Impact of Nursing Educational Program on Knowledge, Drug- Drug Interaction and Psychological Stress, of Heart Failure Patients in Sulaimani Cardiac Hospital

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Abstract

Background: The inability of the heart to pump blood to meet the body's metabolic needs is known as heart failure. Psychosocial therapy can reduce the risk of heart attack in survivors of sudden cardiac arrest, but stress can increase symptoms of heart failure and cognitive impairments. Around the world, nurses are essential to health education, fostering good health outcomes, and improving the effectiveness of healthcare.

Aim: To assess the impact of nursing educational programs on psychological stress of heart failure patients in Cardiac Hospital in Sulaimani city.

Methods: A quasi-experimental design enrolled 200 patients with heart failure at the Cardiac Hospital in Sulaimani City. Two groups divided into interventional (n=100) and control (n=100), contributors finalized a full questionnaire covering socio-demographics, level of stress and knowledge about heart failure. The nursing education program entirely battered the interventional group. Data was collected through direct face to face interviews, and analysis used Statistic independent the Social Sciences version 26, independent t test and Chi square.

Results: The total Mean (SD) of age of both groups was 68.3 ± 11.2 years. 72% and 69% of both groups were male respectively. Each group initially had 100 patients, but the intervention group reduced to 94 and the control group to 90 due to death after the nursing educational program. 59%,65% of them were illiterate, 52%,50% were widow/er, and 33% of both groups lived alone, 48%, 50% of both intervention and control groups were married respectively while 67% of them lived with their spouses. 63%, 68% of them had a bad economic status.

Conclusions: Before the program, nearly all patients lacked information about heart failure, its pathophysiology, and drug-drug interactions. However, after the nursing educational program, a significant change was observed (P value $\leq$ 0.05). Nearly half of the intervention group and more than half of control groups experienced high levels of stress before the program. After the educational program, the stress level in the intervention group decreased to less than a quarter, while the control group's stress level increased to 54.4%. The implementation of the nursing educational program showed highly significant differences between the two groups (P value $\leq$ 0.05).

Keywords *Heart failure; Iraq; Medication safety; Psychological Stress; Patient education.*

Introduction

Heart failure (HF) is a major global health concern that affects both individuals and society. Measures such as hospital readmission rates, mortality rates, and healthcare costs can be used to quantify this burden. The key to preventing complications lies in having a proper understanding of the illness (Baeez & Younis, 2019).

The preservation of a patient's clinical stability is the primary objective of heart failure treatment. Educational programs created by multidisciplinary teams have shown success in achieving this goal. For patient education and continuity of care, nurses in HF clinics play an essential role (Östman et al., 2021). HF was listed as a cause of death on 379,800 death certificates (13.4%) in 2018. The estimated cost of healthcare expenditures for this condition, including lost workdays, prescription drugs, and medical services, totaled $30.7 billion (Benjamin et al., 2019). Researchers have speculated that patients with chronic heart failure (CHF) may have higher rates of depression, anxiety, and stress than those in high-income nations, based on research conducted in other low- and middle-income countries (Tsabedze et al., 2021). Iraq's non-communicable disease burden has increased since the 2003 war, with rapidly rising trends in hypertension and diabetes mellitus, which in turn elevate the risk of ischemic heart disease and cerebrovascular accidents (Hussain & Lafta, 2019).

Reduced quality of life (QoL) in HF patients is linked to longer hospital stays, higher mortality rates, and greater expenses for patients, families, and healthcare systems. Therefore, regular QoL evaluation and self-

care are essential to improving survival rates (Moradi et al., 2020). Even with advances in medical management, both physical and psychological distress significantly harm patients' quality of life and elevate adverse risk levels (Alpert et al., 2017; Jarab et al., 2023). Patients with cardiovascular diseases are more prone to drug–drug interactions because aspirin may block renal prostaglandins and compete with furosemide, reducing the diuretic effect (Akbar et al., 2021). To maximize patient care and improve therapeutic efficacy, pharmacists must stay up to date on food–drug interactions to prevent treatment failure or adverse effects (Yadav et al., 2020). Participation in continuing education initiatives can significantly improve the quality of life for individuals with heart failure, rendering such interventions beneficial and non-pharmacological (Lakdizaji et al., 2013).

The physical and psychological effects of HF symptoms are reflected in patients' QoL, making it a key component of HF management. Severe symptoms often hinder self-care (Heo et al., 2009). Symptoms of heart failure can impair quality of life by reducing exercise tolerance and increasing stress, anxiety, depression, and emotional disturbance (Lakdizaji et al., 2013). Approximately 75% of HF patients report poor QoL (Shojaei, 2008). As heart failure treatments and survival rates improve, enhancing QoL becomes increasingly important (Salehitali et al., 2009). According to a comprehensive review of 21 trials, HF contributes to social isolation, low QoL, and psychological distress. Improving self-care requires structured interventions such as in-person instruction, psychological support, and patient education. The greatest improvements in QoL are achieved when face-to-face instruction is combined with follow-up phone consultations (Cui et al., 2019).

Emotion-focused coping has been linked to harmful lifestyle choices such as medication misuse, smoking, alcohol consumption, and physical inactivity. These behaviors negatively affect health and increase mortality (Alsentali & Anshel, 2015). In contrast, problem-focused coping involves behavioral and cognitive strategies aimed at modifying or managing the stressor—such as joining social groups, adopting religious practices, or seeking help (Herman & Tetrick, 2009). Therefore, understanding the factors that influence survival among heart failure patients is essential for developing effective stress-reduction and coping strategies (Alsentali & Anshel, 2015).

Drug interactions are responsible for adverse effects in approximately 7.3% of hospitalized patients and up to 88% of elderly patients. For instance, due to their high potassium content, bananas have been shown to lower blood pressure. Patients with hypertension have demonstrated improvements following a seven-day Ambonese banana diet therapy. Additional research indicates that elderly adults with moderate hypertension can lower their blood pressure without medication by consuming two Ambonese bananas (140 g/fruit/day) daily

for one week. Since ACE inhibitors increase potassium—which regulates blood pressure—combining them with bananas can lead to hyperkalemia (Olivia & Suryana, 2018).

The current study aims to assess the impact of a nursing educational program on the psychological stress of heart failure patients in the Cardiac Hospital in Sulaimani City and to evaluate their knowledge regarding HF disease, its pathophysiology, and drug–drug and food–drug interactions.

Methodology

Design of the Study

Quantitative design a (quasi-experimental study) was used to assess impact of nursing educational program on psychological stress from heart failure patients in Cardiac Hospital in Sulaimani city. The study was carried out during the periods of 3rd August 2021 to 10th February 2024.

Administrative Approval

The protocol of the study approved by college of Nursing-University of Sulaimani, an official agreement letter from the College of Nursing - University of Sulaimani was sent to the Directorate of Health, Cardiac Hospital in Sulaimani city to grant facilitation and cooperation during carrying out of Nursing educational program.

The Study's Setting

This study conducted at Cardiac Hospital in Sulaimani city, which is the main hospitals for cardiac diseases. Cardiac Hospital in Sulaimani City- Iraqi Kurdistan region, serves as the primary institution for managing cardiovascular disease patients.

The Study Sample

Non-probability purposive sample was used as a method for selecting samples in this study. Patients who were admitted to the Cardiac hospital were diagnosed with HF by the cardiologists and they were invited to participate in the study. 200 patients participated in the study. The participants were divided into two groups 100 recruited for the interventional and 100 for the control group.

Criteria for Inclusion and Exclusion

The study included adults from 18 and above who diagnosed with HF with reduced ejection fraction (HFrEF), approved by a cardiologist teams. They retained the right to refuse or withdraw from the study. Exclusion criteria encompassed severe mental health problem.

Instruments of the Study

The study tool was composed of three parts, part one dealt with demographic data of patients with HF such as: age, gender, marital status, level of education, residential area, financial situation, part two is dealt with knowledge of HF and part three dealt with drug-drug and food-drug interactions before and after the nursing educational program.

Validity of the study

The data collection validity was established through a review process involving five experts. They evaluated and provided feedback on the study tool, leading to revisions that enhanced the instrument's final validity by making it more pertinent and comprehensible.

Pilot Study

It was conducted with 20 patients with HF from the initial study sample during the period of January 15th 2022.

Reliability of the study sample

The reliability was determined by the Cronbach Alpha Correlation Coefficient and Stability (test- retest) approach, producing a strong association (r = 0.85).

Approaches of data collection

All patients diagnosed with HF and admitted to the Cardiac hospital in Sulaimani City were included in this study sample. Data were collected through face-to-face interviews with the patients for their information. The data collection period spanned from March 26th, 2022. Completing the questionnaire about HF took approximately 10 minutes. More than 50 Patients did not match the inclusion criteria, 23 patients did not agree for participation in the study sample, finally 200 patients remained with HF for both intervention and control groups.

Statistical Analysis of the study sample

Version 26 of the statistical package of social science (SPSS) was used to code and organize the data into computer files. The inferential data analysis, and frequency and percentage computation and Chi square, independent t test were used to process the data.

Results

Table 3.1: Participants' socio-demographic and clinical characteristics (the own numbers are percentages)

Variables	Class	Interventional group F (%) N=100	Control group F (%) N=100	Total	P value

Age	**Mean ± SD**	67.3 ± 11.5	69.2 ± 10.8	68.3 ± 11.2	0.23 **
Gender	Male	72	69	141	0.64 *
	Female	28	31	59	
Educational level	Illiterate	59	65	124	0.62 *
	Primary & Secondary School	34	31	65	
	Institute & College	7	4	11	
Marital status	Married	48	50	98	0.78 *
	widower	52	50	102	
Living with	Alone	33	33	66	0.90 *
	Son, Daughter, Husband / Wife	67	67	134	
Economic state	Insufficient	63	68	131	0.46 *
	Barely sufficient	29	28	57	
	Sufficient	8	4	12	

* Performed by Chi- square test ** performed by independent t test

Table (3.1) demonstrated that the total number of HF patients were 200, their mean age (±SD) was 68.3 ± 11.2 years and the age range were between 38 – 100 years. No significant differences were detected in the mean age of the two study groups (p = 0.23 and 0.11 respectively). (72%, 69%) of both groups were males respectively. (52%, 50%) of both groups were widower respectively, and they live alone or with their children. While others were married and live with their wives or their husbands. The proportion of illiterate patients was higher in the control group than the intervention group (65% and 59%), respectively. In both groups non-governmental employee was a higher proportion of the study sample than governmental employee. Almost all of the patients of the intervention group (95%) were living in urban areas compared to (87%) of patients of the control group. (63%,68%) of both intervention and control groups were in low economic state, while, only (8%,4%) of them had sufficient economic state.

Table 3.2: Comparisons between both groups regarding knowledge of heart failure and drug-drug and food-drug interactions before and after the nursing educational program. (After program intervention group=94 and control group =90 HF patients)

Variable		Interventional group F (%)	Control group F (%)	P-value*
Do you have information about pathophysiology of heart failure ?				
Pre-test	No	98 (98%)	93 (93%)	0.170
	Yes	2 (2%)	7 (75)	
Post-test	No	28 (29.8%)	83 (92.2%)	0.001
	Yes	66 (70.2%)	7 (7.8%)	
Do you have information about symptoms of heart failure?				
Pre-test	No	97 (97%)	94 (94%)	0.498
	Yes	3 (3%)	6 (6%)	
Post-test	No	17 (18.1%)	84 (93.3%)	0.001
	Yes	77 (81.9%)	6 (6.7%)	
Do you have any information about drug- drug interaction?				
Pre-test	No	100 (100%)	100 (100%)	1
	Yes	0	0	
Post-test	No	29 (30.9%)	90 (100%)	0.001
	Yes	65 (69.15)	0	

* Performed by Chi- square test

Table (3.2) showed that preprogram almost patients in both intervention and control groups had no information about heart disease and its pathophysiology (98%,93%) respectively. Whereas, after the program only (29.8%) of intervention group and (92.2%) of control group had no information about heart disease. There was nobody of both groups had information about drug- drug interaction before the program, but after the program (30.9%) of intervention group had no information about it compared to control group, they were in the same previous level. The results indicate that before the program, there was no significant difference between the intervention and control groups in terms of knowledge about HF and physiopathology, signs of heart failure, and information regarding drug-drug interactions. However, after the intervention, there was a significant improvement in knowledge about HF and physiopathology, signs of HF, and information regarding drug-drug interactions in the intervention group compared to the control group at ($P \leq 0.001$).

Table 3.3: Comparisons between both groups regarding the use of analgesic drugs before and after the nursing educational program. (After program intervention group=94 and control group =90 HF patients)

Variable		Interventional group F (%)	Control group F (%)	P-value*
Do you use any of these analgesic drugs frequently for muscle & joint pain with your HF drugs?				
Pre-test	Yes	73 (73)	63 (63)	0.247
	No	10 (10)	17 (17)	
	Some times	17 (17)	20 (20)	
Post-test	Yes	40 (42.6)	61 (67.8)	0.001
	No	35 (37.2)	7 (7.8)	
	Some times	19 (20.2)	22 (22.4)	
Which analgesic do you use?				
Pre-test	Mobic	12 (13.3)	11 (13.2)	0.09
	Diclofenac	8 (9)	12 (14.4)	
	Paracetamol	12 (13.3)	13 (15.7)	
	Ibuprofen and Naproxen	21 (23.3)	19 (22.9)	
	I don't know their name	37 (41.1)	28 (33.8)	
Post-test	Mobic	6 (10.1)	13 (15.6)	0.001
	Diclofenac	3 (5.1)	1 (1.2)	
	Paracetamol	23 (39)	16 (19.3)	
	Ibuprofen and Naproxen	2 (3.4)	19 (22.9)	
	I do not know their name	25(42.4)	34 (41%)	

* Performed by Chi- square test

Table (3.3) illustrated that before the program (73%,63%) of both intervention and control groups used analgesic drugs respectively. While after the program (42.6%, 67.8%) of intervention and control groups consumed it. There was no significant difference between two groups before the program but a significant difference between both groups after the program. Most proportion of both groups were consumed Ibuprofen and Naproxen before program (23.3%, 22.9%), while after program only (3.4%) of intervention and (22.9%) of control group was consumed Ibuprofen and Naproxen. The results showed no significant difference in the variable of use any of these analgesic drugs before the implementation of the intervention program. But, following the nursing education course, a noteworthy distinction was noted between the two cohorts ($P < 0.001$).

Table 3.4: Comparisons between both groups relating to psychological distress by perceived stress scale before and after the educational program. (After program intervention group=94 and control group =90 HF patients)

Variable	Interventional group	Control group	Total	P-value

		F (%)	F (%)	F (%)	
Symptoms of psychological distress by (Perceived Stress Scale)					
Pre-test	High perceived stress	45 (45)	54 (54)	99 (99)	0.376
	Moderate stress	53 (53)	44 (44)	97 (97)	
	Low stress	2 (2)	2 (2)	4 (4)	
Post-test	High perceived stress	11 (11.7)	49 (54.4)	60 (32.6)	0.001
	Moderate stress	78 (83)	41 (45.6)	119 (64.7)	
	Low stress	5 (5.3)	0	5 (2.7)	

* Performed by Chi- square test

Table (3.4) showed that before the implementing nursing educational program (45%, 54%) of both groups has high level of stress and (53%, 44%) of them had a moderate level of stress respectively. While after the educational program, high level of stress from the intervention group decreased to (11.7%) but control group increased to (54.4%). There was no significant difference observed between the intervention and control groups before the educational program. following the nursing education course, a noteworthy distinction was noted between the two cohorts ($P < 0.001$).

Discussion

In this study, 200 patients with heart failure (HF) participated. Of these, 100 patients who received a nursing educational program constituted the intervention group, while the other 100, admitted to the cardiac hospital and receiving routine care, formed the control group. After the nursing educational program, the intervention and control groups decreased to 94 and 90 patients respectively because of mortality during the study period. The mean age was 68.3 ± 11.2 years, with an age range of 38–100 years. This outcome aligns with the findings of Lakdizaji et al. (2013) in Iran, who reported a mean age of 61.7 ± 9.4 years for their participants. In both the intervention and control groups of the present study, the majority of participants were male, similar to the results reported by Stavrianopoulos (2016) in Greece and by Lakdizaji et al. (2013) in Iran, where a higher proportion of male participants was also observed.

Nearly half of the participants in both the intervention and control groups were married, which agrees with the findings of Stavrianopoulos (2016) in Greece, who reported that slightly more than half of both groups were married. More than half of the widowed participants in both groups lived alone, and less than one-quarter lived with their children. Over half of both groups were illiterate, a finding that contrasts with Stavrianopoulos (2016), Akbari et al. (2019), and Lakdizaji et al. (2013), who found that high-school or elementary education levels were most prevalent among their participants. Additionally, more than half of the participants in the current study experienced low economic status (income less than expenditures), which corresponds with the findings of Akbari et al. (2019) in Tehran. The economic-status results of this study are also consistent with those of Lakdizaji et al. (2013) in Iran, where more than half of participants reported a low economic condition. Regarding living arrangements, the present findings mirror those of Lakdizaji et al. (2013), as nearly half of the participants in both studies lived with their spouses.

Before the nursing educational program, nearly all patients in both the intervention and control groups lacked knowledge about HF and its pathophysiology, including symptoms. None had information about food–drug or drug–drug interactions. After the program, the intervention group showed substantial improvement in understanding HF, its pathophysiology, symptoms, and drug interactions, with increases exceeding 50% for each domain. In contrast, the control group exhibited no change. Although no significant difference existed between the two groups prior to the program, a notable improvement was observed in the intervention group compared with the control group after the program ($p = 0.001$). These results differ from those of Gosadi et al. (2021), who reported that patients with chronic non-communicable diseases in the Jazan region of Saudi Arabia were more aware of their clinical and laboratory parameters. The researcher attributes the present findings to low literacy levels among HF patients, limited nursing education, and inadequate support for HF management. The findings are, however, consistent with Baeez and Younis (2019), who reported significant improvements in HF knowledge and health status among patients in Erbil City following implementation of an educational program.

Before the program, nearly half of the intervention group and more than half of the control group exhibited high perceived stress levels. More than half and nearly half of them, respectively, reported moderate stress, while only 2% of both groups had low stress. After the program, the proportion of highly stressed individuals in the intervention group dropped to less than one-quarter, whereas the proportion in the control group remained above

half. A significant difference in stress level between the two groups was observed (p = 0.001). These pre-program outcomes differ from the study by Bhagyalakshmi et al. (2012) in India, where no HF patients reported high stress levels; more than half had low stress, and almost half had moderate stress. The researcher reasoned that advanced age, chronic illness duration, and hospital-admission timing contributed to stress levels. In the current study, many participants were widowed, lacked emotional support, and experienced multiple comorbidities. Religious and emotional assistance were offered, recognizing the shared Muslim background of participants. Insufficient cooperation among hospital departments—particularly among cardiologists, psychiatrists, and pharmacists—and the lack of nursing management may have further contributed to elevated stress levels.

The present findings contradict a U.S. study by Endrighi et al. (2016), who reported that more than half of their patients exhibited high stress levels. Similarly, Năstasă and Fărcaş (2015) found that HF patients experience both physical discomfort and significant psychological stress that affect coping ability, leading to anxiety and depression and potentially impeding recovery. Chronic stress also produces physiological harm through neuroendocrine and metabolic alterations.

Before the educational program, analgesic drugs were used by nearly three-quarters of the intervention group and more than half of the control group. After the program, the intervention group showed a substantial decline in use (42.6%), while the control group's usage increased to more than half. No significant difference was found between the two groups before the program, but a significant difference emerged afterward (p = 0.001). Prior to intervention, nearly half of the intervention group and more than a quarter of the control group did not know the names of the analgesics they used. Fewer than one-quarter in each group reported using ibuprofen, naproxen, paracetamol, Mobic, or diclofenac. Following the program, a larger percentage of participants remained unaware of analgesic names—likely due to high illiteracy rates—while a decline in ibuprofen, naproxen, Mobic, and diclofenac use was evident. After the program, most participants in the intervention group used paracetamol, whereas those in the control group continued using ibuprofen and naproxen. These results confirm that no significant difference existed in analgesic use before intervention, but a clear divergence appeared after education (p = 0.001).

Pharmacologic management of HF includes diuretics, vasodilators, anticoagulants, beta-blockers, angiotensin-converting-enzyme (ACE) inhibitors, angiotensin-receptor blockers (ARBs), calcium-channel blockers (CCBs), digoxin, angiotensin-receptor–neprilysin inhibitors (ARNIs), and nitrates (Heidenreich et al., 2022). Concurrent use of diuretics (thiazides and loops) and ACE inhibitors or ARBs with digoxin increases the risk of hospitalization for digoxin toxicity, cardiac arrhythmia, and electrolyte disturbances (Wang et al., 2018; Wola et al., 2022). Likewise, taking ACE inhibitors or ARBs with nonsteroidal anti-inflammatory drugs (NSAIDs) heightens the risk of acute kidney injury (Ishiguro et al., 2008).

Medication plays a pivotal role in improving public health, preventing disease, and extending life expectancy. However, pharmacotherapy poses increasing challenges, affecting 42–81% of hospitalized patients and underscoring the need for meticulous management to ensure optimal outcomes (Costa et al., 2017). A meta-analysis by Zheng et al. (2018) indicated that 33% of patients in general wards and 67% of those in intensive care encountered potential drug–drug interactions during hospitalization. While some interactions may be minor, distinguishing clinically significant interactions is crucial. A review of 10 studies reported prevalence ranging from 1.2% to 64% in intensive-care populations (Gonzaga de Andrade Santos et al., 2020).

Poor treatment adherence leads to decompensation episodes and hospital admissions in 15–64% of HF cases. Effective management requires a comprehensive therapeutic regimen, lifestyle modification, and individualized education. Nurses, physicians, nutritionists, pharmacologists, and multidisciplinary teams all play critical roles in patient education, utilizing various tools to enhance understanding (Rabelo et al., 2007). Nursing as a profession has deep roots in social justice and community-health advocacy (Pittman, 2019; Tyson et al., 2018). Nurses serve as highly skilled educators, spending more time with patients than physicians, promoting adherence, teaching self-management, and reinforcing medication use. The researchers believe that insufficient nursing skills, motivation, and confidence can negatively affect patient education quality and thereby increase stress levels among HF patients.

Conclusion

Before nursing educational program, nearly all patients lacked information about heart failure, its pathophysiology, and drug-drug interactions. However, after the nursing educational program, a significant

improvement was observed in intervention group compared to control group. Nearly half of the intervention group and more than half of the control group experienced high levels of stress before the program. Following the educational program, stress levels in the intervention group decreased to less than a quarter, while the control group's stress levels increased to more than half. The implementation of the nursing educational program demonstrated highly significant differences between the two groups at (P value $\leq$ 0.05).

Authors' Contributions

All authors read and approved the manuscript, performed procedures and data analysis, and contributed to its writing conception and design.

Conflict of Interests

Conflicts of interest: The authors declare no conflicts of interest.

In this manuscript, all tables and figures have been authored by the researchers.

The authors signed the ethical consideration's approval.

Ethical clearance: The scientific and ethical committee at the college of Nursing-University of Sulaimani has approved our work.

Consent for publications

All authors read and approved the final manuscript for publication.

Ethics approval and consent to participate

Availability of data and material

The data that support the findings of this study are available from the corresponding author upon reasonable request

Authors' contribution statement:

All authors of this study participated equally in all stages of the writing process; they also reviewed and approved the submission of this work

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