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Association of A Body Shape Index with cardiovascular disease according to obesity phenotype

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Background/Aims: Obesity is an important mortality risk factor; however, it is not synonymous with metabolic disease. In this study, we aimed to evaluate the effect of A Body Shape Index on cardiovascular disease (CVD) outcomes according to obesity phenotype. **Methods:** We used data from the National Health and Nutrition Examination Survey from 1999 to 2012. The participants were classified by obesity and metabolic healthy status, as metabolically healthy non-obese/overweight (normal), metabolically healthy obese/overweight (MHO), metabolically unhealthy non- obese/overweight (MUNO), and metabolically unhealthy obese/overweight (MUO). Each group was further classified into three groups based on the tertiles of A Body Shape Index (ABSI). **Results:** The data of 25,270 participants were assessed. In a multivariate logistic regression model, MHO participants who are within the 2nd and 3rd tertiles of ABSI had a significantly higher OR for CVD events, whereas those who are within the 1st tertile of ABSI had a modest risk of developing CVDs compared to normal participants who are within the 1st tertile of ABSI. In addition, a similar increase in the OR was observed in MUNO or MUO participants. In the restricted cubic spline regression, ABSI showed a linear relationship with CVD events according to each obesity phenotype **Conclusions:** We analyzed the association between the CVD outcomes and ABSI across obesity phenotype. ABSI showed a strong linear relationship with CVD across obesity phenotype. These findings may have implications in terms of heterogeneous prognosis of CVD across obesity phenotype. Further prospective studies must be conducted to re-define MHO phenotype in consideration of ABSI to validate MHO

	Normal (n=5,176)	MHO (n=6,688)	MUNO (n=2,671)	MUO (n=10,735)	P-value
Age, years	38.2 (37.6-38.8)	40.9 (40.4-41.5)	54.7 (53.8-55.5)	51.7 (51.3-52.2)	<0.001
Men, %	39.6 (38.0-41.2)	47.6 (46.3-49.0)	48.1 (45.8-50.3)	54.1 (53.0-55.2)	<0.001
Ethnicity/Race, %					<0.001
Mexican American	6.2 (5.4-7.2)	9.2 (7.7-10.9)	4.6 (3.8-5.5)	8.2 (6.7-9.8)	
Other Hispanic	4.3 (3.3-5.4)	6.1 (4.8-7.7)	4.4 (3.2-6.1)	5.4 (4.3-6.9)	
Non-Hispanic White	73.9 (71.7-75.9)	67.6 (64.7-70.3)	73.4 (70.3-76.3)	71.9 (69.1-74.6)	
Non-Hispanic Black	8.4 (7.4-9.6)	13.2 (11.6-15)	7.5 (6.4-8.9)	10.2 (8.9-11.7)	
Other Race	7.2 (6.2-8.3)	4 (3.3-4.8)	10 (8.3-12.1)	4.3 (3.6-5.1)	
CVD events*, %	2.3 (1.8-2.9)	4 (3.5-4.6)	12.3 (10.9-13.9)	12.5 (11.7-13.4)	
Smoking, %	45.4 (43.3-47.6)	43.8 (42.1-45.7)	55.5 (53-58.1)	51.3 (49.9-52.7)	
BMI, kg/m^2	22 (22-22.1)	30.2 (30-30.3)	22.6 (22.5-22.7)	32 (31.8-32.1)	<0.001
Waist circumference, cm	80.7 (80.4-81)	100.3 (99.9-100.8)	85.5 (85.1-85.9)	107.3 (106.8-107.7)	<0.001
ABSI	0.0791 (0.0789-0.0793)	0.0798 (0.0796-0.080)	0.0826 (0.0823-0.0828)	0.0823 (0.0821-0.0824)	<0.001
Systolic BP, mmHg	112 (111.5-112.5)	115.6 (115.2-116)	131 (129.8-132.2)	129.1 (128.5-129.6)	<0.001
Diastolic BP, mmHg	67.9 (67.5-68.4)	69.7 (69.3-70.1)	72.5 (71.8-73.2)	73.9 (73.5-74.4)	<0.001
FBG level, mg/dL	90.8 (90.4-91.2)	93.5 (93-94.1)	105.9 (104.4-107.5)	114.1 (112.8-115.4)	<0.001
HbA1c, %	5.2 (5.2-5.2)	5.3 (5.3-5.3)	5.6 (5.6-5.7)	5.9 (5.8-5.9)	<0.001
Total cholesterol, mg/dL	185.7 (184.3-187.2)	193.4 (192.2-194.6)	209.2 (206.9-211.4)	208.5 (207.1-209.8)	<0.001
HDL-C, mg/dL	61.4 (60.8-62)	54.9 (54.4-55.3)	56.4 (55.3-57.5)	46.5 (46.1-46.9)	<0.001
TG, mg/dL	89.5 (86.7-92.3)	107.9 (105.4-110.5)	141.8 (131.7-151.8)	183.3 (177.6-189.1)	<0.001
Metabolic state, %					
High BP	5.2 (4.5-6)	6.8 (6-7.7)	59.8 (57.2-62.4)	51.4 (49.9-52.8)	<0.001
Hyperglycemia	4.1 (3.5-4.7)	5.9 (5.2-6.6)	44.4 (41.7-47.1)	55.6 (54-57.2)	<0.001
Low HDL-C level	9.3 (8.2-10.4)	13.1 (12-14.2)	34 (31.4-36.8)	52.5 (51.2-53.9)	<0.001
High TG level	37.5 (35.9-39.2)	48.3 (46.5-50)	91.9 (90.4-93.2)	91.8 (91-92.5)	<0.001

Values are presented as number (%) or mean with 95% confidence interval.