

# Visceral adiposity index and risks of cardiovascular events and mortality in prevalent hemodialysis patients

Hung-Yuan Chen<sup>1,2</sup>, MD; Yen-Ling Chiu<sup>1,2</sup>, MD, PhD; Shih-Ping Hsu<sup>1,2</sup>, MD, PhD; Mei-Fen Pai<sup>1,2</sup>, MD; Ju-Yeh Yang<sup>1,2</sup>, MD, MPH; Hon-Yen Wu<sup>1,2</sup>, MD and Yu-Sen Peng<sup>1,2</sup>, MD, PhD

<sup>1</sup>Division of Nephrology, Department of Internal Medicine, Far Eastern Memorial Hospital, New Taipei City, Taiwan.

<sup>2</sup>Division of Nephrology, Department of Internal Medicine, National Taiwan University Hospital and National Taiwan University College of Medicine, Taipei, Taiwan

## OBJECTIVES

Visceral adiposity index (VAI) is a newly-derived measure of visceral adiposity with well-validated predictive power of cardiovascular (CV) outcomes in general population. However, this predictability has not been investigated in hemodialysis (HD) patients and whether VAI is superior to waist circumference (WC) and waist-to-height ratio (WHtR) in prediction of CV outcomes and survival in HD patients remains unknown.

## METHODS

We performed a prospective study and 464 prevalent hemodialysis patients were enrolled. The composite outcome was the occurrence of death and CV event during follow-up. Using multivariable Cox regression model, VAI, WC and WHtR were tested for the predictive power of composite outcome and all-cause mortality.

## RESULTS

VAI, WC and WHtR positively correlated with each other. Patients with higher VAIs (tertile 3 v.s tertile 1, adjusted hazard ratio (HR), 1.65; 95% confidence interval (CI), 1.12 to 2.42; tertile 2 v.s tertile 1, adjusted HR, 1.52; 95%CI, 1.1 to 2.18) had more composite outcomes. VAI had similar predictive power of composite and CV outcomes to WC and WHtR, but had superior predictive power of all-cause mortality to WC and WHtR analyzed by receiver operating characteristic curve.

**Table 2.** VAI, WC, WHtR and baseline factors associated with outcomes in all participants analyzed by Cox proportional-hazards regression model with multivariate adjustments

Variables	Composite outcome		Cardiovascular outcome		All-cause mortality	
	Adjusted H.R (95% CI) <sup>§</sup>	P	Adjusted H.R (95% CI) <sup>§</sup>	P	Adjusted H.R (95% CI) <sup>§</sup>	P
VAI (tertile 2 v.s tertile 1)	1.52 (1.1-2.18)	0.02	1.70 (1.1-2.61)	0.02	1.33(0.81-2.16)	0.3
VAI (tertile 3 v.s tertile 1)	1.65 (1.12-2.42)	0.01	1.80 (1.1-2.8)	0.01	1.49(1.0-2.5)	0.06
WC (every 10 cm increase)	1.29 (1.08-1.54)	0.005	1.36 (1.1-1.67)	0.004	1.11(0.88-1.4)	0.4
WHtR (every 0.01 unit increase)	1.05(1.02-1.08)	0.003	1.06(1.02-1.09)	0.003	1.02(0.98-1.06)	0.4
Demographic data						
With DM	2.2 (1.63-3.0)	<0.001	2.44 (1.5-3.5)	<0.001	2.05(1.36-3.08)	0.001
With CV disease history	1.48 (1.1-2.0)	0.01	1.83 (1.31-2.57)	<0.001	1.37(0.92-2.06)	0.1
With HTN	1.13 (0.77-1.67)	0.5	1.31 (0.82-2.1)	0.3	1.01(0.5-1.31)	0.4
Age (every 10 years increase)	1.38 (1.24-1.52)	<0.001	1.28 (1.1-1.4)	0.001	1.57(1.37-1.77)	<0.001
HD vintage (every 1 year increase)	1.02 (0.98-1.06)	0.3	1.03 (0.98-1.08)	0.2	1.01(0.95-1.07)	0.8
Laboratory parameters						
hs-CRP	1.05 (0.99-1.12)	0.08	1.04 (0.96-1.12)	0.4	1.1(1.02-1.18)	0.01
Hemoglobin	0.9 (0.82-0.99)	0.05	0.93 (0.83-1.05)	0.3	0.92(0.8-1.05)	0.2
GNRI	0.98 (0.96-0.99)	0.002	0.99 (0.97-1.01)	0.4	0.96(0.94-0.98)	<0.001
iPTH	1.0 (0.99-1.01)	0.2	1.0 (0.99-1.02)	0.4	1.0(1.0-1.001)	0.8
CaxP	1.003 (0.99-1.01)	0.5	1.002(0.99-1.01)	0.7	1.008(0.99-1.07)	0.2

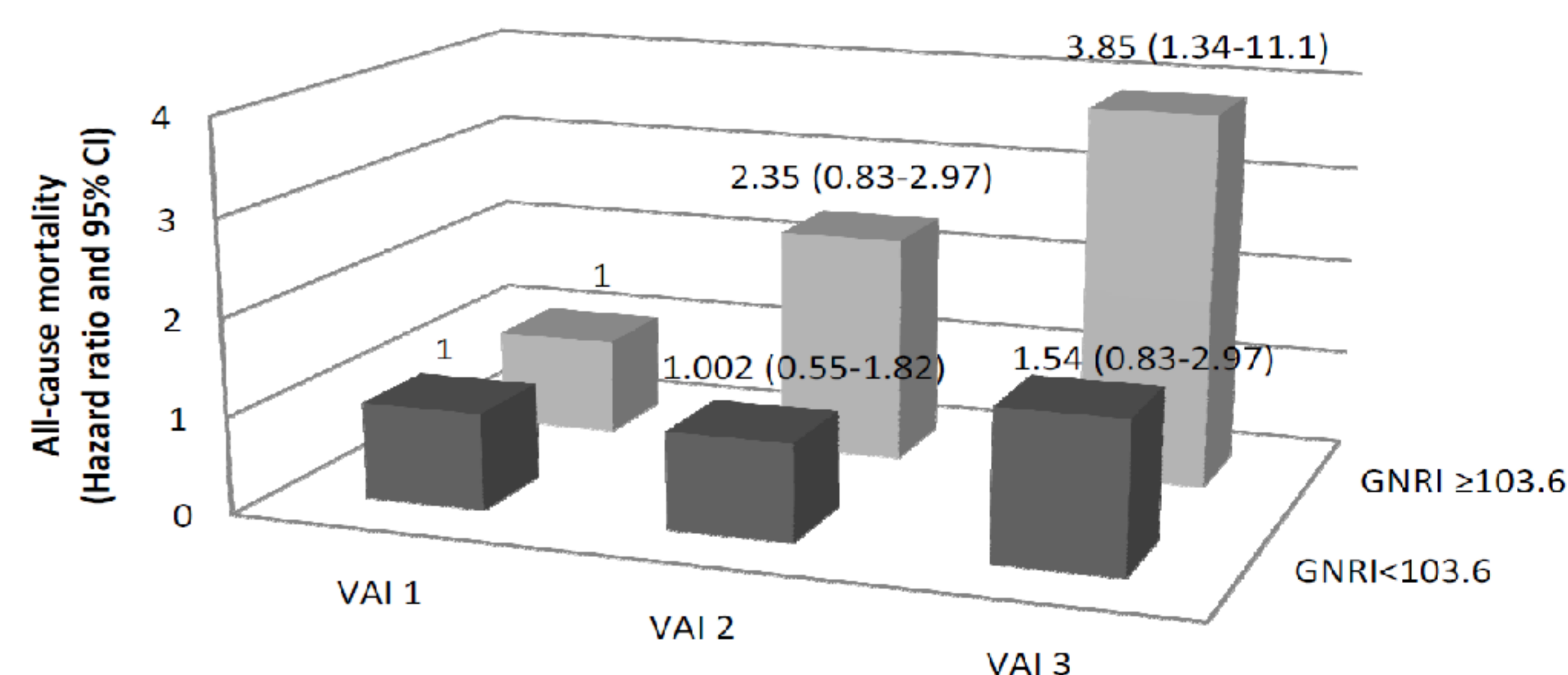
Abbreviations: VAI, visceral adiposity index; WC, waist circumference; WHtR, waist-to-height ratio; H.R, hazard ratio; CI, confidence interval; P, P value; DM, diabetic mellitus; CV, cardiovascular; HTN, hypertension; HD, hemodialysis; hs-CRP, highly-sensitive C-reactive protein; GNRI, geriatric nutritional risk index; iPTH, intact parathyroid hormone; CaxP, calcium phosphate product

**Table 3.** AUCs of ROC curves for prediction of composite outcome, CV outcome and all-cause mortality by VAI, WC and WHtR

		VAI	WC	WHtR
Composite outcome	AUC	0.594 ± 0.026 (0.542-0.645)	0.592±0.026 (0.54-0.644)	0.605±0.026 (0.554-0.656)
CV outcome	AUC	0.608 ± 0.027 (0.556-0.66)	0.619± 0.027 (0.565-0.673)	0.626± 0.028 (0.556-0.68)
All-cause mortality	AUC	0.559 ± 0.03 (0.504-0.618)	0.546 ± 0.032 (0.483-0.608)	0.56± 0.031 (0.499-0.621)

Note: Values expressed as AUC ± SE (95% confidence interval)

Abbreviations: AUC, area under curve; ROC, receiver operating characteristic; CV, cardiovascular; VAI, visceral adiposity index; WC, waist circumference; WHtR, waist-to-height ratio.



## CONCLUSIONS

VAI is an optimal method to measure visceral adiposity for assessing long-term CV outcome and all-cause mortality in prevalent HD patients. VAI may provide superior predictive power of all-cause mortality to WC and WHtR.

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