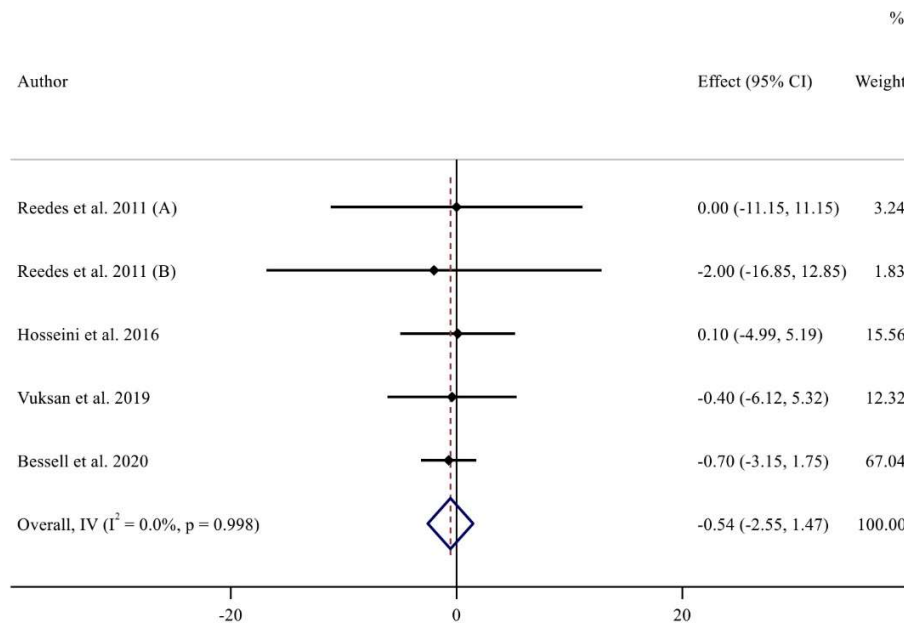
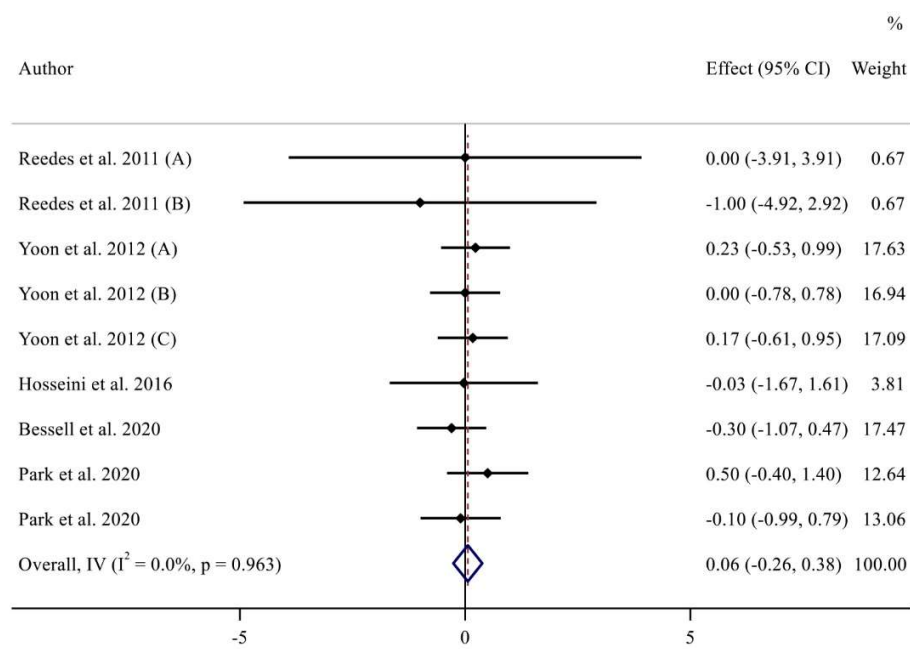


Supplementary Figure S1. Forrest plots presenting mean difference (MD) and 95% confidence intervals for the impact of ginseng supplementation.

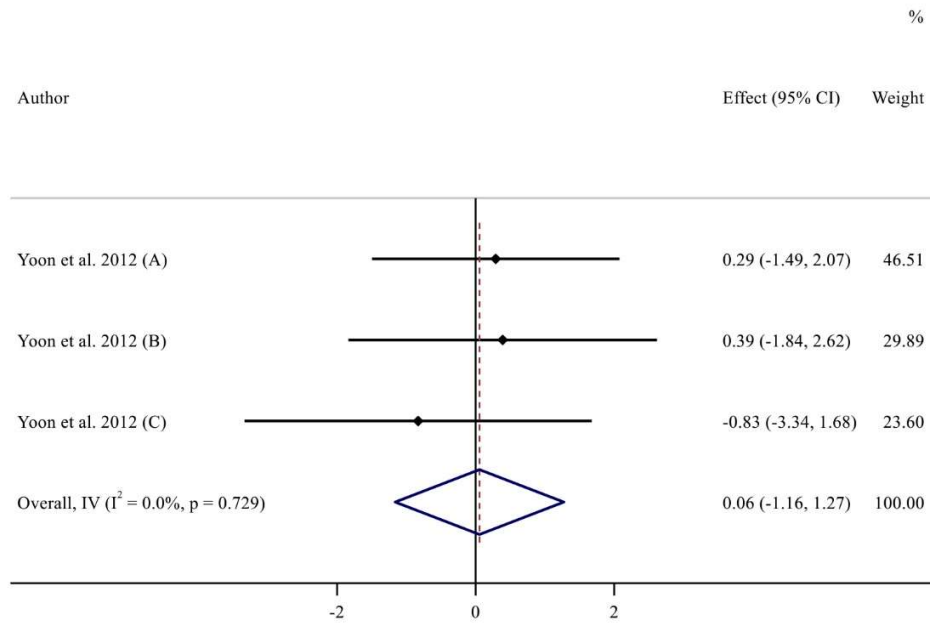
1. a



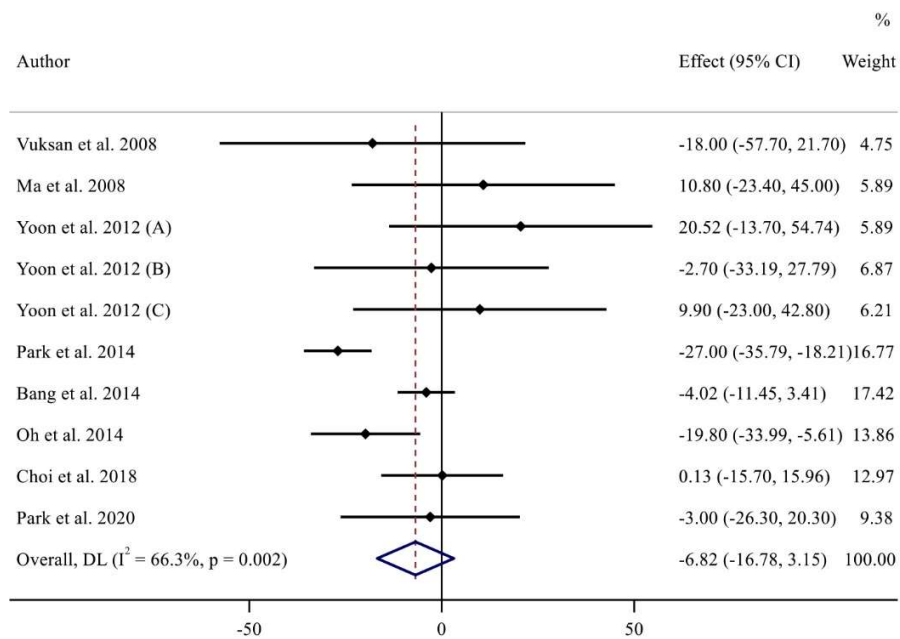
1. b



1. c

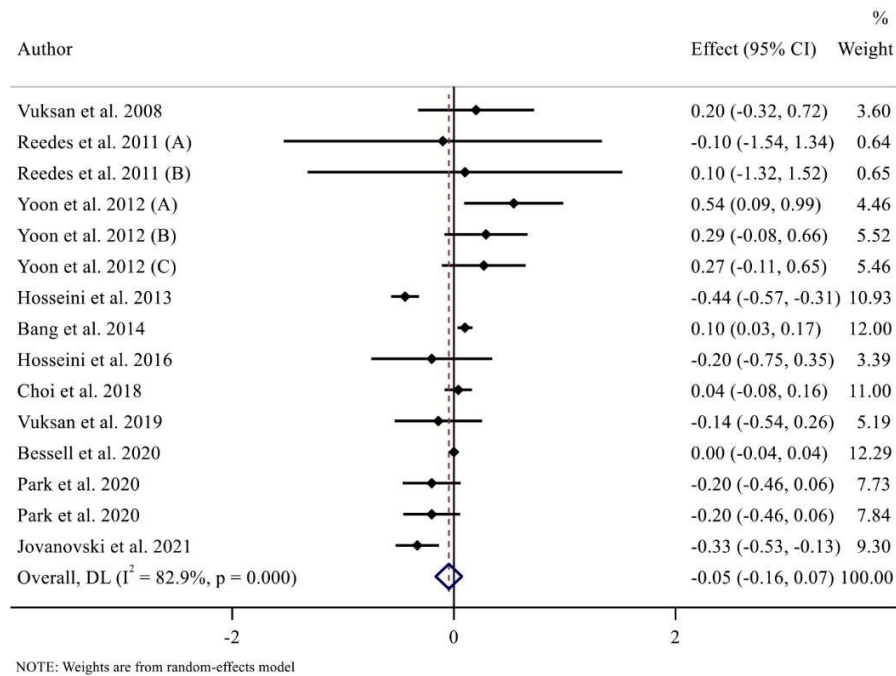


1. d

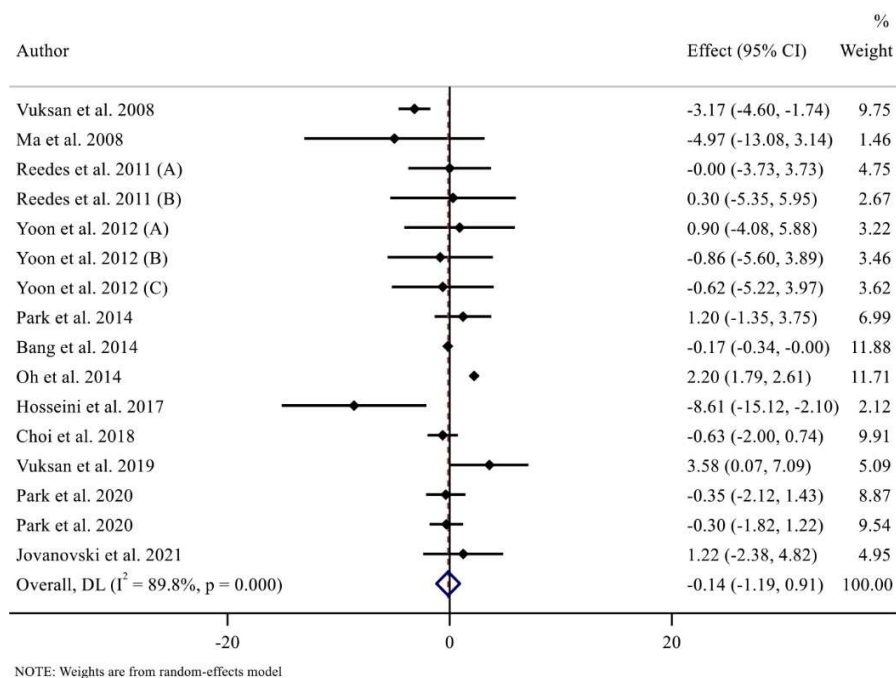


NOTE: Weights are from random-effects model

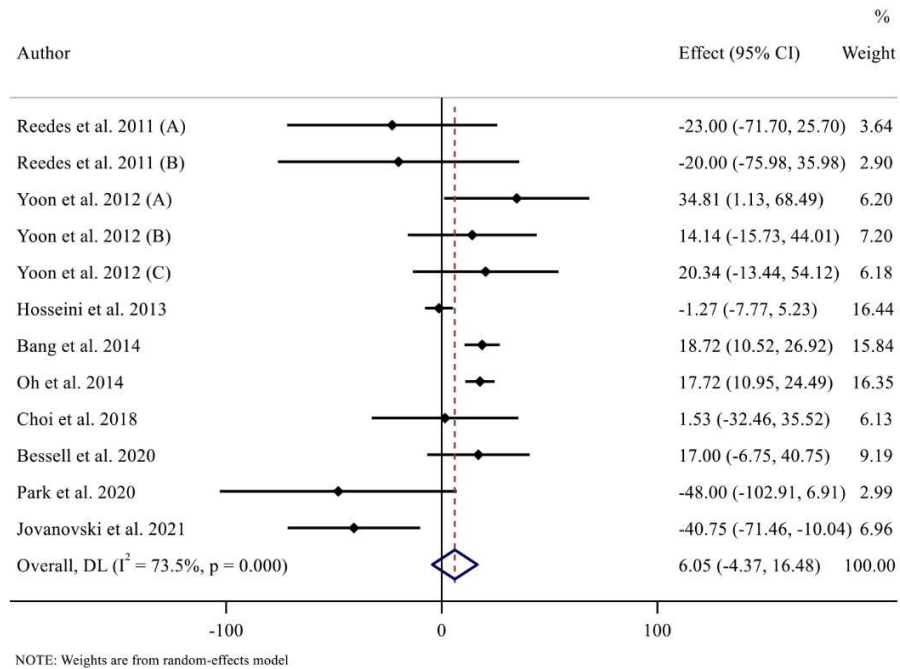
1. e



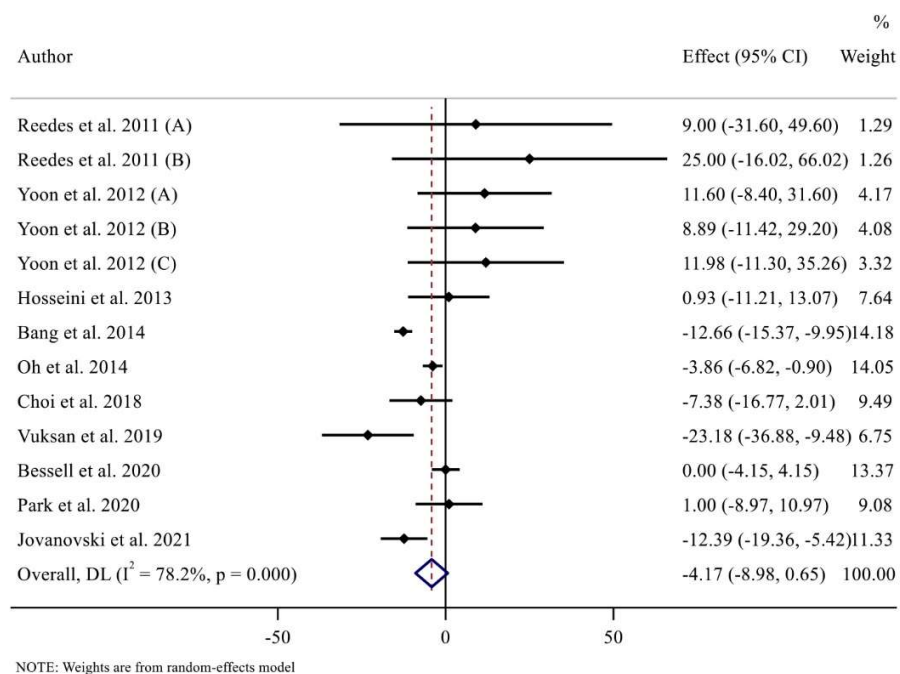
1. f



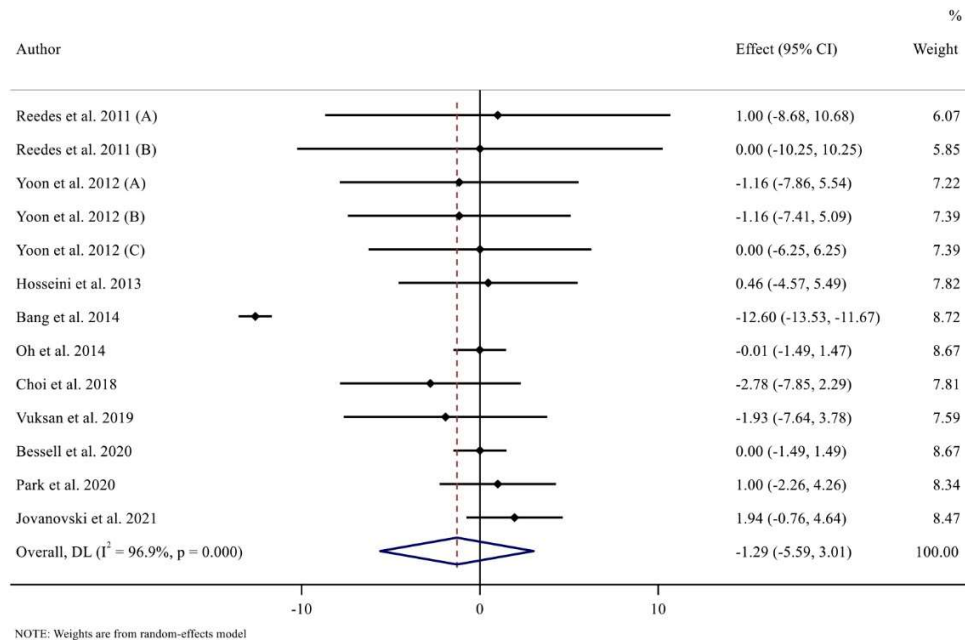
1. g



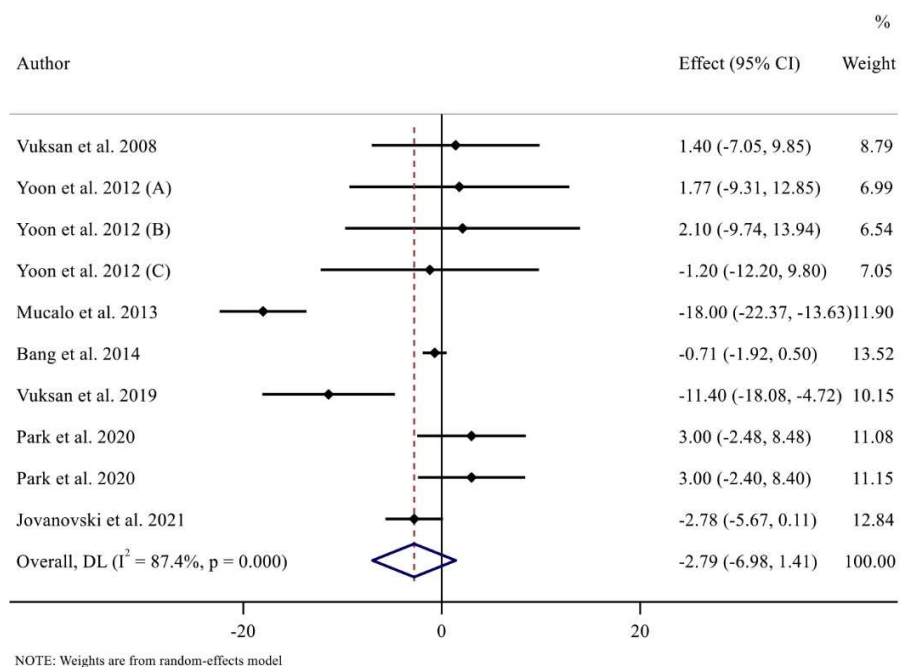
1. h



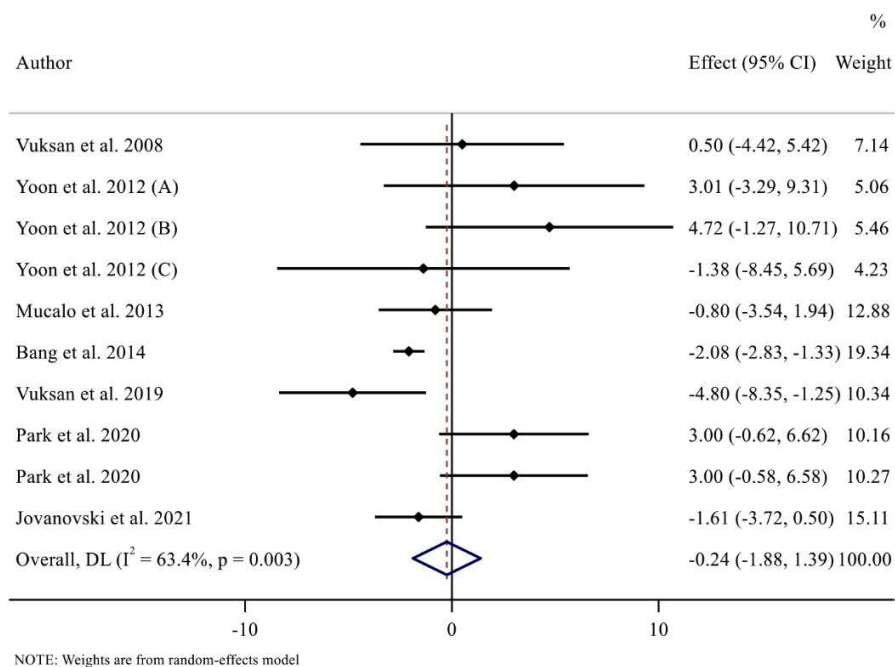
1.i



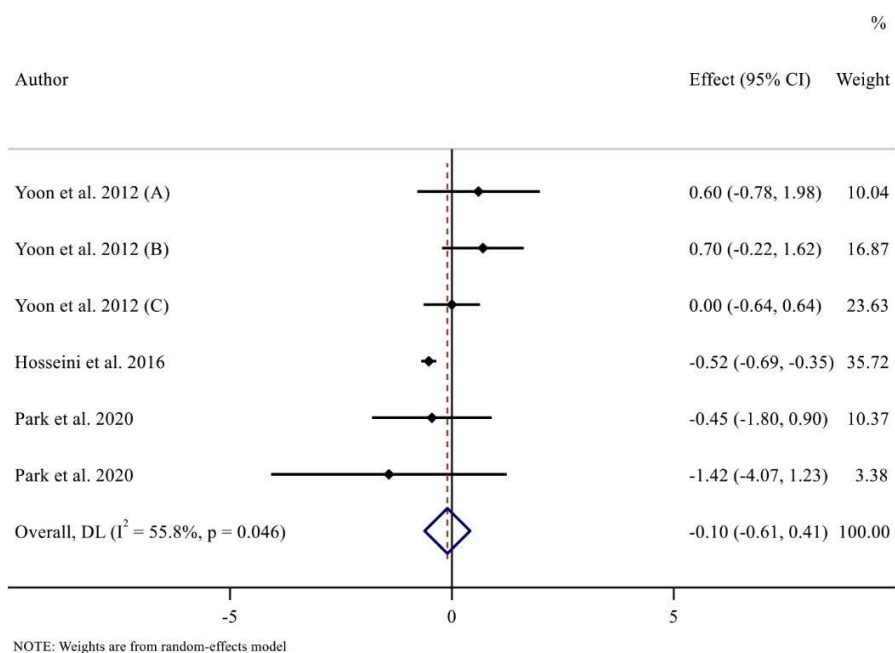
1.j



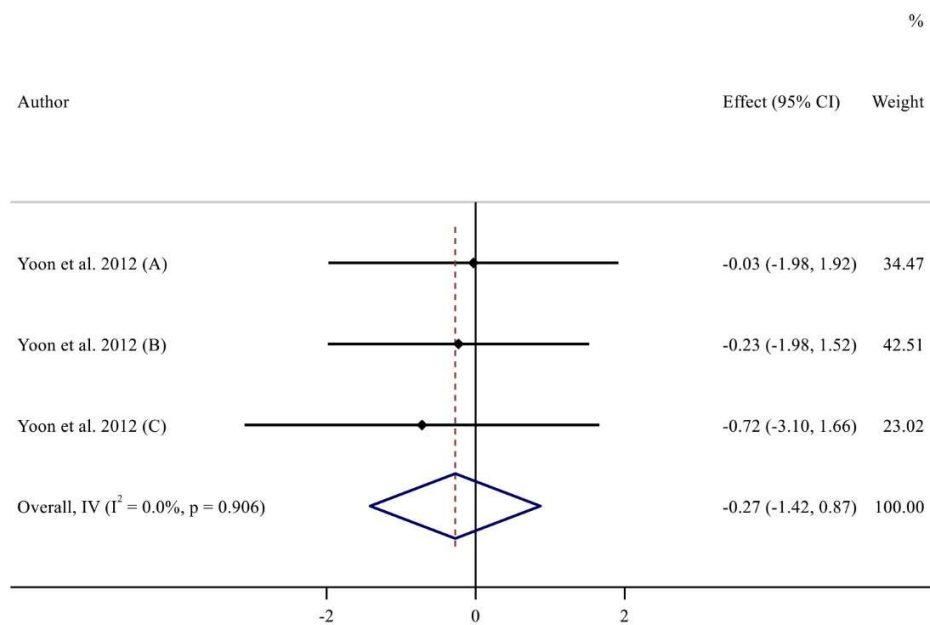
1. k



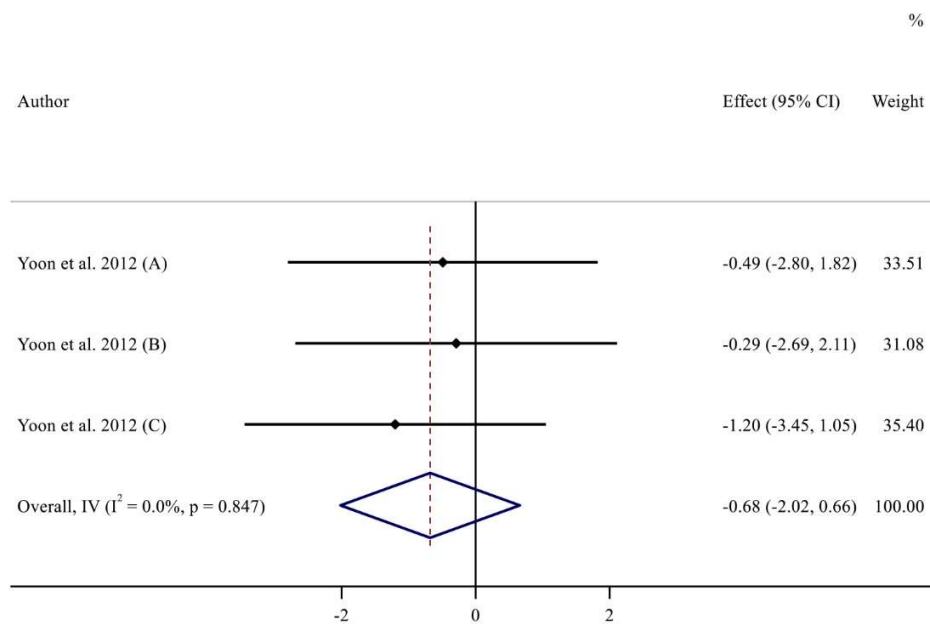
1. l



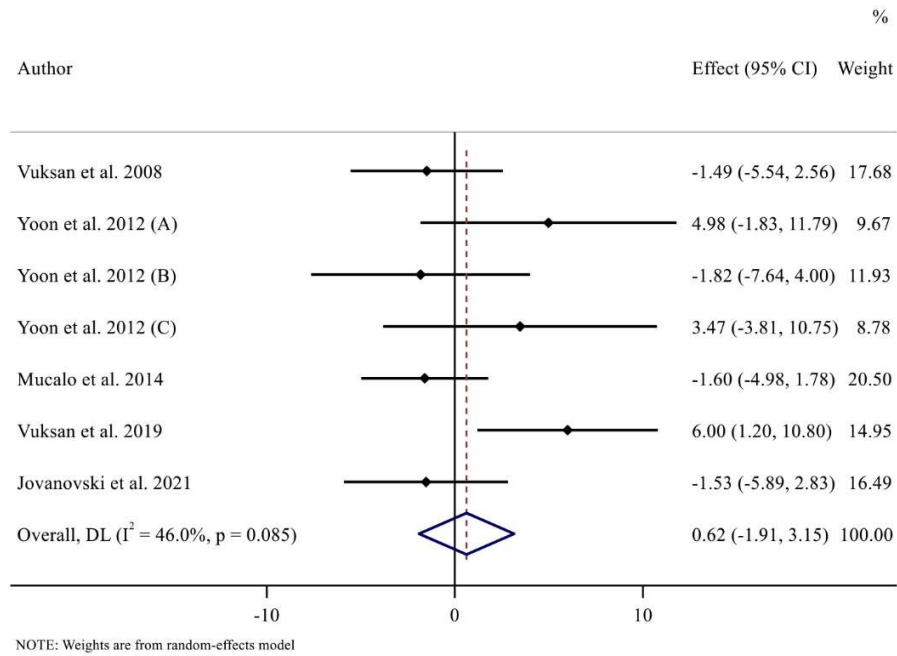
1. m



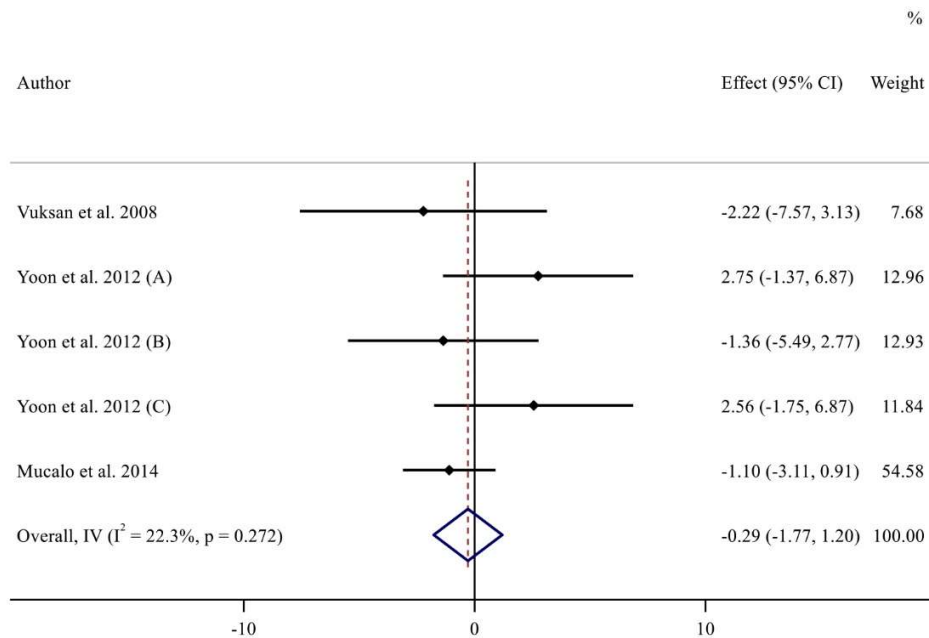
1. n



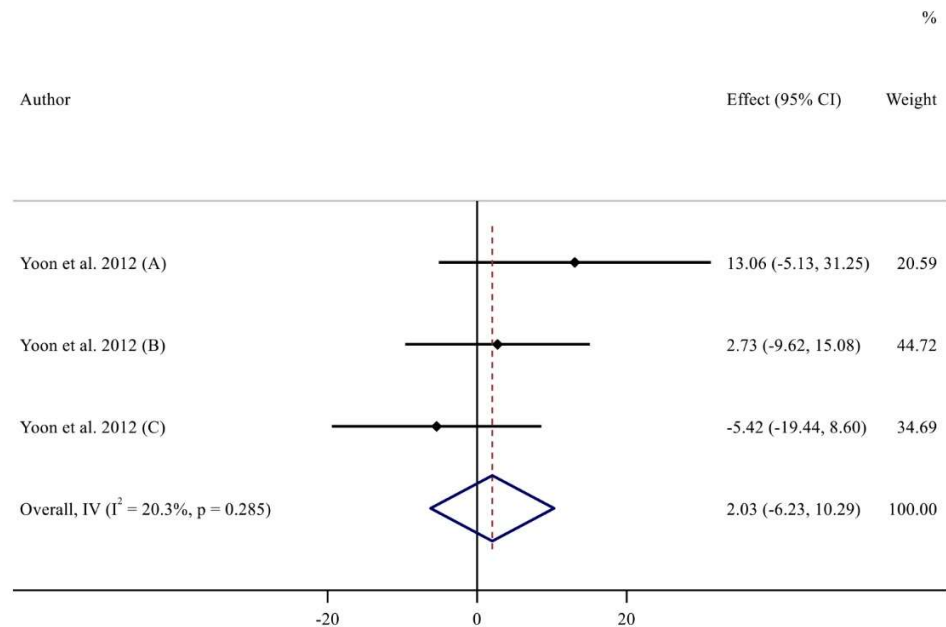
1. o



1. p



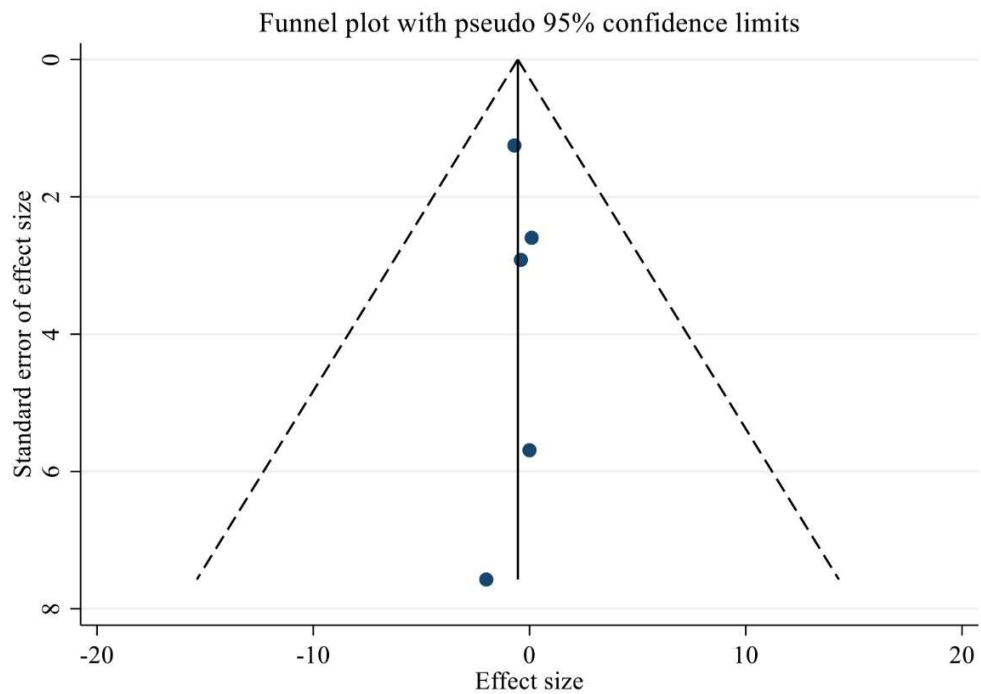
1. q



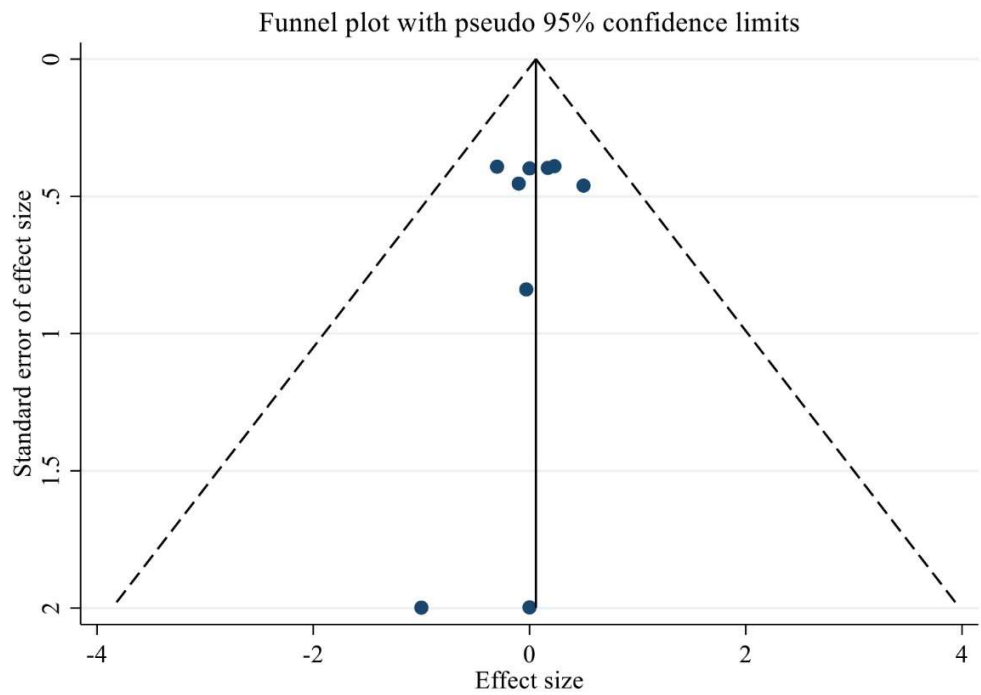
a: body weight (BW); b: body mass index (BMI); c: waist circumference (WC); d: oral glucose tolerance test (OGTT); e: hemoglobin A1c (HbA1c); f: fasting insulin; g: triglyceride (TG); h: low-density lipoprotein cholesterol (LDL-C); i: high-density lipoprotein cholesterol (HDL-C); j: systolic blood pressure (SBP); k: diastolic blood pressure (DBP); l: C-reactive protein (CRP); m: adiponectin; n: leptin; o: alanine aminotransferase (ALT); p: aspartate aminotransferase (AST); q: gamma-glutamyl transferase (GGT).

Supplementary Figure S2. Funnel plots demonstrating publication bias in the trials reporting the effect of ginseng supplementation.

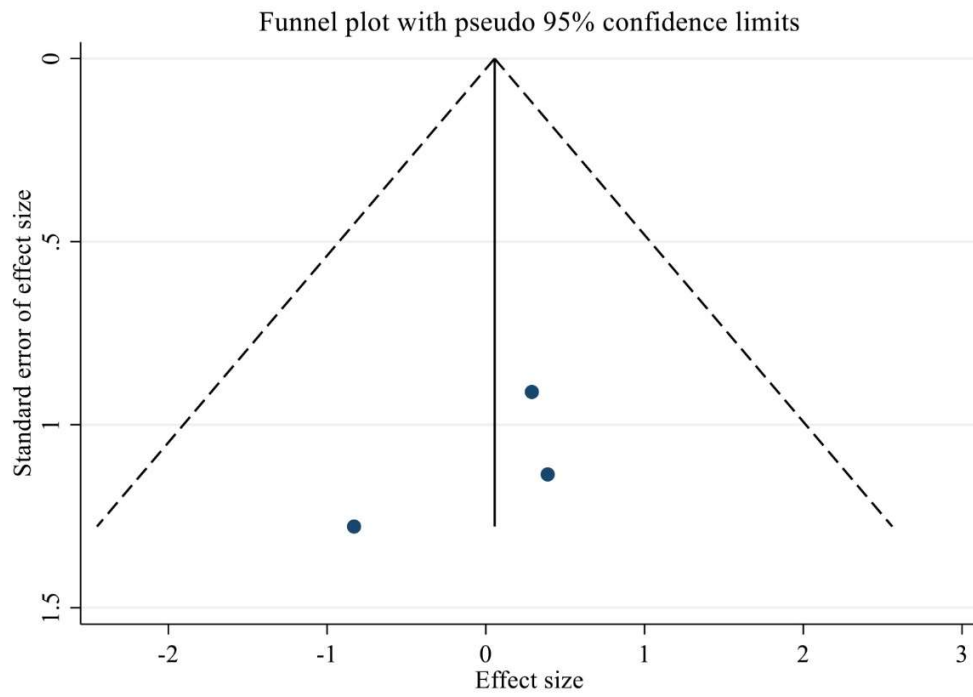
2. a



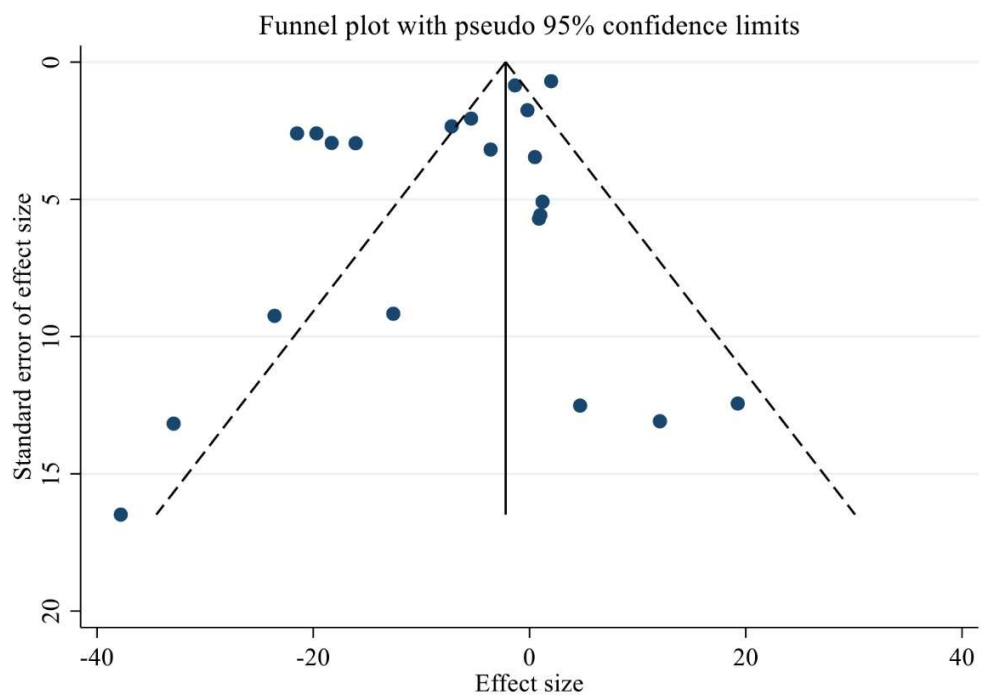
2. b



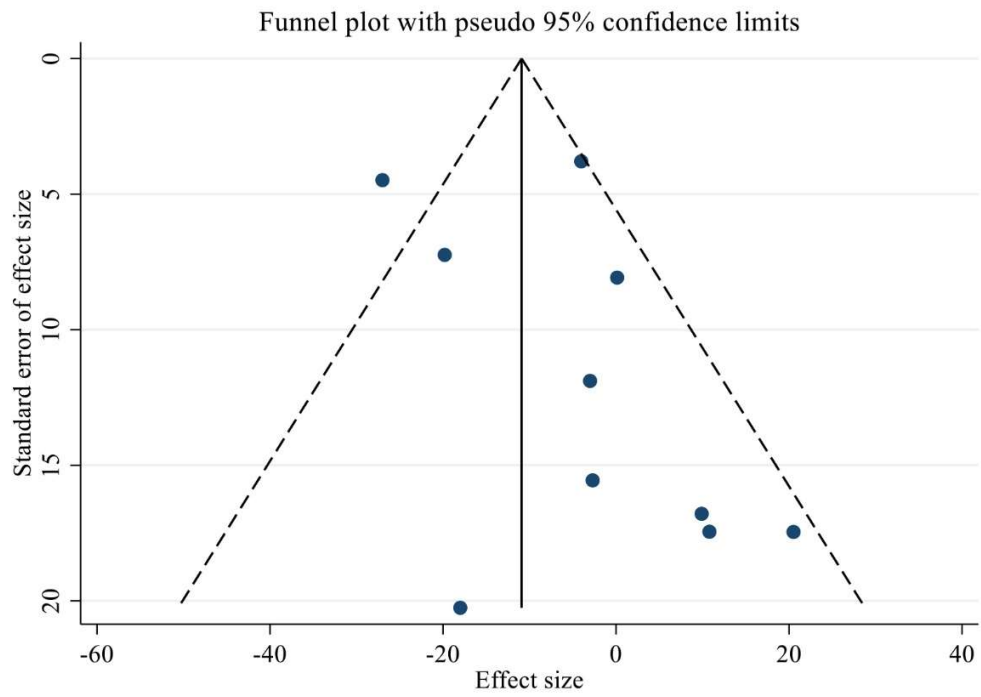
2. c



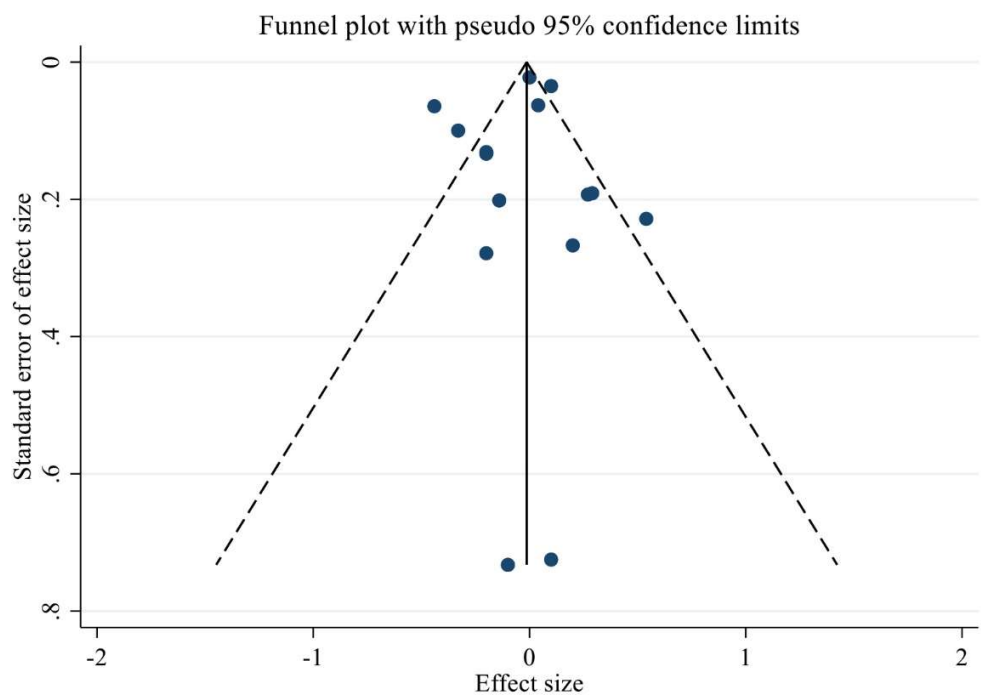
2. d



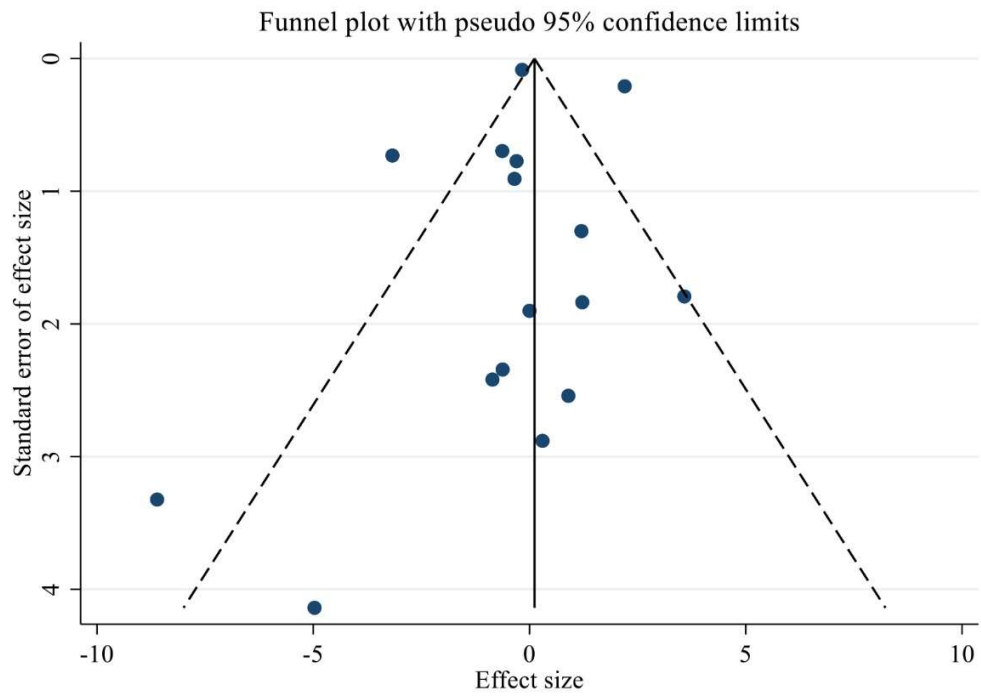
2. e



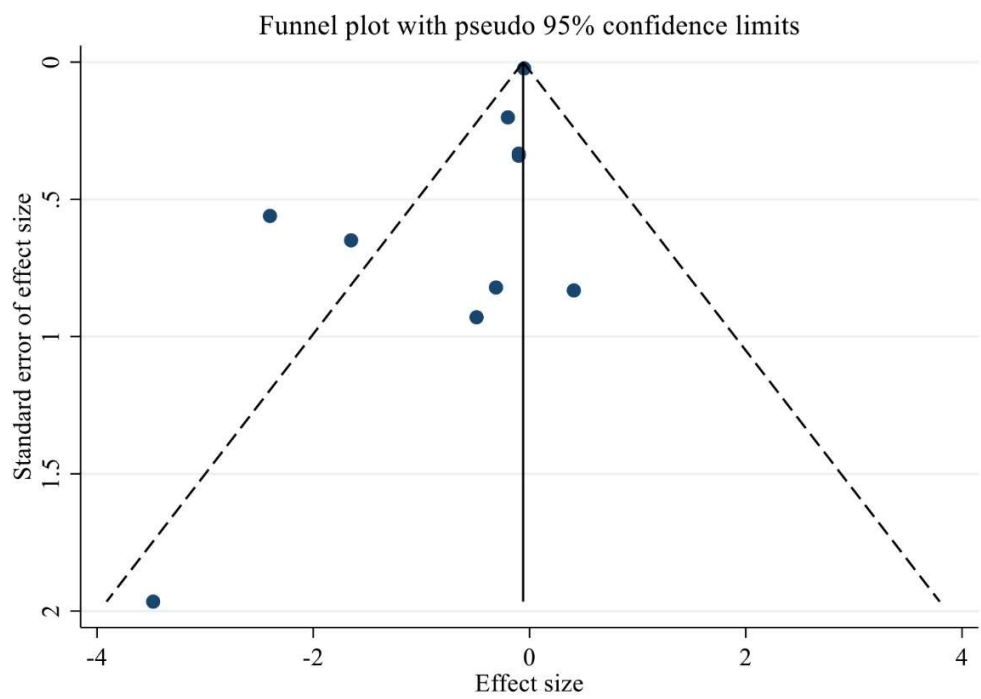
2. f



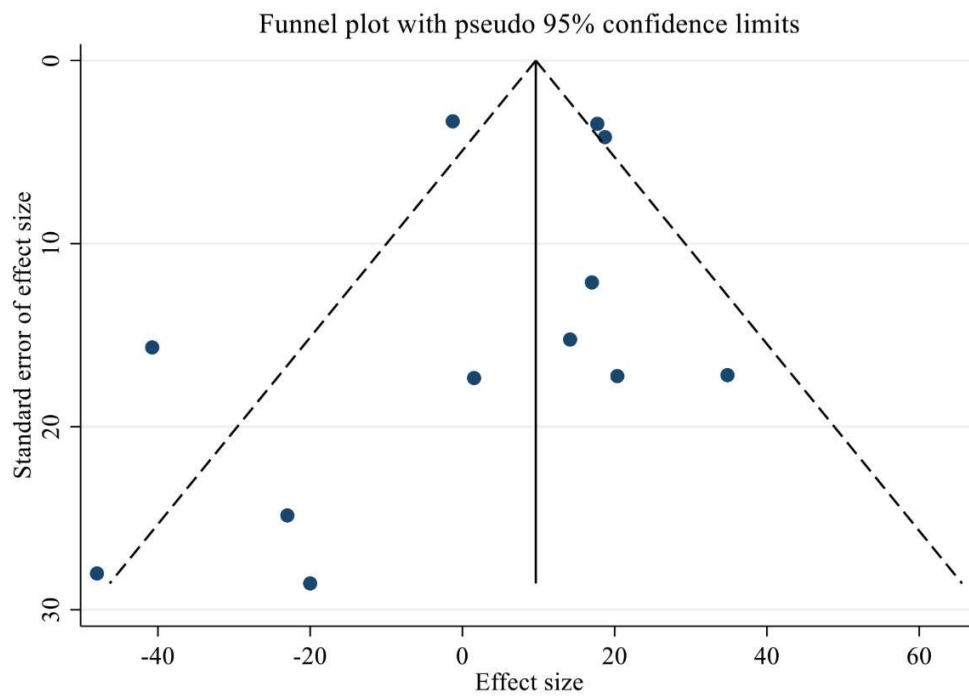
2. g



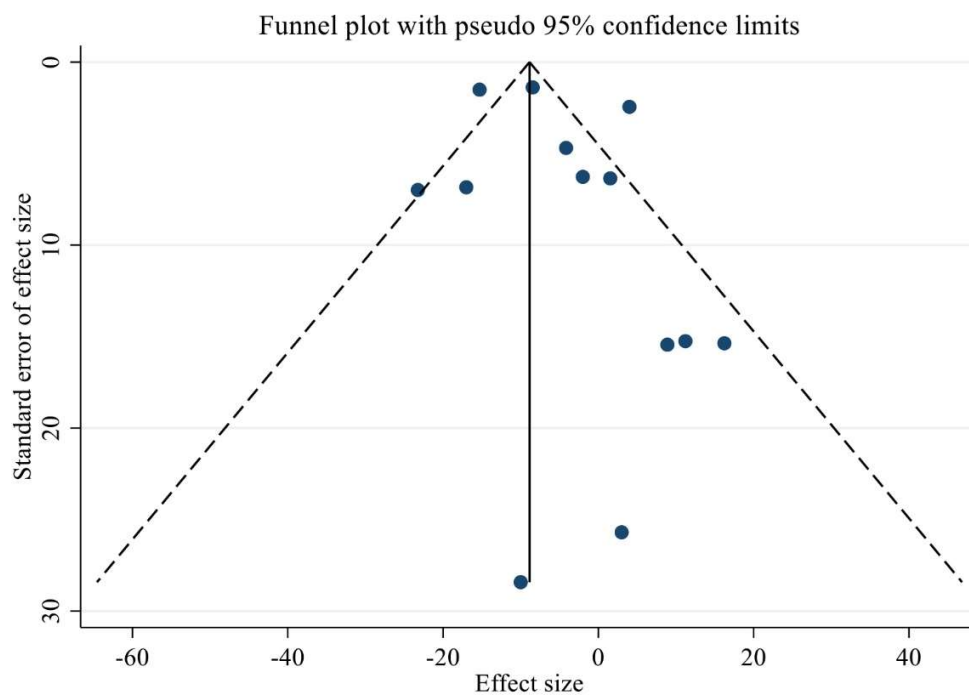
2. h



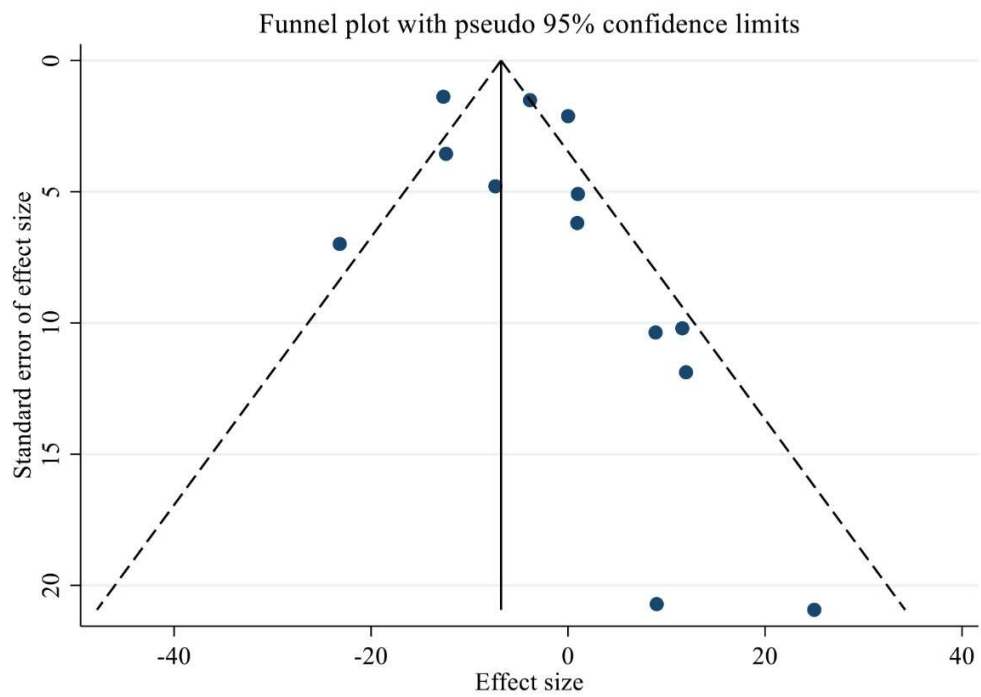
2. i



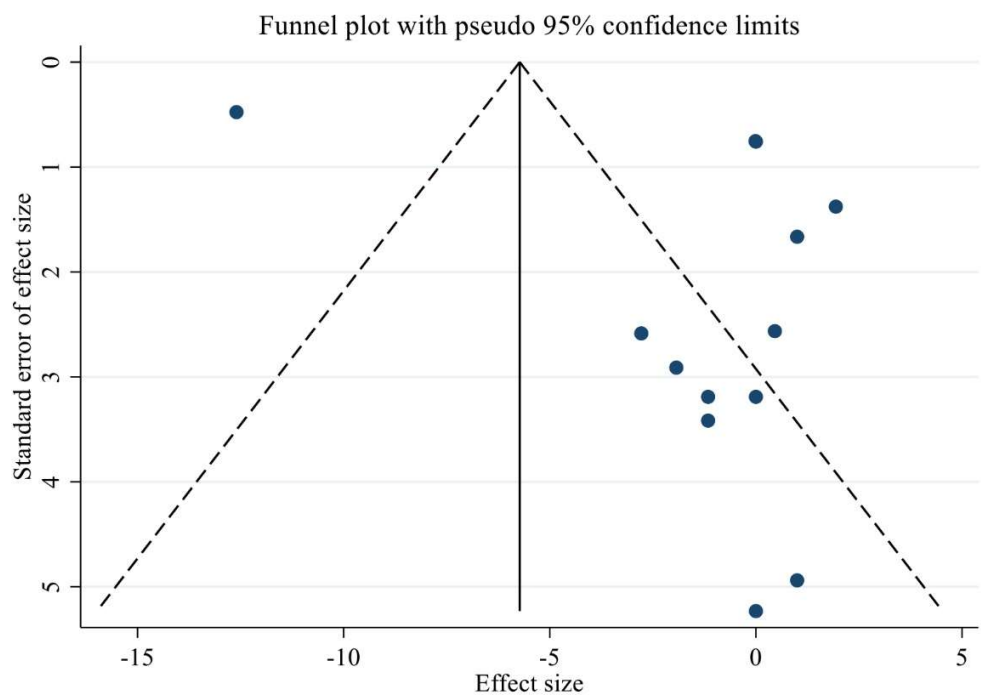
2. j



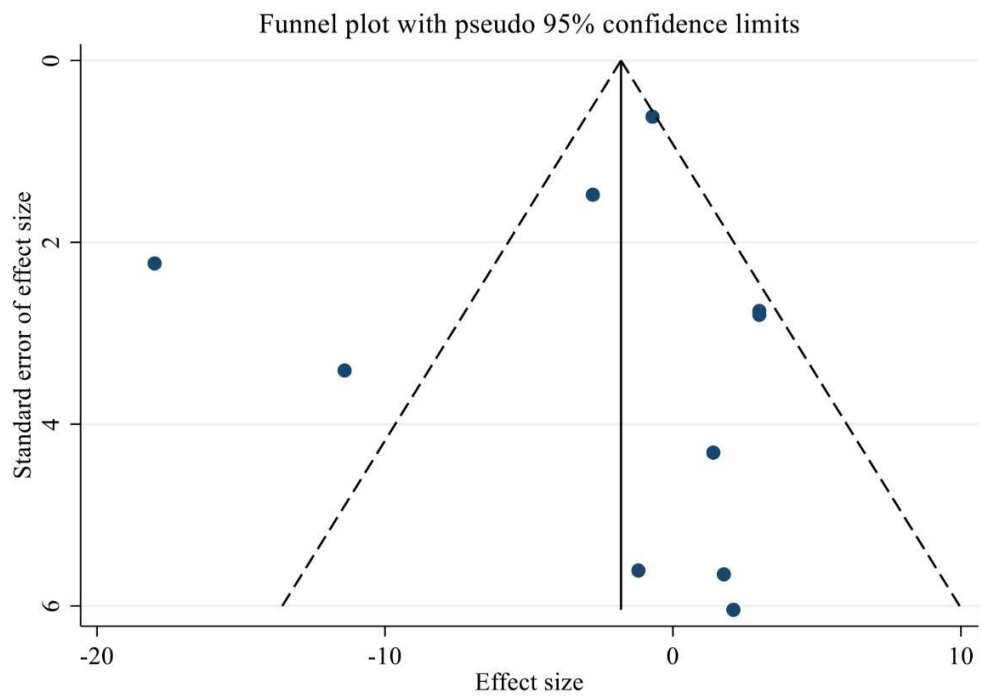
2. k



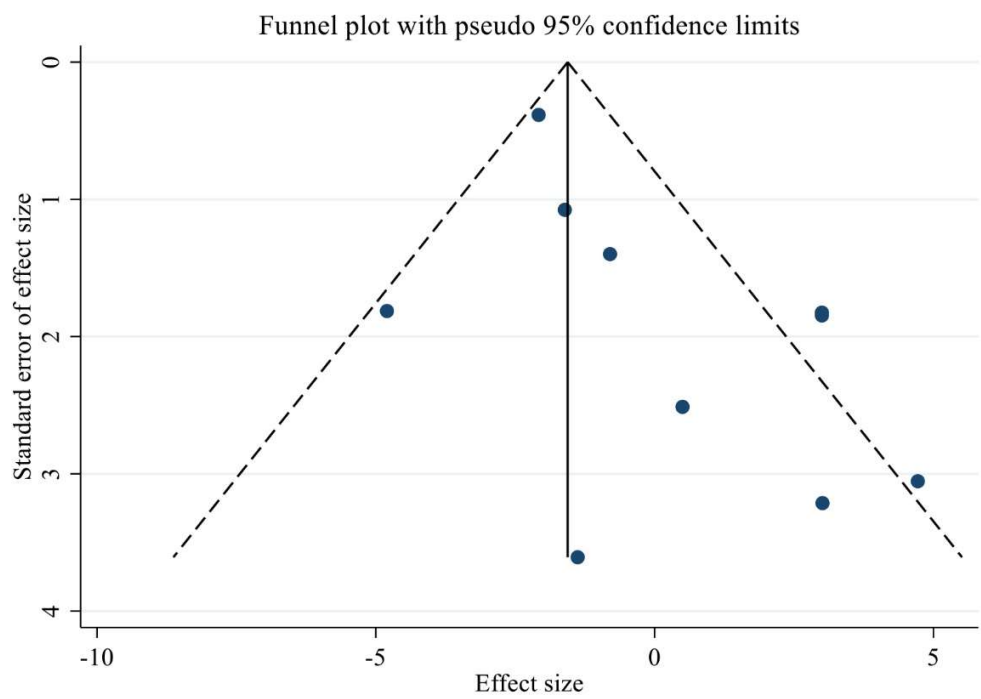
2. l



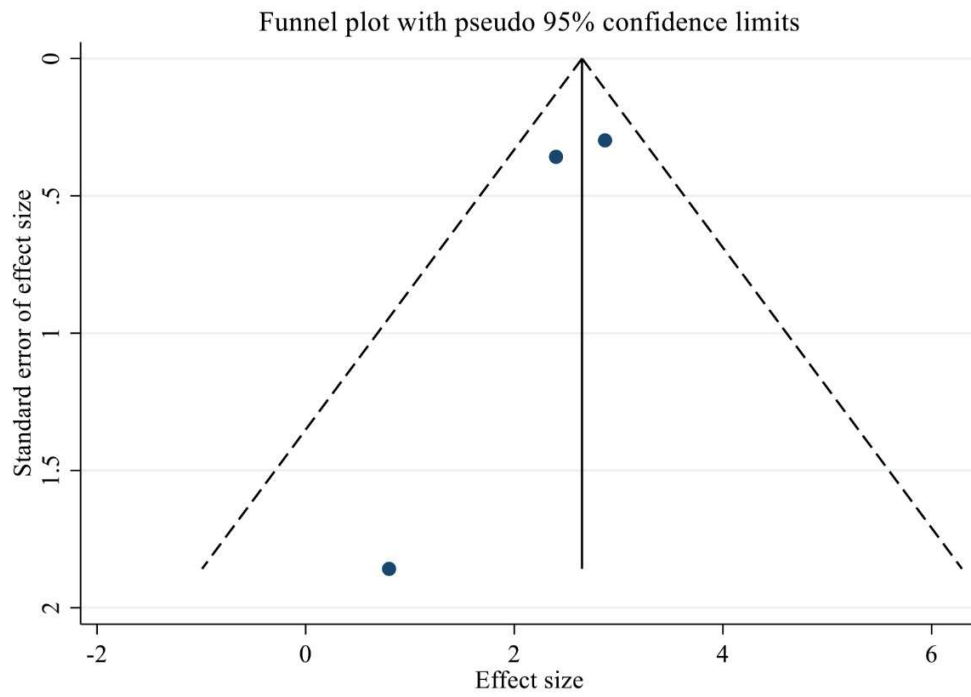
2. m



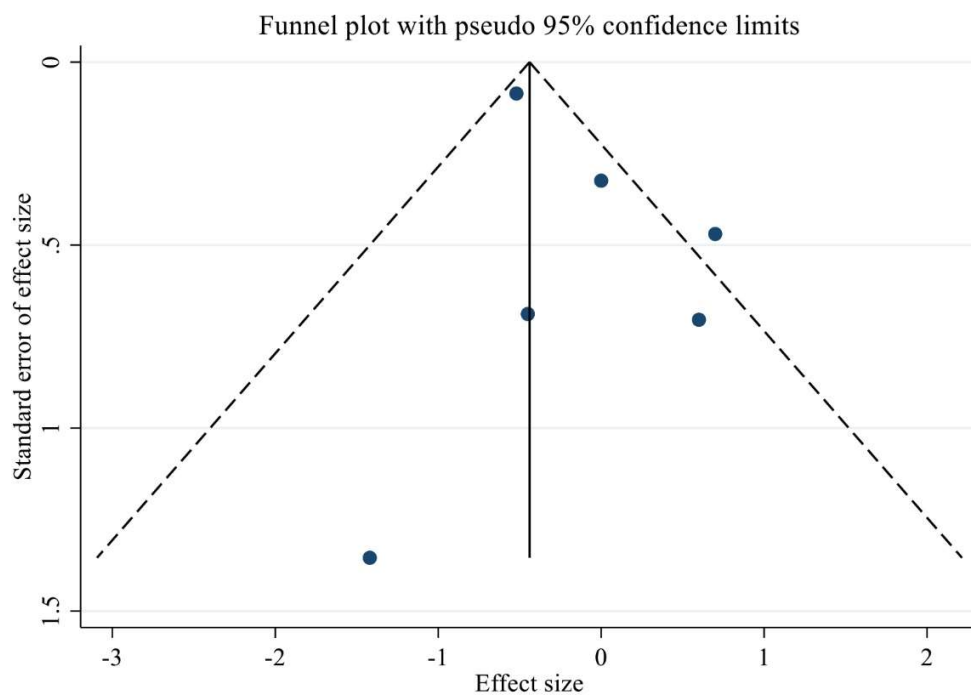
2. n



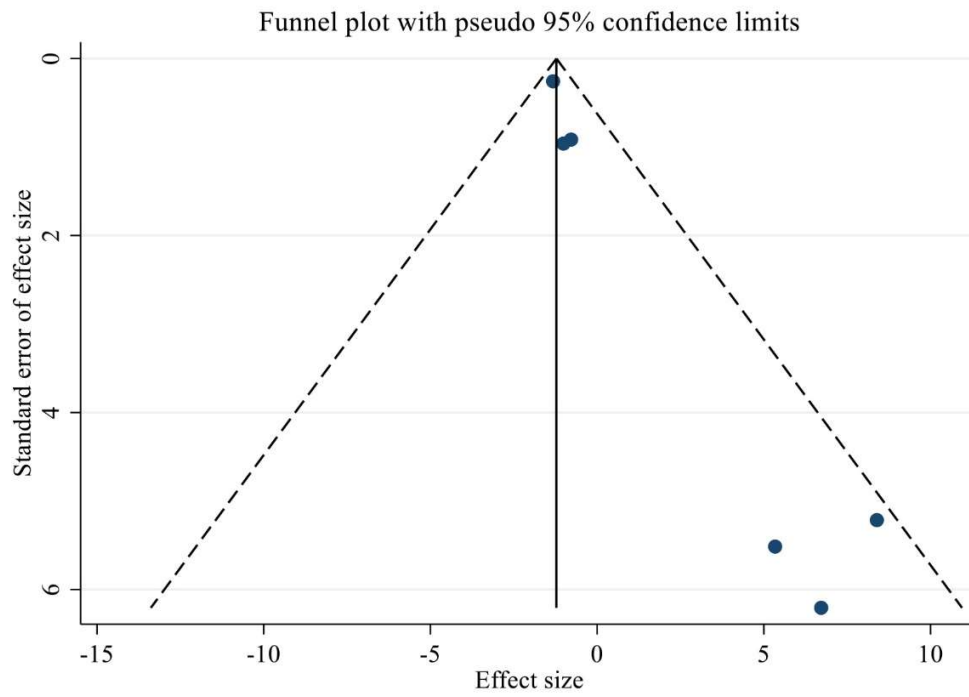
2. o



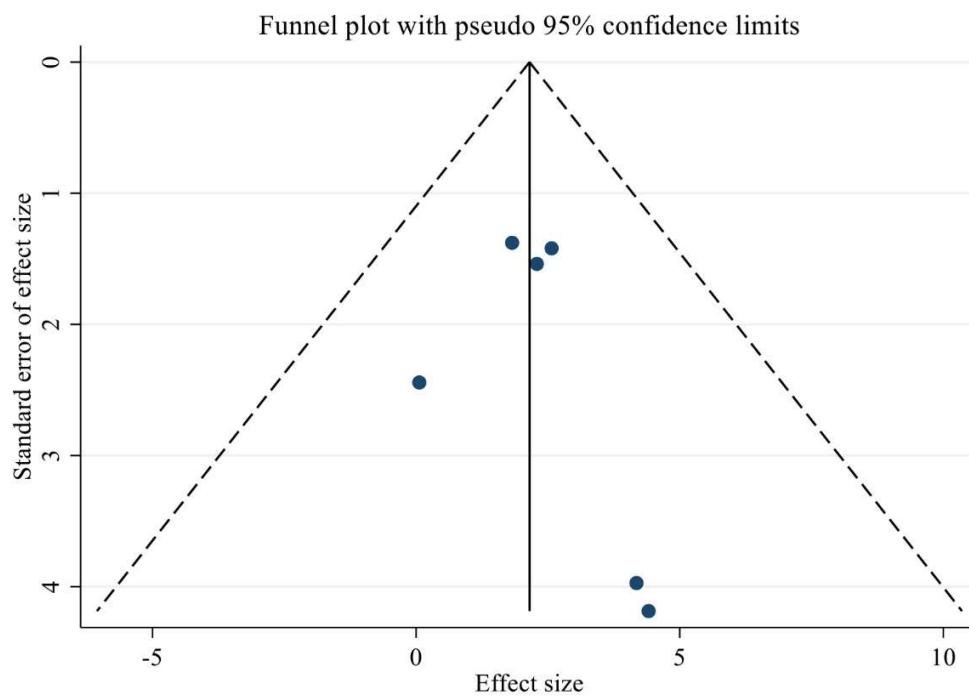
2. p



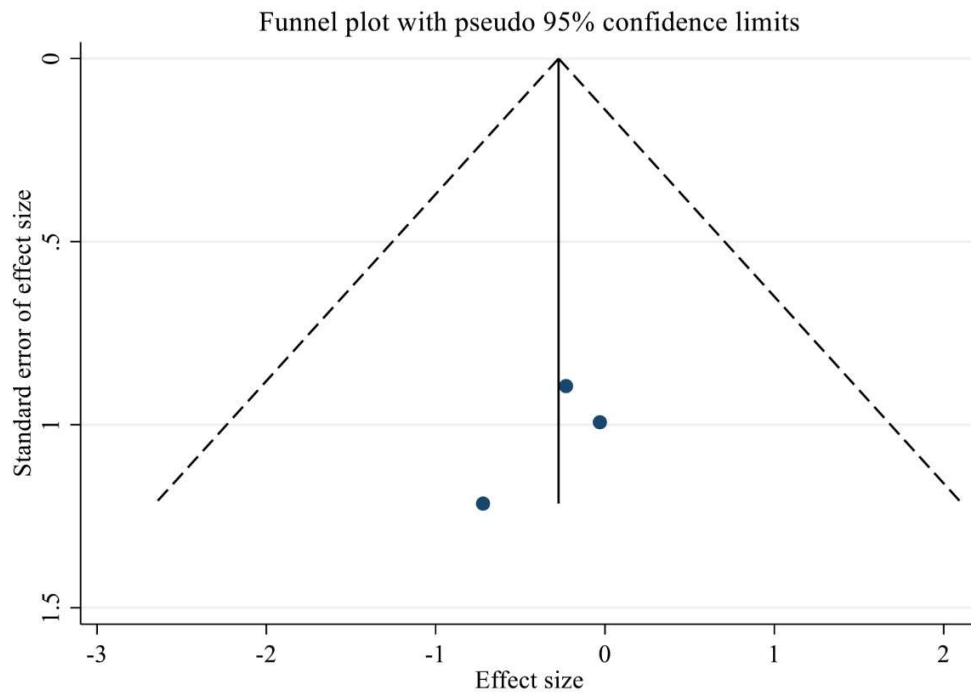
2. q



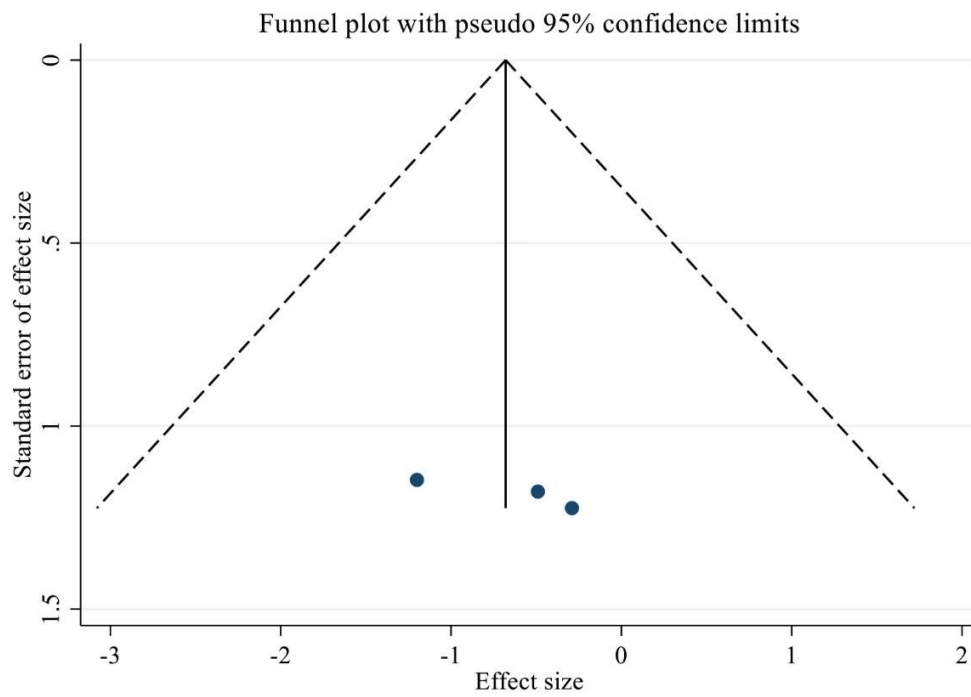
2. r



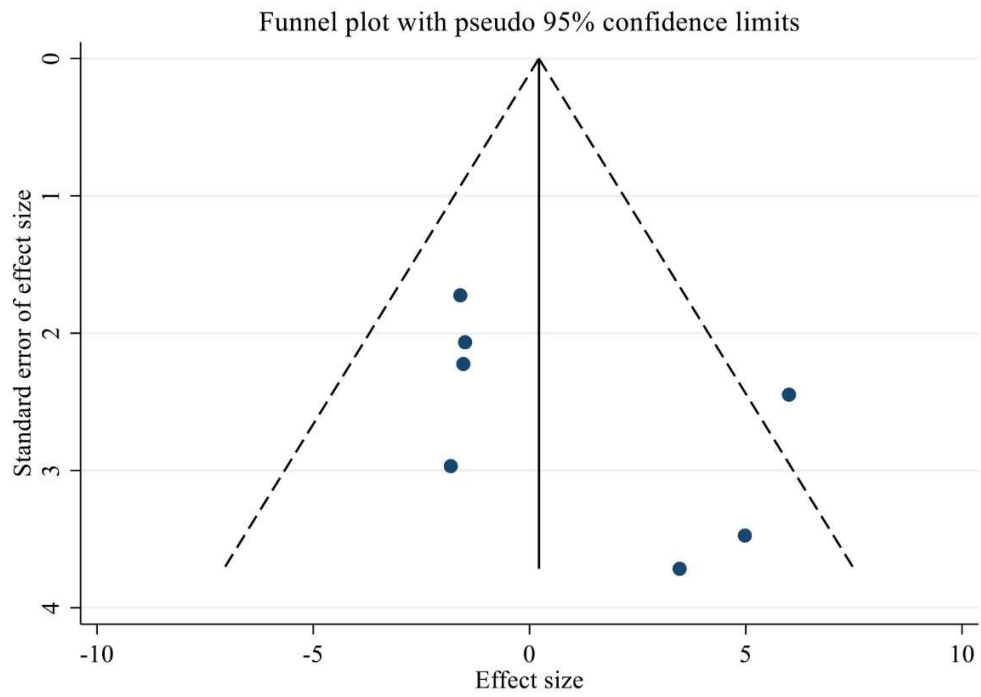
2. s



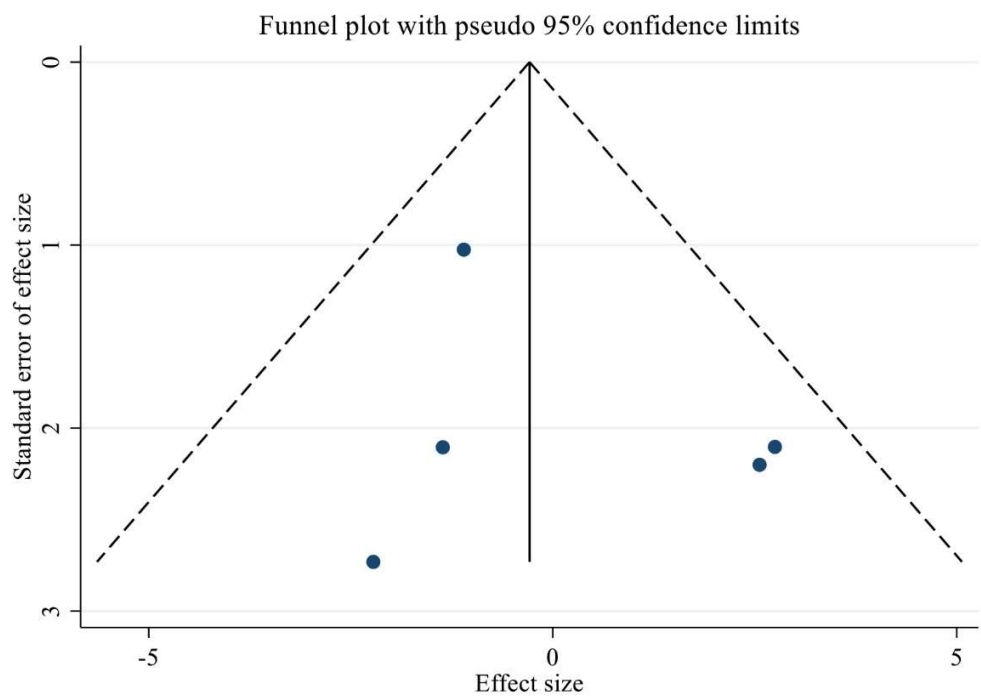
2. t



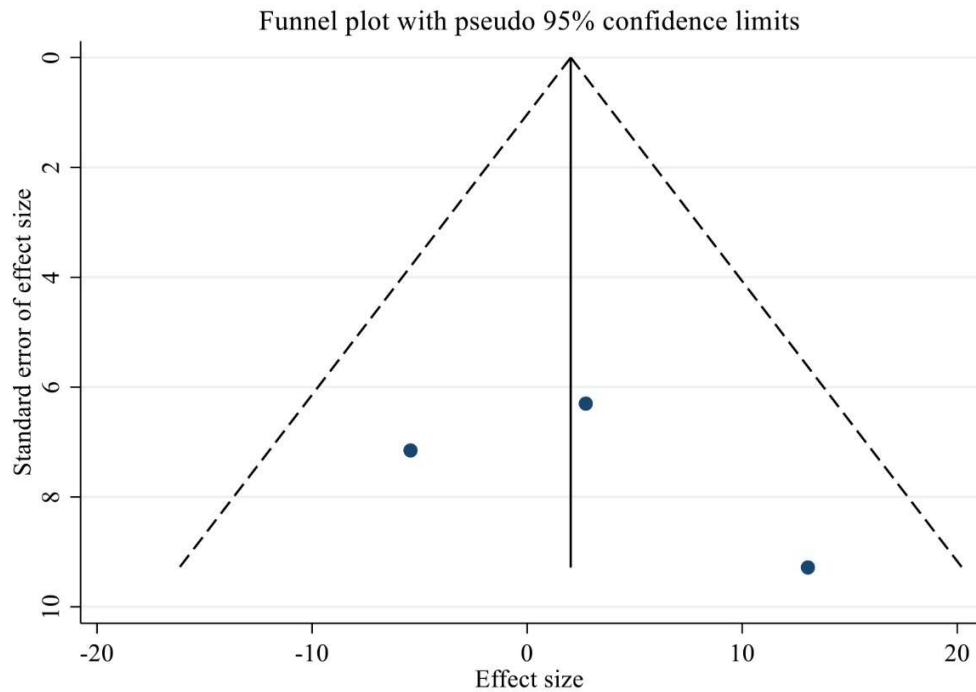
2. u



2. v



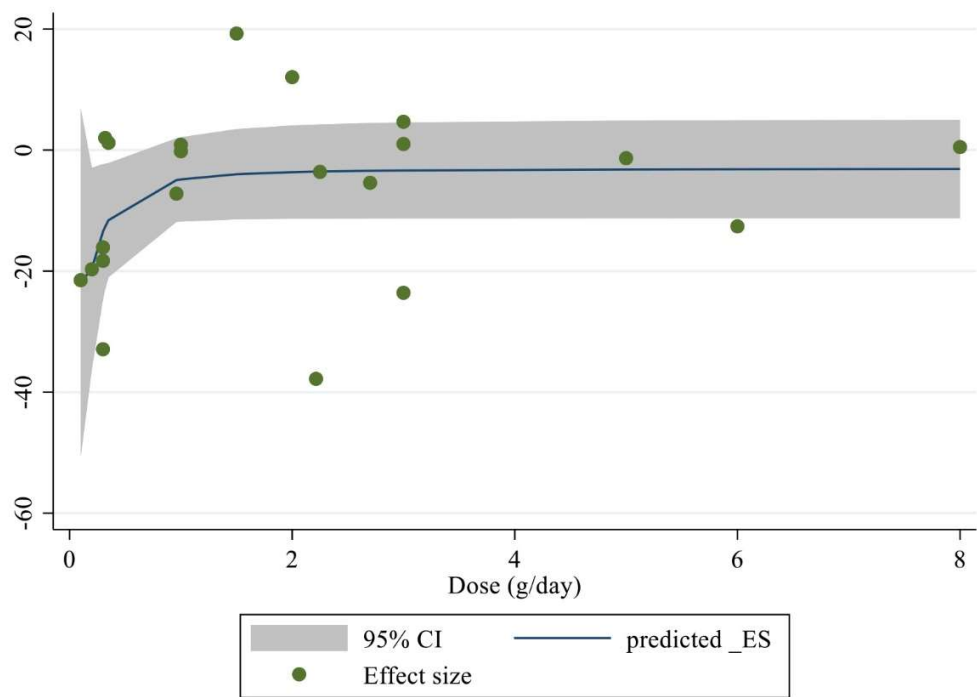
2. w



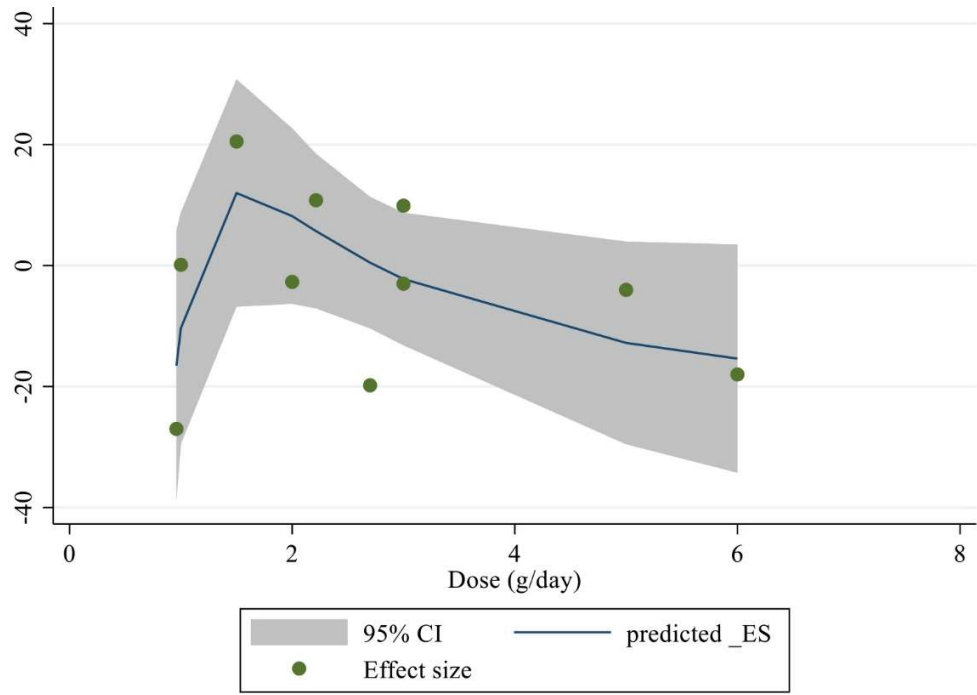
a: body weight (BW); b: body mass index (BMI); c: waist circumference (WC); d: fasting plasma glucose (FPG); e: oral glucose tolerance test (OGTT); f: hemoglobin A1c (HbA1c); g: fasting insulin; h: homeostatic model assessment of insulin resistance (HOMA-IR); i: triglyceride (TG); j: total cholesterol (TC); k: low-density lipoprotein cholesterol (LDL-C); l: high-density lipoprotein cholesterol (HDL-C); m: systolic blood pressure (SBP); n: diastolic blood pressure (DBP); o: heart rate (HR); p: C-reactive protein (CRP); q: interleukin-6 (IL-6); r: tumor necrosis α (TNF- α); s: adiponectin; t: leptin; u: alanine aminotransferase (ALT); v: aspartate aminotransferase (AST); w: gamma-glutamyl transferase (GGT)

Supplementary Figure S3. Dose-response relations between ginseng dosage (mg/day) and mean difference in each outcomes.

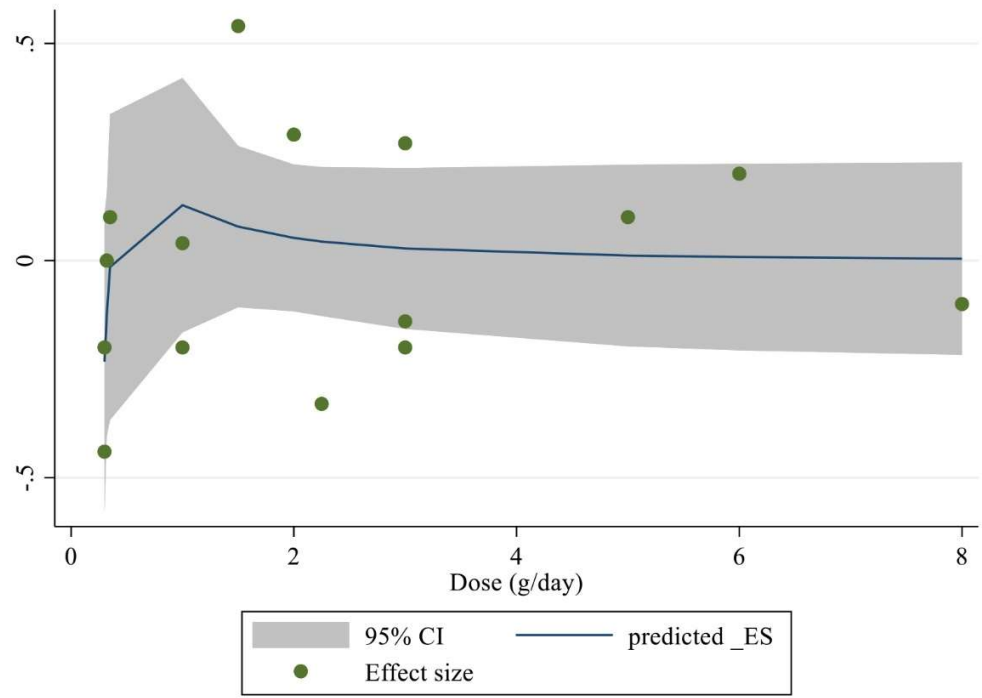
3. a



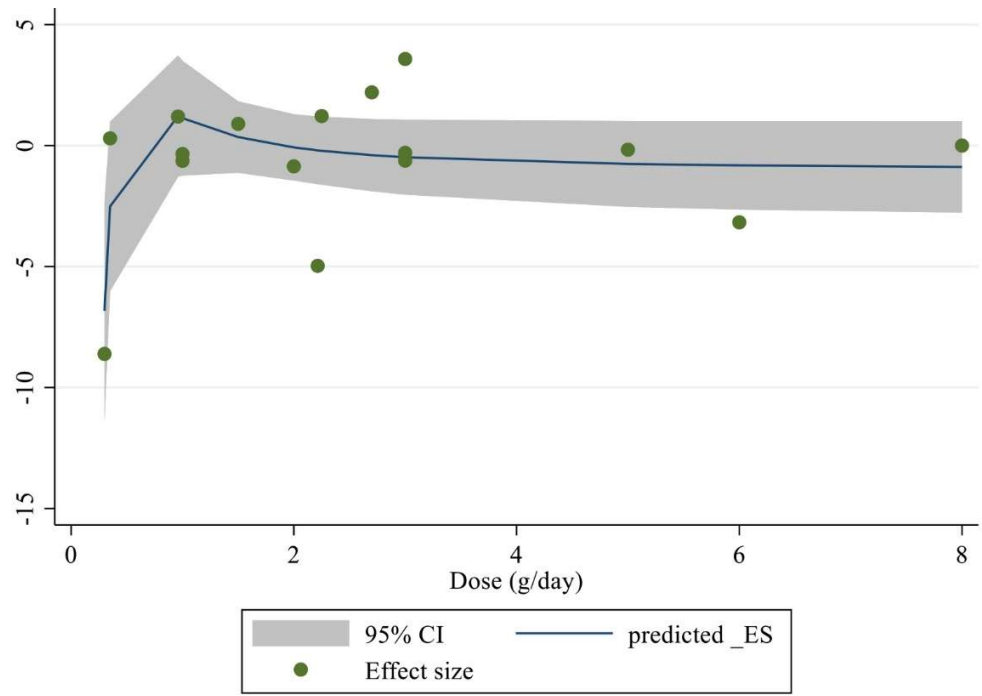
3. b



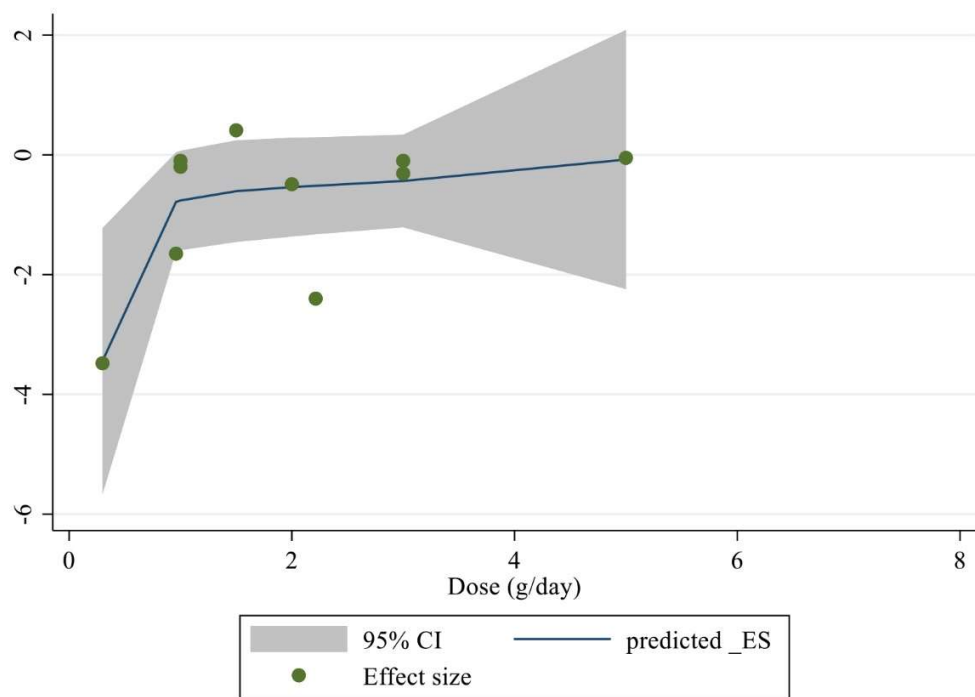
3. c



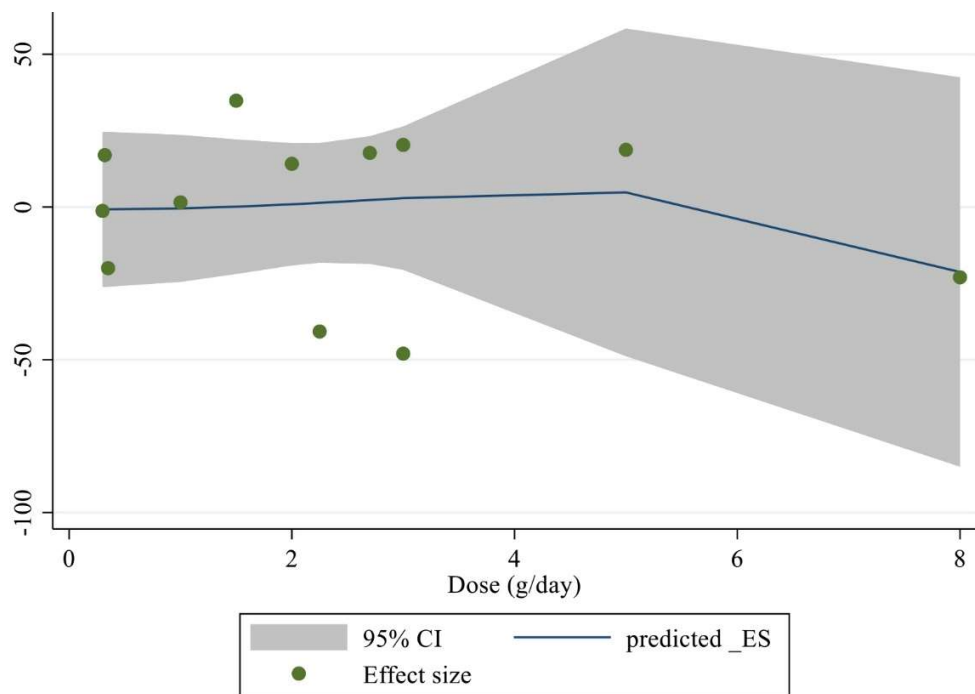
3. d



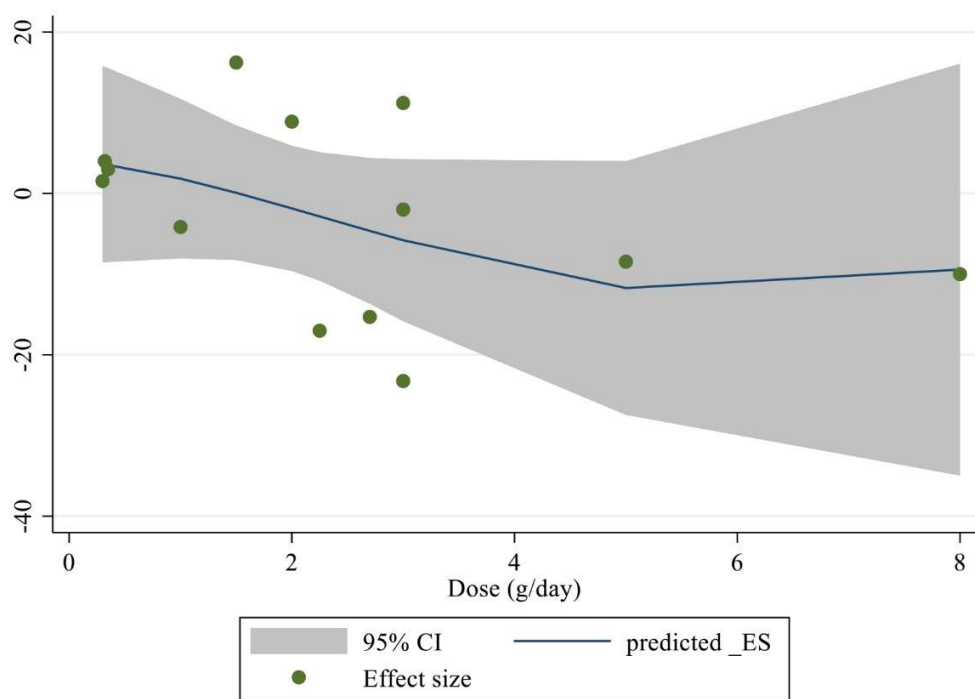
3. e



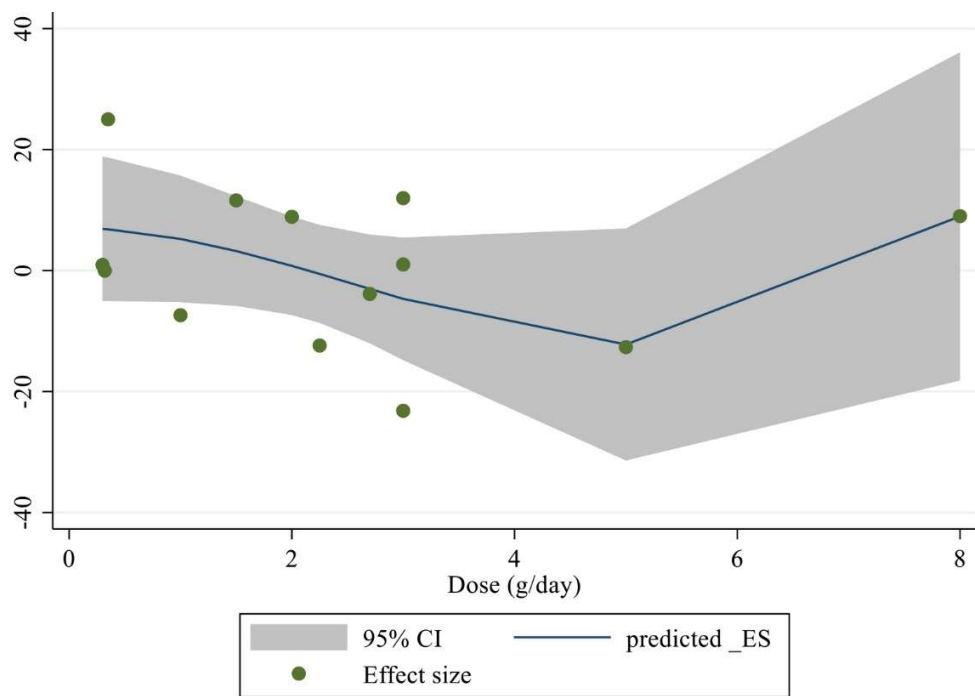
3. f



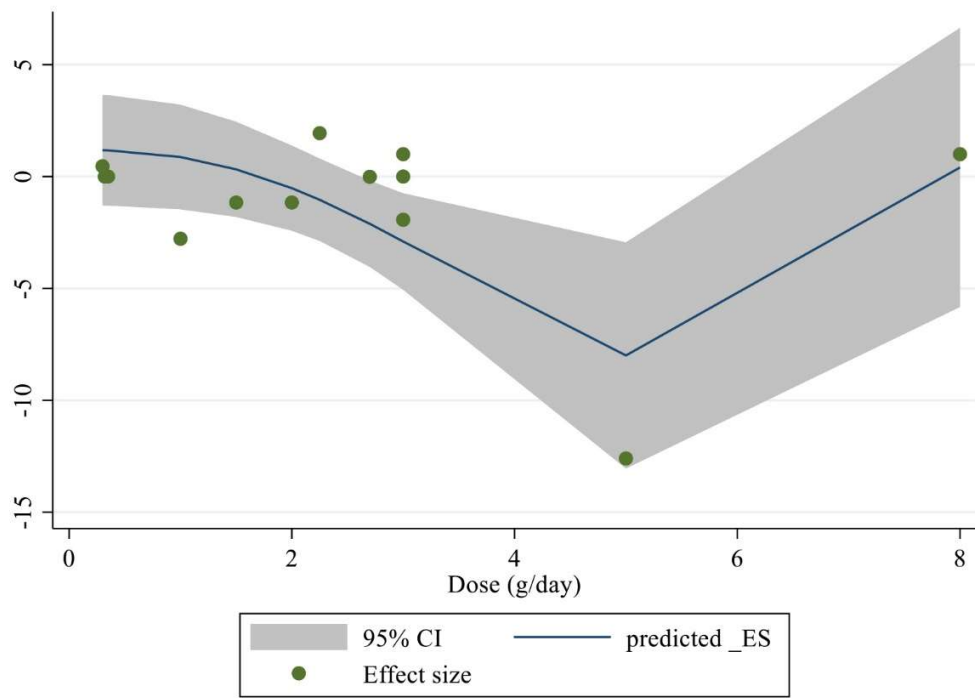
3. g



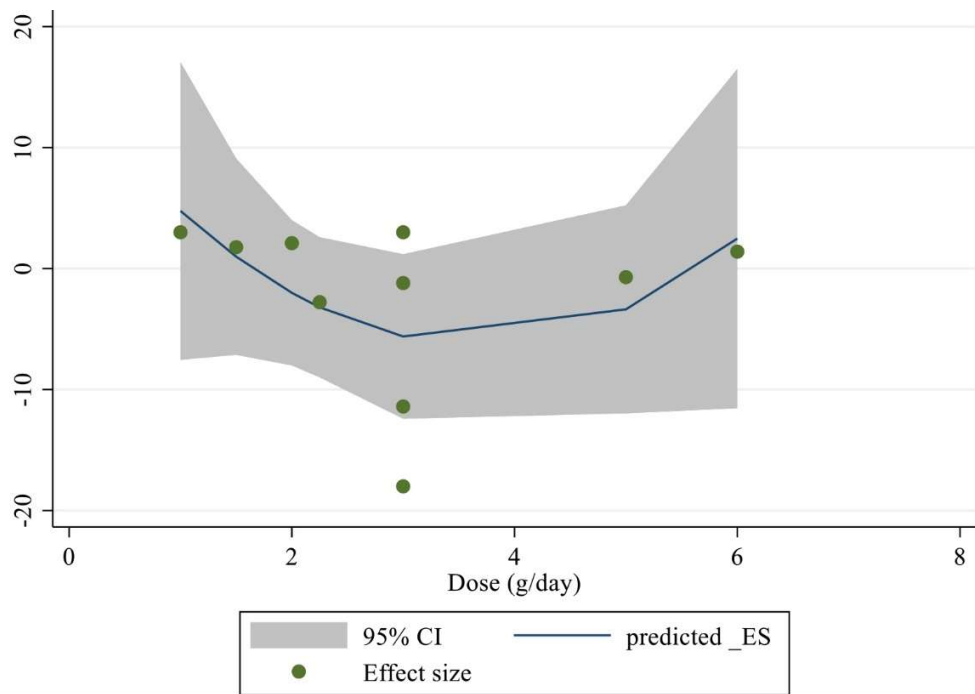
3. h



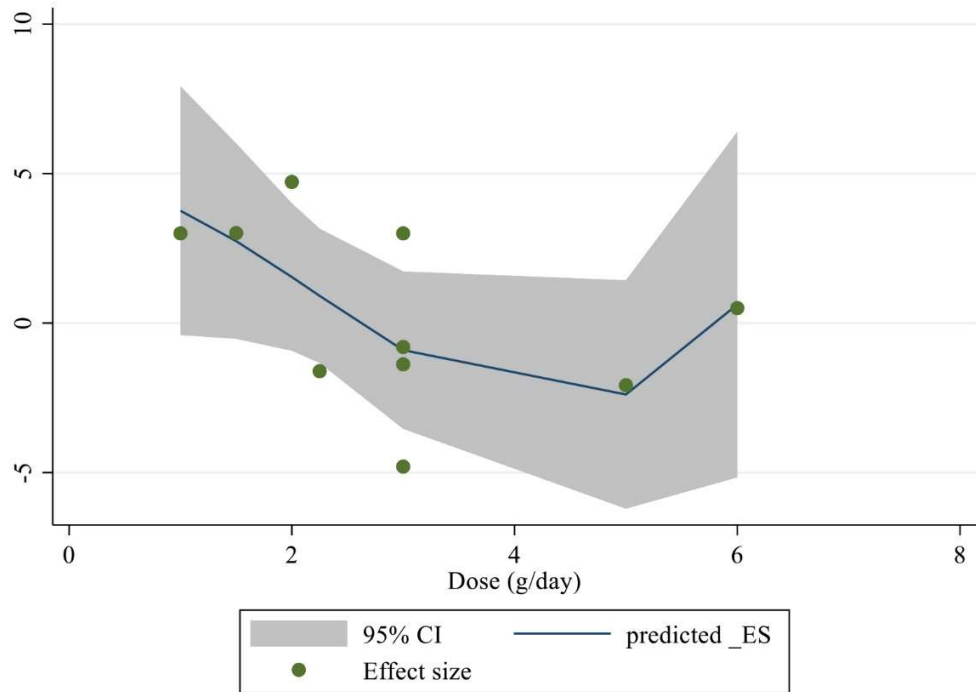
3. i



4. j

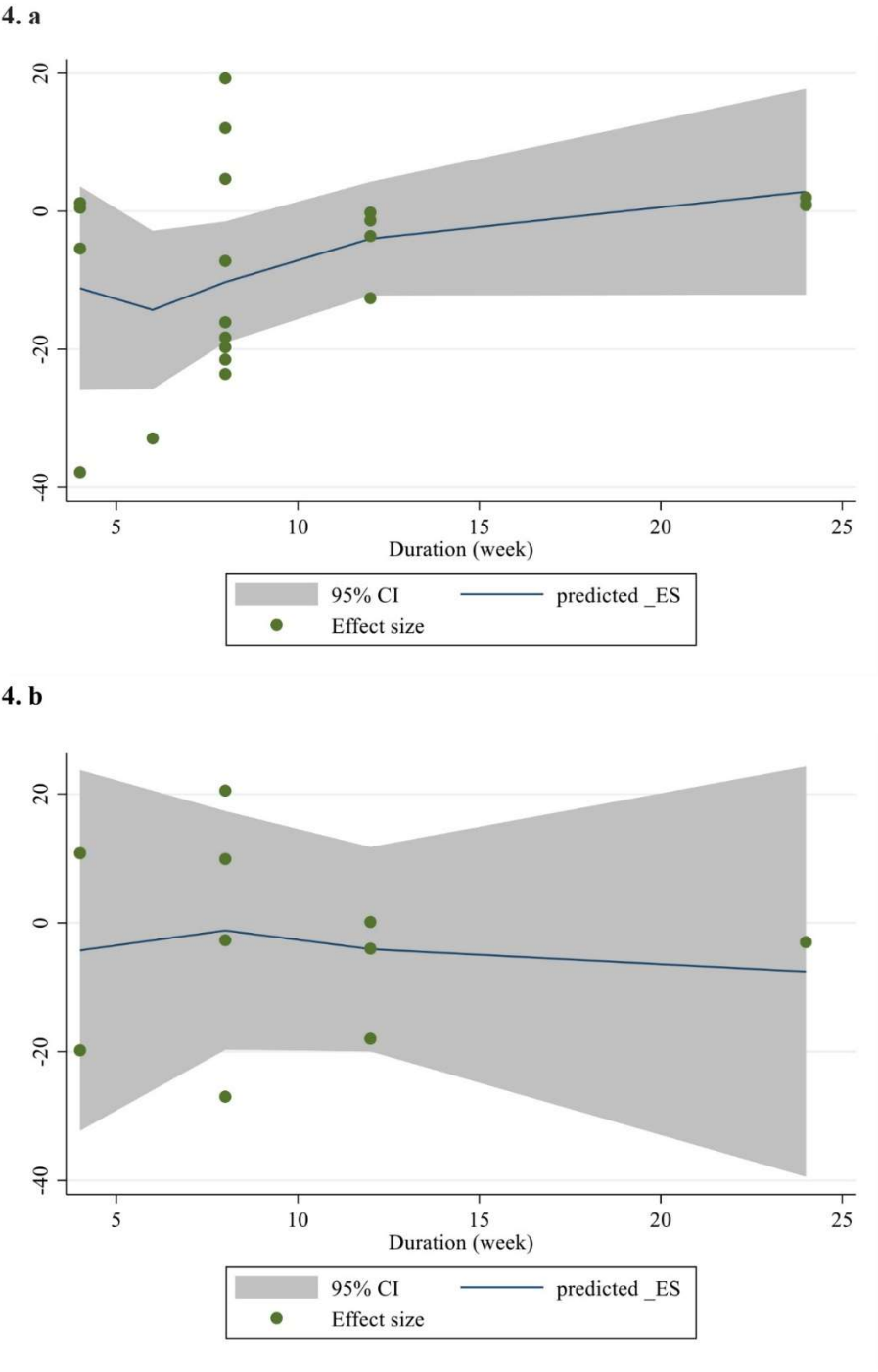


3. k

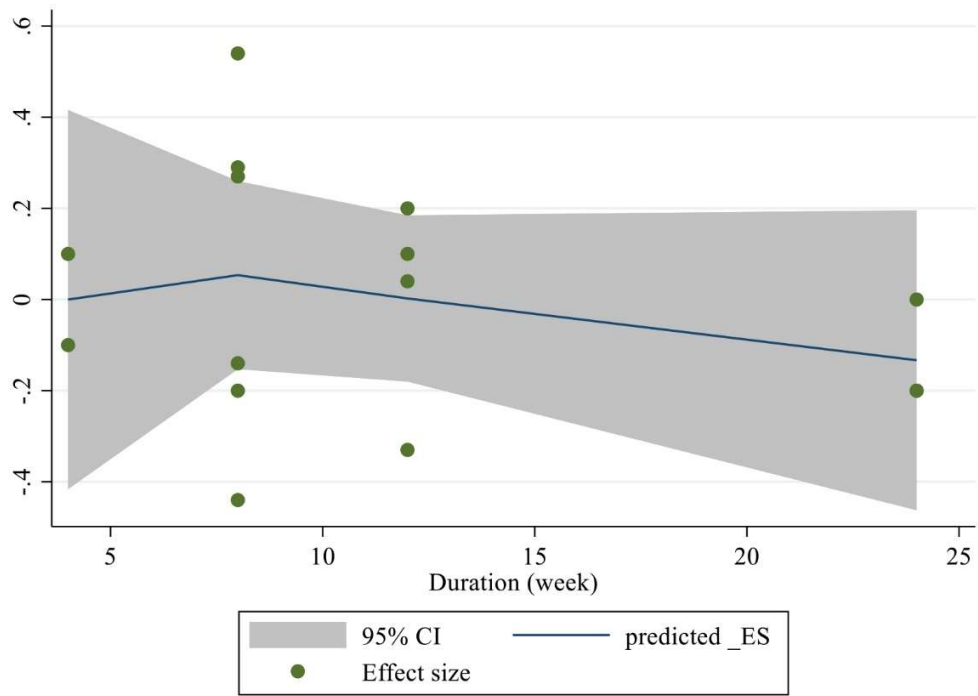


a: fasting plasma glucose (FPG); b: oral glucose tolerance test (OGTT); c: hemoglobin A1c (HbA1c); d: fasting insulin; e: homeostatic model assessment of insulin resistance (HOMA-IR); f: triglyceride (TG); g: total cholesterol (TC); h: low-density lipoprotein cholesterol (LDL-C); i: high-density lipoprotein cholesterol (HDL-C); j: systolic blood pressure (SBP); k: diastolic blood pressure (DBP)

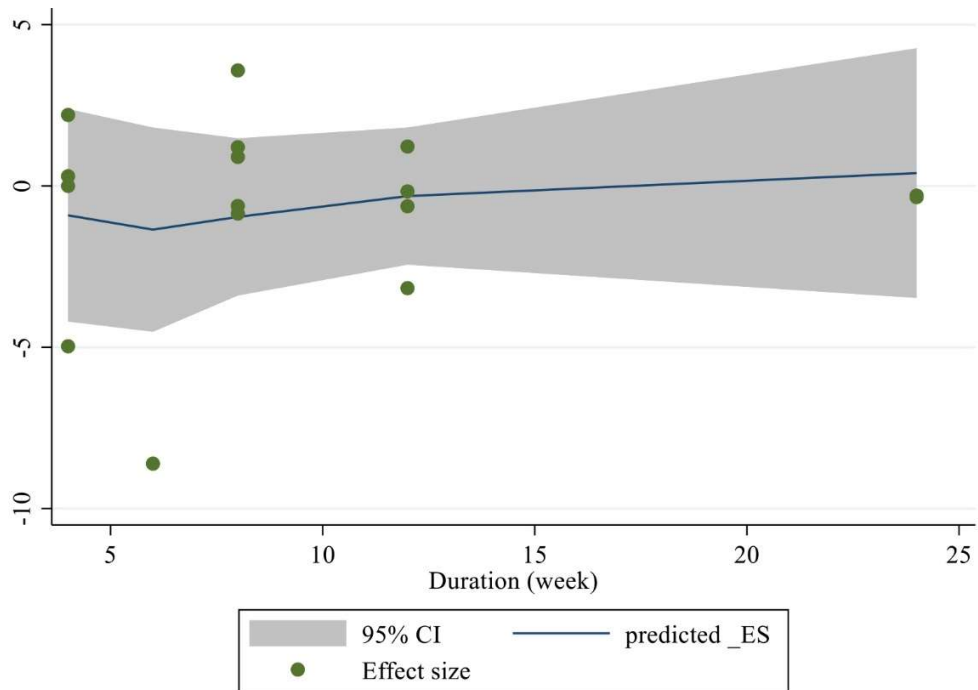
Supplementary Figure S4. Dose-response relations between duration of ginseng (week) and mean difference in each outcomes.



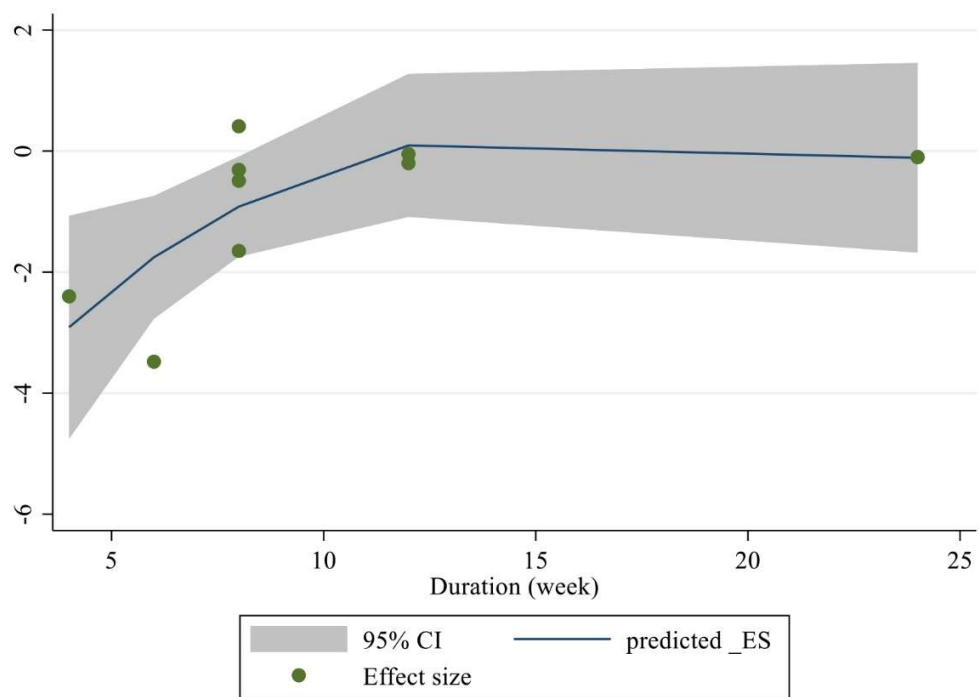
4. c



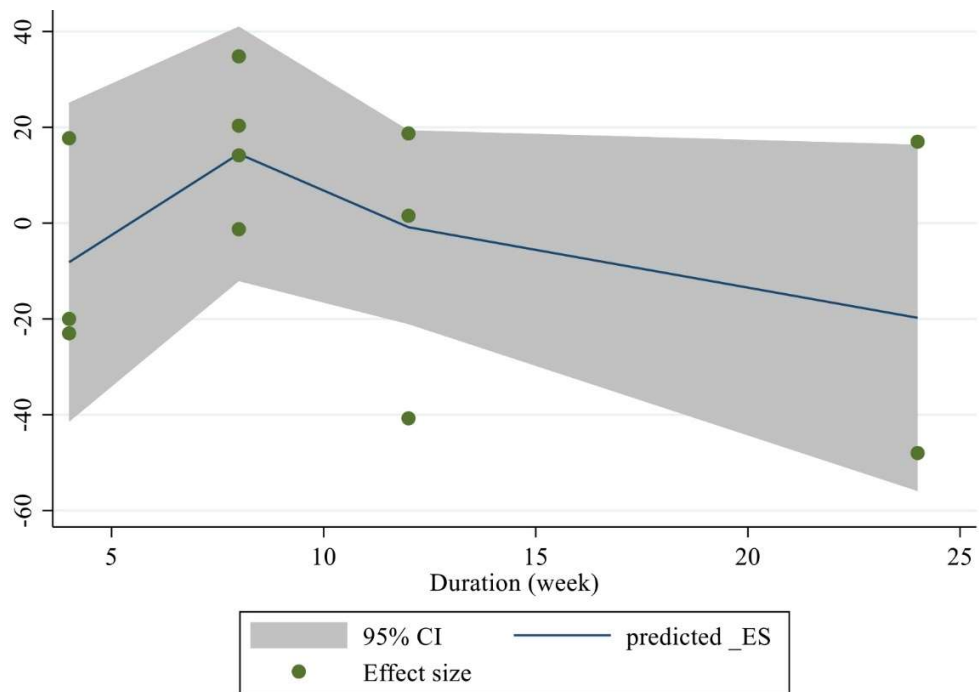
4. d



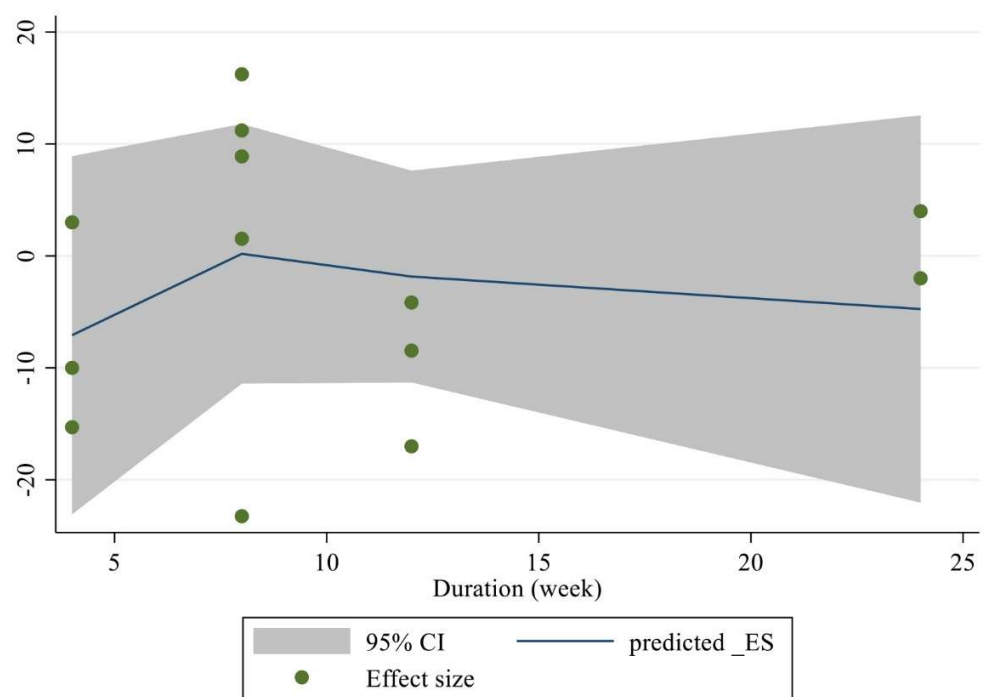
4. e



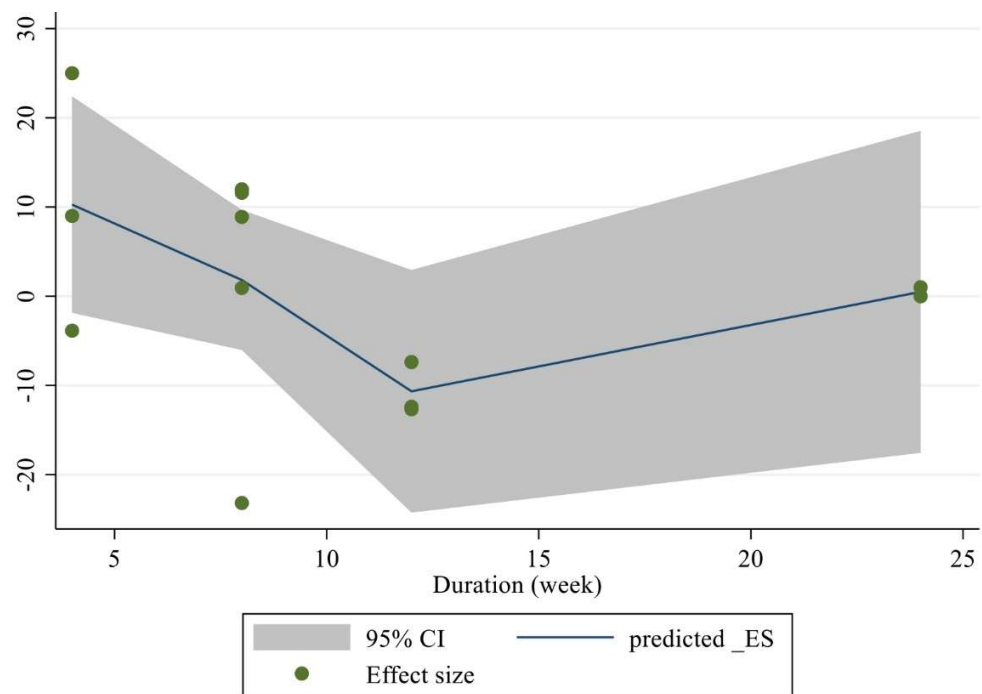
4. f



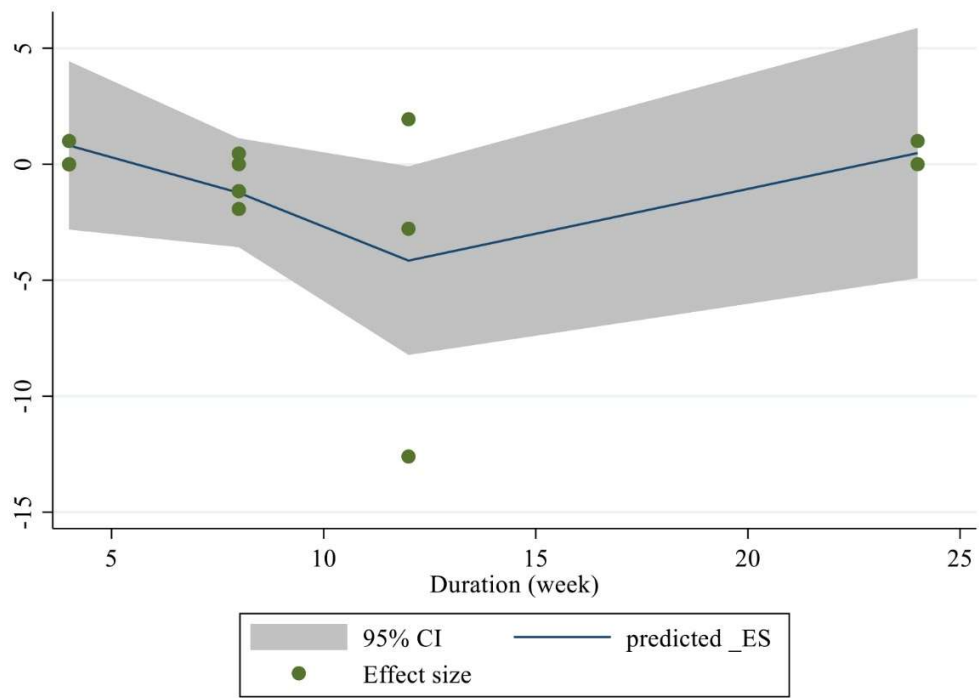
4. g



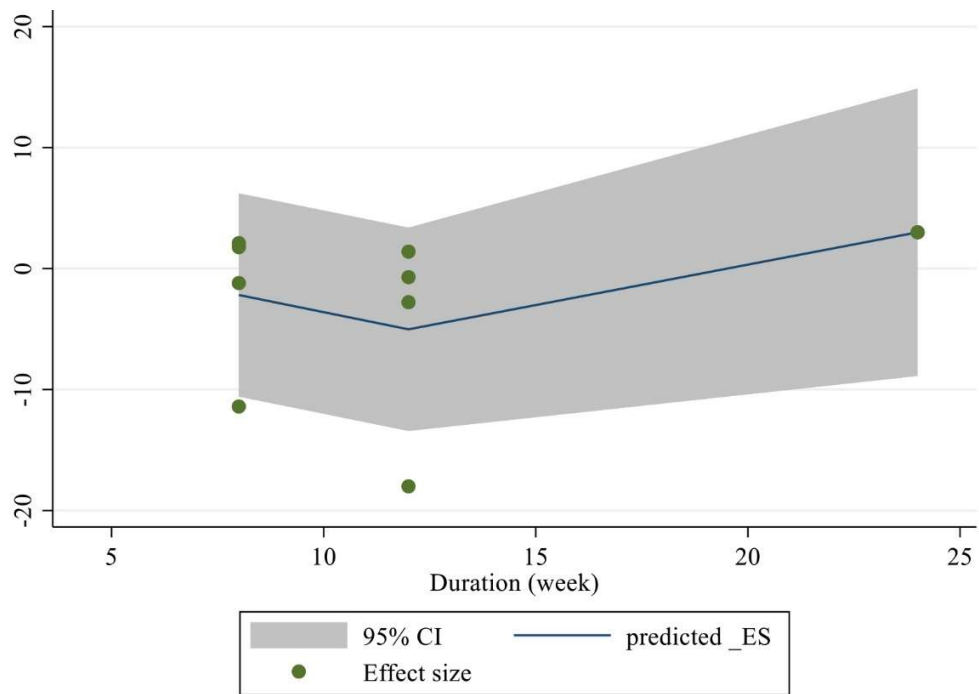
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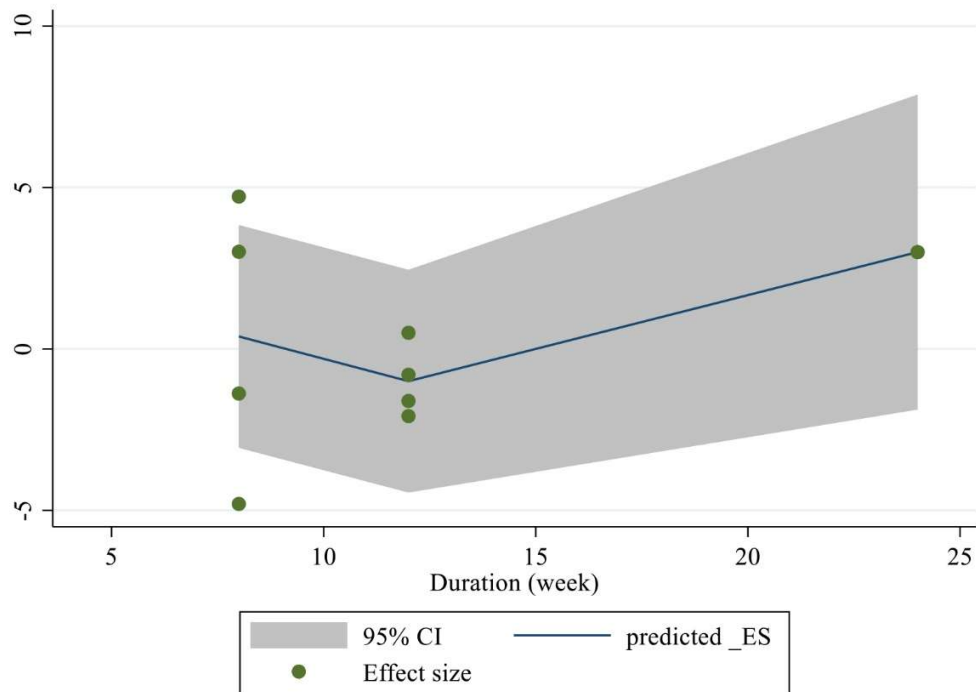
4. i



4. j



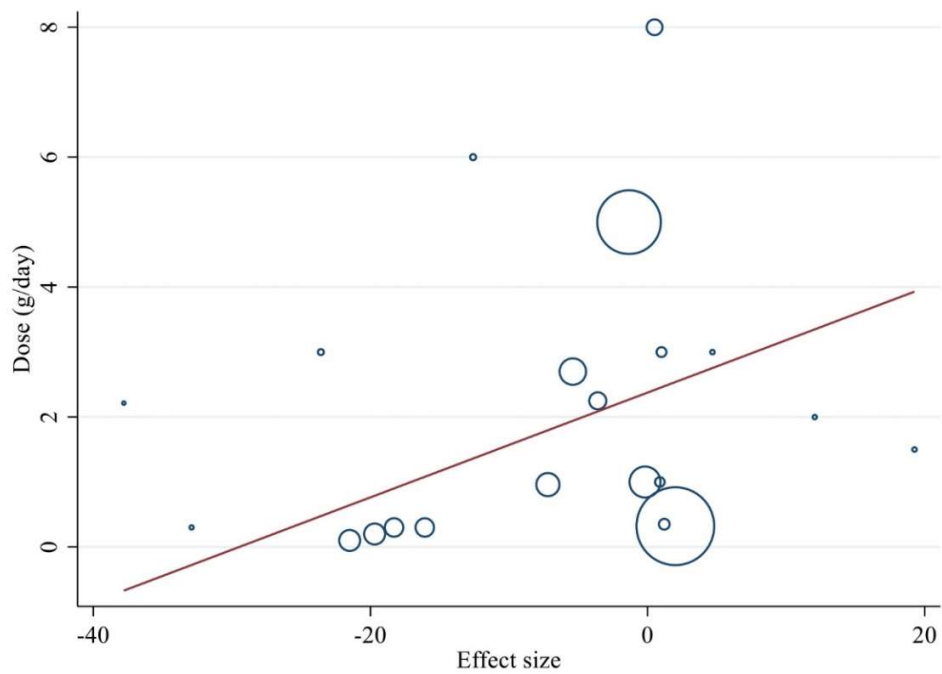
4. k



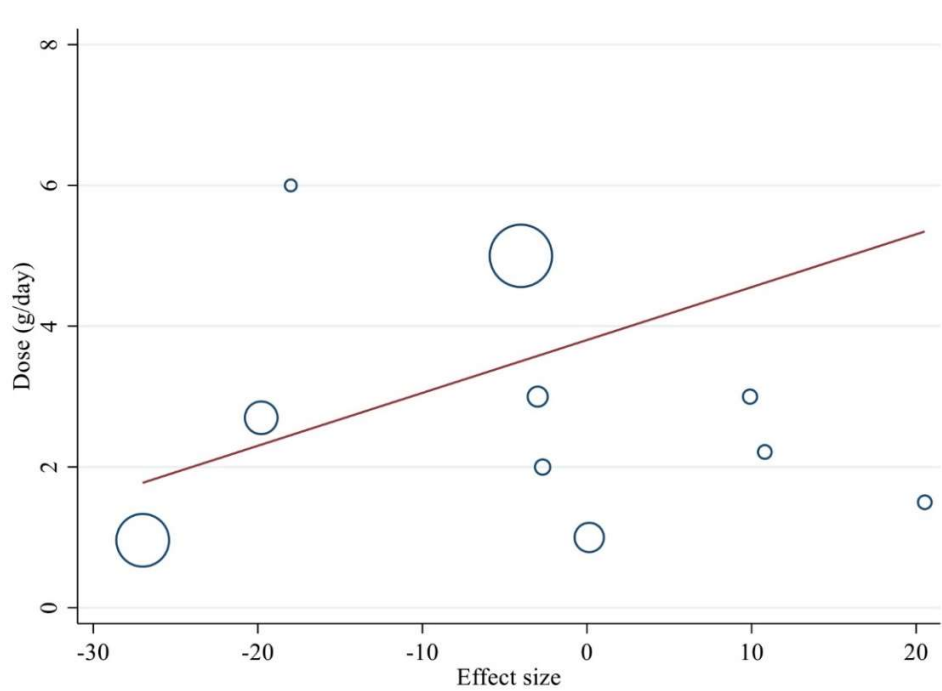
a: fasting plasma glucose (FPG); b: oral glucose tolerance test (OGTT); c: hemoglobin A1c (HbA1c); d: fasting insulin; e: homeostatic model assessment of insulin resistance (HOMA-IR); f: triglyceride (TG); g: total cholesterol (TC); h: low-density lipoprotein cholesterol (LDL-C); i: high-density lipoprotein cholesterol (HDL-C); j: systolic blood pressure (SBP); k: diastolic blood pressure (DBP)

Supplementary Figure S5. Random-effects meta-regression plots of the association between dose of ginseng (mg/day) and weighted mean difference of each outcome.

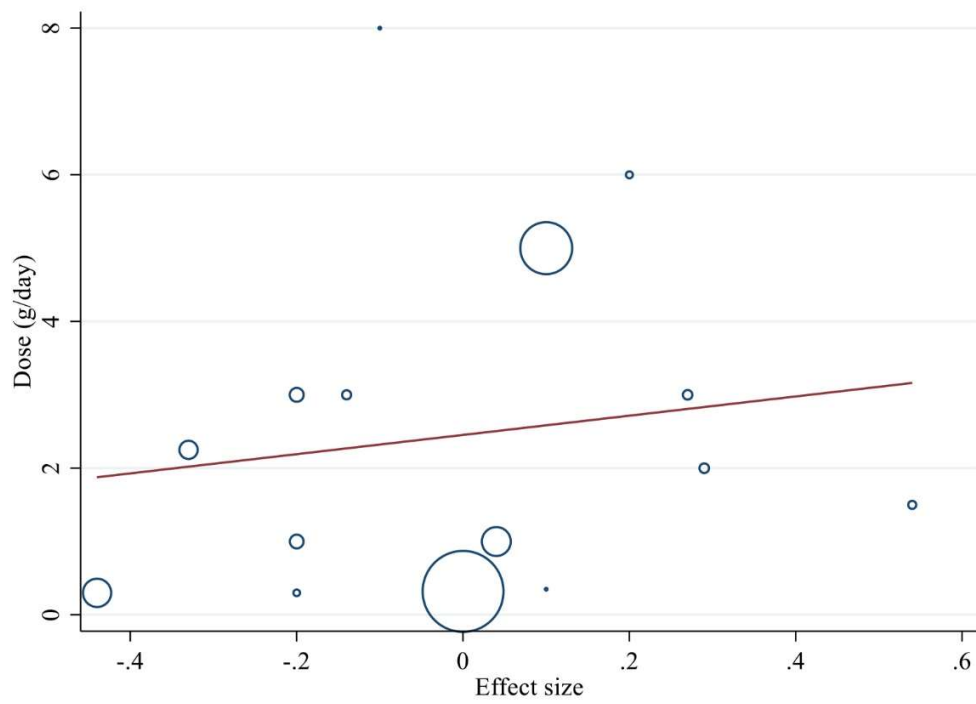
5. a



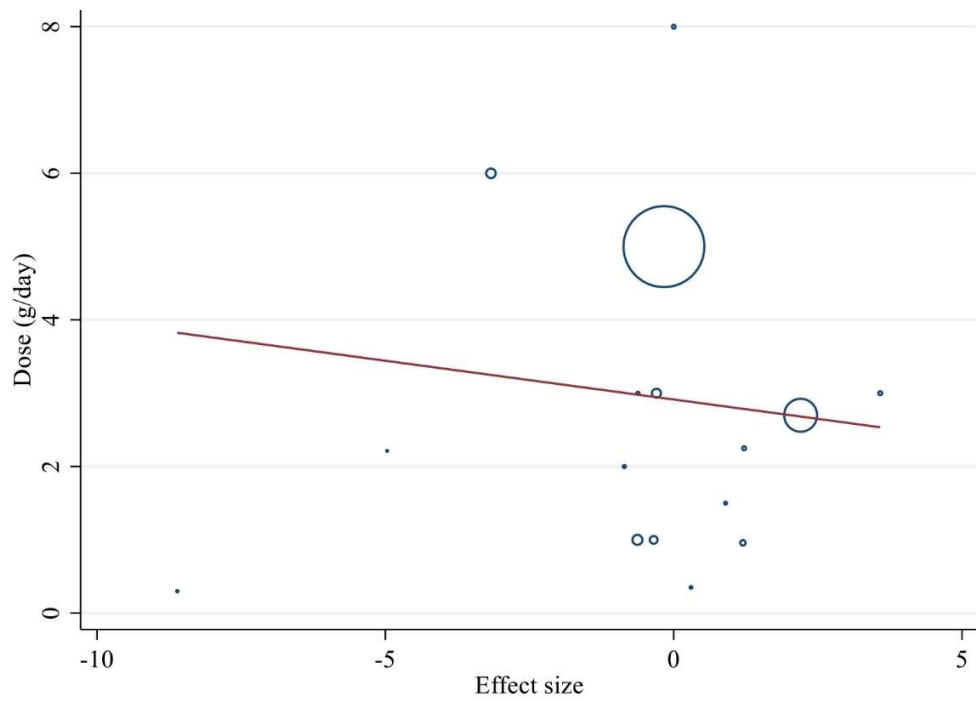
5. b



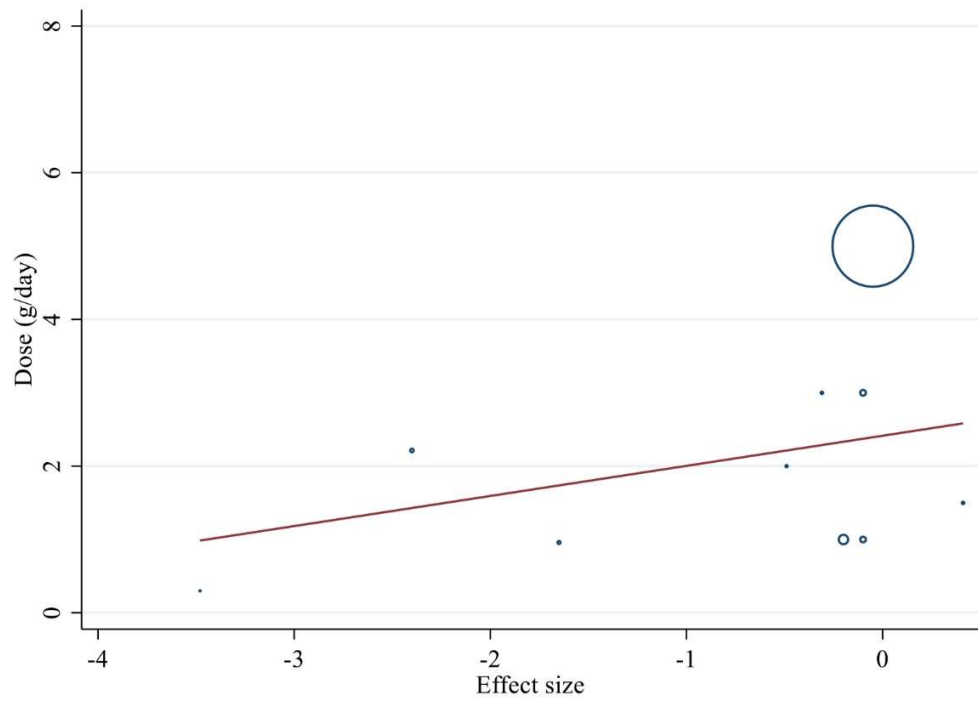
5. c



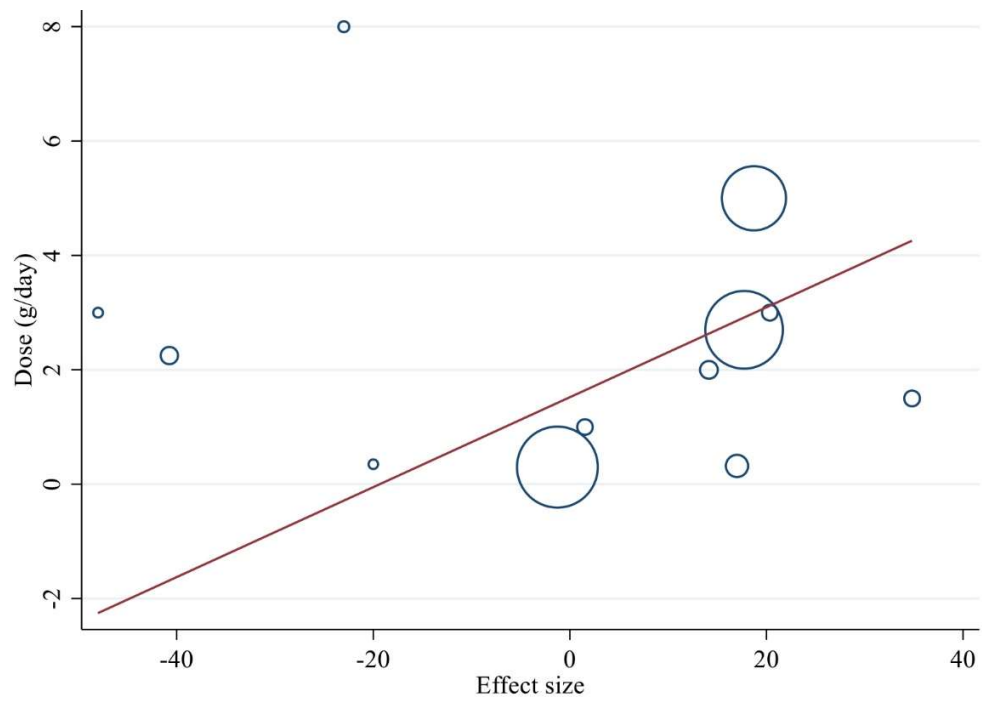
5. d



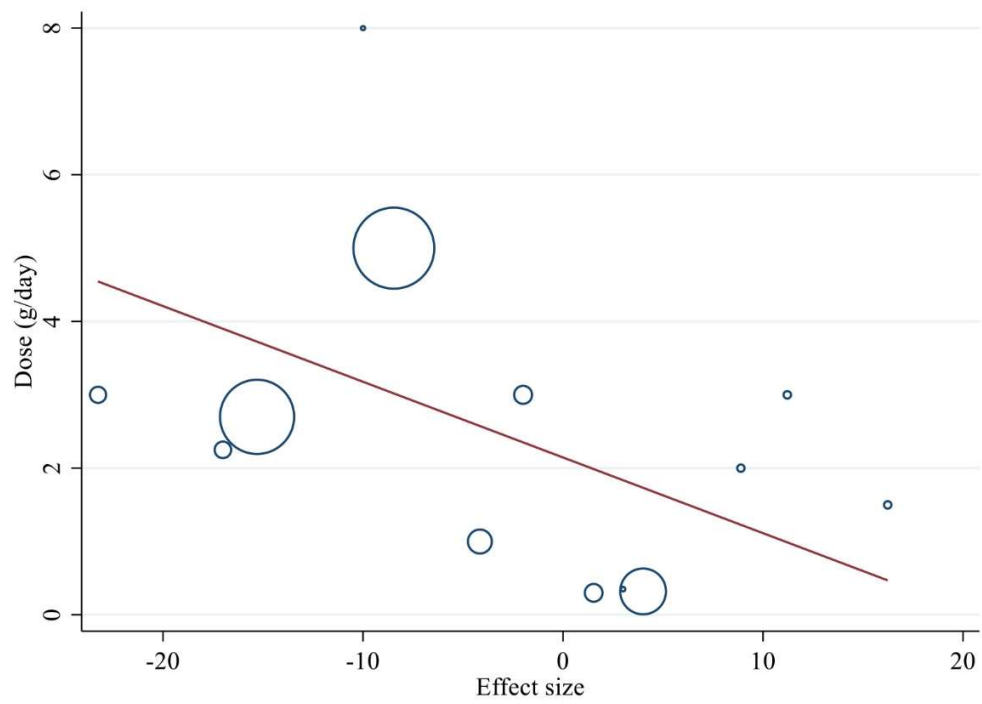
5. e



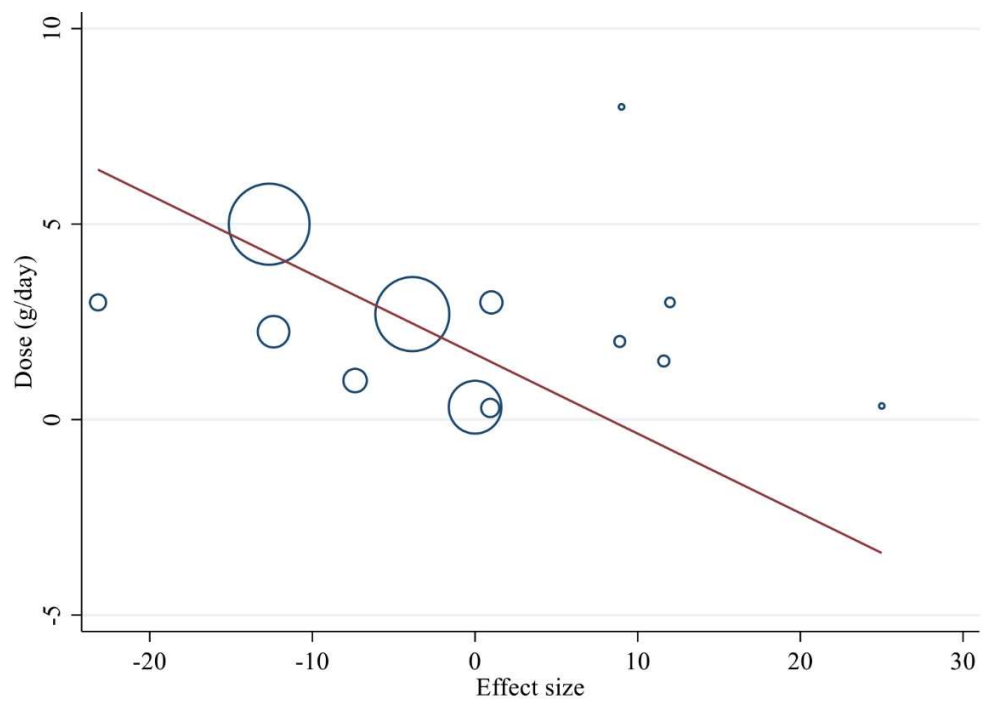
5. f



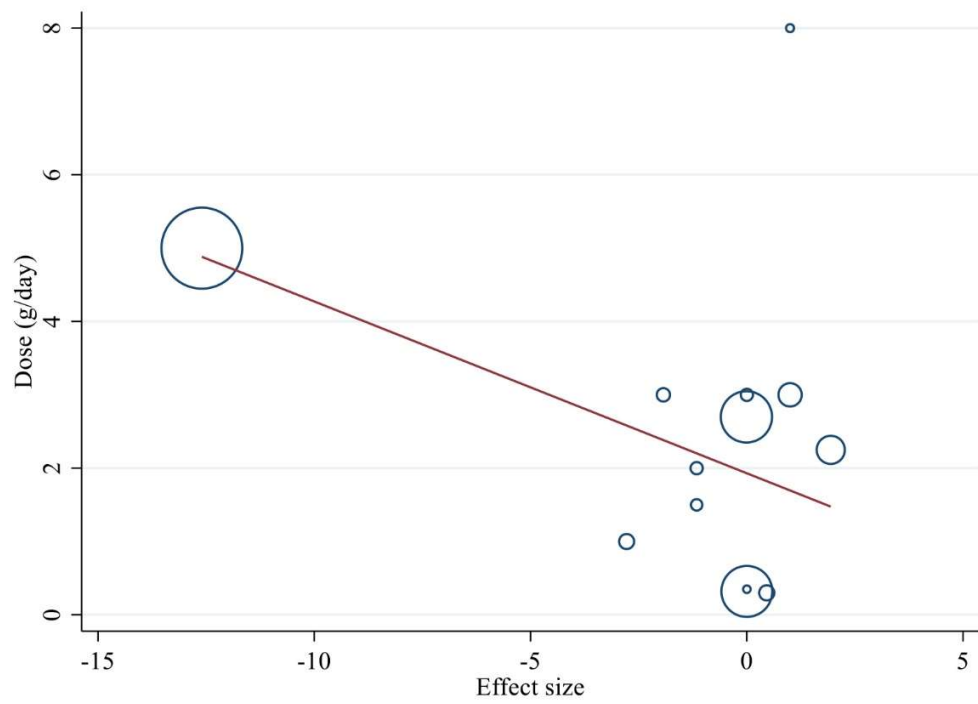
5. g



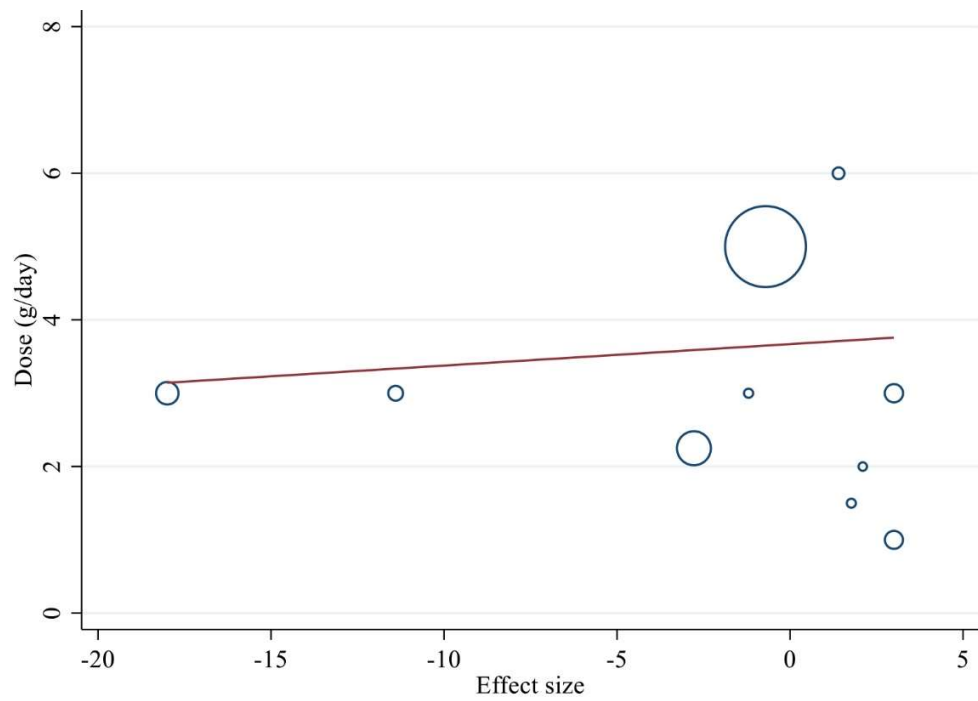
5. h



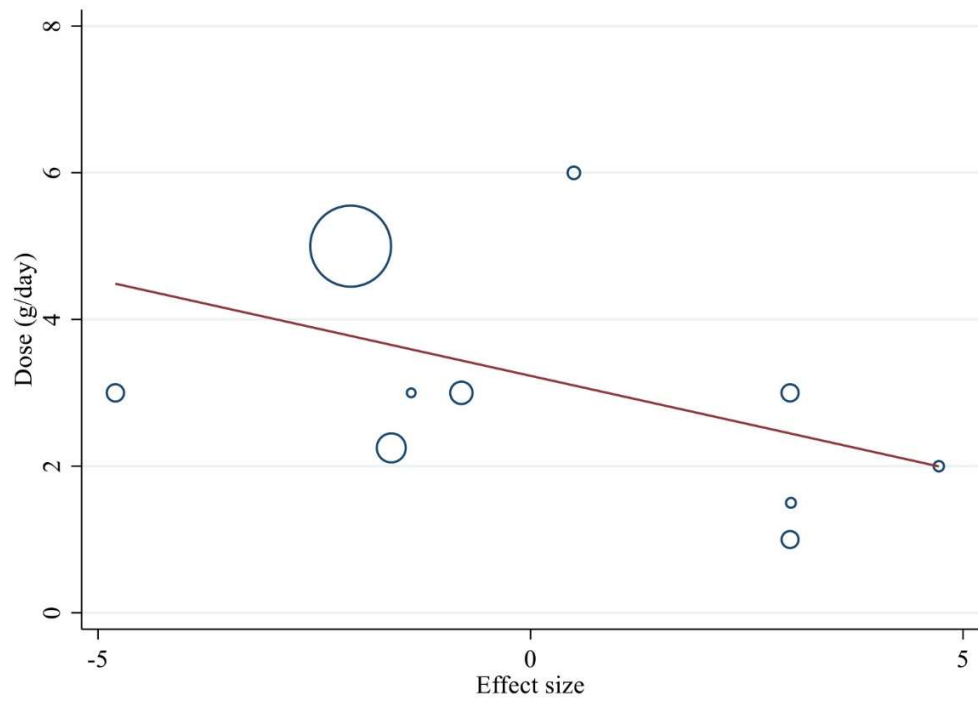
5. i



5. j



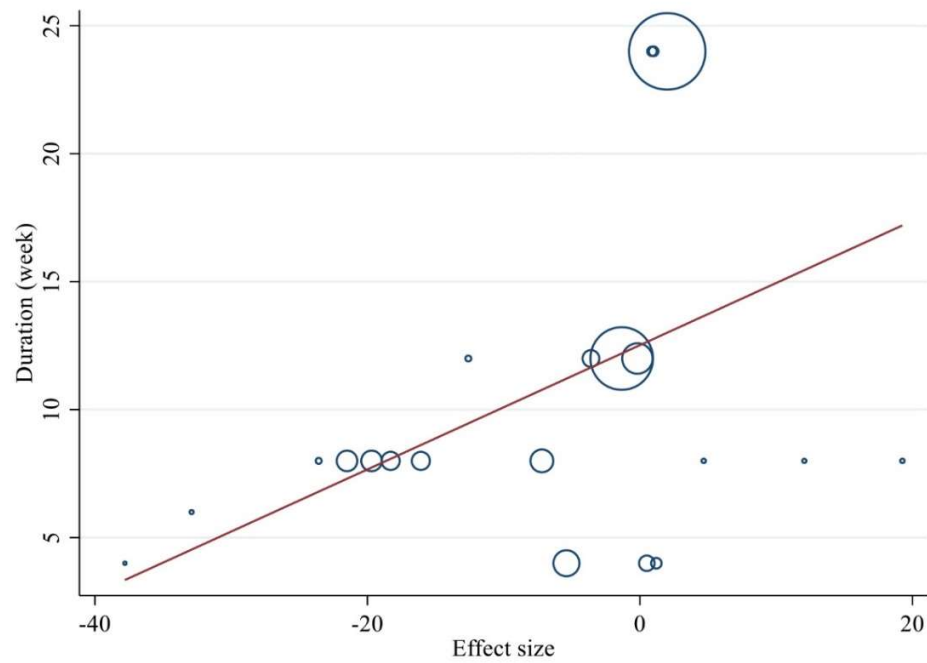
5. k



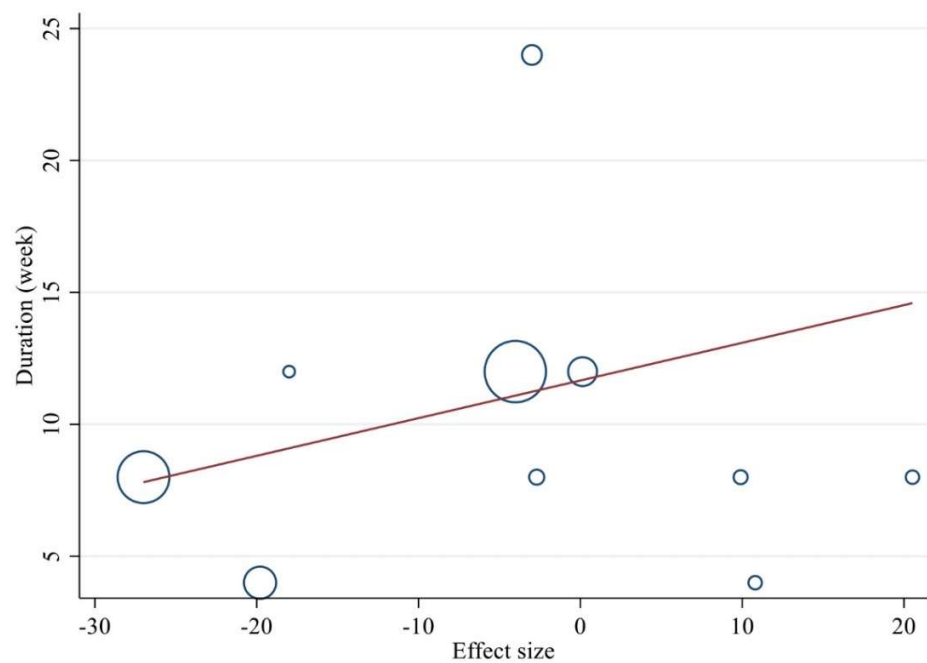
a: fasting plasma glucose (FPG); b: oral glucose tolerance test (OGTT); c: hemoglobin A1c (HbA1c); d: fasting insulin; e: homeostatic model assessment of insulin resistance (HOMA-IR); f: triglyceride (TG); g: total cholesterol (TC); h: low-density lipoprotein cholesterol (LDL-C); i: high-density lipoprotein cholesterol (HDL-C); j: systolic blood pressure (SBP); k: diastolic blood pressure (DBP)

Supplementary Figure S6. Random-effects meta-regression plots of the association between duration of ginseng (week) and weighted mean difference of each outcome.

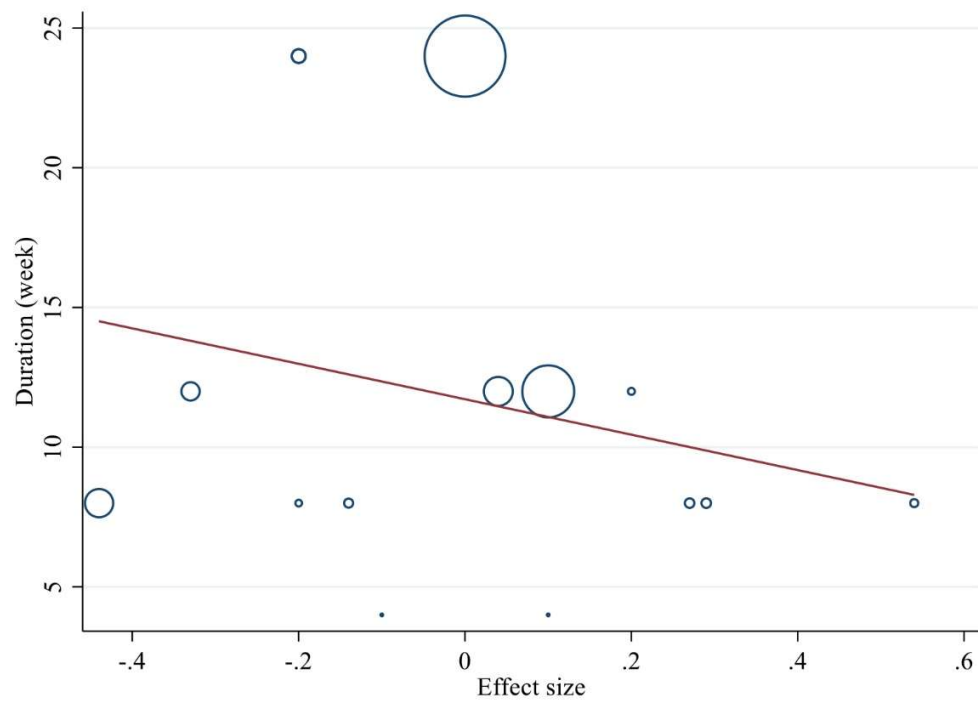
6. a



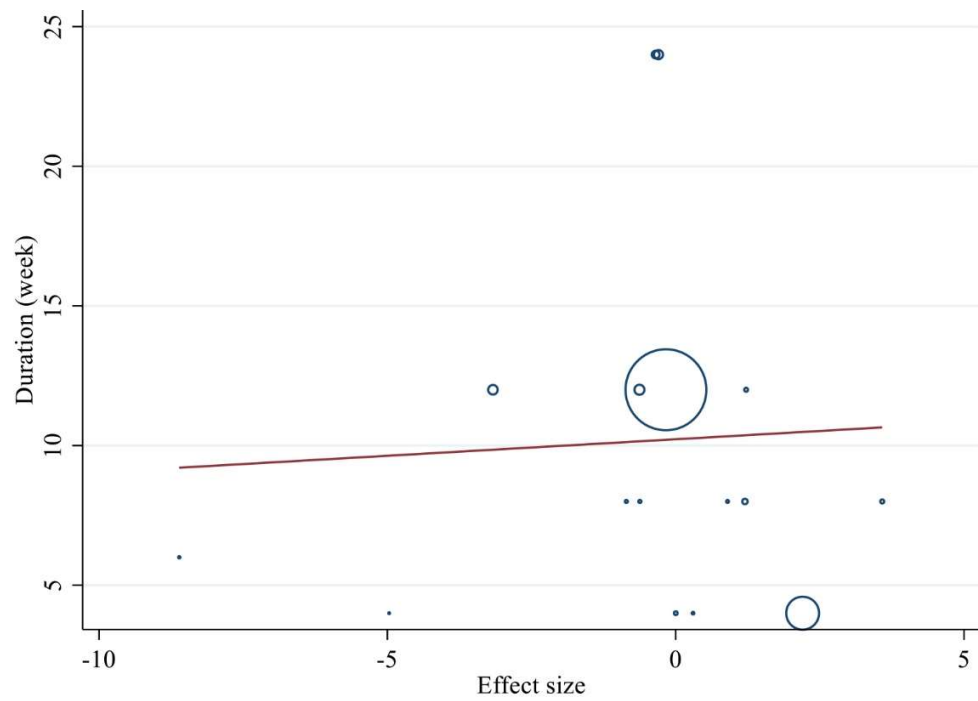
6. b



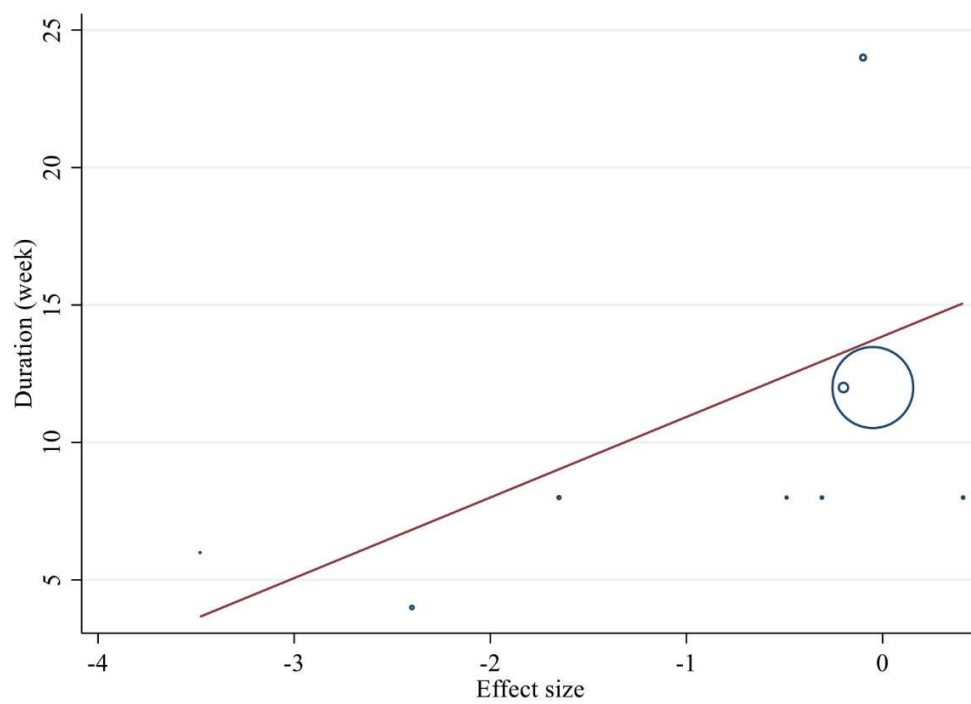
6. c



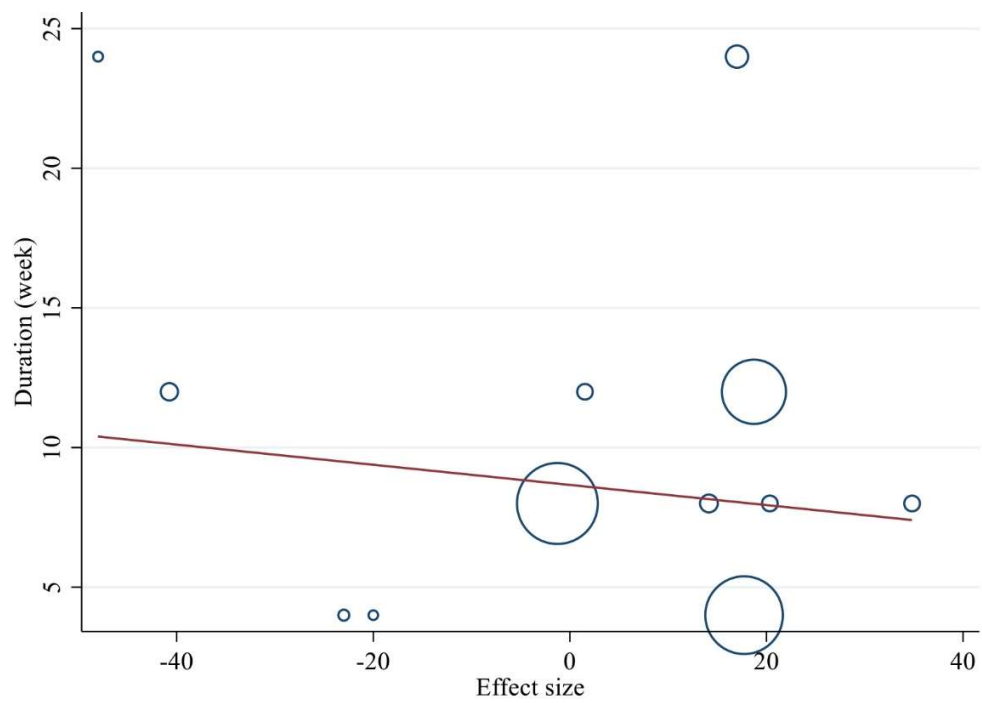
6. d



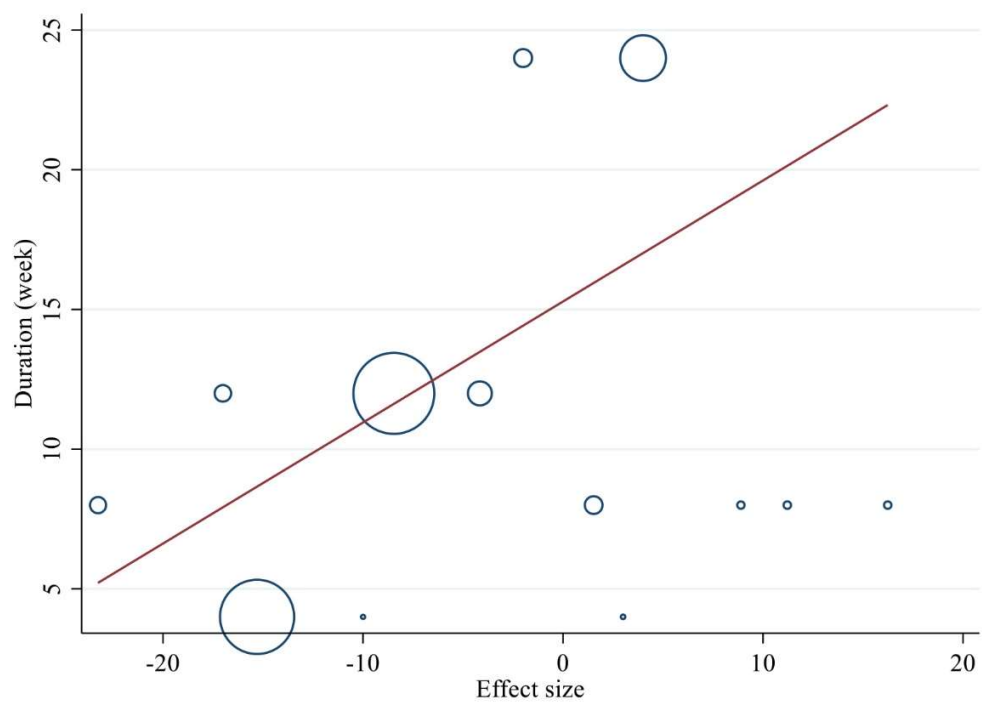
6. e



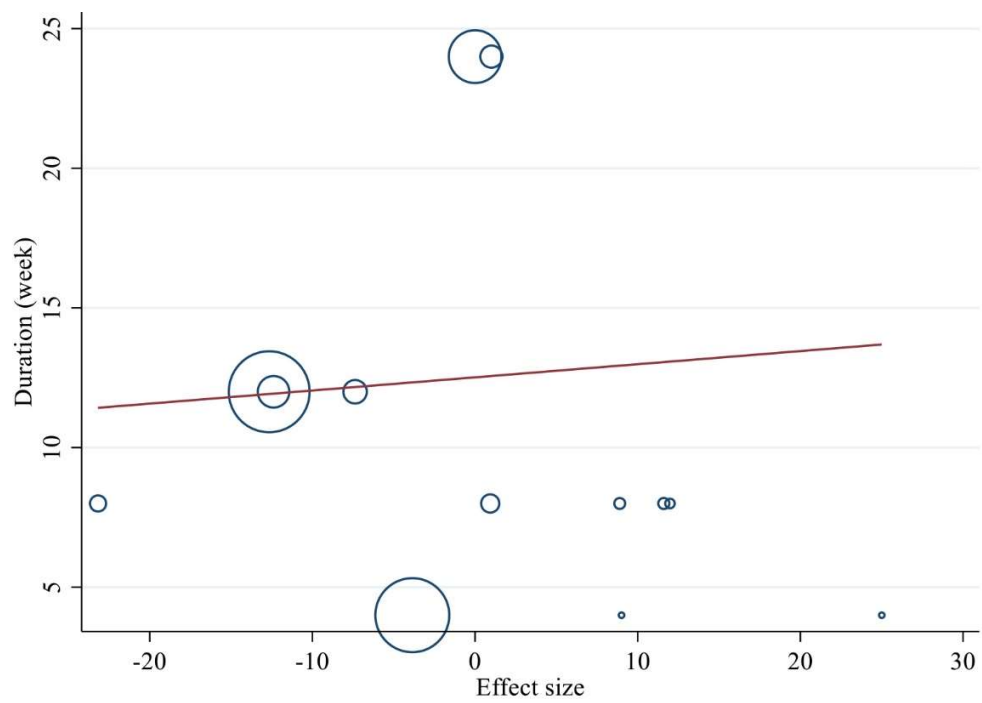
6. f



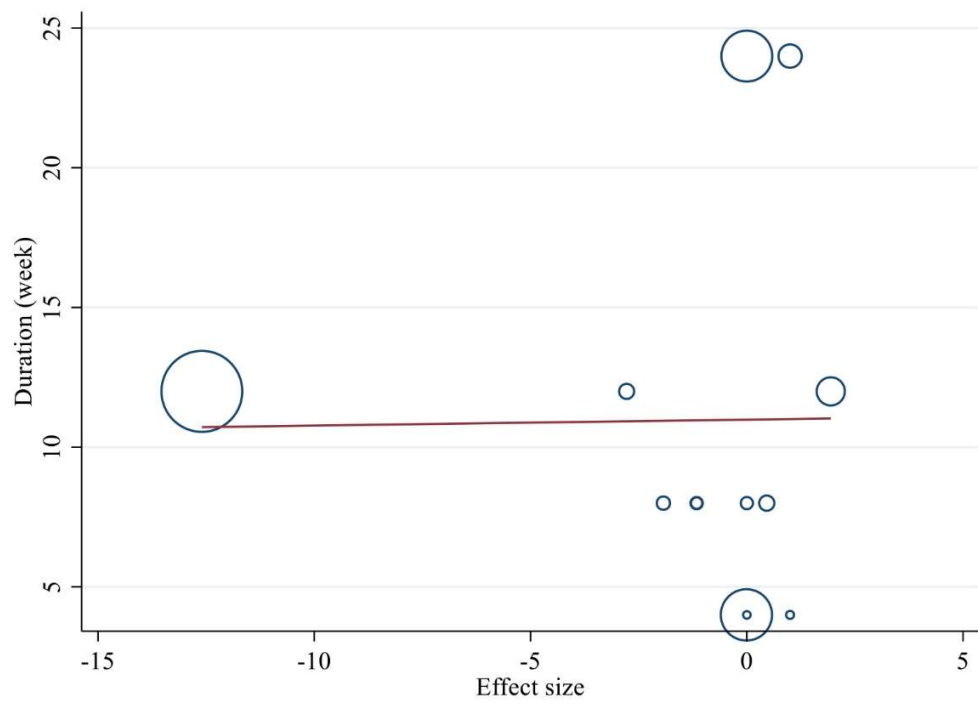
6. g



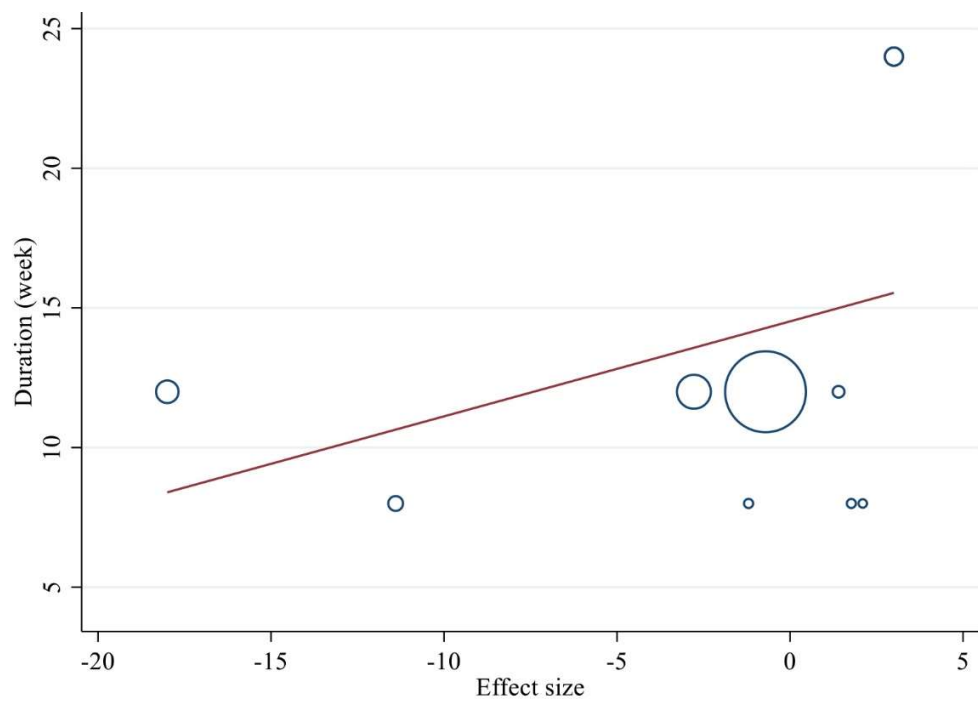
6. h



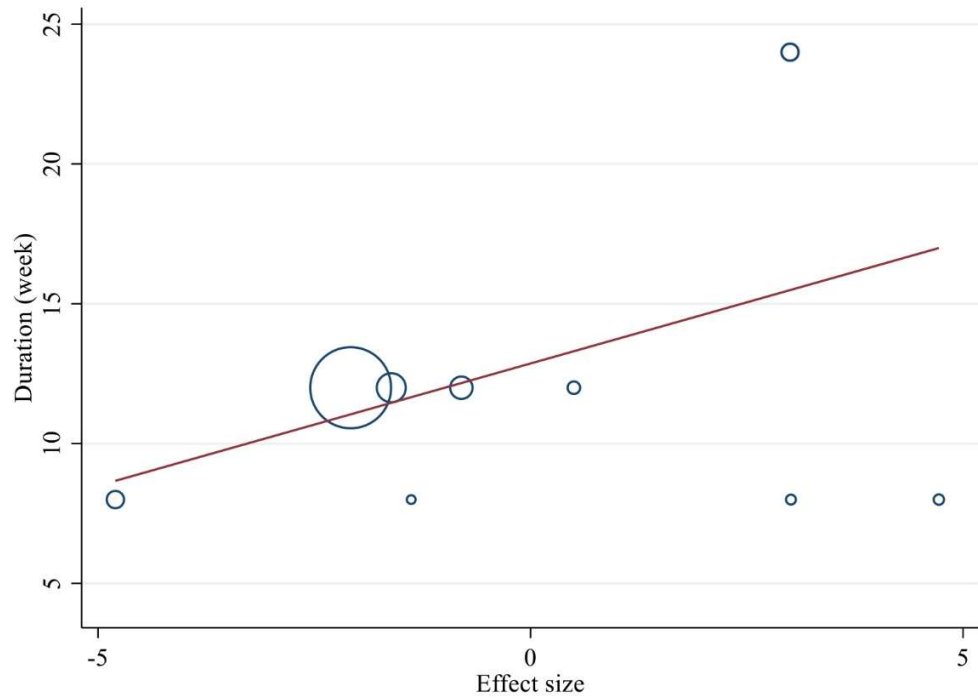
6. i



6. j



6. k



a: fasting plasma glucose (FPG); b: oral glucose tolerance test (OGTT); c: hemoglobin A1c (HbA1c); d: fasting insulin; e: homeostatic model assessment of insulin resistance (HOMA-IR); f: triglyceride (TG); g: total cholesterol (TC); h: low-density lipoprotein cholesterol (LDL-C); i: high-density lipoprotein cholesterol (HDL-C); j: systolic blood pressure (SBP); k: diastolic blood pressure (DBP)

Supplementary Table S1. Search terms used across the various databases.

PubMed	((Ginseng[Title/Abstract] OR ginsenoside[Title/Abstract]) AND ("Type 2 diabetes"[Title/Abstract] OR T2DM[Title/Abstract] OR diabetes OR[Title/Abstract]) AND (Intervention[Title/Abstract] OR "controlled trial"[Title/Abstract] OR randomized[Title/Abstract] OR random[Title/Abstract] OR randomly[Title/Abstract] OR placebo[Title/Abstract] OR "clinical trial"[Title/Abstract] OR Trial[Title/Abstract] OR "randomized clinical trial"[Title/Abstract] OR RCT[Title/Abstract] OR trial[Title/Abstract] OR trials "Cross-Over Studies"[Title/Abstract] OR "Cross-Over"[Title/Abstract] OR "Cross-Over Study"[Title/Abstract] OR parallel[Title/Abstract] OR "parallel study"[Title/Abstract] OR "parallel trial"[Title/Abstract]))
Scopus	(TITLE-ABS-KEY (probiotics OR probiotic OR synbiotics OR synbiotic OR lactobacillus OR bifidobacterium) AND TITLE-ABS-KEY (intervention OR "controlled trial" OR randomized OR random OR randomly OR placebo OR "clinical trial" OR trial OR "randomized clinical trial" OR rct OR trial OR trials "Cross-Over Studies" OR "Cross-Over" OR "Cross-Over Study" OR parallel OR "parallel study" OR "parallel trial"))
Web of science	TITLE: (Probiotics OR probiotic OR Synbiotics OR synbiotic OR Lactobacillus OR Bifidobacterium) AND TITLE: ("controlled trial" OR randomized OR random OR randomly OR placebo OR "clinical trial" OR Trial OR "randomized clinical trial" OR RCT OR trial OR trials "Cross-Over Studies" OR "Cross-Over" OR "Cross-Over Study" OR parallel OR "parallel study" OR "parallel trial")

Supplementary Table S2. Risk of bias assessment.

studies	Random sequence generation	Allocation concealment	Selective reporting	Other sources of bias	Blinding (participants and personnel)	Blinding (outcome assessment)	Incomplete outcome data	General risk of bias
Sotaniemi et al. 1995	L	L	H	H	L	U	L	Moderate
Vuksan et al. 2008	L	L	L	H	L	U	L	Low
Ma et al. 2008	L	L	H	H	L	U	L	Moderate
Reedes et al. 2011	L	L	L	H	L	U	L	Low
Yoon et al. 2012	L	L	L	H	L	U	L	Low
Hosseini et al. 2013	L	L	L	L	L	U	L	Low
Mucalo et al. 2013	L	L	H	H	L	U	L	Moderate
Park et al. 2014	L	L	H	H	L	U	L	Moderate
Bang et al. 2014	L	L	L	L	L	U	L	Low
Oh et al. 2014	L	L	L	H	L	U	L	Low
Mucalo et al. 2014	L	L	H	H	L	U	L	Moderate
Hosseini et al. 2016	L	L	H	H	L	U	L	Moderate
Hosseini et al. 2017	L	L	H	H	L	U	L	Moderate
Choi et al. 2018	L	L	L	H	L	U	L	Low
Vuksan et al. 2019	L	L	H	H	L	U	L	Moderate
Bessell et al. 2020	L	L	H	H	L	U	L	Moderate
Park et al. 2020	L	L	L	H	L	U	L	Low
Park et al. 2020	L	L	L	H	L	U	L	Low
Jovanovski et al. 2020	L	L	H	H	L	U	L	Moderate
Jovanovski et al. 2021	L	L	H	H	L	U	L	Moderate

*General Low Risk<2 high risk, General moderate risk=2 high risk, General high risk>2 high risk

Supplementary Table S3. Publication bias assessment.

Publication bias		
	Begg's Test	Egger's test
BW	1.000	0.799
BMI	0.754	0.578
WC	0.296	0.488
FPG	0.763	0.035
OGTT	0.721	0.258
A1c	0.921	0.681
Fasting Insulin	0.893	0.938
HOMA-IR	0.474	0.060
TG	0.193	0.409
TC	1.000	0.298
LDL-C	0.760	0.192
HDL-C	0.050	0.094
SBP	0.721	0.607
DBP	0.283	0.050
HR	0.296	0.403
CRP	1.000	0.219
IL6	0.133	0.006
TNF- α	0.260	0.558
Adiponectin	1.000	0.444
Leptin	0.296	0.261
ALT	0.072	0.182
AST	1.000	0.482
GGT	1.000	0.581

Abbreviations: body weight (BW); body mass index (BMI); waist circumference (WC); fasting plasma glucose (FPG); oral glucose tolerance test (OGTT); hemoglobin A1c (HbA1c); fasting insulin; homeostatic model assessment of insulin resistance (HOMA-IR); triglyceride (TG); total cholesterol (TC); low-density lipoprotein cholesterol (LDL-C); high-density lipoprotein cholesterol (HDL-C); systolic blood pressure (SBP); diastolic blood pressure (DBP); heart rate (HR); C-reactive protein (CRP); interleukin-6 (IL-6); tumor necrosis α (TNF- α); adiponectin; leptin; alanine aminotransferase (ALT); aspartate aminotransferase (AST); gamma-glutamyl transferase (GGT)