THE CORRELATION AGE AND GENDER WITH STROKE INCIDENT

Agus Setiyadi*, Sara Tania Aprianty, Rani Devayanti, Indah Permatasari

Wijaya Husada Health Institute
Jl. Letjend Ibrahim Adjie, No. 180, Sindang Barang, Bogor, West Java, Indonesia
***corresponding author:** wijayahusada@gmail.com

ABSTRACT

Background : Stroke in Indonesia become increasingly important and urgent. Because now the amount stroke sufferers in Indonesia most in Asia. Amount stroke sufferers with average old 45 years and over more increasing and often happens to men compared to women.

Objective : With this research can know relationship age, gender with incident stroke on patient atroom ICU hospital PMI bogor city.

Method : Research method is quantitative with a descriptive design with cross sectional analysis approach. The population in this study is stroke patients in the ICU Room PMI Hospital Bogor City. Amount samples in this research is 35 people. Research time that is August 2019 – September 2019. Univariate analysis used for describe porposi respondent by way of frequency distribution.

Result and Conclusion : Research results from 35 respondents, the correlation frequency gender with the incidence of stroke in patients in room ICU hospital PMI bogor city a total of 13 (37,1%) respondents experienced a stroke non hemoragic the greater one occurs in men. Significantrelationship value by using computerization get p = 1,000 ≥ 0,05 (alpha), that means Ha rejected and Ho accepted. From this value, the result of the analysis showed that there was not the correlation between the frequency of gender and the incidence of stroke patients in the ICU room of the PMI hospital in Bogor city 2019. Of that value the results of the analysis stated there is no gender frequency relationship with a stroke in patients in the room ICU hospital PMI bogor city 2019. And the results of the analysis also obtained value OR of 4,698 that means gender frequencymen often experience stroke event non hemoragic. Relationship with age frequency of stroke in patients in the room ICU hospital PMI bogor city there are 16 (45,7%) respondents experience an incident stroke non hemoragic in late adulthood the greater one. Significant relationship value by using computerization get p = 0,000 ≤ 0,05 (alpha), that means Ha accepted and Ho rejected.

Suggest : Continuosus health education needs to be held related to risk factors related to events stroke for stroke patients and individuals who have risk factors.

Keywords : Stroke event, frequency of age and gender

PRELIMINARY

The number of stroke sufferersaround the world under the age of 45 continues to increase. At an international conference of neurologists in the UK it was reported that there were more than 1,000 stroke sufferers aged less than 30 years. The world health agency predicts that deaths from stroke will increase alongwith deaths from heart disease and cancer of approximately 6 million in 2010 to 8 million in 2030.[1]

The incidence of stroke both first time attacks and re-attacks are more common in men. Epidemiological research shows that cardiovascular disease is smaller in premenopausal (Pre-MW) women compared to men of the same age.

Estrogen plays an important role as a vasodilator of blood vessels 2.

According to the Indonesian Stroke Foundation (Yastroki) 3, the problem of stroke in Indonesia is becoming increasingly important and urgent, because now the highest number of stroke sufferers in Indonesia is in Asia. The number of stroke patients with an average age of 60 years and over is in second place in Asia, while 15-59 years is in fifth place in Asia[4.]

The results of epidemiologicalstudies also indicate that the risk of death in the 5 years post stroke is 45 - 61% and the occurrence of stroke and recurrence of stroke is 25 - 37%. Some other studies mention that the incidence of recurrent stroke is not much different between men and women. The number of men is quite higher than that of women, with percentages of 56.2% and 43.8%, respectively. These results are in line withprevious studies5 comparing recurrentstrokes often appear more in men thanwomen with a percentage of 60.5% and 54.1%.

Based on data in developed countries like the United States, in 2002, stroke was ranked as the third leading cause of death after heart disease and cancer. In 2006, 700,000 people suffered strokes each year with 550,000 among them new stroke cases (HS Dourman, 2013) 6. From the south east medical information center (SEAMIC) data it isknown that the largest stroke death rate occurred in Indonesia, which was then followed sequentially by the Philippines, Singapore, Brunei, Malaysia, and Thailand[7].

According to the characteristics and age of stroke prevalence that often occurs at age 75+ (50.2%) with a ratio of women 10.9% and men 11.0%. In urban areas the prevalence of stroke is 12.6% while inrural areas it is 8.8% [8.]

According to the Ministry of Health Riskesdas RI data, (2018) 9 the prevalence of non-communicable diseasessuch as stroke has increased, based on the diagnosis of stroke re-examination is the main cause of death at the age of 45-54 years (15.4% of all deaths). According to Nably (2012) 10, stroke is a condition that occurs when blood supply to a part of the brain is suddenly disrupted, because some brain cells die due to obstruction of blood flow due to blockage or rupture of cerebral blood vessels. While WHO11, defines that stroke is the interruption of blood flow to the brain, generally due to rupture of blood vessels to the brain or due to blocked blood vessels to the brain so that the supply of nutrients and oxygen to the brain is reduced.

Based on the cause, stroke is divided into 2, namely ischemic or non-haemorragic stroke and haemorragicstroke. Ischemic stroke occurs due to blocked blood vessels of the brain by plaque (material consisting of protein, calcium, and fat) which causes the flow ofoxygen through the arteries to beobstructed. The haemorragic stroke is a stroke caused by rupture of blood vessels in the brain[12.]

This secondary stroke can be more fatal than the first stroke, due to the increasing extent of brain damage that occurs due to previous stroke13. The most influential risk factors for recurring strokeare hypertension, then followed by other risk factors namely diabetes, cardiac abnormalities, hypercholesterolemia, smoking habits, alcohol use, obesity, physical activity, regularity of taking medication and

stress[14].

Stroke is a functional brain disorder that occurs suddenly (within seconds) or quickly (within a few hours) with clinical signs and symptoms both focal and global that lasts more than 24 hours, caused by obstruction of blood flow to the brain due to bleeding (hemorrhagic stroke) or blockage (ischemic stroke) with symptoms and signs according to the part of the brain affected, which can healcompletely, heal with disabilities, or die[15]. Approximately 32% of strokes are caused by embolism, which is the closureof the arteries by blood clots releasedfrom other places in the circulation. Stroke bleeding is around 20% of all stroke events [16].

Stroke is a clinical syndrome characterized by acute loss of brain function and can cause death17. Stroke isa condition that results in a person experiencing paralysis or death due to bleeding disorders in the brain that cause brain tissue death18. Strokes occur due to blood vessels that carry blood and oxygento the brain become blocked and rupture, lack of oxygen causes the function of body movement control that is controlled by the brain not functioning[19].

Stroke is the third leading cause of death in the world after coronary heart disease and cancer in both developed and developing countries. One in 10 deaths are caused by stroke[20]. Globally, 15 million people have strokes every year,one third die and the rest experience permanent disability (Stroke forum, 2015). Stroke is a major cause of preventable disability[21].

In Indonesia, the tendency of stroke prevalence per 1000 people reaches 12.1 and for every 7 people who die, 1 of them has a stroke22. In a survey at Vermont Hospital, strokes at a young age constituted 8.5% of all hospitalized patients; intracerebral hemorrhage strokes were found in 41% of patients, with the most common causes being aneurysms, AVM (arteriovenous malformation), hypertension, and tumors. Subarachnoidhemorrhage is present in 17% of patients, and ischemic stroke occurs in 42% of patients[22]. The incidence of ischemic stroke under 45 years is only about 5% of all events of ischemic stroke[23].

In the condition of oxygenation enough aerobic metabolism occurs from 1mole of glucose to produce energy in the form of 38 moles of adenosine triphosphate (ATP) which among others are used to maintain ion pumps (Na-K pump), transport neurotransmitters (glutamate, etc.) into cells, protein synthesis, lipids and carbohydrates, as well as the transfer of substances in cells, are producing 2 ATP energy from 1 mole of glucose[24]

An increase in blood carbon dioxide levels causes vasodilation of blood vessels and an increase in oxygen causes vasoconstriction. Nitric-oxides are localized vasodilators released by vascularendothelial cells[25].

Arteroskelorosis occurs because of the accumulation of fat found in the walls of blood vessels so that it blocks the flow of blood to the brain. Atheroscellorosis can also cause an inadequate supply ofcerebral tissue blood, thereby risking the ineffectiveness of brain tissue perfusion[26].

Lifestyle is often the cause of various diseases that attack productive age, because the younger generation oftenadopts unhealthy eating patterns by frequently

consuming foods high in fatand cholesterol but low in fiber. Besides consuming a lot of cholesterol, theyconsume too much sugar so that it will cause obesity which results in the accumulation of energy in the body27.

Gender variable is not a risk factor forstroke in early adulthood. While the results of the study28 state that theincidence of stroke is higher in men thanin women. Based on the Primary Stroke Prevention Guidelines29, stroke riskfactors are divided into two namely, risk factors that cannot be modified and whichcan be modified.

The incidence of stroke is higher in males than females with an average of25% -30%. Although men are more vulnerable than women at a younger age, women will catch up after they reach menopause. This is the hormone that plays a role in protecting women until they pass through childbirth[30.]

There is considerable variation in the incidence of stroke between different ethnic groups. People from African races have a higher risk for all types of strokes compared to people from Caucasian races.This risk is at least 1.2 times higher and even higher for ICH (Intracerebral Hemorrahage) stroke [31.]

It has been suggested that strokes with bloodlines are related. In this case hypertension, diabetes, and defects inblood vessels become genetic factors that play a role. In addition, lifestyle and eating habits in the family that have become difficult to change habits also increase the risk of stroke[32.] Smoking is a real cause of stroke that occurs more in early adulthood than older people. The risk of stroke will decrease after quitting smoking and is clearly visible in the period 2-4 years after stopping smoking. Keep in mind that smoking triggers the production of fibrinogen (blood clottingfactors) more so that it stimulates atherosclerosis[33.]

Stroke not only attacks people who are sick but also can attack physically healthy people as well. Strokes come suddenly in a moment., A few minutes, hours or half a day. This can be caused by several factors including high stress34. According to Goldzmidt and Caplan (2011) [35] to detect and evaluate strokes as follows: History of disease, physical examination, laboratory examination. The main purpose of early evaluation is to identify the type of stroke and determine whether the patient meets the criteria for thrombolytic therapy or other therapies. A history of illness or early physical examination is also used in assessing the extent of neurological dysfunction and identifying risk factors for atherothrombosis and accompanying medical conditions, and imaging. According to Muttaqin (2008) 36 and Batticaca (2008) [37], the management of stroke patients, are: Medical / pharmacological management and nursing management. According to Lingga (2013: 71-81) [38], the impacts caused by stroke include: paralysis and communication disorders. Common complications resulting from inadequate rehabilitation measures, various advanced complications of stroke due to immobilization are as follows[39:] Decubitus ulcers, contractures and shoulder pain, proneal nerve pressure can cause foot drop, osteopenia and osteoporosis, depression and other psychological effects, al incontinence and constipation , and senile after stroke.

According to the large Indonesian dictionary, lifestyle is the daily behaviorof a group of people in society[40]. A healthy lifestyle includes healthy eatinghabits, regular physical activity, non-smoking behavior, non-alcoholic behavior, and stress control41. Primary data is data collected directly by researchers against the target to answerthe problem or the purpose of researchconducted[42.] Editing is the most important part to achieve the main goal before further data processing, where researchersmust review the completeness in thedata[43.]

Bivariate analysis was performed with the chi square test which was used to test the hypothesis of a significant relationship between the factors testing the difference in proportions or two more groups of samples, with the two variables being categorical variables[44.]

Thrombus in the heart is usually examined by echocardiography. Atrial fibrillation occurs in 17% of stroke patients, 18% in ischemic stroke patients, and 11% in bleeding stroke patients. In most cases of atrial fibrillation occurs in patients who have not suffered a stroke and some cases of atrial fibrillation as a cause of stroke[45.]

Research conducted by Siti Alchuriyah and Chatarina Umbul Wahjuni (2016) taken from 2012-2013 medical record data. The results of this study indicate that the total 60 respondents obtained the case group age
<50 years by 15 respondents or 25% and the control group ≥50 years by 45 respondents or 75%. In most sexes aremen, both from the control group or case group. As many as 33 respondents or 55% were male and the remaining 27 respondents or 45% were female. In the case group (<50 years) the male sex is higher (53%) than the female sex (46.7%).Based on the results of a preliminary study conducted on Monday, August 12, 2018 there were 140 patients affected by stroke in the ICU room at PMI Hospital Bogor City. From February 20 people, March 18 people, April 36 people, May24 people, June 16 people, and July 26 people.

From what has been stated above, the authors are interested in conducting research on "The Relationship of Age, Gender With Stroke Events in Patients in ICU Room, Bogor PMI Hospital" with the aim of finding out whether there is a relationship between age, sex and the incidence of stroke in ICU room, PMI Hospital, Bogor City.

RESEARCH METHODS

The design of this study uses quantitative research with descriptive analytic design with cross sectional approach where the independent and related variables are. This study is intended to determine the relationship between age and sex on the incidence of stroke. And understanding of crosssectional is a type of research that observes population data or samples once at the same time. In this type the independent and dependent variables are assessed simultaneously at one time, so there is no follow up.

RESEARCH RESULT

The majority of respondents in late adulthood are 16 (45.7%) greater than the age of young adults and middle adults. The majority of male respondents are 18 (15.4%) greater than women. The frequency distribution of stroke eventsin patients in the ICU room of PMI Bogor City Hospital amounted to 25 (71.4%) of respondents who experienced a non- hemorrhagic stroke and there were 10 (28.6%) respondents who had a hemorrhagic stroke. The relationship between age frequency and stroke incidence in patients in ICU room of PMI Bogor City Hospital with a total of 35 respondents, 16 (45.7%) respondents experienced a greater incidence of non-hemorrhagic stroke in late adulthood.

Based on table 4.5, it is known that there is a relationship between gender frequency and the incidence of stroke in patients in the ICU room of PMI Bogor City Hospital with a total of 35respondents, 13 (37.1%) respondents experienced a greater incidence of non-hemorrhagic stroke occurring in men. Significant relationship value using computerization obtained $p = 1{,}000 \geq 0.05$ (alpha), meaning that Ha is rejected and Ho is accepted.

From these values, the results of theanalysis state that there is no relationship between the frequency of sex with the incidence of stroke in patients in the ICU room of the PMI Hospital in Bogor City non-hemorrhagic stroke.

DISCUSSION

Stroke event

Based on the research results of 35 respondents, stated that the majority of non-hemorrhagic stroke events had a frequency of 25 (71.4%) respondents and 10 (28.6%) respondents experiencedhemorrhagic stroke events. Based on the theory and results of research that have been conducted by researchers at the Bogor PMI Hospital with the number of respondents 35 most of the 18 (51.4%) respondents who experienced a non- hemorrhagic stroke are more common in men who are late adult age between 46 years and over. According to researchers, stroke is a disease that threatens death anddisability.

Age Frequency

Based on the results of research from 35 respondents, stated that the majority of patients who suffered a stroke in late adulthood were 16 (45.7%). The number of stroke patients with an average age of 60 years and over is in second place in Asia, while 15-59 years is in fifth place in Asia. According to researchersage is divided into young adults (21 - 35 years), middle adults (36 - 45 years), and late adults (46 years and above).

Sex Frequency

Based on the results of researchfrom 35 respondents, stated that themajority of patients who had a strokeoccurred in men as many as 18 (51.4%).According to male researchers, they aremore likely to have a stroke which wasinitially caused

by a bad lifestyle pattern. Bivariate Analysis of the Relationship Between Age Frequency and Stroke Incidence in Patients in ICU Room, Bogor PMI Hospital

Obtained from 35 respondents, there were 16 (45.7%) respondents who experienced a non-hemorrhagic stroke that occurred in late adulthood with a p value of 0,000 ≤ 0.05, which means there is a relationship between the incidence of stroke and age. This result was supported by previous researchers with the title relationship between age, sex, and hypertension with the incidence of stroke. The result is that in 77 stroke patients, the incidence at the age of 40 - 55 years was 25 patients (32.5%) and the incidence at age> 55 years was 52 patients (67.5%). Based on the results obtained p value = 0.031, so it can be concluded that there is a relationship between age and the incidence of stroke and is more common in late adulthood. Bivariate Analysis of the Relationship between Gender Frequency and Stroke Occurrence in Patients in ICU Room, PMI Hospital, Bogor City Obtained from 35 respondents, there were 18 (51.4%) who were male greater than 17 (48.6%) with p value = 1,000 ≥ 0.05 which means there was no relationship between types sex with the incidence of stroke and an Odd Ratio (OR) score of 4.698 which means that the incidence of stroke often occurs in men compared to women. Based on the results of the research and theory above, the researcher concludes that there is harmony between the theory and the results of the study, namely that gender frequency does not have a significant relationship between sex with the incidence of stroke with a p value ≥ 0.05. With more common in men compared with women.

CONCLUSION

1. Known results of the frequency distribution of respondents based on age characteristics in stroke patients amounted to 10 (28.6%) respondents at young adulthood, totaling 9(25.7%) respondents at middle adulthood and 16 (45.7%) respondents with highest frequency according to age 46 years and above t
2. It is known that the results of the frequency distribution of respondents based on sex characteristics in stroke patients amounted to 18 (51.4%) with the highest frequency according to gender, namely male and totaled 17 (48.6%) according to female sex.
3. The results of the frequency distribution of respondents regarding the occurrence of stroke in patients by 25 (71.4%) of respondents who experienced a non-hemorrhagic stroke and 10 (28.6%) of respondents who experienced a hemorrhagic stroke.
4. It is known that the frequency distribution of age relationship with the incidence of stroke in patients amounted to 16 (45.7%) respondents who experienced a greater non- hemorrhagic stroke in late adulthood, 9 (25.7%) respondents who experienced a non-hemorrhagic stroke at age middle adults and 10 (28.6%) respondents had hemorrhagic strokes in young adulthood. The value of this relationship is significant with p = 0,000 ≤ 0.05 (alpha) meaning that Ha is accepted and Ho is rejected.
5. It is known that the results of the frequency distribution of sex relations with the incidence of stroke in patients in the ICU room of PMI Bogor City Hospital

amounted to 18 (51.4%) of respondents whichoccurred in men is greater than that of women amounted to 17 (48.6) respondents. The value of thisrelationship is not significant with 1,000 ≥ 0.05 (alpha) means that Ha isrejected and Ho is accepted.

SUGGESTION

1. For Educational Institutions It isnecessary to hold continuous health education related to the risk factors associated with the incidence of stroke for stroke patients and individuals who have risk factors.
2. Health Service Institutions Discharge planning for stroke patients and individuals who have risk factors needs to be made so that continuity of nursing can be carried out at home properly.
3. Stroke clubs need to be formed so that patients can socialize with other people who have the same problem, so they can exchange experiences relatedto risk factors and how to handle or control them.
4. It is necessary to increase the vigilance of nurses to the patient's condition, especially patients who have risk factors and patients who havesuffered a stroke.

REFERENCES

1. American Heart Associaton. 2010. *Stroke Risk Factor* (http://www.strokeassociattion.org/pr esenter.jhtml?identifier). Diakses tanggal 14 Juni 2014.
2. Masood DE, Roach EC, Beauregard KG, et al. (2010). Impact of sex hormone metabolism on the vascular effects of menopausal hormone therapy in cardiovascular disease. Current Drug Metabolism [Curr Drug Metab] 11 (8) : 693-714.
3. Yayasan Stroke Indonesia (Yastroki). 2012. *Jumlah Penderita Stroke Semakin Mrningkat.*
4. Anonim. 2011. *Stroke the SillentKiller*. Diakses tanggal 23 Desember2013, (http://medicastore.com/stroke.html).
5. Nowacki, P., Bajer-Czajkowska, A., & Masztalewicz, M. (2010). Clinical characteristics of early and late recurrent ischaemic stroke. Neurologia I Neurochirurgia Polska, 44(2), 123-130.
6. Dourman, Karel, HS, 2013, *WapadaiStroke Usia Muda*, Cerdas Sehat, Jakarta.
7. Dinata, C. et al. 2013. Gambaran Faktor Risiko dan Tipe Stroke pada Pasien Rawat Inap Di Bagian Penyakit Dalam RSUD Kabupaten Solok Selatan Periode 1 Januari 2010– 31 Juni. Jurnal Kesehatan Andalas :2(2).
8. Riset Kesehatan Dasar (RISKESDAS) Indonesia. 2018. Departemen Kesehatan Republik Indonesia.
9. Riskesdas RI, 2018. Prevalensi Penyakit Tidak Menular.
   Nably. R.A.2012. *Deteksi dini gejala dan pengobatan stroke*. Yogyakarta : Aulia Publishing. (notprint).
10. World Health Organization.Stroke,Cerebrovascular Accident[Internet]. 2014; cited 2015 Jan 17.

11. Available from:http://www.who.int/topics/cerebrovascular_accident/en/
12. Warlow, C, J van Gijn, M Dennis, J Wardlaw, J Bamford, G Hankey, P Sandercock, G Rinkel, P Langhorne, CSudlow, P Rothwell. 2007 Stroke Practical Management (3rdedition).Blackwell : Oxford.
13. Mulyatsih, E. dan Ah mad, A.A.2010. *Stroke : Petunjuk perawatan pasien pasca stroke di rumah*. Cetakan 2. Jakarta : Balai Penerbit FKUI.
14. Depkes RI. (2009) Profil kesehatan Indonesia 2008. Jakarta. Diakses pada tanggal 28 September 2011.http://www.depkes.go.id
15. Junaidi, I.(2011). Stroke Waspadai Ancamannya. Yogyakarta.
16. Washington University. 2011. Stroke in perspective: types of stroke. [Online]Availableat:http//www.strokec enter.org/education/ais_stroke_types/stroke_types.htm [Diakses 08 Mei 2017].
17. World Health Organization.Stroke,Cerebrovascular Accident[Internet]. 2014; cited 2015 Jan 17.
18. Available from: http://www.who.int/topics/cerebrovascular_accident/en/.
19. Batticaca, Fransisca B. (2009). Asuhan Keperawatan Klien dengan Gangguan Sistem Pernafasan. Jakarta : Salemba Medika.
20. American Heart Association (AHA). (2015). Let's Talk About Stroke: Fact Sheet.[Artikel].
21. American Heart Association(AHA). (2015). Heart Disease andStroke Statistics -At-a-Glance[Artikel].
22. Ralph LS, Scott EK, Joseph PB, Louis RC. American Heart Association. An Update Definition of Stroke for the 21st Century: A statement for Healthcare Professionals From the American Heart Association/American StrokeAssociation. Stroke. AHA Journal. 2013; 44:2064-2089.
23. Depkes, 2013, Riset Kesehatan Dasar, Diakses Pada 05 Desember 2015; http://www.depkes.go.id/resource s/download/general/Hasil%20Riskesdas%202013.pdf.
24. Primara, A. B. & Amalia, L.,2015. Stroke pada Usia Muda.*Cermin Dunia Kedokteran*,42(10), pp. 73-737.
25. Alireza A. Ischemic stroke: Patophysiology and Principles of localization. Turner whitecommunication [internet]. 2009[cited 2014 July 20]. Available from: http://www.turner-white.com/ pdf/brm_Neur_V13P1.pdf
26. Arbour, R. Parker, F. J. March, K.2005. Acute Stroke: Pathohysiology, Diagnosis, andTreatment. AACN AdvanceCritical Care: 16 . pp: 421-440.
27. Amin, Hardhi. 2013. *Aplikasi Asuhan Keperawatan Berdasarkan Diagnosa Medis &NANDA NIC NOC, Jilid 1,2*. Yogyakarta: MediaActionPublishing.
28. Dourman. 2013. Waspadai StrokeUsia Muda. Jakarta : Cerdas Sehat
29. Handayani. 2013. Angka Kejadian Serangan Stroke pada Wanita Lebih Rendah Daripada Laki-laki. Jurnal KeperawatanMedical Bedah. Vol 1/No.1:2013
30. Goldstein L.B. 2009. A Primer onStroke Prevention Treatment: An O verview Based on AHA/ASA Guideline. 1st ed. Dallas: Willey- Blackwell.
31. Burhanuddin, M., Wahidudin, Jumriani, 2012, Faktor Risiko Kejadian Stroke

pada Dewasa Awal (18-40 tahun), UNHAS Makassar.
32. Norrving, Bo (Eds). 2014. Oxford Textbook of Stroke and Cerebrovascular Disease. Oxford : Oxford University Press.
33. S, Wiwit. 2010. Stroke dan Penanganannya : Memahami, Mencegah, dan Mengobati Stroke. Yogyakarta : Kata Hati.
34. Pinzon R dan Asanti. 2010. Awas Stroke! Pengertian, Gejala, Tindakan, Perawatan danPencegahan. Yogyakarta : Andi Offset.
35. Smeltzer, & Bare. 2005 *Buku Ajar Keperawatan Medical Bedah Brunner & Suddart*. Edisi 8, Vol 1, alih bahasa: Kuncaran Monica Ester. Jakarta: EGC.
36. Goldszmidt, Adrian J dan Louis RCaplan. 2011. *Stroke Esensial*. Terjemahan oleh Retna Neary Elseria Sihombing. Jakarta : EGC
37. Muttaqin, A, 2008. AsuhanKeperawatan stroke hemoragic.Diakses tanggal 26 Februari 2015dari: http://nursingbegin.com/askep- stroke-hemoragik/
38. Batticaca. 2008. Asuhan Keperawatan Klien DenganGangguan Sistim Persarafan. Salemba Medika. Jakarta.
39. Lingga Lenny, Ph.D, (2013) All About Stroke, pertama, PT Elex Media Komputindo, Jakarta, h.1
40. Yulianto, A. 2011. *Mengapa Stroke Menyerang Usia dewasa muda?*. Jakarta: PT. Buku Kita
41. Badan Bahasa Kemendikbud.2008. *Kamus Besar Bahasa Indonesia Online*. Jakarta:Kementrian Pendidikan dan Kebudayaan. (http://badanbahasa.kemdikbud.g o.id/kbbi/index.php).
42. Proverawati, Atikah dan Eni Rahmawati. 2012. Perilaku Hidup Bersih dan Sehat (PHBS). Yogyakarta : Nuha Medika.