STUDY ON SERUM VITAMIN B_{12} AND FOLIC ACID IN PATIENTS OF ISCHAEMIC STROKE

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Abstract:

Context: *Stroke is the third commonest cause of death in developed countries and is responsible for the physical disability of a large population. Of two types, ischaemic stroke covers 85% and haemorrhagic stroke is only 15%.*

Methods: *A case control study was designed to see the association of serum vitamin B_{12} and folic acid level with ischemic stroke. The study was done from January to December 2009 in the Department of Biochemistry, Dhaka Medical College, Dhaka. A total of 60 subjects were selected as study population. Among them 30 were diagnosed case of ischaemic stroke and 30 were age and sex matched healthy control.*

Results: *The mean vitamin B_{12} and folic acid levels in case group were 231.02±10.81 pg/ml and 2.29±0.54 ng/ml respectively. For control group, the mean vitamin B_{12} and folic acid levels were 278.72±15.88 pg/ml and 7.24±2.19 ng/ml respectively.*

Conclusion: *The study suggests that low levels of serum vitamin B_{12} and folic acid are associated with ischaemic stroke.*

Key words*: Ischaemic stroke, vitamin B_{12}, folic acid.*

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Introduction:

Stroke is the major cause of death and disability worldwide. Each year, about 4.4 million people die of stroke globally, of whom almost three million are from developing countries[1]. The ischemic stroke is the resultant effect of the occlusion of the vessel wall, e.g. collagen diseases and vasculitis, diseases of the blood e.g. coagulopathies and haemoglobinopathies, decreased cerebral perfusion due to shock of any cause and cardiac dysryhthmias which leads to infarction of brain[2]. The metabolism of homocysteine is dependent on folic acid, pyridoxal phosphate (vitamin B_6), and cyanocobalamin (vitamin B_{12}). Hyperhomocysteinaemia is an independent risk factor for atherothrombotic cerebral stroke[3]. Folic acid, pyridoxine (vitamin B_6), and cobalamin (vitamin B_{12}) reduce plasma homocysteine levels and may help to reverse endothelial injury associated with elevated total homocysteine[4]. Decreased level of vitamin B_{12} and folic acid in blood may be an important factor associated with ischaemic stroke. So, the present study was carried out to see the association of serum vitamin B_{12} and folic acid levels with ischemic stroke.

Materials and Methods:

The study was carried out in the Department of Biochemistry, Dhaka Medical College, Dhaka during the period of January to December 2009. The patients were taken from the Department of Neurology and Department of Medicine of Dhaka Medical College Hospital (DMCH), Dhaka. Ischaemic stroke patients were considered as case and the control were age and sex matched healthy volunteers. Cases were the patients who were clinically suffered from ischemic stroke confirmed by computerized tomography (CT) scan of brain attending the Neurology and

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Medicine units of DMCH during the study period. In this study, the sample size was taken 60. 30 patients with ischaemic stroke were taken as cases among which 21 were male and 9 were female. 30 healthy volunteers were taken as controls among which 21 were male and 9 were female. Blood samples were taken to measure the serum vitamin B_{12} and folic acid level. Data were analyzed by SPSS version 12.0. All data were recorded systematically in a preformed data collection sheet. Mean values of the findings were compared between two groups. Student's unpaired 't' test was performed to see the difference between two groups. For all the statistical analyses 2-tailed P values <0.05 were considered as significant.

Ethical clearance: This research work was approved by the Ethical Review Committee of Dhaka Medical College, Dhaka.

Results:

The study showed that the mean vitamin B_{12} level in case group was 231.02±10.81 pg/ml and that of control group was 278.72±15.88 pg/ml. There was highly significant difference of mean vitamin B_{12} level between the case and control group (p=0.0001) (Table-I). The study also showed that the mean folic acid level in case group was 2.29±0.54 ng/ml and that of control group was 7.24±2.19 ng/ml. There was also highly significant difference of mean folic acid level between the case and control group (p=0.0001) (Table-I).

Discussion:

After coronary artery disease and cancer, stroke is the most common cause of death in the developed countries. It predominates in the middle and late years of life. The incidence of stroke increases with age[5]. Folate provides one carbon groups for the methylation of homocysteine to from methionine, with vitamin B_{12} acting as a cofactor, and studies have tended to focus on the role of these vitamins primarily as determinants of homocysteine levels. In the present study, the mean vitamin B_{12} level was 231.0±10.51 pg/ml in case and 278.72±15.88 pg/ml in control groups. Significant association was found between low level of serum vitamin B_{12} and ischemic stroke (p<0.05). Giles et al. (1995)[6] have shown that folic acid levels below 9.2 nmol/l predispose to an increase in the risk of cerebrovascular diseases. Yilmaz et al. (2001)[7] evaluated serum vitamin B_{12} and folate levels in cases of stroke and found a significant correlation among those. Kocer et al. (2004)[3] found the value of mean serum vitamin B_{12} levels were significantly lower in the case than control subjects, 245.40±72.9 pg/ml and 343.2±113.0 pg/ml respectively (p=0.0001). The levels of serum folic acid in case and control groups of the present study were 2.27±0.77 ng/ml and 7.23±2.04 ng/ml respectively. Significant difference was observed between the groups regarding the level of serum folate (p<0.001) i.e. low level of serum folate was significantly associated with ischaemic stroke. Kocer et al. (2004)[3] also found the value of mean serum folate levels were significantly lower in the case than control subjects, 4.62±1.94 ng/ml and 5.97±1.19 ng/ml respectively (p=0.0001). The above mentioned researcher found that vitamin B_{12} and folate levels were decreased in acute cases of stroke when compared with those of the control group in their study. Thus, the result of present study is consistent with the previous studies and showed a correlation between decrease in vitamin B_{12} and folate levels with ischaemic stroke.

Table-I

*Comparison of serum vitamin B_{12} and folic acid level between case and control**

Group	Serum vitamin B_{12} in pg/ml (Mean±SD)	t value	p value	Serum folic acid in ng/ml (Mean±SD)	t value	p value
Case	231.02±10.81	13.605	0.0001	2.29±0.54	12.053	0.0001
Control	278.72±15.88			7.24±2.19		

*Unpaired 't' test was done to test significance; level of significance was at 0.05.

Conclusion:

Vitamin B_{12} and folic acid are important determinants of homocysteine metabolism. Hyperhomocysteineaemia is an independent risk factor for atherothrombotic cerebral stroke. The present study concluded that the low levels of serum vitamin B_{12} and folic acid is significantly associated with ischemic stroke. Diet intake in the aged person may have an effect of low level of serum vitamin B_{12} and folic acid. So, in order to prevent ischemic stroke, supplementation or vitamin B_{12} and folic acid rich diet especially in the elderly people is required.

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