STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No.	Recommendation	Page No.	Relevant text from manuscript
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	1	Title: "Correlation study"; Abstract: "This cross-sectional study enrolled 189 MHD patients"
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	1	Abstract includes background, objectives, methods (ELISA, LVMI, AACS), results (BNP, Gas6, K2, OR), and conclusion
Introduction				
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	1-2	Introduction paragraphs 1-3: CKD-MBD, vascular calcification, LVH, vitamin K, Gas6, and research gaps
Objectives	3	State specific objectives, including any prespecified hypotheses	2	Last paragraph of Introduction: "this cross-sectional study aims to simultaneously examine serum levels of vitamin K2 and Gas6... and their correlations with AACS and LVH"
Methods				
Study design	4	Present key elements of study design early in the paper	2	"MATERIALS AND METHODS" first line: "This single-center, observational cross-sectional study"
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	2	"Clinical information" section: Ningbo Hospital of Integrated Traditional Chinese and Western Medicine; "Patients were recruited between January 2023 and December 2024. Data collection... was completed within two weeks after enrollment"
Participants	6	(a) Cohort study—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up Case-control study—Give the eligibility criteria, and the sources and methods of case	2	"Inclusion criteria" (1)-(6) and "Exclusion criteria" (1)-(9)

		ascertainment and control selection. Give the rationale for the choice of cases and controls Cross-sectional study—Give the eligibility criteria, and the sources and methods of selection of participants		
		(b) Cohort study—For matched studies, give matching criteria and number of exposed and unexposed Case-control study—For matched studies, give matching criteria and the number of controls per case	2	Not applicable (cross-sectional study). Healthy control group (n=40) matched for age and sex, stated at end of "Inclusion criteria" section
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	2-4	Outcomes: AACS (Symeonidis method), LVH (LVMI >100 in females, >131 in males); Exposures: vitamin K2 (ELISA), Gas6 (ELISA); Confounders: age, sex, PTH, phosphorus, calcium, phosphate binders, vitamin D analogs
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	3-4	ELISA methods with catalog numbers, detection ranges, CVs; AACS by chest X-ray with ICC=0.92; LVMI by echocardiography; "Comparability of assessment methods across groups" paragraph on page 4
Bias	9	Describe any efforts to address potential sources of bias	3-4	AACS: inter-rater ICC=0.92, third radiologist arbitration; Vascular calcification score: ICC=0.89; ELISA: duplicate measurements, quality control samples
Study size	10	Explain how the study size was arrived at	3	"Sample size calculation": based on unpublished preliminary data from 30 pilot patients, ANOVA, α=0.05, β=0.20, ≥30 per group, total ≥120, finally 189 enrolled

Continued on next page

Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	3, 5	AACS grouped as 0,1,2,3; LVMI thresholds: female >100, male >131; K2 dichotomized at 2.39 nmol/L (median split)
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	5	SPSS 19.0, chi-square, Fisher's exact, ANOVA with LSD post-hoc, Spearman correlation, multivariate logistic regression adjusted for age, sex, diabetes, phosphorus, calcium, PTH, phosphate binders, vitamin D analogs
		(b) Describe any methods used to examine subgroups and interactions	5	LSD post-hoc tests for pairwise comparisons across AACS groups
		(c) Explain how missing data were addressed	5	"There were no missing data for the primary exposure (vitamin K2, Gas6) or outcome variables (AACS, LVMI) in the final analytic cohort of 189 patients"
		(d) Cohort study—If applicable, explain how loss to follow-up was addressed Case-control study—If applicable, explain how matching of cases and controls was addressed Cross-sectional study—If applicable, describe analytical methods taking account of sampling strategy	5	Not applicable (consecutive sampling, no complex survey design)
		(e) Describe any sensitivity analyses	5	"Sensitivity analysis was performed by excluding patients with extreme calcium levels (n=3) to assess the robustness of the correlation between vitamin K2 and serum calcium"
Results				
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	2	538 screened → 349 excluded → 189 included; further stratified into LVH (n=110) and non-LVH (n=79); AACS: no (46), mild (54), moderate (53), severe (36)
		(b) Give reasons for non-participation at each stage	2	Detailed exclusion reasons: CVD (81), LVEF<50% (52), active inflammation (44), malignancy (38), prior stent (35), valve disease/AF (29), thyroidectomy (22), calcium metabolism disorders (18), amputation (12),

				pregnancy/lactation (8), life expectancy <6 months (10)
		(c) Consider use of a flow diagram	4	Fig. 1 (study flow diagram) with detailed caption
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	5-6	Table 1 (MHD vs controls), Table 3 (LVH vs non-LVH), Table 4 (by AACS severity)
		(b) Indicate number of participants with missing data for each variable of interest	5	"There were no missing data... complete data were available for all included participants"
		(c) Cohort study—Summarise follow-up time (eg, average and total amount)		
Outcome data	15*	Cohort study—Report numbers of outcome events or summary measures over time	-	-
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	-	-
		Cross-sectional study—Report numbers of outcome events or summary measures	5-6	LVH: 110/189 (58.2%); AACS distribution: no 46 (24.3%), mild 54 (28.6%), moderate 53 (28.0%), severe 36 (19.1%); detailed in Tables 3 and 4
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	6, Table 6	Table 6: age >65 years (OR=1.980, 95%CI:1.125-3.483), K2<2.39 nmol/L (OR=0.728, 95%CI:0.572-0.917); adjusted for age, sex, phosphorus, PTH, phosphate binders, vitamin D analogs
		(b) Report category boundaries when continuous variables were categorized	3, 5, 6	AACS: 0-3; LVMI: female >100, male >131; K2: <2.39 nmol/L; age: >65 years
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	Not applicable	Cross-sectional study, no time-to-event data

Continued on next page

Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	5-6	Spearman correlation (Table 5, Fig. 3); sensitivity analysis excluding 3 extreme calcium values (reported in Table 5 footnote and in Methods)
Discussion				
Key results	18	Summarise key results with reference to study objectives	6	First paragraph of Discussion: age, BNP, Gas6, K2 in LVH; correlations with AACS; vitamin K deficiency and vascular calcification
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	7-8	Final paragraphs of Discussion: small sample size, cross-sectional design, no causal inference, dietary phosphorus and medical history not collected, extreme calcium values and lack of pre-specified sensitivity analysis, total Gas6 measurement (not active form), only aortic arch calcification assessed
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	6-8	Throughout Discussion: positive Gas6-AACS correlation discussed as possible compensatory response or inactive forms; negative vitamin K-LVH finding explained by multifactorial pathogenesis; interpretations acknowledge limitations
Generalisability	21	Discuss the generalisability (external validity) of the study results	7-8	Limitations section implies single-center, MHD-specific population; final sentence of limitations: "Whether our conclusions can be generalized to other vascular beds requires further investigation"
Other information				
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	9	"Funding: There was no funding"

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.