UNIVERSITI PUTRA MALAYSIA

THE RELATIONSHIP BETWEEN FACTORS ASSOCIATED WITH BLOOD PRESSURE DECREMENT IN HYPERTENSIVE PATIENTS ON REGULAR HEMODIALYSIS IN HOSPITAL SERDANG

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ABSTRACT

THE RELATIONSHIP BETWEEN FACTORS ASSOCIATED WITH BLOOD PRESSURE DECREMENT IN HYPERTENSIVE PATIENTS ON REGULAR HAEMODIALYSIS IN HOSPITAL SERDANG

INTRODUCTION: Hypertension is a persistent elevation of systolic blood pressure (BP) of 140 mmHg or greater and/or diastolic BP of 90 mmHg or greater. Hypertension is common and difficult to manage in patients with end stage renal disease (ESRD) on regular haemodialysis (HD). Most patients with ESRD developed complications from hypertension such as cardiovascular disease (CVD) which is the major cause of death in ESRD patients. Many studies were done on HD patients; however, the relationships between factors associated with blood pressure are not well defined. **OBJECTIVE:** This study aims to determine factors associated with blood decrement after haemodialysis in hypertensive patients on regular haemodialysis. There were three factors identified as contributing to the BP decrement; IDWG, antihypertensive medications and duration of HD. **METHODOLOGY:** A cross-sectional study with purposive sampling method was done involving a total of 124 respondents on regular haemodialysis in Haemodialysis Unit (HDU) Hospital Serdang, who fulfilled the study's inclusions criteria. A standardized Proforma was modified for the purpose of this study. **RESULTS:** There were 64(51.6%) males and 60(48.4%) females with average age of 51.4±13.1 years old. Most of them were Malay (54.8%) and 52.4% of the respondents had secondary level of education. Majority of respondents (53.2%) gained IDWG < 2.2kg with mean IDWG of 2.25±1.2 kg. There were 52.4% of respondents on with one type of antihypertensive medication and 38.7% of respondents undergone haemodialysis treatment from 1 to 3 years. The mean predialysis systolic and diastolic BP values were 160.34±19.53 mmHg and 80.78±15.26 mmHg, respectively; while mean postdialysis systolic and diastolic BP were 128.75±19.75 mmHg and 73.87±13.27mmHg, respectively. Paired t-test showed there was significant difference between BP pre and post dialysis which showed significant BP decrement after dialysis; however the factors contributing to it was not determined clearly. In this study, there were significant correlations between IDWG and antihypertensive medications with BP decrement after haemodialysis with $r = 0.18$, $p \leq 0.05$ and $r = 0.22$, $p \leq 0.05$ respectively. However, no significant relationship was seen between the duration of HD and BP decrement. **CONCLUSION:** There were significant relationships between IDWG and antihypertensive medications with BP decrement after haemodialysis; however there was no significant relationship with the duration of HD. Further study is warrented in order to determine other factors which might involved in blood pressure control among haemodialysis patients.

Key words: Interdialytic weight gain (IDWG), haemodialysis (HD), blood pressure (BP)

ABSTRAK

HUBUNGAN ANTARA FAKTOR YANG BERKAITAN DENGAN PENGURANGAN TEKANAN DARAH DALAM PESAKIT HIPERTENSI PADA HEMODIALISIS TETAP DI HOSPITAL SERDANG

PENGENALAN: Tekanan darah tinggi adalah ketinggian yang berterusan tekanan darah sistolik (BP) 140 mmHg atau lebih dan / atau tekanan darah diastolik 90 mmHg atau lebih. Hipertensi adalah biasa dan sukar untuk diuruskan pada pesakit peringkat akhir penyakit buah pinggang (ESRD) dalam rawatan hemodialisis biasa (HD). Kebanyakan pesakit dengan ESRD akan mengalami komplikasi dari tekanan darah tinggi seperti penyakit kardiovaskular (CVD) yang merupakan punca utama kematian di kalangan pesakit ESRD. Banyak kajian telah dilakukan ke atas pesakit HD; bagaimanapun, hubungan antara faktor-faktor yang dikaitkan dengan tekanan darah tidak ditakrifkan dengan baik. **OBJEKTIF:** Kajian ini bertujuan untuk menentukan faktor-faktor yang dikaitkan dengan pengurangan darah selepas hemodialisis di kalangan pesakit hipertensi yang menjalani hemodialisis tetap. Terdapat tiga faktor yang dikenal pasti sebagai menyumbang kepada pengurangan tekanan darah; IDWG, ubat antihipertensi dan tempoh HD. **METODOLOGI:** Satu kajian keratan rentas dengan kaedah 'purposive sampling' telah dilakukan yang melibatkan sejumlah 124 responden hemodialisis tetap di Unit Hemodialisis (HDU) Hospital Serdang, yang memenuhi kriteria kajian. Proforma diseragamkan telah diubahsuai untuk tujuan kajian ini. **KEPUTUSAN:** Terdapat 64 (51.6%) lelaki dan 60 (48.4%) perempuan dengan purata umur iaitu 51.4 ± berusia 13.1 tahun. Kebanyakan mereka adalah Melayu (54.8%) dan 52.4% daripada responden mempunyai tahap pendidikan menengah. Majoriti responden (53.2%) yang diperolehi IDWG <2.2kg dengan min IDWG sebanyak 2.25 ± 1.2 kg. Terdapat 52.4% daripada responden dengan satu jenis ubat antihipertensi dan 38.7% daripada responden menjalani rawatan hemodialisis dari 1 hingga 3 tahun. Purata bacaan tekanan darah sebelum dialisis bagi sistolik dan diastolik adalah 160.34 ± 19.53 mmHg dan 80.78 ± 15.26 mmHg, secara selari, manakala purata bacaan tekanan darah selepas dialisis bagi sistolik dan diastolik adalah 128.75 ± 19.75 mmHg dan 73.87 ± 13.27 mmHg, secara selari. Ujian 't-berpasangan' menunjukkan terdapat pengurangan tekanan darah antara tekanan darah sebelum dan selepas dialisis, namun faktor-faktor yang menyumbang kepada pengurangan tidak ditentukan dengan jelas. Dalam kajian ini, jelas terdapat hubungan yang signifikan antara IDWG dan ubat antihipertensi terlibat dalam pengurangan tekanan darah selepas hemodialisis dengan $r = 0.18$, $p \leq 0.05$ dan $r = 0.22$, $p \leq 0.05$, secara selari. Walau bagaimanapun, tiada hubungan yang signifikan dilihat antara tempoh rawatan hemodialisis dengan pengurangan tekanan darah. **KESIMPULAN:** Terdapat hubungan yang signifikan antara IDWG dan ubat antihipertensi dengan pengurangan tekanan darah selepas hemodialisis, namun tidak ada hubungan yang signifikan dengan tempoh rawatan hemodialisis. Kajian yang lebih lanjut diperlukan untuk menentukan faktor-faktor lain yang mungkin terlibat dalam mengawal tekanan darah di kalangan pesakit hemodialisis.

Kata kunci: berat badan antara dialisis (IDWG), hemodialisis (HD), tekanan darah (BP)

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LIST OF ABBREVIATION

<	Less than
>	More than
%	Percentage
BP	Blood Pressure
HPT	Hypertension
IDWG	Intradialytic Weight Gain
HD	Haemodialysis
CVD	Cardiovascular Disease
ESRD	End-stage Renal Disease
SBP	Systolic Blood Pressure
DBP	Diastolic Blood Pressure

CHAPTER 1

1.1 Introduction

Hypertension is defined as persistent elevation of systolic blood pressure (SBP) of 140mmHg or greater and/or diastolic blood pressure (DBP) of 90mmHg or greater (WHO, 2011). Hypertension occurs when the force of blood against the artery walls increases enough to cause damage. One of the factors that cause increasing blood pressure is extra fluid in the body which increases the volume in the blood. Prevalence of hypertension is on a rising trend in developed and developing countries (WHO, 2002). About 29% of the world's adult population (about 1.56 billion people), are expected to have hypertension by 2025 (Ueshima, Zhang, & Choudhurym, 2000). Approximately 7.1 million deaths per year was be attributed by hypertension (Singh et. al, 2000).

Patients with End Stage Renal Disease (ESRD) undergoing regular haemodialysis (HD) are sometimes find it difficult to manage their hypertension (Agarwal et al., 2003). ESRD is a condition where the kidneys are permanently incapable of functioning normally. It occurs when nephrons losses its function, thus resulting the kidney unable to synthesize metabolic waste products, salt, and water retention which are potentially fatal unless renal replacement therapy is started (Gokal & Hutchison, 2002). It is a major problem in both developing and developed countries (Lai & Zaki, 2005).

Most patients with ESRD have complications from hypertension such as cardiovascular disease which are the major cause of death in ESRD patients (Shaza, Rozina, Izham & Azhar, 2005). According to Lynn (2004), hypertension is one of the factors that increases cardiovascular morbidity and mortality in patients with end-stage kidney disease.

Hypertension among haemodialysis (HD) patients if left uncontrolled may lead to left ventricular enlargement, cardiomyopathy and subsequently causing cardiac failure (Foley et al., 1996; Tucker et al., 1997; Rahman et al., 2000). In addition, hypertension is also a significant risk factor for cardiovascular events in ESRD patients receiving maintenance dialysis (Gerard, 2003). In Malaysia, cardiovascular disease is the leading cause of death in this population (Lim & Lim, 2003).

Although it is well known that the control of hypertension is important to reduce the risk on getting CVD in HD patients, there are still a lot of patients with poor blood pressure (BP) control and lack understanding of the disease in the real world. Thus, the paramedics and nurses should take the responsibility to always remind the patients on the consequences of the disease and help them in understanding the disease well.

As usual, patient will come to the dialysis center with a slightly higher BP, and the BP reduces after the completion of the HD treatment. There are many factors associated with BP decrement after HD, however the relationship between factors associated with BP are not well defined (Rahman et al., 1999). Therefore, in this study, we only focus on three factors which are IDWG, antihypertensive medication and duration of HD, which will cause BP decrement after completion of HD treatment.

1.2 Problem Statement

Hypertension is a common clinical problem in patients undergoing chronic haemodialsis (Quarello et al., 1996). Hypertension affects the majority of haemodialysis (HD) patients and may lead to cardiovascular morbidity and mortality (Walter, 2010). However, the relationships between factors associated with blood pressure are not well defined (Rahman et al., 1999). The purpose of this study is to determine the relationship between factors associated with BP decrement in patient undergone HD.

1.3 Benefit of This Study

The findings of this study will be use to increase awareness of health care providers and the patients regarding the relationship between the factors that associated with blood pressure decrement among haemodialysis patient. Therefore, this information may assist health care providers in preparing, improving and enhancing hypertensive haemodialysis patients towards better blood pressure control.

Health care providers and patients also may take appropriate actions towards the factors that may contribute to high blood pressure and subsequently precaution and preventive actions can be carried out to avoid further complications.

1.4 General Objective

Objective of this study is to determine the relationship between factors associated with blood pressure decrement in hypertensive patients on regular haemodialysis.

1.5 Specific Objectives

1. To determine the distribution of respondent according to demographic parameters (gender, age, ethnicity, and education level).

2. To determine the distribution of IDWG, antihypertensive medication, duration of HD and BP.

3. To determine the difference between blood pressure and IDWG, antihypertensive medication and duration of HD.

4. To determine the relationship between BP and IDWG, and antihypertensive medication and duration of HD.

1.6 Research Hypothesis

1.6.1 Ha^1: There is significant association between IDWG and BP.

1.6.2 Ha^2: There is significant association between of antihypertensive medication and BP.

1.6.3 Ha^3: There is significant association between duration of HD and BP.

1.7 Variables

1.7.1 **Dependent**

Blood pressure (BP) of patients.

1.7.2 **Independent**

1.7.2.1 – Socio-demographic factors (gender, age, ethnicity and education level).

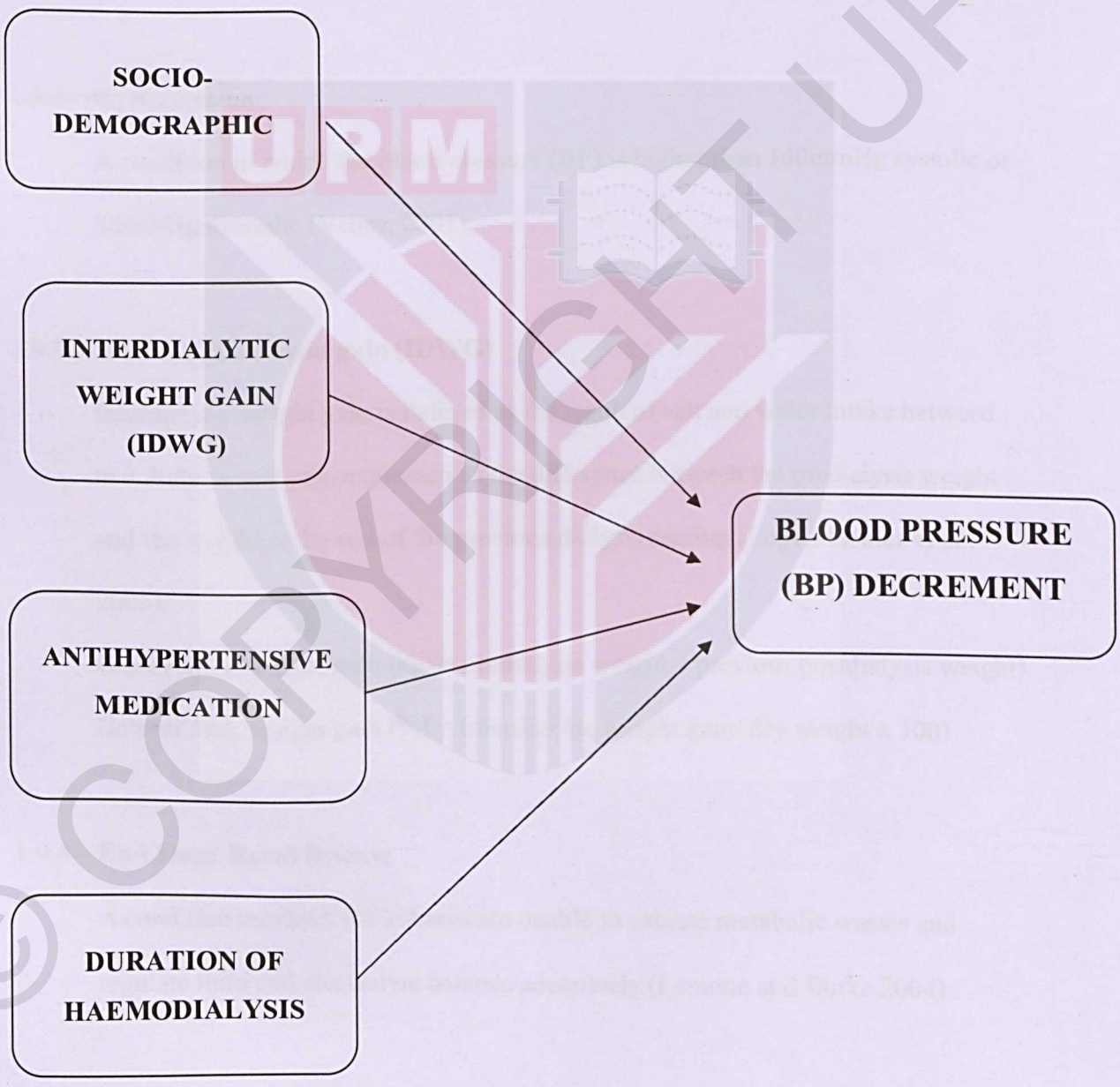
1.7.2.2 – Intradialytic weight gain (IDWG).

1.7.2.3 –Antihypertensive medications.

1.7.2.4 – Duration of Haemodialysis.

1.8 Conceptual Framework:

The Relationship between Factors Associated with Blood Pressure Decrement in Hypertensive Patients on Regular Haemodialysis in Hospital Serdang



1.9 Definition of Terms

1.9.1 – **Blood Pressure**

The tension exerted on the walls of arteries by the strength of the contraction of the heart; the resistant of arterioles and capillaries; the elasticity of blood vessel; the blood volume; and blood viscosity (Venes, 2001).

1.9.2 – **Hypertension**

A condition in which the blood pressure (BP) is higher than 140mmHg systolic or 90mmHg diastolic (Venes, 2001).

1.9.3 – **Interdialytic weight gain (IDWG)**

Interdialytic weight gain is defined as the result of salt and water intake between two dialysis sessions, expressed as the difference between the predialysis weight and the weight at the end of the previous dialysis session (Lopez-Gomez et al., 2005).

(Interdialytic weight gain (kg) = predialysis weight – previous postdialysis weight)

(Interdialytic weight gain (%) = Interdialytic weight gain/ dry weight x 100)

1.9.4 – **End Stage Renal Disease**

A condition in which the kidneys are unable to excrete metabolic wastes and regulate fluid and electrolyte balance adequately (Lemone and Burke,2004)

1.9.5 – **Haemodialysis**

Haemodialysis is the process when the patient's blood is let out of his body where it is treated with anticoagulant (heparin) to prevent it from clotting and passed over a semipermeable membrane is the dialyzer (artificial kidney) through which exchange of solutes (dialysis) takes places (Thye, 1995).

1.9.6 – **Dry weight**

Dry weight is currently defined as the lowest weight a patient can tolerate without the development of symptoms or hypotension (Henderson, 1980).

Dry weight is defined as the lowest tolerated postdialysis weight achieved via gradual change in postdialysis weight at which there are minimal signs or symptoms of hypovolemia or hypervolemia (Singa & Agarwal, 2009).

CHAPTER 2

LITERATURE REVIEW

2.1 End-Stage Renal Disease

End-Stage Renal Disease (ESRD) is a condition where the kidneys are permanently incapable of functioning normally. The kidney has many functions and once it gets affected by problems it may contribute too many problems for us. According to Gokal and Hutchison (2002), ESRD occurs when nephrons losses its function, thus resulting the kidney unable to synthesize metabolic waste products, salt, and water retention which are potentially fatal unless renal replacement therapy is started. ESRD is a major problem in both developing and developed countries (Lai, Hin & Zaki, 2005).

End-stage renal disease in the United States creates a large burden for both individuals and society as a whole (Klag et al., 1996). In 1991, about 190,000 persons in the United States either went to dialysis or received a renal transplant for end-stage renal disease.

On the contrary here in Malaysia, diabetes nephropathy accounted for 52% of ESRD patients, unknown cause for 30%, hypertension for 7%, glomerulonephritis for 4%, obstructive nephopathy for 2% and systemic lupus erhytematous (SLE), polycystic kidney and others for 1 % as stated in the 18th Report of The Malaysian Dialysis & Transplant Registry 2010. Renal replacement therapy is a lifesaving treatment offered to those with ESRD. Treatment is offered in the form of haemodialysis, peritoneal dialysis, or transplantation (Terril, 2002).

2.2 Dialysis

Dialysis is a process which separates solutes dissolved in water through a semipermeable membrane (Thye, 1995). When our kidneys losses its function, dialysis is one of the best ways to help maintain our body system be in the normal function. The purpose of dialysis is to remove metabolic waste products and correct imbalance of body water and electrolyte. It is done on temporary and partial basis, as it does not work as a permanent replacement that has the same functions of real kidneys.

Chronic dialysis and renal transplantation has been practiced in Malaysia since 1976. The dialysis acceptance rate in Malaysia for 2003 was 80 per million populations, with a prevalence rate of 391 per million populations. According to 18th Report of The Malaysian Dialysis & Transplant Registry 2010, numbers of patients commencing dialysis were increase in 10 years from 2112 in 2001 to 4740 in 2009 and at 4521 in 2010. The new dialysis patients were 170 per million populations (pmp) in 2009 and 160 pmp in 2010.

Patients typically undergo haemodialysis three times a week for a period of 4 to 6 hours and have dietary and fluid restriction between dialysis treatments to minimize the unnecessary accumulation of harmful toxins, electrolytes and fluids. Dialysis has two primary aims, which are the removal of solute and the removal of water.

Solute removal is achieved primarily by diffusion, and convective solute transport is minimal. Water removal occurs primarily as a result of ultrafiltration with osmosis contributing in a minor way (Glassock, 1998; Owen, Pereira, & Sayegh, 2000).

2.3 Haemodialysis

Haemodialysis is the process when the patient's blood is going out of his body where it is treated with anticoagulant (heparin) to prevent it from clotting and passed over a semipermeable membrane is the dialyser (artificial kidney) through which exchange of solutes (dialysis) takes places (Thye, 1995). HD patients dialyze three times weekly. If they should happen to miss a HD treatment or cut a HD treatment short, they will have excess fluid overload which would have normally been removed through the HD process. Higher IDWG and higher mortality has been associated to skipping treatment in a number of studies (Obialo et al., 2008).

In order to get the patient's blood to flow out and pass through the artificial kidney machine for cleansing, vascular access is necessary (Thye, 1995). There are three main types which are native arteriovenous (AV) fistulas in forearm, synthetic graft subcutaneously, or long line into a central vein (Glassock, 1998). The AV fistula takes a few weeks to mature while the internal jugular or the subclavian catheter can be used immediately.

The patients requires a haemodialysis machine with a built-in system to monitor the various sets of pumps, the dialyser or artificial kidney, lines for letting out and returning blood to the patient, dialysate or dialysis solution, water treatment unit (deionizer or reverse osmosis) and vascular access for the patient (usually an AV fistula) (Thye, 1995). The dialysate compartment is filled with a mixture of concentrated electrolyte solution and purified water known as 'dialysate', which has an electrolyte composition similar to extracellular fluid (Daugirdas et al., 2001).

2.4 Dry Weight

Dry weight is defined as the lowest weight a patient can tolerate without the development of symptoms or hypotension (Henderson, 1980). Dry weight will be given by the doctor according to the status of the patient; the patient's blood pressure in normal condition, chest x-ray with no cardiomegaly and the patient must be fit in time of dialysis. According to Jaegar and Mehta (1999), in most HD centers worldwide, dry weight is usually reflects the lowest weight a patient can tolerate without intradialytic symptoms and hypotension in the absence of fluid overload.

2.5 Hypertension in ESRD patient

Hypertension in chronic haemodialysis (HD) patients contributes significantly to their morbidity and mortality. In Malaysia, The Third National Health and Morbidity Survey of 2006 showed that the prevalence of hypertension among adults 30 years old and above was 43%, a relative increase of 30% from that of 10 years earlier and close to two thirds of individuals with hypertension in Malaysia were unaware that they have hypertension. The prevalence of hypertension in haemodialysis patients is 8% (18th Report of The Malaysian Dialysis & Transplant Registry 2010).

Hypertension occurs very frequently in chronic kidney disease (CKD) and is nearly universal in patients who reach end-stage renal disease (ESRD) (Nissenson and Fine, 2005). In a survey of 2535 haemodialysis patient from 69 dialysis units in the United States, the prevalence of hypertension was 86 percent (Agarwal et al., 2003).

Hypertension is common and often difficult to manage in patients with end stage renal disease (ESRD) treated with haemodialysis (Agarwal et al., 2003). According to Khosla & Johnson (2004), hypertension is a common clinical problem in patients undergoing chronic HD. Hypertension will contribute to the cardiovascular problem. Studies stated that hypertension contributes to increase cardiovascular morbidity in this population (Foley et al., 1996). In Malaysia, cardiovascular mortality was about 34% of the total cause of death in patients on dialysis (Menon et al., 2003). Studies have shown that BP is often high before dialysis, decreased after dialysis and then increase in the interdialytic period (Covic, Goldsmith & Covic, 2000).

Table 2.1: The Stages of Hypertension

Category	Systolic (mmHg)	Diastolic (mmHg)
Normal	<130	<85
Pre-hypertension	130-139	85-89
Hypertension Stage 1	140-159	90-99
Hypertension Stage 2	160-179	100-109
Hypertension Stage 3	180-209	110-119
Hypertension Stage 3	≥210	≥120

Source: Clinical Practice Guideline on Management of Hypertension (3rd Edition), 2008, Malaysia

As suggested by National Kidney Foundation K/DOQI guidelines recently, predialysis and postdialysis BPs should be of 140/90 and of 130/80 mmHg, respectively.

According to Rahman et al., (1999), the research classified as having uncontrolled hypertension if they had an average predialysis BP or greater than or equal to 160 mmHg or a diastolic BP greater than to 90 mmHg and for control BP lower than 159 mmHg or a diastolic BP lower than 89 mmHg.

Horl et al., (2002), suggested that blood pressure (BP) control would be an important target for intervention to reduce cardiovascular mortality. If the BP be within normal range, it will be a lower risk of cardiovascular events. It was supported by Walter, H., (2010), decrement of blood pressure was associated with lower risks of cardiovascular events. If BP after dialysis was higher, it will contribute too many of problems. As states by Port et al., (1999), postdialysis systolic pressures (> 180 mm Hg) and diastolic pressures (> 110 mm Hg) were associated with an elevated mortality risk as well.

Systolic Vs. Diastolic Hypertension

Most patients on haemodialysis have systolic hypertension that may or may not correlate with diastolic hypertension (Agarwal, 2003). According to Joint National Committee 7th (2003), it designates systolic BP as the primary treatment target in people above 50 years. In fact, diastolic hypertension is rarely used for primary target (Agarwal et al., 2003). According to Tozawa et al., (2002), a direct relationship between systolic BP and total mortality and systolic BP and cardiovascular events has significant in the haemodialysis population; compare to diastolic BP, the relationship is difficult to see. Tozawa et al., (2002) found that

systolic BP is a superior determinant of cardiovascular and total mortality. Thus, it appears reasonable to target systolic BP.

2.6 Factors Related to Blood Pressure on Haemodialysis Patient

2.6.1 Socio-Demographic Data

The most important demographic factors found to be related to non-adherence to HD were young age (Leggat et al., 1998) and male gender (Bame et al., 1993). Commonly, the greater non compliance in younger patients was related to the stress of HD and of trying to be independent. Young HD patient would more contribute to high BP compare to the other age. It was supported by Rohrscheib et al., (2008), systolic BP, diastolic BP, were elevated among young HD patients. This may because of reflect an acceleration of cardiovascular disease in young HD patients.

Many of the studies which investigated the relationship between race and self-care behaviors in HD had small sample sizes and used different criteria to measure adherence which may have resulted in inconsistent findings (Bame et al., 1993). Some studies did not find any association between highest educational level and IDWG adherence to HD self-care regimens is achieved (Leggat et al., 1998). Study done in Seremban by Tan, C. W., (2006), the mean age of the hypertensive patients on regular haemodialysis is 55 years old. Majority is male (55.80%) and mostly is Chinese with 56.7%.

2.6.2 Interdialytic Weight Gain (IDWG)

The first factor that was investigated in this research was interdialytic weight gain or known as IDWG. Interdialytic weight gain is defined as the result of salt and water intake between two dialysis sessions, expressed as the difference between the predialysis weight and the weight at the end of the previous dialysis session (Lopez-Gomez et al., 2005). In the HD patient, fluid intake is monitored using interdialytic weight gain (IDWG), which refers to the weight gain that occurs as a result of fluid retention between HD treatments. The majority of HD treatments incorporate a prescription for fluid removal targeted to a patient's "dry weight" (Jaegar & Mehta, 1999).

According to Daurgirdas et al. (2001), patients should strive to keep their IDWG below than 1.0kg per day. On the other hand, according to Lopez-Gomez et al. (2005), water and salt intake can give rise to a volume overload, which can be the key for the developing of high blood pressure and left ventricle hypertrophy, both of which can increase the cardiovascular risk. Excessive IDWG due to volume overload is considered to be both a major determinant of hypertension, dependent on the volume and also as predisposing factor for development of CVD (Wilson, Shah & Nissenson, 2004). Early observation with haemodialysis led to the concept that hypertension could be controlled by correcting volume overload (Vesters et al., 1969).

One of the kidneys functions is to regulate renin-angiotensin system that will make sure the blood pressure in a normal condition. If this system was denied, it will suppress the blood pressure in a high reading. This is supported by Doulton and MacGregor (2004), that the

volume expansion often fails to suppress the renin-agiotensin system appropriately and this inevitably leads to high BP in the majority of individuals on haemodialysis.

Hypertension in HD patients is often due to salt and water overload associated with an excessive interdialytic weight gain (IDWG) and contributes to the higher morbidity and mortality in these patients (Leggat et al. 1998; Mazzuchi et al. 2000). High IDWG will give many unwanted effects to the patients. Patient have to restrict their intake to make sure it does not over limit. The patient with high IDWG will have problems including increased mortality (Leggat et al., 1998), left ventricular dilatation, hypertrophy (Jaegar & Mehta, 1999), and cardiac failure (Harnett & Parfrey, 1997). Furthermore, another study reported that HD patients who had greater than 5.7% intersession IDWG had a 35% higher risk of death, greater than risk of death for skipping or shortening HD sessions (Leggat et al., 1998).

The direct relationship between volume status and blood pressure (BP) has long been recognized (Charra et al., 1998). Studies had shown that at least 80% of all hypertension in dialysis patients was due to chronic hypervolemia (Lins et al., 1997). According to Grekas (2000), hypertension in dialysis patients concluded that 90% of cases resulted from sodium and volume overload, while the remaining 10% had elevated renin activity.

The other studies also had shown similar relationship between the volume status and blood pressure as well. High IDWG were correlated with high BP. According to Leypoldt et al. (2002) decrease in body weight and plasma volume was associated with a decrease in predialysis and postdialysis systolic.

Although majority of the studies shown the relationship between IDWG and BP, there were other studies which revealed no relationship between those parameters. It was supported by Savage et al. (1997) who found no correlation between IDWG and BP in sixteen apparent volume-dependent ESRD patients. Wu and Jeng (2001) also failed to observe a correlation between IDWG with casual BP in 40 and 117 patients respectively.

According to Lopez-Gomez, Villaverde, Jofre, Rodriguez-Benitez, and Perez-Garcia, (2005), interdialytic weight gain (IDWG) plays an important role in controlling BP as it represents the water and salt intake in between two HD sessions. Although total body volume overload likely has a significant role in hypertension in patients with ESRD, the association or proven between BP and IDWG is less clear and still remains controversial.

2.6.3 Antihypertensive medication.

The second factor that been discussed in this research is antihypertensive medication. In general, the use of antihypertensive drugs has been shown to reduce total mortality in hemodialysia patients (Foley, 2002; Zager et al., 1998). According to Rocco et al., (2001), the majority of patients with end-stage renal disease (ESRD) on chronic dialysis undergoing standard three times a week treatment need antihypertensive drug therapy.

Antihypertensive drug therapies can effectively reduce BP and are needed by the vast majority of haemodialysis patients (Agarwal et al., 2006). Most 91% patients with uncontrolled hypertension were receiving less than maximal antihypertensive drug therapy (two or more antihypertensive) (Smith et al., 1995). The majority of patients with end-stage renal disease (ESRD) undergoing standard three times a week treatment need antihypertensive drug therapy (Rocco et al., 2001).

Most patients undergoing conventional HD require a number of antihypertensive medications to achieve an appropriate BP (Inrig J. K., 2010; Levin et al., 2010). Walter, H. (2010) stated that antihypertensive drugs may reduce cardiovascular complications. One study suggested that the use of more antihypertensive drugs in haemodialysis patients is paradoxically associated with even worse BP control (Thomson, 1967).

Study done by Salem (1999) revealed the statistic between number of antihypertensive medication taken and BP; 86 patients not treated with antihypertensive drugs, 220 patients with one drug, 132 patients with two drugs and 29 patients with three or more drugs. Thus, the result showed that mean blood pressure of patients with no antihypertensive treated, were slightly high {117.9 ± 6.3mmHg} as compared to the BP of patients who is treated with antihypertensive {113.9 ± 11.2mmHg}, majority treated with one drug.

Charra B., (1994) reported on 692 patients in which the use of antihypertensive drugs was over 3 months, the mean arterial pressure were achieved 110mmHg or less in 3 months. It's showed that using antihypertensive medication was associated in reducing the BP among haemodialysis patients. According to Agarwal et al., (2006), antihypertensive drug therapies can effectively reduce BP and are needed by the vast majority of haemodialysis patients.

2.6.4 Duration of Haemodialysis

The third factor discussed in this research was duration of haemodialysis (HD). Multiple studies have shown that hypertension is associated with increase morbidity and mortality in patients undergoing long-term haemodialysis (Kimura et al., 1996).

Raimundo et al., (2006) stated that, poor performance of usual activities was attributed in 45% to the duration of haemodialysis and of renal failure and pain/discomfort was worsened in 45% by the duration of haemodialysis and of renal failure. The longer patient on HD, the more complications occurred, thus it may give impact to the BP.

Although majority research showed that the longer duration of HD will make the BP go higher, but it also may contribute to the hypotension. According to Shoji et al., (2004), stated that duration of dialysis correlated significantly with fall in diastolic blood pressure. Cravedi et al., (2009) stated that decrease of systolic BP from 149.4 ± 16.6 to 128.4 ± 26.0 mmHg ($P < 0.001$) and a decrease of diastolic BP from 87.7 ± 11.1 to 79.6 ± 16.7 mmHg ($P < 0.05$) in haemodialysis patients on 2 years duration of HD treatment. Stidley et al., (2006) stated that lower BPs have been associated with decreased mortality in HD patients who survived for >3 years in haemodialysis treatment.

CHAPTER 3

METHODOLOGY

3.1 Study Location

This study was conducted at Haemodialysis Unit (HDU) in Hospital Serdang, Selangor.

3.2 Study Design

This is a cross-sectional study.

3.3 Sampling

3.3.1 Study Population

ESRD patients on regular haemodialysis in haemodialysis unit, Hospital Serdang.

3.3.2 Sampling Method

Purposive sampling

3.3.3 Sample Size

Testing differences between two means:

$$n = \frac{2\sigma^2 [Z_{1-\alpha/2} + Z_{1-\beta}]^2}{(\mu_1 - \mu_2)^2}$$

n = Sample size

σ = standard deviation of BP*

z = standard score corresponding to a given confidence level

μ_1 = mean of SBP before *

μ_2 = mean of SBP after *

In this study: 95% confidence level of z = 1.96 is used (80% strength), and 10% sampling error.

(* Wang, S. M., et al., 2009)

$$n = \frac{2\,(16)^2 [\,1.96 + 0.842\,]^2}{(6)^2}$$

$$n = \frac{4019}{36}$$

n = 112 respondents from each group

n = 112 + 10% considering drawn out rate

Sample Size = 124 Respondents

3.4 Inclusion Criteria

3.4.1 - ESRD patients who are diagnosed with hypertension (Systolic BP 140 and above, or diastolic BP 90 and above, or both)

3.4.2 - Age 18 and above

3.4.3 - On Regular Haemodialysis for 1 year and above

3.5 Exclusion Criteria

3.5.1 - Unwilling to participate in the study

3.5.2 - Medically ill

3.6 Instrument and Data Collection

This study conducted from 1st January 2012 until 1st April 2012.

3.6.1 Proforma

A standardized Proforma by Tan, C. W., (2006) was reconstructed to facilitate data collection.

3.6.2 Weighing Machine and BP Monitor

Subject's pre and post HD body weight were measured using standard weighing machine in the haemodialysis unit. Pre and post HD BP (4 hours duration of HD, 10 minutes after arrival in the HDU and 20 minute after completion HD) were measured in the sitting position using a standard electronic BP monitor. Instrument used were calibrated each morning prior to measurements being taken.

3.7 Ethical

Study conducted upon approval from Ethics Committee of Faculty Medicine and Health Sciences, UPM and Medical Research Ethics Committee, Ministry of Health, Malaysia. The consents will be obtained from all patients who satisfied from the inclusion and exclusion criteria.

3.8 Data Analysis

All data collected were analyzed using the Statistical Package for Social Sciences (SPSS) version 19.0. The data will be analyzed according to the table below:

Table 3.1: Data analyzing according to objectives of research

	PARAMETER	TEST
Socio-demographic	Gender, Age, Ethnicity, Education Level, Dry weight	Descriptive (Percentage)
Differences	BP, IDWG, Duration of HD, Antihypertensive medication	Paired t-test and ANOVA
Association	• BP and IDWG • BP and duration of HD • BP and antihypertensive medication	Pearson Correlation

The readings of the results for Pearson correlation were reviewed according to the table 3.2 for the interpretation. Association of the factors can be explained by the value of correlation coefficient which was range from -1 to 1.

Table 3.2: Strength indicator for Pearson correlation.

Value	Interpretation
0	no correlation
0.1 – 0.3	very weak
0.31 – 0.5	weak
0.51 – 0.7	moderate
0.71 – 0.9	strong
> 0.9	very strong

The strength value presented as r. The value which closer to value of 1; there was strong association between two variables.

CHAPTER 4

RESULTS

Introduction

This chapter highlighted the findings and analysis of the data. The results organized into a number of sections: 4.1 the distribution of socio-demographic, 4.2 the distribution between factors and BP, 4.3 the differences between factors with BP and 4.4 the association between factors and BP. The socio-demographics were displayed as pie and bar charts. Total 124 (100%) respondents successfully completed the study.

4.1 The Distribution of Socio-Demographic

The first objective for this research was to determine the distribution of respondent according to demographic parameters (age, gender, ethnicity, education level). The descriptive characteristic of the study (n=124) was listed in Table 4.1.

Table 4.1: Characteristic of study population.

Variable	(n=124) Mean ± Standard deviation
Age	51.48 ± 13.17
Gender: Male/Female (%)	51.6% / 48.4%
Race: Malay/Chinese/Indian (%)	54.8% / 37.1% / 8.1%
Education level: Primary/Secondary/Tertiary (%)	38.7% / 52.4% / 8.9%
Duration of HD (1-3, 4-6, 7-9, >10years)	38.7% / 37.9% / 12.9% / 10.5%
No. of Antihypertensive: None / 1 / 2 / >2	20.2% / 52.4% / 18.5% / 8.9%
IDWG (Kg)	2.25 ± 1.21
Predialysis systolic BP, mmHg	160.34 ± 19.53
Predialysis diastolic BP, mmHg	80.78 ± 15.26
Postdialysis systolic BP, mmHg	128.75 ± 19.75

4.1.1 Gender

Figure 4.1 showed the distribution of study population by gender. There were 64 (52%) males and 60 (48%) females. The gender ratio (males to females) was 1:1.06.

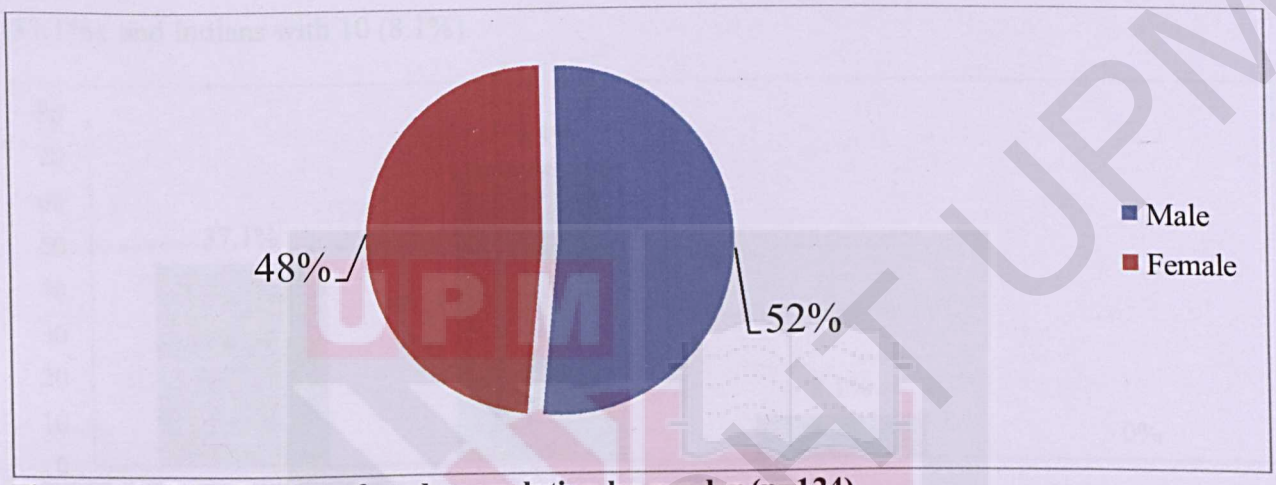


Figure 4.1: Distribution of study population by gender (n=124)

4.1.2 Age

The age of the respondents ranged from 22 to 82 years and the mean was 51.48 ± 13.17 years. Majority of respondents belongs to age group of 50-59 years that represented 29.8%. Meanwhile, the second largest group was between age 40-49 years and the smallest group was between age 18-39 years (Figure 4.2).

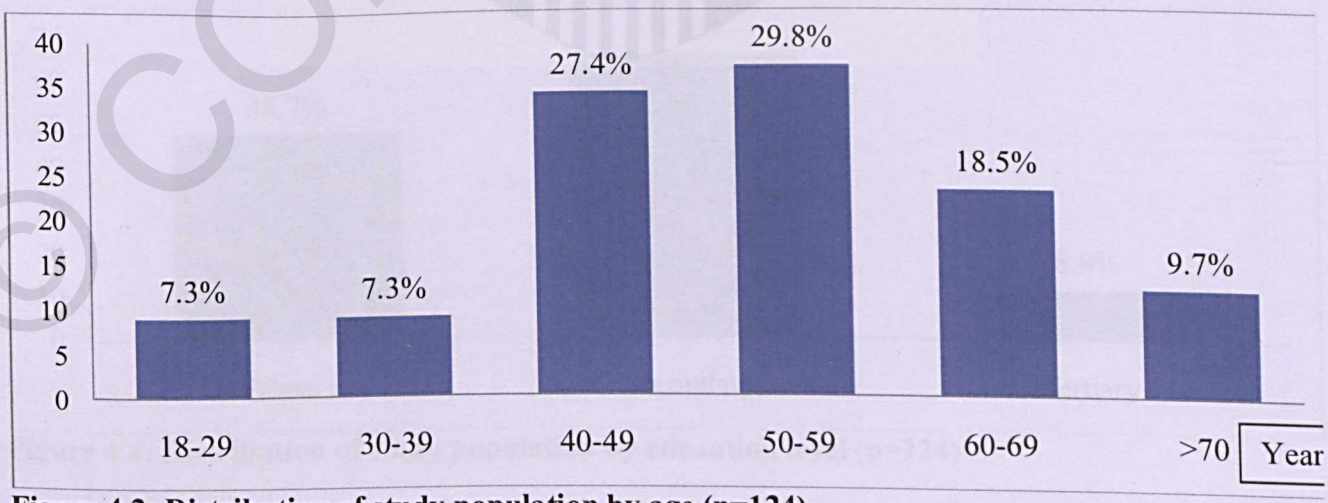


Figure 4.2: Distribution of study population by age (n=124)

4.1.3 Ethnicity

Figure 4.3 showed that Malays patients were the highest ethnic group who under haemodialysis treatment with 68 (54.8%), compared to other ethnics such as Chinese with 46 (37.1%), and Indians with 10 (8.1%).

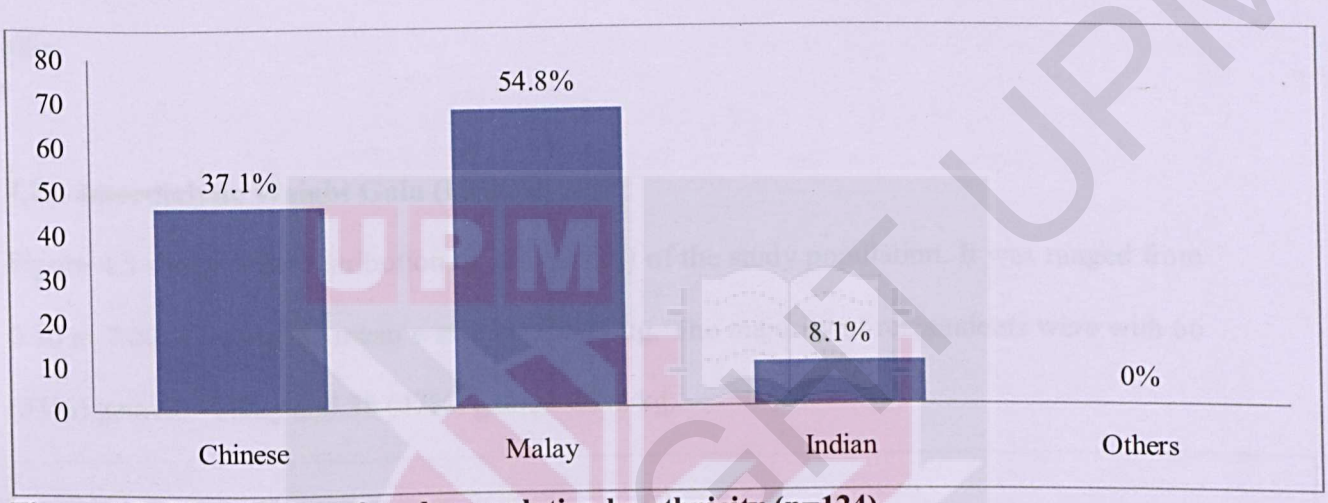


Figure 4.3: Distribution of study population by ethnicity (n=124)

4.1.4 Education level

In terms of education level, patients with secondary level (secondary school) were the highest with (52.4%), compared to patients with primary level (primary school) with 48 (38.7%), and tertiary level (college/university) were 11 (8.9%) (Figure 4.4).

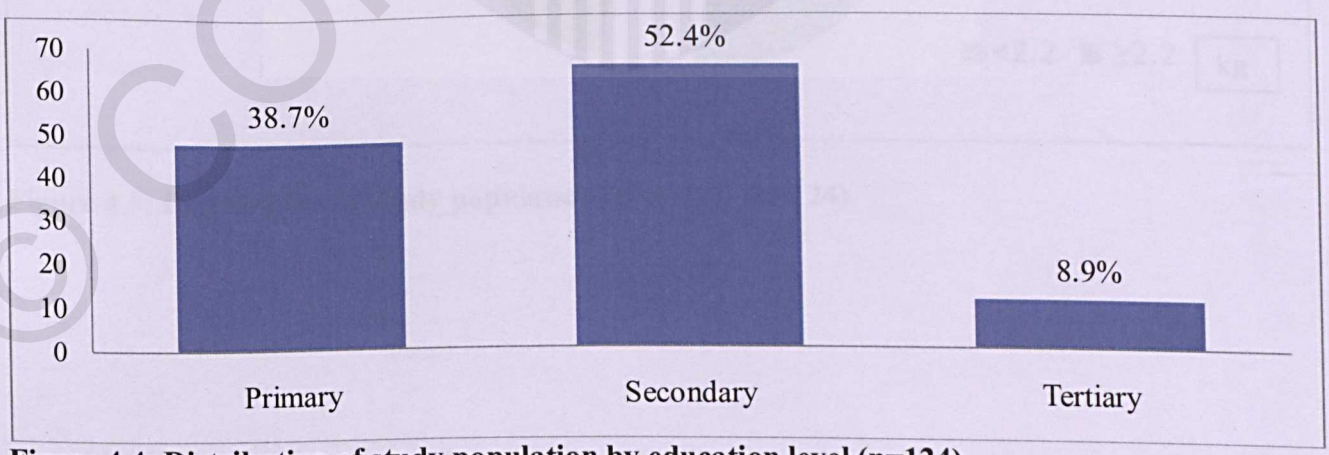


Figure 4.4: Distribution of study population by education level (n=124)

4.2 The distribution of factors (IDWG, antihypertensive medication and duration of HD) and blood pressure.

The second objective for this study was to determine the distribution of IDWG, number of antihypertensive medication taken, duration of haemodialysis and blood pressure before and after.

4.2.1 Interdialytic Weight Gain (IDWG)

Figure 4.5 showed the distribution of IDWG (kg) of the study population. It was ranged from 0.10 to 7.00kg, while the mean was 2.25 ± 1.21 kg. The majority of respondents were with 66 (53%) gained < 2.2kg and 58 (47%) gained ≥2.2 kg.

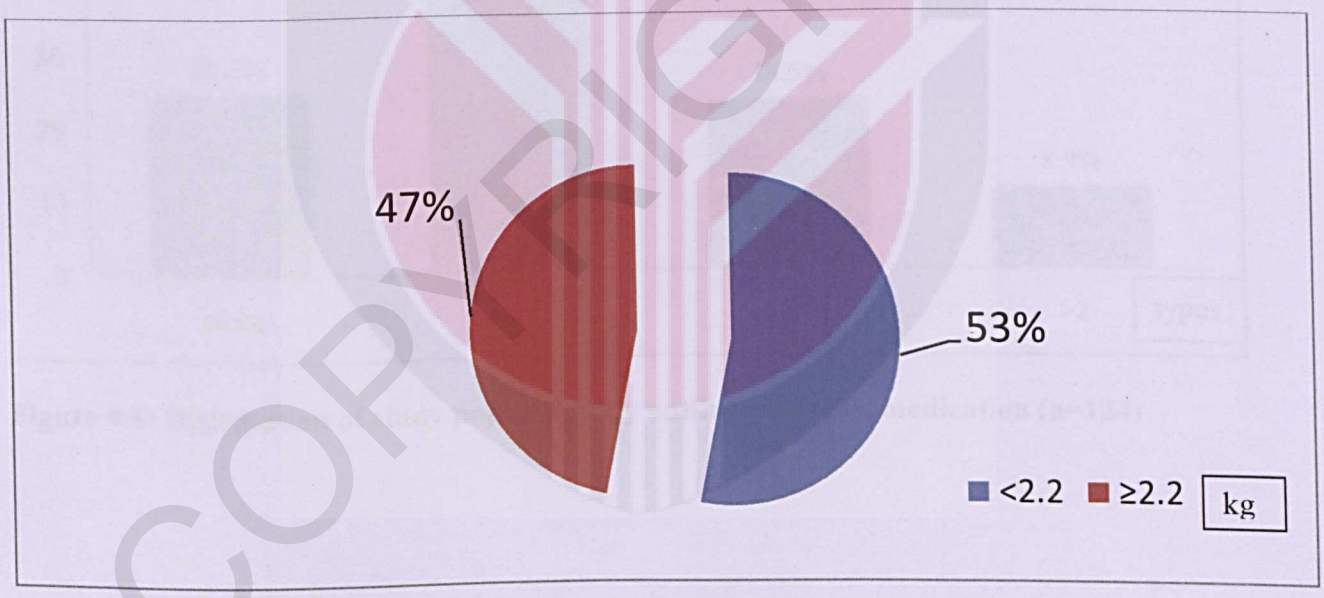


Figure 4.5: Distribution of study population by IDWG (n=124)

4.2.2 Antihypertensive Medication

The majority of respondents were on with one tablet of antihypertensive medication with 65 (52.4%), while 25 (20.2%) were not prescribed with any antihypertensive medication, 23 respondents with 18.5% were on with two types of medication and only 11 respondents (8.9%) were on more than two types of antihypertensive medication taken (Figure 4.6). The mean of antihypertensive medication taken was 2.16 ± 0.85.

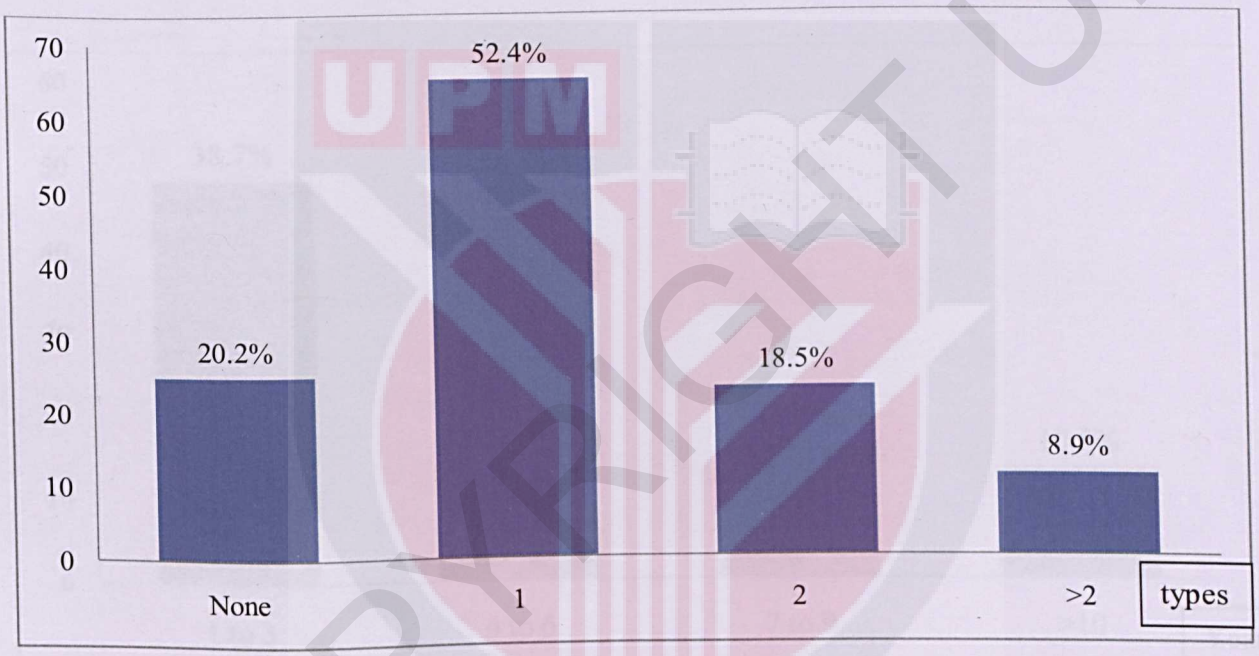


Figure 4.6: Distribution of study population by antihypertensive medication (n=124)

4.2.3 Duration of Haemodialysis (HD)

The overall mean haemodialysis duration of the study population was 1.95 ± 0.97 years. The majority of respondents in this study were undergone haemodialysis treatment from 1 to 3 years with 48 respondents (38.7%), followed by 4 to 6 years with 47 respondents (37.9%), 7 to 9 years with 16 respondents (12.8%) and lastly, more that 10 respondents 10.5% were undergone haemodialysis more than more 10 years (Figure 4.7).

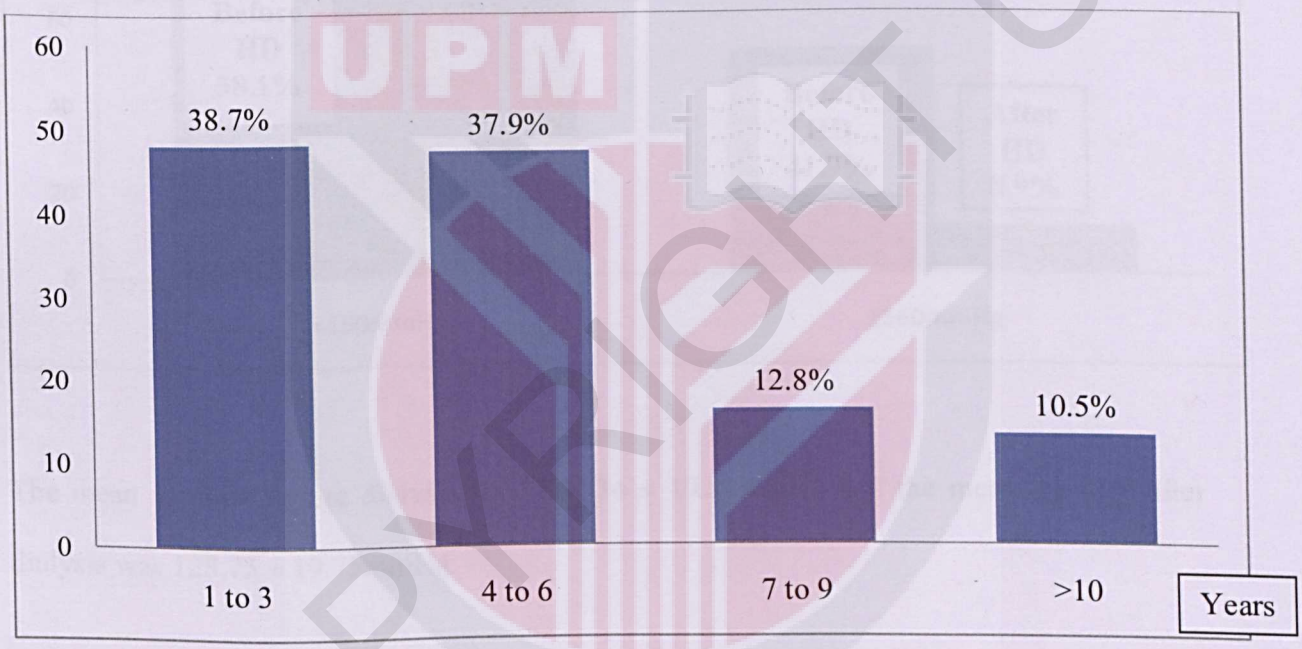


Figure 4.7: Distribution of study population by duration of HD (n=124)

4.2.4 Systolic Blood Pressure (SBP) Before and After Dialysis.

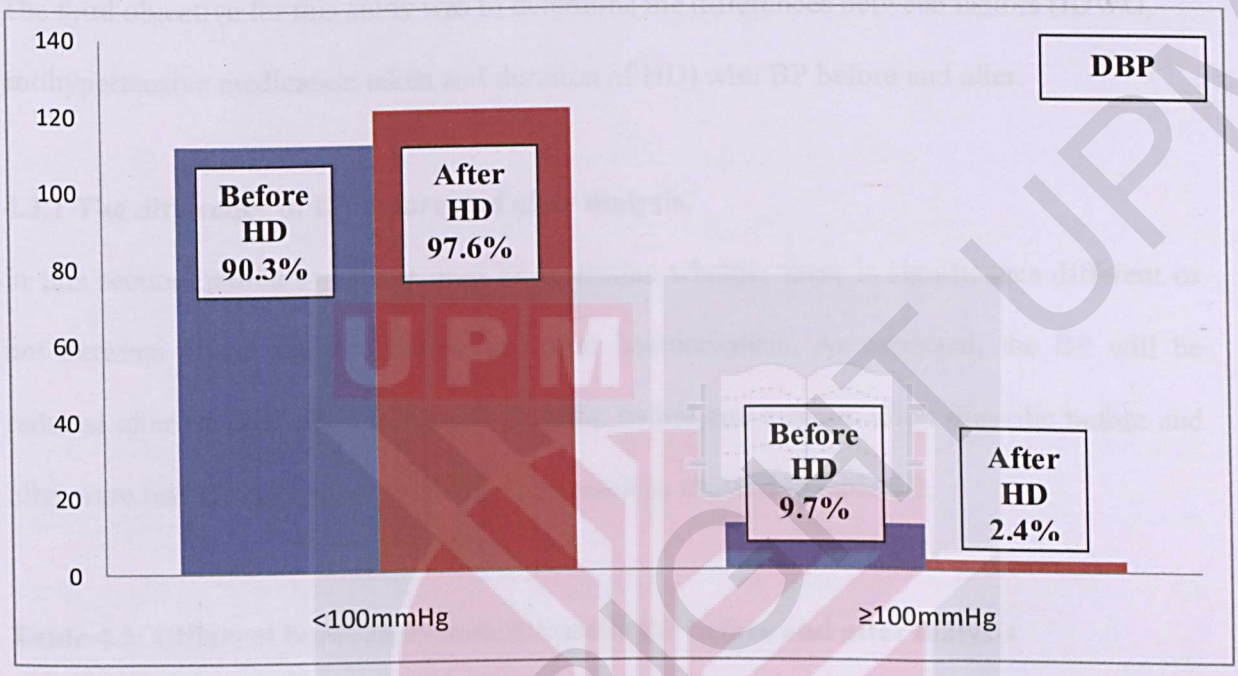
Figure 4.8: Distribution of SBP before and after (n=124) dialysis.

The mean for SBP before dialysis was: 160.34 ± 19.53mmHg and the mean for SBP after dialysis was 128.75 ± 19.75mmHg.

Figure 4.8 showed the decrement of post HD, SBP in which there are more patient in range <160mmHg after the dialysis had been done. Seventy two or (58.1%) respondents were range <160mmHg predialysis, but after the dialysis, the BP came down and the percentage was increased to 113 respondents or 91.1% for BP under <160mmHg. For the SBP ≥160mmHg, the percentages of the respondents was decreased postdialysis from before dialysis were 52 respondents or 41.9% to 11 respondents or 8.9%.

4.2.5 Diastolic Blood Pressure (DBP) Before and After Dialysis.

Figure 4.9: Distribution of DBP before and after (n=124) dialysis.



The mean for DBP before dialysis was: 80.78 ± 15.26mmHg and the mean for DBP after dialysis was 73.87 ± 13.27mmHg.

Figure 4.9 showed the decrement of post HD, DBP in which there are more patient in range <100mmHg after the dialysis had been done. One hundred and twelve or (90.3%) respondents were range <100mmHg predialysis, but after the dialysis, the BP came down and the percentage was increased to 121 respondents or 97.6% for BP under <100mmHg. For the DBP ≥100mmHg, the percentages of the respondents were decreased after done the dialysis from before dialysis were 12 respondents or 9.7% to 3 respondents or 2.4%.

4.3 The differences between factors (IDWG, antihypertensive medication taken and duration of HD) and BP.

The third objective for this study was to determine the differences between factors (IDWG, antihypertensive medication taken and duration of HD) with BP before and after.

4.3.1 The difference of BP before and after dialysis.

In this section, paired t-test was used to determine whether there is significance different or not between blood pressure before and after haemodialisis. As expected, the BP will be reduced after heamodialisis treatment. Systolic before and systolic after, diastolic before and after were tested together, respectively. The result as showed in table 4.2.

Table 4.2: Different between Systolic/Diastolic BP before and after dialysis

		Paired Differences		Sig. (2-tailed)
		Mean	Std. Deviation	
Pair 1	Systolic Before & Systolic After	.331	.489	**.000***
Pair 2	Diastolic Before & Diastolic After	.073	.290	**.006***

*Significant at p-value of ≤0.001

Table 4.2 showed that there were significant different between systolic BP before and after dialysis with $p<0.05$ and diastolic BP before and after with $p<0.05$. As a result; there were significant different between BP before and after the haemodilysis treatment; the BP reduced after the treatment.

Table 4.3: Characteristic of BP before and after dialysis

	Systolic Before	Systolic After	Diastolic Before	Diastolic After
Mean ± Std. Deviation	160.34 ±19.5mmHg	128.75 ± 19.7mmHg	80.78 ± 15.2mmHg	73.87 ± 13.2mmHg

Table 4.3 showed that characteristic of BP before and after dialysis. Mean for systolic before was 160.34 ±19.5mmHg, reduced to 128.75 ± 19.7mmHg after heamodialysis. Before dialysis mean for diastolic was 80.78 ± 15.2mmHg, reduced to 73.87 ± 13.2mmHg.

From the test (table 4.2), it showed that there were significant different between blood pressure before and after dialysis; BP reduced after the haemodialysis, but we do not know which parameters or factors (IDWG, antihypertensive medication and duration of HD) were contributing to the significant different. Therefore, further analysis by using ANOVA was done: to compare mean between groups, to see which parameters show significant differences.

4.3.2 ANOVA (to compare mean between groups)

In this section, the factors that contribute and affected the BP decrement after haemodialysis were tested using ANOVA; to compare mean between groups. The significant value was $p<0.05$. If there any significant value, revealed that the factors were affected for the BP decrement after haemodialysis treatment.

Table 4.4: Different between factors with BP before and after haemodialysis treatment.

	Sum of Squares	Mean Square	Sig.
IDWG			
Between Groups	5.878	5.878	**.046***
Within Groups	175.965	1.442	
Total	181.843		
Antihypertensive Medication			
Between Groups	4.467	4.467	**.012***
Within Groups	84.308	.691	
Total	88.774		
Duration of HD			
Between Groups	1.855	1.855	**.161**
Within Groups	113.855	.933	
Total	115.710		

*Significant at p-value of ≤0.05

Table 4.4 showed the results of the factors; tested with BP before and haemodialysis treatment. There was significant difference of mean between group of IDWG with BP among haemodialysis patient with P <0.05. Thus, the IDWG had affected the BP reduced down after haemodialysis treatment.

There was significant difference of mean between group of antihypertensive medication with BP among haemodialysis patient with p <0.05. Therefore, antihypertensive medication among respondents also had affected the BP decrement after the haemodialysis treatment. There was no significant difference of mean between groups for duration of HD with BP among haemodialysis patient with p > 0.05.

4.4 The association between factors (IDWG, antihypertensive medication and duration of HD) with BP.

The last objective for this study was to determine the association between factors (IDWG, antihypertensive medication and duration of HD) with BP. Previously, there were significant differences between IDWG and antihypertensive medications with the BP before and after heamodialysis treatment which causing the BP decrement. Only the duration of HD was not significant to the BP decrement after the heamodialysis.

In this section, the three factors tested again by using the Pearson correlation to determine the association between factors and the BP of haemodialysis patient. The readings of the results were reviewed according to the Table 3.2 for the interpretation. Association of the factors can be explained by the value of correlation coefficient which was range from -1 to 1. The strength value presented as r. The value which closer to value of 1; there was strong association between two variables.

Table 4.5: The significant relationship between factors and BP

Factors	Before				After			
	Systolic		Diastolic		Systolic		Diastolic	
1. IDWG	r = 0.18	p = 0.04*	r = 0.16	p = 0.04*	r = 0.20	p = 0.03*	r = 0.15	p = 0.01*
2.Antihypertensive medication	r = 0.22	p = 0.01*	r = 0.19	p = 0.03*	r = 0.25	p = 0.02*	r = 0.20	p = 0.04*
3. Duration of HD	r = -0.12	p = 0.16	r = 0.10	p = 0.25	r = -0.09	r = 0.23	r = 0.14	p = 0.28

*Significant at p-value of ≤0.05

Table 4.5 showed the relationship between factors; IDWG, antihypertensive medication and duration of HD with BP before and after heamodialysis. There were significant relationships of IDWG and antihypertensive medication with blood pressure before and after haemodialysis, but there was no significant relationship between duration of haemodialysis and blood pressure before and after haemodialysis.

As the systolic BP is more significant than diastolic BP in mortality and cardiovascular events, this study focused to see the SBP rather than DBP relationship between the factors. Tozawa et al., (2002), found that the SBP is a superior determinant of cardiovascular and total mortality. Thus, it appears reasonable to target SBP.

4.4.1 Relationship: Interdialytic weight gain (IDWG) and BP

There was a significant relationship between IDWG and BP among haemodialysis patients. Therefore, the IDWG was one of the factors that contributed to the decrement of BP before and after HD.

There was positive, significant very weak relationship of IDWG with the SBP before dialysis ($r = 0.18$, $p = 0.04$). There was positive, very weak strength between IDWG and DBP before dialysis ($r = 0.16$, $p = 0.04$). For the SBP after dialysis, there was very weak strength and positive relationship with IDWG ($r = 0.20$, $p = 0.04$). The positive relationship DBP after dialysis with IDWG was also very weak correlation ($r = 0.15$, $p = 0.01$).

4.4.2 Relationship: Antihypertensive medication and BP

There was a significant relationship between antihypertensive medication and blood pressure among haemodialysis patients. So, from the results, it showed that antihypertensive medication was one of the factors that contributed to the decrement of blood pressure before and after.

There was a positive, significant very weak relationship with the SBP before dialysis ($r = 0.22$, $p = 0.01$) and there was very weak correlation with DBP before dialysis ($r = 0.19$, $p = 0.03$). For the SBP after dialysis, there was very weak correlation with positive relationship ($r = 0.25$, $p = 0.02$) and DBP after dialysis ($r = 0.20$, $p = 0.04$).

4.4.3 Relationship: Duration of haemodialysis (HD) and BP

There was no significant relationship between duration of HD and blood pressure among haemodialysis patients. It showed that duration of HD was not one of the factors that contributed to the decrement of blood pressure before and after.

CHAPTER 5

DISCUSSION AND CONCLUSION

5.1 Discussion of study results

According to 18th report of the Malaysian dialysis and transplant registry (MDTR) 2010, the number of dialysis centers for the whole of Malaysia increased from 230 in 2001 to 618 in 2010 giving a rate of 10 per million populations (pmp) in 2001 and 22 pmp in 2010. The number of dialysis patients in Malaysia has tripled in 10 years from 7837 in 2001 to more than almost 23,000 in 2010. For the public sector in Selangor and Wilayah Persekutuan Putrajaya, there were increament of dialysis patients from 2 per million populations (pmp) 2001 to 4 pmp in 2010, including Hospital Serdang.

In this study, 124 patients were invited to participate after screening for exclusion criteria, all of respondents completed the study procedures and included in this report. Therefore, the response rate was 100%.

5.1.1 Socio-Demographics

The characteristic of gender in this study were 64 (51.6%) males and 60 (48.4%) females as showed in Figure 4.1. The gender ratio (males to females) was 1:1.06. According to MDTR 2010, the male is to female prevalent dialysis patients remained the same at 55 to 45% respectively.

Table 5.1: Dialysis Treatment Rate by Gender, per million male or female populations 2001 – 2010 in Malaysia

GENDER	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
MALE	97	110	122	128	139	155	170	191	198	188
FEMALE	88	94	95	110	111	133	143	157	163	154

Source: 18th report of the Malaysian dialysis and transplant registry, 2010.

Barsoum (2002) discovered that there was a significant male preponderance of ESRD patients that varied from about 52% in Thailand to 68% in Egypt and up to 80% in India. He explained that this might be partly due to increased exposure of men to noxious environmental differences factors. Intrapopulation differences exist as there are genetic and environmental differences in the studied population.

The majority of respondents from this study were belongs to age group of 50-59 years (Figure 4.2). The age of the respondents ranged from 22 to 82 years and the mean was 51.48 ± 13.17 years.

According to 18th report of the MDTR 2010, new dialysis treatment rates in the younger age-groups less than 55 years have remained unchanged in the last few years, suggesting that almost all patients with ESRD in those age groups who were in need of dialysis were able to access treatment. The treatment rate for patients 65 years and older have continued to show rapid increase to more than 1000 per million age related population in 2009 (Table 5.1).

Table 5.2: Dialysis Treatment Rate by Age Group, per million age group population 2001-2010 in Malaysia

AGE GROUPS (years)	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
15-24	22	28	25	27	30	30	32	30	34	27
25-34	45	52	49	47	51	57	60	70	68	72
35-44	101	97	98	109	104	115	119	143	129	121
45-54	248	269	272	300	291	348	350	388	381	355
55-64	502	527	578	579	639	662	755	746	787	741
≥ 65	444	505	588	661	670	816	851	967	1007	899

Source: 18th report of the Malaysian dialysis and transplant registry, 2010.

In Malaysia, the mode age group for dialysis treatment increased from 35-44 years in the 1980's to 55-64 years after 1992. Treatment rates for those above 55 years rose rapidly and accounted for the largest proportion of new intake of patients each year in the last 10 years (Lim & Lim, 2003). In developed countries, the dialysis demographics changes were even more remarkable toward age of 65, partly due to increase access to health care resources and average life expectancy overt time (Krishnan, Lok, & Jassal, 2002).

The ethnic distribution of this study was highest in Malays with 68 respondents (54.8%), followed by Chinese with 46 respondents (37.1%), and Indians with 10 respondents (8.1%). Most of the study population have secondary education (secondary school) with (52.4%), compared to patients with primary education (primary school) with 48 (38.7%), and those completed tertiary education (college/university) were 11 (8.9%). According to Tan, C. W., (2006), most of the respondents have primary and secondary education and the highest respondents were Chinese (57%).

5.1.2 The distribution between Factors (IDWG, Antihypertensive Medication & Duration of HD) and Blood Pressure.

IDWG

The distribution of IDWG (kg) of the study population ranged from 0.10 to 7.00kg, while the mean was 2.25 ± 1.21 kg. The majority of respondents were (53.2%) gained < 2.2kg and (46.8%) gained ≥2.2 kg. IDWG is significantly higher in men than in women. According to Lopez-Gomez et al. (2005), means that both sexes had equal control of IDWG, excess IDWG in men could be explained by their differences in body weight (size).

Antihypertensive Medication

The majority of respondents were on one type of antihypertensive medication (52.4%), while (20.2%) were not prescribed with any antihypertensive medication, 23 respondents (18.5%) were on with two types of medication and only 11 respondents (8.9%) were on more than two types of antihypertensive medication (Figure 6).

Duration of HD

The overall mean haemodialysis duration of the study population was 1.95 ± 0.97 years. The percentage of respondents remained in haemodialysis treatment was 38.7%, 37.9%, 12.8% and 10.5% for 1 to 3 years, 4-6 years, 7-9 years and more than 10 years respectively. These was quite consistent with the survival trend of Malaysia dialysis patients starting dialysis in 1993 to 2002, which appeared to be 90%, 73%, 60% and 39% at one year, 3 years, 5 years and 10 years respectively (Shaariah, Wong, Ong & Tan, 2003).

Blood Pressure

The BP will decrease after the haemodialysis. In this study, mean for SBP before dialysis was: 160.34 ± 19.53 mmHg and the mean for SBP after dialysis was 128.75 ± 19.75 mmHg. It showed the SBP is decreasing, in which there were more patients in range of <160 mmHg. Before dialysis there were 72 respondents (58.1%) under group <160 mmHg, but after haemodialysis, the percentage was increased to 113 respondents or 91.1%. For the systolic BP ≥160 mmHg, the percentages of the respondents were decreased from 52 respondents (41.9%) to 11 respondents (8.9%).

For DBP, mean for DBP before dialysis was: 80.78 ± 15.26 mmHg and mean for diastolic blood pressure after dialysis was 73.87 ± 13.27mmHg. It showed that the DBP was decreasing, in which there were more patients in range of BP <100 mmHg after the haemodialysis. Before dialysis there were 112 (90.3%) respondents with DBP under <100mmHg, but after the dialysis, the percentage was increase to 121 respondents (97.6%). For the diastolic BP ≥100 mmHg, the percentages of the respondents were decreased after haemodialysis from: 12 respondents (9.7%) to 3 respondents (2.4%).

According to Tan, C. W., (2006), mean predialysis SBP was higher, 155.58 ±16.66 mmHg compared to the previous postdialysis SBP, 140.73 ±14.32 mmHg. The mean of predialysis DBP was also higher, 77.85 ± 9.69 mmHg compared to the previous postdialysis diastolic BP, 72.27 ± 9.67 mmHg. As suggested by National Kidney Foundation K/DOQI guidelines recently, predialysis and postdialysis BPs should be 140/90 and 130/80 mmHg, respectively.

5.1.3 The Differences between Factors (IDWG, Antihypertensive Medication & Duration of HD) and Blood Pressure.

From Table 4.3, it showed that predialysis systolic and diastolic BP was higher compared to postdialysis systolic and diastolic BP. There were significant different between predialysis and postdialysis BP. Predialysis and postdialysis SBP and DBP were shown to be having significant difference.

It showed, there were significant different for BP before and after haemodialysis treatment that contribute the BP reduced after dialysis, but we do not know which parameters or factors (IDWG, antihypertensive medication and duration of HD) were contributing to the significant difference. Hypertension using predialysis BP is higher than postdialysis BP (Agarwal et al., 2006). So, further analysis by using ANOVA were tested among factors and BP by using comparison of the mean between groups to see which parameters contribute to reduce the BP.

There was significant difference of mean between group of IDWG (<2.2 and ≥ 2.1) with the BP among haemodialysis patient with $p < 0.05$ and there was significant difference of mean between group of antihypertensive medication with the BP among haemodialysis patient with $p < 0.05$. These showed that differences in IDWG and antihypertensive medication among respondents affected the BP. Duration of HD had no significant difference of mean between groups for duration of HD with BP among haemodialysis patient.

5.1.4 The Association between Factors (IDWG, Antihypertensive Medication & Duration of HD) and Blood Pressure.

The BP among respondents were slightly higher for predialysis and but the BP reduced. This study was designed to determine which factors that contributes to the decrement of BP after the haemodialysis treatment. As the SBP is the more significant than diastolic BP in total of mortality and cardiovascular events, so this study will be more focus on the SBP rather than diastolic BP relationship between the factors. Tozawa et al., (2002) found that systolic BP is a superior determinant of cardiovascular and total mortality.

Interdialytic weight gain (IDWG) and BP

The first factor tested with BP was IDWG. There was positive, significant very weak relationship of IDWG with the SBP before dialysis ($r = 0.18$, $p = 0.04$). There was positive, very weak association between IDWG and DBP before dialysis ($r = 0.16$, $p = 0.04$). For the SBP after dialysis, there was positive, very weak relationship with IDWG ($r = 0.20$, $p = 0.03$). There was positive, also very weak relationship between DBP and IDWG ($r = 0.15$, $p = 0.01$).

Thus, there were significant relationships between IDWG and BP among haemodialysis patients. In conclusion, the IDWG was one of the factors that contributed to the decrement of BP before and after.

Antihypertensive medication and BP

The second factor tested with BP was antihypertensive medication. There was a positive, very weak relationship between antihypertensive medication and SBP before dialysis ($r = 0.22$, $p = 0.01$). There was positive, very weak association between antihypertensive medication and DBP before dialysis ($r = 0.19$, $p = 0.03$). For the SBP after dialysis, there was positive, very weak correlation relationship with antihypertensive medication ($r = 0.25$, $p = 0.02$). There was positive, very weak association between DBP after dialysis with antihypertensive medication ($r = 0.20$, $p = 0.04$).

There were significant relationships between number of antihypertensive medication taken and blood pressure among haemodialysis patients. According to Agarwal et al., (2006), antihypertensive drug therapies can effectively reduce BP and are needed by the vast majority of haemodialysis patients. Subsequently, from the results, it showed that number of antihypertensive medication taken was one of the factors that contributed to decrement BP before and after the heamodialysis treatment.

Duration of haemodialysis taken and BP

The third factor tested with BP was the duration of HD. There was negative relationship for the duration of haemodialysis with the SBP before dialysis ($r = -0.12$, $p = 0.16$). There was very weak and positive relationship between duration of HD and DBP before dialysis but it was not significant ($r = 0.10$, $p = 0.25$).

For the SBP after dialysis, there was negative relationship with duration of haemodialysis ($r = -0.09$, $p = 0.23$). There was positive relationship of DBP after dialysis with duration of haemodialysis was very weak strength but it still was not significant ($r = 0.14$, $p = 0.28$).

In conclusion, there were no significant relationships between duration of HD and BP among haemodialysis patients. Therefore, it was not one of the factors that contributed to the decrement the BP before and after the haemodialysis treatment. According to Gokal and Hutchison (2002), ESRD patients were high risk in potentially fatal because of hypertension unless renal replacement therapy is started.

5.2 Conclusion

The purpose of this study was to determine any relationship between factors and BP; whether is there any contribution for the BP decrement. As stated earlier, the predialysis BP was noted to be slightly higher compared to postdialysis BP. In this study; three factors were listed to be investigated to see which factors that had relationship with the BP. We had organized which factors that had relationship with the BP in this study, therefore, as a nurse, we are able to control it by giving good information to the patients regarding these problems. Correlation studies showed that there were significant relationships between IDWG and antihypertensive medication with BP before and after haemodialysis, but there was no relationship between duration of haemodialysis and BP before and after haemodialysis. In a nutshell, hypertension was very common for haemodialysis patients, but which factors that contributes to make BP slightly better after the haemodialysis treatment was still unclear. In this study, IDWG and antihypertensive medication were significantly showed to contribute the BP decrement after haemodialysis treatment, but not for duration of HD. There will a need for further research to determine the exact mechanism involved for the BP decrement after haemodialysis treatment.

5.3 Limitations of Study

There were some limitations in this study. Firstly, a single centre result was not sufficient for generalization as it only represented a certain group of patients. So, if we want to make it generalized and represented for the country, the data must be taken from each of hospital in all states in Malaysia. Therefore, the result may be more beneficial to represent a country for the world organization.

Second limitation was the time constraint. If this study would take longer time, maybe it would be more beneficial. Therefore, it hard to complete the research within less than a year, however, it was not impossible to do it, and it revealed some significant results. If given longer time of study, perhaps better result will be obtained and more variables can be subjected to research.

Lastly, factors that contribute to the change of BP independently, for instance, food and salt intake, comorbids of patients such as cardiovascular problems, are factors that cannot be control in this study. Further comprehensive study should be done in the future to try to limit these confounding factors thus making the results more meaningful.

5.4 Recommendations

Firstly, the haemodialysis nurse need to increase knowledge and awareness, thus improve their skills to be more effective in provide care for haemodialysis patients. The information obtained from this study could be used to assist health care provider, NGOs and related government sectors in order to enhance health education, awareness and taking steps in preventing the occurrence of high BP among haemodialysis patients. Related programmed would been organized during their in-service continuous education such as CNE, CME or workshop.

Secondly, every haemodialysis patients should be provided with the knowledge about hypertension, how the hypertension occurs and the consequences if developed high BP. One of the consequences of hypertension is 34% of dialysis patients dying from cardiovascular disease were increasing over the last few years and in 2009 (17th Report of The Malaysian Dialysis & Transplant Registry 2009). As a nurse, we have to give information and advices to the patients by giving them pamphlet, booklet or any poster (collaboration with nephrologists) that related to factors that may heighten the BP, so that patient will be more aware to control their BP.

Thirdly, the nurses have to emphasize on salt and fluid restriction remains necessary as the long-term effects of excessive IDWG on BP are clear defined. IDWG is the main factor that contributes the BP decrement. Katzarski et al., (1999), stated that higher IDWG should induced higher BP. So, as a nurse, we have to tell the patient to adjust and strictly maintain the IDWG as it can make the BP goes high. To make IDWG well control, the patient had to

follow strictly the health care's advice, restrict water intake to at least below than <1kg per day, similarly as recommended by Daugirdas et al., (2001), which suggested that IDWG must be within the normal range (<1.0kg/day).

Fourthly, the nurses have to emphasize how important to comply with the antihypertensive medication, as it may contribute to high BP. Most (91%) patients with uncontrolled hypertension (BP >160/90mmHg) were receiving less than maximal antihypertensive medication which they were not prescribed two or more antihypertensive at maximum dosage (Smith, M. C. & Dunn, M. J., 1995). The reasons why patients do not receive optimum doses of antihypertensive medication were because intolerance to side effects, cost and noncompliance. Therefore from these findings, the nurses have to play their role to explain the function of the medication properly. The important of antihypertensive medication is to control the BP and if not compliance to the medication strictly, may contribute to high BP should be explained patient. Further research needs to list down the suitable type of the drugs that can be used type of medication that better in controls the BP among HD patients.

Lastly, future multicentre research should be done and needs to address the important issues in hypertensive haemodialysis patients. The effective therapeutic strategies to control blood pressure in heamodialysis patients need to be developed. Cardiovascular disease is common in patients on HD, and plays a major role in the high mortality and one of its pathogenesis is hypertension (Villar & Farrington, 2011). As the hypertension will give negative impact to the haemodialysis patients, so the researchers need to investigate the other factors as it will help to reduce the risk of consequences from hypertension.

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APPENDICES

Appendix I

Approval letter from Medical Research Committee University Putra Malaysia

Appendix II

Letter to Hospital Serdang

S.k. Ketua Jabatan Nefrologi Hospital Serdang
Penyelaras Projek Penyelidikan (NUR3004)

Appendix III

Investigator's Agreement, Head of Departments and Institutional Approval

Appendix IV

Approval letter to conduct research in Hospital Serdang

Appendix V

Research Submission

Research Submission

Date Printed : 20-12-2011 16:30:52

ResearchID :	10587
Research Title :	The Relationship between Factors Associated with Blood Pressure in Hypertensive Patients on Regular Hemodialysis in Hospital serdang
Research Abbreviation :	The Relationship between Factors Associated with BP in HPT PTs on Regular HD in Hospital serdang
Approval Type :	Institutional Approval - Institute of Public Health

Built PDF By : MUHAMMAD AMIN BIN AHMAD ZAKI

Built PDF Date : 20-12-2011 16:30:52

Research Details

Date Printed : 20-12-2011 16:30:52

ResearchID : 10587

Correspondence Person : MUHAMMAD AMIN BIN AHMAD ZAKI

The Relationship between Factors Associated with Blood Pressure in Hypertensive Patients on Regular Hemodialysis in Hospital serdang

1.2. Title abbreviate : The Relationship between Factors Associated with BP in HPT PTs on Regular HD in Hospital serdang

1.3. Collaborative research :

- [x] This is NOT a collaborative work with any of the NIH institutes
- [ ] Clinical Research Centre (CRC)
- [ ] Institute for Medical Research (IMR)
- [ ] Institute of Public Health (IPH)
- [ ] Institute for Health Management (IHM)
- [ ] Institute for Health Systems Research (IHSR)
- [ ] Institute for Health Behavioural Research (IHBR)

1.4. Submission purpose :

Institute of Public Health (IPH)

IRB/IEC Medical Research Ethics Committee (MREC)

IRB/IEC Jawatankuasa Etika Penyelidikan Perubatan (UPM)

Research Registration

2.1. Protocol ID :

2.2.1. Student Academic Project : Bachelor

2.2.2. Student Academic Project Specify :

2.3. Research Type : Public Health / Epidemiology

2.4. Clinical Research Sub Type :

Clinical Research

3.0.1. Research Purpose : The general objective of this study is to determine the relationship between factors associated with blood pressure in hypertensive patients on regular hemodialysis.

3.0.2. Research Description : Research about Objective of this study is to determine the relationship between factors associated with blood pressure in hypertensive patients on regular hemodialysis in Hospital Serdang. This research is a cross sectional study.

3.0.3. Keywords : Blood Pressure, Hemodialysis, Hypertension, Intradialytic weight gain

3.0.4. Research Date Start : 05/01/2012 **3.0.5. Research Date Completed :** 05/05/2012

3.0.6. Research Duration (months) : 4.0

3.0.7. LinkURL :

3.0.8. Recruitment Status : Not applicable

3.0.9. Condition : Hypertensive Hemodialysis patients with regular hemodialysis treatment

3.0.10. Age Limit : [ ] **3.0.10.1. Not Available - Not Applicable** **3.0.10.2. Age Limit Min :** 18.0 **3.0.10.3. Age Limit Max** 99.0

3.0.11. Gender : Both

3.0.12. Eligibility : Inclusion criteria: ESRD patients who are diagnosed with hypertension (Systolic BP 140 and above, or diastolic BP 90 and, above, or both), Age 18 and above, On Regular Hemodialysis for 1 year and above and Patient with hemodialysis with on antihypertensive regardless of the BP reading. Exclusion criteria: Unwilling to participate in the study and Medically ill.

3.0.13. Acceptable Participant : Yes

3.0.14. Target No Subject - All / Msian : 124 / 124

3.0.15. Target Number Subject in Malaysia : **1.Total in number :** 124

2.Number by site in text:

Clinical Trial

3.1.1. Study Phase :

3.1.2. Purpose :

3.1.3. Allocation :

3.1.4. Masking :

3.1.5. Control :

3.1.6. Assignment :

3.1.7. Endpoint :

3.1.8.1. OutcomeMeasure Primary :

3.1.8.2. OutcomeMeasure Secondary :

3.1.9.1. Name of intervention under investigation :

3.1.9.2 Intervention Type :

3.1.10. Therapy Area :

Observational Study

3.2.1.1. Disease Area :

3.2.1.2. Disease Area Specific Disease :

3.2.1.3.Disease Area Other Specify :

3.2.2. Purpose :

3.2.3. Selection :

3.2.4. Duration :

3.2.5. Timing :

Appendix VI

National Institutes of Health for Conducting Research in Ministry of Health Malaysia

NATIONAL INSTITUTES OF HEALTH APPROVAL FOR CONDUCTING RESEARCH IN THE MINISTRY OF HEALTH MALAYSIA

PENGESAHAN INSTITUSI PENYELIDIKAN NEGARA UNTUK MENJALANKAN PENYELIDIKAN DI KEMENTERIAN KESIHATAN

This is an auto computer - generated document.It is issued by one of the research institute under the National Institutes of Health (NIH). These are the Institute for Medical Research (IMR), Clinical Research Centre (CRC), Institute of Public Health (IPH), Institute for Health Management (IHM), Institute for Health Systems Research (IHSR), and Institute for Health Behavioural Research (IHBR)

Dokumen ini adalah cetakan berkomputer. Borang ini dikeluarkan oleh salah satu institusi dibawah National Institutes of Health (NIH) iaitu Institut Penyelidikan Perubatan (IMR), Pusat Penyelidikan Klinikal (CRC), Institut Kesihatan Umum (IKU), Institut Pengurusan Kesihatan (IPK), Institut Pergurusan Sistem Kesihatan (IPSK), Institut Penyelidikan Tingkahlaku Kesihatan (IPTK)

Unique NMRR Registration ID : [Nombor Pendaftaran]	NMRR-11-896-10587
Research Title : [Tajuk]	The Relationship between Factors Associated with Blood Pressure in Hypertensive Patients on Regular Hemodialysis in Hospital serdang
Protocol Number if available : [Nombor Protokol jika ada]	

#	**Investigator Name** [Name Penyelidik]	**Institution Name** [Nama Institusi]
1	MUHAMMAD AMIN BIN AHMAD ZAKI	Serdang Hospital

I have reviewed the above titled research, and approve of its design and conduct.

Saya telah menyemak kajian yang bertajuk seperti di atas dan meluluskan rekabentuk dan perlaksanaannya.

Name of Director : *[Nama Pengarah]*	Dr. Tahir Aris
NIH Institute (IMR, CRC, IPH, IHM, IHSR and IHBR) *[Nama Institusi di bawah NIH]*	Institute of Public Health (IPH)
Signature & Official stamp : *[Tandatangan dan Cop Rasmi]*	This is computer generated document, therefore no signature is required.
Date : *[Tarikh]*	16-01-2012

(Note: This is a computer generated document. It may not carry any signature)

Appendix VII

Approval Letter from Medical Ethical, Ministry of Health Malaysia

Appendix VIII

Proforma

RESEARCH CODE NO:

PROFORMA

AUDIT OF PATIENTS ON REGULAR HEMODIALYSIS

Registration No. :_____ I.C No. :_____

Gender : ☐ M ☐ F

Age : _____ years Dry weight: _____ kg

Race : ☐ M ☐ C ☐ I ☐ Others: _____

Duration of HD : ☐ 1 year – 3 years ☐ 4 – 6 years ☐ 7 – 9 years
☐ ≥ 10 years

Education Level: ☐ Primary ☐ Secondary ☐ Tertiary

No of Antihypertensive: ☐ None ☐ 1 ☐ 2
☐ >2

REGISTRATION NO:

RESEARCH CODE NO:

DRY WEIGHT:

BP	Pre HD	1 Hr HD	2 Hr HD	3 Hr HD	Post HD
SBP					
DBP					
Weight					

Appendix IX

Information Sheet (English and Malay)

UNIVERSITI PUTRA MALAYSIA

FAKULTI PERUBATAN DAN SAINS KESIHATAN
FACULTY OF MEDICINE AND HEALTH SCIENCES
UNIVERSITI PUTRA MALAYSIA, 43400 UPM SERDANG,
SELANGOR, MALAYSIA

RESPONDENT'S INFROMATION SHEET

Please read the following information carefully, do not hesitate to discuss any questions you may have with your researcher.

STUDY TITLE: The Relationship between Factors Associated with Blood Pressure Decrement in Hypertensive Patients on Regular Haemodialysis in Hospital Serdang.

INVESTIGATORS: Muhammad Amin Bin Ahmad Zaki
Pn. Faridah Binti Mohd Said
Dr. Nor Fadhlina Binti Zakaria

1. Invitation paragraph

You have been invited to take part in a research study. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully. Do ask us if there anything that is not clear. We like to thank you for reading this information sheet.

2. Purpose of this study

The purpose of this study is to find out the problem in hemodialysis treatment amongst patients on regular hemodialysis patients.

3. You are been chosen because:

i. You have been diagnosed with end-stage renal disease

ii. You have been on regular hemodialysis for 6 month or more.

4. Do I have to take part?

It is up to you to decide whether you want to take part or not. Event you decide to take part, you are still free to withdraw at any time and without giving any reason.

5. What will I do if I take part?

You will only be asked to provide information which should take about five to ten minutes. Your body weight and blood pressure will be measured pre and post hemodialysis.

6. Are there any risk?

This study will not cause any harm/risk to you.

7. What will be benefits of the study?

Your contribution is valuable in providing information for further understanding of hemodialysis treatment.

8. Will the information and my identity remain confidential?

All information which is collected about you during the course of the research will be kept strictly confidential. All the information provided will be anonymous.

10. Contact for further information

If you have any questions about this questionnaire, please do not hesitate to contact any of the following personnel:

Muhammad Amin Bin Ahmad Zaki
Research Student, Bachelor of Nursing,
Faculty of Medicine and Health Sciences,
University Putra Malaysia,
43400 UPM Serdang,
Hp No. : 013 2222 403

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CONSENT FORM

STUDY TITLE: The Relationship between Factors Associated with Blood Pressure Decrement in Hypertensive Patients on Regular Haemodialysis in Hospital Serdang.

INVESTIGATORS: Muhammad Amin Bin Ahmad Zaki
Research Student, Bachelor of Nursing
University Putra Malaysia

I ..... Identity Card No. .....
address .....
.....hereby voluntarily agree to take part in the clinical research *(clinical study, questionnaire study) specified above.

I have been informed about the nature of the clinical research in terms of methodology, possible adverse effect and complications (refer to information sheet). I understand that I have the right to withdraw from this clinical research at any time without assigning any reason whatsoever. I also understand that these studies are private and confidential.

By signing this form, I certify that all information I have given, including my medical history, is true and correct to the best of my knowledge.

Signature ..... *(Respondent)*

Date: .....

Signature ..... *(Witness)*

Name: .....
I.C No. .....

I confirm that I have explained to the respondent the nature and purpose of the above – mentioned clinical research.

Date: ..... Signature ..... *(Researcher)*

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BORANG PENERANGAN PENYELIDIKAN

Sila baca maklumat di bawah dengan teliti, jika ada sebarang keraguan, anda boleh bertanya dan berbincang dengan penyelidik kajian ini

Tajuk Penyelidikan: Penyelidikan hubungan antara kaitan faktor-faktor yang melibatkan pengurangan tekanan darah di kalangan pesakit yang mendapat rawatan hemodialisis di Hospital Serdang.

Pegawai Penyelidik: Muhammad Amin Bin Ahmad Zaki
Pn. Faridah Binti Mohd Said
Dr. Nor Fadhlina Binti Zakaria

1. Kata-kata Aluan

Anda di jemput untuk mengambil bahgaian dalam penyelidikan ini. Sebelum anda membuat sebarang keputusan, adalah penting untuk anda memahami kenapa penyelidikan ini di lakukan dan ianya berkenaan dengan apa. Sila ambil masa untuk membaca sebarang informasi dengan teliti. Sila bertanya jika terdapat sebarang keraguan. Kami amat berterima kasih kepada anda kerana sudi meluangkan masa membaca boring maklumat ini.

2. Tujuan penyelidikan ini dijalankan

Tujuan penyelidikan ini dijalankan adalah untuk mengenal pasti masalah yang sering berlaku dalam rawatan hemodialisis di kalangan pesakit-pesakit hemodialisis.

3. Anda dipilih adalah kerana:

i. anda telah didiagnosakan dengan penyakit buah pinggang peringkat lewat.
ii. anda telah mendapat rawatan hemodialisis untuk 6 bulan atau lebih

4. Adakah saya perlu mengambil bahagian?

Ianya terpulang kepada anda untuk membuat keputusan samada anda ingin mengambil bahagian dalam penyelidikan ini atau tidak. Jika anda telah mengambil bahagian, anda masih bebas membuat keputusan untuk tidak mengambil bahagian dalam penyelidikan ini tanpa member sebarang alasan.

5. Apa yang perlu saya lakukan jika saya mengambil bahagian?

Anda akan di soal berdasarkan kepada informasi yang telah disediakan yang mana ia hanya mengambil masa selama lebih kurang lima atau sepuluh minit. Berat badan anda akan ditimbang dan tekanan darah anda akan di ukur sebelum dan selepas menjalani rawatan hemodialisis.

6. Adakah penyelidikan ini terdapat sebarang risiko?

Penyelidikan ini tidak mempunyai sebarang risiko kepada anda.

7. Apakah kebaikan penyelidikan ini?

Penglibatan anda dalam mengambil bahagian bagi penyelidikan ini akan memberi maklumat yang penting kepada pesakit-pesakit hemodialisis yang lain dalam medapatkan rawatan hemodialisis.

8. Adakah maklumat anda dalam penyelidikan ini akan dirahsiakan?

Segala maklumat yang telah di ambil dalam penyelidikan ini akan dirahsiakan manakala maklumat akan di beri kod yang mana hanya pegawai penyelidik sahaja yang tahu.

10. Untuk maklumat lanjut

Jika anda ada sebarang pertanyaan berkenaan dengan penyelidikan ini, jangan ragu-ragu untuk menghubungi penyelidik

Muhammad Amin Bin Ahmad Zaki
Pelajar Penyelidik, Bacelor Kejururawatan,
Fakulti Perubatan dan Sains Kesihatan,
University Putra Malaysia,
43400 UPM Serdang,
Hp No. : 013 2222 403

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BORANG PERSETUJUAN

Tajuk Penyelidikan: Penyelidikan hubungan antara kaitan faktor-faktor yang melibatkan pengurangan tekanan darah di kalangan pesakit yang mendapat rawatan hemodialisis di Hospital Serdang.

Penyelidik: Muhammad Amin Bin Ahmad Zaki
Pelajar Penyelidik, Bacelor Kejururawatan
Universiti Putra Malaysia

Saya ..... No. Kad pengenalan.....
di alamat .....
..... secara suka rela bersetuju untuk mengambil bahagian dalam penyelidikan ini.

Saya telah di beritahu berkenaan dengan latar belakang penyelidikan ini dari segi metodologi, kesan sampingan dan komplikasi (rujuk borang penerangan penyelidikan). Saya memahami yang masa saya ada hak untuk menarik diri daripasa penyelidikan ini tanpa perlu menyatakan sebab. Saya juga memahami yang mana setiap maklumat dari penyelidikan ini adalah dirahsiakan.

Dengan menandatangani boring ini, saya mengakui saya telah memberi maklumat yang tepat dan betul, termasuk sejarah perubatan.

Tandatangan ..... Tandatangan .....
(Responden) *(Saksi)*

Tarikh: ..... Nama: .....
No. Kad Pengenalan .....

Saya telah mengesahkan di mana saya telah menerangkan kepada responden berkenaan dengan penyelidikan saya dan juga tujuannya di selidik.

Tarikh: ..... Tandatangan ..... *(Penyelidik)*