Correlation between homocysteine and dyslipidemia in ischaemic stroke patients with and without hypertension

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Abstract. Almost 80% of strokes are ischaemic and stroke is the third most common cause of death in developed countries. The treatment of stroke still limited, the best approach to reduce mortality and morbidity is primary prevention through modification of acquired risk factors. Hypertension and dyslipidemia are one of the major risk factor for stroke while homocysteine is a less well-documented risk factor. The purpose of this study was to know the correlation between homocysteine and dyslipidemia in ischaemic stroke patients with and without hypertension. This study is a cross sectional study; the sample were taken consecutively. All sample matched with inclusion and exclusion criteria, demography data and blood sample were taken. Demography data was analyzed using descriptive statistic, to analyze the relation, we used Chi-Square test. p value <0.05 was significant. Of the 100 patients, were divided into two groups, with hypertension, and without hypertension, hyperhomocysteinemia was found in 62 patients (59 patients had mild hyperhomocysteinemia, three patients had moderate hyperhomocysteinemia) and dyslipidemia was found in 60 patients. There is a significant relation between homocysteine and dyslipidemia in ischaemic stroke patients with hypertension, p value = 0.009. A significant correlation between homocysteine and dyslipidemia might be because both of them have an important role in the acceleration of the atherosclerotic formation by activation platelet and thrombus, but we still need further study to get more explanation about the relation.

Keywords: atherosclerotic disease, blood pressure, risk factors of stroke

1. Introduction
Almost 80% of strokes are ischaemic, and the remainder is haemorrhagic [1], stroke is the third most common cause of death in developed countries [1,2]. The treatment of stroke still limited, the best approach to reduce mortality and morbidity is primary prevention through modification of acquired risk factors [3,4].

Hyperhomocysteinemia is a less well-documented modifiable risk factor [5], that correlated with vascular disease, including stroke. [6,7,8] An increasing total plasma homocysteine is an independent risk factor for atherosclerosis and increased the risk of ischaemic stroke about two and half times. Epidemiologic studies showed that a moderate increasing plasma homocysteine level (>10 μmol/L) could increase the risk of stroke. [9] Hyperhomocysteinemia can caused endothelial dysfunction that correlated with activation platelet and thrombus [10].
Data from cohort and case control studies showed a positive correlation between total concentration of homocysteine and the risk of stroke. [11,12] An increased plasma serum level about five μmol/L will increase the risk of stroke about 50% [11], while decreased plasma serum level about three μmol/L will decrease the risk of stroke about 24%. [13]

Dyslipidemia has an important role as the cause of disability and mortality. Mechanism dyslipidemia as the cause of ischaemic stroke still unclear, its has been reported that there is a relation between cholesterol total, LDL, and HDL with the risk of ischaemic stroke. [14]

Disorders of lipid metabolism such as elevated serum levels of total cholesterol, triglyceride, low density lipoprotein, high density lipoprotein, apolipoprotein A have been considered to There is a study that has proved that cholesterol total, HDL, LDL, has relation with acute ischaemic stroke, but the role in pathogenesis of ischaemic stroke still unclear. Others studies reported that cholesterol total, LDL, HDL related with the risk factor of ischaemic stroke. [15]

Another study reported a decreased relation between lipid and stroke. From 296 stroke patients and control, found that cholesterol total, trygliserida, and HDL had connection with the risk of ischaemic stroke, even higher total ratio of cholesterol/ HDL increased the risk. [14]

The purpose of this study was to know the correlation between homocysteine and dyslipidemia in ischaemic stroke patients.

2. Materials and Methods
This study is a cross sectional study; the sample was taken consecutively. The study was conducted with the approval of the ethic committee of the institutions involved and informed consent was obtained from all subjects or their relatives (for comatose patients) for the inclusion of the study. Inclusion criteria included first were the presence of stroke at the present hospital admission. The neurological deficits were confirmed in all cases by computerized tomography (CT) scan. The homocysteine was classified into two categories: (1) normal and (2) hyperhomocysteinemia. Dyslipidemia was classified into two categories: (1) normal, (2) dyslipidemia. All sample matched with inclusion and exclusion criteria, demography data and others data were taken. Demography data was analyzed using descriptive statistic, to analyze the relation, we used Chi-Square test. P value <0,05 was significant.

3. Results and Discussion
Of the 100 patients with ischaemic stroke patients were divided into two groups, with, and without hypertension. A total of 63 men had an ischaemic stroke, while 37 women had an ischaemic stroke, 35 patients at the age below 50 y.o (24 male, 11 female), 65 patients at the age above 50 y.o (39 male, 26 female), hyperhomocysteine was found in 62 patients, dyslipidemia was found in 60 patients, smoking was found in 45 patients, diabetes mellitus was found in 64 patients.

| Table 1. Baseline Characteristic of the Ischaemic Stroke Patients |
|------------------|---|---|
| Subjects    | Male | Female |
| Age         |     |       |
| < 50y.o     | 24  | 11    |
| > 50y.o     | 39  | 26    |
| Hyperhomocysteine |     |       |
| Yes         | 41  | 21    |
| No          | 22  | 16    |
| Dyslipidemia |     |       |
| Yes         | 40  | 20    |
| No          | 23  | 17    |
| Smoking     |     |       |
| Yes         | 43  | 2     |
| No          | 20  | 35    |
| Diabetes mellitus |     |       |
| Yes         | 42  | 22    |
| No          | 21  | 15    |
Table 2. Relation between Homocysteine and Dyslipidemia

| Ischaemic Stroke | Hyperhomocysteine | Dyslipidemia | p  = 0.009 |
|------------------|-------------------|--------------|------------|
| With Hypertension | 47                | 46           |            |
| Without hypertension | 15       | 14            |            |

There is a significant relation between homocysteine and dyslipidemia, p=0.009 (p<0.005).

This study found that, among 100 patients with ischaemic stroke, hyperhomocysteinemia was found in 62 patients (59 patients had mild hyperhomocysteinemia, three patients had moderate hyperhomocysteinemia) and dyslipidemia was found in 60 patients. Many epidemiologic studies found that increased level of homocysteine is an independent risk factor for atherosclerosis and thrombosis artery. There are many adverse effects of homocysteine, most of them are related to endothelial dysfunction which is related to platelet activation and thrombus formation. [10]

Newest study has explain the relation between lipid and ischaemic stroke, and has shown that ischaemic stroke and the size of carotid atheroma can be reduced by lipid lowering agents. Its has been reported that the association between cholesterol total, LDL, HDL with the incidence of ischaemic stroke.[14]

Tian et al. 2014 found that cholesterol total, LDL, HDL related with the incidence of acute ischaemic stroke [14]. Kurth et al. 2007 and Shahar et al. 2003 reported that cholesterol total, LDL, HDL related with risk factor of ischaemic stroke [15,16]. Shahar et al. 2003 and Bowman et al. 2003, reported a decreased relation between lipid and stroke [16,17].

Atherosclerotic is the cause of death for more than half death in west countries. [16] its cause the most serious morbidity and mortality [17]. It is a slow progressive artery disease, produced by the thickness of tunica intima that caused by fibrous accumulation that gradually will narrowing the vessel lumen and caused thrombus [16].

Atherosclerosis risk factors act at several points on this pathogenic pathway, such as the plaques generally cause clinical manifestations by producing flow-limiting stenoses that lead to tissue ischaemia, or by provoking thrombi that can interrupt blood flow locally or embolize and lodge in distal arteries.[18,19]

There are several limitations of our study. First the study enrolled hospital based stroke patients rather than patients from a community based general population, secondly, this study did not collect data on others several major risk factors that may influence the homocysteine level.

4. Conclusion

A significant correlation between hyperhomocysteinemia and dyslipidemia might be because both of them have an important role in the acceleration of the atherosclerotic formation by activation platelet and thrombus, that caused atherosclerotic vascular disease. Atherosclerosis is the main cause of death for more than half in west countries. This is a slow progressive artery disease, with the thickness of tunica intima that happens because of gradually accumulation of fibrosa that make the lumen smaller and become thrombus. Lumen narrowing as the effects of the plaque accumulation caused stiffness of the artery wall that can cause ischaemic. [16]

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