

Relationship Between Resilience, Depression, Stress, Anxiety, And Treatment Adherence Amongst Haemodialysis Patients

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ABSTRACT

Haemodialysis patients with depression, anxiety and stress have poor treatment adherence. It was found that resilience was correlated with depression and anxiety. However, the relationship between resilience and treatment adherence was found inconsistent in different studies. There were also no research studies on resilience in haemodialysis patients in Malaysia. This study aims to examine the relationship between resilience, depression, anxiety, stress, sociodemographic characteristics and treatment adherence in haemodialysis patients in Malaysia. This study was a cross sectional study on 82 haemodialysis patients from March to October 2021 in Malaysia. Participants were recruited using a purposive sampling method through social media and private dialysis centres. The data were collected using sociodemographic questionnaire, Depression, Anxiety and Stress Scale 21-item (DASS-21), Brief Resilience Scale (BRS), and End-Stage Renal Disease Adherence Questionnaire (ESRD-AQ). The descriptive statistics, Spearman's correlation and multiple linear regression analyses were used for analysing data. The mean age of the participants was 45.78 ± 11.84 years, and most participants were females (62.2%). The correlations between resilience, depression, stress, and treatment adherence behaviour were observed. However, the results of multiple linear regression showed no association between treatment adherence behaviour and resilience, depression, anxiety and stress. Nevertheless, age was found to be significantly associated with treatment adherence behaviour. This study showed that treatment adherence behaviour was not associated with resilience, depression, anxiety and stress in haemodialysis patients. Future studies may replicate this study with a larger sample size.

Keywords Resilience; Depression; Anxiety; Stress; Treatment adherence; Haemodialysis.

Introduction

It is common that haemodialysis patients experience depression, anxiety, and stress (Bhatia & Marwaha, 2020). Depression is an emotional state characterized by persistently feelings of sadness, loss of interest in enjoyable activities, hopelessness about the future, worthlessness, changes in appetite, disrupted sleep, poor concentration, fatigue, and suicidal thoughts for at least two weeks (Torres, 2020). As for anxiety, it is characterized by persistently feelings of disproportionate levels of fear and anxiety and anticipation of future situation (Muskin, 2021). Stress can be

unhealthy if it is too intense and persistent that causes a person struggles to cope with.

The global prevalence rate in haemodialysis patients for depression is about 39.3% (Palmer et al., 2013) and for anxiety is from 21% to 35.5% (García-Llana et al., 2014). In the prospective follow-up Malaysian study, the prevalence of depression among haemodialysis patients increased from 7.13% to 84.9% over the period of nine months in 2017 (Khan et al., 2019). The prevalence rate of anxiety among haemodialysis patients in Malaysia ranges from 7.4% to 10.9% (Ibrahim et al., 2016) and stress is about 19.9% (Bujang et al., 2015).

Research studies from different countries revealed that haemodialysis patients who reported higher levels of depression, anxiety, and stress have poor treatment adherence (Malaysia, Md Yusop et al., 2013; Turkey, Ok & Kutlu, 2019). In contrast, other studies found a higher compliance rate on treatment among haemodialysis patients (Malaysia; Chan et al., 2012; Brazil; Nakao et al., 2016). Additionally, Nakao and colleagues (2016) revealed that haemodialysis patients who do not adhere to treatment showed no depression. They also found that there is no association between anxiety and treatment compliance in haemodialysis patients.

Comparing between different treatment modalities, Al-Khattabi (2014) reported a lower compliance rate to haemodialysis treatment, but higher compliance rates to medication, diet and fluid restrictions in haemodialysis patients. On the contrary, Chan and colleagues (2012) found that haemodialysis patients have a higher attendance rate to haemodialysis treatment, but their adherence rates to dietary, fluid intake and medications are lower. Although Nakao and colleagues (2016) found higher adherence rates to haemodialysis session, medication and diet restrictions, the adherence rate to fluid restrictions is lower in haemodialysis patients.

In addition, there are contradictory findings found between sociodemographic factors and treatment adherence among haemodialysis patients. In terms of gender, men are found to be more likely to adhere to haemodialysis treatment (Nakao et al., 2016). However, another study found that women are more adhering to haemodialysis treatment (Chan et al., 2012). Furthermore, a study found that men have 2.074 times higher risk of non-compliant to haemodialysis treatment (Ozen et al., 2019).

As for age, a Palestinian study found that older haemodialysis patients are more likely adhering to treatment (Naalweh et al., 2017). Similarly, Malaysian studies showed that younger haemodialysis patients are more likely to be non-compliant to treatment (Chan et al., 2012; Tengku Abd Kadir et al., 2019). In

contrast, a more recent study found that there is no association between age and treatment adherence in elderly haemodialysis patients (Parker et al., 2019).

Other factors such as marital status, educational level, and employment status are found no association with treatment adherence in haemodialysis patients (Mukakarangwa et al., 2018). While a Malaysian study revealed similar findings that educational level is not associated with treatment adherence in haemodialysis patients, unemployed haemodialysis patients are found to be more compliant to treatment (Chan et al., 2012). Other researchers revealed that haemodialysis patients who are less educated have higher adherence rate to treatment (Nakao et al., 2016; Ozen et al., 2019).

Building resilience in haemodialysis patients could overcome the negative experiences caused by the disease and the haemodialysis treatment (Silva et al., 2016), to which it is important to promote their mental health and treatment adherence. Evidently, resilience is found negatively correlated with depression in haemodialysis patients (Müller et al., 2015; Freire de Medeiros et al., 2017). Similarly, another study revealed that higher resilience in haemodialysis patients showed fewer depressive symptoms (Liu et al., 2018). Furthermore, male, employed and higher education are found to be the factors correlated with higher resilience in haemodialysis patients (Ma et al., 2013).

On the other hand, there are inconsistent findings found in some studies on resilience in haemodialysis patients. A study showed that haemodialysis patients with higher resilience are less compliant to haemodialysis treatment (Freire de Medeiros et al., 2017). In contrast, another study found that haemodialysis patients with higher resilience are more adhering to haemodialysis treatment (Noghan et al., 2018).

Undoubtedly, more attention has been focused on studying resilience in haemodialysis patients. However, existing Malaysian studies only emphasized on examining the underlying

factors associated with depression and treatment adherence in haemodialysis patients (Chan et al., 2012; Tengku Abd Kadir et al., 2019). Hence, it is not known whether resilience could predict treatment adherence behaviour in haemodialysis patients in Malaysia.

Given the contradictory findings from the abovementioned studies and, to the best of knowledge, there is no research studies on resilience in haemodialysis patient in Malaysia, the current study aims to examine whether resilience, depression, anxiety, stress and sociodemographic characteristics associated with treatment adherence behaviour amongst haemodialysis patients in Malaysia.

Materials and Methods

Study Design and Participants

This cross-sectional study was conducted from March to October 2021. A purposive sampling method was employed on haemodialysis patients. A total of 82 participants were recruited based on the selection criteria from social media (i.e., Facebook) and two private haemodialysis centres in Malaysia. The inclusion criteria for recruitment were those who (1) were above 18 years old; (2) were able to provide informed consent; and (3) commenced dialysis treatment; and (4) were able to read and understand English language. The exclusion criteria for selection were those who (1) were receiving peritoneal dialysis; (2) were undergoing kidney transplant; (3) wanted to transfer to another dialysis centre; and (4) were unable to read and understand English language. The required sample size of 127 for the study was determined based on G-power software application version 3.1.9.4 with multiple linear regression as the primary model.

Pilot Study

A pilot study was conducted on 15 participants to discover problems before the main study begins to help to improve the research process (Salkind, 2010). The participants were selected based on the eligible criteria and recruited

through a purposive sampling method from social media (i.e., Facebook).

Ethical Considerations

This study was approved by the Human Research Ethics Committees at the University of Cyberjaya. Permissions from the haemodialysis centres were granted.

Sociodemographic Questionnaire

The sociodemographic questionnaire included age, gender, ethnicity, education level, marital status, monthly household income, welfare status, and employment status was used.

Depression, Anxiety and Stress Scale 21-item (DASS-21)

The degree of depression, anxiety and stress were assessed using DASS-21 (Lovibond & Lovibond, 1995). It contains 7 items for each scale. Scores are calculated by summing the scores of all the items for each domain. The items are divided into four categories: normal, mild, moderate, and severe. It has good validity and reliability of 0.90, 0.95 and 0.93, respectively for depression, anxiety, and stress, and 0.97 in overall. This scale has been validated and used on haemodialysis patients in Malaysia (Bujang et al., 2015).

Brief Resilience Scale (BRS)

The degree of resilience in participants were measured using BRS (Smith et al., 2008). It contains two latent factors which are positive items (1, 3, and 5) related to resilience and negative items (2, 4, and 6) related to succumbing. The scores are calculated by reversing the items and summing all scores. The score ranges from 6 to 30. Higher scores indicate higher resilience. It has good reliability of 0.93 and valid to be used as a tool for resilience measurement in Malaysia (Amat et al., 2014).

End-Stage Renal Disease Adherence Questionnaire (ESRD-AQ)

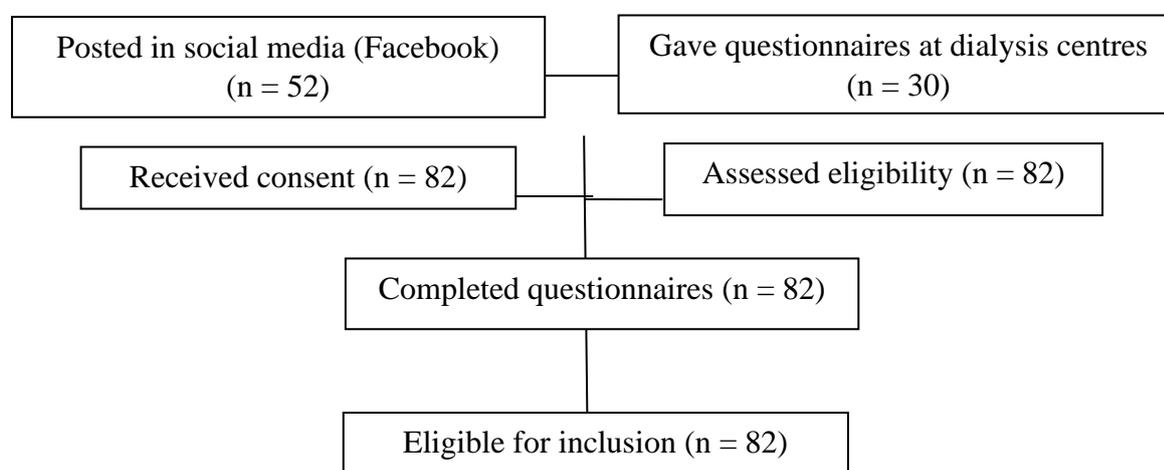
ESRD-AQ (Kim et al., 2010) was used to measure the treatment adherence behaviour in

haemodialysis patients. Treatment adherence behaviour were assessed in total score based on six items involved haemodialysis attendance, frequency of shortening of haemodialysis, duration of shortening of haemodialysis, medication use, fluid restrictions, and diet recommendations. The scores are calculated by summing all scores. Higher scores indicate higher level of adherence to treatment. It has high test-retest reliability, ranging from 0.83 to 1.00 and good content validity, ranging from 0.86 to 1.00. It has been validated and used on haemodialysis patients in Malaysia (Lim et al., 2020).

Data Collection and Procedure

Data collection were completed by administering online survey forms (i.e., Google Form) through social media. The person-in-charge of the dialysis centres administered questionnaires to participants due to the investigator was disallowed to be there during the pandemic of coronavirus disease 2019. The completion of the questionnaires was approximately 45 minutes. The flow chart of the recruitment process is shown in Figure 1.

Figure 1. The flow chart of the recruitment process



Data Analysis

The SPSS for Window Version 26.0 was used to conduct statistical analyses on quantitative data collected. Reliability analysis was conducted for measurement tools used in this study. The assumptions of normality, linearity and homoscedasticity were assessed, and found to be violated. Thus, a Spearman's correlation analysis was performed. The multiple linear regression model was used. Normality, linearity and equal variance (homoscedasticity) assumptions were met by testing through histograms, normal probability plot of standardised residuals and scatter plots. Multivariate outliers and multicollinearity were not detected. A *p* value of < 0.05 was considered significant.

Results

Pilot Study

A total of 15 participants who met the inclusion criteria enrolled in this pilot study. They ranged from 30 to 45 years of age with the mean age of 38.60 (SD = 4.60). The Spearman's correlation results showed that depression, anxiety, and stress were correlated among each other. No significant results were found in the relationship between resilience, depression, anxiety, stress and treatment adherence behaviour in haemodialysis patients. There were no significant results found in the relationship between sociodemographic factors and treatment adherence behaviour among haemodialysis patients. No adjustment was

made for the research process and self-rating questionnaires.

Reliability Analyses

The DASS-21 scale was found to be highly reliable ($\alpha = .96$). The BRS scale showed to have a poor internal reliability ($\alpha = .52$). Reliability test was not conducted for ESRD-AQ as it contained Likert, multiple choice, and dichotomous items, which were not homogeneous.

Participant Characteristics

The descriptive characteristics of the participants are presented in Table 1. A total of

82 participants ranged from 27 to 76 years of age with the mean age of 45.78 (SD = 11.84). The majority of participants were Malays (64.6%) and had completed their tertiary education (70.7%). Approximately two thirds of the participants were below 46 years old (58.5%), females (62.2%), and married (69.5%). More than half (54.9%) of the participants did not receive aid assistance and about 37 of them were still working. Almost half of the participants earned less than RM4, 849 (57.3%) which were categorized as lower-income group (Department of Statistics Malaysia, 2020).

Table 1. Descriptive Characteristics of the Participants (N = 82)

Characteristics	Frequency	Percentage
Age (years), mean (SD)	45.78 (11.84)	11.97
Age group		
Young, 18 – 45	48	58.5
Middle aged, 46 – 65	29	35.4
Elderly, > 65	5	6.1
Gender		
Female	51	62.2
Male	31	37.8
Marital status		
Divorced	4	4.9
Married	57	69.5
Single	21	25.6
Ethnicity		
Malay	53	64.6
Chinese	19	23.2
Indian	4	4.9
Others (Iban, Bidayuh, Kadazan)	6	7.3
Education level		
Primary education	1	1.2
Secondary education	23	28.0
College/ University	58	70.7
Household income		
Less than RM 4, 849	47	57.3
Between RM 4, 850 and RM 10, 959	15	18.3
More than RM 10, 960	6	7.3
Missing	14	17.1
Aid assistance		

Disabled aid	8	9.8
Disabled worker's allowance	9	11.0
Senior citizen aid	2	2.4
Zakat	17	20.7
No financial assistance	46	56.1
Employment status		
Not working	23	28.0
Working	37	45.1
Retired	22	26.8
Had peritoneal dialysis		
Yes	16	19.5
No	66	80.5
Had kidney transplant		
Yes	2	2.4
No	80	97.6
Transportation to dialysis centre		
Bus	1	1.2
Personal transportation	76	92.7
Taxi	5	6.1
Companion to dialysis centre		
Spouse	16	19.5
Child	4	4.9
Parent	2	2.4
Friend	1	1.2
Myself	58	70.7
Others (Siblings)	1	1.2
Number of days undergoing haemodialysis per week		
2 days or less	2	2.4
3 days	77	93.9
4 days	3	3.7
Duration of haemodialysis treatment per day		
3 hours and 30 minutes	3	3.7
4 hours	79	96.3
Years of undergoing haemodialysis		
Less than 1 year	7	8.5
1 – 2 years	24	29.3
2 – 3 years	4	4.9
More than 3 years	47	57.3

Perception Towards Haemodialysis-Related Treatment

As shown in Table 2, the majority of participants (91.5%) reported that their

haemodialysis schedule is convenient to them. Most participants believed that it is highly and very important to adhere the haemodialysis sessions (98.8%).

Table 2. Perception towards Haemodialysis-Related Treatment

Perception	n (%)
Perception on convenience with haemodialysis schedule	

Yes	75 (91.5)
No	7 (8.5)
Perception on haemodialysis adherence	
Highly / Very important	81 (98.8)
Moderately important	1 (1.2)
Little / Not important	0
Perception on medication adherence	
Highly / Very important	80 (97.6)
Moderately important	2 (2.4)
Little / Not important	0
Perception on fluid restriction	
Highly / Very important	76 (92.7)
Moderately important	4 (4.9)
Little / Not important	2 (2.4)
Perception on dietary recommendations	
Highly / Very important	77 (93.9)
Moderately important	4 (4.9)
Little / Not important	1 (1.2)
Perception on body weighing	
Highly / Very important	55 (67.1)
Moderately important	21 (25.6)
Little / Not important	6 (7.4)

Adherence to Various Treatment Modalities

The overall adherence behaviour and adherence to the four treatment modalities are presented in

Table 3. The compliance rate to haemodialysis treatment was the highest (92.7%) among treatment modalities.

Table 3. Overall Adherence and Adherence Scores for Treatment Modalities

Adherence	Adherers n (%)	M (SD)
Overall adherence	–	1019.51 (125.77)
Attendance for haemodialysis	76 (92.7)	287.8 (45.52)
Frequency of shortening haemodialysis	71 (86.6)	188.41 (36.26)
Duration of shortening haemodialysis if shortened	73 (89.0)	93.29 (20.43)
Adherence to medication	48 (58.5)	178.05 (27.33)
Adherence to fluid restriction	28 (34.1)	142.68 (58.86)
Adherence to dietary restriction	11 (13.4)	129.27 (50.89)

Depression, Anxiety and Stress

Of all participants, most of them reported a normal range of stress (70.7%), an extremely severe range of anxiety (23.2%), and no

depression (39%). It is shown in Table 4. The key observation was the higher percentage of haemodialysis patients reported no stress and depression as compared to anxiety.

Table 4. Severity of Depression, Anxiety and Stress among Patients Undergoing Haemodialysis

Severity	Depression n (%)	Anxiety n (%)	Stress n (%)
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Normal	32 (39.0)	18 (22.0)	58 (70.7)
Mild	14 (17.1)	16 (19.5)	10 (12.2)
Moderate	24 (29.3)	18 (22.0)	3 (3.7)
Severe	4 (4.9)	11 (13.4)	9 (11.0)
Extremely severe	8 (9.8)	19 (23.2)	2 (2.4)

Relationship between Depression, Anxiety, Stress and Treatment Adherence Behaviour

The Spearman's correlation results revealed that depression and stress have a weak negative correlation with treatment adherence behaviour. Interestingly, anxiety was not significantly correlated with treatment adherence behaviour. The multiple linear regression results showed no significant association between depression, anxiety, stress and treatment adherence behaviour in haemodialysis patients ($F(3, 78) = 1.52, p = 0.22$). As depression and stress were

correlated with treatment adherence behaviour, a simple linear regression analysis was therefore conducted to predict the level of treatment adherence behaviour in haemodialysis patients based on the degree of depression and stress respectively. The results revealed that depression was significantly predict treatment adherence behaviour ($F(1, 80) = 4.15, p < 0.05$) and accounted for 4.9% of the variance. On the other hand, stress was found to be not a significant predictor on treatment adherence behaviour ($F(1, 80) = 3.81, p = 0.06$). These are presented in Table 5 and 6.

Table 5. Spearman's correlations between Depression, Anxiety, Stress and Treatment Adherence Behaviour

Variable	1	2	3
1. Depression	–		
2. Anxiety	.82*	–	
3. Stress	.84*	.81*	–
4. Treatment Adherence Behaviour	-.20*	-.11	-.16*

* $p < .01$, one-tailed.

Table 6. Multiple Linear Regression Analysis of Association between Depression, Anxiety, Stress and Treatment Adherence Behaviour.

Variable	Treatment Adherence Behaviour				
	B	SE B	B	t	p
Depression	-5.99	7.36	-.22	-.81	.42
Anxiety	4.30	6.58	.15	.65	.52
Stress	-4.51	8.52	.15	-.53	.60

* $p < .05$.

Relationship between Resilience, Depression, Anxiety, Stress and Treatment Adherence Behaviour

The Spearman's correlation results showed that resilience has a moderate negative correlation with depression. There was also a moderate negative correlation between resilience and anxiety, as well as between resilience and stress.

In addition, resilience was also found a weak positive correlation with treatment adherence behaviour. The multiple linear regression results revealed no significant association between resilience, depression, anxiety, stress and treatment adherence behaviour in haemodialysis patients ($F(4, 77) = 1.24, p = 0.30$). As resilience was found to be correlated

with treatment adherence behaviour, a simple linear regression analysis was then carried out to predict the level of treatment adherence behaviour in haemodialysis patients based on the degree of resilience. The results revealed

that resilience was found to be not a significant predictor for treatment adherence behaviour ($F(1, 80) = 0.56, p = 0.46$). These are presented in Table 7 and 8.

Table 7. Spearman's Correlations between Resilience, Depression, Anxiety, Stress and Treatment Adherence Behaviour

Variable	Resilience
Depression	-.59**
Anxiety	-.44**
Stress	-.56**
Treatment Adherence Behaviour	.20*

* $p < .05$, one-tailed. ** $p < .01$, one-tailed.

Table 8. Multiple Linear Regression Analysis of Association between Resilience, Depression, Anxiety, Stress and Treatment Adherence Behaviour

Variable	Treatment Adherence Behaviour				
	B	SE B	β	t	p
Depression	-7.27	7.64	-.27	-.95	.52
Anxiety	5.04	6.70	.18	.75	.34
Stress	-5.46	8.67	-.18	-.63	.45
Resilience	-3.52	5.38	-.09	-.66	.53

* $p < .05$.

Relationship between sociodemographic characteristics and treatment adherence behaviour

The Spearman's correlation results showed that age has a moderate positive correlation with treatment adherence behaviour in haemodialysis patients. It indicates that older age was associated with better treatment adherence in haemodialysis patients. However, gender, marital status, ethnicity, education level, monthly household income, aid assistance, and employment status were not correlated with treatment adherence behaviour in haemodialysis patients. The multiple linear regression results revealed a significant association between age, employment status,

gender, marital status, ethnicity, education level, monthly household income, aid assistance and treatment adherence behaviour in haemodialysis patients ($F(8, 59) = 2.22, p < 0.05$). Predictor variables of age, employment status, gender, marital status, ethnicity, education level, monthly household income, and aid assistance combined accounted for 23% of the variance treatment adherence behaviour in haemodialysis patients. However, only age was a significant predictor ($\beta = 0.47, p < 0.01$), which indicating that higher adherence in haemodialysis treatment was predicted by younger age. These are presented in Table 9 and 10.

Table 9. Spearman's Correlations between Sociodemographic Characteristics and Treatment Adherence Behaviour

Variable	Treatment Adherence Behaviour
Age	.40*

Gender	-.05
Marital status	-.07
Ethnicity	.10
Education level	-.01
Monthly household income	.14
Welfare status	-.05
Employment status	.14

* $p < .01$, one-tailed.

Table 10. Multiple Linear Regression Analysis of Association between Sociodemographic Characteristics and Treatment Adherence Behaviour

Variable	Treatment Adherence Behaviour				
	B	SE B	β	t	p
Age	5.51	1.61	.47	3.41	.001*
Gender	32.81	31.39	.12	1.05	.30
Marital status	-49.65	29.41	-.20	-1.69	.10
Ethnicity	8.86	17.28	.06	.51	.61
Education level	10.45	41.87	.04	.25	.80
Monthly household income	6.62	24.23	.03	.27	.79
Welfare status	5.81	8.96	.08	.65	.52
Employment status	-.43	23.42	-.002	-.19	.99

* $p < .01$.

Discussion

The present study investigated the relationship between resilience, depression, anxiety, stress, sociodemographic characteristics and treatment adherence behaviour among haemodialysis patients in Malaysia.

Based on the study results, it was observed that a large percentage of haemodialysis patients did not suffer from stress and depression. These findings are not consistent with other studies (Bujang et al., 2015; Liu et al., 2018).

Contrary to the expectations, this study did not find a significant association between treatment adherence behaviour and depression, anxiety and stress in haemodialysis patients, which is inconsistent with the first hypothesis of the study. The study results, not consistent with the second hypothesis, have also showed no significant association between resilience, depression, anxiety, stress and treatment adherence behaviour in haemodialysis patients.

Despite the non-significant results found, other findings of this study revealed that depression, anxiety and stress have a moderate negative correlation with resilience in haemodialysis patients. These findings match those observed in earlier studies (Müller et al., 2015; Freire de Medeiros et al., 2017; Liu et al., 2018). This suggests that haemodialysis patients with higher level of resilience displayed lower level of depression, anxiety, and stress. Other important findings were that depression and stress were negatively correlated with treatment adherence behaviour among haemodialysis patients. Resilience was positively correlated with treatment adherence behaviour in haemodialysis patients. However, the strength of these correlations was weak. These findings agree with the findings of other studies, in which haemodialysis patients with higher degree of resilience and lower level of depression and stress were more compliant to treatment (Md Yusop et al., 2013; Freire de Medeiros et al., 2017). Surprisingly, no

correlation was found between anxiety and treatment adherence behaviour in haemodialysis patients, which was in line with the study by Nakao and colleagues (2016).

There are several possible explanations for the findings. Firstly, it seems possible that these differences may be due to the small sample size in this study. Earlier studies recruited over a hundred of participants. Interestingly, a more recent study showed that most haemodialysis patients, among the total of 148 participants, reported from a normal to mild range of depression, anxiety and stress (Yu et al., 2021), which was similar to the result of this study.

The second possible explanation for the differences might be that haemodialysis patients recruited in this study were mostly young. A recent study revealed that haemodialysis patients who were 60 years old and above were likely to have depression (Al-Jabi et al., 2021). In the present study, only 15.7% participants who were 60 years old and above, which explains the lower level of depression in them.

The large amount of haemodialysis patients believed the importance of receiving treatment related to haemodialysis in this study may also explain these differences. A recent study found that increased knowledge about disease and haemodialysis-related treatment contributed to a higher degree of treatment adherence (Arad et al., 2021). It is noted that most participants in this study reported a higher frequency of receiving education from their dialysis centres, which influences their perception and affects their treatment adherence behaviours.

In this study, only age was found to be significantly associated with treatment adherence behaviour among haemodialysis patients, which is in line with the third hypothesis of the study. This study shows that older haemodialysis patients were more compliant to treatment, which is consistent with those of other studies (Chan et al., 2012; Naalweh et al., 2017; Tengku Abd Kadir et al., 2019).

Other than age, the findings of this study revealed that gender, ethnicity, education level, marital status, welfare status, employment status and monthly household income were not predictors for treatment adherence behaviour in haemodialysis patients. Similar to other studies, marital status, educational level, employment status and financial income were not associated with treatment adherence behaviour among haemodialysis patients (Chan et al., 2012; Mukakarangwa et al., 2018). However, different findings found in other studies regarding the higher compliance rate between men and women on treatment (Chan et al., 2012; Nakao et al., 2016).

Limitations and Future Directions

There were several limitations for this study. One limitation is the small sample size. Smaller sample size may not be sufficient enough to detect the associations between groups (Andrade, 2020) as this study showed no associations between resilience, depression, anxiety, stress and treatment adherence behaviour in haemodialysis patients, which contradicts to the earlier studies. The sample size was limited to demonstrate an association with treatment adherence behaviour in haemodialysis patients due to the pandemic of coronavirus disease 2019. Therefore, it is recommended to replicate the present study with a larger sample size.

Another limitation might be the differences in religiosity, motivations and comorbidities of the participants that have affected their resilience, depression, anxiety and stress and their treatment adherence. Higher levels of religiosity and motivations in haemodialysis patients could help to build their hope in living and that affect their treatment adherence (Mukakarangwa, Chironda, Nkurunziza, Ngendahayo, & Bhengu, 2020; Shahin, Kennedy, & Stupans, 2019). Moreover, haemodialysis patients with less comorbid illnesses may feel less burden about their treatment, which could also affect their treatment adherence (Hwang et al., 2018).

Hence, it is suggested that future studies include these variables.

The third limitation is that the measurement tools used may be limited as many participants were more comfortable to complete questionnaire in their native language. Therefore, it is recommended that future studies translate and validate measurement tools into various languages for cross-cultural purpose.

Conclusions

In conclusion, findings of the present study revealed that only age was associated with treatment adherence behaviour among haemodialysis patients. However, this study showed no association between depression, anxiety, stress and treatment adherence behaviour among haemodialysis patients in Malaysia. There was also no association between resilience, depression, anxiety, stress and treatment adherence behaviour among haemodialysis patients in Malaysia. This could be explained by the small sample size, younger patients recruited and a higher number of patients perceived about the importance of receiving haemodialysis-related treatment, which may affect study results. Despite that, there were weak correlations between resilience, depression, stress and treatment adherence behaviour in Malaysian haemodialysis patients. Therefore, it is important that future research replicate this study with a larger sample size, assess religiosity, motivations and comorbidities, and use translated measurement tools to identify and promote resilience in Malaysian haemodialysis patients to deal with their illness and treatment adherence.

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