Serum Adipocyte-Fatty Acid Binding Protein Discriminates Patients With Permanent and Temporary Body Weight Loss

D. Stejskal,^{1*} M. Karpisek,² and J. Bronsky³

¹Department of Internal and Laboratory Medicine, Sternberk Hospital, Sternberk, Czech Republic

²Department of Human Pharmacology and Toxicology, University of Veterinary and Pharmaceutical Sciences, Brno, Czech Republic

³Department of Clinical Biochemistry and Pathobiochemistry, 2nd Medical Faculty, Charles University, Prague, Czech Republic

Adipocyte-fatty acid binding protein (A-FABP) is a biomarker of adiposity and metabolic syndrome. The aim of our work was to investigate the effect of weight reduction on serum A-FABP value. In the study, we analyzed a group of 189 probands suffering from obesity (102 women and 87 men; aged 57.3 ± 12 years) initially, after a 3-month low-fat diet and once again 3 months after the termination of the diet for serum A-FABP, insulin, glucose, total cholesterol, HDL-cholesterol, LDL-cholesterol, and triglycerides. Basal biomarker concentrations were typical of the metabolic syndrome, and moreover A-FABP correlated with Quicki and BMI. We observed a reduction in BMI in 145 subjects who were divided into two subgroups: A—with persistent BMI reduction even after 6 months, B—with BMI reduction after 3 months and

its regress after 6 months. Individuals with rise or no BMI difference were signed as subgroup C. In subgroup A, A-FABP level increased and returned to the earlier level (42.3 vs 68.3 vs $37.1 \mu\text{g/l}$) and correlated with the markers of the metabolic syndrome. In subgroup B, A-FABP level increased less significantly, however elevated A-FABP level persisted for 6 months (41.9 vs 53.6 vs $50.7 \mu\text{g/l}$). Subgroup C ($n = 54$) showed no difference in A-FABP after 3-month diet and after next 3 months. The A-FABP value correlated with the some components of the metabolic syndrome. In conclusion, we describe that serum A-FABP might be a prognostic marker of body weight loss suggesting a preventive therapeutic intervention. *J. Clin. Lab. Anal.* 22:380–382, 2008. © 2008 Wiley-Liss, Inc.

Key words: obesity; A-FABP; BMI; weight reduction; low-energetic diet

INTRODUCTION

Adipocyte-fatty acid binding protein (A-FABP) is suggested to be a biomarker of adiposity and metabolic syndrome (1–3), and is lowered after atorvastatin therapy (4). Only a few studies have been presented before on weight loss and A-FABP values. Weight loss led to a significant decrease in A-FABP and A-FABP levels were related to weight status in 30 obese children. (5). Recently, it was also presented that serum A-FABP levels are reduced in morbidly obese subjects after gastric banding-induced weight loss (6). However, no information regarding serum A-FABP level in relation to weight loss in adults treated by diet and regime has been published.

The aim of our work was to investigate the effect of diet-induced body weight loss on serum A-FABP values in adults.

METHODS

In the study, we analyzed a group of 189 probands suffering from obesity (102 women and 87 men; aged 57.3 ± 12 years) initially, after a 3-month low-calorie diet (20 kcal/kg) and once again 3 months after the termination of the diet for serum A-FABP (ELISA, Biovendor, Bruo, Czech Republic), insulin (DPC), glucose, cholesterol, HDL-cholesterol, LDL-cholesterol, triglycerides (Diasys, Holsheim, Germany), Quicki index, body mass

*Correspondence to: David Stejskal, Department of Internal and Laboratory Medicine, Jivavska 20, 78516 Sternberk, Czech Republic. E-mail: david.stejskal@nemstbk.cz

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index (BMI), blood pressure, and waist circumference (WC).

RESULTS

Basal parameters of individuals in the group were typical of metabolic syndrome; serum A-FABP levels correlated with Quicki ($r = -0.67$; $P < 0.01$) and BMI ($r = 0.87$, $P < 0.01$). After 3-month low-caloric diet, we observed a reduction in BMI (37.6 vs 29.5 kg/m², $P < 0.01$) and WC (129 vs 101 cm, $P < 0.01$), and a rise in Quicki index (0.21 vs 0.34, $P < 0.01$). Serum A-FABP values did not differ from the basal ones and did not correlate with the markers of the metabolic syndrome (systolic or diastolic blood pressure, serum values of triacylglycerides, HDL-cholesterol, Quicki index, BMI). We observed a lower BMI in 145 individuals whereas a rise or no difference was found in the remaining 54 patients. Subsequently, we analyzed those 145 individuals and divided them according to maintenance of lowered BMI (subgroup A) or relapsing BMI (subgroup B) 3 months after the end of the prescribed diet. Individuals with rise or no BMI difference were signed as subgroup C.

In subgroup A ($n = 79$) A-FABP value increased after a 3-month diet (42.3 vs 68.3 µg/l) followed by a significant decrease 3 months later (42.3 vs 37.1 µg/l). The final A-FABP value correlated with the markers of the metabolic syndrome: systolic blood pressure ($r = 0.54$; $P = 0.02$), triacylglycerides ($r = 0.38$; $P = 0.04$), HDL-cholesterol ($r = -0.42$; $P = 0.01$), Quicki index ($r = -0.59$; $P < 0.01$), BMI ($r = 0.61$, $P < 0.01$). In subgroup A we performed a multiple stepwise regression analysis and only the A-FABP serum values were subsumed as independent variables into the model for lower BMI ($P < 0.05$).

We also observed a significant increase in A-FABP value after 3-month diet in subgroup B ($n = 66$) persisting during the next 3 months (41.9 vs 53.6 vs 50.7 µg/l). No correlation or significant regression analysis between A-FABP and metabolic syndrome markers or dynamics of BMI was found in this subgroup (Table 1).

Subgroup C ($n = 54$) showed no difference in A-FABP after 3-month diet and after next 3 months. The A-FABP value correlated afterwards with the some components of the metabolic syndrome: triacylglycerols ($r = 0.41$; $P = 0.04$), Quicki ($r = -0.52$; $P < 0.01$), BMI ($r = 0.56$, $P < 0.01$).

DISCUSSION

Serum-AFABP level in patients lowering body weight might be affected through an activation of lipolytic activity of hormone sensitive lipase and lipoprotein

TABLE 1. Individuals With Permanent vs Temporary Reduction in BMI

Parameter	X-A	X-B	R1-R2
A-FABP1	42.3	41.9	$P = 0.57$
A-FABP2	68.3	53.6	$P = 0.01$
Delta1-2	26.0	11.7	$P = 0.019$
A-FABP3	37.1	50.7	$P < 0.01$
Delta1-3	-5.1	8.8	$P < 0.01$
Quicki1	0.19	0.2	$P = 0.51$
Quicki2	0.34	0.31	$P = 0.08$
Quicki3	0.33	0.23	$P < 0.01$
Cholesterol1	5.8	5.7	$P = 0.29$
Cholesterol2	5.9	5.6	$P = 0.34$
Cholesterol3	5.5	6.0	$P = 0.11$
HDL1	0.9	0.9	$P = 0.75$
HDL2	1.0	0.9	$P = 0.06$
HDL3	1.2	0.9	$P = 0.04$
Triglycerides1	4.3	4.5	$P = 0.59$
Triglycerides2	2.6	2.7	$P = 0.85$
Triglycerides3	1.9	2.9	$P = 0.02$
BMI1	37.1	37.2	$P = 0.56$
BMI2	30.4	30.8	$P = 0.25$
BMI3	30.1	37.2	$P < 0.01$
BP syst1	148.3	150.1	$P = 0.42$
BP syst2	143.0	143.7	$P = 0.37$
BP syst3	142.0	144.0	$P = 0.31$
BP diast1	102.0	101.3	$P = 0.57$
BP diast2	91.7	93.2	$P = 0.68$
BP diast3	93.2	96.2	$P = 0.09$
WC1	129	132	$P = 0.44$
WC2	104	101	$P = 0.29$
WC3	102	123	$P < 0.01$

X-A, mean of group A; X-B, mean of group B; R1-R2, significance of group differences; X- mean (subgroups have normal data distribution); A, subgroup A with permanent (at least 6 months) weight reduction; B, subgroup B with temporary weight reduction; Delta, difference between the subgroups; WC, waist circumference; BP, blood pressure; 1, before therapy; 2, after 3-month therapy; 3, after 6 months (3 months after the therapy termination).

lipase or any damage of adipocytes as well as through mechanism releasing A-FABP from adipocytes (7). A-FABP may thus also reflect adipose tissue cell turnover.

In our study, we observed that individuals with at least for 6 months lowered BMI had a temporary rise in serum A-FABP value followed by a significant decline in value 3 months after the termination of the diet. In addition, in these individuals, A-FABP correlated with the metabolic syndrome markers. On the contrary, individuals with temporary reduced BMI showed persistently increased serum A-FABP value, moreover A-FABP did not correlate with the markers of the metabolic syndrome during whole 6-month period. A-FABP value is suggested to be a positive marker of metabolic syndrome and has been shown to accelerate atherosclerotic lesion development (2,4,8,9). Long-term rise of A-FABP in serum might therefore participate in impaired cardiovascular morbidity in patients during

body weight loss. With regard to the evidence, that atorvastatin reduces serum A-FABP value (4), we bring the hypothesis that atorvastatin may protect patients during or immediately after aggressive body weight loss. Further research is warranted to confirm our findings.

In conclusion, we describe that serum A-FABP might be a prognostic marker of body weight loss suggesting a preventive therapeutic intervention. So far high plasma levels of A-FABP correlate with obesity so weight loss leading to short term higher A-FABP levels could be due to adipocyte damage/loss.

Individuals with persistently higher serum A-FABP value during or after diet therapy might be subjects with better compliance with therapy and prognosis.

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