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Biomarkers status and their relation with the presence of type 2 diabetes with and without angiopathy

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Introduction

The knowledge on the status of several biomarkers [1] is a useful tool for disease diagnosis and treatment of type 2 diabetes. The additive clinical effect of the presence of different biomarkers can be used to evaluate the risk to develop angiopathy and also in disease management.

Aim

The aim of this study was to evaluate the levels of cardiovascular oxidative stress and nutritional biomarkers and their relationship with the presence of type 2 diabetes and angiopathy.

Methods

A population-based case-control study in 150 Portuguese type 2 diabetic patients was performed. Group I - 75 diabetics with angiopathy, group II - 75 diabetics without angiopathy and group III - non-diabetic controls. Plasma levels of homocysteine, malondialdehyde (MAD), vitamins B₆, C, A and E and carotenoids were measured by HPLC methods. Vitamin B₆ and folate serum levels were achieved by an electrochemiluminescence method.

Results

The baseline characteristics of diabetic patients studied are presented in Table 1. The results of biomarkers plasma or serum levels evaluation are presented in Table 2. The hyperhomocysteinemia prevalence was 20% (group I), 8.7% (group II) and 7.1% (group III). Group I showed the higher prevalence of hyperhomocysteinemia (17%). The MAD serum levels were above the reference value for all groups. The percentage of subjects with ascorbic acid low plasma levels were statistically different in diabetic (I: 55%; II: 47%) compared to non-diabetic subjects (III: 22%). The prevalence of hypovitaminosis B₆ deficiency was at least 30% for all groups. Type 2 diabetes predisposes to hypovitaminosis C (OR: 3.10; p = 0.0002) (Table 3). In group I, the probability to have hyperhomocysteinemia was around 3 times higher (p = 0.04) in comparison with group II and 35 times (p = 0.0006) with group III (Table 4). The combined effect of type 2 diabetes and type 2 diabetes angiopathy is associated with high MAD (OR: 5.33; p = 0.002) (Table 3). The effect of the angiopathy presence was only significant for homocysteine biomarker (Table 5).

Conclusion

The prevalence of hypovitaminosis B₆ was relevant in all studied groups. Low levels of vitamin C were more frequent in type 2 diabetics with angiopathy than without or non-diabetic subjects. The presence of type 2 diabetes increases the risk of hyperhomocysteinemia, oxidative stress and hypovitaminosis C. The isolated effect of type 2 diabetes increases the probability to have hyperhomocysteinemia.

Table 1 — Baseline characteristics of the study population

Table 2 — Evaluation of plasma or serum levels of biomarkers

Table 3 — Effect of type 2 diabetes presence on the variation of biomarkers

Table 4 — Effect of hyperhomocysteinemia on the variation of biomarkers

Table 5 — Combined effect of type 2 diabetes and angiopathy presence on the variation of biomarkers

REFERENCES