**EDITORIAL COMMENT**

# Waist Circumference as a Superior Predictor of Atrial Fibrillation Compared to Body Mass Index?

Hisaki Makimoto, MD, PhD

Obesity is a contributing factor to the global increase in atrial fibrillation (AF).[1] Increases in body mass index (BMI) and fluctuations in body weight are associated with a higher risk of AF.[2,3] However, BMI standards vary significantly across ethnic groups because of differences in body structure and physique.[4] This variability highlights the challenge of predicting future AF risk using only BMI, as it may not consistently capture the full spectrum of obesity-related risk factors.

In this issue of *JACC: Asia*, Rhee et al[5] used nationwide claims data from South Korea, including large health screening data, to demonstrate that waist circumference (WC) measurements over multiple years more effectively predicted AF onset than did BMI measurements. Furthermore, the combined use of BMI and WC improved AF prediction accuracy.

This study elucidated the relationship between cumulative BMI and WC data over 4 years and the risk of AF onset identified using the International Classification of Diseases-10th Revision codes. The analysis included 3,726,172 adults aged 20 years and older without a history of AF, utilizing their national health check-up results over 4 years and claims data from national health insurance. The median follow-up period was 5.2 years. Both BMI and WC were scored (**Table 1**), with the analysis using single-year measurements as well as the cumulative score burden over the 4-year period.

When participants were categorized by cumulative scores, both BMI (score: 0-8) and WC (score: 0-4)

showed that higher scores were associated with increased AF risk as well as a higher prevalence of comorbidities and elevated blood pressure. The increase in AF risk appeared to be more pronounced for WC than for BMI across different groups.

This study compared the association between single-year measurements from the fourth year and cumulative 4-year data on AF incidence rates. Interestingly, they reported that even when participants were classified as having obesity (BMI $\geq$25 kg/m$^2$ or WC $\geq$90 cm for men/85 cm for women) based on their fourth-year measurement, those whose 4-year average did not meet the obesity threshold had AF incidence rates similar to that in participants who consistently did not have obesity over the 4 years.

Additionally, among participants with the same BMI score, those with higher WC scores had a higher risk of AF; this trend was more evident with cumulative values than with single-year measurements. The results of this study suggest that cumulative measurements more efficiently represent AF risk than do single-year measurements. From a medical standpoint, cumulative values, which reflect long-term trends, may be reasonably considered to represent a patient's risk more accurately than a single measurement. Regardless of the BMI, individuals with a cumulative WC score of 0 had a lower AF risk, whereas those with higher WC scores had a greater AF risk. These findings suggest that compared with BMI, WC may be more strongly associated with the risk of AF.

When comparing AF prediction capabilities, the combination of cumulative BMI and WC scores demonstrated the highest predictive power. Although the BMI does not fully reflect abdominal obesity or metabolic health, WC may partially compensate for these limitations. Furthermore, even when BMI falls within the normal range, a larger WC is associated with an increased risk of AF.[6] This suggests that

From the Cardiovascular Center/Data Science Center, Jichi Medical University, Shimotsuke-City, Japan.

**TABLE 1  Scoring for Body Mass Index and Waist Circumference**

| Score | Body Mass Index, kg/m$^2$ | Waist Circumference, cm |
|-------|---------------------------|--------------------------|
| 0 | <23 | Male: <90, Female: <85 |
| 1 | ≥23 and <25 | Male: ≥90, Female: ≥85 |
| 2 | ≥25 | |

combining BMI and WC could contribute to more effective AF risk prediction.

However, individuals who were not classified as having obesity based on their fourth-year measurements, but whose average BMI over the 4-year period indicated obesity, showed a higher incidence of AF than that of those who consistently had obesity throughout the 4 years. This result raises the possibility that rapid weight loss may have increased the risk of AF, or that pathological weight loss occurred, potentially caused by underlying comorbidities, which could either induce or coexist with AF. These possibilities must be differentiated when investigating their association with the risk of AF. In future studies, incorporating additional variables such as levels of physical activity would be valuable and could provide further insights. This approach may help better differentiate individuals who intentionally increase their activity levels and successfully reduce their weight from those who experience pathological weight loss caused by underlying conditions.

When categorized by cumulative WC score, differences in BMI scores within each group did not affect AF risk. However, when categorized according to the cumulative BMI score, an increase in the cumulative WC score was associated with a higher AF risk across all groups. Although the BMI is inherently adjusted for height, the WC is not. Taller individuals tend to have higher normal WC values. Despite the lack of height adjustment, this study concluded that WC had a greater impact on the risk of AF than BMI. If height adjustment was applied to the WC score, this trend might have become even more pronounced, potentially allowing for a more detailed analysis.

The same research group has already reported that in East Asian populations, not only obesity but also underweight (BMI <18.5 kg/m$^2$) is a risk factor for the development of AF.[7] In the present study, the underweight population has been categorized as having a normal BMI, potentially inflating the AF risk within the normal BMI or WC cohort. This could have contributed to the overestimation of AF risk among individuals with normal BMI or WC, making the predictive relationship between BMI/WC and AF more complex.

Interestingly, the increase in AF risk associated with higher WC was most strongly observed in individuals with moderate BMI scores (3-4). The reason for this remains unclear; however, one possibility is the inclusion of data from a small number of non-Koreans living in Korea. As acknowledged by the authors as a limitation, this retrospective observational study focused primarily on East Asian populations. Therefore, the influence of unmeasured confounding factors such as ethnicity cannot be excluded. Individuals with high BMI and WC may also have been under-represented in the study because of higher rates of pre-existing AF, leading to their exclusion from the study cohort.

In conclusion, the finding that the cumulative WC score reflects the AF risk more efficiently than the cumulative BMI score is interesting. The authors commendably highlight the importance of long-term WC measurement in AF risk prediction. Further prospective or large-scale cohort studies are warranted to explore these associations in greater detail, including the potential generalizability of the findings to non-East Asian populations. The integration of additional health-related metrics may further improve AF risk stratification models in future studies.

## FUNDING SUPPORT AND AUTHOR DISCLOSURES

**ADDRESS FOR CORRESPONDENCE:** Dr Hisaki Makimoto, Cardiovascular Center/Data Science Center, Jichi Medical University, Yakushiji 3311-1, Shimotsuke-City 329-0498, Japan. E-mail: h1sak1mak1m0t0@gmail.com.

## REFERENCES

**1.** Lavie CJ, Pandey A, Lau DH, Alpert MA, Sanders P. Obesity and atrial fibrillation prevalence, pathogenesis, and prognosis: effects of weight loss and exercise. *J Am Coll Cardiol*. 2017;70:2022–2035.

**2.** Stout K, Almerstani M, Adomako R, et al. Prevalence and impact of poorly controlled modifiable risk factors among patients who underwent atrial fibrillation ablation. *Am J Cardiol*. 2023;198:38–46.

**3.** Pathak RK, Middeldorp ME, Meredith M, et al. Long-term effect of goal-directed weight management in an atrial fibrillation cohort: a long-term follow-up study (LEGACY). *J Am Coll Cardiol*. 2015;65:2159–2169.

**4.** WHO Expert Consultation. Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. *Lancet*. 2004;363:157–163.

**5.** Rhee T-M, Han K-D, Choi E-K, et al. Combination of body mass index and waist circumference burden determines the risk of atrial fibrillation. *JACC Asia*. 2025;5(1):129–139.

**6.** Baek YS, Yang PS, Kim TH, et al. Associations of abdominal obesity and new-onset atrial fibrillation in the general population. *J Am Heart Assoc*. 2017;6:e004705.

**7.** Kim YG, Han KD, Choi JI, et al. The impact of body weight and diabetes on new-onset atrial fibrillation: a nationwide population based study. *Cardiovasc Diabetol*. 2019;18: 128.

**KEY WORDS** atrial fibrillation, body mass index, burden, central obesity, waist circumference