

### Glycosylated haemoglobin in children with protein-energy malnutrition

Dear Editors,

In the field of diabetes, the non-enzymatic glycosylation of proteins offers the possibility of reflecting the time-integrated glucose concentration. Determination of the glycosylated haemoglobin (HbA1c), widely used for diabetic control, is considered as an accurate index of the mean blood glucose concentration during the preceding 2 months. Although mostly concerned with hyperglycaemia, it has been shown that HbA1c can also reflect hypoglycaemia as in patients suffering from insulinoma (Freedman, Dandona & Hobbs, 1980).

We wanted to investigate whether HbA1c is lower in children with protein-energy malnutrition (PEM). The leading hypothesis is that children suffering from PEM have a higher probability of past low glycaemia. Several studies have shown hypoglycaemia in severe PEM (Kerr *et al.*, 1973) and low glycaemia has been observed during fasting in moderate PEM (Kerpel-Fronius & Kaiser, 1967). If such a relationship is observed, non-enzymatic glycosylation of proteins of different turnover times could be an interesting investigation tool for PEM and a reference criterion for validation of nutritional indicators used in public health, such as anthropometric indicators.

The study has been performed on children aged 12-36 months in Brazzaville, Congo, in 1987. Twenty-nine cases were hospitalized in the paediatric ward of the general hospital of Brazzaville or in a nutritional rehabilitation center. They were defined by having weight for height lower than -2 standard deviations (SD) of the mean of the NCHS reference population. The 60 healthy controls (weight for height greater than -2 SD) were attending the well-baby clinics for routine growth monitoring. The two groups were matched for age.

The HbA1c analyses were performed on whole blood by an ion exchange chromatography method on microcolumns (Biorad).

Statistical analysis was done with analysis of variance test.

The mean weight for height was -2.7 SD in the malnourished group and -0.43 in the control group. Good age matching has been obtained as mean age is 18.1 months (s.e.m. 0.8 months) in both groups.

Glycosylated haemoglobin was significantly lower in the malnourished group (4.6 per cent, s.e.m. 0.2 per cent) than in the control group (5.3 per cent, s.e.m. 0.2 per cent). The difference observed is statistically significant, with a P value of 0.017 (Figure).

As a conclusion to this preliminary work, if the initial hypothesis seems valid, further investigations should consider the two following points.

Firstly, a more precise determination of HbA1c, such as with HPLC methods, could perhaps improve the discrimination between malnourished and healthy children.

Secondly, the case control design of this study and the age adjustment between groups protect against possible confounding factors. But the influence of haemoglobinopathies and haemolysis on HbA1c levels lead to a noisy relation with PEM, especially in tropical areas. This should be

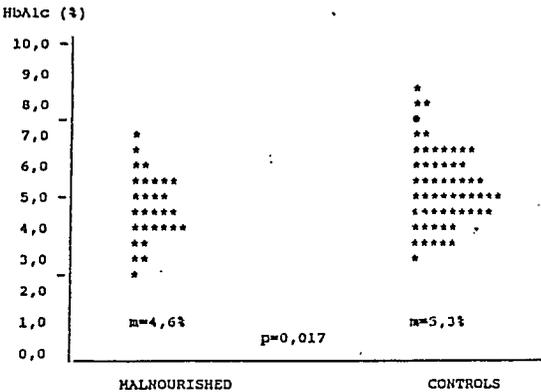


Fig. 1. Glycosylated haemoglobin levels (HbA1c) in children suffering from protein energy malnutrition and in controls. Malnourished: weight for height lower than -2 SD. Controls: weight for height greater than -2 SD.

ORSTOM Fonds Documentaire  
N° : 30.641 2x1  
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18 SEP. 1990

improved by controlling for those factors. Furthermore, additional insight could be given by studying other glycosylated proteins, such as collagen.

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