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Research Article

Hyperhomocysteinemia and Peripartum Cardiomyopathy in Bamako, Mali

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Abstract

Definitions: Homocysteine is an amino acid produced by the demethylation of methionine. A pathological increase in its plasma value is a cardiovascular risk factor. Peripartum cardiomyopathy, rare in Europe, is common in Sudano-Sahelian Africa, particularly in Mali.

Aims: To determine the plasma homocysteine values in a population of African women hospitalized for heart failure related to peripartum cardiomyopathy, and to compare these values with those of a control population.

Patients and Methods: Plasma homocysteine was measured using an immunological method in 53 patients hospitalized in the cardiology department of Bamako (Mali) for peripartum cardiomyopathy. Thirty-four African women, apparently healthy and of comparable ages, constituted the control group. The mean plasma homocysteine values of the two groups were statistically compared.

Results: The mean value (± 1 standard deviation) of plasma homocysteine in the 54 patients with peripartum cardiomyopathy was = 13.8 µmol/L (± 4.9). For the Control group, the mean value was = 8.3 µmol/L (± 3.0). The difference in values between the 2 groups was statistically significant ($p < 0.05$).

Conclusion: Hyperhomocysteinemia is present in African women hospitalized for peripartum cardiomyopathy. However, these patients were in heart failure at the time of their hospitalization, a pathological condition that could explain plasma hyperhomocysteinemia. A study, after therapeutic correction of heart failure, would be useful.

Kew Words: homocysteine; peripartum cardiomyopathy

Introduction

Peripartum heart failure is consistently the clinical manifestation of peripartum dilated cardiomyopathy (PPCM) [1]. Exceptional in Europe [2, 3], it is frequently diagnosed in sub-Saharan Africa, particularly in the Sudano-Sahelian region [4]. It primarily affects women of modest social status living in rural areas [4]. Hemodynamic and echocardiographic data are those of dilated cardiomyopathy [1]. Its cause, in cardiology textbooks, is considered "unknown" [5]. The results of research over the past 30 years support the hypothesis of a multifactorial disease combining physical overwork, psychological stress [6], specific traditional practices [6], infection [7] and nutritional deficiency [8]. Selenium deficiency has been demonstrated in patients with PPCM in Niamey [9]. In this study, we explore a new hypothesis: homocysteine. This amino acid, derived from the demethylation of methionine, is, when its plasma concentration is abnormally high, an important cardiovascular risk factor, particularly for strokes, coronary accidents, thromboses and certain complications related to pregnancy (eclampsia). It is independent of other risk factors [10].

Patients and Methods:

The clinical portion of the study took place in Bamako (Republic of Mali) in the cardiology departments of Point G Hospital (Professor Touré Koreissi, Dr. Dembélé Mamadou) and Gabriel Touré Hospital (Professor Diarra Bocari Mamadou, Dr. Sanogo Kassoum) from 1996 to 1998. Study inclusion criteria were: left-sided or congestive heart failure occurring in the last month of pregnancy or within 5 months postpartum, with ventricular dilation and hypokinetic syndrome (collapsed left ventricular

ejection fraction). Exclusion criteria were: the presence of heart disease prior to pregnancy, unless the same syndrome was present, increased left ventricular wall thickness observed on echocardiography, and blood sampling taken some time after inclusion. Hypertension at the time of diagnosis was not an exclusion criterion as the left ventricular wall thickness was normal on echocardiography. A venous blood sample on lithium heparin was immediately centrifuged and the resulting plasma was stored by freezing at -80°C in cryotubes. Plasma samples were processed in France, after transporting the tubes in liquid nitrogen (-196°C). Plasma homocysteine assays were performed in the Biochemistry and Molecular Biology Laboratory of Brest University Hospital (Dr. Abalain Jean-Hervé). Plasma homocysteine concentrations were determined by an immunoassay using a fluorescence polarization analyzer (IMX Systems, Abbott Laboratories, Abbott Park, IL, USA). To compare the results, a control group was formed by recruiting African women living in the Bamako area, in good health, of comparable age, and present on site as companions. Venous blood samples were collected following the same procedure as for patients with PPCM.

Results

The "PPCM" group comprised 53 patients, and the "Control" group comprised 34.

The mean plasma homocysteine level in the "PPCM" group was 13.8 µmol/L (± 4.9). The highest value was 28.8 µmol/L, and the lowest was 6.4 µmol/L. In the "Control" group, the mean value was 8.3 µmol/L (± 3.0). The highest value was 16.9 µmol/L, and the lowest value was 3.6 µmol/L.

The following table compares the number of patients and the number of controls with plasma homocysteine levels above or below 12 µmol/L and 17 µmol/L, values considered abnormally high [10].

	PPCM		Controls
>12 µmol/L	28/53 (52.8%)	2/34 (5.9%)	$p < 0.05$
>17 µmol/L	11/53 (26.2%)	0/34 (0%)	$p < 0.01$
Total	53	34	

Discussion

The total plasma homocysteine concentration in healthy (fasting) individuals is low and ranges between 5.0 and 12 µmol/L by immunoassay [10]. In our study, only 2 out of 34 controls had a serum homocysteine level slightly above 12 µmol/l, but none at 17 µmol/l or above, data consistent with normal figures in the literature [10]. On the other hand, in the PPCM group, more than one in two patients (52.8%) was above 12 µmol/l and just over one in four (26.2%) was above 17 µmol/l, the latter value being clearly pathological. We have not found any publications in the literature devoted to plasma homocysteine in peripartum cardiomyopathy. On the other hand, several references correspond to research on homocysteine and heart failure [11-14]. Patients with chronic heart failure have elevated plasma homocysteine levels, regardless of the cause of the heart failure. The reported hyperhomocysteinemia values are comparable to those in our study. It is therefore not possible to know whether the elevated plasma homocysteine levels in our patients are related to cardiomyopathy, even though they are in heart failure at the time of blood sampling. To determine this, homocysteine levels would need to be measured after the signs of heart failure have regressed under the effect of treatment. This is an important question because we know that elevated homocysteine levels can be related to a diet low in B vitamins (particularly folic acid and vitamin B12) [14]. In a study conducted in Sikasso [8], the study of 75 patients hospitalized for heart failure linked to PPCM highlighted a deprived standard of living with nutritional insufficiency. The question is therefore whether vitamin B supplementation during pregnancy would not have a preventive effect on the occurrence of PPCM? This type of study, called intervention, is justified in regions where female populations are particularly exposed to this cardiac pathology.

Conclusion

Hyperhomocysteinemia is present in African women hospitalized for peripartum cardiomyopathy in Bamako. However, these patients were in heart failure at the time of their hospitalization, a pathological condition that could explain plasma hyperhomocysteinemia. A study, after therapeutic correction of heart failure, would be useful.

Conflict of interest:

There is no conflict of interest.

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