non-adherence rates to dialysis among CKD patients in previous studies were reported to be 2 to 87%.⁸

Patients adherence to the regimen is one of the behaviors related to chronic diseases, which predicts successful treatment and reduces the adverse effects and severity of the disease.⁹ Adherence to dietary regimens is needed to the success of HD whose absence is related to significant health problems and complications for patients. Besides education, HD patients need a continuous care plan that improves their adherence knowledge, practice, and attitude.¹⁰ Adherence to dietary regimens reduces the kidney workload and helps prevent renal complications and uremia.¹¹ Since adherence to prescribed therapies and prescriptions is a main challenge among patients with chronic diseases, if patients cannot comply with their treatment plans, they will suffer from severe consequences, resulting in the need for immediate treatment and hospitalization.¹² Non-adherence to the regimen in dialysis patients is related to frequent hospitalization, lack of benefits of treatment, high treatment costs and a high number of physician visits.¹³ Wabe *et al.* stated that adherence to the regimen is related to

the decrease in glycosylated hemoglobin, which increases the rate of hemoglobin glycosylation by 14% to 16% with a 10% adherence with treatment.¹⁴ The reason for non-adherence is different in terms of the person's features and position. Many factors play significant roles in non-adherence, and it is best to change the payment after identifying them with appropriate corrective actions.¹⁵ A dynamic model, a patient adhered to treatment that has the necessary information, motivation and ability to control the disease, the relationship of information in non-adherence, is a requirement to conduct the voluntary adherence behavior, is the patient's knowledge of treatment.^{16,17} Therefore, this study was conducted with the aim of systematic review on the non-adherence to treatment in dialysis patients in Iran.

MATERIALS AND METHODS

In this study, a systematic review of all researches conducted on determining the most important causes of non-adherence in patients on dialysis was done according to previous studies until 2018.

Literature Search

The method of expressing the data in this work includes determining the studied problem, collecting the data, analyzing and interpreting the findings based on the systematic study reporting system i.e. PRISMA. The above-mentioned protocol was used as a measure to search the papers. There was a time limit to perform the electronic searches (2010 to 2018). Some keywords (dialysis, hemodialysis, adherence, and non-adherence) searched for English and Persian databases; Iranmedex, Magiran, SID, Iran doc, Google, Google scholar, PubMed, Embase, CINAHL, PsycInfo, and Cochrane Database of Systematic Reviews to access the information requested from the studies related to our title.

In this study, the PRISMA guidelines were used for assessing the quality of Systematic Reviews.

Inclusion and Exclusion Criteria

Inclusion and exclusion criteria were: papers related to adherence or non-adherence, papers were in English and Persian, the papers were original and all the papers provided with free full text. As a result, 40 papers were found and analyzed related to inclusion and exclusion criteria. Data were collected based on studied characteristics,

measures of non-adherence, prevalence rates, and factors related to non-adherence. The PRISMA guidelines were followed in performing this systematic review.

Data Extraction

According to inclusion criteria all enrolled papers were related to adherence or non-adherence, in English and Persian, original and all provided with free full text that Figure shows the information.

RESULTS

According to the criteria, 40 papers were found. Thus, the main reasons for non-adherence to treatment among dialysis patients listed in the papers included: patient related factors, socioeconomic factors, psychological factors, health care related factors, therapy related factors and disease-related Factors (Table 1). Table 2 summarizes the description of included Studies.

DISCUSSION

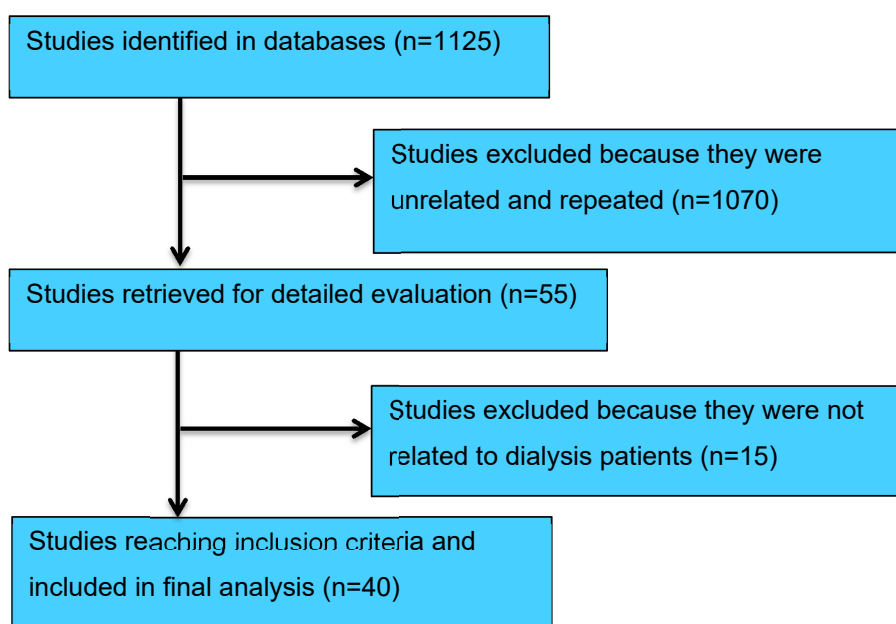
Six categories of factors resulting in non-adherence in CKD patients are patient related, psychological, disease related, socioeconomic, therapy related and health care system related factors. There are different sub factors for each category, which result in non-adherence as shown in Table 1.

Table 1. The Main Reasons for Non-adherence with Treatment in Dialysis Patients

Categories of Reasons Contributing to Non-adherence	Sub-reasons for Each Category
1. Patient -related Factors	Age Gender Level of Education Health Beliefs
2. Social Support Factors	Family and Friends Support Peer Support Health System Support
3. Psychological Factors	Depression Anxiety
4. Health Care-related Factors	Availability of Dialysis Centers Appropriate Educational System Attitudes of Health Workers Knowledge of Health Workers Facilities for Dialysis Centers
5. Therapy-related Factors	Muscle Cramps Sleep Disturbance Intra-dialytic Hypotension Pain Physical Fatigue
6. Disease-related Factors	Sexual Dysfunction Acute and Chronic Pains Uremia Osseous Dysfunctions Sleeplessness

Patient Related Factors

Al-Akhtari (2014) considered age as one factor that affects the non-adherence to the treatment in HD patients. Despite that, in many studies,



The selection process of studies included in this study.

Table 2. Descriptive Summary of Included Studies

No.	Author (year)	Study Title	Country	Sample Size	Study Type	Results Based on Main Categories
1	Burns D. (2004)	Physical and psychosocial adaptation of blacks on hemodialysis	US	102	Non-experimental study	Putting trust in God was the most frequently identified strategy. The results from this study add to the body of knowledge about the problems that are experienced and the coping strategies in HD patients. ⁶⁷
2	Tsay SL. et al (2005)	Effects of an adaptation training programme for patients with end-stage renal disease	Taiwan	57	Randomized controlled trial	An adaptation training programme decreased stress and depression levels, and improved the quality of life of ATP patients receiving HD. ⁶⁸
3	Ekelund M-L. et al (2007)	Elucidating Issues Stressful for Patients in Predialysis and Dialysis: From Symptom to Context	Sweden	201	Descriptive-analytical study	The patients' behavior was avoidant or passive, although occasionally the account of being dependent upon others and the uncertainty associated with having to take special medication involved references to physical training as a way of coping. ⁶⁴
4	Herslman M. (2008)	Non-adherence to dietary prescriptions in chronic kidney disease	South Africa		Review of literature	The effect of obesity is thought to be related to its link with diabetes and hypertension, both known risk factors for chronic kidney disease. ⁷⁰
5	Rafii F. et al (2009)	Perceived social support in hemodialysis Patients	Iran	202	Cross-sectional, correlational	Perceptions in HD patients on social support and its related factors were varied. ⁴⁴
6	Sajjadi A. et al (2010)	Effective factors on fatigue in patients with chronic renal failure undergoing hemodialysis	Iran	56	Descriptive correlation study	By reducing the education level, income, increasing the age, dialysis history and risk of CRF the fatigue increased; These differences were significant only in terms of gender, income and history of disease. ⁸⁹
7	Bogner HR. et al (2012)	Integrated management of type 2 diabetes mellitus and depression treatment to improve medication adherence	Taiwan	31, 971	Randomized controlled trial	Depression is an important factor to reduce patient adherence. ⁵⁶
8	Scheurer D. et al (2012)	Association between different types of social support and medication adherence.	US	50 studies	Systematic review	This study found that practical social support was most consistently associated with greater medication adherence. ⁸⁸
9	Biniazi V. et al (2013)	Different Aspects of Fatigue Experienced by Patients Receiving Maintenance Dialysis in hemodialysis Units	Iran	163	Descriptive Cross-Sectional	Weakness and fatigue are among the debilitating complications of HD which impact on most patients who are continuously dialyzed. ⁶⁶
10	Vardanjani R. et al (2014)	Adherence to HD treatment and some related factors in HD patients	Iran	71	Descriptive analytic study	Treatment adherence condition in HD patients was moderate and related to chronic nature, economic problem and knowledge deficit. ⁹⁰
11	Montazeri RS, et al (2014)	Evaluation of Nutritional Knowledge in Terms of Dietary Sources of Protein, Phosphorous, Potassium and Fluids Restriction in hemodialysis Patients	Iran	50	Descriptive-analytical study	Patients' knowledge scores about dietary sources of phosphorous and potassium were significantly lower than those of other parts. ⁹¹

Table 2. Continued

No.	Author (year)	Study Title	Country	Sample Size	Study Type	Results Based on Main Categories
12	Farrokhi F. et al (2014)	Association between depression and mortality in patients receiving long-term dialysis	Iran	31 studies	Systematic review and meta-analysis	Association between depression and mortality and significant link was established between the depressive symptoms and mortality. ⁵⁸
13	Sayed M. et al (2014)	Assessment of socioeconomic burden of hemodialysis on ESRD patients in suez canal cities & ELArish	Egypt	121	Descriptive Cross-Sectional	The problems of transportation to and from the dialysis centers are other problems to improve the patient's conditions and better adherence with treatment. ⁶³
14	Joshi VD (2014)	Quality of life in end stage renal disease patients	India	109 studies	Systematic review	The end stage renal disease can be reduce the self-confidence and a sense of oneliness of the patient and increases the need to support. ³¹
15	Al-Akhtari AM. et al (2014)	Medication adherence among adult patients on hemodialysis.	Saudi arabia	100	Descriptive Cross-Sectional	Gender, presence of a care-giver, number of members in the household and employment status have no impact on medication adherence. ¹⁸
16	Ibrahim S. et al (2015)	Non-compliance among chronic hemodialysis patients and its impact on patients' outcomes	Egypt	100	Cross-sectional study	Non-adherence is associated with poor quality of life, depression and malnutrition. ²⁰
17	Qobadi M. et al (2015)	Health literacy and medical adherence in hemodialysis patients: the mediating role of disease-specific knowledge	Iran	204	Descriptive Cross-Sectional	There was a significant relation of kidney disease knowledge with both health literacy and adherence. ¹
18	Wim L. L. et al (2015)	Association of depressive and anxiety symptoms with adverse events in Dutch chronic kidney disease patients	Netherland	100	Prospective cohort study	Depressive symptoms were associated with an increased risk of poor clinical outcome. ⁵³
19	Munuo AE. et al (2016)	Nutrition knowledge, attitudes and practices among healthcare workers in management of chronic kidney diseases in selected hospitals	Tanzania	133	Cross-sectional study	Nutrition knowledge among participants was poor; though their attitude was positive they failed to practice due to poor knowledge. ⁹²
20	Janssen IM. Et al (2015)	Preferences of patients undergoing hemodialysis	Germany	4,518	Questionnaire-based study	Patients rate the absence of adverse effects of treatments, remaining in a good emotional state and good physical functioning. ⁵⁹
21	Loosman WL. et al (2015)	Iron supplementation associates with low mortality in pre-dialyzed advanced chronic kidney disease patients receiving erythropoiesis-stimulating agents	Taiwan	11,381	prospective cohort study	Depression increases the mortality and hospitalization in dialysis patients. ⁵⁴
22	Andrew S. et al (2016)	Educating Patients about CKD: The Path to Self-Management and Patient-Centered Care	USA	6 studies	Qualitative study	Considered the unawareness of the society and the lack of related educational centers and problems to access the scientific resources on renal failure, as the causes affecting the adherence with treatment. ⁶⁰
23	Rahimi Z. (2016)	Evaluation of Perceived Social Support of Patients Undergoing hemodialysis and Its Relation to Treatment Adherence and Clinical Outcomes in Educational Institutions in West Azerbaijan	Iran	255	Descriptive Cross-Sectional	There was relationship between perceived social support and adherence to diet restrictions, adherence to fluid restriction and adherence to medical prescriptions. ⁹³

Table 2. Continued

No.	Author (year)	Study Title	Country	Sample Size	Study Type	Results Based on Main Categories
24	Wong MM et al (2017)	Interdialytic weight gain: trends, predictors, and associated outcomes in the international Dialysis Outcomes and Practice Patterns Study	12 countries	21,919	prospective cohort study	Gender impacted on the adherence with the treatment and males ignore to comply compared with females. ²²
25	Sinclair S.et al (2017)	Sympathy, empathy, and compassion: A grounded theory study of palliative care patients' understandings, experiences, and preferences	Canada	53	semi-structured interviews	There was relationship between the patient, the medical team and the family as one of the most effective factor on adherence with the treatment. ²⁹
26	Tannor EK et al (2017)	Quality of life in patients on chronic dialysis in South Africa	South Africa	106	comparative mixed methods study	Family support was impacted on the quality of life and adherence with treatment in chronic dialysis patients. ³⁸
27	Yusuke T. et al (2017)	Comparison of hospital mortality and readmission rates for Medicare patients treated by male vs female physicians	England	1,583, 028	Descriptive Cross-Sectional	Gender of the physicians is an effective factor on the mortality in patients, and female physicians treated the patients to have lower mortality. ⁴²
28	Tohme F. et al (2017)	Predictors and outcomes of non-adherence in patients receiving maintenance hemodialysis	US	286	(SMILE) trial	The novel factors independently associated with nonadherence to HD-related treatments, and independent associations of non-adherence with hospitalization and mortality. ⁷³
29	Kara B. (2018)	The Effect of Health Beliefs on the Observance of Diet and Refrain from Salt Consumption	Turkey	200	Cross-sectional study	Health beliefs related to salt restricted diet were independently associated with limiting salt intake, family support. ²⁸
30	Goh ZS, et al (2018)	Anxiety and depression in patients with end-stage renal disease	Singapore	Multiple studies	Narrative review	Social support as one of the emotional-coping mechanisms can impact on the quality of life. ³²
31	Ramezani T. et al (2018)	Effect of Educational Intervention Based on Self-efficacy Theory on Adherence to Dietary and Fluids-intake Restriction in HD Patients	Iran	70	Randomized clinical trial	The educational intervention based on Self-efficacy theory impacted on adherence to diet and fluid-intake restriction in patients with HD. ⁹⁴
32	Mousa I.et al (2018)	Dialysis-related factors affecting self efficacy and quality of life in patients on hemodialysis	Palestin	283	Descriptive Cross-Sectional	Impaired self-efficacy was related to the elderly, patients living with family, and patients with a high number of co-morbid diseases. ³⁶
33	Hedayati P.et al (2018)	Nonadherence behaviors and some related factors in kidney transplant recipients	Iran	183	Descriptive analytical study	The adherence to the treatment was associated with demographic characteristics and time passed since the transplant, levels of education, family support, marital status, and gender of the patients. ³⁹
34	Liu Y-M. et al (2018)	Role of resilience and social support in alleviating depression in patients receiving maintenance hemodialysis	Taiwan	194	Descriptive study	The severity of illness and daily living were the major determinants of depressive symptoms. High resilience could alleviate depressive symptoms in the older patients. ⁴⁰
35	Abdi A. et al (2018)	Prevalence of depression among Iranian patients under hemodialysis	Iran	24 studies	Systematic review and meta-analysis	More than half of the HD patients in Iran suffer from depression. Given the overlap of depression symptoms with uremia in HD patients. ⁵⁵

Table 2. Continued

No.	Author (year)	Study Title	Country	Sample Size	Study Type	Results Based on Main Categories
36	Gerogianni G. et al (2018)	A holistic approach to factors affecting depression in hemodialysis patients	Greece	---	Review of literature	Depression is affected by non-adherence and co-morbid diseases. ³⁰
37	Janosevic D. et al (2018)	Difficult Patient Behavior in Dialysis Facilities	USA	---	Review of literature	realized that physicians the behavior and adherence of the patients could be managed through proper management and creation of appropriate environmental facilities. ⁶¹
38	Pawar MAA. et al (2018)	Effectiveness of "music therapy" on "feeling of wellbeing" among patient undergoing hemodialysis	Indian	40	Cross sectional study	The positive effects of music on reducing anxiety and improving the physical and mental conditions of patients. ⁶²
39	Mukakarangwa MC. et al (2018)	Adherence to hemodialysis and Associated Factors among End Stage Renal Disease Patients	Rwanda	41	Descriptive Cross-Sectional	Age and religion. education of health care workers about the importance of not missing dialysis, perceived relative importance of HD, and experiencing difficulties during the procedure were associated with adherence to HD. ⁷⁴
40	Nagasawa H. et al (2018)	The Effect of Quality of Life on Medication Compliance Among Dialysis Patients	Japan	92	Descriptive Cross-Sectional	High sleep-related QOL is associated with better medication compliance. ⁸⁵

HD: hemodialysis

there has been only an insignificant effect of age on the adherence to the treatment.¹⁸ However, in others, there was a positive and effective role of age on the adherence to the treatment.¹⁹ Gender has also affected ineffectively the adherence to the treatment according to some studies.^{20,21} In many studies, gender also affects effectively the adherence and males mostly ignore to comply compared with females.^{22,23} Chironda (2016) expressed that, the level of education is one of the main factors affects the adherence. Low level of education was related to the lack of knowledge about illness and treatment and a reason for non-adherence.²⁴ The knowledge of patients is a facilitator in adherence to the treatment.²⁵ The absence of health literacy is a factor to develop the health disorders and, thus, non-adherence.^{26,27} Belgüzar Kara (2018) conducted a cross sectional descriptive study entitled "The Effect of Health Beliefs on the Observance of Diet and Refrain from Salt Consumption" on 200 HD patients in Turkey. He concluded that a better understanding of the health beliefs about a limited-salt diet and the related factors may facilitate the implementation of appropriate interventions.²⁸

Qobadi *et al.* (2015) aimed at examining the role

of health literacy in patient's knowledge about kidney disease and medical care adherence and also to test the mediating role of kidney knowledge on the relationship between health literacy and medical adherence among patients treated with dialysis. This cross-sectional study was conducted on 240 consecutive patients diagnosed with end stage renal disease (ESRD) referred to dialysis ward affiliated to Tehran University of Medical Sciences from March 2014 to June 2014 according to the inclusion criteria. These findings showed the high prevalence of low-health literacy in Iranian population and the health literacy was an important point to promote the disease-specific knowledge and adherence behaviors among hemodialysis patients.¹

Sinclair *et al.* (2017) considered the relationship between the patient, medical team and the family as one of the most effective factors on adherence to the treatment. Showing compassion and care by the treatment medical staffs can be an important factor to encourage the patient to comply with the treatment.²⁹ Proper communication with and supporting the patient is one of the important adherence factors which is effective to control the depression in dialysis patients.³⁰

Social Support Factors

The duration of the treatment period and many problems encountered by these patients reduce their attention to family members and friends. However, the incidence of chronic renal failure and HD changes in one's life increases its dependency on others, reduces the self-confidence and a sense of loneliness of the patient and increases the need to support for others.³¹ Social support as one of the emotional-coping mechanisms can affect the quality of life.³² Social support is defined as a mental feeling about belonging, accepting, favoring and receiving assistance in the required conditions.³³ Understanding support is much more important than having it. In other words, the perception and attitude of patients towards received support is more important than the level of support provided to patients.³² Identifying the benefits of social support can play an important role in the advanced stages of chronic renal failure, protecting the individual against stress-induced illness, reducing the psychological outcomes resulting from physical impairment, and improving compliance, tolerating chronic illness. Understanding social support can prevent the adverse physiological side effects of the disease, increase the level of self-care, affect positively the physical, psychological and social situation of the individual, and ultimately results in an increased performance.^{33,34}

Information support also informed the person about how to care for themselves, control the disease and the diet, and this is an effective factor to improve the patient's condition, increases the self-confidence, and reduces his anxiety and fear.³⁵

Mousa *et al.* (2018) specified the factors related to the self-efficacy and health-related quality of life (HRQoL) among HD patients. A cross-sectional descriptive correlation study was conducted on CKD patients treated with HD at 12 different dialysis centers in Palestine. The results showed that impaired self-efficacy was related to the elderly, patients living with family, and patients with a high number of co-morbid diseases. Moreover, this study concluded that the worst HRQoL was related to patients with a low education level, lower levels of self-efficacy, and higher number of co-morbid diseases.³⁶

Rahimi *et al.* (2017) stated that family support is one of the most important factors to increase the tolerance and resistance of patient and adherence

to the treatment, which has been confirmed by various studies inside and outside Iran.³⁷ Elliott *et al.* also stated that family support is very effective on the quality of life and adherence in these patients due to the complicated and enormous problems of them.³⁸ Hedayati *et al.* believed that patients consider their partner as a key factor to support them. In fact, the support and preservation by the partner is the most important encouraging source for individuals during the illness.³⁹ The descriptive study of Leo *et al.* (2018) indicated that in HD patients, the spouse is the first source of support for the patient followed by children. They even reduced the severity of depression in these patients and finally result in better adherence to the treatment.⁴⁰ Afkham *et al.* also stated that physician is the first one in the medical team to confront with the patient and can help reduce the stress in the patient by having a supportive behavior at this stage. Participants in this study stated that the types of the given support by physicians can be mostly emotional (sympathy and giving hope) and informative.⁴¹ Some studies have indicated the role of the gender of the physician and nurse to support the patients. In a descriptive study, Yusuke Tsugawa *et al.* realized that even the gender of the physicians is an effective factor on the mortality in patients, and female physicians treated the patients to have lower mortality. The researchers also expressed that the reason for this difference could be better communication with patients and better education by female physicians.⁴² In their study, Aghae *et al.* found that proper responsibility and training by nurses are the factors of providing hope and adherence to treatment by the HD patients.⁴³ Perception of empathy provided by the nurses and the needs of patients for sympathy and kindness affect the adherence treatment.²⁹ Rafi'ie *et al.* realized that friends' support is one of the important factors of adherence. These behaviors by friends play an important role to prevent the seclusion, isolation and depression of patients. This is due to the fact that HD patients cannot participate in-group and collective activities due to changes in their physiognomy and the limitations to coordinate their activities with the members of the group. Therefore, they cut down their social relations and usually been excluded from the groups.⁴⁴

Imani *et al.* (2013) also examined the effects of

face-to-face education on body weight and some of the serum indices in patients treated with HD, and suggested heavily nursing education was performed in dialysis department.⁴⁵ Hassanzadeh *et al.* (2011) also expressed that the effectiveness of two facial and video self-care educational programs on compliance with diet and fluids in HD patients was not significantly different.⁴⁶ Feizalahzadeh *et al.* (2016) compared the effects of multimedia based education and traditional methods on life quality of HD patients. The HD and Essentials Care application based on the education could improve patients' life quality as well as traditional method. This application could be used to facilitate the patient education process to improve their life style.⁴⁷

Al-Khattabi (2014) identified the prevalence of adherence to (HD attendance, medications, fluid and diet restrictions) among HD patients at governmental kidney centers.⁴⁸

Montazeri and Sharifi (2014) conducted a study aimed at measuring the nutritional knowledge in terms of dietary sources of protein, phosphorous, potassium and fluids restriction in HD patients. Patients' knowledge scores about dietary sources of phosphorous and potassium were significantly lower than those of other parts. It should be noted that qualified doctors, nurses and dieticians, should educate HD patients in relation to their literacy levels, especially when describing dietary sources of phosphorus, potassium and protein.⁴⁹

Sa'adeh *et al.* (2018) measured the knowledge, attitudes and practices (KAP) of hypertensive patients towards prevention and early detection of CKD, and to determine the clinical and socio-demographic factors, which affect the KAP according to the prevention of CKD. Among hypertensive patients, higher scores for total knowledge and attitudes in terms of prevention, male sex, and normal BMI were related to modestly higher scores to prevent the practices. Finally, the findings may encourage healthcare workers to consult better to improve knowledge.⁵⁰

Adeline *et al.* (2016) examined the nutrition knowledge, attitudes and current practices of healthcare providers to manage patients with CKD in selected hospitals. Nutrition knowledge among studied participants was poor; they failed to practice due to poor knowledge because their attitude was positive. Inadequate nutrition

training in medical school, lack of resources and motivation were identified as factors that affect the nutrition management of CKD in the studied area. Recommendations provided by the study include: review of medical curriculum to incorporate clinical nutrition topics, continuous nutrition education programs for in-services, improving working conditions and hiring clinical nutritionists in each hospital department would improve nutrition management of CKD patients in hospitals.⁵¹

Psychological Factors

Various studies have expressed that the main treatment for chronic renal failure, which includes HD and kidney transplantation, both have psychological burden for the patient and can cause psychosocial problems for patients treated with these methods.⁵²

In brief, depression and anxiety in renal patients are very common and depression in patients has several consequences such as lack of follow-up. It is estimated that depression in patients treated with dialysis is 25%.⁵³ Research expresses that depression increases the mortality and hospitalization in dialysis patients.^{53,54} Various factors such as age, sex, and duration of treatment can affect depression and anxiety in patients under 50 years of age.⁵⁵

Several studies have stated that hospitalized patients with depression also impose a higher cost to the health system. This can be due to the fact that depression is an important factor to reduce patient adherence.⁵⁶

The absence of participation of depressed patients in treatment adds to their medical problems, endangers their health and in some cases even causes premature death.⁵⁷

Farrokhi *et al.* (2014) systematically examined and analyzed the relationship between depression and mortality risk in adults with kidney failure treated by long-term dialysis. There was a significant relationship between study heterogeneity in reports of depressive symptoms in dialysis patients, likely caused by high variability in the way to measure depressive symptoms. However, the total significant independent effect of depressive symptoms on survival of dialysis patients validates examining the fundamental mechanisms of this relationship and the possible benefits of interventions to improve depression on the outcomes.⁵⁸

Abdi *et al.* (2018) in a systematic review

and meta-analysis examined the prevalence of depression in Iranian HD patients. The findings expressed that more than half of the HD patients in Iran suffer from depression. According to the overlap of depression symptoms with uremia in this group of patients, it is necessary to identify depression in these patients for early management and interventions.⁵⁵

Janssen *et al.* (2015) rated the relative importance of different outcomes for HD patients and to analyze whether the related importance is different among subgroups of patients. We assessed the relative importance of 23 outcomes as rated on a discrete visual analog scale within the framework. More important outcomes were hospital stays, accompanying symptoms, HD duration, and the improvement or preservation of a good emotional state. Outcomes related to the delivery or provision of care and aspects affecting the quality of life are rated by patients to be at least as important as clinical outcomes. Many of the outcomes assumed to be important by the patients are not regularly considered in research, evaluation studies, or quality programs⁵⁹.

In a systematic study, Georgia Gerogianni *et al.* (2018) addressed the close relationship between depression and hospitalization, disability and mortality, job loss, suicidal thoughts, sleep disorders, fatigue, restless leg syndrome, sexual disorders, malnutrition, and pain.³⁰

Health Care System Related Factors

The factors related to the health care system are another important factors affecting the adherence with treatment. Other factors that affect the adherence with treatment in this group of patients include the access to dialysis centers, problems and costs of dialysis (drug procurement, transportation etc.), facilities and equipment of the dialysis centers and even the treatment of medical personnel. Andrew *et al.* (2016) considered the unawareness of the society and the lack of related educational centers and, of course, problems to access the scientific resources on renal failure, as the causes affecting the adherence with treatment. Another barrier is the absence of qualified educators in the community. Another important factor is the shortage of time among physicians and nurses to educate the patients in non-adherence. Another problem has been the lack of desire for

education among patients. Another important barrier to adherence is also the disagreement on the starting time to educate the renal patients. System barriers to patient education are multifaceted, and may have the absence of motivation for education, lack of support for decisions, and interdisciplinary health models. Another barrier is insufficient motivation and lack of willingness among the healthcare personnel⁶⁰. In their research conducted on the facilities and behavior toward dialysis patients, Daniel *et al.* (2018) realized that physicians the behavior and adherence of the patients could be managed through proper management and other health personnel and creation of appropriate environmental facilities such as training, the emergence of the environment and proper behavior.⁶¹ Pavar *et al.* (2018) examined the positive effects of music as a nursing intervention on reducing anxiety and improving the physical and mental conditions of patients.⁶² Sayed *et al.* stated that the problems of transportation to and from the dialysis centers are other problems to improve the patient's conditions and better adherence with treatment.⁶³

Therapy-related Factors

Patients understand the complications of disease and HD as physical, social, and psychological problems. These problems will result in non-adherence with the treatment and they include: the physical complications of the illness, pain, fatigue and disability, food limitations, constant fear and anxiety, uncertainty, inadequacy in education, marriage and life, motherhood problems, and travel restrictions. In their study, Ekelund ML, Andersson (2007) examined the physical problems such as sleep disorders, complaints of cramps and itching in HD patients⁶⁴. In Sajjadi *et al.* (2010), most dialysis patients complained of high fatigue, and the mean of fatigue in the entire sample was 5.1 (out of the Likert score of 7).⁶⁵ Biniazi *et al.* (2013) expressed that weakness and fatigue are among the debilitating complications of HD which affect most patients who are continuously dialyzed.⁶⁶ The pain of needles was another problem of HD that caused fear, anxiety and discomfort in patients. In his study, Burns D (2004) stated the need for frequent perforation of the vein and the related pain as one of the most important problems of HD patients.⁶⁷ Dietary limitation is another problem

for many HD patients, which somewhat causes discomfort and harassment, and prevents the patient from having a normal life. Tsay *et al.* (2005) expressed the dietary constraints as one of the most stressing factors in HD patients.⁶⁸ Monahan *et al.* (2007) stated that the main social problems in a patient with chronic renal failure include social pressures, job loss, and restrictions on social and leisure activities.⁶⁹

Disease-related Factors

In HD patients, the complications of the illness are also related to non-adherence. Herslman *et al.* explained the severe complications of para-clinical parameters such as anemia, calcium and phosphorus deficiency, and uremia and an increase in inflammatory chemical agents in these patients.⁷⁰ These mediators and complications reduce the tendency to eat and result in malnutrition.⁷¹ Uremia causes frustration in the sense of taste and severe nutritional disorders.⁷² Tehme *et al.* (2017) considered the acute and chronic pains as another cause of non-adherence in these patients. Sexual dysfunction is also a factor for non-adherence.⁷³ The incidence of various types of sexual disorders has been reported to be about 70% and 80%, which causes the stress in these patients.⁷⁴ Osseous dysfunctions, and especially an increase in the level of parathyroid hormone, are other factors that reduce the quality of life and consequently cause the non-adherence with the treatment.⁷⁴ The study conducted by Maung *et al.* (2017) showed that about 70 to 80% of the patients complained of sleeplessness. Sleeplessness leads to non-adherence with the treatment considering that sleeping is an effective factor in the ability of the body to control the stressful situations.⁷⁵

Generally, Patients treated with HD are encountering many challenges to adhere to treatment⁷⁴ besides all the factors that have been listed in various papers as causes of non-adherence to the treatment^{46,76-79}.

Depression is a type of mood disorder diagnosed by symptoms of low mood, decreased energy and interest, feeling guilty, difficulty in concentrating, anorexia, thoughts of death and suicide, insomnia or sleepiness, weight loss, and functional impairment.⁸⁰ Several studies have explained that hospitalized patients with depression also impose a higher cost to the health system.⁸¹⁻⁸⁴ This matter

can be because of this fact that depression is a significant factor to reduce patient's adherence. The absence of participation of depressed patients in treatment adds to their medical problems, endangers their health and in some cases even causes premature death.⁸⁵ In contrast, the social support factor has been examined as the most important feature in the neutralization of undesirable effects of psychological pressures.⁸⁶ In addition to the positive effect that researchers have found on social support, it is also important to pay attention to understand the patient in this area. In other words, patients' perceptions and attitudes towards received support are more important than the patient's support.⁸⁷

Social support is a social psychological factor that is identified as a facilitator of health behavior and can accelerate patient adherence with self-care behaviors.⁸⁸

CONCLUSION

In this study, we tried to examine the main causes of non-adherence to the treatment of dialysis patients according to the studies; it is pointed out that factors such as psychosocial problem and especially depression, plays a significant role in isolating, confusing and disappointing individuals and as a consequence, non-adherence to treatment. Other factors such as lack of awareness and attitude of dialysis patients about their treatment and lack of adequate social support were also discussed.

Nurses, as experts who have the greatest relationship with patients during dialysis, can play a significant role by creating a continuous, dynamic care relationship to increase the awareness and practice of effective care for patients. On the other hand, economic problems, deprivation and difficult living conditions with high costs, inability to work effectively, having diseases other than kidney problems are all factors that cause many psychological problems in both patients and their families and can cause many other problems, apart from enduring the pain and suffering of the disease. Therefore, government should design the policies aim to minimizing the side effects of dialysis patients such as economic problems, cost of illness, etc.; in such a way that, the motivation and efforts of the patients could be increased to continue life and improve the quality of life and close follow-up of their treatment plans.

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Received April 2019

Revised July 2019

Accepted September 2019