KdJ

KOREAN DIABETES JOURNAL

The Adiponectin/Leptin Ratio and Metabolic Syndrome in Healthy Korean Adult Males

Seung-Hyun Ko

Department of Internal Medicine, The Catholic University of Korea, Seoul, Korea

Insulin resistance plays an important role in the pathogenesis of obesity, metabolic syndrome and type 2 diabetes mellitus. Therefore, quantitative measurements of insulin resistance are clinically meaningful and may help researchers to better understand the etiologies of this disease. The best-established methods of quantitative measurement of insulin resistance are the hyperinsulinemic-euglycemic clamp, minimal model assessment and homeostatic model assessment (HOMA) methods [1]. However, given the dominant role of obesity in the pathogenesis of insulin resistance, plasma leptin and adiponectin levels, and the ratio of these two best-characterized adipocytokines, have been suggested as parameters to assess insulin resistance [2].

Several recent studies have shown that the leptin:adiponectin ratio (LAR) or the adiponectin/leptin (A/L) ratio is as strongly associated with the gold standard measure of insulin resistance (hyperinsulinemic-euglycemic clamp) as other currently used parameters such as fasting insulin or HOMA level. Leptin and adiponectin levels were measured in 2,097 non-diabetic individuals in the Ely and European Group for the Study of Insulin Resistance (EGIR) Relationship between Insulin Sensitivity and Cardiovascular Risk (RISC) study cohorts. This was a large prospective, observational cohort study that involved healthy men and women aged between 30 and 60 years. According to this cohort study, the LAR was significantly correlated with HOMA-S and the insulin sensitivity index drawn from the hyperinsu-

linemic–euglycemic clamp, both in men and women [2]. Moreover, some have reported that the LAR is a more effective parameter of insulin resistance than adiponectin, leptin alone, or HOMA-IR in non-diabetic and type 2 diabetes patients [3-5]. The present study measured adiponectin, leptin, and A/L ratio in 68 healthy adult Korean males. Although HOMA-IR is better correlated with percent body fat, triglyceride, and fasting glucose than A/L ratio, the results of this study demonstrated a significantly negative correlation between HOMA-IR and A/L ratio. Interestingly, the A/L ratio was significantly higher in patients with metabolic syndrome compared with its counterpart. A/L ratio decreased as the number of metabolic syndrome components increased. This finding corresponds to the results of a study by Zhuo et al. that included 2,046 older Chinese subjects (950 males, 220 with metabolic syndrome and 1,096 females, 452 with metabolic syndrome), aged 60-96 years. Zhuo et al. suggested that L/A ratio and leptin may be better diagnostic markers for metabolic syndrome than adiponectin level [6-8]. Moreover, there is some evidence that the L/A ratio is an independent predictor of carotid intima-media thickness [9-11]. Therefore, the A/L ratio may be a good candidate for predicting future atherosclerosis or metabolic syndrome, and eventually cardiovascular disease, in high risk subjects.

Regarding the results of the present study, I would like to extend my appreciation for the efforts of the investigators, who have provided valuable evidence regarding the relationship be-

Corresponding author: Seung-Hyun Ko
Division of Endocrinology and Metabolism, Department of Internal Medicine, St. Vincent's Hospital, The Catholic University of Korea, 93 Chi-dong, Paldal-gu, Suwon 442-723, Korea
E-mail: kosh@catholic.ac.kr

tween the L/A ratio and insulin resistance in adult Korean males. In addition, I would like to note that although the study sample was small, and included only males, the L/A ratio is significantly correlated with parameters of insulin resistance, while leptin, adiponectin and the LAR were observed to be higher in women than in men in Japanese type 2 diabetic patients [9]. The age distribution of the study sample, along with sex differences, might affect leptin, adiponectin production and L/A ratio results [4]. Therefore, it seems reasonable to analyze men and women separately.

However, in the present study, while the authors enrolled "apparently healthy" male adults, it is not clear how the authors defined "healthy." Regarding to L/A ratio, some previous studies have excluded participants with dyslipidemia, hypertension, known cardiovascular disease or overweight, but others included all of these groups in the study sample. Therefore, it would be also needed to consider the clinical characteristics of study subjects when we interpret the results.

The L/A ratio may be a useful parameter for insulin resistance assessment in patients with and without diabetes. As the authors have noted, future studies, including large population-based cross-sectional or cohort studies in patients with various conditions are warranted.

REFERENCES

1. Wallace TM, Matthews DR. The assessment of insulin resistance in man. Diabet Med 2002;19:527-34.
2. Finucane FM, Luan J, Wareham NJ, Sharp SJ, O'Rahilly S, Balkau B, Flyvbjerg A, Walker M, Hojlund K, Nolan JJ; European Group for the Study of Insulin Resistance: Relationship between Insulin Sensitivity and Cardiovascular Disease Risk Study Group, Savage DB. Correlation of the leptin:adiponectin ratio with measures of insulin resistance in non-diabetic individuals. Diabetologia 2009;52:2345-9.
3. Zaletel J, Barlovic DP, Prezelj J. Adiponectin-leptin ratio: a useful estimate of insulin resistance in patients with type 2 diabe-
tes. J Endocrinol Invest. Epub 2010 Feb 5.
4. Oda N, Imamura S, Fujita T, Uchida Y, Inagaki K, Kakizawa H, Hayakawa N, Suzuki A, Takeda J, Horikawa Y, Itoh M. The ratio of leptin to adiponectin can be used as an index of insulin resistance. Metabolism 2008;57:268-73.
5. Inoue M, Maehata E, Yano M, Taniyama M, Suzuki S. Correlation between the adiponectin-leptin ratio and parameters of insulin resistance in patients with type 2 diabetes. Metabolism 2005;54:281-6.
6. Zhuo Q, Wang Z, Fu P, Piao J, Tian Y, Xu J, Yang X. Comparison of adiponectin, leptin and leptin to adiponectin ratio as diagnostic marker for metabolic syndrome in older adults of Chinese major cities. Diabetes Res Clin Pract 2009;84:27-33.
7. Yan E, Chen S, Hong K, Kim WS, Bajpai A, Treyzon L, Gratton L, Elashoff R, Wang HJ, Li Z, Heber D. Insulin, hs-CRP, leptin, and adiponectin. An analysis of their relationship to the metabolic syndrome in an obese population with an elevated waist circumference. Metab Syndr Relat Disord 2008;6:64-73.
8. Kumagai S, Kishimoto H, Masatakasuwa, Zou B, Harukasasaki. The leptin to adiponectin ratio is a good biomarker for the prevalence of metabolic syndrome, dependent on visceral fat accumulation and endurance fitness in obese patients with diabetes mellitus. Metab Syndr Relat Disord 2005;3:85-94.
9. Takamura N, Hayashida N, Hagane K, Kadota K, Yamasaki H, Abiru N, Ozono Y, Kamihira S, Aoyagi K, Ishibashi K, Nakazato M, Maeda T. Leptin to high-molecular-weight adiponectin ratio is independently correlated with carotid intima-media thickness in men, but not in women. Biomarkers 2010;15:340-4.
10. Kotani K, Sakane N, Saiga K, Kurozawa Y. Leptin:adiponectin ratio as an atherosclerotic index in patients with type 2 diabetes: relationship of the index to carotid intima-media thickness. Diabetologia 2005;48:2684-6.
11. Norata GD, Raselli S, Grigore L, Garlaschelli K, Dozio E, Magni P, Catapano AL. Leptin:adiponectin ratio is an independent predictor of intima media thickness of the common carotid artery. Stroke 2007;38:2844-6.