LEVEL OF STROKE KNOWLEDGE AND STROKE RISK FACTORS AMONG HOME-BASED FIRST EVER STROKE PATIENTS IN KOTA BHARU

by

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CERTIFICATE

This is to certify that the dissertation entitled 'Assessment of stroke knowledge and stroke risk factors among home-based first ever stroke patients in Kota Bharu' is a bona fide record of research work done by Rosmawani Binti Ab Razak, Matrix number 118281 during the period of September 2015 to May 2016 under my supervision. This dissertation submitted in partial fulfillment for the degree of Bachelor of Health Sciences (Nursing). Every research work and collection of data belongs to Universiti Sains Malaysia.

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DECLARATION

I hereby declare that this dissertation is the result of my own investigations, except where otherwise stated and dully acknowledge. I also declare that is has not previously or concurrently submitted as a whole for any other degrees at Universiti Sains Malaysia or other institutions. I grant Universiti Sains Malaysia the right to see the dissertation for teaching research and promotional purpose.

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LIST OF ABBREVIATIONS

MOH: Ministry of Health

WHO: World Health Organization

USM: Universiti Sains Malaysia

ADL: Activity Daily Living

SKT: Stroke Knowledge Test

AF: Atrial Fibrillation

HTN: Hypertension

SBP: Systolic Blood Pressure

CHD: Coronary Heart Diseases

MI: Myocardial Infarction

HBM: Health Belief Model

TIA: Transient Ischemic Attack

TAHAP PENGETAHUAN STROK DAN FAKTOR RISIKO STROK DI KALANGAN PESAKIT STROK DI RUMAH DI KOTA BHARU

ABSTRAK

Angin ahmar adalah penyakit yang biasa berlaku yang berkaitan dengan kecacatan terhadap pesakit tersebut. Ia juga merupakan penyebab kematian yang biasa berlaku di seluruh dunia selepas penyakit jantung koronari. Pada masa yang sama, Beban Malaysia National Penyakit dilaporkan strok adalah kedua punca utama kematian di Malaysia yang dianggarkan kira-kira 12.1% dalam kalangan wanita dan 8.9% melibatkan dalam kalangan lelaki. Punca-punca utama peningkatan kadar kematian dan morbiditi strok kerana kekurangan pengetahuan mengenai strok di kalangan pesakit. Oleh itu, kajian ini dijalankan untuk mengenal pasti tahap pengetahuan strok dan apakah faktor risiko strok di kalangan pesakit strok yang pertama kali mendapat serangan strok dan sudah keluar dari Hospital USM. Tujuan kajian ini adalah juga untuk mengenal pasti perkaitan antara data sosio-demografi dengan tahap pengetahuan strok dan kaitan antara faktor-faktor risiko strok dan pengetahuan strok. Kajian keratan rentas telah dijalankan kepada 50 orang responden yang adalah separuh dari seharusnya responden yang diperlukan. Maklumat mengenai responden diperolehi dari Jabatan Rekod Hospital USM. Responden adalah terdiri dari mereka yang pertama kali mendapat strok, berusia lapan belas tahun dan keatas, tinggal di kawasan di Kota Bharu, dan tidak mempunyai sebarang masalah neurologi. Soal selidik yang disediakan adalah soal selidik yang ditadbir sendiri yang terdiri dua bahagian. Bahagian A ialah data sosio-demografi, Bahagian B ialah Ujian Pengetahuan Stroke (SKT) oleh Sullivan. Kajian ini menunjukkan 70% daripada responden adalah kurang pengetahuan tentang strok yang dan hanya 30% adalah pengetahuan yang baik. Data sosio-demografi (tahap pendidikan, kewangan dan jenis kerja-kerja sebelum stroke) adalah menunjukkan yang ketara ada perkaitan dengan tahap pengetahuan strok dengan ($p = 0.010$, 0,044 0,014,) $p < 0.05$. Walau bagaimanapun, beberapa data sosio-demografi tidak berkaitan dengan tahap pengetahuan seperti umur, jantina, dan faktor-faktor risiko strok ($P > 0.05$). Oleh itu, hasilnya akan kajian ini mencadangkan melaksanakan program pendidikan mengenai pengetahuan strok adalah penting dalam meningkatkan tahap pengetahuan strok di kalangan pesakit sebelum dilepaskan untuk mencegah berulangnya strok yang akan menjadi lebih teruk.

LEVEL OF STROKE KNOWLEDGE AND STROKE RISK FACTORS AMONG HOME-BASED STROKE PATIENTS IN KOTA BHARU

ABSTRACT

Stroke is common diseases that related to the people disability. It also most common cause of death worldwide after coronary heart diseases. At the same times, Malaysia National Burden of Diseases reported stroke is two leading causes of death in Malaysia which is estimated about 12.1% in female and 8.9% in male. The main causes of the increasing of the mortality and morbidity of stroke due to lack of knowledge regarding stroke among patients. Therefore, this study are conducted to identify the level of stroke knowledge and what common risk factors among first-ever stroke patients who are already discharge from Hospital USM. The purposes of the study are also to identify the associations between socio-demographic data with level of stroke knowledge and association between stroke risk factors and stroke knowledge. This cross-sectional study was performed to 50 respondents which are half from exactly respondents that required. The information regarding the respondents is getting from Hospital USM record department. The respondents are those who first-ever stroke, above eighteen years old, live in area in Kota Bharu, and does not have any neurological problem. The questionnaires provided are self-administered questionnaires which consist two sections. Section A is socio-demographic data, Section B is Stroke Knowledge Test (SKT) by Sullivan. This study resulted with 70% of the respondents are poor knowledge and only 30% are good knowledge. The socio-demographic data (level of education, financial and type of works before stroke) are show an independent significant with the level of stroke knowledge with ($p= 0.010, 0.044, 0.014$) $p<0.05$. However, some of the socio-demographic data are not significant associated with the level of knowledge such as age, gender, and risk factors of stroke ($P>0.05$). Therefore, the findings are suggested the implement of educational program regarding stroke knowledge are important in increased the level of stroke knowledge among patients before discharge to prevent the recurrence of stroke that would be more severe.

CHAPTER 1

INTRODUCTION

1.1 Background of the study

Stroke is a common cause of adult disability and is the second most common cause of death worldwide after coronary heart diseases (Malaysia Society of Hypertension, 2011). Annually, approximately 15 million people worldwide suffer a stroke. Of these, 5 million died and another 5 million are left permanently disabled (Afiza Hanum, Azidah, & Monniaty, 2012). Stroke also contributes to major morbidity and mortality in both developed and developing countries (Keat & Siew, 2012) and is also one of the top five leading causes of death and one of the top ten causes of hospitalization in Malaysia.

Stroke is defined as the interruption of the blood supply to the brain, usually due to bursting of the blood vessel or it's blockage by a clot (World Health Organization, 2015). It is also defined as a clinical syndrome, of presumed vascular origin, typified by rapidly developing signs of focal or global disturbance of cerebral functions lasting more than 24 hours or leading to death (The Royal College of Physicians, 2012). According to Farooq, Chaudhry, Amin, and Majid (2008), the clinical definition has four components which are neurological impairment or deficit, sudden onset, lasting more than 24 hours and presumed vascular origin. In order to assess the severity of stroke, identification will be made in accordance with the general conditions of the stroke such as assessing the body functionality such as confusion, difficulty in speaking or understanding speech; difficulty in seeing with one or both eyes; difficulty in

walking, dizziness, loss of balance or coordination; severe headache with no known cause; fainting or unconsciousness (WHO, 2015).

The American Stroke Association, (2015) stated that there are two types of stroke which are ischemic and hemorrhagic stroke. The ischemic stroke occurs when there is an obstruction of the blood vessel to supply blood to the brain. Therefore it can cause ischemia at the brain cell. This type of stroke is the most common among stoke patients amounting to about 87% of all of them. Whereby, hemorrhagic stroke is the condition of stroke which is the weakening and rupturing of blood vessel and causing hemorrhagic. The common cause of the hemorrhagic stroke is uncontrolled hypertension.

The other condition which is similar to stroke but can be resolve within 24 hours is known as Transient Ischemic Stroke (TIA). It is also called as 'mini stroke'. After identifying the stroke attack, there are a few diagnostic procedures in order to identify and differentiate the different types of stroke. The stroke patient will be diagnosed by computed tomography scan (CT scan) (Siti & Sakinah, 2014). From the CT scan, the type of stroke will be identified for example hemorrhagic or ischemic stroke. There is also Magnetic Resonance Image (MRI) which uses a large magnetic field to produce an image of the brain. Like the CT scan, it shows the location and extent of brain injury by the specific area and it is also sharper and detailed in comparison to a CT scan (American Stroke Association, 2015). By performing the diagnostic test towards the stroke patient the health professionals will identify the exact diagnosis of diseases and the severity of stroke and then proceed to the treatment according to the type of stroke they have.

There are many risk factors that contribute to stroke. Based on the study by Thomas and Lars-Henrik, (2010) the major risk factor of stroke are hypertension then followed by a history of stroke and hypercholesterolemia which is at rank 2nd and 3rdas the most important risk of stroke. After that, tobacco smoking and diabetes mellitus also contribute to the factors of stroke. Meanwhile, WHO (2006) listed the most conventional factors of stroke are more to the vascular risk factors associated with age, obesity, tobacco smoking and diabetes. For example atrial fibrillation by far is the most important because it is common which carries high relative risk of stroke and also as a causal factor to many cases.

According to the American Stroke Association (2013), stroke is the third leading cause of death in the United States and more than 140,000 people die each year from stroke. It is also the main cause of serious long disability among the elderly in the United States. This means that the cases of stroke are not only high in Malaysia but also worldwide. At the same times, stroke is also the second most common cause of death and the leading cause of chronic disability among adults in Australia (Karen et al., 2006) where the disability may be either temporary or permanent. The disability will also cause the decreasing of their ADL such as bathing, grooming, and other physical activities. Meanwhile, stroke is also becoming one of the top five causes of death and hospitalization with the greatest burden of disease, based on the disability to adjust life years (Loo & Gan, 2012). Therefore, the complication of the stroke not only relates to their health but affect their ADL and financial situation.

Additionally, the Malaysia National Burden of Diseases study reported that stroke is the two leading cause of death in Malaysia which is estimated about 12.1% in female and

8.9% in male (Nazifah et al., 2012). Therefore, according to the statistics mentioned, the percentage of stroke among males and females do not differ too much. So, gender is not the main reason why stroke cases are increasing but maybe due to other risk factors such as lifestyle. Meanwhile, in a study of Zariah et al (2015) found that Malaysian stroke patients are approximately 10 years younger than patients in developed countries (62.8 versus 72.3 years). Thus, due to Malaysia's increase in the number of elderliness, the number risk of stroke patients will also increase (Zariah et al., 2015). Furthermore, the stroke prevalence will also increase with the high number of elderly population (Karen & Natalie, 2004).

In ASEAN countries, stroke is among the top five leading causes of death with the crude rate range from 10.9/100 000 (Thailand) to 54.2/100 000 (Singapore). Meanwhile, there are no specific incidence and prevalence of stroke in Malaysia (Ministry of health, 2012). The data from the Burden of Stroke in Malaysia stated that the number of stroke patients may gradually increase whereby in Kelantan, the mean age of stroke patients is between 59.3 compared to Penang which is 65 years (Keat and Siew, 2012). At the same time, the numbers of stroke patients who are being hospitalized for recurrent stroke are increasing from the first 4 years with the first month increase of about 1.8%, then 6 months 5.0%, 1 year 8.0 %, 2 years 12.1 %, 3 years 15.2% and 4 years 18.1%. (Susan, 2010).Based on the Stroke Association (2013) the cumulative risk of recurrent stroke to occur within the first 30 days is about 3.1%,within one year is about 11.1%, within 5 years is 26.4% and within 10 years 39.2%. The Burden of Stroke in Malaysia stated that there are five leading causes of death among males and female in Malaysia (Keat & Siew, 2012) (Table 1).

Table 1.1: Five leading causes of death among males and female in Malaysia

Table 1 Five leading causes of death among males and females in Malaysia (3)

Male			Female		
Rank	Diseases	Percentage (%)	Rank	Diseases	Percentage (%)
1	Ischemic heart disease	16.3	1	Ischemic heart disease	13.9
2	Pneumonia	8.9	2	Cerebrovascular disease	9.5
3	Cerebrovascular disease	7.7	3	Pneumonia	9.2
4	Septicemia	5.8	4	Septicemia	6.5
5	Chronic lower respiratory disease	4.6	5	Diabetes mellitus	2.0
6	Others*	56.7	6	Others*	58.9
Total cases (n)		17,935	Total cases (n)		14,808

*Others include transport accidents, malignant neoplasms of the trachea, bronchus and lung, diabetes mellitus, certain conditions originating in the perinatal period, and liver diseases.

(Sources: Keat & Siew, 2012)

The Malaysia Ministry of Health statistics show the top five mortality rates in hospitals in year of 2009 in which the highest mortality rate is caused by heart diseases and diseases of pulmonary circulation followed by septicemia, malignant neoplasm, pneumonia and cerebrovascular diseases.

Table 1.2: Top 5 Mortality rate in MOH hospitals 2009

	Mortality (rate per 100 000 population)
Heart Disease and Disease of Pulmonary Circulation	16.09
Septicemia	13.82
Malignant neoplasm	10.85
Pneumonia	10.38
Cerebrovascular Diseases	8.43

(Sources: MOH 2012)

The comparison between the occurrences of stroke event differs based on its severity. According to Siti, Sakinah and Che Rabiaah (2013) the first ever stroke is usually less

fatal and disabling compared to the recurrent stroke. This is because patients with recurrent stroke are at high risk of getting another stroke as their body has already been introduced to the minor event of the stroke. Meanwhile, the prevalence data of the recurrent stroke in Malaysia is not available (Siti, et al., 2013). Therefore, the recurrent stroke events should be avoided because it will lead to an increase in the number of mortality and disability among stroke patients. To prevent recurrent stroke events, the standard strategy today aims at reducing the risk factors involved in atherosclerosis, heart disease and metabolic disorders. This includes blood pressure treatment, lipid-lowering agents and platelet inhibitors. A better understanding of the relative importance of the risk factors could lead to a better secondary prevention and thus limit the future stroke burden in the increasingly elderly population.

1.2 Problem Statement

The awareness regarding the risk factors of stroke among the people remains low. The reduction in the risk factors of stroke depends on the general population's level of stroke awareness. (Carod-Artal, Ribeiro, & Vargas, 2007). According to Carod-Artal et al., (2007) there are several previous studies which show that the public's awareness is low regarding stroke warning signs and symptoms. They also found that, 74% of the respondents involved in their study who experience stroke reported that their health care providers did not discuss with them regarding the stroke that they were facing. Thus, from the study they found that the knowledge of the stroke risk factors was limited and only 57% to 76% of the stroke patients were able to name the stroke risk factors or at least one risk factor. It was stated that the knowledge of the stroke patient remains low due to lack of knowledge regarding the risk factors of stroke.

Therefore, many of the studies are focusing more on the awareness and the knowledge of people regarding the risk factors of stroke. Based on the study of Anuar Deen, Nik Azlan, Mohd Fairuz and Zuraidah (2014),the poor knowledge of stroke risk factors and warning signs of stroke contribute to the increase in the number of stroke cases. According to the National Institute of Neurological Disorder and Stroke on a respondent's understanding of warning signs, about 57% of respondents listed at least one of the warning signs correctly, 28% listed at least two of it correctly and only 8% listed three correctly (Anuar Deen et al., 2014).

At the same time, the awareness of the major stroke symptoms are still at a low level (Thomas & Lars-Henrik., 2010) for example, the majority of the stroke patients don't reach hospital in time because of the inability of the patient and by standers to recognize warning symptom of stroke and to get to the emergency room as quickly as possible after the patient experience a symptom of stroke (Ahmed, et. al., 2014). It is also found that the knowledge or awareness of risk factors and warning signs in the community has consistently been found poor (Hickey, O'Hanlon, McGee, Donnellan, Shelley, Horgan, &O'Neill., 2009). So, the awareness and knowledge among recurrent or first-ever stroke patients regarding risk factors and warning signs are essential for prevention of stroke or recurrence of stroke and also for initiation of immediate effective treatment of stroke. Besides that, awareness of risk factors may also help in improving the medical services and also improve the health education and health teaching in wards for those who are admitted and before being discharged home.

This study was conducted on the basis that previous studies have shown that stroke knowledge on the prevalence, incidence and stroke risk factors are low. Thus, when

patients lack knowledge relating to risk factors it will increase the risk of getting the diseases and for those who are first-ever stroke patients, it will increase the recurrence of stroke. Meanwhile, in Kelantan the risk factors of stroke which are hypertension and diabetes mellitus are common when a survey was conducted at the ward. This is due to the ethnicity and the way of their lifestyle that could interrelate to the risk factors of stroke. Therefore, by assessing the level of stroke knowledge and stroke risk factors, we were able to identify the level that could make the health care realize on the importance of providing patients information regarding the diseases and the risk factors.

1.3 Research Objective

1.3.1 General objective

The aim of the study was to assess the level of stroke knowledge and stroke risk factors among home-based stroke patients in Kota Bharu.

1.3.2 Specific objectives

The specific objectives of this study were:

I. To identify the level of stroke knowledge among home-based first ever stroke patient in Kota Bharu.

II. To determine the stroke risk factors among home-based first ever stroke patient in Kota Bharu

III. To determine the association between selected demographic data with stroke knowledge among home-based first ever stroke patient in Kota Bharu.

IV. To identify the association between stroke risk factors with stroke knowledge among home-based first ever stroke patients in Kota Bharu.

1.4 Research Questions

The research questions for this study were:

I. What is the level of stroke knowledge among home-based first-ever stroke patients in Kota Bharu.

II. What are the stroke risk factors among home-based first-ever stroke patients in Kota Bharu.

III. Is there an association between demographic data with stroke knowledge among home-based first ever stroke patients in Kota Bharu

IV. Is there an association between stroke risk factors with stroke knowledge among home-based first ever stroke patients in Kota Bharu.

1.5 Research Hypothesis

I. **Null hypothesis (H_0):** There is no significant association between demographic data with stroke knowledge among home-based first ever stroke patients in Kota Bharu.

Alternate hypothesis (H_1): There is significant association between demographic data with stroke knowledge among home-based first ever stroke patients in Kota Bharu

II. **Null hypothesis (H_0):** There is no significant association between risk factor of stroke with stroke knowledge among home-based first ever stroke patients in Kota Bharu.

Alternate hypothesis (H_1): There is significant association between risk factor of stroke with stroke knowledge among home-based first ever stroke patients in Kota Bharu.

1.6 Definitional of Term (Conceptual/Operational)

Table 1.3 Definition of conceptual and operational terms

Terms	Conceptual	Operational
Stroke	Stroke is defined as a clinical syndrome which occurs with the acute loss of brain function with symptom lasting more than 24 hours due to lack of blood supply to a part of the brain (ischemia stroke) or spontaneous hemorrhage into part of brain (hemorrhagic stroke) (Sidhartha et al., 2015).	In this study the respondents were stroke patients who were admitted to Hospital USM and already discharged.
Knowledge	The belief must be true, and the truthfulness must be justified and understanding of or information about a subject that are based on experience or study, either known by one person or by people generally (Nonaka, 2006)	In this study, the knowledge of stroke among home-based stroke patients were assessed by using Stroke Knowledge Test (SKT) questionnaire by Sullivan & Waugh (2005).

Home-based stroke patients	Stroke patients who are post-stroke and discharged from the Hospital USM.	In this study, home-based stroke patients who were from the Kota Bharu area and admitted to Hospital USM.

1.7 Significant of the Study

Statistics have shown that the risk of recurrent stroke is high. This is due to low awareness and knowledge regarding stroke risk factors among the community or patients with first-ever stroke (Müller-Nordhorn et al., 2006). Therefore, the significance of this study is to assess the level of knowledge and awareness relating to risk factors of stroke among home-based stroke patient so that health care providers can implement and conduct a campaign among them. At the same time, the health care provider can also provide more specific health teachings for the patients who are admitted to Hospital USM before being discharged. This is to prevent the recurrence of stroke among them. This is because the number of stroke cases in Hospital USM admitted to ward have increased from year 2012 until 2014 with 233 patients whereas in year 2014 until September 2015 there were 344 cases (Hospital USM Record Departments). The increase in the number of stroke cases is evidence of the lack of stroke knowledge and awareness among patients even though the exact study on the level of knowledge and awareness in Kelantan were not found.

That was the main reason why this study was conducted which was to analyze and identify the level of knowledge and awareness among the community especially those who had first attack of stroke to prevent the recurrent stroke that will give high risk of mortality, morbidity and give permanent disability to the patients not only physical disability but also mental disability. On the other hand, this study will also help the people in the community to show them that the awareness and knowledge about some diseases is important to prevent the increase of mortality and morbidity rate. The finding of this research will further provide a research data regarding their awareness and knowledge of risk factors of stroke among home-based first-ever stroke in Kota Bharu.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter reviews the section that relates to the stroke knowledge among home-based stroke patients. It also will provide the data on the incidence and prevalence of stroke, risk factors of stroke, relationship between risk factors of stroke and stroke knowledge and conceptual framework in which it he theory that was used in this study was Health Belief Model (HBM).

2.2 Incidence and Prevalence of Stroke

According to Neurological Disorder public health challenges (2006), the WHO had defined stroke diseases as the clinical syndrome of rapid onset of focal (or global, as in subarachnoid hemorrhage) cerebral deficit, lasting more than 24 hours (unless interrupted by surgery or death) with no apparent cause other than a vascular one. Stroke is one of the most common neurological disorders in clinical practice and second commonest cause of death worldwide (Monaliza, Meena & Achal, 2012). It is also classified as medical emergency that requires clinician to diagnose the patient properly and quickly otherwise it will increase the risk of mortality of a patient.

Incidence and prevalence are terms that are commonly used in describing the diseases epidemiology (Advance Renal Education Program, 2012). In Malaysia, stroke is one of the top five leading causes of death after ischemic heart diseases, septicemia, malignant neoplasm, and pneumonia (Keat & Siew, 2012). At the same time, the percentage of

death caused by stroke in 2005 also increased from 6.6% to 8.4%. The actual incidence and prevalence rates in this country are not available (Keat & Siew, 2012).

On the other hand, according to a cohort study conducted there were about 228 stroke cases in northwest state of Penang Island. (Zariah et al., 2015) and an estimated age-adjustment incidence and prevalence rates were reported at 67 per 100,000 and 88 per 100,100 for 2010. It shows that the age of the stroke cases are younger compared to other countries. With the current aging population high andstroke as an age-related disease, the prevalence of stroke is expected to increase. It was also estimated that about 40,000 people suffer from stroke annually in Malaysia according to Anuar Deen et al., (as cited in National Stroke Association Malaysia, 2012).

Prognosis of stroke depends on the stroke type, size and location. Hemorrhagic stroke has a higher mortality rate than ischemic stroke (MOH, 2012). The lifestyle diseases are high in Malaysia such as stroke, diabetes mellitus (DM) and hypertension. The incidence of stroke patients admitted to Hospital Universiti Sains Malaysia (Hospital USM) in Kelantan between January 1997 and December 1998, was 86.1%Malay and the rest amounting to 13.9% were Chinese (Keat & Siew, 2012).

On the other hand, from the Record Unit Hospital USM, 431 stroke patients were admitted to HUSM from January 2012 until September 2014 in which 233 of them were males and 198 were females. The latest statistics on the admission cases of stroke were about 344 cases from 2014 until September 2015. From the cases mentioned above, about 161 patients were females and the rest 183 cases were males. There were no significant differences between the numbers of cases according to gender. Based on the

statistics, there was no specific data specifying stroke for the first time or recurrent stroke.

According to Ahmed, AlBatool, Naurah, Fawaz, and Yousef (2014), their studies had shown that hypertension (56%), diabetes mellitus (42%) and cardiopathy (33%) were the most common causes of stroke in Saudi Arabia. Whereby, based on Thomas and Lars-Henrik (2010) the three most frequently identified stroke risk factors were hypertension (72.3%), history of cerebrovascular disease (49.5%) and high concentration of cholesterol (33.2%) in which the study was carried out in the general population of Denmark. In France, most of the patients who were respondents were able to name three risk factors in which about 62.3% listed the risk factors of excess of alcohol, high cholesterol level and bad diet, the percentage being 37.7%, 29.7% and 25.8% respectively (Jean-Philippe, Pierre & Gaëlle., 2009).

2.3 Complications of stroke

The complications of stroke are common for those who are post-stroke. A study had been carried out showing that post-stroke there are many systems that are affected (MOH, 2012). A previous study showed that the rate of mortality among post-stroke patients during immediate period are caused by direct consequences of the brain damage but the most high rate leading to mortality and morbidity were due to potentially preventable or treatable complications of stroke (Doshi, Say, Young, & Doraisamy, 2003). According to the American Heart Association (2013), the most common medical complication of post-stroke patients is brain edema. Brain edema is increase pressure on the brain, which develops when the brain swells after a large stroke. Such swelling occurs quickly, becomes most severe within 3 to 5 days

after the stroke, and it can cause death. Pressure on the brain is more likely in people who have had a stroke caused by a bleeding blood vessel (hemorrhagic stroke) (WebMD, 2014). On the other hand, other complications are pneumonia which causes breathing problems, a complication of many major illnesses (American Heart Association, 2013). Meanwhile, post-stroke pneumonia has an incidence ranging from 4% to 50% (Camara-Lemarroy, Ibarra-Yruegas, & Gongora-Rivera, 2014).

A recurrent stroke is the highest risk for those already exposed to a mild stroke. The recurrent stroke may lead to severe disability and also contribute to mortality among post-stroke patients. Stroke can sometimes cause temporary or permanent disabilities, depending on how long the brain lacks blood flow and which part is affected. The most common complications can cause disability weather temporary or permanent disability. For example paralysis can be major (whole body) or minor which is half of a body or a certain part. Other complications based on Black (2010) involves their cognitive and neurology such as memory loss or thinking difficulties. Many people who have had stroke experience some memory loss. Others may have difficulty in thinking, making judgments, reasoning and understanding concepts.

2.4 Risk Factors of Stroke

There are many risk factors that contribute to high risk of stroke. By knowing the risk factors, it will prevent the risk of getting stroke among people. The risk of stroke and recurrent stroke depends on a number of factors that one is exposed to. The risk factors are dividing into two; modified risk factor which is a factor that we can control and non-modified risk factor which is the factor that we cannot avoid or control. Based on a study conducted by Robert and Zamzami, (2014) the major risk factors that contribute

to stroke are old age, hypertension, Transient Ischemic Attack (TIA), diabetes, high cholesterol level, smoking and atrial fibrillation. Another study also state that the risk factor of getting old are higher compared to other risk factors based on study by Madae'en et. al., (2013).

2.4.1 Non-Modifiable Risk Factors of stroke

2.4.1.1 Age

A few of the previous studies emphasize that age contribute more to the risk factor of stroke (Müller-Nordhorn, et al., 2006). This is because the aging process will relate to the slowing down of the physiology of the body therefore the body system will not work properly causing multiple diseases. According to the study by Guang et. al., (2015) there is the risk factor of the stroke not only focusing on the elderly but among young people which will contribute to the increase in the number of stroke patients. Based on their study of 258 patients, 143 of them were young stroke patient at the age of < 65 years old whereas another 115 were> 65 years old. Therefore, the main cause nowadays do not only relate to aging process but other factors too. (Guang et. al., 2015).

The most relevant predictors in epidemiology trial for stroke include advancing of age (Kamarulzaman et al, 2013). Meanwhile, the study finding conducted by Libre-Guerra, Cepero, Concepión., et al (2015) at Havana and Cuba, state that the global incidence of stroke among older patients which is older than 65 years old was 786.2 with the new cases per 100 000 person-years. They also found that the incidence rate of the TIA or Transient Ischemic Attack were about 525.8 per 100 000 per person-years. On the other hand, the stroke incidences increase within the age group of 70-74 compared to the age

group of 75-79 which was about 9.6 cases per 1000 persons-years (Libre-Guerra, et al 2015). At the same time, most stroke patients are at the age of 60-80 which is are elderly group in the study at India (Sidhartha et al., 2015). It is within this group, that the prevalence and incidence of stroke is very high and greatly impacting morbidity as well as mortality (Robert & Zamzami, 2014)

2.4.1.2 Gender

The study conducted by Nolte et al., (2005) which were to identify the differences of knowledge of stroke with atrial fibrillation (AF) found that when comparing males and females, the findings revealed that female patients with AF more correctly interpret the symptoms of indicating stroke with a percentage of about 29% compared to a percentage of 27% among males. On the other hand, regarding of considering urgent medical help about 48% among female compared to male 43%, knowledge of stroke 80% for female and 68% for male and considered immediate hospital admission as appropriate medical help for stroke more often with female 76% versus male 67%. (Nolte et al., 2005). Thus, the stratification of the gender have shown that the female patients with AF indicate that they have better knowledge about stroke, stoke symptoms and appropriate medical care as compared to male patients. At the same time, the ratio of stroke patients in Malaysia between females and males are 1:1.4, meanwhile stroke patients in Australia are 1:1.5 (Tan, Tan, & Churilov, et al, 2010).

Besides that, the incidence of stroke increased to 23% in men compared to women 28% of the age of 70 years old (Kamarulzaman et al, 2013). Moreover, from the total of the first-ever stroke within 3 years, there were 325 patients and about 56% of them were

males (182 patients) and 44% were females (143 patients) (Kamarulzaman et al, 2013). Thus, it is strongly stated that the differences in gender are influencing the knowledge of stroke factors with the other related factors.

2.4.1.3 Family History

Aycock et al., (2014) stated that individuals who have a family history of stroke are more prone to have a stroke and are twice more likely to have a stroke compared to those who are without a family history of stroke. Further, family history may also contribute to the increase of risk factors of stroke because of the genetic factor that could be inherited, culture within the ethnicity, or other inherited diseases which are risk factors of stroke such as hypertension, diabetes, and obesity (Aycock et al., 2014). Meanwhile, based on the study by Kim et al., (2004) the risks of family history are more common in young women whether hemorrhagic or ischemic. Thus, those who had a positive family history of stroke were found as having one or more affected first-degree relatives.

2.4.2 Modifiable Risk factors of stroke

2.4.2.1 Smoking

Smoking is a known risk factor of stroke, with the evidence of a strong dose-response relationship (Levine et at., 2013). According to the smoking and mortality of stroke survivors by Levine et al., (2013) the percentage of smoking attributions towards stroke risk factors are about 20%. Thus, clinical guidelines practices suggest that for those having stroke or Transient Ischemic Attack to stop smoking for over 15 years because it

will save the life for about 18-35% (Levine et at., 2013). In addition, 'heavy smokers have a relative risk of stroke that is 2–4 times greater than that of nonsmokers' (Kim et al., 2012).

A large cohort study of 22,071 (as cited by Robbins et al., 1994) US male physicians showed that heavy smokers (>20 cigarettes/day) had a relative risk for total nonfatal stroke of 2.71 and for fatal stroke of 1.46 (Kim et al., 2012). At the same time, according to Nishino et al. (2014) on their study regarding Environment Tobacco Smoke (ETS) ,there is a 14% increased risk of stroke death in subjects with ETS exposure at home which is among patients of the age of 40–79 years. Therefore, this study shows that the risk of mortality of stroke associated with ETS exposure at home during adulthood increases significantly. Besides that, based on Mumtaz et al., (2009) the main risk factor for stroke are hypertension, diabetes mellitus, ischemic heart diseases, hyperlipidemia and smoking. The total number of respondents in their study was about 88 stroke patients and 12 of them have stated that that was the risk factor of the stroke.

2.4.2.2 Hypertension

Hypertension is defined as an elevation of the blood pressure in the range more than 140/95 mmHg (Mumtaz et al., 2009). Hypertension is responsible for a large and increasing proportion of the non-communicable disease burden (Biderafsh, Karami, Faradmal, & Poorolajal, 2015). Therefore, hypertension (HTN) is a common modifiable risk factor for both cerebrovascular and cardiovascular disease, which affects 20% of Canadians (Gorgui, Gorshkov, Khan, & Daskalopoulou, 2014). In addition, about two-thirds of stroke and almost half of all patients with ischemic heart disease were

attributable to raised systolic blood pressure (SBP) above 115 mmHg which is an indication of having a stroke (Gorgui et al., 2014). Meanwhile, based on 2010-2014 data, hypertension was a major risk factor for both ischemic and hemorrhagic stroke event (n=3224) for the first-ever stroke and n=1078 in ischemic stroke and for hemorrhagic stroke, the total respondents that reported hypertension as risk factor of stroke were n=827 for first-ever stroke and n=220 for recurrent stroke (Aziz et al., 2015).

The data from the study of Nazifah et al., 2012 stated that the most risk factor from the total patients registered was hypertension with 73.3% and it showed the highest percentage in all stroke subtype. It also shows that the most common risk factor of stroke in Malaysia is hypertension which is at the rate of 75.5% according to National Stroke Registry (Nazifah et al., 2012). These findings will bring more attention to focus more in the plan of prevention and how to overcome hypertension which is an important risk factor of stroke.

2.4.2.3 Hypercholesterolemia

As known by many, cholesterol is an important element in the body which is essential in synthesizing the hormone, fat digestion, and formation of cell membranes (El Bcheraoui et al., 2014). However, El Bcheraoui et al., (2014) stated that an elevation of cholesterol level beyond the normal level in blood stream will give an adverse impact such as myocardial infarction, stroke, ischemic injury, and organ failure. Hypercholesterolemia is well- known as the common risk factor of cardiovascular diseases (Weng et al., 2013). In addition, the cause of the elevation of cholesterol level in the blood can also cause other diseases such as coronary artery diseases, systemic

atherosclerotic disease, including intimal and medial thickness of the common carotid artery. Some studies have stated that cholesterol-lowering agent will become the standard agent to prevent any cerebrovascular diseases after having stroke but there is still an interrelation between stroke and hypercholesterolemia (Weng et al., 2013).

According to Uchiyama et al., (2009) the risk factor to the development of stroke has not been investigated in hypercholesterolemia individuals. They also state that there still remain controversies in deciding whether the hypercholesterolemia is an independent or dependent risk factor for stroke because both positive and negative interactions between these parameters have been reported (Uchiyama et al., 2009). From the study conducted, they found that the risk factor for all stroke patients in Japan were associated with the hypercholesterolemia. This means that, hypercholesterolemia is also the risk factor that could give an impact but some people do not realize that and will contribute to the high risk factor of stroke.

2.4.2.4 Heart diseases

According to Tektonodis et al., (2015) cardiovascular disease (CVD) is the leading cause of morbidity and death worldwide. Meanwhile, in the Dubbo study of elderly Australian men and women, for example, hypertension and atrial fibrillation were particularly strongly related to stroke (Hamer et al., 2011). There are a few heart conditions that lead to stroke such as Atrial Fibrillation, Myocardial Infarction (MI), Coronary Heart Diseases (CHD), arteriosclerosis, and Heart Failure (Kotsaftis et al., 2010). As cited by Goldstein et al., (2001); Rojas et al., (2007) the ischemic stroke is the third cause of death worldwide especially in elderly and the most frequent cause of dependence of stroke (Kotsaftis et al., 2010). Meanwhile, based on Odoi & Busingye,

(2014) stroke and coronary heart disease (CHD), particularly myocardial infarction (MI), was the leading causes of death and disability among adults in the United States (as cited by Roger et al., 2011). Therefore the association between CHD and stroke relates to the mortality rate among people in Tennessee, Unites States (U.S) (Odoi & Busingye, 2014). Moreover, based on Neau, Ingrand, and Godeneche, (2009)on a study conducted in France based on 411 stroke patients living in Poitou-Charentes to identify the knowledge of stroke risk factors, they found that 36 patients (8.8%) were able to identify cardiovascular diseases as one of the stroke risk factors.

In Malaysia, stroke community awareness among the public in Kuala Lumpur have shown that 30 people from 100 respondents agreed that Ischemic Heart Diseases is one of the risk factor of stroke. (Anuar Deen, Nik Azlan, Mohd Fairuz, & Zuraidah, 2014). In addition, based on Nazifah et al., (2012) from the data of treatment stroke patient via venous thrombosis prophylaxis (VTE) and anticoagulant therapy for atrial fibrillation (AF) was poor in the population in Terengganu and Seberang Jaya, Pulau Pinang about 38.6% and 39.4% respectively from 1018 acute stroke patients. Therefore, from the findings, it shows that the stroke patients associated with heart problem remain at a controllable rate as compared to hypertension relating to stroke which remains high in Malaysia.

2.4.2.5 Diabetes

Diabetes mellitus is a global health concern, an estimated 347 million people worldwide are affected, and in 2008 diabetes accounted for 1.3 million deaths (Peters, Huxley, &Woodward, 2014). Meanwhile, it also relates to the disability worldwide and is a strong risk factor for stroke. Moreover, as cited by Abbott, Donahue,MacMahon, Reed,

& Yano, 1987; Iso et al., 2004; Jørgensen et al., 1994; Kissela et al., 2005 stated that diabetic patients are exposed to significantly higher risk of ischemic stroke and its recurrences (Policardo et al., 2014). This means that the diabetic patient are more exposed to get the ischemic stroke attack and these patients with first-ever stroke will increase the risk of getting recurrence stroke that could get more severe. Furthermore, the previous study was conducted to analyze the diabetes relating to stroke between males and females. From the findings they identified that according to Policardo et al., (2014) the excess risk of stroke associated with diabetes was higher in women than in men (as cited by Peters, Huxley, & Woodward, 2014). Whereby, in the latest study diabetes was more common in women compared to men but the report by Copenhagen Stroke Study reported that the recurrence of diabetic was common among males (Peters, Huxley, & Woodward, 2014). Findings from previous studies have been inconsistent, with some investigators reporting either a stronger, similar or weaker effect of diabetes on stroke risk in women compared to men (Peters et al., 2014).

In Malaysia, the most common and leading risk of stroke is hypertension, followed by diabetes Mellitus and ischemic heart diseases (Aziz et al., 2015). There also stated that from the previous epidemiology study in Malaysia, it was found that an independent risk factors of stroke are having history of transient ischemic attack, diabetes mellitus, poorly uncontrolled hypertension, smoking and male sex. (Nazifah et at., 2012). Moreover, the incidence of diabetes in Kelantan is also the highest which could be the predisposing factor of stroke (Keat & Siew, 2012).