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Response to: Obstructive sleep apnea syndrome and obesity: screening ability

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Dear Editor,

Please find below our response to T. Kawada's letter to the editors of our article "Association between obstructive sleep apnea syndrome and waist-to-height ratio" [1].

We compared the area under the curve (AUC) of the receiver operating characteristic (ROC) curves by considering the DeLong's Method [2] using the algorithm from Sun and Xu [3]. There was no significant evidence that the AUC values of waist circumference, waist-to-height ratio, and body mass index (BMI) were different for men and women (all p values ≥ 0.05). As we stated in our article [1], the results do not demonstrate superiority to the waist-to-height ratio over waist circumference and BMI in predicting development of obstructive sleep apnea syndrome (OSAS). We reached this conclusion by observing the similarity of the ROC curves and AUC values. Note that the waist-to-height ratio has been reported [4] to be a better determinant of prognosis in cardiovascular diseases than waist circumference and BMI.

As mentioned in the letter to the editors by T. Kawada, OSAS is more common in men. Our results are in accord with this observation in that 323 of 437 (73.9%) patients with OSAS were men [1]. In regard to the comment about a difference between cutoff values for men and women, only the threshold values for waist circumference, to determine patients with a high risk of OSAS and severe OSAS, were lower in women than in men (Table 1). These lower cutoff values for waist circumference do not mean that the prevalence of OSAS is higher in women. Since the mean values of waist circumference are lower in female patients and control groups (Table 2), it is expected that the number of cases that will exceed this value will be small. This study mainly aimed to investigate waist-to-height ratio in terms of increased risk for OSAS and to determine a cutoff value in order to provide the examination priority for the risk group. Besides that, we studied waist circumference and body mass index. The objective was not to investigate the risk factor differences for OSAS in men and women. Therefore, we did not consider the factors such as lifestyle changes for sex differences. Determining the cutoff values by examining differences in sex-related risk factors for obesity may be a new research subject.

We mentioned in our publication that there may be changes due to racial differences: "Anthropometric measurements and their clinical effects exhibit racial variances. Different cutoff values according to different races, therefore, appear to be necessary." In addition, we expressed differing cutoff values from two distinct populations. Although our study was conducted in a single-center, the results can be used in populations with similar demographics.

Table 1 Cutoff values to classify high risk for OSAS, their sensitivities and specificities, and the area under the ROC curves (AUC)

		Cutoff value	Sensitivity (%)	Specificity (%)	AUC
Women	WC (cm)	95.5	84	78	0.88
	WHR	0.595	78	78	0.87
	BMI (kg/m^2)	27.75	78	83	0.81
Men	WC (cm)	100.5	75	69	0.80
	WHR	0.575	76	67	0.79
	BMI (kg/m^2)	27.75	73	69	0.77

WC, waist circumference; *WHR*, waist-to-height ratio

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Table 2 Anthropometric measurements and AHI scores of OSAS patients and controls for men and women

		WC (cm) mean ± SD $p < 0.001$*	WHR mean ± SD $p < 0.001$*	BMI (kg/m^2) mean ± SD $p < 0.001$*	AHI scores median (min-max) $p < 0.001^+$
Women	OSAS	106.60 ± 12.62	0.66 ± 0.08	31.77 ± 6.14	20.3(5–102.3)
	Control	88.14 ± 11.63	0.54 ± 0.07	25.54 ± 4.30	1.35(0–4.8)
Men	OSAS	108.40 ± 11.70	0.62 ± 0.07	30.58 ± 4.60	32.7(5.5–118.2)
	Control	95.21 ± 11.45	0.55 ± 0.06	26.35 ± 3.52	2.8(0.1–4.9)

WC, waist circumference; *WHR*, waist-to-height ratio

*Welch t test

+ Wilcoxon-Mann-Whitney test

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