



Determinant of fluid adherence among hemodialysis patients in Malang, Indonesia[☆]



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Abstract

Objective: To analyze the factors related to fluid adherence among hemodialysis (HD) patients in a hospital in Malang.

Methods: The study used a cross-sectional design with a consecutive sampling technique. The sample comprised 98 respondents. The study was conducted in the HD Unit May 23–26, 2018. The data were collected by use of the characteristics of the respondent questionnaire, personality questionnaire, health locus of control questionnaire, family support questionnaire, and fluid adherence questionnaire. The Pearson correlation coefficient and the Spearman's rank correlation coefficient were calculated, and multivariate linear regression analysis was performed.

Results: The results showed that the factors related to fluid adherence were age ($p=0.001$), complications ($p=0.017$), agreeableness ($p=0.013$), and family support ($p=0.001$). The results of the multivariate analysis showed that the most dominant factor influencing fluid adherence was age ($r=0.255$).

Conclusion: The results indicated that appropriate health education that involves the family was an important component in improving fluid adherence.

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Introduction

Hemodialysis (HD) has been the most widely used treatment for renal replacement therapy (RRT) in patients with end-stage renal disease (ESRD). It is a therapy for avoiding complications. It has been used to maintain patients' quality of life and to prolong their lives.^{1,2} According to the World

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Health Organization (WHO), the lives of approximately 1.5 million people are dependent on kidney replacement or HD therapy. The WHO estimated an increase in terminal kidney failure, which has been increasing every year, by 41.4% between 1995 and 2025.³ According to the Indonesian Renal Registry (IRR), the number of patients with terminal kidney failure in Indonesia in 2015 was 30,544, and 6276 were from East Java. The success of HD depends on the patients' commitment to regulating their daily life patterns, included those related to fluid regulation.⁴

Fluid is a component that must be regulated by ESRD patients who are undergoing HD. If not regulated, it can cause a build up of harmful substances in the body as a result of low GFR (Glomerular Filtration Rate). Excess fluid is strongly associated with the main causes of increased morbidity and mortality in HD patients. It has also been found to be the main cause of the worsening of complications related to the cardiovascular system and has even been a cause of death.^{5,6} However, excess fluid as a risk factor for ESRD complications can potentially be mitigated through behavioral change. Therefore, complications can be avoided.

Adherence has been defined as a behavior for following or implementing changes based on recommendations. It is influenced by factors related to the patients themselves, their conditions or therapy, health services, and clinical care.⁷ Although significant advances have been made in the biomedical sciences, adherence is still considered a fundamental component in effective nursing care and is as important as the medical treatments.^{8,9} However, HD patients are often not adherent to fluid restrictions, and this can lead to morbidity and mortality.¹⁰ Some of the factors in HD patients' lack of adherence to long-term therapy are the complicated therapeutic regimens, difficulties in understanding the rationale for or importance of the therapy, and the short-term consequences of non-adherence.⁸

Some studies have shown that the adherence rate of HD patients was poor, with adherence to fluid restrictions being the most difficult issue; consequently, the high risk of overload is a threat.^{4,11} Other studies conducted in Indonesia and other countries have also found a lack of fluid adherence among HD patients. Therefore, researchers are interested in understanding the factors related to patients' fluid adherence behaviors.

Studies related to fluid adherence have identified several factors; however, the results are inconclusive. Some studies have suggested that age and education have no effect on fluid adherence; others have suggested the opposite.^{4,12} The results for other factors, such as family support, have been mixed. Other factors that are also interesting and worthy of further study are health locus of control (HLC) and patient personality, which can also determine health behavior and patient compliance with fluid adherence. The possible relationship of these factors to fluid adherence behavior in HD patients is worthy of analysis.

Method

This quantitative study used a cross-sectional approach with a correlative analytical design. The design was chosen to facilitate the observation of the dynamics of the correlations

among the factors important for health status and to explain the relationships among the variables.

The study used non probability sampling: consecutive sampling. The total sample comprised 98 respondents. The inclusion criteria were chronic HD patients who (1) had undergone at least three months of treatment, (2) were conscious (*compos mentis*) and cooperative, (3) could read and write in Bahasa, and (4) were willing to participate. The criterion for exclusion was patients who, according to their answers to the questionnaire, had experienced acute HD complications.

This study used two main formats for data collection: the characteristics of respondent questionnaire and research instrument questionnaires. The characteristics of respondent questionnaire were developed independently by researchers who assessed the respondents' general personal data, such as age, sex, amount of time (in months) on HD, IDWG (Inter-Dialytic Weight Gain), adequacy of HD, and complications. The research instruments consisted of the personality questionnaire from the International Personality Item Pool (IPIP), the health locus of control questionnaire from Form C of the Multidimensional Health Locus of Control Scale (MHLC), the family social support questionnaire, and the fluid adherence questionnaire.

The IPIP personality questionnaire consisted of 50 statements. The result of the validity test was 0.71–0.98. The reliability test yielded alpha scores of 0.839 (extraversion), 0.762 (agreeableness), 0.811 (conscientiousness), 0.862 (emotional stability), and 0.768 (intellect). Form C of the MHLC questionnaire consisted of 18 statements, which passed the validity test with the results for the internal dimensions, chance, and powerful others *r* count values (0.500–0.777, 0.432–0.803, and 0.587–0.764, respectively) greater than the *r* table (0.361). The reliability of the questionnaire was also tested, and the results showed that the Cronbach's Alpha coefficient for the internal dimensions, chance, and powerful others were 0.703, 0.715, and 0.791, respectively, which meant reliability. The family support questionnaire used in this study had been previously tested for validity and reliability by Syamsiah.¹³ This questionnaire consisted of seven statements. In addition, it had good validity value. The reliability test showed that the alpha *r* value was greater than the *r* table value (0.907 > 0.423); therefore, it could be concluded that this questionnaire was reliable. The fluid adherence questionnaire used in this study consisted of eight statements. The reliability and validity tests had been previously conducted by Melianna.³ The questionnaire was deemed valid and reliable because the *r* value of the results was greater than the *r* table value (0.394–0.662 > 0.361), and the *r* alpha was greater than the *r* table value (0.741 > 0.361).

This study was conducted after the ethics test at the Faculty of Nursing Universitas Indonesia was passed and a research permit was obtained from the dean. The ethical principles in this study were beneficence, justice, and respect for human dignity. In addition, the permit and ethics test results were taken to the research site so that a research permit could be obtained from the hospital in Malang. The researchers then collected a memo from the hospital to be given to the HD Unit. The researchers then met with the head of the room to convey the purpose and objectives of the study. The data were collected on May 23–26, 2018. The

Table 1 Distribution of respondents regarding independent variables.

No.	Variables	Mean ± SD	95% CI
1	Age	50.18 ± 11.25	47.93–52.44
2	Complications (total)	0.66 ± 0.86	0.49–0.84
3	Total time (months) on HD	20.71 ± 22.65	16.17–25.26
4	IDWG (%)	3.47 ± 1.37	3.19–3.74
5	HD adequacy (Kt/V)	1.42 ± 0.25	1.37–1.47
6	Extraversion	25.21 ± 3.43	24.53–25.90
7	Agreeableness	29.83 ± 3.67	29.09–30.56
8	Conscientiousness	31.50 ± 4.15	30.67–32.33
9	Intellect	25.37 ± 3.74	24.62–26.12
10	Emotional stability	26.09 ± 4.86	25.12–27.07
11	Internal HLC	27.90 ± 5.67	26.76–29.03
12	Powerful others HLC	27.79 ± 4.25	26.93–28.64
13	Chance HLC	23.63 ± 6.73	22.28–24.98
14	Family support	32.38 ± 2.83	31.81–32.94

data were then processed using an application on a computer program. Univariate, bivariate (Pearson correlation coefficient or Spearman's rank correlation coefficient), and multivariate (linear regression) analyses were performed.

Results

Respondent characteristics

Table 1 shows that the mean age of the HD patients in this study was 50.18 (SD 11.25), the mean time spent on HD was 20.71 months (SD 22.65), the mean IDWG was 3.47% (SD 1.37), the mean HD adequacy was 1.42 Kt/V (SD 0.25), and the mean for complications suffered by HD patients was 0.66 diseases (SD 0.86).

Personality

The mean score for agreeableness in this study was 29.83 (SD 3.67), the mean for conscientiousness was 31.50 (SD 4.15), the mean for emotional stability was 26.09 (SD 4.86), the mean for extrovertedness was 25.21 (SD 3.43), and the mean for intellect was 25.37 (SD 3.74) [Table 1].

Health locus of control (HLC)

The mean score for internal HLC was 27.90 (SD 5.67), the score for chance HLC was 23.63 (SD 6.73), and the score for powerful others HLC was 27.79 (SD 4.25) [Table 1].

Family support

The average score for family support for the HD patients in this study was 32.38 (SD 2.83) [Table 1].

Fluid adherence

Table 2 shows that the mean score for the HD patients' fluid adherence was 20.92 (SD 4.02). It could therefore be

Table 2 Distribution of respondents regarding dependent variables.

No.	Variable	Mean ± SD	95% CI
1	Fluid adherence	20.92 ± 4.02	20.11–21.72

Table 3 Relationship between independent variables and fluid adherence.

No.	Variable	<i>p</i> value	<i>r</i> value
1	Age	0.001*	0.336
2	Total time on HD	0.780	−0.029
3	Complications	0.017*	0.240
4	Extraversion	0.128	0.155
5	Agreeableness	0.013*	0.251
6	Conscientiousness	0.052	0.197
7	Emotional stability	0.326	0.100
8	Intellect	0.513	0.067
9	Internal HLC	0.238	−0.120
10	Powerful others HLC	0.683	0.042
11	Chance HLC	0.643	0.047
12	Family support	0.001*	0.339

* Significant to $p < 0.05$.

concluded from the estimate interval with 95% CI that the main score was 20.11–21.72.

Relationship between independent variables and fluid adherence

Table 3 shows that the results of the study showed a significant relationship between fluid adherence and age, complications, agreeableness, and family support. The results also indicated a relationship between fluid adherence and extraversion, conscientiousness, emotional stability, intellect, all of the HLC dimensions, and the total time spent on HD.

Table 4 Multivariate modeling.

Variable	<i>B</i>	β	<i>r</i>	<i>r</i> ²	<i>p</i> value
Constants	-0.303				
Age	0.138	0.255			
Complications	0.107	0.168	0.490	0.240	0.0001
Agreeableness	0.233	0.171			
Family support	0.440	0.243			

Factors most related to fluid adherence

Table 4 shows that the results of the multivariate linear regression analysis indicated that the factor that was most related to fluid adherence was age ($p=0.001$; β coefficients=0.255). After complications, agreeableness, and family support were controlled for, each increase in patient age was accompanied by an increase of 0.138 in the fluid adherence score.

Discussion

The results showed a significant relationship between age and fluid adherence. Increased age adds life experience and improves maturity. Therefore, the patients have more structure in their lives, and this improves fluid adherence.^{4,14} Older people were more receptive than younger people to the requirements of the therapy regimen. Young people felt more vulnerable to the side effects of the therapy. They were also more stressed because of workloads and daily tasks; thus, fluid adherence was difficult.^{15,16}

This study included 18-year-old respondents who had to undergo the HD routine. The interviews with the patients suggest that the causes of ESRD could be poor drinking patterns and the lack of drinking water. However, the cause of ESRD is still unclear because of the lack of investigation and assessment of patient medical records. According to previous studies, the incidence of ESRD at young ages was not high; it was only approximately 5%. However, ESRD at a young age carries a higher mortality rate: 30 times higher than adult. The cause of mortality in young HD patients is cardiovascular disorders, which are the result of the complications of ESRD and HD. Cardiovascular disorders in young HD patients usually occurs from non-adherence to HD, diet, and fluid.¹⁷ Glomerulonephritis and focal segmental glomerulosclerosis have been found to be the main causes of kidney damage in young ESRD and HD patients.^{18,19}

The results showed an insignificant relationship between the total time spent on HD and patient fluid adherence. The longer that patients undergo HD, the more knowledge and experience they gain. They adapt to their health problems and are thus more accepting of the fluid restrictions.^{20,21} Furthermore, the amount of time required for increasing knowledge and improving fluid adherence behavior is specific to each patient.^{20,22} From the first day of HD therapy, the patients in this study were provided health education related to fluid restrictions. Therefore, the duration of the HD did not significantly affect fluid adherence.

The analysis showed a significant relationship between the number of complications and fluid adherence in that

patients with a higher number of complications were more compliant. This supports the findings of previous studies, namely that complications from ESRD or HD therapy could affect patients' perceptions of illness severity such that the need or the will to adhere to fluid restrictions increases.^{4,10} The number of complications suffered by patients can affect their perceptions of their vulnerability and the seriousness of their illness. Thus, if patients are worried about their health, they would be more adherent to fluid restrictions.^{23,24}

Regarding the "Big Five" personality traits, only agreeableness was associated with the HD patients' fluid adherence. The relationship between agreeableness and fluid adherence was weak ($r=0.251$), with a positive pattern. This means that the higher the agreeableness personality score, the higher was the patients' adherence to fluid restrictions. Patients with the agreeableness trait were usually psychologically independent and tended to make the right decisions; therefore, they most likely did not have difficulty seeking advice. They also tended to follow the health professionals' directions and to practice self-regulation.^{25,26} The positive correlations in this study were meaningful not only for the high scores but also for the low scores. This means that the lower the agreeableness personality score, the lower the patient's adherence to fluid restrictions. Patients with low levels of agreeableness tended to be suspicious, stingy, unfriendly, irritable, more aggressive, likely to criticize others, and less cooperative.^{27,28}

The results showed that none of the three types of HLC, i.e., internal, powerful others, and chance, was related to fluid adherence. HLC is a construction of beliefs and expectations regarding an individual's ability to manage or control health from both inside and outside the body. HLC was divided into three dimensions: internality (internalization), powerful others, and chance.^{29,30}

The analysis indicated a moderate relationship ($r=0.339$) and positive pattern between family support and fluid adherence. This means that the greater the family support, the higher would be the fluid compliance rate of ESRD patients who undergo HD. Family support could be interpreted as a combination of attitudes, actions, and acceptance of the illness through the attention and encouragement provided by therapeutic interpersonal relationships. Such support could also be demonstrated by the provision of motivation, attention, and reminders to limit fluid intake according to the advice of the health care providers.

Most of the patients in this study were accompanied by family members. During the HD therapy, the family members remained at the patients' bedsides and participated in monitoring their conditions. Some questions from the researchers about a patient's condition or HD history were often

re-asked of the family member by the patient or even answered directly by the family member. This indicates the family members' attention to the patients and monitoring of their health conditions. Therefore, family support was a factor in adherence to the health care providers' therapy recommendations, especially those regarding fluid restrictions. Moreover, family support was a therapeutic interpersonal relationship; thus, family involvement in health education could be effective.

The multivariate analysis showed that the factor most associated with patient fluid adherence was age ($\beta = 0.255$), which was positively correlated with fluid adherence. Other dominant variables were complications, agreeableness, and family support. Most of the respondents reported adherence to the fluid restrictions. The study also found that most respondents were likely to accept the restrictions in order to avoid conflict. This was consistent with the results of the study: that agreeableness was related to fluid adherence.

The study found age, complications, agreeableness personality, and family support to be related to HD patients' adherence to fluid restrictions. The most dominant factor was age.

The scope of the study can be extended to determine the possibility of fluctuations in patient adherence levels. The concept of adherence could be explored further in nursing education.

The results also showed that health education about fluid restrictions is an important component. This information must be explained in detail. Periodical monitoring of compliance can be accomplished with family involvement. Family involvement encourages patient adherence and maximizes the nursing care provided to patients.

A limitation of this study was the lack of documentation of the respondents' disease complications and total time spent on HD in the hospital medical records. Therefore, the researchers needed to rely on family members or the respondents themselves who were sometimes subject to confusion or memory lapses.

Conflict of interests

The authors declare no conflict of interest.

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