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THE ASSOCIATION BETWEEN INTERDIALYTIC WEIGHT GAIN (IDWG) AND THE INCIDENCE OF BREATHLESSNESS IN HAEMODIALYSIS PATIENTS AT MUHAMMAD SANI HOSPITAL 2024

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Abstract

Interdialytic Weight Gain (IDWG) is an increase in body weight that occurs between dialysis sessions in patients with chronic kidney disease. Excessive IDWG is often associated with various complications, one of which is shortness of breath. A pre-survey of 10 patients showed that 5 patients had mild, 2 moderate, and 3 severe IDWG. Shortness of breath occurred in 6 patients with varying frequency of visits to the emergency room, while 4 others experienced weakness and dizziness. The purpose of this study was to determine the relationship between IDWG and the incidence of shortness of breath in hemodialysis patients at Muhammad Sani Hospital. This study used an observational analytic research design with a cross sectional approach. The sampling technique used purposive sampling method, the research instrument used was an observation sheet which was carried out to 78 respondents. The results of the analysis showed that more than half of the study respondents had a percentage of Interdialityc Weight Gain (IDWG) in the mild category (56.4%) compared to the percentage of IDWG in the moderate (29.5%) and severe (14.1%) categories, then more than half of the study respondents did not experience shortness of breath (74.4%) compared to respondents who experienced shortness of breath (25.6%). The results of the analysis using chi-square obtained a P value = 0.000 < 0.05, meaning that there is a significant relationship between Interdialityc Weight Gain (IDWG) with the incidence of shortness of breath in patients with chronic renal failure at Muhammad Sani Hospital. It is expected that patients with renal failure can control fluid input and follow dietary guidelines provided by the medical team to help manage body weight and reduce unwanted symptoms.

Keywords: Interdialytic Weight Gain (IDWG), Shortness of breath, Hemodialysis

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Introduction

The kidneys are essential for keeping the body in balance and ensuring that the various organ systems work properly. The kidneys filter the blood to remove waste and excess fluid, which is then excreted through urine. Chronic kidney failure can occur if kidney damage persists for a long time. Some of them, such as diabetes mellitus, heart disease and blood vessel disease, are thought to cause kidney failure (Wiliyanarti & Muhith, 2019).

According to the World Health Organization (WHO), there were 254,028 cases of death due to chronic kidney failure in 2020. This number will increase to 843.6 million cases in 2021, and it is estimated that the number of deaths due to chronic kidney failure will increase to 41.5% in 2020. 2040. Chronic kidney failure is in 12th place of all causes of death, according to this high figure (Aditama et al, 2023). There were 1.93 million cases of kidney replacement therapy patients in 2019 and 1.79 million cases in 2020. The number of recorded cases of kidney failure in Indonesia is 1,322,798, according to the 2022 Indonesian Health Profile (Indonesian Ministry of Health, 2023).

From the causes that can lead to kidney failure, there will be a gradual decline in kidney function. This causes problems with the kidneys which prevent waste substances that should be excreted from being excreted by the kidneys. Ureum levels in the body continue to increase as a result of kidney damage where urea has the ability to damage all cells, including neurons (Saadah & Hartanti, 2021).

Along with the accumulation of metabolic waste substances that settle or experience retention in the body containing nitrogenous waste products such as urea and creatinine in the blood, it can result in pulmonary edema, hypertension and fluid overload. resulting in electrolyte imbalances, including hyperpotasemia, hypercalcemia and hypophosphatemia, which cause acidosis. Acidosis occurs due to obstructed acid excretion due to kidneys not functioning properly. This causes the blood pH to become more acidic, resulting in shortness of breath, lack of focus (dazed), and always feeling tired (Ramatillah, 2021).

To remove waste substances from the body that cannot be excreted by the kidneys, hemodialysis therapy is needed, which is one of the popular symptomatic treatments and is recognized as having benefits. Dialysis therapy, known as hemodialysis, aims to remove fluid and waste from the body gradually or gradually when the kidneys are no longer able to carry out this process (Pratama et al, 2020).

According to research conducted by Lok et al (2020) hemodialysis is the most common kidney replacement method and causes chronic kidney failure patients to live longer. To monitor the increase in fluid volume between two dialysis times or known as *Interdialytic Weight Gain* (IDWG), which is calculated based on the average of body weight before and after dialysis recorded at 3 consecutive dialysis sessions. The IDWG to be monitored is expressed in kilograms and as a percentage of the patient's dry weight (Maimani et al, 2021).

For patients with chronic renal failure, increasing interdialysis weight gain will have a negative impact on their health. The higher the IDWG, the greater the amount of excess fluid in the patient's body and the higher the risk of complications. Many chronic kidney failure patients still do not comply with fluid restrictions, which can cause pulmonary edema which leads to

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shortness of breath, respiratory muscle retraction and low oxygen saturation (Sitifa et al, 2018).

In research conducted by (Nurseskasatmata & Harista, 2020), it was found that 80 patients who came to the emergency room with chronic kidney failure experienced shortness of breath. On average, patients have undergone hemodialysis therapy and experience shortness of breath between the previous hemodialysis treatment and the next hemodialysis treatment. The results showed that, in patients with chronic renal failure, there was a correlation between the use of hemodialysis over a long period and the frequency of shortness of breath, with a p value of 0.000 < 0.05.

Based on data from service Province Archipelago Riau year 2021 Of get number incident GGK as much as 767 case. failed Kidney Chronicle including the in disease chronic highest and disease complications most from Hypertension or pressure blood high and Diabetes Mellitus (DM) or sugar blood high Of coverage region archipelago Riau this (Province Archipelago Riau, 2021).

Muhammad Sani Hospital is the only hospital that is a referral hospital for chronic kidney failure patients who need hemodialysis therapy in Karimun Regency. The number of CKD patients recorded as of May 2024 who are undergoing hemodialysis routinely is 107 patients. The results of a pre-survey conducted by researchers on 10 CKD patients undergoing Hemodialysis (HD) showed that 5 patients had mild IDWG, 2 patients had moderate IDWG, and 3 patients had severe IDWG. Meanwhile, in patients who experienced shortness of breath in the period from the previous HD to the current HD, 1 patient said they came to the ER 3 times because of shortness of breath, 2 patients said they came to the ER 2 times because of shortness of breath, 3 patients came once to the ER because of shortness of breath, while the other 4 patients did not experience shortness of breath but felt weak and dizzy.

Research on chronic kidney failure patients by linking CKD with fluid management in CKD patients is the focus of this research, where excessive IDWG will cause CKD failure patients to experience shortness of breath which if left to continue will increase the risk of death.

Research Methods

This research uses an observational analytical method with an approach *cross sectional* which was carried out on hemodialysis patients at Muhammad Sani Regional Hospital. The sample in this study was 78 hemodialysis patients at Muhammad Sani Regional Hospital who were taken using the technique *purposive* sampling by establishing inclusion and exclusion criteria. The research was carried out in July 2024 in the Hemodialysis room at Muhammad Sani Regional Hospital.

The research instrument used in this research is a measurement sheet or research worksheet which contains respondent data such as age, gender and duration of HD. Then in this instrument there are measurements of body weight before the first HD, after the first HD and body weight before the second HD as well as the results of IDWG calculations and the incidence of shortness of breath.

Data were collected and analyzed statistically using univariate and bivariate analysis using tests *Chi-Square*. The analysis results are said to be related if the p value < alpha (0.05). In analyzing data, researchers focus on analyzing the relationship between the two variables studied without analyzing confounding factors or making specific models.

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Research Result

Table 1 Percentage Description *Interdialityc Weight Gain* (IDWG) in the Hemodialysis Unit of Muhammad Sani Regional Hospital in 2024

% IDWG	n	Percentage
Mild	44	56,4
Moderate	23	29,5
Severe	11	14,1
Total	78	100

Based on the table above, the percentage is known *Interdialityc Weight Gain* (IDWG) mostly in the mild category, namely 44 respondents (56.4%) compared to the percentage of moderate IDWG of 23 respondents (29.5) and the severe category of 11 respondents (14.1%).

Table 2 Description of the incidence of shortness of breath in hemodialysis patients at Muhammad Sani Regional Hospital in 2024

Breath	n	Percentage
Not Breathless	58	74,4
Breathlessness	20	25,6
Total	78	100

Based on the table above, it is clear that the description of the incidence of shortness of breath in hemodialysis patients is that the results for respondents who were not short of breath were obtained by 58 respondents (74.4%) compared to 20 respondents who were short of breath (25.6%).

Table 3 Relationships *Interdialityc Weight Gain (IDWG)* With Incident Crowded breath On Patient failed Kidney Chronic Of HOSPITAL Muhammad Sani Years 2024

% IDWG	Breath				Total	%	p
	Not Breathless	%	Breathlessness	%			
Mild	43	55,1	1	1,3	44	56,4	0.000
Moderate	15	19,2	8	10,3	23	29,5	
Severe	0	0	11	14,1	11	14,1	
Total	58	74,4	20	25,6	78	100	

Based on the table above, it shows that respondents with a mild IDWG percentage were 44 respondents (56.4%) of whom 43 respondents (55.1%) did not experience shortness of breath and 1 respondent (1.3%) experienced shortness of breath. Of the 23 respondents (29.5%) with a moderate IDGW percentage, 15 respondents (19.2%) were not short of breath, while 8 respondents (10.3%) were short of breath. Respondents with a percentage of severe IDGW and experiencing shortness of breath were 11 respondents (14.1%). Results of analysis using statistical tests *Chi-square* then it is obtained *P Value* equal to 0.000 < 0.05 which means there is a

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significant relationship between *Interdialityc Weight Gain* (IDWG) with the incidence of shortness of breath in chronic kidney failure patients at Muhammad Sani Regional Hospital in 2024.

Discussion

a. Percentage Overview *Interdialityc Weight Gain* (IDWG) in the Hemodialysis Unit of Muhammad Sani Regional Hospital in 2024

The research results show that more than half of the respondents have a percentage *Interdialityc Weight Gain* (IDWG) in the light category, namely 44 respondents (56.4%). Dry body weight is the patient's body weight that feels comfortable, there is no tightness and there are no signs of excess fluid that can be tolerated by the body, which is no more than 3% of dry weight. IDWG >4% increases hospitalization, and IDWG exceeding 5.7% will increase patient mortality (Wong et al, 2017). Meanwhile, according to Naryati et al, (2023) it is very important for patients undergoing dialysis to maintain homeostasis, excess or lack of intake or output can cause serious disorders.

The causes that can trigger an increase in IDWG consist of several factors such as limiting fluid intake, where according to Ayu (2019), the thing that CKD patients most often complain about is the problem of excess fluid volume. Many patients undergoing hemodialysis therapy experience non-compliance in controlling their diet and limiting fluid consumption within the recommended time period. Poor management of fluid restrictions can result in weight gain and reduced quality of life (Dewi et al, 2023).

Interdialysis weight gain (IDWG) should be lower than 4.0 to 4.5% of dry weight. High IDWG is associated with a greater risk of cardiovascular mortality and all-cause mortality as well as increased morbidity, such as ventricular hypertrophy and adverse cardiac and cerebrovascular events. In addition, this leads to additional dialysis sessions with consequent reductions in quality of life and significant increases in costs (Ipema et al, 2016).

High IDWG is basically caused by excessive fluid and/or food intake. Non-compliance with diet and fluid restrictions is very common. Many factors have been shown to determine failure to comply with diet and fluid restrictions including loss of motivation and lack of self-assessment, which is defined as the inability to determine fluid status and salt and fluid intake correctly (Ipema et al, 2016).

The research results are in line with research conducted by Sulistyaningrum et al. (2022) where in their research the majority of respondents had a mild IDWG percentage (71%). Regarding the research results, researchers assume that patients who have mild IDWG have effective weight management strategies and have good control over their fluid intake and diet. Meanwhile, in patients with IDWG in the moderate and severe categories, it can be caused by various factors, such as not being compliant and understanding the importance of fluid restrictions, age, gender, duration of HD, environment, nutrition, patient behavior, physiological factors and psychological factors.

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b. Description of Shortness of Breath Events in Hemodialysis Patients at Muhammad Sani Regional Hospital in 2024

The results of the study showed that the incidence of shortness of breath in hemodialysis patients, namely respondents who were not short of breath, was found to be greater by 58 respondents (74.4%) compared to 20 respondents who were short of breath (25.6%).

Shortness of breath in patients with chronic renal failure can be caused by fluid accumulation which is a sign of hypervolemia which can cause ePulmonary fever is a complication that occurs in CKD. The results of research conducted by Rahma (2017) showed that there were respondents with mild hypervolemia (40%) and severe hypervolemia (31%). According to Rahma (2017), this occurs due to fluid overload or a disturbance in the homeostatic mechanism in the fluid balance process, causing weight gain and the patient experiencing shortness of breath, therefore it is often found in patients with chronic renal failure who experience edema in some parts of the body or throughout the body. .

The buildup of fluid in the alveoli or lung tissue is caused by decreased kidney function which causes hypoalbuminemia. Hypoalbuminemia is characteristic of CKD, reducing plasma osmotic pressure and promoting fluid movement from pulmonary capillaries, resulting in pulmonary edema. As a result, the problem of progressively ineffective breathing patterns arises which causes shortness of breath which can be life-threatening (Aprioningsih et al, 2021).

According to the researchers' assumptions, the results above indicate that the prevalence of shortness of breath in hemodialysis patients in this research sample is relatively low. Several factors can influence the incidence of shortness of breath in hemodialysis patients, namely effective fluid management during the distance between the first HD and the second HD can reduce the possibility of excess fluid in the body which often triggers shortness of breath. then patient compliance with therapy recommended by medical personnel, including the use of medication and following the dialysis schedule, can also influence the incidence of shortness of breath. Hemodialysis patients with good management and maintained health conditions may experience a lower frequency of shortness of breath.

Many CKD patients still do not comply with fluid and diet restrictions and there is still low support from the family, which can allow various complications to occur, if the fluid volume accumulates continuously, pulmonary edema can occur. One of the symptoms is shortness of breath, respiratory muscle retraction, cold, saturated sweat oxygen that goes down (Aisara, Azmi, & Yanni, 2018).

c. Connection *Interdialityc Weight Gain (IDWG)* With the occurrence of shortness of breath in chronic kidney failure patients at Muhammad Sani Regional Hospital in 2024

The results showed that 44 respondents (56.4%) had mild IDWG, of whom 43 respondents (55.1%) did not experience shortness of breath and 1 respondent (1.3%) experienced shortness of breath. Then there were respondents with a percentage of severe IDGW and experiencing shortness of breath, 11 respondents (14.1%).

An increase in IDWG caused by the inability of the kidneys to carry out their function of excreting excessive

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acid loads causes metabolic acidosis. A decrease in acidity due to the inability of the renal tubules to secrete ammonia and absorb sodium bicarbonate, a decrease in the excretion of phosphate and other organic acids also occurs which will gradually lead to acidosis. A clear symptom of acidosis is kusmaul breathing, namely heavy and deep breathing that occurs due to the need to increase carbon dioxide excretion (Nurseskasatmata & Harista, 2020). Adding an IDWG value that is too high can have negative effects on the patient's condition, including shortness of breath (Bayhakki & Hasneli, 2017).

Results of analysis using statistical tests *Chi-square* then it is obtained *P Value* equal to 0.000 < 0.05 which means there is a significant relationship between *Interdialityc Weight Gain (IDWG)* with the incidence of shortness of breath in chronic kidney failure patients at Muhammad Sani Regional Hospital in 2024.

For patients with chronic renal failure, increasing interdialysis weight gain will have a negative impact on their health. The higher the IDWG, the greater the amount of excess fluid in the patient's body and the higher the risk of complications. Many chronic kidney failure patients still do not comply with fluid restrictions, which can cause pulmonary edema which leads to shortness of breath, respiratory muscle retraction and low oxygen saturation (Sitifa et al, 2018).

Fluid restriction is closely related to IDWG and hypervolemia is related to complications such as shortness of breath caused by excess fluid in the body which the body cannot secrete. Research conducted by Rahma (2017) shows that there is a relationship between fluid restriction and the occurrence of hypervolemia which can cause shortness of breath.

In research conducted by (Nurseskasatmata & Harista, 2020), it was found that eighty patients who came to the emergency room with chronic kidney failure experienced shortness of breath. On average, patients have undergone hemodialysis therapy and experience shortness of breath between the previous hemodialysis treatment and the next hemodialysis treatment. The results showed that, in patients with chronic renal failure, there was a correlation between the use of hemodialysis over a long period and the frequency of shortness of breath, with a p value of 0.000 < 0.05.

Based on these results the researcher assumes that IDWG is an important indicator in the management of hemodialysis patients, and is often associated with various complications, including shortness of breath. From these results, more patients who had mild IDWG were not short of breath than respondents who were short of breath, while patients who had severe IDWG all experienced shortness of breath.

Fluid restriction is closely related to IDWG and hypervolemia is related to complications such as shortness of breath caused by excess fluid in the body which the body cannot secrete. In research conducted by Rahma (2017), the p value obtained was 0.000, so it can be concluded that there is a relationship between fluid restriction and the occurrence of hypervolemia which can cause shortness of breath.

In chronic renal failure, around 90% of the nephron mass has been destroyed, causing the glomerular filtration rate (GFR) to decrease so that the kidneys are no longer able to

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maintain fluid and electrolyte homeostasis in the body. Decreased glomerular filtration rate (GFR) causes retention (excess) of sodium and water. The difference in osmotic pressure due to retained sodium causes the process of osmosis to occur, namely water diffuses through the cell membrane until osmotic balance is reached (Price & Wilson, 2015). The main function of sodium is to help maintain fluid balance, especially intracellular and extracellular. This retention (excess) of sodium and water will cause the volume of extracellular fluid to increase (hypervolemia) which will later move the fluid into the interstitial space, causing an increase in blood volume and edema (Mubarak et al, 2015).

Some patients still feel normal because sometimes in certain situations this only causes symptoms limited to swollen feet and tightness which are not that disturbing. However, it would be very unfortunate if during subsequent routine examinations it was discovered that left ventricular hypertrovia, pleural effusion or ascites had occurred, which of course would be more difficult to treat (Wibowo & Siregar, 2020).

Conclusion

Based on the results of the research discussion entitled "Relationships *Interdialityc Weight Gain (IDWG)* with incident crowded breath on patient fail kidney chronic Of HOSPITAL Muhammad Sani Years 2024" several conclusions can be drawn:

a. More than half of the research respondents had a percentage *Interdialityc Weight Gain* (IDWG) in the mild category, namely 44 respondents (56.4%).
b. More than half of the research respondents did not experience shortness of breath, namely 58 respondents (74.4%).
c. There is a significant relationship between *Interdialityc Weight Gain (IDWG)* with incident crowded breath on patient fail kidney chronic Of HOSPITAL Muhammad Sani Years 2024 (*p value* = 0,000 < 0.05).

Suggestion

Based on the conclusions above, the author can put forward the following suggestions

a. For Chronic Kidney Failure Patients
   For chronic kidney failure (CKD) patients, it is hoped that reducing salt and fluid intake and following the dietary guidelines provided by the medical team can help manage weight and reduce unwanted symptoms. In addition, patients must immediately report any changes in their health condition, including symptoms of shortness of breath, to medical personnel to receive appropriate treatment.
b. For Muhammad Sani Regional Hospital
   It is recommended that Muhammad Sani Regional Hospital be able to develop more effective intervention strategies to manage patient weight during the inter-dialysis period. In addition, increasing patient education regarding the importance of fluid control and adherence to recommended therapy can also help reduce the risk of respiratory complications.
c. For Nursing Practice
   In nursing practice, it is recommended to increase routine and strict IDWG monitoring in patients with chronic renal failure. In addition, it is important to educate patients about the importance of limiting fluid

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intake and that an appropriate diet is necessary to reduce the risk of excessive interdialytic weight gain.

d. For Further Research
For future researchers, it is recommended that researchers expand the study sample to include a more diverse population and consider other factors that may influence the results, such as comorbidities, physical activity levels, and patient compliance with treatment.

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