PLASMA TOTAL HOMOCYSTEINE LEVELS IN VIOLENT AND NON-VIOLENT PSYCHIATRIC PATIENTS IN A SPIRITUAL HEALING CENTRE IN NIGERIA

ORLUWENE[1] C. G B.Med.Sci, MBBS, FMCPath
Department of Chemical Pathology, University of Port Harcourt Teaching Hospital, Port Harcourt
IDERIAH[2] B.J MBBS, FMCPsych (Part 1)
Department of Psychiatry/mental Health, University of Port Harcourt Teaching Hospital, Port Harcourt

ABSTRACT

Objective

Increased plasma levels of total homocysteine in psychiatric patients have variously being reported in studies. Much as these findings appear interesting, the evidence for this increase still appear limited and mixed. The aim of this study was therefore to evaluate plasma total homocysteine level in freshly recruited psychiatric patients in a spiritual healing centre in Nigeria and to assess the relationship between plasma total homocysteine level and violent psychiatric illness. |Plasma total homocysteine may be associated with violent behavior in psychiatric patients.

All correspondence to:
Dr. Chituru G. Orluwene, Department of Chemical Pathology, University of Port Harcourt Teaching Hospital
P. M. B. 6173 Port Harcourt, Rivers State.
E-mail: Ituru2001@yahoo.com Phone: 08033063385

Subjects and Method

A total of 40 psychiatric subjects and 30 age-matched healthy controls were recruited for this study that lasted for 2 years (April, 2008-May, 2010). The subjects and controls were all from the Madonna Pilgrimage Centre/Spiritual healing home, Elele in Rivers State, Nigeria. Each subject was evaluated with a structured diagnostic interview. Demographic data were collected and blood was analyzed for total homocysteine level using high performance liquid chromatography (HPLC). Confounding factors affecting homocysteine level were controlled by exclusion or by statistical methods.

Results

Plasma homocysteine level was elevated in Nigerian Psychiatric Subjects. Mean plasma total homocysteine in both male (19.27(1.8)µmol/L; control: 10.83(2.5) µmol/L; P<0.001) and female (16.72(3.0)µmol/L; control: 8.51(1.97)µmol/L). Psychiatric subjects were higher than the healthy controls. There was a strong association between plasma homocysteine level and severity of psychiatric illness but not duration of illness.

Conclusion

The plasma total homocysteine levels were elevated in both male and female psychiatric patients and the levels are higher in patients manifesting violent behavior. Plasma total homocysteine levels are not affected by the duration of psychiatric illness.

Keywords: Plasma total homocysteine, violent, psychiatric patients, Nigeria.

INTRODUCTION

Interest in the association between plasma total homocysteine level and neuropsychiatric disease has grown exponentially in the past few decades. Recent studies have demonstrated increase levels of homocysteine in psychiatric patients[1-3]. A 5µmol/L increase in plasma homocysteine level have been associated with a 70% higher risk of schizophrenia[4]. Homocysteine level have also been shown to be higher in patients with a family history of neuropsychiatric disorder.[5] There have been studies demonstrating no role of homocysteine in neuropsychiatric disorder[6,7].

Studies relating the plasma level of total homocysteine with the level of aggression (violent behaviour) demonstrated by psychiatric patients are scanty. It is therefore postulated that an elevated plasma total homocysteine is associated with psychiatric disorder in Nigerian psychiatric patients and the level will correlate with the level of aggression seen in psychiatric patients and also with the duration of the psychiatric illness. The objectives of this study were to compare the plasma total homocysteine levels in violent and non-violent psychiatric

patients and match these with the plasma total homocysteine (tHCy) levels in healthy controls; and also ascertain whether the plasma total homocysteine level has any association with the duration of psychiatric illness.

SUBJECT AND METHODS

40 psychiatric patients who were brought to the Madonna Pilgrimage Centre, Elele between April, 2009 and 30th May, 2010 for spiritual healing were recruited for this study (out of this 40, 18 were very violent while 22 were non-violent). 30 healthy controls were recruited from the pilgrimage centre and consisted of regular pilgrims at the centre. All subjects and controls were aged between 30 and 40 years. None of the subjects had received any form of medical treatment before presentation or on any psychiatric drugs. Informed consent was obtained from the non-violent subjects and from direct relatives of both the violent and non-violent subjects. Institutional consent was obtained from the management of the pilgrimage centre which is affiliated with the Madonna University.

Before randomly selecting the 40 psychiatric subjects for this study, individuals on drugs that affect plasma homocysteine level or on any medical treatment for psychiatric illness or epilepsy were excluded through structured psychiatric and medical interview. Also excluded were individuals on alcohol or substance abuse, smokers and pregnancy.

All subjects and controls had plasma folate level >15μmol/L and plasma Vitamin-B_{12} >155μmol/L. All subjects with folate and vitamin B_{12} deficiency were excluded from the study.

All psychiatric subjects had stayed in the healing centre for at least 2 weeks on normal diet before the study. A 5ml venous blood specimen was collected from each patient and control into a lithium heparin specimen container. The specimen was immediately taken to the Chemical Pathology Laboratory and centrifuged at 3000g. Plasma was separated into properly labelled sample tubes and stored at -70°C. Samples were batch analyzed. Plasma total homocysteine (tHCy) level was assayed using High-performance liquid chromatography. Plasma Vitamin-B_{12} and folate assays were analyzed using high-performance liquid chromatography for the purposes of exclusion.

The body mass index (BMI) of subjects and controls were estimated from the height (meter) and weight (kg) using the formula: weight in kg divided by the square of the height in meter. Subjects were also sorted out according to the duration of illness–subjects with illness less than 1 year and subjects with illness more than 1 year.

STATISTICAL ANALYSIS

Results are presented in percentages and/or as mean (standard deviation). Data were analyzed using students t-tests. Analysis of covariance (ANCOVA) and Pearson correlation were used to determine the differential effects of gender and duration of illness. $P<0.05$ was considered statistically significant. SAS 9.2 for windows was used to analyze the data.

RESULTS

The subjects and controls were similar in gender distribution, age and body mass index (Table I). 18 (45%) of psychiatric subjects presented violently while 22 (55%) were non-violent. The violent group consisted of more males than females while the non-violent group consisted of more females than males (Table II).

Plasma total homocysteine was significantly higher in the psychiatric subjects (18.29(2.3)μmol/L) when compared with the healthy controls (10.6(3.8)μmol/L, $P<0.001$. The mean plasma total homocysteine levels were also significantly higher in the male (19.27(1.8)μmol/L and female (16.72(3.0)μmol/L) psychiatric subjects when compared with the male (10.83(2.5)μmol/L) and female (8.51(1.97)μmol/L) healthy controls, $P<0.001$ (Table III). Table III also show that male psychiatric subjects had significantly higher tHCy levels than female subjects, $P=0.001$. Plasma total homocysteine level was significantly higher in violent subjects (19.96(2.6)μmol/L when compared with non-violent subjects (15.74) (1.2)μmol/L), $P = 0.025$ (Table IV).

Pearson correlation was used to evaluate the relationship between the duration of mental illness and the plasma total homocysteine level (Table V). Table V shows no correlation between the plasma total homocysteine level and the duration of mental illness ($R=0.148, P=0.088$).

DISCUSSION

The study confirmed the hypothesis that plasma total homocysteine is increased in the study population of psychiatric patients. This result agrees well with those of studies done in other populations of the World-Caucasians[8,9], Southern Israel[1], Arabian Gulf[5] and the Korean population[10]. Some studies have actually reported negative findings[11,12], although this study used a relatively smaller sample size. When compared with previous studies[13], this study reported a markedly elevated homocysteine levels in psychiatric patients compared with the healthy controls. This may not be unconnected with the method used and the population of the present study. Variations of homocysteine results between methods and populations are considerable[14] and international reference materials have been available only recently[15]. The present study did not find any significant

correlation between plasma total homocysteine levels and duration of illness. This findings agrees with findings in recent studies[5,16].

Factors affecting plasma homocysteine levels were strictly controlled in this study and so elevated plasma total homocysteine levels in our study were unlikely to be due to the use of antipsychotic agents or other drugs as subjects on drugs known to affect plasma homocysteine levels[17-20] were excluded from the study.

This study showed that violent psychiatric subjects had higher plasma total homocysteine levels than non-violent subjects. This finding, if further explored in subsequent larger sample size studies, could place plasma total homocysteine as a marker for aggressiveness in psychiatric illness. More research will also be needed to determine the exact cause(s) of elevated plasma total homocysteine levels in psychiatric patients and whether genetic factors play a role and also the prospects of using homocysteine-reducing agents as adjuncts in the management of psychiatric illnesses.

CONCLUSION

Plasma total homocysteine level was found to be elevated in psychiatric patients in our study population. The elevation correlates with violent or aggressive behavior demonstrated by psychiatric patients. Plasma total homocysteine levels are higher in male patients than in the female patients. Plasma total homocysteine levels do not correlate with the duration of psychiatric illness.

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Table i:

Subject Characteristics (n=70)

Parameters	**Psychiatric Subjects (n=40)**		**Healthy Controls (n=30)**			
	n	**%**	**n**	**%**	**X^2**	**P**
GENDER						
Male	22	55	15	50	0.028	0.621
Female	18	45	15	50		
	MEANSD		MEANSD	t	P	
AGE (Years)	34 (7.5)		35 (8.2)	1.031	0.35	
BMI (kg/m^2)	25.6 (5.1)		27.1 (4.4)	2.142	0.61	

BMI,=Body Mass Index

Table ii:

Stratification of Subjects

	Psychiatric Subjects		
	Violent	**Non Violent**	**Controls**
Parameters	**Subjects**	**Subjects**	
Number 30 (100%)	18 (45%)	22 (55%)	
Male 15 (50%)	12 (67%)	10 (45%)	
Female 15 (50%)	6 (33%)	12 (55%)	

Table iii

Plasma Total Homocysteine levels between Psychiatric Subjects and Controls

Parameters	**Psychiatric Subjects**	**Controls**	**T**	**P**
Number (All)	40	30		
Mean (tHCy) in All, µmol/L	18.29(2.3)	10.62(3.8)	-	4.170<0.001
Number (male)	22	15		
Mean (tHCy) in male, µmol/L	19.27(1.8)	10.83(2.5)	-	4.321<0.001
Number (female)	18	15		
Mean (tHCy)	16.72 (3.0)	8.51 (1.97)	-	3.999<0.001

(tHCy), = Plasma total homocysteine level

(tHCy), = Plasma total homocysteine level

Table iv:

Plasma Total Homocysteine levels between Violent and Non-Violent Subjects

Parameters	Violent Subjects	Non-violent Subjects	T	P
Number	18	22		
tHCy	19.96 (2.6)	15.74(1.2)	2.250	0.025

Table v:

Relationship between Plasma Total Homocysteine level and duration of Mental Illness

(Pearson Correlation)

Parameters	<1yr of illness	>1yr of illness	R	P
Number (n)	24	16		
tHCy	17.56(3.4)	18.98 (1.2)	0.148	0.088

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