Original article

Potential influence of Type A personality on plasma C-reactive protein levels in people with diabetes

J.-C. Chauvet-Gélinier [a,b], B. Trojak [a,b], C. Lemogne [f,g,h], L.-S. Aho-Glélé [e], M.-C. Brindisi [c,d], B. Bouillet [c,d], E. Ponavoy [a,b], V. Meille [a,b], I. Simoneau [c,d], K. Chahraoui [b], G. Vaillant [c,d], J.-M. Petit [c,d], S.M. Consoli [f,g], B. Bonin [a,b,1], B. Vergès [c,d,*,1]

[a] *Psychiatry unit, department of neurosciences, Marion building, university hospital CHU Le Bocage, 14, rue Gaffarel, 21000 Dijon, France*
[b] *Laboratory of psychopathology and medical psychology (IFR 100), university of Burgundy, 21000 Dijon, France*
[c] *Department of endocrinology and metabolic diseases, university hospital CHU Le Bocage, 14, rue Gaffarel, 21000 Dijon, France*
[d] *Department of endocrinology and metabolic diseases, Inserm Research Center 866, CHU Le Bocage, 2, boulevard Maréchal-de-Lattre-de-Tassigny, 21000 Dijon, France*
[e] *Department of hospital hygiene and epidemiology, university hospital CHU Le Bocage, 14, rue Gaffarel, 21000 Dijon, France*
[f] *Faculté de médecine, université Paris-Descartes, Sorbonne Paris-Cité, 75015 Paris, France*
[g] *Service de psychiatrie de l'adulte et du sujet âgé, hôpitaux universitaires Paris-Ouest, AP–HP, 20, rue Leblanc, 75015 Paris, France*
[h] *Inserm, U894 centre for psychiatry and neuroscience, 75014 Paris, France*

Abstract

Aim. – Type A personality, although classically known as a factor linked to increased vascular risk, has recently been associated with increased survival in patients with diabetes. As low-grade inflammation predicts a poor outcome, the present study explored the potential associations between Type A and plasma levels of C-reactive protein (CRP) in diabetes.

Methods. – Type A personality was assessed by the Bortner questionnaire in people with diabetes. The association between Type A and plasma CRP levels was examined by multivariable linear regression, and structural equation modelling (SEM) was performed to determine the impact of the major clinical, biological and psychological confounders.

Results. – The study included 626 participants with type 1 and type 2 diabetes from the Diabetes and Psychological Profile study. Multivariable analyses showed an independent inverse association between Type A score and CRP levels. The structural model adjusted for age, gender, diabetes type and duration, body mass index (BMI), smoking status, alcohol abuse, oral antidiabetic and statin treatments, HbA_{1c} levels, lipids, perceived stress, anxiety and depression revealed significant associations between CRP and Type A ($\beta = -0.135$, 95% CI: -0.242, -0.028; $P = 0.014$), BMI ($\beta = 0.194$, 95% CI: 0.038, 0.350; $P = 0.015$) and HDL cholesterol ($\beta = -0.132$, 95% CI: -0.245, -0.020; $P = 0.014$).

Conclusion. – Our present study data indicate that Type A personality is independently associated with lower CRP levels. This lower level of inflammation might explain the better clinical outcomes associated with Type A personality in patients with diabetes.

1. Introduction

A Type A personality is defined by a combination of several traits encompassing a sense of time urgency, high job involvement, strong drive, a need for achievement, ambition and competitiveness. Although earlier reports have mentioned that Type A is associated with a greater risk of developing coronary

* Corresponding author. Department of endocrinology and metabolic diseases, Inserm Research Center 866, CHU Le Bocage, 2, boulevard Maréchal-de-Lattre-de-Tassigny, 21000 Dijon, France.
E-mail address: bruno.verges@chu-dijon.fr (B. Vergès).
[1] Both authors are equally responsible for the research.

heart disease, subsequent studies have dismissed the link and focused attention on hostility as the 'toxic' component [1–3]. Indeed, cardiovascular and all-cause mortality rates are found to be more robustly linked to cognitive hostility (harbouring hostile thoughts as opposed to hostile behaviours) than with Type A personality [3]. In the context of chronic diseases, Type A personality was even associated with increased survival in people with coronary heart disease [1]. Also, Type A was recently associated with lower cardiovascular and all-cause mortality in type 1 diabetes [4]. It is worth mentioning that the association between Type A personality and lower mortality in patients with diabetes [4] was found with the Bortner Type A rating scale, which captures time urgency, job involvement and competitiveness dimensions, but not hostility. However, the psychobiological processes underlying the improved prognosis in Type A people with chronic disease remain unknown. Among the putative biological mechanisms, chronic low-grade inflammation may play a critical role in mediating the association between Type A and clinical outcomes among those with diabetes [5]. In fact, emerging evidence stresses the relationship between personality traits and inflammatory pathways [6,7], leading to a focus on the potential links between Type A personality and low-grade inflammation in diabetes. Moreover, inflammation is found to predict poor outcomes in people with diabetes [8,9], and has been associated with several psychological factors, including personality traits [6,7].

The present study involved a population of 626 people with type 1 or type 2 diabetes from the Diabetes and Psychological Profile (DPP) study (NCT01961466), and aimed to assess Type A personality in this population, and identify a potential link between Type A and plasma levels of C-reactive protein (CRP), a marker of inflammation, while controlling for potential confounding factors such as perceived stress, anxiety and depression. As Type A is linked with specific personality dimensions such as conscientiousness [6,7], optimism [10] and positive engagement coping [11], which are associated with both lower levels of inflammation and better clinical outcomes in diabetes [4], the present study postulated that lower plasma CRP levels would be associated with Type A personality among patients with diabetes.

2. Methods

2.1. Participants

The study population consisted of people with type 1 or type 2 diabetes from the DPP study who had been seen as outpatients or been hospitalized in the Endocrinology and Metabolic Diseases Department of Dijon University Hospital between 2010 and 2013. For the present research, adults (minimum age 18; no upper age limit) with diabetes were invited to participate in the observational study.

2.2. Ethics

The study was conducted after approval had been obtained from the local ethics committee. Prior to the interviews and assessments, the interviewer described the aim of the study to each participant and obtained their full verbal consent. In addition, written information was given to the participants in accordance with the recommendations of the local ethics committee, which approved the oral consent on the basis that the research would not cause serious harm to the study participants (NCT01961466).

2.3. Clinical and biological measurements

Participants with either type 1 or type 2 diabetes underwent standardized clinical examinations. Data concerning their diabetes type and duration, gender, age, history of depression, alcohol abuse, smoking status, drug treatments and presence of diabetes complications were recorded by direct interview and by review of their medical records.

For each participant, blood was drawn at 8 am in a fasting state to assess HbA_{1c}, lipid and CRP levels. All biological parameters were determined at the Dijon University Hospital laboratory. HbA_{1c} was measured by ion exchange high-performance liquid chromatography (HPLC; Bio-Rad Laboratories, Hercules, CA, USA; normal range: 4.0–6.0%); the coefficient of variation (CV) was 0.46% within runs and 0.53% between runs. Triglycerides, total cholesterol, low-density lipoprotein (LDL) cholesterol and high-density lipoprotein (HDL) cholesterol concentrations were measured on a Dimension analyzer with dedicated reagents (Dade Behring, Newark, DE, USA).

Plasma CRP was measured by immunonephelometry using monoclonal antibodies in a Dimension Vista^{TM} system (Siemens Healthcare Diagnostics, Marburg, Germany). The limit of detection is 2.9 mg/L, and the CV is < 6% for this assay, which measures normal CRP (not high-sensitivity CRP). To assess only low-grade inflammation, people with CRP values > 20 mg/L were excluded. This cut-off value was chosen based on its high sensitivity and specificity to detect any current bacterial infection in individuals with chronic medical conditions such as diabetes [12,13]. In addition, people for whom a current infection was clinically suspected were also excluded from the present study.

2.4. Psychological measurements

Three self-administered questionnaires were filled out by participants to measure Type A personality as well as any potential psychological confounders such as perceived stress, anxiety and depression.

2.4.1. Type A personality scores

To measure Type A, the Bortner Rating Scale was used [14]. This scale is recognized for its ability to assess time urgency and impatience, competitiveness and job involvement, but without measuring hostility [15]. In the present study, Type A personality was assessed by the French version of the Bortner Scale, which has been validated for the French population. This psychometric tool comprises 14 items, each composed of two opposing statements related to Type A (for example, "never late"—"always late"), with 24 subdivisions between the two statements (scale ranging from 1 to 24). In the present sample, Cronbach's alpha