Homocystiene Profile in Elderly

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Abstract:

Background: Homocysteine (Hcy) is a sulfurated amino acid an elevated homocysteine level is a marker for a pathogenic process as well as a cause of pathology.

Method: it is across sectional study conducted on 91 elderly participants 60 years and older selected from geriatric outpatient clinic and geriatric inpatient departmentthey underwent comprehensive geriatric assessment, and homocysteine (Hcy) level in blood by Enzyme Immunoassay (EIA).

Results: homocysteine not significantly related to age, sex and functional status. Also mean Hcy level is 15.4 μmol/liter.

Conclusion: further studies to evaluate Hcy level in elderly with different ages are recommended.

Keywords: Homocystiene, profile, elderly

Introduction:

Homocysteine (Hcy) is a sulfurated amino acid derived from ingested methionine found in cheeses, eggs, fish, meat, and poultry. It is directly toxic to neurons and blood vessels and can induce DNA strand breakage, oxidative stress, and apoptosis(1).

The methionine-homocysteine metabolic pathway intermediaries are *S*-adenosyl methionine and *S*-adenosylhomocysteine. The pathway produces methyl groups required for the synthesis of catecholamines and DNA. This is accomplished by remethylatinghomocysteine—using B12 and folate as cofactors—back to methionine (2).

Homocysteine is cleared by transulfuration to cysteine and glutathione, an important antioxidant. Transulfuration requires vitamins B6 and B12. The components of the homocysteine-methionine cycle are affected by genetic variation, diet, kidney and gastrointestinal diseases, and prescribed and over the-counter drugs. Since homocysteine is a sensitive indicator of B vitamin deficiency, an elevated homocysteine level is a marker for a pathogenic process as well as a cause of pathology(2).

Elevated blood concentrations of the amino acid homocysteine are frequent in the elderly (3), especially as a consequence of nutritional deficiencies of vitamin B12 and folate (4).

Ueland and Refsum (5) noted impaired homocysteine metabolism seems to exist in 15–30% of patients with

premature cardiovascular disease. Moderate hyperhomocysteinemia is a risk factor for cardiovascular disease, independent of conventional risk factors.

Results of a recent meta-analysis of prospective studies suggest that lowering the serum homocysteine level by 25% (about 3 μmol/liter) decreases the risk for ischemic heart disease. Reduction of levels reduces the risk of heart disease by 11% and stroke by 19%(6).

Mild HHcy has been observed in type I diabetic patients with micro albuminuria and nephropathy and may explain the increased risk of vascular disease in this high-risk population (7).

Subjects and Methods

A) Subjects:

The study is a cross sectional study performed in geriatric clinics and geriatric inpatient ward in the department of geriatrics and gerontology, Ain Shams University Hospital. The study participants were 91 elderly (60 years and older)

Verbal consent was taken from all subjects before enrollment in the study. Subjects who refused to participate in the study, patients suffering from renal failure (creatinine clearance <60 ml/min) and those with drug or alcohol abuse were excluded from the study. Patients on drugs such as methotrexate, carbamazepine, phenytoin, were also excluded as these drugs can affect homocysteine metabolism and may give elevated levels of Hcy (8).

Assessment: All participants underwent comprehensive geriatric assessment which include: Full history, examination,Functional assessment by:Activities of daily living (ADL) (9) and Instrumental activities of daily living (IADL) (10).

All participants underwent measurement of serum homocysteine by Enzyme Immunoassay (EIA) by the following technique:

1-Analytical Methods:

Sampling:

Under complete aseptic condition, 3 milliliters of venous blood were collected by venipuncture from all patients and healthy controls in sterile plain tubes (sterile dry vacutainers). Samples were left to clot for 20 minutes, and then centrifuged at 1000 xg for 10 minutes. Sera were separated stored at - 20ºC until the assay of homocysteine level. Heamolysed samples were discarded, repeated thawing and freezing was avoided.Food consumption can affect circulating homocysteine levels as protein rich meals give higher homcysteine values, therefore should be avoided late in the day before sampling.

Measurement of Hcy:

Quantitative determination of total L-homocysteine in human serum was carried out by Axis® Homocysteine Enzyme Immunoassay (EIA) (11).

Axis® Homocysteine Enzyme Immunoassay (EIA) is an enzyme immunoassay specific for determination

of L-form Hcy which is the only form present in the blood (12).

Protein-bound Hcy is reduced to free Hcyby use of dithiothreitol (DTT), and enzymatically converted to S-adenosyl-L-homocysteine (SAH)by the use of SAH hydrolase and excess adenosine (Ad) in a separate procedure prior to the immunoassay *(11)*. The solid-phase enzyme immunoassay is based on competition between SAH in the sample and immobilized SAH bound to the walls of the microtitre plate for binding sites on a monoclonal anti-SAH antibody. After removal of unbound anti-SAH antibody, a secondary rabbit anti-mouse antibody labelled with the enzyme horse radish peroxidase (HRP) is added. The peroxidase activity is measured spectrophotometrically at 450 nm after addition of substrate, and the absorbance is inversely related to the concentration of Hcy in the sample.

Aset of low, medium and high controls of homocysteine level provided by the kit was used.

2. Statistical Analysis:

The collected data was revised, coded, tabulated and introduced to a PC using Statistical package for Social Science *(13)*. The following tests were done: Chi-Square test, One-Way ANOVA test, Person Correlations test. The probability of error at 0.05 was considered significant, while at ≤0.01 highly significant.

Results:

The study was conducted on 91 elderly patients with age ranging from 60-98 years with mean age 69.1(±8.3). As regard homocysteine level was ranged from 4-50µmol/L with mean 15.4 ±8.9with no statistical significant correlation with age (table 1). Also in the current study 52.8% of the participants were female and 47.3% were males with no statistical significant difference with Hcy level (table 2). As regard the function the majority of the participants were independent in ADL and IADL (75.8% and 64.8% respectively) (tables 3-4-5).

Table (1): Descriptive statistics of age and homocysteine and Correlation of age with homocysteine:

Descriptive Statistics			Correlations		
	Range	**Mean± SD**			**homocystsine level**
AGE	60.0- 98.0	69.088 ±8.379	**AGE**	**r**	-0.086
homocystsine level	4.0- 50	15.371±8.933		**P-value**	0.423

Table (2): comparison of homocysteine level between males and females:

| | SEX | | | | | | T-Test | |
| | Female | | | Male | | | | |
	Mean	±	SD	Mean	±	SD	t	P-value
homocystsine level	15.272	±	9.047	15.477	±	8.916	-0.108	0.915

Table (3): ADL and IADL of the participants:

| | ADL | | IADL | |
	N	%	N	%
Independent	69	75.82	59	64.84
Assisted	14	15.38	16	17.58
Dependent	8	8.79	16	17.58
Total	91	100.00	91	100.00

Table (4): One way ANOVA test to compare between ADL and homocysteine level:

| Descriptives | | ADL | | | ANOVA | |
		Independent	assisted	dependent	F	P-value
homocystsine level	Mean	15.119	16.107	16.188	0.105	0.900
	SD	8.746	5.923	14.643		

Table (5): One way ANOVA test to compare between IADL and homocysteine level:

| Descriptives | | IADL | | | ANOVA | |
		Independent	assisted	dependent	F	P-value
homocystsine level	Mean	14.431	16.700	17.531	0.954	0.389
	SD	8.271	9.651	10.541		

Discussion:

In our study the age not significantly related to homocysteine which not agreed with many studies as *Reif et al (14); El-Sammak et al. (15)* which found that homocysteine were positively correlate with aging.

Also, plasma homocysteine level was measured in 159 healthy Turkish

individuals. The data indicate the significance of age-associated differences of homocysteine levels *(16).*

Plasma Hcy concentrations were significantly higher in elderly than in young female subjects *(17)*

Plasma total homocysteine concentrations in the 385normal Chinese subjects showed that both normal females and males above the age of 50 years old exhibited significant increases of plasma homocysteine compared to subjects below this age *(18).*

This difference may be due to small range of age butit indicate that Hcy level although increase with age but the rate of increase not markedly observed.

Our study reports that mean homocysteine level was 15.4 (SD ±8.9) which agreed with *MacIlroy et al. (19) and Kerkeni et al. (20)* depressed groups but not control groups as Hcy is lower in control groups

In another comparative cross-sectional study of 47 depressed patients of Turkish descent and 28 of Dutch descent the mean of homocysteine was 11.2 μmol/L (SD6.30) in Turkish descent and 10.61 μmol/L(SD ±0.04) in those of Dutch descent *(21).*

These results were greater from other studies this may due to effect of comorbidities as the sample taken from geriatric patient.

In the current study, sex not significantly related to Hcy this disagreed with *Chen et al. (22)* who found that average plasma Hcy was 13.3+/-0.6 micromol/ L for males and 10.6+/-0.7 micromol/L for females. Also homocysteine concentration was significantly greater in males than in females in studies done with *Ardawi et al. (23) and Setnik et al. (24).*

This may be due to that plasma total homocysteine (Hcy) levels are higher in men and postmenopausal women, but it is not known whether this difference is related to sex steroids.

In the current study there was no association between homocysteine and functional impairment, this disagreed with *Kuo et al. (25)* who stated that elevated homocysteine was associated with disability in ADL, IADL. Also high Hcy concentration can be associated with functional impairment *(26)*

Conclusion: further studies to evaluate Hcy level in elderly with different ages are recommended to evaluate the difference between elderly other age groups.

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