The Relationship between Perceived Social Support and Adherence to Treatment Regimens among Patients Undergoing Hemodialysis: A Scoping Review

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ABSTRACT

Context: End-stage renal disease is characterized by a progressive and permanent impairment of the kidney's functions. Hemodialysis is the most common treatment. Patient adherence to strictly prescribed regimens is critical to treatment success. Social support is a critical factor in many chronic diseases, including ESRD.
Aim: This review aimed to identify the extent of current evidence regarding the adherence to treatment regimens and its associated factors among hemodialysis patients, as well as the relationship between perceived social support and adherence to treatment regimens among these patients.
Methods: A scoping review was completed using four databases included MEDLINE, CINHALE, ProQuest, and PubMed, for related articles between 2010 to mid-2021. After extensive review, 22 studies were found eligible according to applied inclusion and exclusion criteria.
Results: Variances in patients' adherence levels range from 23% to 98%. When researchers examined the relationship between sociodemographic, psychological, and clinical characteristics with adherence, different or non-significant associations appeared between various factors and adherence. Social support frequently showed either a positive or no significant correlation with adherence.
Conclusion: This study's findings may help nurses boost the factors related to social support that contribute to successful functioning and consequent improvement in patient adherence.

Keywords: Hemodialysis, social support, treatment adherence, end-stage renal disease

1. Introduction

Chronic kidney disease (CKD) and End-Stage Renal Disease (ESRD) have become worldwide public health issues *(Nabolsi et al., 2015)*. The burden of ESRD is significant and often greater when compared to other populations suffering from chronic medical conditions *(Reyes et al., 2021)*. ESRD is a chronic illness that has a negative impact on patients' physical, emotional, social, and sexual well-being *(Nabolsi et al., 2015)*.

ESRD is characterized by a progressive and permanent impairment of the kidney's functions *(Hinkle & Cheever, 2018)*. ESRD can be caused by various factors, including diabetes (about 50% of cases) and hypertension, accounting for about 25% of cases *(Harding et al., 2020)*. Dialysis or kidney transplantation are required for patient survival *(Halle et al., 2020)*.

Hemodialysis (HD) is the most common treatment *(Luitel et al., 2020)*. Effective and successful management of ESRD patients' health problems necessitates many improvements and alterations to a patient's routine, habits, and general lifestyle. Adherence to fluid and dietary restrictions and medication guidelines and attending prescribed hemodialysis sessions is essential to managing end-stage renal failure patients.

Hence, patient adherence to strictly prescribed regimens is critical to treatment success. Non-adherence to dialysis could be concerning because it can result in life-threatening consequences. Failure of adherence in HD patients can increase morbidity, mortality, cost, and burden on the healthcare system. Failure of adherence in HD patients can increase morbidity, mortality, cost, and burden on the healthcare system *(Alhawery et al., 2019)*.

Many factors influence patients' adherence. Social support is a critical factor in many chronic diseases, including ESRD *(Ahrari et al., 2014)*. Patients with ESRD have a significant decline in wider social contact due to dialysis schedules. Understanding how getting social support to HD patients' survival and well-being can have significant clinical benefits. It can empower clinical practice to enhance or improve patients' support networks *(Ahrari et al., 2014)*.

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2. Aim of the study

The current review aims to identify the extent of current evidence regarding adherence to treatment regimens and its associated factors among hemodialysis patients and the relationship between perceived social support and adherence to treatment regimens among these patients.

PICOT Questions

Table (1): PICOT Questions

PICOT	CONTENT	PICOT QUESTION
P	Adult Patients with ESRD under Hemodialysis.	What is the prevalence of adherence to treatment regimens and their relationship with social support among hemodialysis patients?
I	The social support.	
C	No Comparison.	
O	Adherence to treatment regimens.	
T	2010 to mid-2021	

3. Subjects & Methods

3.1. Research Design

A scoping review is a subset of the systematic literature review and not a full systematic literature review *(Arksey & O'Malley, 2005)*.

3.2. Search methods

A computer-based search was performed to find literature related to social support and adherence of hemodialysis patients. Searching conducted in electronic databases: CINAHL Database, PUBMED, ProQuest, and MEDLINE. Boolean operators' AND' and 'OR' were combined with search terms to retrieve relevant studies. The search terms used included 'hemodialysis or dialysis or renal replacement therapy or renal treatment and "social support" or "family support" or "social environment" and "Adherence to treatment" or compliance or attitude.

3.3. Inclusion and Exclusion Criteria

Inclusion Criteria

Studies included in English language only, adult population >18 years, published between 2010-mid 2021

and Quantitative studies. Studies addressed only ESRD who receive hemodialysis, focused on social support research among hemodialysis patients, and studies assessed hemodialysis treatment adherence.

Exclusion criteria

Studies excluded languages other than English, infants, and children in the population, and studies published before 2010. Also, articles that are not relevant to the topic, such as articles that address adherence or social support among peritoneal or kidney transplantation or other chronic diseases, and qualitative studies.

3.4. Screening

The screening of the article was done by authors, which included the title, abstract, and full text. All articles that meet inclusion criteria were included.

3.5. Data extraction

The review matrix was applied to represent the included studies and their respective characteristics. This matrix summarized the study authors, location, aim, design, sample, tools, and results.

3.6. Search outcome

Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) was used to identify the literature. PRISMA contains four-phase flow diagrams explained in Figure 1. The database search provided 194 records, while 11 additional papers were retrieved from checking references lists. After eliminating duplicates (n = 26), the title was screened on 179 records. Of these, 141 were removed because they did not meet the inclusion criteria. Then the remaining 38 articles, titles, abstracts, and full texts were screened manually by the researchers, and only relevant articles were obtained. Finally,22 Full-text articles were included, excluding 16 articles (nine articles not relevant outcome and two were not original articles were eliminated. Two transplanted, three peritoneal articles) were excluded.
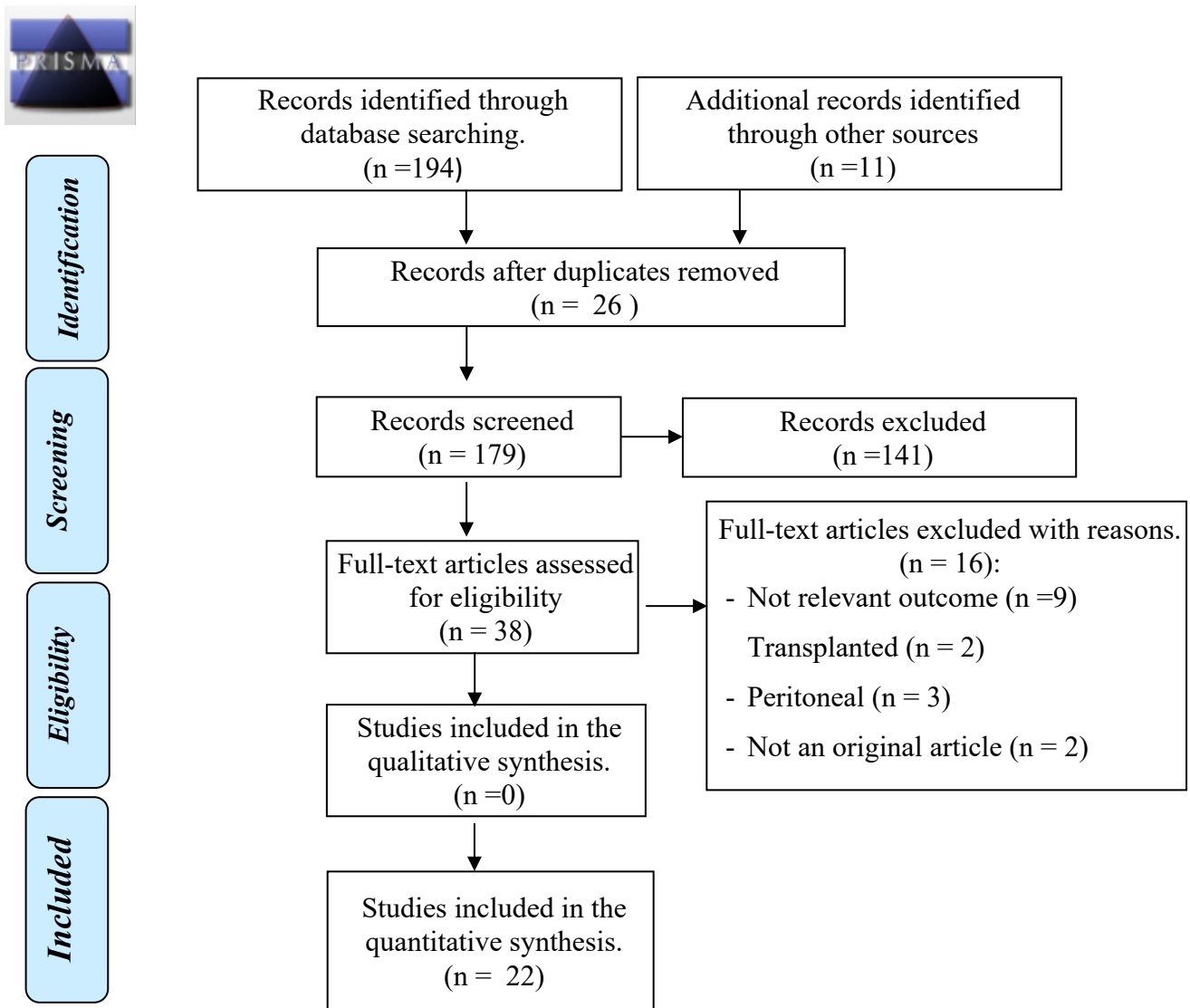
Figure 1: PRISMA 2009 Flow Diagram.

3.7. *Quality assessment*

Quality assessment was conducted using the tool done by *Hawker et al.(2002)*.

Table (2): Quality assessment.

Author/s	Abstract/ title	Introduction/ aims	Method/ data	Sampling	Data Analysis	Ethics/ Bias	Findings / results	Transferability / generalizability	Implications /usefulness	Total Score/36	
Reyes et al. (2021)	3	3	4	4	4	4	4	3	4	33	Good
Thapa et al. (2021)	3	3	4	4	4	4	3	3	3	31	Good
Aleidiet al. (2020)	3	3	3	3	3	4	4	3	3	29	Good
Halle et al. (2020)	4	3	3	3	4	4	4	3	2	30	Good
Luitel et al. (2020)	4	3	4	3	3	4	4	3	2	30	Good
Alhawery et al. (2019)	3	3	3	4	3	4	3	2	2	27	Fair
Ozen et al. (2019)	4	4	4	4	4	4	3	3	3	33	Good
Mukakarangwa et al. (2018)	4	4	4	4	3	4	3	2	3	31	Good
Varghese (2018)	3	4	4	4	4	4	3	3	3	32	Good
Victoria et al. (2018)	3	4	4	4	4	4	4	2	2	31	Good
Naalweh et al. (2017)	4	3	4	4	4	4	4	3	3	33	Good
Alosaimi et al. (2016)	3	3	3	3	4	4	3	2	2	27	Fair
Nakao et al. (2016)	3	3	3	3	3	4	3	3	2	27	Fair
Nabolsi et al. (2015)	3	4	4	3	4	4	4	3	3	34	Good
Smyth et al. (2015)	4	4	4	4	4	4	4	3	4	35	Good
Ibrahim et al. (2015)	3	3	3	3	3	4	3	2	2	26	Fair
Al-Khattabi (2014)	4	4	4	4	3	4	4	2	2	31	Good
Alkatheri et al. (2014)	2	3	4	3	3	4	4	2	2	27	Fair
Chirondaet al. (2014)	3	3	3	3	3	3	4	3	3	28	Good
Ahrari et al. (2014)	4	4	4	4	4	4	4	3	3	34	Good
Khalil et al. (2013)	3	3	3	3	3	4	3	2	2	26	Fair
Chan et al. (2012)	3	3	4	4	4	4	4	3	3	32	Good

4. Finding and Results

The thematic analysis identified into three categories as mentioned in table (3)

Table (3): Scoping review themes.

Themes	Sub-themes	Author name/publish year
Theme 1: Prevalence of adherence behavior among patients undergoing hemodialysis.		
		Reyes et al. (2021); Thapa et al. (2021); Aleidi et al. (2020); Halle et al. (2020); Luitel et al. (2020); Alhawery et al. (2019); Ozen et al. (2019); Mukakarangwa et al. (2018); Naalweh et al. (2017); Alosaimi, et al. (2016); Nakao et al. (2016); Smyth et al. (2015); Ibrahim et al. (2015); Al-Khattabi. (2014); Alkatheri et al. (2014); Chironda et al. (2014); Ahrari et al. (2014); Khalil et al. (2013); Chan et al. (2012).
Theme 2: Factors associated with non-adherence behavior among patients undergoing hemodialysis		
	2.1. Sub-theme: Sociodemographic factors	
		Alhrari et al. (2014); Thapa et al. (2021); Aleidi et al. (2020); Halle et al. (2020); Luitel et al. (2020); Alhawery et al. (2019); Ozen et al. (2019); Mukakarangwa et al. (2018); Victoria et al. (2018); Naalweh et al. (2017); Alosaimi, et al. (2016); Nakao et al. (2016); Nabolsi et al. (2015); Smyth et al. (2015); Ibrahim et al. (2015); Alkatheri et al. (2014); Chan et al. (2012).
	2.2. Sub-theme: Psychological factors	
		Reyes et al. (2021); Alosaimi et al. (2016); Nabolsi et al. (2015); Ibrahim et al. (2015); Khalil et al. (2013).
	2.3. Sub-theme: Clinical characteristics (number of years of hemodialysis, total number of hemodialysis treatment, vascular access)	
		Luitel et al. (2020); Ozen et al. (2019); Victoria et al. (2018); Smyth et al. (2015); Alkatheri et al. (2014); Chan et al. (2012).
Theme 3: The relationship between social support and treatment adherence among hemodialysis patients.		
		Reyes et al. (2021); Varghese (2018); Nakao et al. (2016); Ahrari et al. (2014); Khalil et al. (2013).

Three categories emerged in the findings of this study as follows:

4.1. Theme (1): Prevalence of adherence behavior among patients undergoing hemodialysis

This literature review found that 22 studies have assessed adherence levels among HD patients based on the four main components of the renal therapeutic regimens. Patients undergoing dialysis must follow dietary and fluid restrictions and medication and dialysis prescriptions. Physiological and biochemical markers are commonly used as objective measurements to determine patients' adherence. Subjective measurements, such as self-reporting, have also been used by some researchers.

In a cross-sectional study conducted in Malaysia, *Chan et al. (2012)* analyzed the overall adherence to therapeutic regimens among 188 patients undergoing HD. The results showed poor compliance to dietary, fluid as 27.7%, 24.5%, respectively, while good compliance in medication and dialysis requirements was 66.5% and 91.0%.

Similarly, *Khalil et al. (2013)* conducted a study in Jordan to determine how adherence to dietary and fluid requirements correlates to depressive symptoms, health-related quality of life, perceptions of exercise benefits and barriers, and social support. They studied 190 end-stage renal disease patients receiving hemodialysis from three Jordanian cities. The results revealed that just 27% of the patients followed their dietary guidelines fully, and only 23% followed their fluid guidelines during the previous 14 days.

Moreover, *Luitel et al. (2020)* performed a study in the Kathmandu Valley in Nepal to determine the therapeutic adherence among chronic kidney disease (CKD) patients under hemodialysis. The study included 164 patients undergoing HD and found that 98.8% of the respondents regularly followed hemodialysis as prescribed by the physician. In contrast, *Smyth et al. (2015)* carried out a three-month retrospective chart review in Australia to measure the number of patients who attended every scheduled hemodialysis session and gained no more than one kilogram per day between dialysis sessions be classified as adherent. A total of 72 chart reviews were included in the study. The results revealed that 56.9% of patients attended every scheduled treatment. Regarding adherence to fluid allowances, approximately three-quarters of the patients managed, on average, to adhere to the recommended daily weight gain between dialysis sessions.

Similarly, *Mukakarangwa et al. (2018)* conducted a study in Rwanda with 41 ESRD adult patients to determine the level of adherence to HD. The findings indicated that 51% of ESRD participants strictly adhered to HD. Furthermore, a recent study was done in Nepal by *Thapa et al. (2021)* to assess the quality of life and adherence to treatment of 96 patients undergoing HD. The results showed that 54.1% of the patients had moderate adherence to treatment while 31.2% had good adherence. In a study conducted in Zimbabwe, *Chironda et al. (2014)* explored the relationship between perceived physical health and the level of adherence to hemodialysis among 85 ESRD adult patients. This study's findings showed that more than 50% of patients did not adhere to their scheduled hemodialysis plan.

[27]*Naalweh et al. (2017)* conducted a study in Palestine that assessed participants' adherence to dietary, fluid intake, medication requirements, and HD sessions. The study's sample consisted of 220 patients undergoing HD, and the findings illustrated that 24% of participants observed dietary adherence while 31% observed fluid restriction adherence. Reported adherence to HD sessions stood at 52%, while adherence to medications stood at 81%. Furthermore, *Nakao et al. (2016)* performed a study in Brazil that evaluated the adherence of 64 patients to HD. According to the criteria used, 60% of patients generally adhered to dietary and medication requirements, 84.4% adhered to HD sessions, and 48.4% adhered to fluid restriction requirements.

Moreover, a study investigated the association of depression with treatment adherence. It examined the possible moderating roles of social support and the physician-patient working alliance (PPWA) on treatment adherence, satisfaction with treatment, and quality of life among 95 patients undergoing HD in New York *(Reyes et al., 2021)*. The findings presented that 80% of participants observed dietary adherence while 94% adhered to fluid restriction. Reported adherence to HD sessions stood at 71%, while adherence to blood pressure medications stood at 40%.

Moreover, *Ozen et al. (2019)* carried out a study on 274 patients undergoing HD in Turkey to determine the prevalence of patient non-adherence in terms of dietary and fluid limits, HD, and medication. The results showed non-adherence rates of 39.1% for dietary and fluid limits, 33.6% for HD, and 20.1% for medication. *Ahrari et al. (2014)* conducted a study on 273 patients undergoing HD in Iran to examine the relationship between social support and adherence to dietary and fluid restrictions in hemodialysis patients. The results showed non-adherence rates of 41.1% for diet and 45.2% for fluids.

This finding contrasts with a study conducted by *Halle et al. (2020)* in Sub-Saharan Africa that considered the prevalence and predictors of non-adherence to HD regimens in Cameroon. The researchers reviewed 170 HD patients' medical records, and their results indicated non-adherence rates of 15.3% for fluid restrictions, 26.9% for dietary restrictions, and 21.2% for HD sessions. In a study conducted in Egypt, *Ibrahim et al. (2015)* analyzed potential reasons for non-compliance, including demographic factors, education levels, employment, mental functions, the presence of depression, and the impact of dialysis outcomes. The sample included 100 patients undergoing HD, and the results showed that 36% of HD patients did not comply with taking their dialysis and/or drug prescriptions.

AlKhattabi (2014) conducted a study in Makkah to assess the prevalence of adherence to hemodialysis attendance, medications, fluid limits, and diet restrictions among hemodialysis patients. The sample included 361 patients undergoing HD at three major governmental hospitals. The results illustrated that the majority of patients adhered to dietary, fluid, and medications requirements (88.37%, 87.78%, and 87.99%, respectively), and nearly half of patients adhered to undergoing dialysis sessions (55.96%).

Furthermore, in Riyadh, *Alosaimi et al. (2016)* studied the prevalence of patients' adherence to the recommended management of ESRD. The sample consisted of 234 patients undergoing HD, and the findings demonstrated that 80.8% of patients were adherent and 19.2% were non-adherent. This finding contrasted with the retrospective case-control study conducted by Riyadh by *Alhawery et al. (2019)* that estimated the prevalence of non-adherence among 265 patients undergoing HD. The results showed full session non-adherence to HD sessions in 25% of patients and shortened session non-adherence (over the

entire month of the study period in at least one instance) in 72% of the patients.

Alkatheri et al. (2014) conducted an earlier study in Riyadh that assessed patients' adherence to taking medication among 89 patients in a hemodialysis unit at the King Abdul-Aziz Medical City (KAMC). Low adherence was seen in 31.46% of patients, medium adherence in 40.45%, and high adherence in 28.09%. In a recent study, *Aleidi et al. (2020)* assessed the use of phosphate binders, knowledge about their use, and adherence among 237 patients undergoing HD in four centers at Qassim City. They found that 63% of patients demonstrated a medium level of phosphate binder adherence.

4.2. Theme 2: Factors Associated with Non-Adherence Behavior among Patients Undergoing Hemodialysis

The researchers also are interested in determining which factors make patients undergoing HD non-adherent and which factors influence patients' adherence. Therefore, patients' sociodemographic factors, psychological variables, and clinical characteristics have been examined in the literature as potential determinants of adherence.

4.2.1. Sub-theme: Sociodemographic Factors

Sociodemographic factors such as age, gender, marital status, education level, employment status, and religiosity have been studied to examine their relationship with adherence. Many researchers have unanimously demonstrated that older patients adhere more than younger patients *(Ahrari et al., 2014; Alosaimi et al., 2016; Chan et al., 2012; Alkatheri et al., 2014; Mukakarangwa et al., 2018; Nakao et al., 2016; Naalweh et al., 2017)*. By contrast, *Aleidi et al. (2020)* determined that younger people can explain their good medication adherence by having fewer chances of polypharmacy. *Ibrahim et al. (2015)* found a non-statistically significant association between compliant and non-compliant patients concerning age.

In a study conducted in Australia, *Smyth et al. (2015)* found that patients younger than 60 were statistically less able to adhere to fluid allowances. However, *Halle et al. (2020)* demonstrated that youth functioned as an independent predictor of non-adherence to fluid restrictions may be due to the desire to live normal lives like their peers.

Regarding gender, *Luitel et al. (2020)* conducted a study in Kathmandu Valley, and *Naalweh et al. (2017)* studied a group in Palestine and found that men were more likely to adhere to therapeutic regimens than women. However, women were more likely to adhere to dietary regimens than men *(Chan et al., 2012)*. *Nakao et al. (2016)* evidenced the association between gender and HD adherence. Male patients are more likely to adhere to HD than females. Women, however, seem to be more likely to adhere to diet and medication when compared to men.

Although, many studies failed to find an association between gender and adherence *(Alkatheri et al., 2014;*

Alosaimi et al., 2016; Ibrahim et al., 2015; Smyth et al., 2015). Moreover, Ozen et al. (2019) reported that males were more common in non-adherent to HD treatment.

Marital status was another demographic factor that related to patients' adherence. Two studies showed that being married can add additional support to the participants enhancing their medication adherence through social support and follow-up *(Aleidi et al., 2020; Alkatheri et al., 2014)*. Moreover, *Halle et al. (2020)* demonstrated that being unmarried served as an independent predictor of non-adherence to fluid restrictions. *Ibrahim et al. (2015)* found significantly higher numbers of divorced patients among the non-compliant group than among the compliant group to HD session, and 76.6% of the compliant patients were married.

In terms of education levels, *Victoria et al. (2018)* found that high school graduates, university students, and graduates scored significantly higher in every dimension of adherence than illiterate patients and primary school students. This result contrasted with other studies that demonstrated no statistically significant differences between education level and adherence *(Alosaimi et al., 2016; Chan et al., 2012; Ibrahim et al., 2015; Mukakarangwa et al., 2018)*.

Regarding employment status, *Chan et al. (2012)* found that employed subjects were more likely to be non-compliant to dietary and fluid restrictions than unemployed subjects. However, *Ozen et al. (2019)* found that the number of employed patients was significantly higher in the adherent patient group. Concerning religiosity, *Mukakarangwa et al. (2018)* demonstrated in their study in Rwanda that religion was found to have a significant association with hemodialysis adherence.

4.2.2. Sub-theme: Psychological Variables

Researchers have studied psychological variables to identify patients at risk of non-adherence, such as depression and anxiety. *Nabolsi et al. (2015)* examined the relationship between quality of life, depression, perceptions of the seriousness of the illness, and adherence to treatment among patients undergoing HD in Jordan. The sample consisted of 244 patients, and the findings showed that patients undergoing HD have a moderate decrease in quality of life (QOL), with more than half reporting moderate to severe depression. There was a negative relationship between depression scores and therapeutic regimen adherence and perceived seriousness of the illness, indicating depression as a factor in hemodialysis patients. Depression lowers adherence to HD therapy.

In addition, depression scores were higher among non-compliant patients with HD sessions *(Ibrahim et al., 2015)*. Another study of adherence to a renal therapeutic regimen in Saudi Arabia revealed that non-adherence was linked to higher levels of depression and anxiety *(Alosaimi et al., 2016)*. Furthermore, a recent study in New York emphasized that higher levels of depression were significantly associated with lower ratings of adherence, quality of life, and social support *(Reyes et al., 2021)*.

A study conducted in Jordan by *Khalil et al. (2013)* attempted to determine if dietary and fluid adherence related to depressive symptoms, health-related quality of life, perceptions of exercise's benefits and barriers, and social support among Jordanian patients with ESRD receiving hemodialysis. The results revealed no relationship between dietary and fluid adherence with the selected psychosocial predictors and health-related perceptions.

4.2.3. Sub-theme: Clinical Characteristic

Researchers have studied clinical characteristics such as the number of years a patient has been on hemodialysis, the total number of hemodialysis treatments they have received, and their vascular access to examine their relationship with adherence. *Ozen et al. (2019)* reported that the dialysis duration was also statistically significantly higher in the patients who were non-adherent to their medication compared with those who were adherent. A previous study found that patients had a higher level of adherence the more years they were on HD *(Victoria et al., 2018)*. Participants who received hemodialysis through a central venous catheter had a significantly lower adherence score than those who received hemodialysis through graft or arteriovenous fistula *(Ozen et al., 2019; Victoria et al., 2018)*.

Moreover, *Luitel et al. (2020)* noted a statistically significant difference in therapeutic adherence based on the number of years a patient was on hemodialysis and the total number of hemodialysis treatments received. In contrast, *Chan et al. (2012)* revealed an association between the longer a patient was on hemodialysis and increased non-compliance. Longer hemodialysis vintage was associated with poorer compliances on fluid and medication. However, *Smyth et al. (2015)* demonstrated no statistically significant differences in length of time a patient was on dialysis and vascular access with HD attendance and fluid allowances.

4.3. Theme 3: The Relationship Between Social Support and Adherence among Patients Undergoing Hemodialysis

Five studies have attempted to study the relationship between social support and patients' adherence to the therapeutic regimen. In a cross-sectional correlation study conducted in Florida, *Varghese (2018)* investigated the causal relationship between perceived social support with treatment adherence and health-related quality of life of ESRD patients. Varghese recruited 413 ESRD patients from Florida center dialysis clinics. The study found a positive and statistically significant correlation between ESRD patients' perceptions of social support from family, friends, and relevant persons and treatment adherence. Similarly, in a study conducted in Iran, *Ahrari et al. (2014)* found that patients with more social support had more adherence to diet and fluid limits and lower phosphorus and potassium levels in laboratory results. Similar findings were found in Brazil by *Nakao et al. (2016)*, who discovered that adherent patients had greater social support scores than non-adherent patients. Moreover, a study done in New

York by *Reyes et al. (2021)* revealed that higher levels of social support and the physician-patient working alliance were significantly associated with higher ratings of adherence, satisfaction with treatment, and quality of life.

However, *Ahrari et al. (2014); Nakao et al. (2016); Varghese (2018); Reyes et al. (2021)* were contrasted with a study conducted in Jordan by *Khalil et al.* (2013). The results revealed no relationship between dietary and fluid adherence and social support.

6. Discussion

This scoping review aimed to identify the extent of current evidence regarding the adherence to treatment regimens and its associated factors among hemodialysis patients and the relationship between perceived social support and adherence to treatment regimens among these patients. Adherence to fluid and dietary restrictions and medication guidelines and attending prescribed hemodialysis sessions is essential to managing end-stage renal failure patients. Several sociodemographic, psychological, and clinical characteristics were identified as predictors of the different domains of treatment adherence. This finding is consistent with a study done by *Al-Khattabi (2020)* that concludes that patients who had factors associated with non-adherence deserve special attention and support to improve their adherence behavior.

It is challenging to adhere to every part of the hemodialysis therapy plan. These studies revealed that patients' adherence varies widely from approximately 23% to 98%. This finding also suggested that patients could be adherent to one component of the treatment regimen but not to another. Even when treatment regimens contain the same components, various criteria have been used to determine patients' adherence, further increasing the chance of obtaining inconsistent results. To date, the most reported indicators for the assessment of compliance include serum phosphorus level and interdialytic weight gain (IDWG), whereas in some studies, compliance has been directly evaluated and the compliance rate reported *(Wang et al., 2018)*.

In the context of health and disease, social support has been examined as one of the important variables capable of minimizing the negative effects of stress on health. Several studies found that social support was positively influenced the adherence to treatment of patients undergoing HD. This consistency with a previous systematic review *(Sousa et al., 2019)* pointed to the protective role of support received from family members, significant others, and health professionals of the dialysis staff on treatment adherence *(Sousa et al., 2019)*. Social support is an important psychosocial resource that offers psychological assistance, information, or guidance to patients, to assist them in finding a solution and facilitating communication with appropriate institutions *(Reyes et al., 2021)*

7. Conclusion

This review suggested an overall pattern of mixed findings concerning treatment adherence among HD

patients and social support. Inconsistences occurred because researchers used different tools for measurements and parameters to assess variables. When researchers examined the relationship between sociodemographic, psychological, and clinical characteristics with adherence, different or non-significant associations appeared between various factors and adherence. Social support frequently showed either a positive or no significant correlation with adherence.

8. Recommendations

In reviewing the literature, it is essential in the present study to extend the knowledge base of nephrology workers on the effect of social support on the treatment adherence of HD patients. This review's results may be used to direct professional caregivers in educating clients and their families on treatment adherence and inspire other researchers to propose alternative social support models and strategies. This study's findings may help nurses assess the environmental factors related to social support that contribute to successful functioning and consequent improvement in patient adherence.

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Appendix 7 Review Matrix

Ser.	Author/s, year of publication, Country)	Purpose	Method	Sample /sitting	Tools	Main findings
1.	Thapa et al. (2021) Nepal	To assess the quality of life and adherence to treatment of pt. undergoing HD	A descriptive correlational study	Ninety-six patients were under HD at Nobel Medical College Teaching Hospital, Biratnagar.	- Kidney Disease Quality of Life Questionnaire (KDQOL) - End-Stage Renal Disease Adherence Questionnaire (ESRD – AQ)	- More than half (54.1%) of the patients had moderate adherence to treatment. - 31.2% had good adherence.
2.	Reyes et al. (2021) New York	To investigate the association of depression with treatment adherence and examined the possible moderating roles of social support and the physician-patient working alliance (PPWA) on treatment adherence, satisfaction with treatment, and quality of life.	Cross-section correlation.	ninety-five patients with End-Stage Renal Disease received outpatient hemodialysis (HD) treatment in New York.	- Beck depression inventory. - The physician-patient working alliance inventory (PPWAI). - Medical patient satisfaction questionnaire. - General adherence measure. - World health organization quality of Life-BREF (WHOQOL-BREF). - Laboratory results.	- HD Attendance (Skipping) 71 % - Adherence to the fluid restriction (IDWG) 94% - Adherence to diet 80% - Adherence Blood Pressure Medications 40% - Higher levels of depression were significantly associated with lower ratings of adherence, quality of life, and social support. - Higher levels of social support and the physician-patient working alliance (PPWA) were significantly associated with higher adherence ratings, satisfaction with treatment, and quality of life.
3.	Aleidiet al. (2020) Saudi Arabia	To assess phosphate binders' usage, knowledge regarding their utilization, and adherence among hemodialysis patients.	A cross-sectional study.	Two hundred thirty-seven patients were undergoing HD in four centers at Qassim City.	A clinical measure of serum phosphate and self-reported adherence scale.	- A total of 63% of patients showed a medium level of adherence to phosphate binders. - The young age group might justify the good adherence as it decreased the chances of polypharmacy among patients. - Being married can add additional support to the participants enhancing their commitment to therapy through social support and follow-up.
4.	Halle et al. (2020) Sub-Saharan Africa	Aimed to determine the prevalence and predictors of NA to HD regimens in Cameroon.	A cross-sectional study and analytical study.	170patients undergoing HD.	Medical records reviewed.	- 15.3% for Non-Adherence to fluid restriction, 26.9% for dietary restriction, and 21.2% for HD sessions. - Young age and unmarried status were independent predictors of NA to fluid restriction.
5.	Luitel et al. (2020) Kathmandu Valley (Nepal	To find out the therapeutic adherence among CKD patients under hemodialysis.	A descriptive cross-sectional study.	164 patients undergoing HD.	Structured interview schedule and five points Likert Scale developed by researchers.	- 98.8% of the respondents had regularly done hemodialysis as prescribed by a physician. - More adherence in male than female - There was a statistically significant difference in therapeutic adherence with hemodialysis duration and the total hemodialysis treatments.

Ser.	Author/s, year of publication, Country)	Purpose	Method	Sample /sitting	Tools	Main findings
6.	Alhawery et al. (2019)\n\nRiyadh, Saudi Arabia	To estimate the prevalence and identify the causes and consequences of non-adherence to HD.	A retrospective case-control study.	265 patients undergoing HD	- Modified ESRD Adherence Questionnaire.\n\n- Medical records of all HD patients studied were reviewed.	- Full-session non-adherence to HD sessions was observed in 25%, and shortened session non-adherence (for at least one occasion over the month of the study period) was observed in 72% of the patients.
7.	Ozen et al. (2019)\n\nTurkey	To evaluate the prevalence of patient non-adherence in terms of dietary and fluid restrictions, HD, and medication treatment (b) to identify the factors that influence non-adherence in patients undergoing HD.	Cross-section correlation.	274 patients undergoing HD	- sociodemographic and clinical details\n- Hospital Anxiety and Depression Scale\n- Multidimensional Scale of Perceived Social Support\n- Non-adherence Measures\n- Morisky Green Levine Medication Adherence Scale	- The non-adherence rate was 39.1% for dietary and fluid restrictions, 33.6% for HD, and 20.1% for medication.\n- Being male was more common in the group non-adherent to HD treatment.\n- The percentage with arteriovenous fistula and the dialysis duration was statistically significantly higher in the group adherent to HD treatment.\n- The employed patient rate was statistically significantly higher in the adherent patient group.\n- The dialysis duration was also statistically significantly higher in the patients who were non-adherent to their medication compared with those who were adherent.\n- Having a CVC to be a risk factor for non-adherence to HD treatment.
8.	Mukakarangwaet al. (2018)\n\nRwanda	Aimed to determine the level of adherence to hemodialysis and the associated factors among (ESRD).	Descriptive cross-sectional design and analytical Study.	41 patients undergoing HD	USD adherence questionnaire. Adherence to hemodialysis of 90% to 100% was classified as high, 80% to 89% moderate, and adherence to hemodialysis below 80% was considered low.	- 51% of ESRD participants adhered highly.\n- Age (41 – 50 years) and religion were significantly associated with adherence to HD.\n- Other demographic factors were not significantly associated with adherence to hemodialysis.
9.	Varghese. (2018)\n\nFlorida	Aimed to examine the causal relationship of perceived social support with treatment adherence and health-related quality of life (HRQOL) of ESRD patients.	A non-experimental descriptive research design explains the causal relationships between the variables in the study.	413 patients undergoing HD	- Medical Outcomes Study Short Form (MOS-SF-36)\n- Multidimensional Scale of Perceived Social Support (MSPSS).\n- The four non-adherence treatment indications.\n- Participant's medical records.	- The study's findings supported a statistically significant relationship between perceived social support and HRQOL and between perceived social support and treatment adherence.

Ser.	Author/s, year of publication, Country)	Purpose	Method	Sample /sitting	Tools	Main findings
10	(Victoria et al., 2018) Greece	To measure the adherence levels among hemodialysis patients and correlate the adherence levels with demographic and clinical characteristics.	Correlation cross-section	350 patients undergoing HD	A self-administered questionnaire included demographic and clinical variables.	- The educational level was independently associated with the total adherence score of participants, with the "Medication Adherence" score and "Attendance at HD Session" scores. - Educational level and years on HD were independently associated with the adherence to "Diet/Fluid restrictions." - Longer the duration (years) on HD, the higher the adherence of their level. - Participants using a central venous catheter to undergo hemodialysis had a significantly lower score than those who performed hemodialysis with a graft.
11.	Naalwehet al. (2017) Palestine	To assess adherence to diet, fluid restriction, medications, and HD sessions.	A cross-sectional study.	220 patients undergoing HD	ESRD-AQ and objective measures.	- Adherence to HD treatment modalities was less than optimum, with approximately 45% of studied patients having an overall moderate or poor adherence. - 55.5% of patients had good overall adherence behavior, 40.5% had moderate adherence, and 4.1% had poor adherence. - Male patients had significantly higher adherence behavior. - Dietary adherence was observed in 24%, while fluid restriction adherence was observed in 31% of studied patients. Reported adherence to HD sessions was 52%, while that for medications was 81%. - Male elderly patients who live in the city have higher odds of having higher adherence.
12.	Alosaimi et al. (2016) Riyadh, Saudi Arabia.	To examine the prevalence of psychosocial factors including depression, anxiety, insecure attachment style, and cognitive impairment and their associations with adherence to recommended management of ESRD.	A cross-sectional observational study.	234 patients undergoing HD	sociodemographic characteristics, clinical profile related to renal failure and dialysis, medical history, and psychiatric history before and after the diagnosis of renal failure.	- 189 (80.8%) are considered adherent, and 45 (19.2%) are non-adherent. - None of the gender, marital status, education level, nationality, occupation, and monthly income were significantly associated with non-adherence, except for younger patients that showed a trend of association with non-adherence. - Non-adherence was significantly associated with higher levels of depression and anxiety.

Ser.	Author/s, year of publication, Country)	Purpose	Method	Sample /sitting	Tools	Main findings
13	Nakao et al. (2016) Brazil	To evaluate patients' adherence to hemodialysis (HD) and its relationship to psychosocial variables.	Descriptive cross-sectional study	64 patients undergoing HD	- A semi-structured interview script. - The Hospital Anxiety and Depression Scale (HADs) - The Social Support Scale.	- 60% of patients generally adhered to dietary and medication requirements, 84.4% adhered to HD sessions, and 48.4% adhered to fluid restriction requirements. - Association between sex and adherence to HD and diet and medication was found and between schooling and overall adherence. - There was also evidence of an association between sex and HD adherence. - Male patients are more likely to adhere to HD than females. Women, however, seem to be more likely to adhere to diet and medication when compared to men. - The average age was higher among the group that adhered to fluid restrictions and the treatment as a whole. - Association was found between depression and adherence to fluid restrictions. - Patients presented higher scores of social supports than those obtained by the non-adherent participants.
14.	Nabolsi et al. (2015) Jordan	To identify QOL among Jordanian patients on hemodialysis. To describe the prevalence of depression among Jordanian patients on hemodialysis. Identify the relationships between QOL, depression, perceived seriousness of the illness, and adherence among Jordanian patients on hemodialysis.	A descriptive cross-section correlation design.	244 patients undergoing HD.	- Sociodemographic information and adherence scale. - Ferrans and Powers Quality of Life Index—Dialysis Version III to measure the QOL. - Beck Depression Inventory.	- The higher the depression, the lower the QOL. - A positive relationship was found among levels of socioeconomic status based on monthly income on QOL but no significant difference on depression scores. - patients undergoing HD have a moderate decrease in quality of life (QOL) - A positive relationship between QOL and adherence; perceived seriousness of the illness. - There is a negative relationship between depression scores and adherence to therapeutic regimens and the perceived seriousness of the illness. - Patients with higher scores in QOL were more adherent with treatment. - The more the patients perceive the seriousness of their illness, the more they adhere to their therapeutic regimen and the higher their QOL.

Ser.	Author/s, year of publication, Country)	Purpose	Method	Sample /sitting	Tools	Main findings
15.	Smyth et al. (2015) Australia	To measure adherence to hemodialysis regimens in a cohort of patients attending an in-hospital North Queensland renal unit.	Retrospective chart review designs	72 chart HD patients	The charts of patients scheduled for regular hemodialysis.	- Forty-one (56.9%) patients attended all of their scheduled sessions, with the remaining 31 (43.1%) missing at - least one scheduled session over the 12 weeks. - Approximately three-quarters of the patients managed, on average, to adhere to the recommended daily weight gain during hemodialysis. - Patients younger than 60 years were statistically less likely to adhere to fluid allowances, and non-diabetic patients were more likely to adhere to fluid allowances. - There were no statistically significant differences between gender, length of time on dialysis, vascular access, and fluid allowances.
16.	Ibrahim et al. (2015) Egypt	The study focused on analyzing the potential causes of non-compliance, including demographic factors, education, employment, mental function, and the presence of depression. The impact on dialysis outcomes was assessed regarding the quality of life, dialysis adequacy, and nutritional state.	Correlation Cross section.	100 patients undergoing HD	- Patients' socioeconomic factors. - Beck Depression Inventory. - Blessed Dementia Information Memory–Concentration test. - Subjective Global Assessment (SGA) questionnaire. - The SF-36 questionnaire was used to assess the Quality of Life (QoL). - Laboratory data.	- 36% of HD patients were non-compliant with their dialysis or drug prescription. - There were no statically significant differences between compliant and non-compliant patients concerning age, gender, education level, and employment status. - 76.6% of the compliant patients were married. - There were significantly higher numbers of divorced patients among non-compliant patients than the compliant group. - Depression scores were higher among the non-compliant group.
17.	Al-Khattabi (2014) Saudi Arabia	Aimed to identify the prevalence of adherence to (hemodialysis attendance, medications, fluid restrictions, and diet restrictions) among hemodialysis patients.	A cross-section study.	Three hundred sixty-one patients were undergoing HD at three major governmental hospitals.	Questionnaire (ESRD-AQ).	Most patients adhered to the diet, fluid, and medications (88.37%, 87.78%, and 87.99%, respectively), and nearly half of patients were adherent to dialysis sessions (55.96%).

Ser.	Author/s, year of publication, Country)	Purpose	Method	Sample /sitting	Tools	Main findings
18.	Alkatheri et al. (2014) Saudi Arabia	To assess the patient medication adherence in patients on HD and to understand the factors that affect this adherence, negatively or positively.	A cross-sectional design.	Eighty-nine patients were undergoing HD at the King Abdul-Aziz Medical City.	Morisky Medication Adherence Scale.	- 31.46% showed low adherence, 40.45% showed medium adherence, and 28.09% showed high adherence. - Showed that older age is associated with better adherence. - Being married was shown to enhance medication adherence. - Other demographic characteristics did not affect the medication adherence in this current sample.
19.	Chirondaet al. (2014) Zimbabwe	To examine the relationship between perceived physical health and level of adherence to hemodialysis among ESRD patients.	Correlational cross-section study.	85 patients undergoing HD.	- Sociodemographic variables - Adherence to hemodialysis - Perceived physical health.	- This finding has been shown in this study where more than 50% of patients were not adherent to scheduled hemodialysis plans.
20.	Ahrariet al. (2014) Iran	Investigate the relationship between social support and adherence to dietary and fluid restrictions in hemodialysis patients.	Correlational cross-section study.	237 patients undergoing HD.	- Dialysis diet and fluids non-adherences hemodialysis questionnaire. - Multidimensional al scale of perceived Social Support. - Objectives measures.	- 41.1% of patients reported non-adherence to diet, and 45.2% reported non-adherence to fluid. - More supported patients had more adherence to diet and fluid restrictions and had a lower level of phosphorus and potassium in the laboratory. - Older people are more conservative and may have more compliance than younger ones.
21.	Khalil et al. (2013) Jordan	To determine whether dietary and fluid adherence is related to depressive symptoms, health-related quality of life, perception of exercise benefits and barriers, and social support among Jordanian patients with ESRD receiving hemodialysis.	A descriptive correlational, cross-sectional design.	190 patients undergoing HD From three Jordanian cities	- 1. Dialysis Diet and Fluid Non-Adherence Questionnaire - 2. Beck Depression Inventory-II - 3. Quality of Life Index - 4. Dialysis Patient-Perceived Exercise Benefits and Barriers Scale - 5. Multidimensional Perceived Social Support Scale	- Only 27% of the patients showed full commitment to diet guidelines and 23% to fluid guidelines during the last 14 days. - The majority (78.4%) of the patients had mild to severe levels of depression. - About 50% of the patients had moderate to high life satisfaction. - Non-adherence to fluid and diet has no significant correlation with depression, perceived benefits of exercise, perceived exercise barriers, satisfaction, and importance of life.

Ser.	Author/s, year of publication, Country)	Purpose	Method	Sample /sitting	Tools	Main findings
22.	(Chan et al.,2012) Malaysia	To determine the overall compliance behavior to therapeutic regimens among patients undergoing hemodialysis and the factors contributing to compliance among these subjects.	A cross-sectional study.	188 patients undergoing HD.	Self-reported compliance behaviors and biochemical measurements.	- Compliance rates of dietary, fluid, medication and dialysis were 27.7%, 24.5%, 66.5% and 91.0%, respectively. - Younger subjects were more non-compliant with the therapeutic regimen than their older counterparts. - Female subjects were statistically more compliant with dietary and fluid restrictions. - Employed were more likely to be non-compliant to dietary and fluid restrictions. - Longer hemodialysis vintage was associated with poorer compliances on fluid and medication. - No significant associations between compliance indicators and education level or family income. - The longer duration on hemodialysis was more non-compliant.