# Table S1. PRISMA Checklist

| Section/topic | # | Checklist item | Reported on page # |
|---|---|---|---|
| **TITLE** | | | |
| Title | 1 | Identify the report as a systematic review, meta-analysis, or both. | 1 |
| **ABSTRACT** | | | |
| Structured summary | 2 | Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number. | 1 |
| **INTRODUCTION** | | | |
| Rationale | 3 | Describe the rationale for the review in the context of what is already known. | 1-2 |
| Objectives | 4 | Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS). | 2 |
| **METHODS** | | | |
| Protocol and registration | 5 | Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number. | 2 |
| Eligibility criteria | 6 | Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale. | 2-3 |
| Information sources | 7 | Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched. | 2 |
| Search | 8 | Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated. | 2 |
| Study selection | 9 | State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis). | 3 |
| Data collection process | 10 | Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators. | 3 |
| Data items | 11 | List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made. | 3 |
| Risk of bias in individual studies | 12 | Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis. | 3 |
| Summary measures | 13 | State the principal summary measures (e.g., risk ratio, difference in means). | 3 |
| Synthesis of results | 14 | Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., $I^2$) for each meta-analysis. | 3 |

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| Risk of bias across studies | 15 | Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies). | 4 |
| Additional analyses | 16 | Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified. | 3 |
| **RESULTS** | | | |
| Study selection | 17 | Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram. | 4 |
| Study characteristics | 18 | For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations. | 4 |
| Risk of bias within studies | 19 | Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12). | 7 |
| Results of individual studies | 20 | For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot. | 4-6 |
| Synthesis of results | 21 | Present results of each meta-analysis done, including confidence intervals and measures of consistency. | 6 |
| Risk of bias across studies | 22 | Present results of any assessment of risk of bias across studies (see Item 15). | 8 |
| Additional analysis | 23 | Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]). | 7-8 |
| **DISCUSSION** | | | |
| Summary of evidence | 24 | Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers). | 9 |
| Limitations | 25 | Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias). | 10 |
| Conclusions | 26 | Provide a general interpretation of the results in the context of other evidence, and implications for future research. | 10 |
| **FUNDING** | | | |
| Funding | 27 | Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review. | 10 |

*From:* Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

For more information, visit: **www.prisma-statement.org**.

**Table S2 The results of subgroup analysis**

| Subgroup | No. of studies | No. of participants | No. of cases | Relative risk (95% CI[1]) | $I^2$ (%) |
|---|---|---|---|---|---|
| **Study type** | | | | | |
| case control study | 3 | 1618 | 974 | 6.59 (1.17, 37.02) | 95 |
| prospective study | 16 | 122942 | 6445 | 1.28 (1.19, 1.38) | 32 |
| **Sample size** | | | | | |
| no more than 1000 | 5 | 2527 | 1071 | 3.63 (1.30, 10.15) | 91 |
| more than 1000 | 14 | 122033 | 6348 | 1.28 (1.18, 1.38) | 32 |
| **Subtype of stroke** | | | | | |
| ischemic stroke | 7 | 45856 | 3731 | 2.36 (1.53, 3.63) | 88 |
| hemorrhagic stroke | 4 | 9463 | 460 | 2.50 (0.87, 7.15) | 89 |
| **Vitamin type** | | | | | |
| intake | 3 | 13432 | 1339 | 1.22 (0.96, 1.55) | 53 |
| circulating | 17 | 111883 | 6150 | 1.93 (1.49, 2.48) | 86 |

[1] CI, confidence interval.

**Table S3 Variables adjusted in the model of each included study**

| Study | Variables adjusted in model |
|---|---|
| Marniemi et al, 2005 | age, gender, smoking and functional capacity, for serum 25(OH)D<br>age, gender, smoking, functional capacity and weight adjusted energy intake, for vitamin intake |
| Bolland et al, 2010 | treatment allocation (calcium or placebo) , baseline age , body weight , smoking status , systolic blood pressure , history of ischemic heart disease、stroke or transient ischemic attack , dyslipidemia, and diabetes |
| Drechsler et al, 2010 | age, sex, atorvastatin treatment, season, coronary artery disease, congestive heart failure, systolic blood pressure, smoking, duration of dialysis, ultrafiltration volume, body mass index, levels of LDL, HDL cholesterol, C-reactive protein, HbA1c, use of beta-blockers, ACE inhibitors, diuretics,levels of parathyroid hormone, calcium, and phosphate. |
| Anderson et al, 2010 | age, gender, hypertension, hyperlipidemia, diabetes mellitus, and peripheral vascular disease , fractures, pulmonary embolism, depression, renal failure, skeletal disorder, hypothyroidism, infection requiring medical attention, and headache |
| Schierbeck et al, 2012 | age, smoking, blood pressure, family history of MI, education and hip/waist ratio |
| Kojima et al, 2012 | age, total kilocalories, BMI, hypertension, diabetes mellitus, pack-years smoking, PAI, serum cholesterol, and alcohol intake |
| Sun et al, 2012 | age at blood draw (year), menopausal status, use of postmenopausal hormone, race, smoking status ,body mass index, physical activity, use of aspirin, hypertension, high cholesterol, history of heart disease or diabetes, alcohol consumption, use of multivitamin, intakes of calcium and trans-fat, polyunsaturated fat to<br>saturated fat ratio, and glycemic load |
| Michos et al, 2012 | age and sex,income, education, body mass index, smoking, physical activity, alcohol use, season,C-reactive protein, diabetes, hypertension, hypercholesterolemia, and race |
| Perna et al, 2013 | age, sex, and season of blood draw, BMI, smoking, physical activity, total cholesterol, CRP, family history of CVD, fish consumption, regular multivitamin supplement intake, hypertension, DM, and CKD |
| Kühn et al, 2013 | BMI, sex, stratified by center, age at baseline, waist circumference, alcohol intake, education level, physical activity, and smoking |
| Skaaby et al, 2013 | study group, gender, education, season of blood sample, intake of fish, physical activity, smoking habits, body mass index, and alcohol consumption |
| Ford et al, 2014 | age, sex, time since fracture, type of fracture, diabetic status, smoking status, and myocardial infarction |

| | |
|---|---|
| Schneider et al, 2015 | age, sex, race, center, education, physical activity, smoking status, and body mass index |
| Judd et al, 2016 | age, race, age*race interaction, sex, season of blood draw, systolic blood pressure, body mass index, diabetes, left ventricular hypertrophy, current smoking, atrial fibrillation, coronary heart disease, estimated glomerular filtration rate, log-transformed albumin to creatinine ratio and use of anti-hypertensive medications, statins, aspirin serum calcium, phosphorus, intact parathyroid hormone, high-density lipoprotein, low-density lipoprotein, total cholesterol and triglyceride concentrations |
| Zittermann et al, 2016 | gender, body mass index, ECMO implantation, aspartate aminotransferase, white blood cells, C-reactive protein, and platelets |
| Alfieri et al, 2017 | age, gender, body mass index levels, ethnicity, smoking status, diabetes, dyslipidemia, antihypertension, hypoglycemic, and hypolipemiant drugs |
| Tan et al, 2017 | N.A. |
| Leung et al, 2017 | age, sex, BMI, lifestyle factors (smoking, drinking, physical activity, education levels), biomarkers of vitamin D (season, eGFR, serum calcium, serum phosphate, serum alkaline phosphatase, serum parathyroid hormone levels), history of lipid lowering medications, and history of antihypertensive drugs |
| Afzal et al, 2017 | age, sex, smoking status, cumulative tobacco consumption, alcohol consumption, leisure time physical activity, body mass index, income, diabetes mellitus, ratio of non–high-density lipoprotein (HDL) to HDL cholesterol, stroke in parents, atrial fbrillation, estimated glomerular fltration rate, antihypertensive medication, month and year of blood sample, and study |