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Supplementary Table 1. Search strategy

Search terms	PubMed [1]	Scopus [2]	ScienceON [3]
1	tomato*	tomato*	tomato*
2	lycopene	lycopene	lycopene
3	*"Solanum lycopersicum"*	*"Solanum lycopersicum"*	*"Solanum lycopersicum"*
3	1 OR 2 OR 3	1 OR 2 OR 3	1 | 2 | 3
4	systematic review*	systematic review*	systematic review*
5	meta-analy*	meta-analy*	meta-analy*
6	metaanaly*	metaanaly*	metaanaly*
7	meta analy*	meta analy*	meta analy*
8	4 OR 5 OR 6 OR 7	4 OR 5 OR 6 OR 7	4 | 5 | 6 | 7
9	3 AND 8	3 AND 8	3 AND 8

1) ("Tomato"[Title/Abstract] OR "Lycopene"[Title/Abstract] OR "Solanum lycopersicum"[Title/Abstract]) AND ("systematic review*"[Title/Abstract] OR "meta analy*"[Title/Abstract] OR "metaanaly*"[Title/Abstract] OR "meta analy*"[Title/Abstract])

2) (TITLE-ABS-KEY (tomato* OR lycopene OR "Solanum lycopersicum") AND TITLE-ABS-KEY (systematic AND review* OR meta-analy* OR metaanaly* OR meta AND analy*)) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (DOCTYPE , "re"))

3) Title=(tomato* \| lycopene \| "Solanum lycopersicum") (systematic review* \| meta-analy* \| metaanaly* \| meta analy*) OR Abstract=(tomato* \| lycopene \| "Solanum lycopersicum") (systematic review* \| meta-analy* \| metaanaly* \| meta analy*) OR Keyword=(tomato* \| lycopene \| "Solanum lycopersicum") (systematic review* \| meta-analy* \| metaanaly* \| meta analy*)
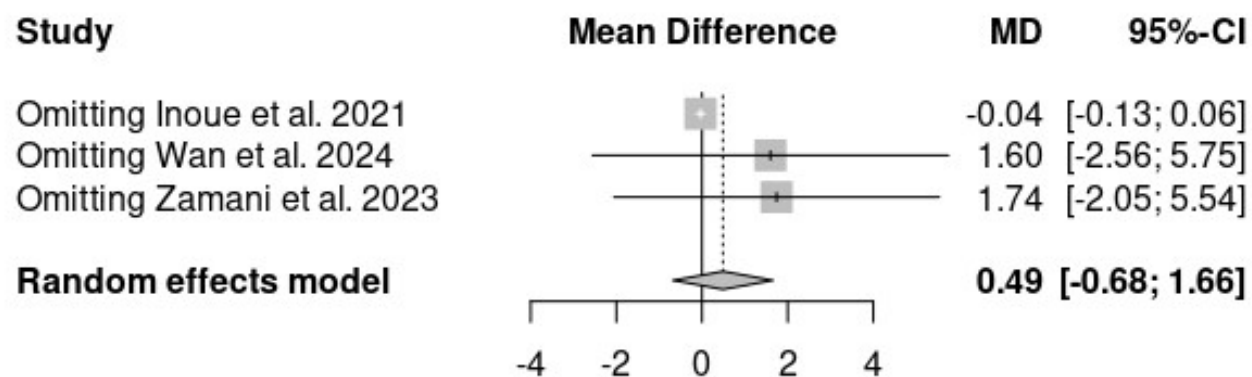
Supplementary Table 2. Characteristics of the participants in the primary studies included in the systematic reviews and meta-analyses

Authors (Year)	Population (age range, n)	Participant characteristics
Inoue *et al.* (2021)	≥18 (1,635)	• Healthy adults / Female students • CVD / Hyperlipidemia / Low HDL-cholesterol / Metabolic syndrome / Overweight / T2D
Joung *et al.* (2023)	18–74 (385)	• CVD / Dyslipidemia / Heart failure / Hypertension & Pre-hypertension / Metabolic syndrome / Obesity / T2D
Rattanavipanon *et al.* (2021)	≥18 (548)	• Healthy adults • Hypertension & Pre-hypertension / Overweight
Rezaei kelishadi *et al.* (2022)	≥18 (688)	• Healthy adults • CVD / Hypertension & Pre-hypertension / Overweight
Senkus *et al.* (2019)	20–80 (29,957)	• Healthy adults / Female students • Metabolic syndrome (pre-existing diagnosis) / Overweight CVD
Tierney *et al.* (2020)	≥18 (2,306)	• Healthy adults / Physically active (e.g., ultramarathon runners) / Postmenopausal women / Sedentary lifestyle / Smokers or alcohol consumers • CVD (incl. stable on statin therapy) / Dyslipidemia / Elevated cholesterol / Elevated triglycerides / Hypertension & Pre-hypertension / Low HDL-cholesterol / Metabolic syndrome / Obesity / Overweight / Oxidative stress / T2D
Wan *et al.* (2024)	18–75 (666)	• Healthy adults • Hypertension
Wang *et al.* (2020)	18–74 (758)	• Healthy adults / Postmenopausal women • High cardiovascular-risk patients / Hypertension / Obesity / Overweight
Zamani *et al.* (2023)	≥18 (1,980)	• Healthy adults / Athletes / Female students / Postmenopausal women / Smokers (healthy) • Benign prostate hyperplasia / CVD / Chronic obstructive pulmonary disease / Heart failure / Hemodialysis / Hypertension & Pre-hypertension / Obesity / T2D

Abbreviations: CVD, cardiovascular disease; T2D, type 2 diabetes; HDL, high-density lipoprotein.

Supplementary Fig. 1. Results of AMSTAR2 quality assessment of the methodological quality of the systematic reviews. Each row represents one included SR/MA, and columns represent the 16 AMSTAR 2 items. Green circles (●) indicate "Yes," yellow circles (◑) indicate "Partial yes," red (X) marks indicate "No," and dashes (-) indicate "No meta-analysis conducted" (for items applicable only to meta-analyses). AMSTAR 2 Critical Items (bolded item numbers in the figure): 2, 4, 7, 9, 11, 13, 15. Full item descriptions: (1) PICO components in research question; (2) Protocol registration and justification for deviations; (3) Study design selection and justification; (4) Comprehensive literature search strategy; (5) Study selection in duplicate; (6) Data extraction in duplicate; (7) List of excluded studies with justification; (8) Adequate description of included studies; (9) Satisfactory technique for assessing risk of bias (RoB); (10) Reporting of funding sources for included studies; (11) Appropriate statistical methods for meta-analysis (if applicable); (12) Assessment of potential impact of RoB on results (if applicable); (13) Consideration of RoB when interpreting results; (14) Satisfactory explanation of heterogeneity; (15) Investigation of publication bias (if applicable); (16) Reporting of conflicts of interest and funding sources.

Study	Mean Difference	MD	95%-CI
Omitting Inoue et al. 2021		-0.04	[-0.13; 0.06]
Omitting Wan et al. 2024		1.60	[-2.56; 5.75]
Omitting Zamani et al. 2023		1.74	[-2.05; 5.54]
Random effects model		**0.49**	**[-0.68; 1.66]**

Supplementary Fig. 2. **Leave-one-out sensitivity analysis for the meta-analysis of HDL-C.** Forest plot showing the pooled mean difference (MD) in HDL-C when each systematic review was sequentially omitted from the meta-analysis. Each row represents the meta-analysis result on excluding the study indicated on the left. HDL-C, high-density lipoprotein cholesterol; MD, mean difference; CI, confidence interval.