# CHAPTER 1 INTRODUCTION

## 1.0 Introduction

End stage renal disease (ESRD) presents special challenges to patients and families because of the complexity of the treatment plan, lifestyles changes required and the pervasiveness of the symptoms and treatment activities in the individual's life. The common treatment for ESRD is thrice-weekly haemodialysis for four hours each time (Couchoud *et al,* 2009). According to statistics, 92% of the ESRD patients were on haemodialysis treatment in 2011 (Malaysian Renal Registry 2011). Treatment with haemodialysis entails not just regular treatment, but also management of multiple medication regimes, dietary and fluid restrictions, as well as physical symptoms such as fatigue, cramps and giddiness. In addition to physical difficulties, haemodialysis patients face the burden of chronic disease and regular haemodialysis treatment throughout their lifetime. Over the years, many advances have been developed to improve the efficiency and quality of dialysis treatment, but patients still need to comply with numerous dietary restrictions and fluid intake. Although routine dialysis treatment can remove large quantities of fluid in short periods of time, dietary and fluid intake compliance remains essential and important. Nurses as health care professionals have a duty to develop practice which contributes to the health and wellbeing of their patients (Forbes & While, 2009). Nurses should focus on patient education with regards to kidney disease and its complications, the provision of renal replacement therapy and in assisting patients to achieve optimal health as well as to promote quality of life among haemodialysis patients (Chamney, Pugh-Clarke & Kafkia, 2009).

Previous study identified non-compliance to fluid intake was prevalent among patients undergoing hemodialysis in a single center in Malaysia (Barnett et al. 2008). However, data on fluid and salt intake knowledge was not available. Hence this present study

aimed to determine the knowledge level ,fluid compliance behavior and to evaluate the effectiveness of an educational intervention.

## 1.1 Background information

### 1.1.1 End Stage Renal Disease and haemodialysis

The kidney is an excretory organ. Its main function is to remove metabolic by-products and regulate vascular and extravascular body fluid. When an individual has kidney damage with deteriorated kidney function, they are diagnosed as having chronic kidney disease. According to the National Kidney Foundation Kidney Disease Outcomes Quality Initiative (NKF-KDOQI, 2002) clinical practical guidelines, chronic kidney disease is defined as kidney damage or by a glomerular filtration rate of less than 60 mL/min/ 1.73m³ for three months or more. The classifications of the five stages of chronic kidney disease are shown in Table 1.1. End-Stage Renal Disease (ESRD), also known as Stage 5 Chronic Kidney Disease (Levey *et al.* 2005), is the irreversible decline of kidney function from Stage 1 to 5 in which the individual needs renal replacement therapy to sustain life.

Table 1.1: Stages of Chronic Kidney Disease

| Stage | Description | GFR (mL/min/ 1.73m³) |
|---|---|---|
| 1 | Kidney damage with ↑GFR | $\geq$ 90 |
| 2 | Kidney damage with mild ↓GFR | 60-89 |
| 3 | Moderate ↓GFR | 30-59 |
| 4 | Severe↓GFR | 15-29 |
| 5 | Kidney failure | < 15 (or dialysis) |

Renal replacement therapy is the main treatment option for patients with end stage renal disease (ESRD), which include haemodialysis, peritoneal dialysis and transplantation. Haemodialysis is one of the common treatments initiated for ESRD patients to remove toxic waste and excessive fluid. The primary mechanism for toxin removal in haemodialysis consists of diffusion across a semi-permeable membrane when a solute concentration gradient is established across the membrane. Haemodialysis treatment is carried out using a dialysis machine to which an artificial kidney (dialyzer) is attached to allow the diffusion process to occur. The dialyzer contains a hollow fiber which is a semi permeable membrane that allows the membrane to perfuse the blood on one side of the membrane and the dialysis fluid (dialysate) on the other side. Solutes, whose concentrations are higher in the blood than in the dialysis fluid will diffuse across the concentration gradient, from blood to dialysate and drain out through the machine.

In haemodialysis, an extracorporeal dialyzing system is used to remove waste products and excessive water. During the process, the patient's uremic blood is purified by drawing it from an artery, passing it through a sterile extracorporeal circulation through a dialyzer in which dialysis takes place, and returning it to the venous system in its purified state (Figure 1.1).

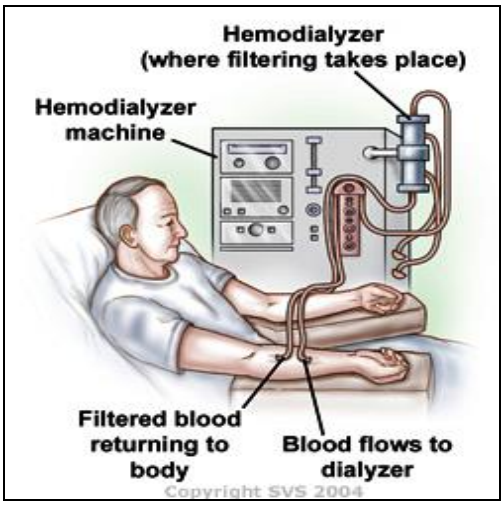


Figure 1.1 Patient on haemodialysis treatment.

The majority of haemodialysis patients receive dialysis three to four sessions weekly at centers or hospitals (Couchoud *et al.* 2009). Patients who received haemodialysis are put on a strict dietary and medical regimen to control the increase of toxins and fluid in the blood (Ash *et al.* 2006). The most important part of the patients' dietary restrictions is their fluid intake. Excess fluid cannot be excreted without dialysis or healthy kidney function. As patients receive haemodialysis on alternate days, fluid intake must be strictly monitored, with patients advised to maintain intake at the recommended 1 liter per day (Cvengros *et al.* 2004). Research suggests that 30 to 60 percent of patients fail to adhere to recommended fluid restrictions (Christensen *et al.* 2002). Failure to adhere to fluid restrictions can lead to complications such as hypertension, congestive heart failure, pulmonary edema and an increased risk of mortality (Morse *et al.* 2003).

### 1.1.2 Common problems in haemodialysis patients

#### 1.1.2.1 Hypertension

Hypertension is very common among end stage renal disease patients. Hypertension is estimated to occur in 72% of the chronic haemodialysis patients in the United States (Rocco *et al.* 2001). It has been long believed that hypertension is a major cause of morbidity and mortality in dialysis patients (Ozkahya *et al.* 2006). Hypertension remains poorly controlled in haemodialysis patients because of the variability of pre- and post-dialysis blood pressure measurement (Agarwal, 2000). The 19$^{th}$ Report of the Malaysian Dialysis & Transplant Registry 2011 highlighted the difficulty in controlling pre-dialysis systolic blood pressure among the haemodialysis population. Only 26% of haemodialysis patients achieved the ideal systolic blood pressure of below 140 mmHg in 2011. The mean and median pre-dialysis systolic blood pressure among haemodialysis patients in 2011 was on average unacceptably high at 151.5 mmHg. Poor blood pressure control is defined as blood pressure remaining generally poorly controlled despite new antihypertensive medications being introduced; however the report does not mention the reason behind high blood pressure levels. Uncontrolled hypertension in haemodialysis patients is associated with adverse cardiac, cerebral and vascular outcomes.

The prevalence of hypertension in the haemodialysis population has been estimated to be approximately 80%, with hypertension not only a leading cause of renal failure but also a common and vexing health issue in dialysis patients by causing or contributing to cardiovascular disease. Hypertension has been shown to cause or contribute to the development of left hypertrophy, cardiac chamber dilation, redistribution of coronary blood flow, myocardial ischemia heart failure and arrhythmias (Morse *et al.* 2003).

Cardiovascular disease is the major cause of death in patients with chronic kidney failure and those receiving haemodialysis, the risk of which is estimated to be about 20-30 times higher than the general population (Ozkahya *et al.* 2006). Classical cardiovascular risk factors such as hypercholesterolemia and hypertension increases cardiovascular events among the chronic renal failure population, but hypertension remains the most prevalent risk factor (Picton & Foley, 2000). Haemodialysis patients are at an increased risk of sudden death for many reasons. A large proportion of these patients suffer from coronary artery disease and cardiomyopathy, and this is a well-known risk factor for sudden death (Tapolyai *et al.* 2011).

#### 1.1.2.2 Fluid overload and weight gain

Volume expansion has been considered the most important factor in the development and maintenance of hypertension in ESRD for a long time (Chen *et al.* 2003). The pathogenesis of hypertension in renal failure is mainly caused by fluid retention. Patients with end stage renal disease often experience fluid overload and hypertension at the initiation of dialysis. Generally, blood pressure is better controlled when there is a reduction of fluid volume (Leunissen *et al.* 1999). In haemodialysis patients, larger increases of interdialytic weight gain is closely related with poorer survival rates and increased cardiovascular death (Kalantar-Zadeh *et al.* 2009). According to the US Renal Data System, 217 hospitalizations per 100 patient-years are attributed to congestive heart failure, and this excess in volume plays a major role in chronic haemodialysis patients (Agarwal, 2010).

Haemodialysis patients have large swings of increased volume status because of the intermittent nature of dialysis. These swings are especially prominent over the weekend when patients have three day intervals, rather than the customary two days without dialysis. Death may occur as the result of an accumulation of excess fluid over the longer weekend interval, as well as due to post-dialysis hypotension when a large amount of fluid is removed. A report from the US Renal Data System (USRDS) (Bleyer, Russel & Satko, 1999) suggested that patients dialyzed on MWF (Monday, Wednesday, Friday) had higher rates of sudden death and cardiac death on Monday, whereas patients who dialyzed TTS (Tuesday, Thursday, Friday ) had increased risk on Tuesday. Patients who survive until their dialysis treatment on Monday or Tuesday undergo the removal of very large amounts of fluid in a short time, frequently resulting in postdialysis hypotension. Both pre-dialysis hypertension and post-dialysis hypotension have been found to be risk factors for mortality in haemodialysis patients (Zager *et al.* 1998).

Interdialytic weight gain is associated with an increase in blood pressure. There is a 1.66 mmHg increase in systolic blood pressure for every 1% increase in interdialytic weight gain (Inrig *et al.* 2007). The increase in blood pressure with weight gain seems to be of greater magnitude in patients with hypertension as compared to those who are normotensives. Therefore, the relationship between blood pressure and volume status is partly dictated by patients' characteristics. The evidence shows that hypertension is not well-controlled in haemodialysis patients. The short duration and intermittent haemodialysis makes blood pressure treatment difficult to manage. Volume management has been suggested as a basis for optimal hypertension treatment (Fishbane & Scribner, 2002).

There is a positive correlation between interdialytic weight gain and blood pressure in haemodialysis patients. An analysis carried out by Rahman *et al.* (2000) in 5,369 patients receiving haemodialysis showed 37% were normotensive and 63 % hypertensive, with 11% of these patients having Stage III hypertension with blood pressures of more than 180/110 mmHg. In addition, noncompliance to treatment and fluid restriction was found to be associated with higher blood pressure readings.

### 1.1.3. Noncompliance

Noncompliance to a prescribed therapeutic regimen is a poorly elucidated concept. There are many definitions on the concept of noncompliance among patients. In dialysis patients, noncompliance had been defined as the interdialytic weight gain of more than 5.7% of dry weight (Friedman, 2001). Dry weight refers to the weight of the patient with normal fluid balance, without edema or excess body fluid. The National Kidney Foundation Kidney Disease Outcomes Quality Initiative (NKF-KDOQI, 2006) defined dry weight as the weight when fluid volume is optimal or as the estimated target weight that needs to be maintained during haemodialysis treatment. The NKF-KDOQI (2006) recommends that weight gain between dialyses should not exceed 1 kg during the week and 1.5 to 2 kg during the weekend. If haemodialysis patients exceed this recommended weight gain between dialysis, he/she can be labeled as noncompliant with regards to fluid and dietary sodium intake. In addition, excessive interdialytic weight gain due to nonadherence to fluid restriction is also categorized as noncompliance in dialysis patients. Fluid intake is the most important determinant of weight gain between haemodialysis session especially for patients with minimum or no urine output. If patients drink excessive fluids, this may lead to large interdialytic weight gain and directly increase their risk of heart failure and death (Tomson, 2001). As discussed, large interdialytic weight gain increases cardiovascular risk and lead to

sudden death. The issue of noncompliance should be included in training programs for dialysis teams, with patient education being an essential element in reducing noncompliant behavior.

### 1.1.4 Strategies for noncompliance

Patient education offers many potential benefits for patients and health care professionals. Early education can enhance compliance with all aspects of treatment and offer a greater opportunity for health care professionals to intervene and prevent the occurrence of co-morbid conditions. Various studies relating to the benefits of patient education programs have shown that educated patients have a reduced incidence of emergency dialysis (Golper, 2001). Preliminary results from the US National Pre–End-Stage-Renal Disease (pre-ESRD) Education Initiative which involved an educational intervention in a large number of pre-ESRD patients on kidney function, renal failure, and dialysis and transplant suggests that the initiative might influence patient outcomes (Gopler, 2001).

Education is an important factor in improving patient compliance and maximizing the success of treatment. Two surveys conducted on renal failure patients based on the National Kidney Foundation (NKF) guidelines showed that the provision of patient information could influence patient compliance rates (Gopler, 2001). In the first survey, a questionnaire based on NKF guidelines regarding treatment of chronic renal insufficiency was carried out on members of the American Association of Kidney Patients. An analysis of 1700 responses showed that provision of patient information was associated with greater compliance and achievement of successful therapy. Patients were prepared to change their behavior to feel better and live longer. The second survey was sent to members of the NKF Patient Organization. Findings showed the need for

dialysis patients to receive information on the guidelines themselves. Patients need to understand the direct impact guidelines have on disease outcomes and make healthcare decisions that can impact their treatment and outcomes (Gopler, 2001).

## 1.2 Problem statement

### 1.2.1 Statistics

The 19th Report of the Malaysian Dialysis and Transplant Registry 2011 stated that there were 26,159 patients receiving dialysis in Malaysia, with slightly more than 5,000 new patients that started dialysis in 2011. However, 25,688 were notified to the Malaysian Dialysis and Transplant Registry. The equivalent incidence and prevalence rate of patients on dialysis were 181 and 900 per million populations for Malaysia in 2011. The majority (92%) of these patients were on haemodialysis (HD) treatment while 8% were on peritoneal dialysis (PD). The intake of new dialysis patients continues to show a linear increase - from 2,375 in 2002 to 5,153 in 2010 and at least 5,201 in 2011. The number of prevalent dialysis patients showed a steeper increase from 9,107 in 2002 to 25,688 in 2011. Diabetes mellitus accounted for more than half of the primary renal disease of new dialysis patients since 2003. In 2011, 56% of new patients had diabetes mellitus as the primary renal disease. Hypertension was the primary renal disease in 6% of new patients in 2011 (p43).

In 2011, annual death rates for dialysis stood at 11.4% per year as reported by the 19th Report of The Malaysian Dialysis and Transplant Registry. The annual death rate has consistently been 11-12% from 2002 to 2011. The three most common causes of death in the dialysis population were cardiovascular disease (38%), death at home (19%) and sepsis (22%). Cardiovascular disease remained the main cause of death in 2011,

accounting for 38% of all deaths, which subsequently increased from 26% in 2007 to 38% in 2011. Deaths at home accounted for another 19% with the majority of these deaths probably due to cardiovascular events. Death from infection has increased over the last 7 years and in 2011 became the second most common cause of death, accounting for 22% of all deaths (p76).

### 1.2.2 Previous studies

The common cause for cardiovascular disorder is ventricular hypertrophy associated with dialysis hypotension. Some of the contributing factors to dialysis hypotension are hypervolaemia and large interdialytic weight gains (IDWG) or short treatment times (Agarwal, 2012). As the total amount of fluid that needs to be removed per session (4 hours) increases and session length is reduced, the required rate of fluid removal increases. The IDWG is considered a valid and reliable measure of fluid adherence, and is utilized in both clinical and research settings (Cvengros, Christensen & Lawton, 2004). Patients are routinely weighed at the start and after completion of each dialysis session; therefore IDWG is calculated based on the individual's post-dialysis weight or dry weight of the previous session subtracted from the pre-dialysis weight for the subsequent session (Khechane & Mwaba, 2004; Cvengros *et al.* 2004).

A prospective randomized study (Luik, Weideman, Cheriex, Kooman & Leunissen, 2001) on the influence of both increased volume removal and increased treatment time on blood pressure found that patients who decreased in dry weight without change in dialysis treatment time or increased in dialysis treatment time without changes in dry weight showed a significant improvement in blood pressure control. Patients should be counseled to limit their interdialytic weight gain to not more than 1kg / day to minimize the risk of cardiovascular complications. The interdialytic weight gain seen in patients

may be a result of hypervolaemia or overhydration. Overhydration is significantly linked to hypertension and the development of cardiovascular disease in dialysis patients. A sensitive bedside method that allows repeated measurements of intracellular and extracellular fluid volume may help to detect overhydration and help define an optimum dry weight in dialysis patients. Patients with fluid overload or increased extracellular water pre-haemodialysis should receive information on fluid control to improve fluid compliance.

### 1.2.3 Personal interest

The researcher has been providing care to dialysis patients for the past ten years. Based on her experience, she noticed that 70% of the haemodialysis patients had an average weight gain of 2.5 to 3 kilograms with one day of dialysis interval and dialysis schedule of three times a week. In addition, 60% of this population experienced hypotension or angina during treatment due to large interdialytic weight gain.

To date, there has not been any study conducted to assess knowledge on fluid and salt control and fluid compliance levels among the haemodialysis population locally. The researcher is interested in finding out the knowledge levels of patients on fluid and salt restrictions, the prevalence of fluid noncompliance and the effect of an educational intervention on fluid compliance at five selected hospital-based dialysis centers in the Klang Valley.

## 1.3 Research Questions

Despite the critical role of patient education in enhancing compliance in the dialysis population, there is no teaching program for these patients; prompting the researcher to wonder:

What is the knowledge level of haemodialysis patients on fluid and salt control pre- and post-intervention?

Is the source of information prior to the educational intervention associated with knowledge level on fluid and salt control?

Is there any difference in total knowledge mean scores between the experimental and the control group pre- and post-intervention?

Is the educational intervention effective in knowledge improvement among the experimental group?

Is there any association between knowledge, demographic and clinical factors?

What is the general fluid compliance status pre- and post-educational intervention?

Is the educational intervention effective in improving compliance in the experimental group?

Is there any association between fluid compliance, and demographic and clinical factors for the experimental group?

What are the predictors of knowledge and fluid compliance improvement in the experimental group?

The paucity of answers to the above questions suggests that such a study should be carried out to explore the knowledge levels and evaluate the effectiveness of a patient education program.

### 1.4 Research aims and Objectives

The purpose of this study is to examine the effectiveness of patient education on fluid compliance among haemodialysis patients.

The objectives of this study are:

1. To assess the level of knowledge on fluid and salt control pre- and post-intervention
2. To determine the association of knowledge level with source of information pre- and post-intervention.
3. To compare the mean total for knowledge on fluid and salt control by demographic and clinical characteristics pre- and post-intervention between the experimental and control groups.
4. To evaluate the effectiveness of an educational intervention on knowledge improvement 3-month post-intervention for both the experimental and control groups.
5. To determine the association and prediction between knowledge improvement, demographic and clinical factors post-intervention for the experimental group.
6. To determine fluid compliance status pre- intervention and at 1-, 3- and 6-month post-intervention in both the experimental and control groups.

7. To evaluate the effectiveness of patient education on fluid compliance improvement at 1-, 3- and 6-month post-intervention for the experimental group.
8. To determine the association and prediction between fluid compliance improvement, demographic factors and knowledge levels at 1-, 3-, 6- month post-intervention for the experimental group.
    - age
    - gender
    - marital status
    - educational level
    - employment status
    - duration of dialysis therapy
    - number of concurrent diseases
    - antihypertensive therapy
    - number of antihypertensive medication
    - knowledge

This study was carried out to assess patient noncompliance and address the questions on whether structured patient education improves fluid compliance among haemodialysis patients. The researcher hopes the findings of this study can positively impact health costs, nursing practice and promote quality of life in the haemodialysis population.

### 1.5 Significance of this study

Noncompliance refers to a person's behavior which does not adhere to health and medical recommendations. Patients with end stage renal disease on haemodialysis treatment need to conform to various regimen therapies such as medication, dialysis schedule, diet and fluid restriction and weight control between dialysis sessions. Many studies have highlighted the relationship between noncompliance, mortality and mortality (Banders &Walters, 1998). As cited in Fincham, Kagee & Moosa (2008), poor knowledge on treatment regimens has been shown to be an important predictor of non-compliance and patient education has been reported to have positive outcomes in renal failure patients.

#### 1.5.1 Patients

Haemodialysis patients must restrict fluid intake to approximately 700ml to 1000ml per day and maintain weight gain between 0.5 to 1kg per day (Moosa, Naicker, Naiker, Pascoe & Rensberg, 2006). Excessive fluid retention or prolonged hypervolemia may lead to cardiovascular complications and sudden death. Fluid compliance is crucial to promote quality of life and the survival of haemodialysis patients. The overall goal of dialysis is to live a quality life and have optimal health despite dialysis treatment. A better quality of life indicates improvement in their life with dialysis. Patient education enhances knowledge on salt and fluid intake, and increases fluid compliance, thus promoting it.

### 1.5.2 Nursing Practice

Patients who do not follow the advice given to them by health care practitioners are referred to as noncompliant. Nurses can establish a therapeutic relationship to change 'health –related behaviors' to convince patient to adhere to prescribed treatment (Kyngas, Duffy, Kroll, 2000). Dialysis nurses provide direct care to haemodialysis patients when they come for dialysis sessions and maintain contact hours with patients at each session. Nurses play a communicative role in disseminating information or advice related to dialysis treatment. Nurses can introduce strategies, structured education program, behavior modification program, and improve patient-nurses communication to reduce non compliance. An educational intervention can have a positive impact on fluid compliance and reduce complications (Baraz *et al.* 2009). Nurses play an important role in emphasizing the importance of fluid compliance and adverse effects of excessive weight gain such as hypertension and cardiac failure. Promoting better fluid compliance minimizes cardiovascular risks, enhances quality of life and reduces the burden of medical cost.

### 1.5.3 Organization

Fluid retention is a major clinical problem for end stage renal disease patients. Haemodialysis is initiated to remove excessive fluid and reduce the complications related to hypervolemia. Haemodialysis patients need to limit fluid consumption to 500ml per day to control weight gain of less than 1 kg between 2 consecutive dialysis sessions. Non adherence to fluid intake results in a high mortality rate (20%-25% per year in United State) mostly due to cardiovascular complications (Kalantar-Zadeh *et al.* 2009). The prevalence of noncompliance indicates the magnitude of poor compliance and indirectly measures the efficacy of patient care management. Determining

noncompliance can help to justify the need to develop better interventions such as practical guidelines or a structured teaching program to improve compliance among haemodiaysis patients.

A retrospective cohort study was conducted to assess the relationship between medication adherence and healthcare costs in patients who were receiving dialysis with an initial cinacalcet prescription, and results suggested that the medical cost could be saved by$8,899 because of the cinacalcet adherence (Lee *et al.* 2011). Increasing compliance has greater magnitude on the economic benefits because of the attainment of better patient outcomes, and cost containment of disease recurrence and complications. Furthermore, noncompliance is a waste of scarce healthcare resources. Identifying noncompliance and rendering adherence strategies indirectly saves health care cost.

**1.6 Conceptual definitions and Operational Definitions**

a) Haemodialysis patients

   Haemodialysis patients are patients suffering from end stage kidney disease and undergoing haemodialysis treatment.

   In this study, haemodialysis patients are referred to as patients in a chronic haemodialysis program for at least six months attending regular dialysis sessions three times weekly.

b) Fluid compliance

   Compliance is the action or fact of complying with a wish or command, thus fluid compliance refers to action of complying with a recommended fluid intake. (Oxford Dictionary, 2010)

In this study, fluid compliance is referred to as adhering to or following the daily fluid intake recommendations. Fluid intake per day = 24 hours urine output + 500mls. Haemodialysis patients without urine output have to strictly adhere to this daily.

c) In this study, indicators/outcome measures are the measures used to indicate fluid compliance. These measures include interdialytic weight gain (IDWG), mean predialysis blood pressure (MPBP) and rate of fluid adherence (RFA).

i) Interdialytic weight gain (IDWG) refers to the increase of body weight between dialysis sessions. It is calculated based on the subtraction of post-dialysis body weight (previous session) from pre-dialysis body weight. IDWG = predialysis weight – previous post dialysis weight.

Interdialytic weight gain (IDWG) should not be more than 3% (1.5-2kg) of dry weight according to the Renal Replacement Therapy: Clinical Practice Guidelines (MOH, 2004).

Dry weight is referred to as the body weight at which there are no clinical signs of fluid retention/ edema.

IDWGs of 2 kg and below (IDWG $\leq$ 2kg) are considered compliant.

(NKF KDOQI, 2006)

ii) Mean predialysis blood pressure is referred to as an average measurement of blood pressure taken before the dialysis which is calculated based on systolic blood pressure (SBP) plus two times diastolic blood pressure (DBP) and divided by three.

MPBP = {SBP + (2 X DBP)} / 3 (Lopez- Gomez. 2005).

MPBP of 100 mmHg and below (≤ 100 mmHg) is considered as compliance.

iii) Rate of adherence (RFA) is referred to as patients' behavior or compliance in relation to the recommended interdialytic weight gain between dialysis sessions. In this study, RFA is defined as the total number of times that patient adhere to weight gains of 2kg and below over the total number of dialysis sessions in a month, calculated based on the following formula:

RFA= (number of dialysis session (IDWG ≤ 2kg) / total dialysis sessions) x 100%

Example: There were 12 dialysis sessions per month, 9 sessions of IDWG ≤ 2kg

RFA= 9/12 = 75%

Weight gains of less than 3.5% (1.5-2kg) of dry body weight between thrice-weekly dialysis treatments/sessions.

RFA of ≥ 75% labeled as compliance. (Lindberg, 2010)

## 1.7 Focus and organization of the thesis

The write up of this thesis is structured into six chapters to facilitate clarity and ease of understanding of the study.

In Chapter One, the background information provides an overview of renal disease and haemodialysis. Relevant literature is outlined to strengthen the study background on common problems and noncompliance among haemodialysis patients. The research questions and objective give a clear direction on the outcome of the study. Research context and the significance of the study are elaborated.

Chapter Two is a critical review of literature which includes previous studies conducted in the area of fluid compliance and education strategies to identify a gap in the existing knowledge and the need for a new study. Subsequently, it enables a more comprehensive analysis and discussion of the findings in later chapters.

Chapter Three presents the research design utilized in this study. The instrument and data collection process was clearly described. Ethical considerations, pilot study result, data management and analysis are described in this section.

Chapter Four describes the major findings on knowledge levels and fluid compliance pre- and post-intervention, comparison of knowledge and fluid compliance between the experimental and control groups, as well as the effectiveness of patient education on knowledge and fluid compliance improvement. The association of knowledge and fluid compliance with demographic and clinical factors and its predictors concludes the chapter.

Chapter Five focuses on the discussion of the main findings related to knowledge and fluid compliance. Previous study findings were used to compare and draw conclusions from the comparison.

Chapter Six concludes the various issues that emerges from the findings. Implications and recommendations in relation to the practice, education and research are highlighted. The limitations and the strengths of the study are mentioned in this section. The chapter ends with an overview of the study findings.

## 1.8 Summary

This chapter provides a brief overview of end stage renal disease and haemodialysis, common problems in haemodialysis patients, issues related to noncompliance, and strategies to increase compliance. This section outlines the research problems, research questions, and research objectives. The significance of conducting this study for the benefit of patients, organization, and nursing is highlighted. The operational definition is presented in the final section of this chapter, which operationally defined terms such as haemodialysis patients, fluid compliance, interdialytic weight gain, mean pre-dialysis blood pressure and rate of fluid adherence.