Nutrition 32 (2016) 921–927

Contents lists available at ScienceDirect

Nutrition

journal homepage: www.nutritionjrnl.com

Applied nutritional investigation

Adipokines, inflammatory mediators, and insulin-resistance parameters may not be good markers of metabolic syndrome after liver transplant

Lucilene Rezende Anastácio Ph.D. [a], Marina Chaves de Oliveira M.Sc. [b], Kiara Gonçalves Diniz M.Sc. [a], Adaliene Matos Versiane Ferreira Ph.D. [b], Agnaldo Soares Lima Ph.D. [c], Maria Isabel Toulson Davisson Correia Ph.D. [c,d], Eduardo Garcia Vilela Ph.D. [c,e,*]

[a] Nutrition Department, Universidade Federal do Triângulo Mineiro, Minas Gerais, Brazil
[b] Nutrition Department, Nurse School, Universidade Federal de Minas Gerais, Minas Gerais, Brazil
[c] Alpha Institute of Gastroenterology, Hospital of Clinics, Medical School, Universidade Federal de Minas Gerais, Minas Gerais, Brazil
[d] Surgery Post Graduation Program, Medical School, Universidade Federal de Minas Gerais, Minas Gerais, Brazil
[e] Internal Medicine Department, Faculty of Medicine, Universidade Federal de Minas Gerais, Minas Gerais, Brazil

ARTICLE INFO

Article history:
Received 27 July 2015
Accepted 27 December 2015

Keywords:
Liver transplantation
Metabolic syndrome
Obesity
Adipokines
Insulin resistance

ABSTRACT

Objective: The role of adipokines in liver transplantation (LTx) recipients who have metabolic syndrome (MetS) has seldom been assessed. The aim of this study was to investigate the concentrations of adipokines, inflammatory mediators, and insulin-resistance markers in liver recipients with MetS and its components.

Methods: Serum samples from 34 patients (55.9% male; 54.9 ± 13.9 y; 7.7 ± 2.9 y after LTx; 50% presented with MetS) were assessed for adiponectin, resistin, tumor necrosis factor (TNF)-α, monocyte chemoattractant protein (MCP)-1, interleukin (IL)-6, C-reactive protein (CRP), homeostatic model assessment-insulin resistance (HOMA-IR) and free fatty acid (FFA) levels. The dosages were uni- and multivariate analyzed to cover MetS (using the Harmonizing MetS criteria), its components, and dietary intake.

Results: A higher concentration of adiponectin ($P < 0.05$) was observed among patients with MetS (5.2 ± 3.2 μg/mL) compared with those without MetS (3.2 ± 1.2 μg/mL), as well as those with MetS components versus those without them: abdominal obesity (4.6 ± 2.6 μg/mL versus 2.6 ± 0.6 μg/mL), high triacylglycerols (TGs; 5.6 ± 3.1 μg/mL versus 3 ± 0.9 μg/mL) and low high-density lipoprotein (HDL; 6.1 ± 2.7 μg/mL versus 3.3 ± 1.9 μg/mL). Increased TNF-α and HOMA-IR values were seen in patients with abdominal obesity. Patients with high TGs also had greater FFA values. Independent predictors for adiponectin were waist-to-hip ratio, low HDL and high TGs. High TGs and fasting blood glucose were independent predictors for HOMA-IR. Independent predictors could not be identified for CRP, TNF-α, MCP-1, IL-6, or FFA.

Conclusions: MetS and its components are related to an increased HOMA-IR concentration and FFA. Adiponectin, resistin, and inflammatory markers, such as TNF-α, IL-6, MCP-1, and CRP, were not associated with MetS in this sample of post-LTx patients.

© 2016 Elsevier Inc. All rights reserved.

LRA, ADMF, ASL, MITDC, and EGV participated in design of the research. LRA, MITDC, and EGV participated in writing the paper. LRA, KGDD, and MCO participated in performance of the research. ADMF and ASL contributed to the analytical tools. LRA, ADMF, MITDC, and EGV participated in data analysis. The authors have no conflicts of interest to declare. The authors acknowledge Pró-Reitoria de Pesquisa da Universidade Federal de Minas Gerais for their support in language reviewing and Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq); Comissão de Aperfeiçoamento em Nível Superior (CAPES) and Fundação de Amparo à Pesquisa de Minas Gerais (FAPEMIG) for the grants and financial support.

* Corresponding author. Tel.: +55 31 9106 8785; fax: + 31 3409 9641.
E-mail address: Evilela@medicina.ufmg.br (E. G. Vilela).

http://dx.doi.org/10.1016/j.nut.2015.12.038
0899-9007/© 2016 Elsevier Inc. All rights reserved.

Introduction

Obesity and metabolic syndrome (MetS) are highly prevalent after liver transplantation (LTx) [1–3] and have been considered risk factors for developing cardiovascular disease (CVD) [4], cancer [5], steatosis [6], nonalcoholic steatohepatitis (NASH) [7], and graft fibrosis [8], producing a negative affect on long-term patient survival [9].

The adipose tissue is the largest endocrine organ. A range of bioactive polypeptides and proteins are secreted by adipocytes and have been collectively named adipokines [10]. These adipokines play a role locally, peripherally, and centrally in many physiological processes, including energy balance and food intake, insulin action, lipid metabolism, angiogenesis, homeostasis, and regulation of blood pressure [11,12]. Among the various secreted adipokines, adiponectin stands out as an abundant adipokine from the adipose tissue, acting as an anti-inflammatory and antiobesity hormone. This molecule improves insulin sensitivity and has antiatherogenic properties [13,14]. Whereas adiponectin acts to improve metabolism, other molecules, including resistin, tumor necrosis factor (TNF)-α, monocyte chemoattractant protein (MCP)-1, interleukin (IL)-6, C-reactive protein (CRP), and free fatty acids (FFA) have been associated with inflammation and insulin resistance (IR) [15,16].

Many studies assessing the general population have demonstrated that adiponectin concentrations are low [17,18] and that resistin [19], TNF-α and IL-6 [20], MCP-1 [21], CRP [20,22], and FFA [23] levels are high in patients with MetS or its components, such as obesity or diabetes. These markers have been studied in patients undergoing solid organ transplantation [24,25], especially in kidney recipients [26–29]. However, to date, few papers of this type can be found concerning hepatic transplant patients [30,31]. The aim of the present study was to investigate whether the concentrations of adipokines, inflammatory mediators, and IR are good markers of MetS and its components in patients who underwent LTx.

Materials and methods

This cross-sectional study assessed serum samples from patients who had undergone LTx for adiponectin, resistin, TNF-α, MCP-1, IL-6, CRP, FFA, insulin, and fasting blood glucose (the latter to calculate the homeostatic model assessment-insulin resistance [HOMA-IR]). The prevalence of MetS and its components were investigated to better predict the concentrations of adipokines, inflammatory mediators, and IR. The present study included a convenience sample, and those with (n = 17) and without MetS (n = 17) were evaluated in the same quantity. The MetS prevalence observed in this set of patients is in agreement with other studies positing an effect of 44.5% to 63.5% on liver graft recipients [32,33].

This study was carried out between 2012 and 2013. Any outpatients followed at Instituto Alfa de Gastroenterologia, Hospital das Clínicas, Universidade Federal de Minas Gerais, Brazil were invited to participate. We obtained written consent from all participants and the study was approved by the Ethics Committee (protocol 44/08). We excluded individuals who presented with noncompensated liver disease; those who had been diagnosed with cancer or renal disease at stage 3, 4, or 5; those who refused to participate; and those who were pregnant during the study period.

The MetS diagnosis was based on the Harmonizing the Metabolic Syndrome criteria [34]. Patients presented with MetS if they had at least three of the following disorders: abdominal obesity (waist circumference ≥80 cm for women and ≥90 cm for men, in South America), high fasting glucose (≥100 mg/dL and/or using oral hypoglycemic agents), high blood pressure (systolic blood pressure ≥130 mm Hg and/or diastolic blood pressure ≥85 mmHg, and/or using of antihypertensive medications), hypertriacylglycerolmia (triacylglycerols [TGs] ≥150 mg/dL) and low high-density lipoprotein (HDL; <50 mg/dL for women and <40 mg/dL for men).

Data collection consisted of age and sex, time since transplant, indications for transplant, and use of tacrolimus or cyclosporine. Fasting glucose, TGs and serum HDL were obtained from the routine tests performed in the outpatient clinic. Each patient's blood pressure was assessed on the interview day. Anthropometric data also was assessed and consisted of waist circumference, hip circumference, waist-to-hip ratio (WHR), weight, height, body mass index (BMI) and its classification in overweight: BMI ≥25 kg/m^2 and obesity: BMI ≥30 kg/m^2 [35]. Body composition data, as lean mass, fat mass, total body water, and phase angle were obtained using bioelectrical impedance (RJL Systems Quantum, Clinton Township, MI, USA). Patients also completed a nonconsecutive 3-d food diary (including one weekend day) and, the assessment of food intake encompassed calories; carbohydrates; protein; total fat; saturated fatty acids (SFA); monounsaturated fatty acids (MUFA); polyunsaturated fatty acids (PUFA); cholesterol; total fiber; vitamins A, C, D, and E; thiamin; riboflavin, niacin, vitamins B_6 and B_{12}; folic acid; calcium; iron; magnesium; potassium; sodium; zinc; and phosphorus. These data were assessed using Excel software (Microsoft Corp., Redmond, WA, USA) and a food composition table [36].

Blood samples were collected to analyze the adipokines, inflammatory mediators, and IR markers during the morning after an overnight fasting. The blood was centrifuged to obtain the serum, which was then stored in a freezer at −80°C. Adiponectin (EZHADP-61 K-96 Well Millipore Corp., Bedford, MA, USA), resistin (EZHR-95 K–Linco Research, St. Charles, MI, USA), TNF-α (Millipore Corp., Bedford, MA, USA), MCP-1 (555179-20/PLT–BD PharMingen or Endogen, Woburn, MA, USA), and IL-6 (555179-20/PLT–BD PharMingen or Endogen, Woburn, MA, USA), and FFA (WAKO; Pure Chemical Industries, Japan) were assessed by enzyme-linked immunosorbent assay (ELISA) kits according to the manufacturers' instructions. To determine the value of the CRP, the Vitros (Ortho-Clinical Diagnostics, Inc., Johnson & Johnson, New York, USA), with a sensitivity of 5 mg/L and a linearity between 5 and 90 mg/L, was used. The results were divided into a low (CRP <5 mg/dL) and a high (CRP >5 mg/dL) group. HOMA-IR was calculated by the following formula: HOMA-IR = fasting insulin (μU/mL) × fasting glucose (mg/dL)/405. IR was classified using the HOMA-IR cutoff of 2.7 [37]; for this analysis, we excluded patients with diabetes who were using insulin.

Statistical Package for Social Sciences (SPSS) version 17.0 (SPSS Inc., Chicago, IL, USA) was used for statistical analyses. Categorical data are presented as percentages and numerical, according to their normality (Kolmogorov–Smirnov test) are presented as the averages and SDs or medians, minimums, and maximums. Patients were compared according to their serum dosages using the Student's t test or the Mann–Whitney test and the Pearson or Spearman correlation after outliers had been excluded. The χ^2 test or Fisher's exact test were used as appropriate in the univariate analysis to assess the associated factors for IR by HOMA-IR and CRP classifications. Variables that had $P < 0.1$ in the univariate analysis were included in the multiple linear regression analysis, which was undertaken in a stepwise, backward method. $P < 0.05$ was considered statistically significant.

Results

Plasma serum samples from 34 patients were assessed (55.9% male; average age 54.9 ± 13.9 y). These patients were enrolled an average of 7.7 ± 2.9 y after their LTx had been performed (range 3–15 y). Most patients were using tacrolimus as immunosuppressant (85.3%; n = 29); the others, cyclosporine (14.7%; n = 5). Eight LTx recipients (23.5%) also were using prednisone. The leading cause for liver transplantation was hepatitis C virus cirrhosis (41.1%; n = 14), followed by alcoholic cirrhosis (17.7%; n = 6); cryptogenic cirrhosis (14.7%; n = 5); autoimmune cirrhosis (11.8%; n = 4); hepatocarcinoma with cirrhosis (11.8%; n = 4); and others (23.5%; n = 8). The patients demonstrated an average 2.6 ± 1.6 of the components of MetS, with a majority having abdominal obesity (76.5%; n = 26), hyperglycemia (52.9%; n = 18), and high blood pressure (55.9%; n = 19).

In these LTx patients, the adiponectin level was 4.1 ± 2.5 μg/mL, and the resistin, 5.3 ± 2.1 ng/mL. The TNF-α value was 41.6 ± 30.8 pg/mL, and the MCP-1 level, 292.6 ± 231.6 pg/mL. The median IL-6 value was 25.5 pg/mL, with a range from 2 to 81.1 pg/mL. HOMA-IR was 2.4 ± 1.7. The concentrations of FFA were 0.6 ± 0.3 mEq/L.

Adiponectin (3.2 ± 1.2 μg/mL versus 5.2 ± 3.2 μg/mL; $P < 0.05$) and HOMA-IR (1.6 ± 0.8 versus 3.4 ± 2) were statistically affected by the presence of MetS (Table 1). MetS components were associated with adiponectin, TNF-α, HOMA-IR, and FFA. An increased concentration of adiponectin was observed among liver recipients with abdominal obesity (2.6 ± 0.6 μg/mL versus 4.6 ± 2.6 μg/mL; $P < 0.01$), high TGs (5.6 ± 3.1 μg/mL versus 3 ± 0.9 μg/mL; $P < 0.05$) and low HDL levels (3.3 ± 1.9 μg/

Download English Version:

https://daneshyari.com/en/article/3276092

Download Persian Version:

https://daneshyari.com/article/3276092

Daneshyari.com