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The effect of therapeutic regimen education on improving the self-efficacy in cancer patients undergoing haemodialysis: a quasi-experimental study

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ABSTRACT

Introduction: Cancer treatments often comes with varying adverse effects on both functional and physiological status of cancer patients, such as reduced kidney function, necessitating haemodialysis. The aim of this study was to determine the effect of therapeutic regimen education on the treatment self-efficacy of cancer patients undergoing haemodialysis.

Methods: This study used a quasi-experimental method, involving 136 participants divided into control and intervention groups. The intervention group was given therapeutic regimen education that lasted for 4 weeks. The self-efficacy score was measured before and after intervention in both groups. Pre- and post-intervention scores were measured using the Chronic Kidney Disease Self-Efficacy instrument (r = 0.845). Paired t-test and independent t-test were used, respectively.

Results: The results show that the patients who received therapeutic regimen education had significant increases in self-efficacy scores ($p < 0.001$). The mean (SD) score for all sub-variables increased after treatment: autonomy, from 15.07 (4.29) to 26.50 (1.74); personal integrity, from 11.63 (3.92) to 23.68 (2.59); problem-solving, from 10.66 (3.98) to 18.85 (0.82); and seeking social support, from 7.13 (2.38) to 14.06 (1.62). From the statistical test results, a significant difference in each dimension of self-efficacy was found between before and after treatment ($p < 0.001$). When the post test scores between intervention and control were compared, it showed significant different between them ($p < 0.001$).

Conclusions: Therapeutic regimen education can increase treatment self-efficacy in cancer patients undergoing haemodialysis treatment, which can affect the patient's healing process.

Keywords: cancer patients, haemodialysis, self-efficacy, therapeutic regimen education

Introduction

Cancer is one of the main causes of morbidity and mortality worldwide, with an estimated 19.3 million new cancer cases and nearly 10 million cancer-related deaths. At Dharmais Cancer Hospital, 6,135 new patients in the outpatient unit were recorded in 2022. Based on the patient medical records in its out-patients cancer clinic, breast cancer patients accounted for the highest percentage (62%) of cancer patients in the second quarter of 2022, followed by those with nasopharyngeal cancer (8%), colon cancer (7%), and cervical cancer (6%). Currently, there are several cancer therapy options available, including surgery, radiotherapy, chemotherapy, or a combination of these therapies (Debela et al., 2021). As a consequence of these treatments, cancer patients experienced various functional and physiological side effects which include hematological, heart, and nephrotoxic problems (Altun

& Sonkaya, 2018; Aslam et al., 2014). A study in France investigating the severe adverse effects suffered by cancer patients revealed 5.8% of the population experienced renal and urinary disorders (Ingrand et al., 2019). Patients with renal complications often require additional treatment, including undergoing hemodialysis.

The number of cancer patients undergoing hemodialysis is increasing every year. At Dharmais Cancer Hospital, 262 patients underwent hemodialysis in 2018. This number almost doubled in 2022, where 431 patients underwent hemodialysis, not including those undergoing the treatment outside of the hospital clinic. The cancer treatment puts a burden on patients and hemodialysis adds to the burden both physically and financially (Husebø, et al., 2023; Irragori et al., 2021). By observation, many patients feel greatly burdened by having to undergo hemodialysis twice a week during their treatment course with chemotherapy and radiotherapy. The perceived burden, along with other elements of treatment should factor into the patient's compliance against therapy and treatment regimen. Accordingly, one of such factors is the patient's self-efficacy. This is related to low treatment self-efficacy and uncertainty about the effectiveness of hemodialysis in reducing complications associated with impaired kidney function.

Bandura's self-efficacy theory emphasizes that patients' beliefs about their own abilities influence their feelings, thoughts, and motivation toward their actions and behaviors. Studies have shown that educational interventions based on self-efficacy have a positive effect on dietary treatment compliance and fluid restriction in patients undergoing hemodialysis (Ramezani et al., 2018), which leads to increased self-efficacy, treatment compliance, and improved quality of life (Xu et al., 2021). Nurses as the forefront health professional in cancer patients' care play an active role in assisting patients through nursing interventions to increase patients' self-efficacy.

The self-efficacy of cancer patients has been researched for many years. However, there is a knowledge gap regarding interventions that could positively impact the patients' self-efficacy in Indonesia. Therefore, the researchers suggested the need to investigate educational interventions that could effectively increase patients' self-efficacy. This study aimed to examine the effect of education intervention on treatment self-efficacy in cancer patients undergoing hemodialysis at the Dharmais Cancer Hospital.

Materials and Methods

Study design and setting

This research used a quasi-experimental study design in which study respondents received an intervention, thus the effect of the treatment was assessed. The quasi-experimental design used in this research was the non-equivalent control group design. The respondents were divided into a control group and an intervention group from which their responses were collected using questionnaires both before and after the intervention was given. The treatment regimen education curriculum was focused on providing scheduled education and supporting tools to increase understanding and compliance with therapeutic regimens. Hence, this study used a cross-sectional model in which the data were compiled from the observed results through the questionnaires.

Population and sample

The research was conducted in the hemodialysis room at Dharmais Cancer Center Hospital, Jakarta, from the first week of February 2023 to August 2023. The study respondents were selected from the patients registered at the hemodialysis room of Dharmais Cancer Center Hospital who satisfied the study inclusion criteria. Convenience sampling technique was used. The inclusion criteria were patients undergoing hemodialysis (HD) treatment in relation to cancer treatment; patients were on their first or second HD; and patients who were able to communicate effectively. Patients on their first or second HD treatment were chosen in consideration of their exposure to general health education during visits to better observe the difference between the control and intervention groups.

Accordingly, the same respondents would be required to complete questionnaires at two different times, namely before and after the intervention was given to the intervention groups. Therefore, the number of samples was determined using the paired numerical analytic formula (Dahlan, 2010). The study required 68 respondents for each group, resulting in 136 respondents in total.

Research Instrument

The independent variable of this research was the therapeutic regimen education, and the dependent variable was the self-efficacy. The therapeutic regimen education was comprised of two instruments namely, the program plan and educational tools as patient education instruments. Furthermore, a modified Chronic Kidney Disease Self-Efficacy (CKD-SE)

Table 1. Homogeneity Test According to Numerical Data on Respondent Characteristics

No.	Variable	N	Mean	SD	MD (95% CI)	t	df	p Value
1	Age							
	Intervention	68	49.18	15.44	6.5 (1.77–11.26)	2.71	134	0.07*
	Control	68	55.69	12.35				
2	Social Support							
	Intervention	68	28.57	7.99	−9.81 (−12.3 to −7.29)	-7.73	134	0.00*
	Control	68	18.76	6.75				
3	Self-efficacy							
	Intervention	68	42.96	13.32	0.19 (−4.38 to 4.76)	0.08	134	0.93
	Control	68	43.15	13.65				

*Significant at α = 0.05, with independent t-test

questionnaire was used as an instrument for assessing patient self-efficacy. The questionnaire consisted of six questions used to measure treatment compliance as the dependent variable. Sociodemographic statuses as the confounding variables were assessed using sociodemographic questionnaire which inquired the patient's age, education level, marital status, income, disease status (disease duration and time since diagnosis) and social support (the use of external assistance in hemodialysis attendance, motivation, dietary management, fluids, medication, and family support). The social support inquiry used seven statements on a 5-point Likert scale. The CKD-SE Questionnaire has been tested for validity and reliability with the result of 0.59±0.91 for validity and r=0.845 for reliability (Lenggogeni et al., 2021).

The respondents in both groups were then given a questionnaire that assessed self-efficacy using the CKD-SE instrument prior to receiving the intervention. Furthermore, in the control group, the patients were given general health education as per the hospital's protocol before and after the treatment. For the intervention group, the patients were given the treatment regimen education as per the researchers' program plan. The program consisted of four session spanning four weeks). The patients in the intervention group were given education about hemodialysis, interdialytic weight gain, Benson's relaxation technique, and a booklet (list of activities, food and drink, and treatment schedule) in the first week. In the second week, the patients were showed an educational video and discussed the problems they encountered during the treatment. In the third week, the patients discussed their goals, their achievements in relation to their treatments, and were given support to set a treatment goal. Patients were expected to be able to practice a simple relaxation technique by the fourth week. The treatment re-evaluation was later conducted by distributing the questionnaires in the fourth week.

Statistic Analysis

The data were edited after collection to see the completeness of the questionnaire answers, and then coding and data entry were carried out based on the answers. Data cleaning, processing, and analysis were performed using the computer software. The univariate analysis was applied to all variables to gain characteristic description. Bivariate analysis was used to investigate the effect of therapeutic regimen education on patients' self-efficacy and the difference in score for self-efficacy

Table 2. Homogeneity Test According to the Categorical Data of the Respondents' Characteristics

Characteristic	Control (n=68)	Intervention (n=68)	p Value
	n (%)	n (%)	
Sex			
Female	41 (46.6)	47 (53.4)	0.37
Male	27 (56.3)	21 (43.8)	
Level of Education			
Primary School	12 (63.2)	7 (36.8)	0.20
Junior High School	12 (66.7)	6 (33.3)	
High School	34 (44.7)	42 (55.3)	
University	10 (43.5)	13 (56.5)	
Marital Status			
Married	67 (52.3)	61 (47.7)	0.06
Not yet	1 (12.5)	7 (87.5)	
Income			
≤Regional Minimum wage (IDR 4,6M)	57 (49.1)	59 (50.9)	0.81
>Regional Minimum wage (IDR, 4,6M)	11 (55.0)	9 (45.0)	
Disease Duration			
<1 year	5 (31.3)	11 (68.8)	0.18
≥1 year	63 (52.5)	57 (47.5)	
Type of Cancer			
Gynaecological	28 (50.9)	27 (49.1)	1.00
Non-gynaecological	40 (49.4)	41 (50.6)	

*Significant at α = 0.05, with independent t-test

Table 3. Changes in Self-efficacy Scores Before and After Therapeutic Regimen Education

Variable	Group	Mean	SD	MD (95% CI)	T	df	p Value
Self-efficacy	**Intervention**						
	Before	42.96	13.32	−40.16	−24.58	67	0.000*
	After	83.12	6.112	(−43.42 to −36.90)			
	Control						
	Before	43.15	13.65	−33.76	−19.93	67	0.000*
	After	76.91	1.88	(−37.14 to −30.38)			

*significant at p<0.05, with paired t-test

before and after the intervention. The type of bivariate analysis used was decided according to the distribution of the collected data; the paired t-test would be used for normally distributed data. The post-test scores between intervention and control were compared with independent t-test.

Ethical Consideration

This study complied with the ethical principles of research. This study has gone through ethical testing at Dharmais Cancer Center Hospital, Jakarta, and has been approved with the approval No: 074/KEPK/II/2023.

Results

The homogeneity and normality tests were performed to test the data distribution of each variable. The homogeneity test was the Levene test (significant at p>0.05). The test result in Table 1 shows that the age and social support variables in the intervention and control groups were not equal (p < 0.05). The mean (SD) age in the control group was older (55.69 [12.35] years vs. the intervention group (49.18 [15.44] years). The mean (SD) social support score in the control group was lower (18.76 [6.75]) than that of the intervention group (28.57 [7.99]).

Table 2 shows that 88 respondents were women, 46.6% of whom were in the control group and 53.4% were in the intervention group. Most respondents had a high school education, but the percentage in the intervention group was higher (55.3%) than that in the control group (44.7%). Most respondents were married, with the control group having a higher percentage of married respondents (52.3%) than the intervention group (47.7%). A total of 116 respondents had incomes lower than the regional minimum wage, while 20 respondents had incomes higher than the regional minimum wage. Most respondents have had cancer for more than one year, with 63 in the control group and 57 in the intervention group. More respondents were diagnosed with non-gynecological cancer (81 respondents) than gynecological cancer (55 respondents). An equality analysis based on the homogeneity test revealed that the intervention and control groups had equality based on gender, educational level, marital status, opinion, illness duration, and type of cancer among the respondents before treatment.

Data were analyzed using paired t-test to examine the significance of the difference of means before and after the intervention. Table 3 shows that, before treatment, the intervention group had a lower mean (SD) self-efficacy score than the control group (42.69 [13.32] vs. 43.15 [13.65]). After the intervention, the self-efficacy score increased significantly in both groups but were higher in the intervention group than in the control group (83.12 [6.112] vs. 76.91 [1.88]). The analysis result was that both control group and

Table 4. Changes in Self-efficacy Scores in the Sub-variables of Autonomy, Self-Integration, Problem-Solving, and Seeking Social Support Before and After the Therapeutic Regimen Education (n = 68)

Sub-variable	Intervention Group	Mean	SD	MD (95% CI)	t	df	p Value
Autonomy	Before	15.07	4.290	−11.42	−21.9	67	0.000*
				(−12.46 to −10.36)			
	After	26.50	1.740				
Self-integration	Before	11.63	3.920	−12.01	−22.16	67	0.000*
				(−13.1 to −10.93)			
	After	23.68	2.590				
Problem-solving	Before	10.66	3.980	−8.19	−17.12	67	0.000*
				(−9.14 to −7.23)			
	After	18.85	0.820				
Seeking Social Support	Before	7.13	2.380	−6.93	−21.06	67	0.000*
				(−7.58 to −6.27)			
	After	14.06	1.620				
Total	Before	42.96	13.32	−40.16	−24.58	67	0.000*
				(−43.42 to −36.90)			
	After	83.12	6.112				

*significant at p<0.05, with paired t-test

Table 5. Differences in Mean Self-efficacy Scores After Education on Therapeutic Regimens and Differences in Self-efficacy Scores Between the Intervention and Control Groups

Variable	Group	Mean	SD	MD (95% CI)	t	df	p Value
Self-efficacy	**After**						
	Control	76.91	1.88	−6.206 (−7.74 to −4.67)	−8.0	134	0.000*
	Intervention	83.12	6.11				
	Difference						
	Control	33.76	13.96	−6.397 (−11.05 to −1.74)	−2.71	134	0.007*
	Intervention	40.16	13.47				

*significant at α 0.05, with independent t-test

intervention group showed a significant difference in self-efficacy scores after education ($p < 0.001$).

Table 4 shows that, after treatment in the intervention group for four weeks, the self-efficacy scores increased for the following sub-variables: autonomy, self-integration, problem-solving, and seeking social support. The mean (SD) score for the following sub-variables increased after treatment: autonomy, from 15.07 (4.29) to 26.50 (1.74); personal integrity, from 11.63 (3.92) to 23.68 (2.59); problem-solving, from 10.66 (3.98) to 18.85 (0.82); and seeking social support, from 7.13 (2.38) to 14.06 (1.62). From the statistical test results, a significant difference in each dimension of self-efficacy was found between before and after treatment ($p < 0.001$). For overall dimension the self-efficacy scores increased significantly ($p < 0.001$).

Discussions

This study aimed to investigate the effect of therapeutic regimen education on the self-efficacy of cancer patients undergoing hemodialysis treatment related to their cancer diagnosis. This study was conducted to 136 participants divided into two groups (intervention and control group). The study was conducted between March and August 2023. Patients in the control group were undergoing treatment as per the hospital protocol, while the patients in the intervention group received an intervention model aimed to improve patients' self-efficacy in undergoing hemodialysis treatment.

In this study, therapeutic regimen education was selected as the intervention method. The initial session emphasized the importance of treatment self-efficacy and compliance through delivering knowledge on hemodialysis using audio visual media, followed by delivering relaxation guidance using Benson's method. The patients received a booklet detailing activities, dietary guidelines, and treatment schedules. The pivotal first session aimed to motivate patients toward a better life. Subsequent weeks involved patients sharing their challenges, collaboratively problem-solving with nurses in the second week, and setting goals in the third week. This approach provided patients with the necessary information to adhere to the prescribed treatment.

Cancer patients' sociodemographic characteristics

This study recruited 136 participants with 68 participants in each control and intervention group. More than 50% of the participants were female. However, more were diagnosed with non-gynecological cancer than gynecological cancer. These results were consistent with the research on cancer incidence in Asia by Huang et al. (2022) which showed that more countries presented increasing trends of cancer incidence in women. The research also highlighted, that greater incidence of lung cancer and gastrointestinal cancer was reported than gynecological cancer. With the shift to an urban lifestyle, long-term exposure to air pollution (Gabet et al., 2021), and higher awareness of cancer detection, it is expected the rate of incidence to remain at the increasing trends in Indonesia.

This study findings also showed most participants were married and had low to mid-level income. More married patients being diagnosed by cancer has been consistently observed in most research in Indonesia. This phenomenon was in part factored by the influence of eastern culture in Indonesia which favors earlier marriage. More presentation of patients coming from low to mid-income was expected as well, as Indonesia is a middle-income country according to the World Bank.

Self-Efficacy of Cancer Patients Undergoing Hemodialysis Therapy

This study found that the self-efficacy of the cancer patients in both groups was below the middle score (on a scale of 100) in which the control group's self-efficacy mean score was 43.15 and 42.96 in the intervention group. As observed in Table 3, the mean score of the intervention group was also lower than the mean score of self-efficacy in the control group. This result was similar to the study of Wasalamah, Alim, and Widyandana (2022). which showed that the intervention group had lower self-efficacy scores than the control

group before the intervention was given Low levels of self-efficacy in patients undergoing hemodialysis was also observed in another study in Egypt (Qalawa, Eltahry, & Aly, 2022). The low level of self-efficacy might be a result of a number of factors. The lack of adequate knowledge about the therapy, its use, and how it factored to the cancer treatment that they were undergoing could be an influence. Moreover, as hemodialysis put a burden to the patients' physiological status and financial situation, the prospect of having to undergo such treatment continuously should prove to be daunting.

The adverse effects of the therapy, such as nausea, fatigue, and loss of appetite, could affect the patient's level of self-efficacy in terms of treatment compliance and quality of life (Kurt & Sarikaya, 2022). In a research conducted by Suryani et al. (2023), it was stipulated that self-efficacy is the strongest predictor of self-management among patients. Therefore, self-efficacy can be recognized as the beliefs and confidence that motivate the patients to see through the treatment they are receiving whilst having the awareness necessary regarding the treatment.

Self-Efficacy Score Differences in the Intervention Group Before and After Intervention

This study employed the therapeutic regimen education model as the intervention with the purpose to increase the self-efficacy of cancer patients undergoing hemodialysis therapy. In the intervention group, the patients were educated based on the guidelines and schedule created. After the self-efficacy was measured, the results were analyzed using the paired t-test to investigate the difference in means of self-efficacy in the control and intervention group before and after the intervention. The result of the analysis is described in Table 3. As shown, it can be stipulated that there was a statistically significant increase in self-efficacy scores after the intervention, with the intervention group scoring higher than the control group.

The result of this study signified that the therapeutic regimen education had a positive effect on patients' self-efficacy in undergoing the hemodialysis treatment. A study in India found that an adequate level of self-care knowledge given through an education model as cancer patients undergo their treatment proved to raise the self-efficacy of cancer patients to a higher level (Sivakumar & Susila, 2021). Another study in Saudi Arabia also supported this study's findings, stipulating that health education improves the self-efficacy of patients (Yakout et al., 2023). Therapy regimen education as part of the health education model provided patients with much-needed knowledge to help them navigate through the treatment they were undergoing. With sufficient knowledge, patients would be able to recognize the purpose of the treatment, the challenges they were facing, and the methods they could use to overcome them. This should factor into the increased self-efficacy levels after the intervention was given.

In addition, this study result also showed a significant difference in means score on all four sub-variables of self-efficacy investigated in the study. As shown in Table 4, the intervention group experienced an increase in autonomy, self-integration, problem-solving skills, and social support seeking behavior after the intervention. Similar findings were gained in a study conducted by El-Metwaly et al. (2017) that demonstrated the value of each sub-variable of self-efficacy increased in the intervention group after educational intervention. Therefore, the researchers believed that the education model used in this study had the adequate design to improve all sub-variables of self-efficacy to achieve a higher level of self-efficacy. Good self-efficacy is needed by cancer patients in treatments such as chemotherapy, surgery, radiation and other treatment. Low level of self-efficacy could lower the patients' readiness to face challenges in their illness journey (Nuraini et al., 2023). Additionally, patients' self-efficacy can further influence their behavior through cognitive processes (such as planning for the future) and motivational processes (such as increased commitment to goals), as well as potentially disruptive affective processes (Suryani et al., 2023).

Furthermore, this study's results showed a statistically significant difference in pre-test and post-test self-efficacy scores, with the intervention group showing a greater difference than the control group (Table 5). A recent study by Ramezani et al. (2019) found similar phenomenon where the intervention group had a statistically significantly higher self-efficacy score than the control group. It can be inferred from the results that the therapeutic regimen education substantially improves self-efficacy.

While the general education did provide improvement as the patients in the control group underwent more treatments, the therapeutic regimen education was shown to have a more positive effect. The positive effect of the therapeutic regimen education might be derived from the more comprehensive and supportive model of learning, as well as the design of the education model that provided patients in the

intervention group with an additional instrument to discuss challenges and problem-solving methods. A study of unmet supportive needs in Indonesia found that illness and side effect information, information on how partners can support cancer patients as well as methods to reduce the patients' stress were reported by cancer patients' partner as unmet supportive needs (Afiyanti et al., 2021). The education program used in this study could provide relief to these unmet needs, assisting the change in how patients and caretaker view the illness and its entails which could affect existing beliefs and built confidence that improves self-efficacy.

Therapeutic educational interventions are multidimensional strategies that improve self-management skills and treatment engagement, reduce complications, and provide health and financial benefits for patients with chronic diseases (Champarnaud et al., 2020; Taibanguay et al., 2019). Therapeutic regimen education is also a basic and long-lasting component for patients (Champannaud et al., 2020). It enables people with chronic illnesses to manage their illnesses, increasing self-efficacy, treatment compliance, and psychological health (Correia et al., 2023; Deif et al., 2015).

Cancer patients who must follow hemodialysis therapy experience various physical and psychological problems, which can affect their motivation to adhere to treatment. Nurses, as frontline care providers, play a role in assisting cancer patients to follow the treatment program. The therapeutic regimen education program that has been created in this study can be used as a guide for nurses to improve the self-efficacy and compliance of cancer patients, especially those who follow the hemodialysis program.

The study demonstrated that cancer therapeutic regimen education effectively enhanced treatment self-efficacy and compliance in patients undergoing hemodialysis. Given the severity of cancer and the additional challenge of hemodialysis, maintaining strong treatment self-efficacy and compliance is crucial. Nurses, as the patients' support, could provide assistance to address various challenges—physical, psychological, social, spiritual, and sexual—faced by cancer patients, requiring high motivation to access health services.

This study was conducted in a public hospital and cannot describe the self-efficacy of patients who went to private hospitals to receive treatment. This study also employed a small sample size, which restricts generalizing the cancer patients' self-efficacy. In addition, this study has not investigated other factors that may affect the self-efficacy of cancer patients undergoing hemodialysis treatment.

Conclusion

The general treatment self-efficacy scores and each sub-variable scores (autonomy, self-integration, problem-solving, and seeking social support) increased after therapeutic regimen education in the intervention groups. These results have statistical significance, indicating the effectiveness of the intervention. The effect of therapeutic regimen education on treatment self-efficacy showed a significant difference between the control and intervention groups after therapeutic regimen education was provided.

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Conflict of Interest

The authors declared they have no conflicting interest.

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