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Determinants of Nursing Risk Diagnosis of Decrease in Heart Rate in Patients with Cardiovascular Disease at the Aceh Provincial General Hospital

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Abstract

Decreased cardiac output is a primary nursing diagnosis for patients with cardiovascular disease (CVD), which is a life-threatening condition requiring immediate consideration and action. This study aims to identify the determinants of decreased cardiac output diagnosis in patients with CVD at the Aceh Provincial General Hospital. The research variables include smoking status, sodium diet, and cholesterol levels, with a cross-sectional study design and a sample size of 80 CVD patients selected through convenience sampling. Data collection was conducted through physical examinations, patient/family interviews using a questionnaire guide, and a review of patient history information from medical records. The data collection tools comprised a sociodemographic questionnaire, Semi Quantitative Food Frequency Questionnaire (SQ-FFQ), and a decreased cardiac output questionnaire adopted from the Indonesian Nursing Diagnosis Standards (SDKI). Data were analyzed using the Chi-square test. The results showed a significant relationship between smoking status and sodium diet with decreased cardiac output ($P < 0.00$), but no relationship between cholesterol levels and decreased cardiac output ($P > 0.469$). The hospital and nursing staff are recommended to enhance education on the impact of smoking, sodium diet intake, and cholesterol levels on decreased cardiac output.

Keywords: Cardiovascular Disease, Decreased Cardiac Output, Nursing Diagnosis

Introduction

Cardiovascular disease (CVD) is the leading cause of death globally [1]. It is estimated that by 2030, CVD will account for 23 million deaths [2]. CVD is classified as a chronic degenerative pathology and a public health issue, with high hospitalization rates and hospital costs [3]. By 2025, heart failure (HF) is projected to become the leading cause of death due to cardiovascular disease. Approximately 23 million people live with HF, and 2 million new cases are diagnosed each year worldwide [4]. Decreased cardiac output is a primary nursing diagnosis for patients with heart failure [5]. A study in Brazil identified decreased cardiac output as a priority nursing diagnosis in 303 patients with decompensated heart failure, finding a 100% frequency. Another international study identified this diagnosis in 98% of hospitalized HF patients. The mortality rate for low cardiac output syndrome (LCOS) ranges from 14.8% to 62.5% in the short term (1 month) and 21.4% to 36.6% in the long term (2 months to 1 year) [6]. Major risk factors for decreased cardiac output include smoking, high serum cholesterol levels, obesity, diet, physical activity, medical history, and myocardial dysfunction. This aligns with a study by Caroline *et al*. (2022) [8], which found significant associations between smoking, overweight/obesity, untreated chronic pathologies like systemic arterial hypertension, diabetes, and dyslipidemia, and increased cardiovascular damage [7].

Data from the Aceh Provincial General Hospital indicate that there are approximately 1,318 CVD patients within six months, averaging about 220 patients per month. It is estimated that around 75% of these patients experience decreased cardiac output. Significant decreases in cardiac output represent life-threatening situations requiring immediate nursing consideration and intervention to enable early interventions and minimize the consequences of reduced cardiac function [1]. The nursing process consists of five interdependent stages: Assessment, nursing diagnosis, planning, implementation, and evaluation. Utilizing nursing diagnoses as part of the nursing process should be grounded in nursing theory, serving as a vital strategy to set goals for cardiovascular patients, reveal patient care needs, help nurses focus on early intervention and prevention, and develop

essential technology and knowledge to consolidate good, evidence-based nursing and healthcare practices.

Describing nursing diagnoses contributes to analyzing responses to cardiovascular disease [8]. Therefore, analyzing the diagnosis of decreased cardiac output from the literature is essential to identify factors that may contribute to it (related conditions, at-risk populations) and explain the causal dynamics of this diagnosis, as well as characterize its occurrence in identified scenarios. This information will aid in clinical reasoning and decision-making for nurses, providing evidence that explains the cause-and-effect relationship of this diagnosis, potentially reflecting a higher accuracy level in identifying this human response in clinical contexts. Clinical reasoning, accurate anamnesis, and early detection of disease symptoms require a reference or guideline [5]. Accurate nursing diagnostic analysis for patients with a predicted risk of deterioration due to decreased cardiac output is crucial to predict risk and identify the most vulnerable patients. Therefore, this study aims to analyze the determinants associated with the diagnosis of decreased cardiac output in patients with cardiovascular disease (CVD) at the Dr. Zainoel Abidin General Hospital, Banda Aceh.

Methods and Materials

This study employed a cross-sectional design, collecting data from January 17 to February 16, 2024, in the Integrated Cardiac Care and Intensive Cardiology Care Unit (ICCU) wards of a General Hospital in the Aceh Province. The sample consisted of 80 patients with cardiovascular disease (CVD), selected through convenience sampling. Data collection techniques included physical examinations, patient/family interviews using a questionnaire guide, and a review of patient history information from medical records.

The data collection instruments comprised a sociodemographic data questionnaire, the Semi-Quantitative Food Frequency Questionnaire (SQ-FFQ), nutritional status measured by body mass index (BMI) with four categories (underweight: <18.5 kg/m², normal weight: 18.5-22.9 kg/m², overweight: 23-24.9 kg/m², and obesity: ≥25 kg/m²), and a decreased cardiac output questionnaire based on the Indonesian Nursing Diagnosis Standards (SDKI). Inclusion criteria were: 1) patients with cardiovascular disease (CVD), 2) clear consciousness, 3) stable patient condition, 4) on days 1 to 3 of hospitalization, 5) no communication impairments, 6) adult age (>18 years), and 7) patient consent to participate by signing an informed consent form. Exclusion criteria were: 1) patients with decreased consciousness unable to participate, and 2) patients with congenital heart defects. Data were analyzed using the Chi-square test.

Results

This study aimed to determine the relationship between status merokok, diet natrium and kadar kolesterol. The study results are presented in the following tables and graphs.

Distribution of Respondent Characteristics

Table 1 shows that the average age of the respondents is 57 years. The average systolic blood pressure is 127.69 mmHg, and the average diastolic blood pressure is 82.40 mmHg. The average body weight is 61 kg, the average height is 164 cm, and the average body mass index (BMI) is 22.7 kg/m².

Then, majority of respondents are male (63.8%), have an occupation as entrepreneurs (42.5%), and have a normal pulse rate (50.0%) (Table 2).

Table 3 shows that out of 49 patients with cardiovascular disease who smoke, the majority (67.3%) actually experienced decreased cardiac output. Among 31 non-smoking patients, 90.3% were at risk of decreased cardiac output. Hypothesis testing showed a p-value of 0.000 < 0.05, indicating that Ho is rejected, and there is a significant relationship between smoking status and decreased cardiac output.

Among 31 patients with cardiovascular disease who had a high sodium intake, 24 patients (77.4%) actually experienced decreased cardiac output. Among 49 patients with cardiovascular disease who had a normal sodium intake, 75.5% were at risk of decreased cardiac output. Hypothesis testing showed a p-value of 0.000 < 0.05, indicating that Ho is rejected and there is a significant relationship between sodium intake and decreased cardiac output (Table 4).

Table 1: Frequency Distribution of Respondent Characteristics (n=80)

Demographic Data	N	Minimum	Maximum	Mean	Std. Deviation
Age	80	30	80	56.93	10.7
Systole (mmHg)	80	100	153	127.69	7.8
Dyastole (mmHg)	80	68	89	82.40	4.4
Weight (kg)	80	48.20	77.10	61.51	6.0
Height (cm)	80	151	173	1.64	.04
Body Mass Index (kg/m²)	80	19.30	27.30	22.75	1.5
Valid N (listwise)	80				

Table 2: Frequency Distribution of Respondent Charactereristics (n=80)

S. No	Demographic Data	Frequency	Percentage
1	Gender		
	Male	51	63,8
	Female	29	36,3
2	Occupation		
	Civil Servant	11	13,8
	Retured	2	2,5
	Entrepreneur	34	42,5
	Farmer	15	18,8
	Housewife	18	22,5
3	Pulse Rate		
	Bradycardia	10	12,5
	Normal	40	50,0
	Tachycardia	30	37,5

Table 3: Relationship Between Smoking Status and Low Cardiac Output in Cardiovascular Disease Patients (n=107)

S. No	Variable Smoking Status	Low Cardiac Ouput				Total		*p-value*
		Actual		Risk				
		f	**%**	**f**	**%**	**f**	**%**	
1	Smoking	33	67,3	16	32,7	49	100	0,000
2	Non-Smoking	3	9,7	28	90,3	31	100	
	Total	36	45,0	44	55,0	80	100	

Table 4: Relationship Between Sodium Intake and Low Cardiac Output in Cardiovascular Disease Patients (n=80)

S. No	Variabel Diet Natrium	Low Cardiac Ouput				Total		*p-value*
		Actual		Risk				
		f	%	f	%	f	%	
1	High Intake	24	77,4	7	22,6	31	100	0,000
2	Normal Intake	12	24,5	37	75,5	49	100	
	Total	36	45,0	44	55,0	80	100	

Table 5: Hubungan Kadar Kolesterol dengan Penurunan Curah Jantung Pasien *Cardiovascular Disease* (n=80)

S. No	Variable Cholesterol Level	Low Cardiac Output				Total		*p-value*
		Actual		Risk				
		f	%	f	%	f	%	
1	High	11	37,9	18	62,1	29	100	0,469
2	Normal	25	49,0	26	51,0	51	100	
	Total	36	45,0	44	55,0	80	100	

Table 5 shows that among the 29 patients with cardiovascular disease who had high cholesterol levels, 18 patients (62.1%) were at risk of experiencing low cardiac output. In contrast, among the 51 patients with normal cholesterol levels, 26 patients (51%) were also at risk of low cardiac output. The hypothesis test yielded a p-value of 0.469, which is greater than 0.05, indicating that the null hypothesis (Ho) is accepted. This means that there is no significant relationship between cholesterol levels and low cardiac output.

Discussion

Tobacco smoke contains over 7,000 toxic substances, including nicotine, tar, and carbon monoxide. These substances increase heart rate and contractility, cause inflammation, disrupt endothelial function, promote thrombus formation, reduce the blood's capacity to carry oxygen, and lower high-density lipoprotein (HDL) cholesterol levels, which are associated with the development of cardiovascular disease (CVD).

The high incidence of CVD in Aceh is partly attributed to the persistently high smoking rates in the region. According to data from the Central Statistics Agency (2023), the smoking prevalence among individuals aged ≥15 years in Aceh increased to 28.66% in 2023, up from 27.58% in 2022, with a higher prevalence among men. This study also found that among respondents who did not smoke, 9.7% experienced actual low cardiac output, while 90.3% were at risk of developing low cardiac output. Additionally, this issue is exacerbated by other risk factors such as diabetes, hypertension, hyperlipidemia, sex, and smoking, which affect the pattern and severity of heart disease.

Recent research has shown that current smokers have at least twice the risk of heart failure compared to non-smokers. This risk increases to nearly four times higher in smokers who consume 25 or more cigarettes per day. Moreover, there is a relationship between quitting smoking and a reduced risk of heart failure events and related side effects. The risk of heart failure decreases in individuals who have never smoked, decreases over time after quitting smoking (especially after more than 15 years), and former smokers also show echocardiographic patterns similar to those of never-smokers [18].

The findings of this study indicate that among the 31 respondents with high sodium intake, 77.4% experienced actual low cardiac output. This is due to changes in osmotic pressure, which lead to increased extracellular fluid affecting blood pressure through changes in homeostasis. Sodium, as the most concentrated ion in extracellular fluid, plays a crucial role in determining osmotic pressure in body fluids.

High sodium intake (more than 2.3 g/day) can lead to increased blood pressure, which is a major risk factor for diet-related mortality, with a total of 1.65 million deaths attributed to this condition. This is consistent with research by Bailey & Dhaun (2024), which used a large-scale sample (n = 873) and found that hypertension (blood pressure >140/90 mmHg) was more frequently observed in individuals who reported high salt consumption compared to those who never added salt to their food [19].

The primary sources of salt are processed foods, fast foods, and salt added during food preparation and cooking. Salt is a combination of sodium and chloride, with approximately 40% sodium by weight. The sodium content in processed foods is continuously increasing and is considered a major contributor to morbidity and mortality associated with cardiovascular disease (CVD) worldwide due to its role in hypertension. It is estimated that over 1.3 billion people suffer from hypertension, a major modifiable risk factor for CVD, due to sodium intake exceeding the recommended level of 2.3 g/day [20].

Total cholesterol levels are among the best indicators for predicting cardiovascular disease risk. Cholesterol, a type of fat naturally found in food, is essential for building cells and producing various hormones. Cholesterol levels are associated with carotid intima thickness and the development of carotid artery plaques. Elevated cholesterol levels are associated with a 2.67 times higher likelihood of developing cardiovascular disease compared to individuals with normal cholesterol levels [21].

Increased cholesterol levels in adults are linked to a higher risk of CVD compared to those with normal or low cholesterol levels. Cholesterol is significantly and independently related to arterial stiffness. Elevated blood cholesterol can also result from increases in very low-density lipoprotein (VLDL) and low-density lipoprotein (LDL) cholesterol. This often occurs when there is excessive fat accumulation in the body [22].

Excess cholesterol in the blood can cause narrowing and hardening of the arteries, known as atherosclerosis. High cholesterol levels contribute to plaque formation on arterial walls, leading to reduced vessel diameter and narrowing. Blockages in blood vessels decrease the elasticity of the vessel walls, resulting in increased blood pressure. Chronic hypercholesterolemia can lead to hypertension as well as cerebrovascular and cardiovascular diseases.

Conclusion

There is a significant relationship between smoking status and decreased cardiac output (p = 0.000), as well as between sodium intake and decreased cardiac output (p = 0.000). However, no significant relationship was found between cholesterol levels and decreased cardiac output (p = 0.469) among patients with cardiovascular disease treated in the Integrated Cardiology Care Unit (Raudhah 1) and the Intensive Cardiology Care Unit (ICCU) at the Aceh Provincial General Hospital.

Recommendations

The findings from this study are expected to provide a better understanding for nursing professionals to enhance holistic patient care, thereby improving the quality of life for patients with cardiovascular disease, particularly those with chronic multimorbidity. Given that decreased cardiac output is a life-threatening situation requiring prompt nursing consideration and action, the use of nursing diagnoses, as part of the nursing process, plays a crucial role in enhancing nurses' ability to comprehensively analyze various disease characteristics. This includes identifying factors that may

contribute (related conditions, at-risk populations) and the disease prognosis, thereby setting appropriate care goals and assisting nurses in focusing on early intervention and prevention.

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