

Association of a Body Shape Index as a Novel Anthropometric Indicator with Subclinical Atherosclerosis

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Atherosclerosis is a chronic inflammatory disease of blood vessels, including coronary artery disease and cerebral infarction (atherosclerotic cardiovascular diseases [ASCVD]). However, since atherosclerosis can progress asymptotically for a long time, early detection of atherosclerosis and control of its progression are critically important. In particular, the early detection and therapeutic suppression of subclinical lesions are critically important.

Obesity is the most common metabolic disorder and is widely known to be associated with ASCVD independent of other atherosclerotic risk factors. Therefore, obesity should be prevented, detected early, and treated appropriately to reduce future serious stage. To do this, many anthropometric indices have been proposed related to adiposity and its distribution, including the widely known body mass index, waist circumference, and waist-to-hip ratio. These indices have been used for a variety of purposes, including nutritional risk assessment or evaluation of intervention effects. However, the relationship between these anthropometric indices and the prevalence, incidence, and prognosis of ASCVD is not always clear. A body shape index (ABSI) is a newly developed anthropometric indicator. Krakauer *et al.* proposed the ABSI in 2012 (Fig. 1)¹⁾.

$$ABSI = \frac{WC}{BMI^{2/3} \cdot Height^{1/2}}$$

Fig. 1. ABSI Formula

ABSI is defined as the waist circumference (WC) divided by the body mass index (BMI) raised to two-thirds and by the square root of the height.

The ABSI has been shown to be associated with abdominal adipose tissue¹⁾, metabolic syndrome, and ASCVD risk^{2, 3)}. Meanwhile, other studies have focused on its association with atherosclerosis and subclinical vascular diseases^{4, 5)}. In addition, the ABSI has been reported to predict mortality from ASCVD and would also be a predictor of all-cause mortality^{6, 7)}.

Ma X *et al.* showed an association between the ABSI and subclinical carotid atherosclerosis in a population without cardiovascular and cerebrovascular diseases⁸⁾. They also found that compared to traditional indices, the ABSI was more closely associated with subclinical carotid plaque in a population of rural adults in northwest China without hypertension, diabetes, or dyslipidemia. These results suggest that the ABSI is a simple and useful indicator for assessing subclinical carotid atherosclerosis in a population of adults at low risk of atherosclerosis, although previous studies have reported examinations in populations with some risk factors for atherosclerosis.

However, this study was conducted with participants who lived in a predominantly ethnic minority county in western China. Caution should be taken when applying the results of this study to other regions or ethnic groups. Furthermore, because of the cross-sectional design of this study, it is not possible to establish a causal-effect relationship. On the other hand, there are several limitations regarding the ABSI, including the fact that the ABSI is age- and gender dependent, the lack of data for children, and the lack of specific cutoff values for clinical practice^{9, 10)}. However, the study by Ma *et al.* is considered a valuable report showing an association with early atherosclerosis at a stage with few risk factors, and further studies are warranted to evaluate the potential usefulness of the ABSI as an anthropometric measure in population-level health surveillance.

Conflicts of Interest

None.

References

- 1) Krakauer NY, Krakauer JC. A new body shape index predicts mortality hazard independently of body mass index. *PLoS One*, 2012; 7: e39504
- 2) Bertoli S, Leone A, Krakauer NY, Bedogni G, Vanzulli A, Redaelli VI, De Amicis R, Vignati L, Krakauer JC, Battezzati A. Association of body shape index (ABSI) with cardio-metabolic risk factors: A cross-sectional study of 6081 Caucasian adults. *PLoS ONE*, 2017; 12: e0185013
- 3) Fujita M, Sato Y, Nagashima K, Takahashi S, Hata A. Predictive power of a body shape index for development of diabetes, hypertension, and dyslipidemia in Japanese adults: a retrospective cohort study. *PLoS ONE*, 2015; 10: e0128972
- 4) Abete I, Arriola L, Etxezarreta N, Mozo I, Moreno-Iribas C, Amiano P, Egüés N, Goyenechea E, Lopez de Munain A, Martinez M, Travier N, Navarro C, Chirlaque MD, Tormo MJ, Gavrilá D, Huerta JM, Sánchez MJ, Molina-Montes E, Requena M, Jiménez-Hernández MD, Ardanaz E, Barricarte A, Quiros JR, Rodríguez L, Dorronsoro M. Association between different obesity measures and the risk of stroke in the EPIC Spanish cohort. *Eur. J. Nutr.*, 2015; 54: 365-375
- 5) Haraguchi N, Koyama T, Kuriyama N, Ozaki E, Matsui D, Watanabe I, Uehara R, Watanabe Y. Assessment of anthropometric indices other than BMI to evaluate arterial stiffness. *Hypertens Res*, 2019; 42: 1599-1605
- 6) Song X, Jousilahti P, Stehouwer CD, Söderberg S, Onat A, Laatikainen T, Yudkin JS, Dankner R, Morris R, Tuomilehto J, Qiao Q; DECODE Study Group. Cardiovascular and all-cause mortality in relation to various anthropometric measures of obesity in Europeans. *Nutr. Metab. Cardiovasc. Dis.*, 2015; 25: 295-304
- 7) Sato Y, Fujimoto S, Konta T, Iseki K, Moriyama T, Yamagata K, Tsuruya K, Narita I, Kondo M, Kasahara M, Shibagaki Y, Asahi K, Watanabe T. Body shape index: Sex-specific differences in predictive power for all-cause mortality in the Japanese population. *PLoS ONE*, 2017; 12: e0177779
- 8) Ma X, Chen L, Hu W, He L. Association Between a Body Shape Index and Subclinical Carotid Atherosclerosis in Population Free of Cardiovascular and Cerebrovascular Diseases. *J Atheroscler Thromb*, 2022; 29: 1140-1152
- 9) Piqueras P, Ballester A, Durá-Gil JV, Martínez-Hervas S, Redón J, Real JT. Anthropometric Indicators as a Tool for Diagnosis of Obesity and Other Health Risk Factors: A Literature Review. *Front Psychol*, 2021; 12: 631179
- 10) Ji M, Zhang S, An R. Effectiveness of A Body Shape Index (ABSI) in predicting chronic diseases and mortality: a systematic review and meta-analysis. *Obes Rev*, 2018; 19: 737-759