

Review Article: Systematic Review, Meta-Analysis, Integrative Review, Scoping Review

HOW TO CONTROL INTERDIALYTIC WEIGHT GAIN (IDWG) AMONG HEMODIALYSIS PATIENTS?

Lono Wijayanti^{1*}, Priyo Mukti Pribadi Winoto¹, Nursalam Nursalam¹

¹ Doctoral of Nursing, Faculty of Nursing, Universitas Airlangga, Indonesia

***Correspondence:**

Lono Wijayanti

Doctoral of Nursing, Faculty of Nursing, Universitas Airlangga, Indonesia

Jl. Dr. Ir. H. Soekarno, Kelurahan Mulyorejo, Kecamatan Mulyorejo, Surabaya, East Java Province, Indonesia - 60115

Email:

lono.wijayanti-2021@fkip.unair.ac.id

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Abstract

Background: Chronic kidney failure is a terminal disease that often affects the patient's quality of life. One of the problems that often occurs in patients with end-stage renal failure is the increase in fluid volume between two dialysis times. The increase in Interdialytic Weight Gain (IDWG) has a serious impact, 60-80% of patients die from excess fluid and food intake during the interdialytic period.

Objective: This review aimed to describe the importance of Interdialytic Weight Gain (IDWG) in end-stage renal failure patients undergoing hemodialysis.

Design: This study design is a systematic review to search and review article from database and the theory underlying this study or guidance in this systematic literature review using PRISMA.

Data Sources: This systematic review was conducted using a database with electronic searches on EBSCO, ProQuest, Scopus, SAGE, and Science Direct published in 2017-2021.

Review Methods: The method used in the preparation of the Literature review using the PRISMA checklist and PICOT. Secondary data obtained from the journal with a predetermined discussion.

Results: The results of the database search strategy were 1,907 articles were obtained, but 1,340 articles were excluded. There were seven articles that met the inclusion criteria. Two articles identified that uncontrolled IDWG is at risk of death in chronic renal failure patients undergoing hemodialysis.

Conclusion: Two articles state that IDWG affects hemoglobin concentration and cardiovascular disorders and triggers complications, two other articles state that the factors that contribute to IDWG are fluid intake, thirst, self-efficacy and dietary behavior, one article states that controlled IDWG will improve the quality of life of patients with end-stage renal failure/End-Stage Renal Disease (ESRD) undergoing hemodialysis. Uncontrolled IDWG is at risk of death in patients undergoing hemodialysis. Control of IDWG through adherence to dietary behavior will improve the quality of life of end-stage renal failure patients undergoing hemodialysis.

Keywords: *End-stage renal failure, IDWG, hemodialysis.*

INTRODUCTION

Kidney failure is a systemic disease and the final course of various diseases related to the urinary tract and kidneys. Where there is a progressive and irreversible decline in kidney function so that the body fails to maintain metabolism and fluid and electrolyte balance. The final stage of chronic kidney failure is grade 5 or called End-Stage Renal Disease (ESRD) which requires kidney replacement therapy in the form of hemodialysis or kidney transplantation (Ignatavicius et al, 2017).

The action of hemodialysis in patients with end-stage renal failure makes important changes in the patient's life including the habit of taking drugs every day, limiting food and drink consumption, and dependence on machines to survive. One of the problems most often faced by patients is an increase in fluid volume between two dialysis times, IDWG (Interdialytic Weight Gain) is an increase in fluid volume manifested by an increase in body weight as an indicator to determine the amount of fluid that enters during the interdialytic period and patient compliance with fluid management. indispensable (Kahraman et al, 2015). The tolerable IDWG value is about 2 to 3 pounds or about 0.9 to 1.3 kilograms (Smeltzer and bare, 2015). The fact that some patients often do not comply with fluid regulation, they say that it is difficult to limit fluid intake, with changing weather making them unable to control their thirst so that it is increasingly difficult to limit fluids.

Based on world data from the World Health Organization (WHO) in 2018 there was an increase in patients with chronic kidney failure by 50% from the previous year. Based on the Pernefri (2012) report in the 5th Report of the Indonesian Renal Registry, stage 5 chronic kidney failure is the main disease diagnosis of new hemodialysis patients in Indonesia with the largest percentage of 83%, then the diagnosis of acute kidney failure is 12%, and chronic kidney failure is 5%.

The increase in IDWG has a serious impact, 60-80% of patients die from excess fluid and food intake in the interdialytic period,

because excess fluid in the interdialytic period can result in pulmonary edema or congestion, so monitoring fluid intake in patients is the main action that must be considered. (Indonesian nephrology, 2016). An increase in IDWG exceeding 5% of dry body weight can cause various complications such as hypertension, intradialysis hypotension, left heart failure, ascites, pleural effusion, congestive heart failure and can lead to death (Black & Hawk, 2014). Reports on the prevalence of the increase in Interdialytic Weight Gain (IDWG) in several countries have increased, around 9.7% - 49.5% in the United States and 9.8% - 70% in Europe (Data and Information Center of the Indonesian Ministry of Health, 2017).

To overcome excess fluid volume (overload) patients with chronic kidney failure or end-stage undergoing hemodialysis need special control in limiting the amount of fluid intake that enters the body. With the limitation of fluid intake, patients undergoing hemodialysis still feel comfortable before hemodialysis, during hemodialysis and after hemodialysis therapy. The recommended daily fluid intake for chronic kidney disease patients is only "insensible water losses" plus the amount of urine. The aim of this systematic review is to describe the importance of Interdialytic Weight Gain (IDWG) in end-stage renal failure patients undergoing hemodialysis.

METHODS

Design

This study uses systematic review method by reviewing research articles from previous researchers.

Search Methods

The preparation of this literature review uses various databases by conducting electronic searches on EBSCO, ProQuest, SAGE, Scopus and Science Direct. The search is limited to articles published in the last five years from 2017 to 2021 which are available in English. Several terms or keywords are combined to get the right article as a search strategy such as

using the terms “IDWG, IDWG control, IDWG and hemodialysis, IDWG and chronic kidney failure/End-Stage Renal Disease (ESRD)”.

Search Outcome

The results of the database search strategy were 1,907 articles obtained, but 1,340 articles were excluded, because they were not related to the research question. There are seven articles that meet the inclusion criteria of all the articles

that have been identified. These articles discuss about Interdialytic Weight Gain in chronic renal failure patients undergoing hemodialysis. Seven articles reviewed are original research. Five articles used cross-sectional-correlation studies and two articles used one cohort study. The selection process for the articles included in this literature review is shown in Figure 1.

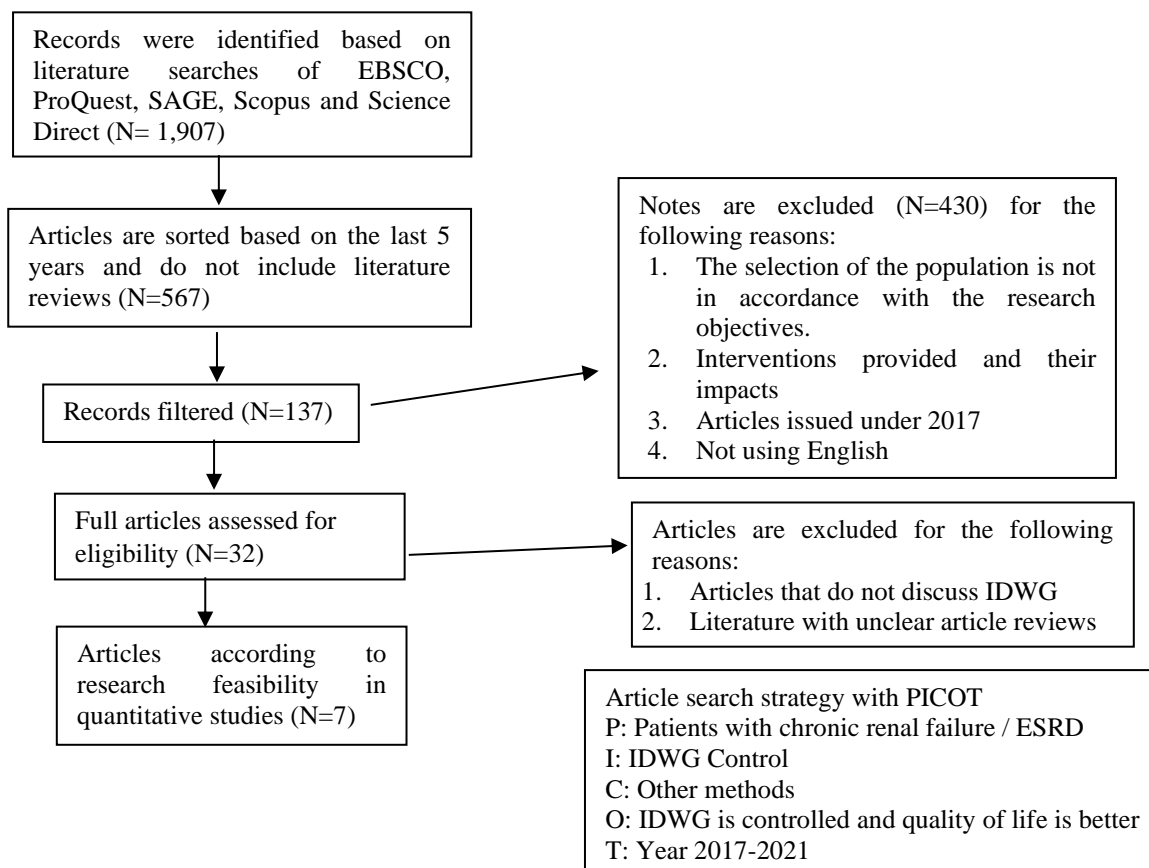


Figure 1. The results of the literature selection are summarized in the PRISMA flow diagram.

Quality Appraisal

The criteria for selecting articles in this literature review were obtained through a selection process and must meet the inclusion criteria: (i) Research on IDWG in patients with chronic kidney failure; (ii) Research on patients with chronic kidney failure/End-Stage Renal Disease (ESRD) on hemodialysis; (iii) Research published in 2017 to 2021 and exclusion criteria: (i) Duplicated articles; (ii) Unpublished articles in scientific journals. The

articles that have been obtained and meet the inclusion and exclusion criteria are then analyzed, compared between one article and another, discussed and concluded.

Data Abstraction

At this stage researchers reviewed abstracts of articles obtained from various databases. Furthermore, articles that meet the inclusion criteria will be independently extracted.

Data Analysis/ Synthesis

The selected article will be done data processing by compiling the theoretical mapping containing author (including the name of the researcher and the year of publication), title, design and sample, intervention, and results.

RESULTS

These articles discuss about Interdialytic Weight Gain in chronic renal failure patients undergoing hemodialysis. Seven articles reviewed are original research. Five articles used cross-sectional-correlation studies and two articles used one cohort study (table 1).

Table 1. List of Journals Included in the Review

Author (Year)	Design of research	Name of journal	Aim of Research	Result
Takashi Hara, et al 2021	A cohort study	Journal Kidney International Reports 2021; Vol 6; issue 7; 1999-2007	Knowing the impact of IDWG on hemoglobin concentration and cardiovascular events	As IDWG increases, the lowest point estimate in each IDWG category tends to shift to the lower hemoglobin concentration category. The relationship between hemoglobin concentration and MACE (major adverse cardiovascular events) was different in IDWG
Suprapti & Febrianti, 2019	Descriptive analytic observational with cross sectional approach.	Journal Annals of Tropical Medicine & Public Health Desember 2019; 22(11): S326	Analyzing the relationship between IDWG and intradialytic complications	There is a relationship between IDWG and intradialytic complications in patients undergoing hemodialysis treatment. The most common complication is intradialytic hypertension, followed by muscle cramps, nausea, headache, chest pain, fever and hypotension.
Dantas, et al 2019	A cohort study	Journal Nephrology 20:402	Knowing the relationship between non-adherence in conventional hemodialysis patients with all-cause mortality and cardiovascular death.	IDWG \geq 4% of dry body weight was identified as an independent predictor of all-cause mortality and represents a borderline outcome for cardiovascular death in patients with conventional HD. The occurrence of excessive IDWG in the presence of malnutrition indicates a significantly increased risk of death.
Yu Jinbo, et al 2021	A correlation research	International Journal of General Medicine 2021:14 211–220	Exploring the relationship between absolute intradialytic blood pressure changes and mortality at different levels of IDWG.	There is a paradoxical relationship between changes in absolute intradialytic blood pressure and long-term mortality with different levels of IDWG

Wahyuni, et al 2019	Analytic cross-sectional (correlation).	Journal Conference Earth and Environmental Science Volume 246 Issue 1	IOP Series. and 2019;	Analyze the factors that influence interdialytic weight gain in hemodialysis patients	Weight gain (IDWG) in hemodialysis patients was significantly related to fluid intake, thirst, and self-efficacy.
Yuki Tamaura, et al 2019	Analytic cross-sectional (correlation).	Journal of Renal Nutrition Volume 29 Issue 1; 24-32e5	2019;	Identified dietary and fluid behavior associated with relative interdialytic weight gain (RIDWG) (divided by individual dry weight [DW]) by grouping patients according to body mass index (BMI).	Diet and fluid behavior associated with relative interdialytic weight gain (RIDWG) differed by BMI group. A more specific type of patient behavior, focusing on underlying factors related to dietary and fluid behavior, and considering BMI is necessary
Visweswaran, et al; 2020	Cross-sectional descriptive study	Journal of Epidemiology and Global Health Vol. 10(4); December (2020), pp. 344–350		Measuring QoL in patients with End Stage Renal Disease (ESRD) on maintenance hemodialysis and to understand various QoL correlations	Patients who had better monthly incomes and better jobs and those who spent more on their medication reported a better quality of life than others. Interdialysis weight gain (IDWG), which reflects patient compliance and adherence to medical advice, was found to be a significant factor determining quality of life in this study.

DISCUSSION

End-stage renal failure is a terminal disease that affects the patient's quality of life. Among the most damaging diseases that affect human life is chronic kidney failure, which causes fatigue, changes the routine of life, and produces side effects related to treatment, which causes various signs and symptoms leading to dependence on continuous use of drugs and difficulties in adapting to devices and treatments that replace the natural function of the kidneys (Ebrahim et al, 2014). And among these treatments is hemodialysis which is one of the most widely used and indispensable alternatives, is able to prolong life, and is commonly used to treat CKD in several countries (Pilger et al, 2017). Achieving fluid balance is one of the goals of hemodialysis therapy, therefore monitoring the amount of fluid and hydration status in the body of hemodialysis patients must be done carefully.

In patients with chronic renal failure, even with hypervolemia, they often experience excessive thirst which is one of the stimuli for the emergence of a thirst sensation. The normal response to thirst is to drink, but patients with end-stage renal failure are not allowed to respond normally to their thirst. Thirst is a general sensation based on the combined action of several types of sensors, some in the peripheral and others on the sensors of the central nervous system (Black & Hawk, 2014).

Based on research conducted by Wahyuni et.al that there are several factors that can affect IDWG and based on his research involving 79 respondents, that there is a significant relationship between fluid intake, thirst with an increase in IDWG. Meanwhile, self-efficacy can affect the client's confidence in undergoing therapy (hemodialysis). High self-efficacy is needed to generate motivation from within to be able to comply with therapy and control fluids well so as to prevent an increase in IDWG (Wahyuni et al., 2019).

The findings of this systematic review show that hemodialysis is not a problem-free therapy, elevated blood pressure which refers to hypertension is the most common problem during therapy and is one of the causes of cardiovascular morbidity and mortality in patients (Cabrera et al., 2015). Several previous studies have revealed that an increase in blood pressure in hemodialysis patients is influenced by an increase in interdialytic weight gain (IDWG). This is in accordance with the results of a study conducted by Yu Jinbo, et al which stated that a correlation was found between IDWG with changes in intradialytic blood pressure and long-term mortality with different levels of IDWG (Yu et al., 2021).

Weighing to determine IDWG is important because an increase in IDWG > 4.8% of dry body weight will increase mortality even though the amount is not stated. Supported by research conducted by Lianna that IDWG 4% of dry body weight is an independent predictor of all-cause mortality in patients undergoing hemodialysis (Dantas et al., 2019). The occurrence of excessive IDWG in the presence of malnutrition indicates a significantly increased risk of death.

The addition of excessive IDWG values can result in negative effects on the body, namely hypotension, muscle cramps, shortness of breath, nausea and vomiting (Moissl et al, 2013). The results of the same study conducted by Suparti and Febrianti stated that the most common intradialytic complications were intradialytic hypertension (85.7%), followed by muscle cramps (55.4%), nausea (51.8%), headache (46%). 4%), chest pain (12.5%), fever (8.9%) and hypotension (5.4%) (Suparti & Febrianti, 2019).

In patients with end-stage renal failure, IDWG balance can be maintained by doing dietary behavior. Diet settings in kidney failure who undergo hemodialysis are so complex. The diet setting is very difficult to be obeyed by the patient so that it has an impact on nutritional status and weight gain. In accordance with the results of research conducted by Tamaura et al. (2019) that there is a relationship between

dietary adherence behavior and fluid restriction to increase IDWG in patients undergoing hemodialysis. Similar to the research conducted by Visweswaran, et al which stated that the better in controlling IDWG, the better the quality of life of end-stage renal failure patients undergoing hemodialysis (Visweswaran et al., 2020)

The factors that contribute to IDWG, one of which is fluid intake. Several studies have shown that due to excess fluid and food intake in the interdialytic period, 60%-80% of patients die (Sonnier, 2000 in Istanti, 2014). In most patients, patient non-compliance in fluid intake restriction is an aspect that is not easy to do. Non-adherence in fluid restriction can cause chronic fluid overload so that it can increase the risk of death due to various organ complications experienced (Wayunah, et al 2016).

Anemia is a common complication in patients undergoing hemodialysis (HD). Low hemoglobin concentrations are associated with high mortality, cardiovascular events, fatigue, and negative health-related quality of life. Research conducted by Takashi Hara, et al stated that with increasing IDWG, the lowest point estimate in each IDWG category tends to shift to the category of lower hemoglobin concentration (Hara et al., 2021). Postdialysis hemoglobin concentration is influenced by the balance between ultrafiltration volume and refill volume (Movili et al, 2002; Minutolo, 2003). In the current practice of measuring predialysis, the consideration of IDWG in the interpretation of predialysis hemoglobin concentrations may contribute to a reduction in the risk of cardiovascular events, even if hemoglobin is true. Considering the volume loading mechanism, previous studies reported that the risk of cardiovascular events increases as IDWG increases (Kalantar et al, 2009).

CONCLUSION

Interdialytic Weight Gain (IDWG) that is not well controlled is at risk of death in end-stage renal failure patients undergoing hemodialysis. Increased IDWG can affect

hemoglobin concentration and cardiovascular disorders and trigger complications such as intradialytic hypertension, followed by muscle cramps, nausea, headache, chest pain, fever and hypotension. The need for support and support from nurses and families in patients undergoing hemodialysis in controlling IDWG through adherence to fluid restriction and dietary behavior so as to improve the quality of life of end-stage renal failure patients undergoing hemodialysis.

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DECLARATION OF CONFLICTING INTEREST

Related to conflict of interest that arise when conducting article.

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AUTHOR CONTRIBUTION

Lono Wijayanti: Main author of literature review and source search used for article writing.

Priyo Mukti Pribadi Winoto: Look for sources used to write and supervise the work of systematic literature review.

Nursalam Nursalam: As a supervisor and supervising the systematic work of literature review.

ORCID

Lono Wijayanti:

None.

Priyo Mukti Pribadi Winoto:

<https://orcid.org/0000-0001-9658-9507>

Nursalam Nursalam:

<https://orcid.org/0000-0002-9052-6983>

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