International Journal of Nephrology and Renovascular Disease

Dovepress

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ORIGINAL RESEARCH

Psychosocial, Spiritual, and Biomedical Predictors of Hope in Hemodialysis Patients

This article was published in the following Dove Press journal:
International Journal of Nephrology and Renovascular Disease

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Background: Hemodialysis patients deal with some psychological and social problems. These problems may be the predictors of hope. This study aimed to determine the psychosocial, spiritual, and biomedical predictors of hope in hemodialysis patients.

Methods: This cross-sectional study was conducted on 350 hemodialysis patients in hemodialysis centers affiliated to Shiraz University of Medical Sciences. Adult Hope Scale, Depression Anxiety Stress Scales, Personal Resources Questionnaire-85, Spiritual Well-Being Scale, and biomedical markers were used for data collection. The data were entered into the SPSS 22 software and were analyzed using Pearson's correlation coefficient and linear regression analysis.

Results: The mean score of hope was 28.54 (SD=5.27). The mean scores of depression, anxiety, and stress were 17.87 (SD=7.62), 13.12 (SD=3.47), and 12.99 (SD=3.88), respectively. The mean scores of social support and spiritual well-being were 126.35 (SD=17.53) and 74.02 (SD=5.84), respectively. The means of biomedical markers including interdialytic weight gain, urea nitrogen, creatinine, phosphate, sodium, and potassium were 2.10 (SD=1.04), 51.55 (SD=13.10), 6.98 (SD=2.48), 4.71 (SD=1.08), 139.32 (SD=4.91), and 4.87 (SD=0.93), respectively. The results revealed a significant association between hope and depression, anxiety, stress, social support, and spiritual well-being ($p<0.05$). In addition, stress ($\beta=-0.14$, $p=0.01$), anxiety ($\beta=-0.20$, $p=0.002$), and social support ($\beta=0.49$, $p<0.001$) were the predictors of hope.

Conclusion: The hemodialysis patients reported moderate levels of hope, social support, anxiety, and depression. In addition, most of them adhered to dietary and fluid restrictions. Considering the association between hope and social support, spiritual well-being, anxiety, depression, and stress, using some interventions regarding the mentioned variables might increase hope among hemodialysis patients.

Keywords: hemodialysis, hope, anxiety, depression, spirituality, social support

Introduction

Chronic renal failure is one of the major public health issues in the world. End-Stage Renal Disease (ESRD) is a stage of chronic renal failure that results in mortality without renal replacement therapy.[1] Renal replacement therapy consists of dialysis and kidney transplant. There are two types of dialysis, namely peritoneal dialysis and hemodialysis. In hemodialysis, a machine is used to filter waste from blood. In 2015, hemodialysis costed 62 million US dollars.[2] It has been estimated that there are 4.90–7.08 million ESRD patients globally.[3]

It was reported that hemodialysis patients had a lower quality of life compared to those who underwent renal transplantation.[4] In another study on hemodialysis

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http://doi.org/10.2147/IJNRD.S255045

patients, health/functioning and socioeconomic subscales of quality of life were lower compared to psychological/spiritual and familial subscales.[5] Hemodialysis patients might also have higher levels of biomedical markers, such as phosphate, potassium (K), and urea nitrogen (BUN).[6] Moreover, some studies indicated that hemodialysis patients suffered from psychological issues; approximately 70.5% of them had low levels of depression and 64% reported low levels of anxiety.[7]

Social support has been reported to be one of the factors that might play an important role during ESRD and protect hemodialysis patients from depression.[8] In fact, ESRD and hemodialysis-related changes increased the patients' dependence on others, reduced their self-esteem and loneliness, and increased their need for social support.[9] A prior study showed that social support was associated with quality of life in hemodialysis patients.[5] It has also been mentioned that social support increased adherence[10] and reduced depression in hemodialysis patients.[11] Peer support decreased anxiety, depression, and stress in hemodialysis patients, as well.[12]

Along with social support, religion and spirituality also impacted individuals' lives and promoted their life quality.[13] Spirituality was effective in improvement of physical, mental, and social health in chronic diseases.[14] Higher levels of spirituality also led to well-being and moral development.[15] Furthermore, hope was associated with spiritual beliefs and optimism.[16] Hope predicted physical, psychological, social relationships and environmental domains of quality of life in hemodialysis patients.[17] In the same vein, hope predicted physical activity, disease threat appraisal, and all aspects of quality of life including physical, functional, emotional, and social well-being in chronic diseases such as cancer.[18] On the other hand, pain, depression, self-esteem, and functional status were found to be the predictors of hope in cancer patients.[19] Another study demonstrated that anxiety, depression, effects and symptoms of renal disease, and mental health dimension of quality of life were the predictors of hope in hemodialysis patients.[20]

As maintained above, some studies have evaluated the predictors of hope in chronic diseases.[17–19] However, only a single study was found on the psychological predictors of hope in hemodialysis patients.[20] The spiritual and social predictors of hope have also been less addressed in hemodialysis patients. Therefore, the present study aims to determine the psychosocial, spiritual, and biomedical predictors of hope in hemodialysis patients.

Methods

This cross-sectional study was conducted in three hemodialysis centers in Namazee, Faghihi, and Sadra hospitals affiliated to Shiraz University of Medical Sciences in 2019. The participants included the hemodialysis patients diagnosed with ESRD at least one year ago. The inclusion criteria of the study were being Iranian and aging 18 years and above. The patients who suffered from psychiatric disorders and used psychiatric drugs were excluded from the study.

Based on a pilot study and considering α=0.05, probability of the type Π error in hypothesis, β=0.85, and r=0.16 as the correlation coefficient between hope and depression, anxiety, and stress, a 311-subject sample size was estimated. Then, it was increased to 350 considering a 12% drop out. The participants were selected via convenience sampling.

The data were collected using the demographic and clinical characteristics form, biomedical markers form, and three questionnaires. The demographic and clinical characteristics form included some information about gender, marital status, education level, length of time on hemodialysis, number of dialysis sessions per week, and having diabetes, hypertension, and hyperlipidemia.

Interdialytic Weight Gain (IWG) and biomedical markers, such as, BUN, Creatinine (Cr), phosphate, sodium (Na), and K levels were assessed. IWG was measured by subtracting post-dialysis weight gain from pre-dialysis weight. In addition, the mean levels of the biomedical markers were calculated over two sequential months. BUN>100 mg/dL, K>6.5 mEq/L, phosphate>6.5 mg/dL, and IWG>2.5 Kg were considered as non-adherence to dietary and fluid restrictions.[6]

One of the data collection instruments was the Adult Hope Scale (https://ppc.sas.upenn.edu/sites/default/files/hopescale.pdf), which included Snyder's cognitive model of hope.[21] Adult Hope Scale consisted of 12 items. The patients responded to each item using an eight-point scale ranging from definitely false to definitely true.[22] Adult Hope Scale contained two subscales, namely agency and pathway. Each subscale contained four items and the scores could range from a minimum of four to a maximum of 32. The total hope score was computed by summing the agency and pathway scores and could range from a minimum of eight to a maximum of 64. Higher scores indicated higher hope levels. The concurrent and divergent validity of this scale have been approved.[23] The reliability of the Persian version

of the scale was also confirmed via confirmatory factor analysis in the research by Yailagh et al.[24] In the present study, the reliability of Adult Hope Scale was approved by Cronbach's alpha=0.80.

Another instrument used in this study was the Depression Anxiety Stress Scales (DASS-21), (https://journals.plos.org/plosone/article/file?type=supplementaryandid=info:doi/10.1371/journal.pone.0219193.s004), which was designed by Lovibond and Lovibond in 1995. This scale consisted of 21 items responded based on a four-point Likert scale. The scores ranged from 0 to 63, with higher scores indicating higher levels of depression, anxiety, and stress. Each of the subscales of depression, anxiety, and stress consisted of seven items. The final score of each subscale was multiplied by two. Thus, the score of each subscale could range from 0 to 42. Accordingly, the scores of depression, anxiety, and stress scales were categorized into normal, mild, moderate, severe, and extremely severe categories (Table 1).[25] The construct validity of DASS was approved by Szabo.[26] Besides, Cronbach's alpha coefficient of the Persian version of the scale was found to be 0.94. The Cronbach's alpha coefficients of depression, anxiety, and stress subscales were also obtained as 0.86, 0.82, and 0.82, respectively.[27] In the current study, the reliability of depression, anxiety, and stress subscales was approved by Cronbach's alpha coefficients of 0.83, 0.79, and 0.80, respectively.

The Personal Resources Questionnaire-85 (PRQ-85) Part II (https://www.ncbi.nlm.nih.gov/pubmed/3306610)[28] was used to measure the patients' perceived social support. PRQ-85 Part II contained 25 items responded via a seven-point Likert-type scale with end points of strongly disagree (1) and strongly agree (7). Thus, the total score of the questionnaire could range from 25 to 175, with higher scores representing higher levels of perceived social support.[28] PRQ-85 has been used in some studies.[5,29] Brandt and Weinert declared that the Cronbach's alpha coefficient of the PRQ-85 Part II was 0.89.[30] The validity of the Persian version of PRQ-85 Part II has been approved, as well. Its reliability has been also approved by the test re-test method (r=0.85) and Cronbach's alpha=0.90.[5] In the present study, the reliability of PRQ-85 Part II was approved by Cronbach's alpha=0.85.

Table 1 DASS Severity Rating

Severity	Scores for		
	Depression	Anxiety	Stress
Normal	0–9	0–7	0–14
Mild	10–13	8–9	15–18
Moderate	14–20	10–14	19–25
Severe	21–27	15–19	26–33
Extremely severe	>28	>20	>34

Spiritual Well-being Scale developed by Paloutzian and Ellison (1982)[31] was also used in the current study. This scale contained 20 items responded via a six-point Likert scale. Hence, the total score of the scale could range from 20 to 120, with higher scores indicating greater spiritual well-being. The validity and reliability of the Persian version of the Spiritual Well-being Scale have been confirmed in the research by Abhari et al.[32] In the current study, the reliability of the Spiritual Well-being Scale was approved by Cronbach's alpha=0.79.

The data were collected by a researcher's assistant who referred to the hemodialysis centers in the hospitals affiliated to Shiraz University of Medical Sciences and distributed the questionnaires among the participants.

This study was approved by the Ethics Committee of Shiraz University of Medical Sciences (IR.SUMS.REC.1397.209). All participants were requested to sign written informed consent forms, which included some information about the research objectives, participants' activities, time for filling out the questionnaires, and voluntary nature of the research. Confidentiality of information and anonymity were also considered in this study.

The data were analyzed using the SPSS statistical software, version 22. In order to determine hope, depression, anxiety, and stress levels, perceived social support, and spiritual well-being, descriptive statistics such as frequency, percentage, mean, and standard deviation were used. The association between the study variables was assessed using Pearson's correlation coefficient. Moreover, linear regression analysis was used to determine the factors associated with hope. The significance level was set at $p<0.05$.

Results

In this study, 390 hemodialysis patients were invited and 350 patients were enrolled. The response rate was 89.74%. The mean age of the participants was 53.46 years (SD=15.97). As shown in Table 2, approximately half of the participants were male (52%). Most of the participants were married (61.1%) and had primary and secondary school degrees (63.7%). In addition, 62.9% and 80.3% of the patients did not have the history of diabetes and hyperlipidemia, respectively. However, 70.6% reported the history of hypertension (Table 2).

Table 2 The Number and Percentage of the Demographic and Clinical Characteristics of the Hemodialysis Patients

Variables		N (%)
Gender	Male	182 (52.0)
	Female	168 (48.0)
Marital status	Single	51 (14.6)
	Married	214 (61.1)
	Divorced or widowed	85 (24.3)
Education level	Primary and secondary schools	223 (63.7)
	High school and diploma	170 (48.6)
	Academic	40 (11.4)
Having diabetes	Yes	130 (37.1)
	No	220 (62.9)
Having hypertension	Yes	247 (70.6)
	No	103 (29.4)
Having hyperlipidemia	Yes	69 (19.7)
	No	281 (80.3)

The length of time on hemodialysis ranged from 12 to 228 months, with a mean of 50.86 (SD=30.01) months. Among the participants, 65 (18.6%) underwent hemodialysis twice a week and 285 (81.4%) did so three or more times per week.

The means and ranges of IWG, BUN, Cr, phosphate, Na, and K have been presented in Table 3. Accordingly, the majority of the participants adhered to IWG, phosphate, and K and all of them adhered to BUN (Table 3).

The mean score of hope was 28.54 (SD=5.27), ranging from 15 to 38. The mean scores of agency and pathway subscales of hope were 14.12 (SD=2.94) and 14.41 (SD=2.72), respectively.

The mean scores of depression, anxiety, and stress were 17.87 (SD=7.62), 13.12 (SD=3.47), and 12.99 (SD=3.88), respectively. Accordingly, the patients suffered from moderate levels of depression and anxiety, but had normal levels of stress (Table 1).

Table 3 Biomedical and Biological Values in the Hemodialysis Patients

Variables	Mean (SD)	Range of Scores	Adherence	Non-Adherence
Interdialytic weight gain, Kg	2.10 (1.04)	0–11.50	278 (79.4)	72 (20.6)
BUN, mg/dL	51.55 (13.10)	15–84	350 (100)	0 (0.0)
Cr, mg/dL	6.98 (2.48)	2.10–17.75	———	———
Phosphate, mmol/L	4.71 (1.08)	2.20–8.90	329 (94.0)	21 (6.0)
Na	139.32 (4.91)	100–152	———	———
K, mEq/L	4.87 (0.93)	2.05–6.80	346 (98.9)	4 (1.1)

The mean score of perceived social support was 126.35 (SD=17.53). Based on the results, the patients had high levels of perceived social support. In addition, the mean score of spiritual well-being was 74.02 (SD=5.84), which was approximately equal to two-thirds of the expected score; ie, 80.

The study results showed no significant associations between hope and age (r=−0.04, p=0.40), gender (r=−0.07, p=0.16), marital status (r=−0.06, p=0.20), education level (r=−0.02, p=0.61), having diabetes (r=0.08, p=0.13), having hypertension (r=0.04, p=0.43), and having hyperlipidemia (r=−0.07, p=0.18). The results also revealed no significant associations between hope and IWG (r=0.09, p=0.06), BUN (r=0.05, p=0.29), Cr (r=0.004, p=0.93), phosphate (r=−0.08, p=0.11), Na (r=−0.03, p=0.50), and K (r=0.02, p=0.62). However, a significant association was observed between hope and depression (r=−0.19, p<0.001), anxiety (r=−0.37, p<0.001), stress (r=−0.33, p<0.001), perceived social support (r=0.49, p<0.001), and spiritual well-being (r=0.11, p=0.03). The variables associated with hope, including depression, anxiety, stress, perceived social support, and spiritual well-being, were entered into the linear regression analysis. Backward linear regression analysis was used to determine the predictors of hope. The results showed that 35% of the changes in hope were explained by the abovementioned factors. The correlation coefficient between hope and the abovementioned variables was 0.59. Among these variables, the associations between hope and anxiety, stress, and perceived social support were statistically significant (p<0.05). However, other variables including depression and spiritual well-being were not significantly associated with hope (p>0.05) (Table 4).

Discussion

This study aimed to determine the psychosocial, spiritual, and biomedical predictors of hope in hemodialysis patients. Assessing all aspects of human life as the predictors of hope in hemodialysis patients made this study different from the previous studies.

The mean score of hope was 28.54 (SD=5.27), which ranged from 27 to 45. This was close to two-thirds of the expected score of hope or the moderate level. Tavassoli et al indicated that the mean score of hope was 36.36 in hemodialysis patients.[33] Similarly, Gao et al reported a moderate mean score of hope among hemodialysis

Table 4 The Association Between Hope and Depression, Anxiety, Stress, Perceived Social Support, and Spiritual Well-Being in the Hemodialysis Patients

Model	Beta	t	P-value*
Anxiety	−0.2	−3.18	0.002
Stress	−0.14	−2.39	0.01
Perceived social support	0.42	9.02	<0.001
Excluded variables			
Depression	−0.02	−0.45	0.65
Spiritual well-being	0.01	0.14	0.88

Note: *Linear regression analysis.

patients.[34] However, a study on hope in hemodialysis patients demonstrated that most of the participants (62%) had high levels of hope.[35] The moderate level of hope in the present study might be due to fear from the future, unpleasant complications, or even death. Therefore, hemodialysis patients could not be expected to have high levels of hope. The only way to save hemodialysis patients is kidney transplantation, which is accompanied with some side effects and complications. Therefore, finding a kidney donor could create hope for these patients.

The study results revealed that the hemodialysis patients suffered from moderate levels of depression and anxiety. However, they had normal stress levels. Based on a study, 64% of hemodialysis patients had low anxiety levels, while 36% suffered from moderate and high levels of anxiety. Moreover, 70.5% of the participants reported low levels of depression, while 17.1% and 12.3% showed moderate and high levels of depression, respectively.[7] In fact, renal failure impacts the hemodialysis patients' emotional status as a result of dietary and fluid restrictions, pain, and fatigue.[36] Therefore, it leads to psychological issues, such as depression and anxiety.

The present study results showed that the mean score of perceived social support was 126.35. Consistently, another study indicated that the mean score of perceived social support was 131.93 among Iranian hemodialysis patients.[5]

In the current study, the mean score of spiritual well-being was 74.02, which was approximately equal to two-thirds of the expected score; ie, 80. Similarly, a prior study revealed that the mean score of spiritual well-being was 75.05 and at the moderate level among hemodialysis patients.[35] It was also found previously that Iranian hemodialysis patients had high levels of spiritual health.[33] Iranian Muslim people had strong spiritual beliefs and used spirituality to cope with chronic diseases.[14]

The findings of the present study revealed a relationship between hope and psychological issues, including depression, anxiety, stress, perceived social support, and spiritual well-being. Moreover, the results of regression analysis showed that the associations between hope and anxiety, stress, and perceived social support were statistically significant. Hope therapy reduced depression, anxiety, and stress in hemodialysis patients.[37] Hope was also associated with spiritual well-being,[35] spiritual health,[16,33] and perceived social support[38] in dialysis patients. In fact, hope predicted the quality of life in these patients.[17] Furthermore, hope was associated with functional, social, and emotional well-being,[18] depression symptoms,[39] depression, and self-esteem[19] in chronic conditions.

The current study findings demonstrated that 35% of the changes in hope were explained by depression, anxiety, stress, perceived social support, and spiritual well-being. Therefore, future studies are suggested to assess other factors associated with hope among hemodialysis patients.

Considering the association between hope and psychological issues, patients' anxiety, depression, and stress can be decreased by increasing hope in hemodialysis wards and clinical settings. Therefore, conducting interventions to enhance hope might be effective in this regard.

This study had some limitations, one of which being its cross-sectional design. Hence, further longitudinal studies in this field are warranted. Another study limitation was not controlling the confounding factors. Therefore, the confounding factors of hope are recommended to be assessed and controlled in future investigations.

Conclusion

The present study results showed that the mean score of hope was close to two-thirds of the expected score or at the moderate level. Moreover, the hemodialysis patients suffered from moderate levels of depression and anxiety. However, they had normal stress levels. They also had high levels of perceived social support. The results revealed an association between hope and depression, anxiety, stress, perceived social support, and spiritual well-being. Other factors associated with hope in hemodialysis patients are recommended to be assessed in future investigations.

Ethical Consideration

This study was approved by the Ethics Committee of Shiraz University of Medical Sciences (IR.SUMS.REC.1397.209).

It was also confirmed that the study was conducted in accordance with the Declaration of Helsinki.

Acknowledgments

This article was the result of the Master's thesis written by Mahsa Mokhtarizadeh. It was approved by Shiraz University of Medical Sciences (No. 16683). The authors would like to thank Shiraz University of Medical Sciences and health care providers of the hemodialysis wards affiliated to Shiraz University of Medical Sciences for their cooperation. They would also like to appreciate all 350 hemodialysis patients who participated in the study. Thanks also go to the Center for Development of Clinical Research of Nemazee Hospital for statistical consultation. Last but not least, Ms. A. Keivanshekouh at the Research Improvement Center of Shiraz University of Medical Sciences is acknowledged for improving the use of English in the manuscript.

Funding

This study was financially supported by Shiraz University of Medical Sciences.

Disclosure

The authors report no conflicts of interest in this work.

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