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Self-Efficacy in Salt Consumption Among Patients Undergoing Hemodialysis

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Abstract

Salt consumption restriction has many advantages in patients on hemodialysis (HD), but it is also very challenging for them. Self-efficacy is a crucial aspect of successful disease management. Factors related to self-efficacy have been evaluated in many countries. However, the different demographic characteristics in Indonesia may show different significant results. Understanding this problem may contribute to the development of nursing interventions and the patients' self-management ability while undergoing HD. Hence, the present study aimed to determine the factors associated with self-efficacy for restricting salt consumption among HD patients. Altogether, 98 HD patients participated in this cross-sectional study. The Self-efficacy for Restricting Dietary Sodium in Hemodialysis Scale questionnaire was completed to assess the patients' self-efficacy. Linear regression was performed to evaluate the relationship between self-efficacy and patient characteristics. The participants' mean age was 50.11 ± 1.29 years and the mean self-efficacy score was 73.56 ± 14.85. Mostly, participants were male (60.2%), married (82.7%), and had hypertension (85.7%). Age ($p = 0.000$; $r = 0.384$), HD duration ($p = 0.004$; $r = -0.287$), and interdialytic weight gain (IDWG) ($p = 0.008$; $r = -0.267$) significantly correlated with self-efficacy for restricting salt consumption. These three variables determined 21% of the variance of self-efficacy among HD patients. The present study provides primary evidence that age, HD duration, and IDWG are associated with self-efficacy for restricting salt consumption among HD patients. Thus, nurses could develop innovative interventions to enhance the self-efficacy among patients with younger age, longer HD duration, and more IDWG.

Keywords: hemodialysis, salt consumption, self-efficacy

Abstrak

Efikasi Diri dalam Konsumsi Garam di Kalangan Pasien yang Menjalani Hemodialisis. *Pembatasan asupan garam pasien hemodialisis (HD) bermanfaat bagi kondisi kesehatan sekaligus menjadi tantangan tersendiri bagi pasien. Efikasi diri merupakan aspek mendasar dalam keberhasilan manajemen penyakit. Faktor yang berhubungan dengan efikasi diri sudah diteliti di negara-negara lain, akan tetapi, perbedaan karakteristik demografi di Indonesia dapat memperlihatkan perbedaan hasil. Pemahaman terkait masalah ini berkontribusi pada peningkatan intervensi keperawatan dan manajemen diri pasien. Oleh karena itu, tujuan penelitian ini untuk mengetahui faktor-faktor yang berhubungan dengan efikasi diri dalam membatasi asupan garam pada pasien hemodialisis. Penelitian ini menggunakan desain* cross-sectional *dengan melibatkan sebanyak 98 pasien. Kuesioner* The self-efficacy for Restricting Dietary Sodium in Hemodialysis Scale *digunakan untuk mengukur efikasi diri pasien. Regresi linear dilakukan untuk melihat hubungan antara efikasi diri dengan data demografi. Rata-rata usia partisipan adalah 50,11 ± 1,29 tahun dengan rata-rata skor efikasi diri pasien adalah 73,56 ± 14,85. Sebagian besar partisipan adalah laki-laki (60,2%), sudah menikah (82,7%), dan memiliki hipertensi (85,7%). Ditemukan bahwa usia ($p = 0,000$; $r = 0,384$), durasi hemodialisis ($p = 0,004$; $r = -0,287$), dan IDWG ($p = 0,008$; $r = -0,267$) berhubungan signifikan dengan efikasi diri dalam membatasi asupan garam. Ketiga variabel tersebut berkontribusi sebesar 21% terhadap variansi efikasi diri pasien hemodialisis. Penelitian ini membuktikan bahwa usia, durasi hemodialisis, dan IDWG berhubungan dengan efikasi diri pembatasan asupan garam pasien hemodialisis. Oleh karena itu, perawat dapat mengembangkan intervensi peningkatan efikasi diri pada pasien dengan usia muda, pasien yang telah lama menjalani HD, dan pasien dengan IDWG lebih.*

Kata Kunci: *asupan garam, efikasi diri, hemodialisis*

Introduction

Chronic kidney disease (CKD) is caused by an injury or abnormality of the kidney structure or function lasting for ≥ 3 months and/or reduced glomerular filtration rate (GFR) (National Institute for Health and Care Excellence [NICE], 2014; Kidney Health Australia [KHA], 2015). Meanwhile, according to the National Institute of Diabetes and Digestive and Kidney Disease (NIDDK) (2014), CKD is a progressive chronic disease characterized by a decrease in eGFR of < 60 ml/minute/1.73 m3 for a period of ≥ 3 months and/or kidney damage in the presence of persistent albuminuria (urine albumin of ≥ 30 mg) for ≥ 3 months. CKD can also cause kidney damage without a decrease in GFR for ≥ 3 months accompanied by albuminuria, hematuria, and structural and pathological abnormalities (KHA, 2015).

Patients with CKD or progressive kidney damage require treatment to improve kidney functioning, including continuous ambulatory peritoneal dialysis, kidney transplantation, and hemodialysis (HD) (Ministry of Health and Kidney Health New Zealand, 2014; NIDDK, 2015). HD is the most common therapy for patients with CKD (Bello et al., 2022).

Patients on HD have specific important rules, including dietary rules, that should be implemented as part of their routine. HD patients' dietary intake is different and their diet should be managed carefully, especially for salt or sodium daily consumption due to a decrease in renal function (NIDDK, 2015; Ministry of Health and Kidney Health New Zealand, 2014). The restriction of salt consumption among HD patients has many advantages in terms of health outcomes, including decreased protein and albumin levels and cardiovascular disorders in patients (McMahon et al., 2015). Salt restriction for hypertension patients receiving diuretic therapy can also increase the effectiveness of treatment (Cobb & Pacitti, 2018).

Restricting salt consumption also contributes to interdialytic weight gain (IDWG) control (NID DK, 2014; University of Michigan Health System [UMHS], 2016). Previous studies have reported that uncontrolled IDWG was mostly experienced by HD patients and further, related to complications, increase the incidence of hospitalization and mortality (Cabrera et al., 2015; Lopez & Banarjee, 2021).

However, salt consumption restriction and management have become complicated challenges encountered by HD patients. The challenges for restricting salt consumption are related to many aspects, including food taste preferences, flavored food varieties, and inadequate knowledge (Meuleman et al., 2018; Sukartini et al., 2022). Another barrier is the patients' perception of insufficient support about the behavioral strategies related to fluid and dietary management (Ozkan & Taylan, 2022). Those many obstacles were experienced by patients with a lower self-efficacy (Meuleman et al., 2018). Therefore, self-efficacy is a crucial aspect of attaining successful disease management (Meuleman et al., 2018).

Self-efficacy plays an important role in controlling and readiness for dietary adherence behavior in HD patients (Clark-cutaia et al., 2014). Moreover, it has a huge impact on patients' self-management, self-care, psychological health, and quality of life (Almutary & Tayyib, 2021; Kav et al., 2017; Kiajamali et al., 2017; Nguyen et al., 2022; Warner & Schwarzer, 2020).

Multi-difficult challenges of HD patients to restrict salt consumption are a crucial aspect. The self-efficacy-related factors have been evaluated in many countries. A similar focus study in Indonesia with different eating habits and demographic characteristics may show a different significant result, especially in terms of salt consumption restriction. Understanding this problem may contribute to the development of nursing interventions and patients' self-management while on HD. Hence, the main purpose of this research was to determine the factors associated with self-efficacy for restricting salt con-

sumption among HD patients.

Methods

We conducted a quantitative correlational study with a cross-sectional approach. The present study had been reviewed and authorized as appropriate by FK-KMK/Faculty of Medicine, Public Health, and Nursing ethic committee, Gadjah Mada University (Ref: KE/FK/0020/ EC/2019). Altogether, 98 HD patients in a hospital in Yogyakarta, Indonesia, were recruited through purposive sampling with inclusion and exclusion criteria. Signed informed consent was obtained from all participants. The inclusion criteria were as follows: 1) patient undergoing HD for ≥ 3 months; 2) age of ≥ 18 years; and 3) fluent in the Indonesian language. They were excluded if they: 1) were unable to write, read, or speak; 2) lost consciousness; and 3) had a psychotic disorder.

The Self-Efficacy for Restricting Dietary Sodium in Hemodialysis Scale is an instrument for measuring the self-efficacy score for restricting dietary sodium among HD patients introduced by Clark-cutaia et al. (2014). We have obtained permission from the instrument's developer to use this instrument. This questionnaire comprises 15 questions covering self-efficacy in the ability to follow a general HD diet, limiting consumption of fast food and high-salt diet, and limiting fluids. Self-efficacy scores using the Visual Numeric Scale (VNS) ranging from 0 to

Table 1. The Original Instruments and Translations

Original Instrument	Translation Instrument in Indonesia
How confident are you that in the next month, you will be able to …	**Seberapa yakin anda bahwa dalam sebulan ke depan, anda dapat …**
follow the dialysis diet in general?	mengikuti diet dialisis dengan baik?
control the amount of salt that you eat?	mengendalikan jumlah garam yang yang anda makan?
limit the number of fluids that you drink?	membatasi jumlah cairan yang anda minum?
avoid the amount of canned food that you eat?	menghindari makanan kalengan yang anda makan?
avoid adding table salt to your food?	menghindari menambahkan garam meja pada makanan anda?
limit the amount of processed meat (such as bacon and luncheon meat) that you eat?	membatasi jumlah daging olahan yang anda makan?
read food labels so that you know how much salt is in your food?	membaca label makanan sehingga anda mengetahui seberapa banyak garam yang ada dalam makanan anda?
limit the amount of weight that you gain from fluid between dialysis treatments?	membatasi kenaikan berat badan sebelum dan setelah hemodialisis?
limit salty snacks?	membatasi snack yang asin
limit the number of times each week you eat at fast food restaurants?	membatasi makan di restoran cepat saji setiap minggunya?
How confident are you that in the next month, you can limit your salt intake when you are …	**Seberapa yakin anda bahwa dalam sebulan ke depan anda dapat membatasi asupan garam saat …**
feeling blue or depressed?	merasa sedih atau depresi
experiencing a day when your appetite is poor?	mengalami hari di mana Anda tidak punya nafsu makan?
How confident are you that in the next month, you can limit your salt intake on…..	**Seberapa yakin Anda bahwa dalam sebulan ke depan anda dapat membatasi asupan garam pada saat …**
dialysis treatment days?	perawatan cuci darah?
weekdays when you have no dialysis treatments?	hari kerja saat Anda tidak melakukan cuci darah?
weekend days when you have no dialysis treatments?	akhir pekan ketika Anda tidak melakukan cuci darah?

100 with the addition of 10 points, with 0 indicating not confident and 100 indicating very confident. The score is calculated based on the average on each subscale/factor I, II, and III. Then, we determined the final score, which is the average of the scores of each subscale, with greater score indicating a higher self-efficacy for restricting salt consumption (Clark-cutaia et al., 2014).

All participants completed the Self-efficacy for Restricting Dietary Sodium in Hemodialysis Scale questionnaire developed by Clark-cutaia et al. (2014). The Indonesian version of the instrument was adapted in this study. This instrument has been translated into Indonesian through two language institutions by a sworn translator. The original instruments and translations can be seen in Table 1. The process was continued by conducting validity tests by experts and pilot testing on HD patients. For the content validity test of the instrument, four experts, including kidney and hypertension consultants, HD nurses, and nutritionists, were involved. Then, the instrument was tested on 45 HD patients. The validity and reliability tests showed good results with S-CVI of 0.90, I-CVI of 0.80, and overall Cronbach α of 0.88 (0.74, 0.88, and 0.67 for factors I, II, and III, respectively). Independent t-test, Pearson correlation, and linear regression were performed to analyze the relationship between self-efficacy and patient characteristics. Data collection involved a research assistant who reads the questionnaire to the patients and the patient stated a score based on their condition. This method was performed due to the limited hand movement of the patient during HD. The process of filling out this questionnaire took approximately 5 minutes.

Results

Altogether, 98 patients (male n = 59; 60.2%; female n = 39; 39.8%), with a mean age of 50.11 ± 1.29 years participated in this study. Eighty-one patients were married (82.7%) and 17 were single (17.3%). The mean HD duration was 3.38 ± 3.36 with the common cause of HD being hypertension (n = 61; 62.2%) and diabetes mellitus (DM) (n = 32; 32.7%). Most of the patients undergo HD therapy twice a week

Table 2. Characteristics of the Study Participants

Respondent Characteristics		n	%	Mean ± SD
Sex	Male	59	60.2	
	Female	39	39.8	
Age (years)				50.11 ± 1.29
Medical History	Hypertension	61	62.2	
	Nonhypertension	37	37.8	
	DM	32	32.7	
	Non-DM	66	67.3	
Duration undergoing Hemodialysis (years)				3.38 ± 3.36
Hemodialysis Frequency	1x/ week	3	3.1	
	2x/ week	95	96.9	
Educational Status	Primary-high school	70	71.4	
	College	28	28.6	
Occupation	Not working/ retired	61	62.2	
	Working	37	37.8	
Marital Status	Single	17	17.3	
	Married	81	82.7	
Blood Pressure	Normal	14	14.3	
	Hypertension	84	85.7	
IDWG (kg)				2.64 ± 2.40

Table 3. Correlation Between the Score of Self-Efficacy for Restricting Salt Consumption Using the Self-Efficacy for Restricting Dietary Sodium in Hemodialysis Scale and Participants' Characteristics

Respondent Characteristics		Self-efficacy score (Mean ± SD)	p	r
Sex [α]	Male	72.23 ± 14.96	0.278	
	Female	75.57 ± 14.65		
Age[β]			0.000**	0.384
Medical History [α]	Hypertension	73.38 ± 14.40	0.882	
	Nonhypertension	73.84 ± 15.74		
	DM	73.05 ± 15.67	0.817	
	Non-DM	73.79 ± 14.55		
Duration Undergo Hemodialysis[β]			0.004**	−0.287
Hemodialysis Frequency [α]	1x/ week	67.81 ± 21.57	0.499	
	2x/ week	73.74 ± 14.72		
Educational Status [α]	Primary-high school	74.69 ± 15.28	0.230	
	College	70.69 ± 13.55		
Occupation [α]	Not working/ retired	75.04 ± 14.99	0.203	
	Working	71.09 ± 14.47		
Marital Status [α]	Single	70.79 ± 15.42	0.402	
	Married	74.13 ± 14.76		
Blood Pressure[α]	Normal	73.43 ± 17.63	0.973	
	Hypertension	73.57 ± 14.46		
IDWG[β]			0.008**	−0.267
Total		73.56 ± 14.85		

**Correlation is significant at the 0.01 level (2-tailed); [α]Independent t-test; [β]Pearson Correlation

Table 4. Regression Analysis of Self-Efficacy, Age, Hemodialysis Duration, and IDWG

Independent variable	Dependent variable	R^2	Adjusted R^2	*F*	Standard error	t	*p*
Age Duration undergoing hemodialysis IDWG	Self-efficacy for restricting salt consumption	0.211	0.186	8.376	8.054	8.187	0.000*

* Correlation is significant at the 0.01 level (2-tailed)

(n = 95; 96.9%), whereas three (3.1%) received HD once a week. The highest educational level of most participants was primary high school (n = 70; 71.4%). Mostly, the participants were not working (n = 61; 62.2%); however, 37 participants (37.8%) were still working. During the study, most of the participants had hypertension (n = 84; 85.7%), whereas 14 (14.3%) had a normal blood pressure. The characteristics of the study participants are presented in Table 2.

As shown in Table 3, the participants' self-efficacy score specific to salt restriction was 73.56 ± 14.85. The self-efficacy score of most participants were > 70. Contrarily, the self-efficacy score was < 70.00 in the participants on HD once a week (67.81 ± 21.57). In the bivariate analysis, age (r = 0.384), HD duration (r = −0.287), and IDWG (r = −0.267) were found to be significantly correlated with self-efficacy. Moreover, the participants' self-efficacy scores specific to restricting salt consumption was not significantly different among the patients stratified by sex, medical history, HD frequency, educational status, occupation, marital status, and blood pressure. However, a significant correlation was noted between the participants' self-efficacy scores specific to restricting salt

consumption and age, HD duration, and IDWG ($p = 0.000$; 0.004; and 0.008).

Moreover, a multivariate analysis was performed to analyze the relationship between self-efficacy and patient characteristics. Age, HD duration, and IDWG were found to contribute to self-efficacy for restricting salt consumption by approximately 21% (Table 4). A positive r value indicates a positive correlation, whereas a negative r value indicates a negative correlation between variables. The present study found a positive correlation between age and self-efficacy for restricting salt consumption, indicating that the older their age, the higher the patients' self-efficacy for restricting salt consumption. Contrarily, HD duration and IDWG showed a negative correlation with self-efficacy for restricting salt consumption, indicating that the longer the HD duration and the higher the IDWG, the poorer the patient's self-efficacy for restricting salt consumption.

Discussion

Overall, HD patients who participated in this study had a mean self-efficacy score of relatively moderate, which was different from the finding of a previous study conducted in Pennsylvania, which reported a high level of self-efficacy score for restricting salt consumption (Hu et al., 2019). This self-efficacy score was still not optimal as compared with those of the other studies, which is probably related to several things, including the number of high-sodium fast food intake and cultural habit of consuming tasteful foods (Biruete et al., 2017; Sakir et al., 2024). There was also no practical guidance and strategies for restricting salt consumption among HD patients (Meuleman et al., 2018). Contrarily, people in developed countries already have a habit of limiting salt consumption because of government support in terms of policy (World Health Organization [WHO], 2020).

Our study findings showed that age has a positive correlation with self-efficacy, which means that older patients have better self-efficacy for restricting salt consumption due to the different lifestyles among patients. In line with the results of a previous study, younger people had higher sodium intake and showed lower self-efficacy in their ability to restrict dietary sodium (Clark-cutaia et al., 2014; Nerbass et al., 2014). Another study also demonstrated that younger patients lacked goal setting and strategies to limit salt consumption, especially because of their "eating out" habit (Meuleman et al., 2018). Contrarily, older patients had lower salt consumption and lower IDWG, reported fewer problems, and also had better self-efficacy for restricting salt consumption (Clark-cutaia et al., 2014).

IDWG was found to be significantly correlated with self-efficacy for restricting salt consumption. Self-efficacy, known as a perceived ability, contributes to the success of developing self-management behaviors, including medication adherence and dietary regulation compliance, among patients (Wild et al., 2017). However, in the present study, the participants' self-efficacy score specific for restricting salt consumption was lower than that of developed countries. Salt consumption can cause an increase in plasma osmolality, resulting in thirst and increased fluid consumption and impacting IDWG (Colson et al., 2018). Patients with more IDWG had lower self-efficacy for restricting dietary sodium (Clark-cutaia et al., 2014). The present study shows that the HD duration was negatively correlated with self-efficacy. Having a machine-dependent life may significantly influence the daily lifestyle of patients, and long-term treatment might increase their stress levels (Tu et al., 2014).

Moreover, the results of the multivariate analysis showed that age, HD duration, and IDWG contribute to self-efficacy for restricting salt consumption by approximately 21%. Self-efficacy is a set of self-beliefs in their action to meet specific goals and also in-between knowledge and self-care (Bandura, 2018; Wu et al., 2016). Enhancing self-efficacy has many advantages for improving the health outcomes of

patients with chronic disease (Cutler et al., 2018; Fors et al., 2018; Willis, 2016). However, each patient has a unique background, which should be considered when exploring strategies to enhance self-efficacy (Farley, 2019). Nurses, which are among the patients' support systems, have an important role in developing an appropriate approach for enhancing self-efficacy among HD patients with younger age, longer HD duration, and more IDWG. However, further research is needed in the future to identify and include additional variables that might better explain patient self-efficacy. This could involve qualitative studies to uncover new factors or expand the scope of quantitative studies to include a broader range of potential predictors.

Self-efficacy for restricting salt consumption is associated with various factors, including knowledge of the health risks associated with high salt consumption, social support, access to low-salt food options, and personal habits (Alhazmi et al., 2024). Individuals well-informed about the dangers of excessive salt consumption and who have received strong support from family and peers are more likely to feel confident that they can successfully reduce their salt consumption. Additionally, access to healthier food choices and learning from past experiences can enhance one's self-efficacy. Motivation and commitment to personal health also play a crucial role, making tailored interventions that address these factors essential to ensure successful reduction of salt consumption.

Contrarily, no significant relationship was observed between sex, health history, frequency of HD therapies, educational status, employment, marital status, and blood pressure and self-efficacy for limiting salt consumption among HD patients. It may be due to the complex and multifactorial nature of self-efficacy. Contrarily, previous research has shown that reduced salt consumption among dialysis patients was associated with meal preparations at home (Uchida et al., 2024). According to Bandura's Social Cognitive Theory, self-efficacy is formed by the interaction of personal experience, social modeling, and verbal persuasion (Bandura, 1997). This may be the reason for the lack of association between some demographic characteristics and self-efficacy for limiting salt consumption. The study data showed that there were more male respondents than female respondents. Based on the data obtained from the Ministry of Health Republic Indonesia (2017), the prevalence of CKD is 0.1% greater in men, with smoking considered as the related factor of progressive damage of the glomeruli. This finding is closely related to the results showing that cardiovascular function exacerbates kidney damage (International Society of Nephrology [ISN], 2017). Besides that, alcohol drinking habits can also affect the function of the kidneys, especially in fluid and electrolyte regulation, and disruption of hormone regulation by the kidneys (Koning et al., 2015).

The respondents' mean age in the present study was approximately 50 years. In line with these results, aging was related to a higher risk of CKD development due to a decrease in GFR each year (Indonesian Renal Registry [IRR], 2017). Increasing age also causes the decrease of the muscle mass of the kidneys, affecting both kidney structure and function, causing CKD, and further requiring HD therapy (Ortiz et al., 2022).

Most of the respondents had hypertension and DM, which are considered as comorbidities or positive medical history. Additionally, hypertension and DM are the risk factors for CKD (Ghaderian & Beladi-Mousav, 2014). This is also in accordance with IRR data (2017) showing that approximately 51% and 21% of CKD patients have hypertension and DM, respectively. A greater number of CKD patients experience hypertension after CKD diagnosis as compared to the number of patients with CKD due to hypertension, whereas DM is mostly the cause or medical history of CKD (Chang et al., 2016). The large number of HD patients with hypertension and DM can be due to the progressive kidney damage caused by the disturbances in the renin–angiotensin–aldosterone

system, which is also related to blood pressure regulation (Pugh et al., 2019). Hypertension in CKD patients is often referred to as resistant hypertension because patients require more than one anti-hypertensive drug and the blood pressure can still increase when the patients experience hypervolemia (Fay & Cohen, 2021). The present study shows that the respondents' mean IDWG was > 2.5 kg, which could be caused by low adherence of patients to fluid restriction, thirst, and self-efficacy (Wahyuni et al., 2019). Compliance with fluid restriction and thirst are related to salt consumption, which can cause an increase in plasma osmolality resulting in increased thirst, fluid consumption, and IDWG (Colson et al., 2018).

The educational level of most respondents was primary high school. In Indonesia, most HD patients have a low educational level or do not go to school (Liu et al., 2021). In other studies, most HD patients have secondary to tertiary educational levels (Jansen et al., 2014; Jenssen et al., 2015; Kiajamali et al., 2017). This situation indicates that a higher educational level will impact patient literacy and awareness of related diseases and decision-making about health (Jenssen et al., 2015).

The disease condition requires HD patients to actively manage the disease and choose an appropriate diet. Nurses who frequently meet patients are expected to be able to influence patients by providing education on managing patient salt consumption to influence their self-efficacy. To increase the level of self-efficacy among HD patients, the development of effective salt consumption restriction strategies needs to be developed, especially on younger patients, those with longer HD duration, and those with more IDWG. Actively reaching out to the family and social environment, such as identifying the person who cooks at home and providing nutritional/dietary guidance, is needed to enhance the reduction of salt consumption.

The limitation of this study is the possibility of bias in reporting patient self-efficacy. Hence, further research needs to be supported by objective assessments, such as identifying the serum sodium level of the patients.

Conclusion

Our study provides primary evidence that age, HD duration, and IDWG were associated with patients' self-efficacy for restricting salt consumption. Our study results suggest that nurses could promote an appropriate approach to improve the self-efficacy of patients with younger age, longer HD duration, and more IDWG. It is necessary to perform further research in this area and develop innovative interventions for the patients to improve their self-efficacy by restricting salt consumption. Moreover, a randomized controlled trial study is needed to generate useful interventions for evidence-based practice, especially for restricting salt consumption in HD patients.

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