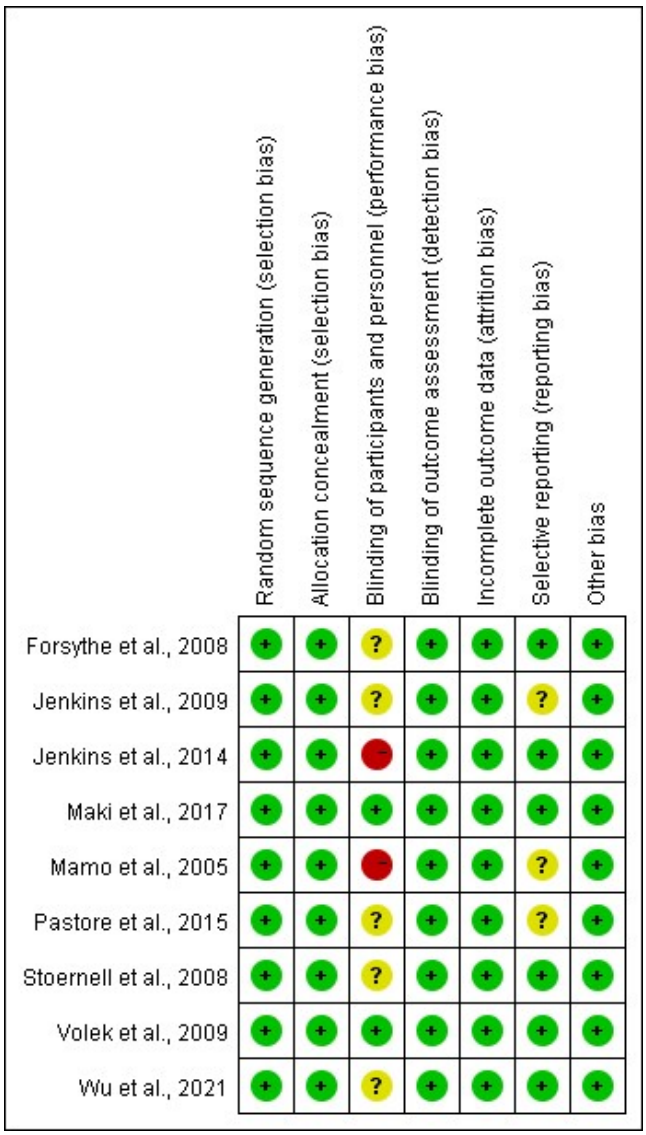
Supplementary material 2: Tables and Figures

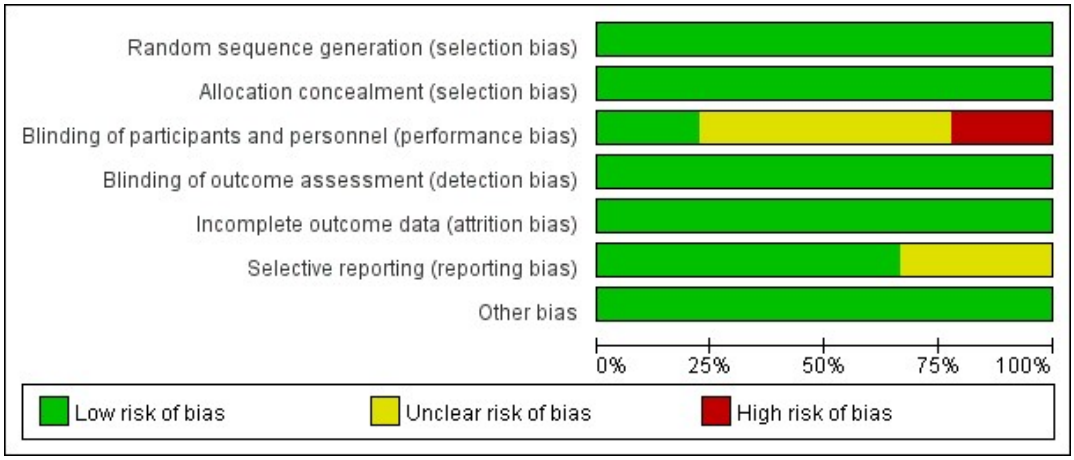
Supplemental Table 1. Risk of bias summary: risk of bias item for each included RCT for meta-analysis according to Cochrane Risk-of-Bias Tool.

Studies	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding of participants and personnel (performance bias)	Blinding of outcome assessment (detection bias)	Incomplete outcome data (attrition bias)	Selective reporting (reporting bias)	Other bias
Forsythe et al., 2008	Low risk.	Low risk.	Unclear risk.	Low risk.	Low risk.	Low risk.	Low risk.
Jenkins et al., 2009	Low risk.	Low risk.	Unclear risk.	Low risk.	Low risk.	Unclear risk.	Low risk.
Jenkins et al., 2014	Low risk.	Low risk.	High risk.	Low risk.	Low risk.	Low risk.	Low risk.
Maki et al., 2017	Low risk.	Low risk.	Low risk.	Low risk.	Low risk.	Low risk.	Low risk.
Mamo et al., 2005	Low risk.	Low risk.	High risk.	Low risk.	Low risk.	Unclear risk.	Low risk.
Pastore et al., 2015	Low risk.	Low risk.	Unclear risk.	Low risk.	Low risk.	Unclear risk.	Low risk.

Stoernell et al., 2008	Low risk.	Low risk.	Unclear risk.	Low risk.	Low risk.	Low risk.	Low risk.
Volek et al., 2009	Low risk.	Low risk.	Low risk.	Low risk.	Low risk.	Low risk.	Low risk.
Wu et al., 2021	Low risk.	Low risk.	Unclear risk.	Low risk.	Low risk.	Low risk.	Low risk.

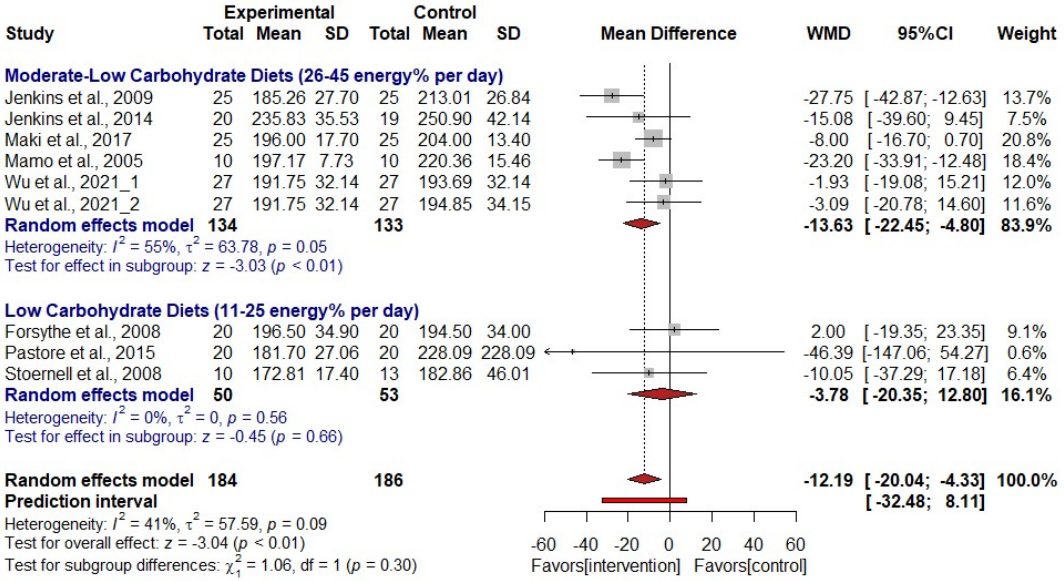


Supplemental Fig.1 Risk of bias summary: risk of bias item for each included RCT according to Cochrane Risk-of-Bias Tool.

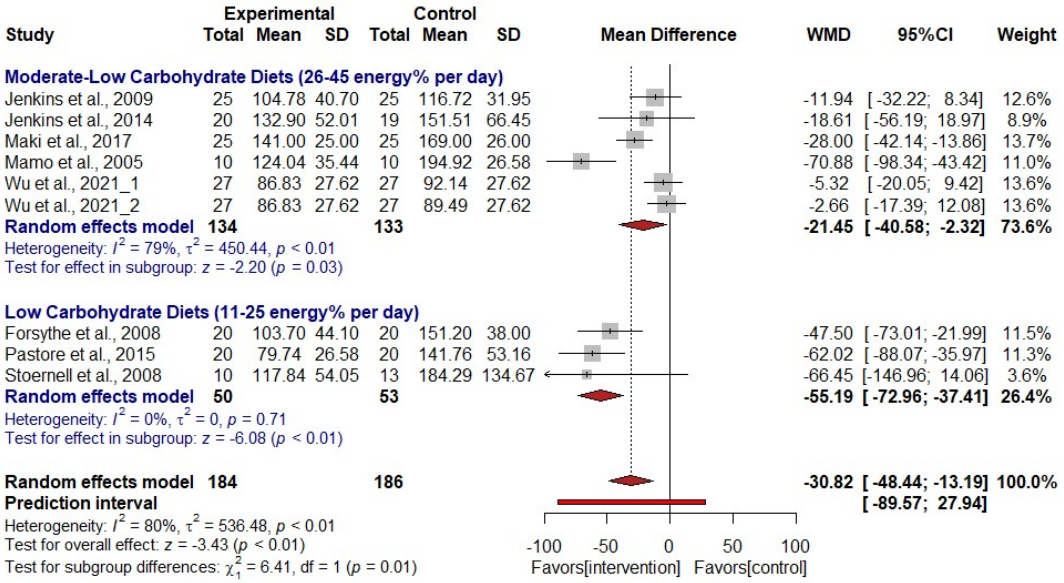


Supplemental Fig.2 Risk of bias graph: each risk of bias item is presented as percentages across all included RCTs.

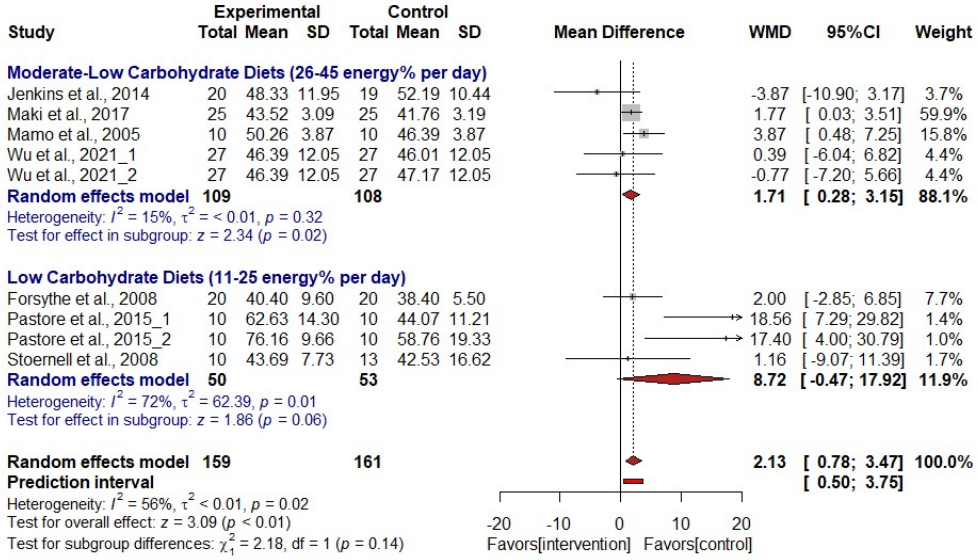
A) Total cholesterol



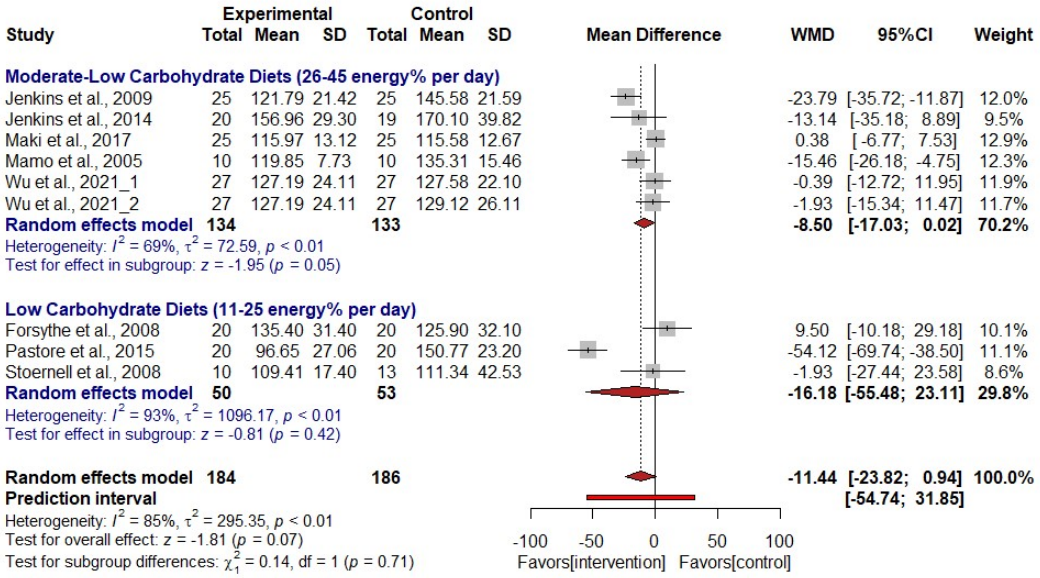
B) Triglycerides



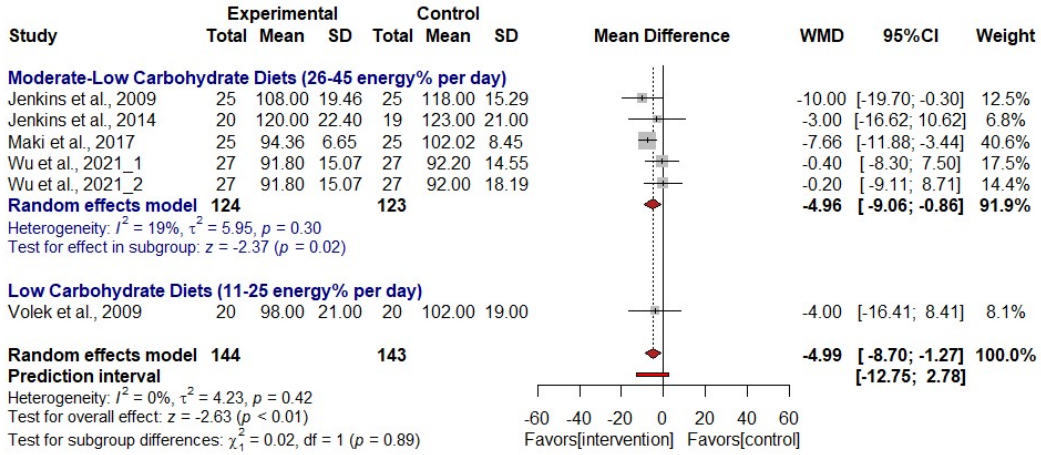
C) HDL-C


Study
Experimental Total Mean SD
Control Total Mean SD
Mean Difference
WMD 95%CI Weight
Moderate-Low Carbohydrate Diets (26-45 energy% per day)
Jenkins et al., 2014 20 48.33 11.95 19 52.19 10.44 -3.87 [-10.90; 3.17] 3.7%
Maki et al., 2017 25 43.52 3.09 25 41.76 3.19 1.77 [0.03; 3.51] 59.9%
Mamo et al., 2005 10 50.26 3.87 10 46.39 3.87 3.87 [0.48; 7.25] 15.8%
Wu et al., 2021_1 27 46.39 12.05 27 46.01 12.05 0.39 [-6.04; 6.82] 4.4%
Wu et al., 2021_2 27 46.39 12.05 27 47.17 12.05 -0.77 [-7.20; 5.66] 4.4%
Random effects model 109 108 1.71 [0.28; 3.15] 88.1%
Heterogeneity: I^2 = 15%, τ^2 = < 0.01, p = 0.32
Test for effect in subgroup: z = 2.34 (p = 0.02)
Low Carbohydrate Diets (11-25 energy% per day)
Forsythe et al., 2008 20 40.40 9.60 20 38.40 5.50 2.00 [-2.85; 6.85] 7.7%
Pastore et al., 2015_1 10 62.63 14.30 10 44.07 11.21 18.56 [7.29; 29.82] 1.4%
Pastore et al., 2015_2 10 76.16 9.66 10 58.76 19.33 17.40 [4.00; 30.79] 1.0%
Stoernell et al., 2008 10 43.69 7.73 13 42.53 16.62 1.16 [-9.07; 11.39] 1.7%
Random effects model 50 53 8.72 [-0.47; 17.92] 11.9%
Heterogeneity: I^2 = 72%, τ^2 = 62.39, p = 0.01
Test for effect in subgroup: z = 1.86 (p = 0.06)
Random effects model 159 161 2.13 [0.78; 3.47] 100.0%
Prediction interval [0.50; 3.75]
Heterogeneity: I^2 = 56%, τ^2 < 0.01, p = 0.02
Test for overall effect: z = 3.09 (p < 0.01)
Test for subgroup differences: χ^2_1 = 2.18, df = 1 (p = 0.14)
-20 -10 0 10 20
Favors[intervention] Favors[control]

D) LDL-C

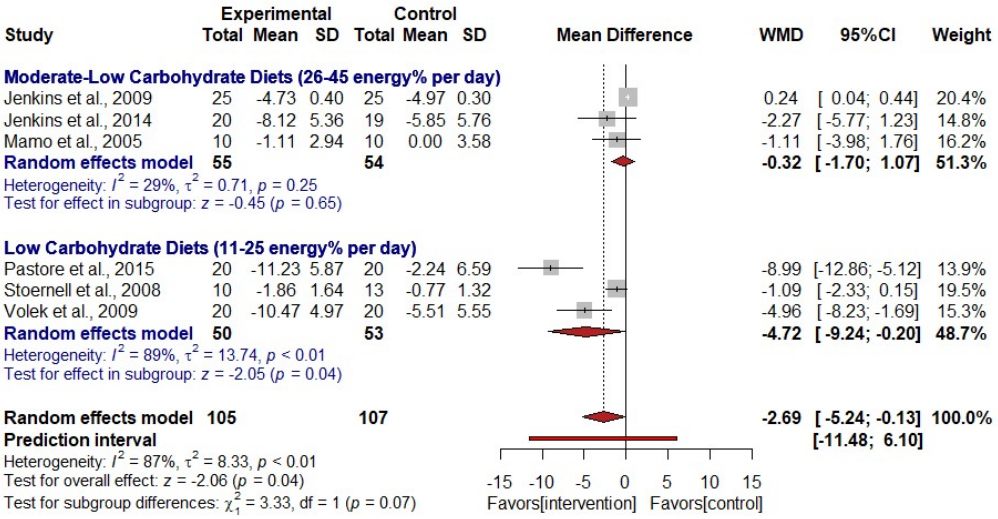

Study
Experimental Total Mean SD
Control Total Mean SD
Mean Difference
WMD 95%CI Weight
Moderate-Low Carbohydrate Diets (26-45 energy% per day)
Jenkins et al., 2009 25 121.79 21.42 25 145.58 21.59 -23.79 [-35.72; -11.87] 12.0%
Jenkins et al., 2014 20 156.96 29.30 19 170.10 39.82 -13.14 [-35.18; 8.89] 9.5%
Maki et al., 2017 25 115.97 13.12 25 115.58 12.67 0.38 [-6.77; 7.53] 12.9%
Mamo et al., 2005 10 119.85 7.73 10 135.31 15.46 -15.46 [-26.18; -4.75] 12.3%
Wu et al., 2021_1 27 127.19 24.11 27 127.58 22.10 -0.39 [-12.72; 11.95] 11.9%
Wu et al., 2021_2 27 127.19 24.11 27 129.12 26.11 -1.93 [-15.34; 11.47] 11.7%
Random effects model 134 133 -8.50 [-17.03; 0.02] 70.2%
Heterogeneity: I^2 = 69%, τ^2 = 72.59, p < 0.01
Test for effect in subgroup: z = -1.95 (p = 0.05)
Low Carbohydrate Diets (11-25 energy% per day)
Forsythe et al., 2008 20 135.40 31.40 20 125.90 32.10 9.50 [-10.18; 29.18] 10.1%
Pastore et al., 2015 20 96.65 27.06 20 150.77 23.20 -54.12 [-69.74; -38.50] 11.1%
Stoernell et al., 2008 10 109.41 17.40 13 111.34 42.53 -1.93 [-27.44; 23.58] 8.6%
Random effects model 50 53 -16.18 [-55.48; 23.11] 29.8%
Heterogeneity: I^2 = 93%, τ^2 = 1096.17, p < 0.01
Test for effect in subgroup: z = -0.81 (p = 0.42)
Random effects model 184 186 -11.44 [-23.82; 0.94] 100.0%
Prediction interval [-54.74; 31.85]
Heterogeneity: I^2 = 85%, τ^2 = 295.35, p < 0.01
Test for overall effect: z = -1.81 (p = 0.07)
Test for subgroup differences: χ^2_1 = 0.14, df = 1 (p = 0.71)
-100 -50 0 50 100
Favors[intervention] Favors[control]

E) ApoB



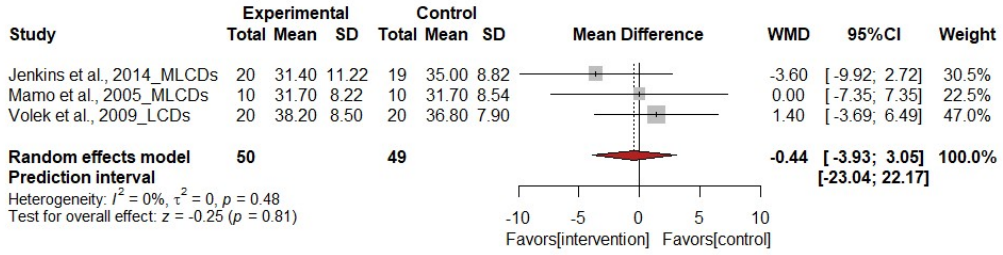
Supplemental Fig.3 Impact of carbohydrate-restricted diets on lipid profiles in dyslipidemia individuals. Examining the effect of carbohydrate-restricted diets on profiles at intervention conclusion compared to normal carbohydrate diets in dyslipidemia individuals across all included RCTs. Random effects model was employed based on the DerSimonian and Laird (DL) method. A) Total cholesterol; B) Triglycerides; C) HDL-C; D) LDL-C; E) ApoB. The subgroup analysis was conducted based on study designs, specifically examining interventions with moderate-low carbohydrate diets versus low carbohydrate diets.

WMD (Weighted Mean Difference) reveals the percentage mean difference at intervention conclusion between experimental and control groups. Data points denote mean differences, and horizontal error bars show 95% confidence intervals. Shaded areas reflect study weights in the random-effects meta-analysis. The vertical dashed line marks the pooled point estimate, while the solid black line represents the null hypothesis (MD=0). Red diamonds signify subgroup and overall effects, accompanied by a red solid line indicating the prediction interval. Abbreviation: HDL-C: High-Density Lipoprotein Cholesterol; LDL-C: Low-Density Lipoprotein Cholesterol; ApoB: Apolipoprotein B; RCTs: Randomized Controlled Trials.



Supplemental Fig.4 Impact of carbohydrate-restricted diets on the percentage change% in body weight among dyslipidemia individuals. Examining the effect of carbohydrate-restricted diets on body weight at intervention conclusion compared to normal carbohydrate diets in dyslipidemia individuals across all included RCTs. Random effects model was employed based on the DerSimonian and Laird (DL) method. The subgroup analysis was conducted based on study designs, specifically examining interventions with moderate-low carbohydrate diets versus low carbohydrate diets.

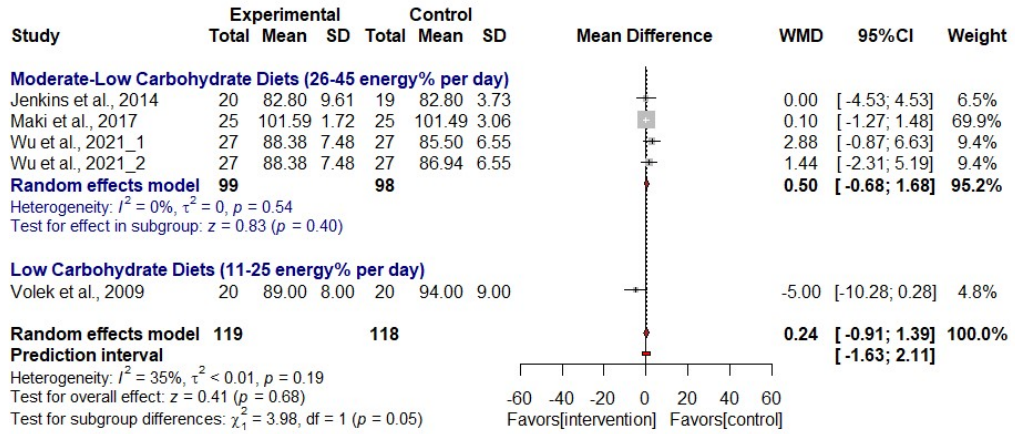
WMD (Weighted Mean Difference) reveals the percentage mean difference at intervention conclusion between experimental and control groups. Data points denote mean differences, and horizontal error bars show 95% confidence intervals. Shaded areas reflect study weights in the random-effects meta-analysis. The vertical dashed line marks the pooled point estimate, while the solid black line represents the null hypothesis (MD=0). Red diamonds signify subgroup and overall effects, accompanied by a red solid line indicating the prediction interval. Abbreviation: RCTs: Randomized Controlled Trials.



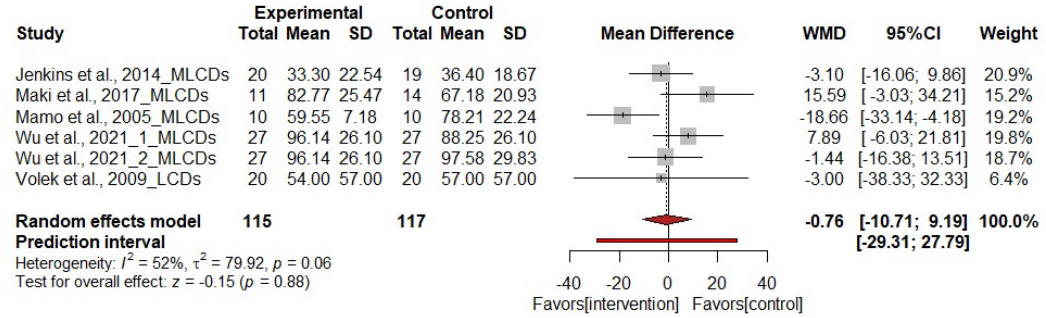
Supplemental Fig.5 Impact of carbohydrate-restricted diets on body fat% in dyslipidemia individuals. Examining the effect of carbohydrate-restricted diets on body fat% at intervention conclusion compared to normal carbohydrate diets in dyslipidemia individuals across all included RCTs. Random effects model was employed based on the DerSimonian and Laird (DL) method.

WMD (Weighted Mean Difference) reveals the percentage mean difference at intervention conclusion between experimental and control groups. Data points denote mean differences, and horizontal error bars show 95% confidence intervals. Shaded areas reflect study weights in the random-effects meta-analysis. The vertical dashed line marks the pooled point estimate, while the solid black line represents the null hypothesis (MD=0). Red diamonds signify subgroup and overall effects, accompanied by a red solid line indicating the prediction interval. Abbreviation: RCTs: Randomized Controlled Trials; MLCDs: Moderate-Low Carbohydrate Diets; LCDs: Low Carbohydrate Diets.

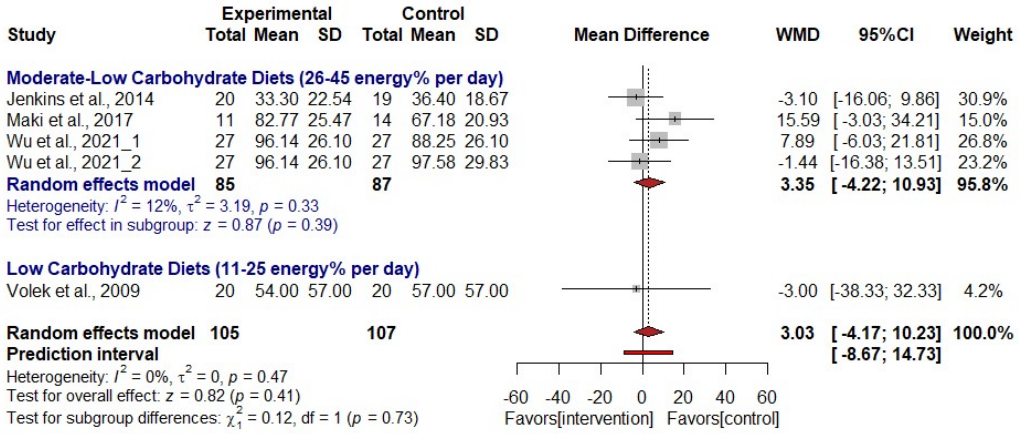
A) Fasting glucose



B) Fasting insulin



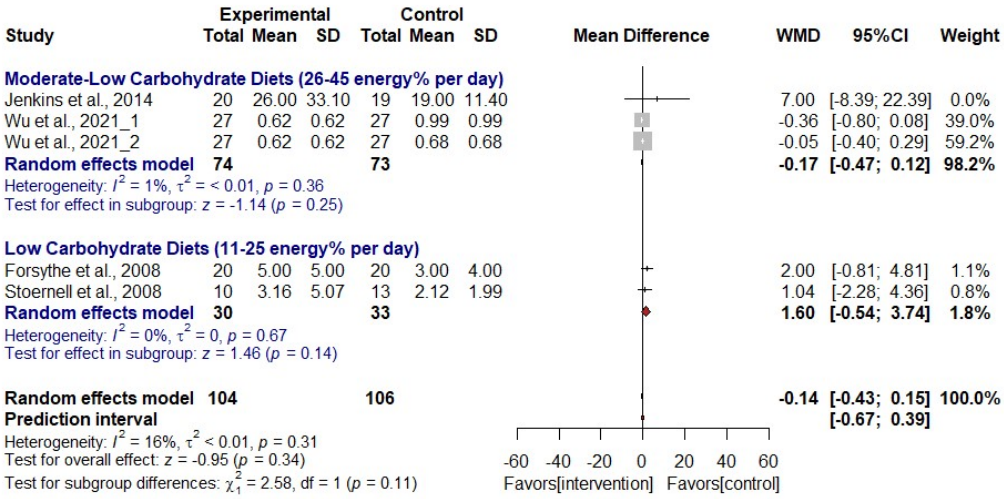
C) Fasting insulin adjusted based on leave-one-out approach



Supplemental Fig.6 Impact of carbohydrate-restricted diets on glucose parameters in dyslipidemia individuals. Examining the effect of carbohydrate-restricted diets on glucose parameters at intervention conclusion compared to normal carbohydrate diets in dyslipidemia individuals across all included RCTs. Random effects model was employed based on the DerSimonian and Laird (DL) method. A) Fasting glucose; B) Fasting insulin; C) Fasting insulin adjusted based on leave-one-out approach; The subgroup analysis was conducted based on study designs, specifically examining interventions with moderate-low carbohydrate diets versus low

carbohydrate diets.

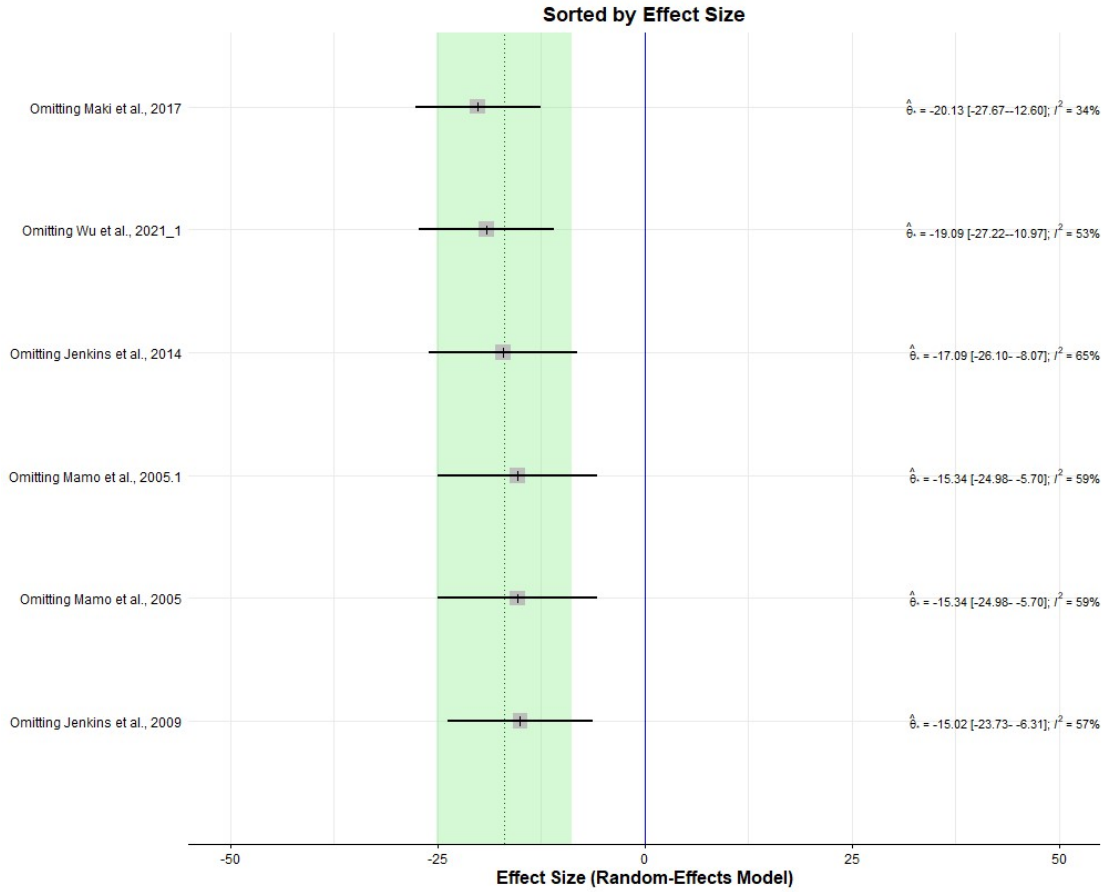
WMD (Weighted Mean Difference) reveals the percentage mean difference at intervention conclusion between experimental and control groups. Data points denote mean differences, and horizontal error bars show 95% confidence intervals. Shaded areas reflect study weights in the random-effects meta-analysis. The vertical dashed line marks the pooled point estimate, while the solid black line represents the null hypothesis (MD=0). Red diamonds signify subgroup and overall effects, accompanied by a red solid line indicating the prediction interval. Abbreviation: RCTs: Randomized Controlled Trials; MLCDs: Moderate-Low Carbohydrate Diets; LCDs: Low Carbohydrate Diets.



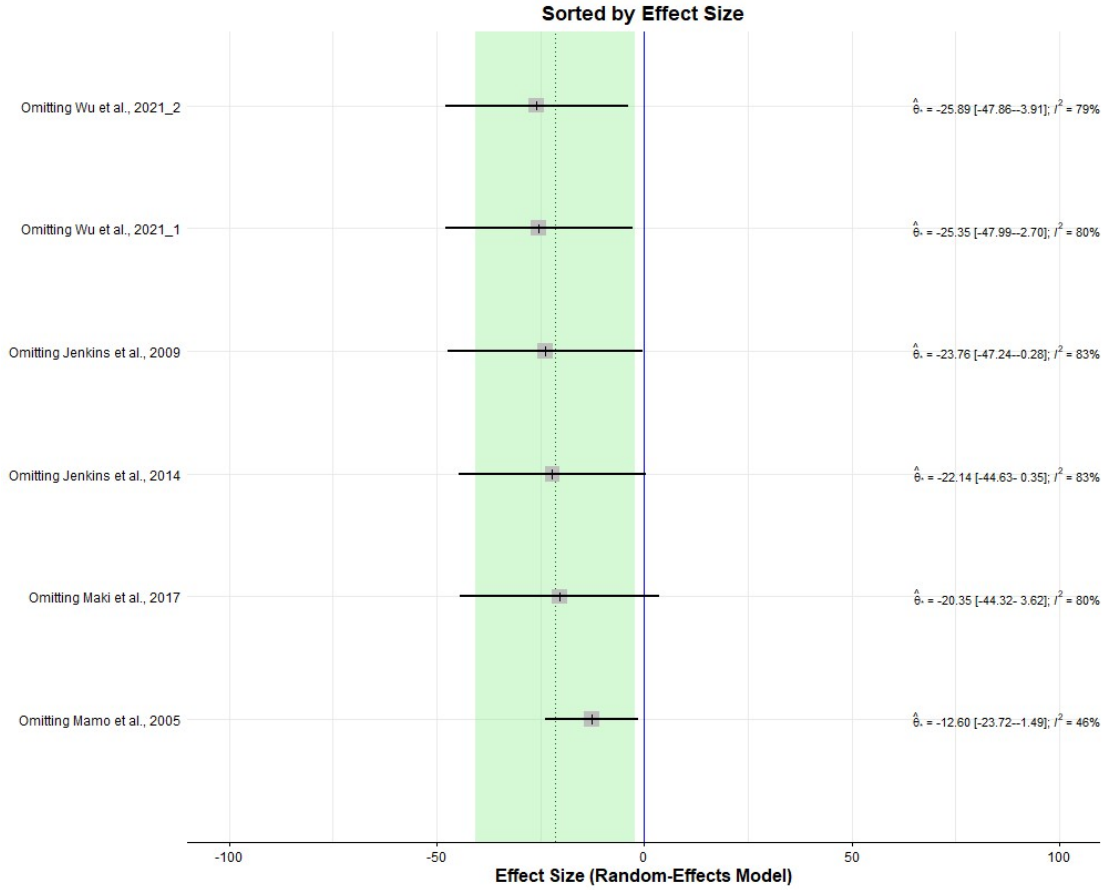
Supplemental Fig.7 Impact of carbohydrate-restricted diets on the levels of blood high-sensitivity C-Reactive Protein (hs-CRP) in dyslipidemia individuals. Examining the effect of carbohydrate-restricted diets on the levels of blood high-sensitivity C-Reactive Protein (hs-CRP) at intervention conclusion compared to normal carbohydrate diets in dyslipidemia individuals across all included RCTs. Random effects model was employed based on the DerSimonian and Laird (DL) method. The subgroup analysis was conducted based on study designs, specifically examining interventions with moderate-low carbohydrate diets versus low carbohydrate diets.

WMD (Weighted Mean Difference) reveals the percentage mean difference at intervention conclusion between experimental and control groups. Data points denote mean differences, and horizontal error bars show 95% confidence intervals. Shaded areas reflect study weights in the random-effects meta-analysis. The vertical dashed line marks the pooled point estimate, while the solid black line represents the null hypothesis (MD=0). Red diamonds signify subgroup and overall effects, accompanied by a red solid line indicating the prediction interval. Abbreviation: RCTs: Randomized Controlled Trials; MLCDs: Moderate-Low Carbohydrate Diets; LCDs: Low Carbohydrate Diets.

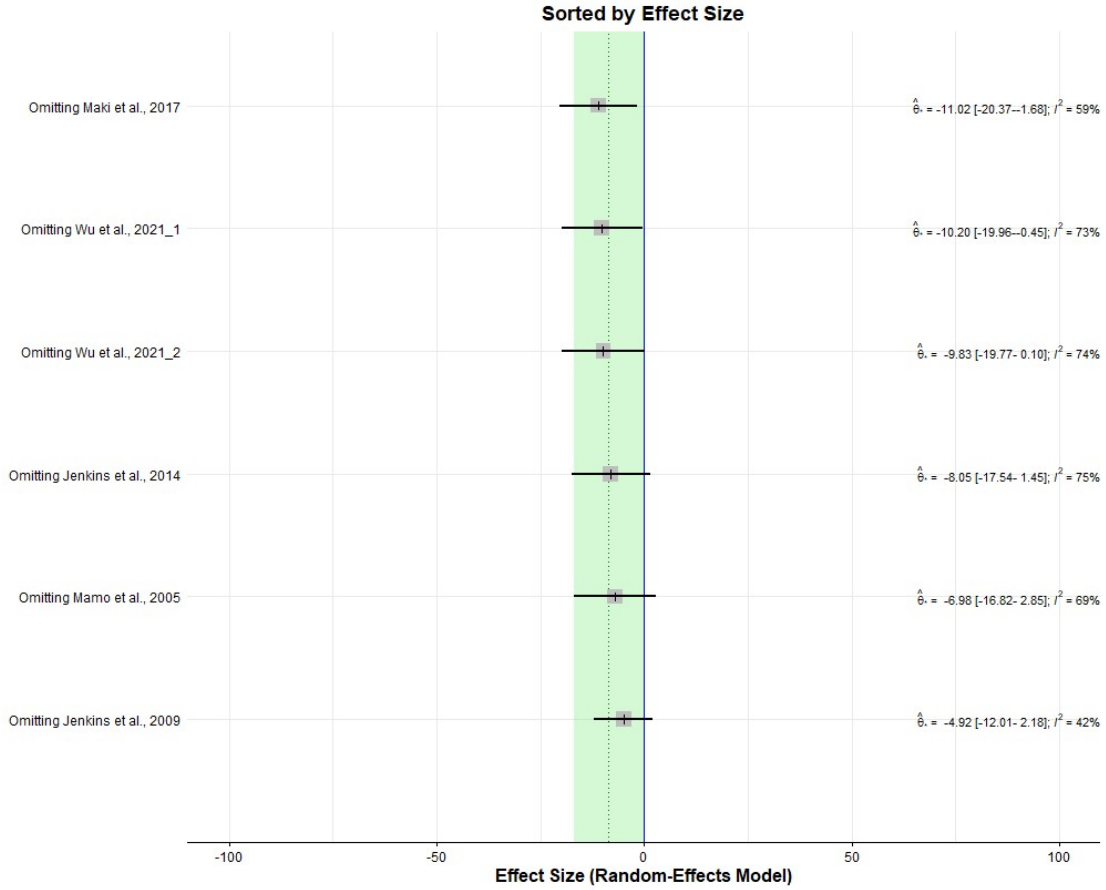
A) Total cholesterol in Moderate-Low carbohydrates diets RCTs (n=6)



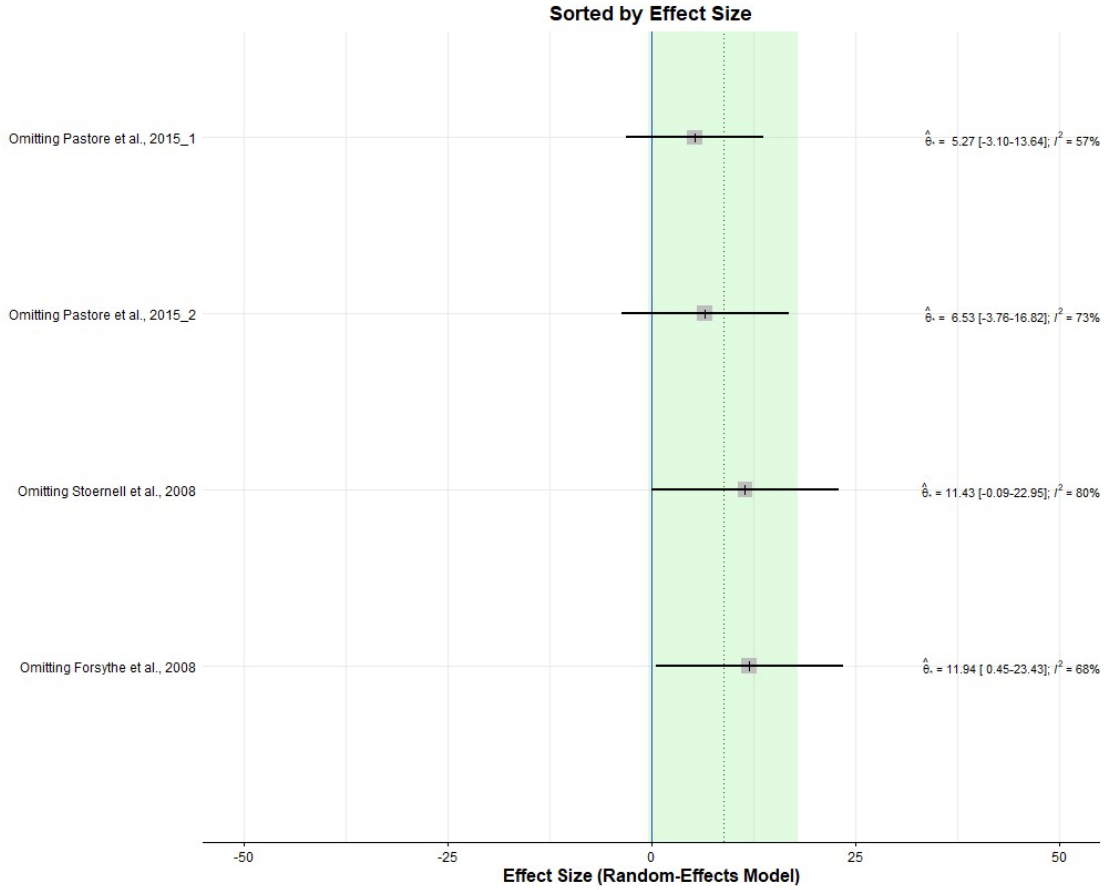
B) Triglycerides in Moderate-Low carbohydrates diets RCTs (n=6)



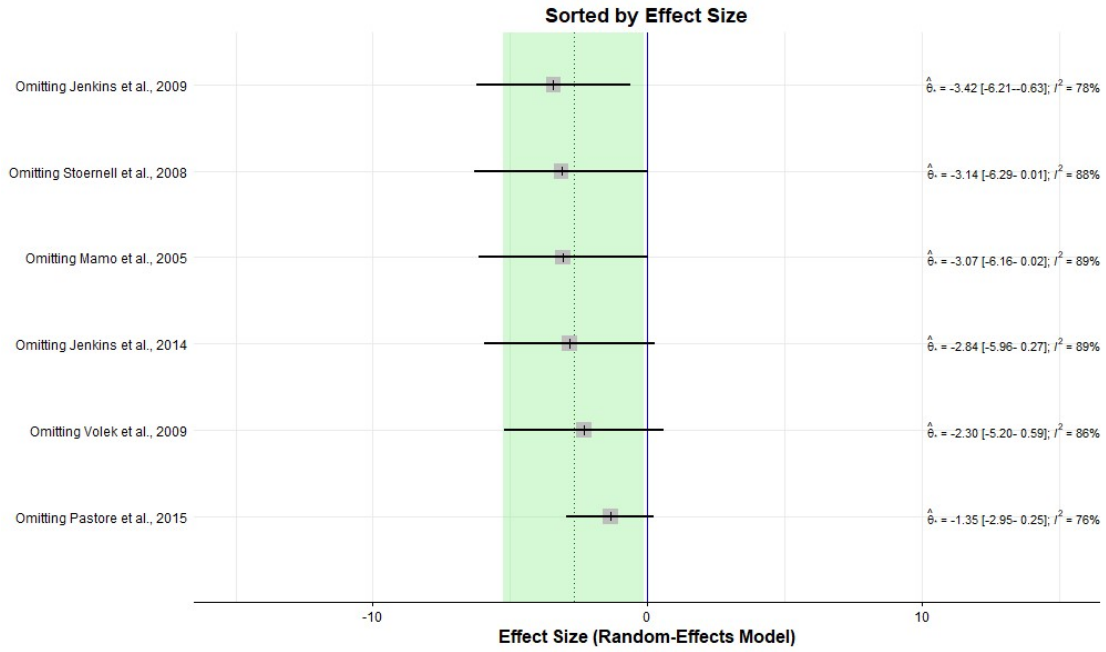
C) LDL-C in Moderate-Low carbohydrates diets RCTs (n=6)



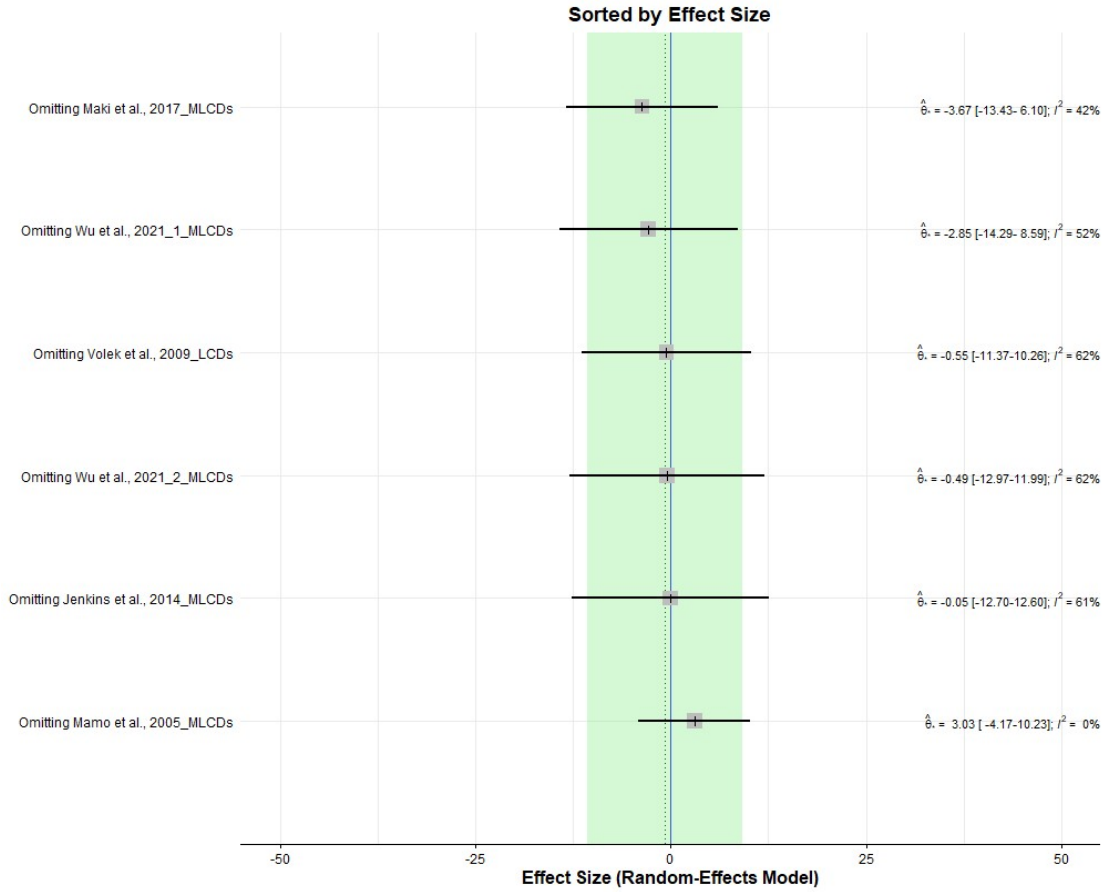
D) HDL-C in Low carbohydrates diets RCTs (n=4)



E) Change% in body weight in all included studies (Moderate-Low carbohydrates diets, n=3; Low-carbohydrates diets, n=3)



F) Fasting insulin in all included studies (RCTs, n=6)



Supplemental Fig.8 Sensitivity analysis of the impact of carbohydrate-restricted diets versus normal carbohydrates diets on total cholesterol, triglycerides, LDL-C, HDL-C, change% in body weight and fasting insulin in dyslipidemia individuals employing leave-one-out approach in all included studies.

A) Total cholesterol in Moderate-Low carbohydrates diets RCTs (n=6)

B) Triglycerides in Moderate-Low carbohydrates diets RCTs (n=6)

C) LDL-C in Moderate-Low carbohydrates diets RCTs (n=6)

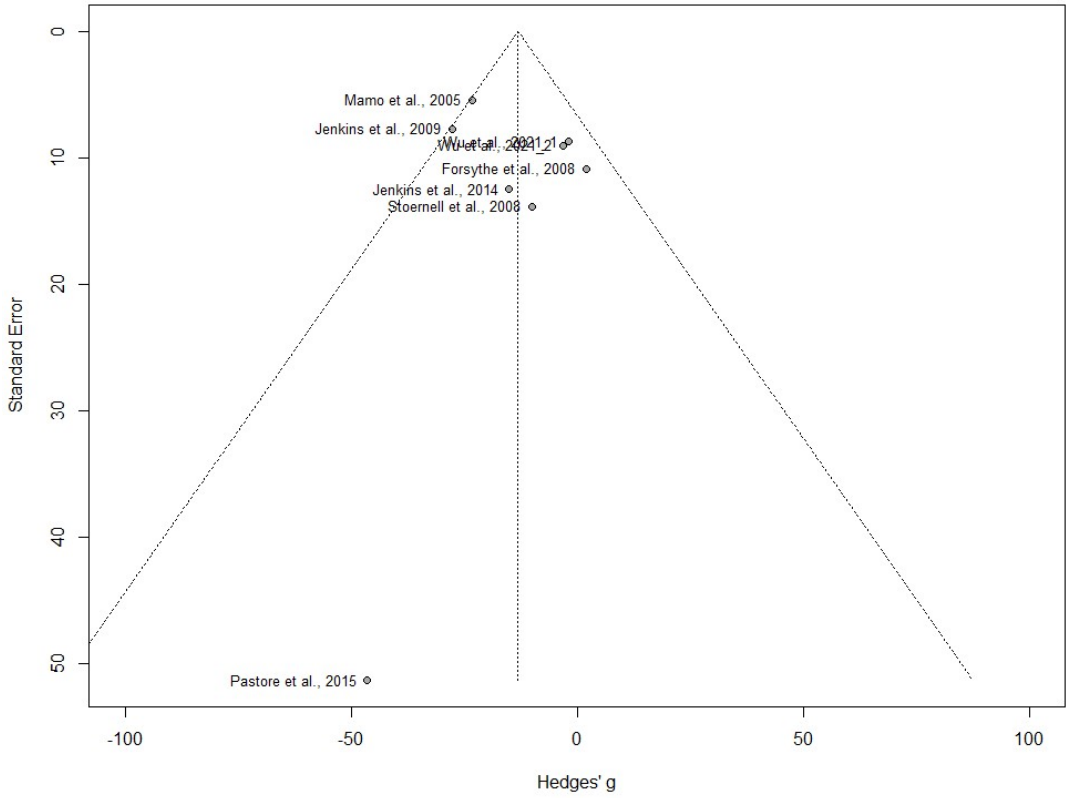
D) HDL-C in Low carbohydrates diets RCTs (n=4)

E) Change% in body weight in all included studies (Moderate-Low carbohydrates diets, n=3; Low-carbohydrates diets, n=3)

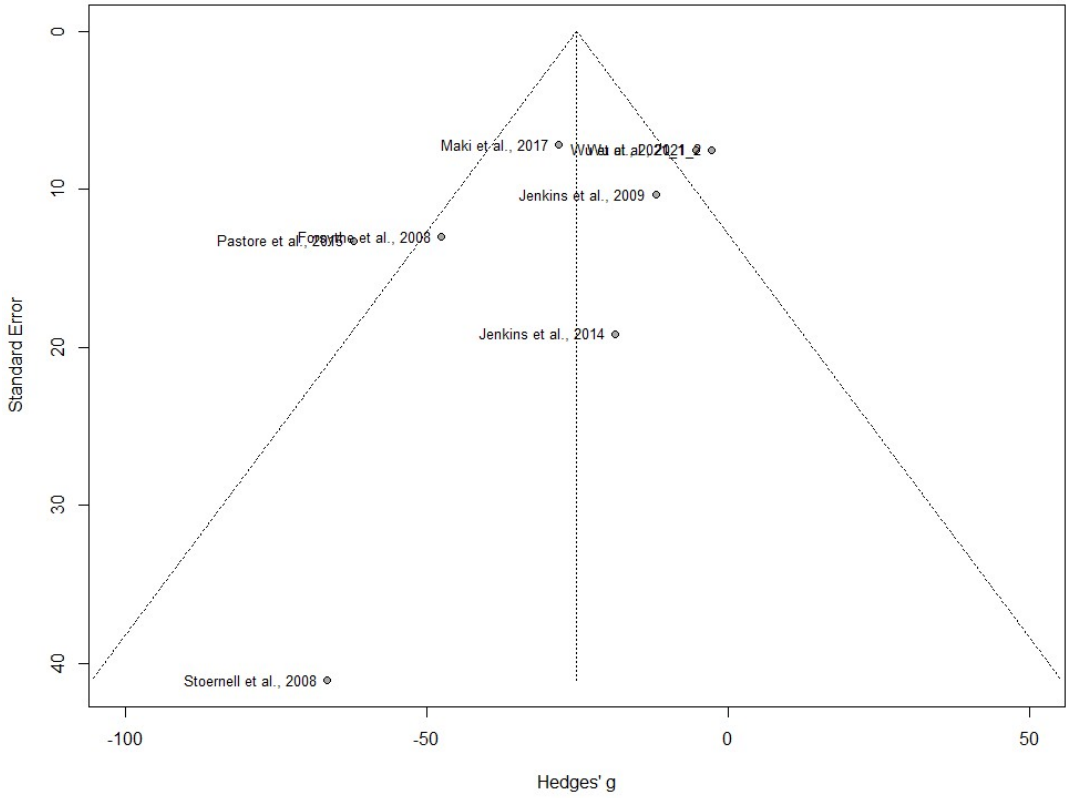
F) Fasting insulin in all included studies (RCTs, n=6)

Abbreviations: HDL-C: High-Density Lipoprotein Cholesterol; LDL-C: Low-Density Lipoprotein Cholesterol. RCTs: Randomized Controlled Trials.

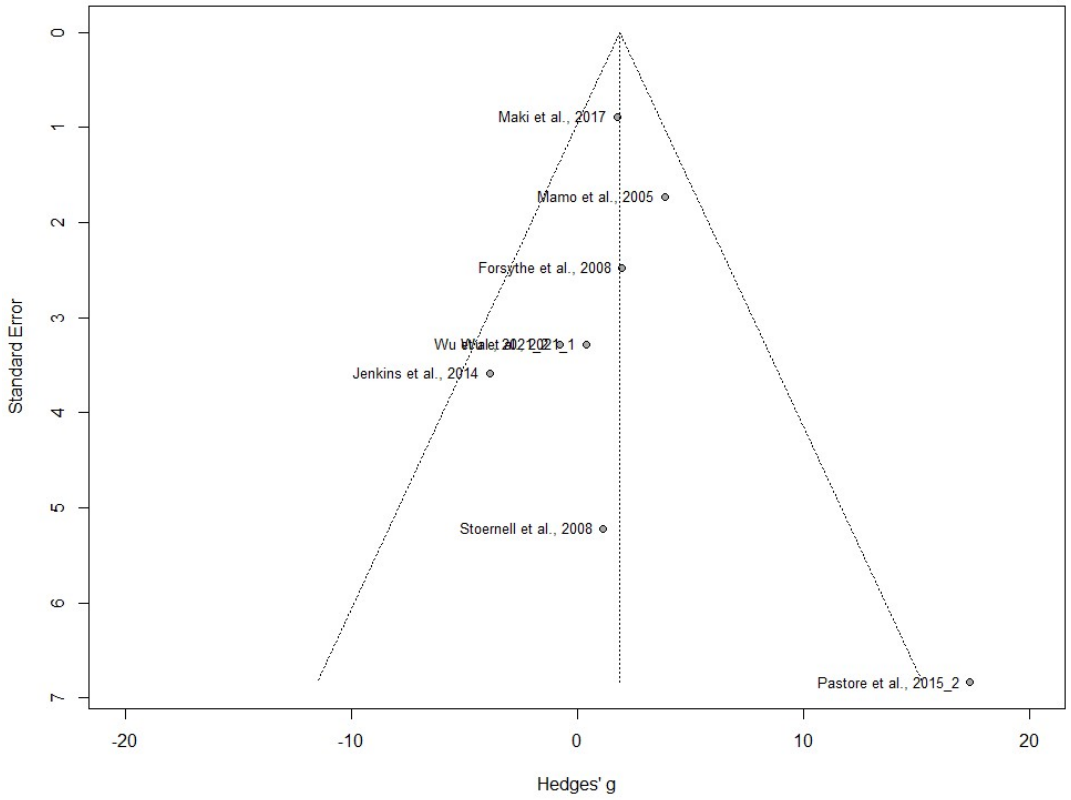
A) Total cholesterol



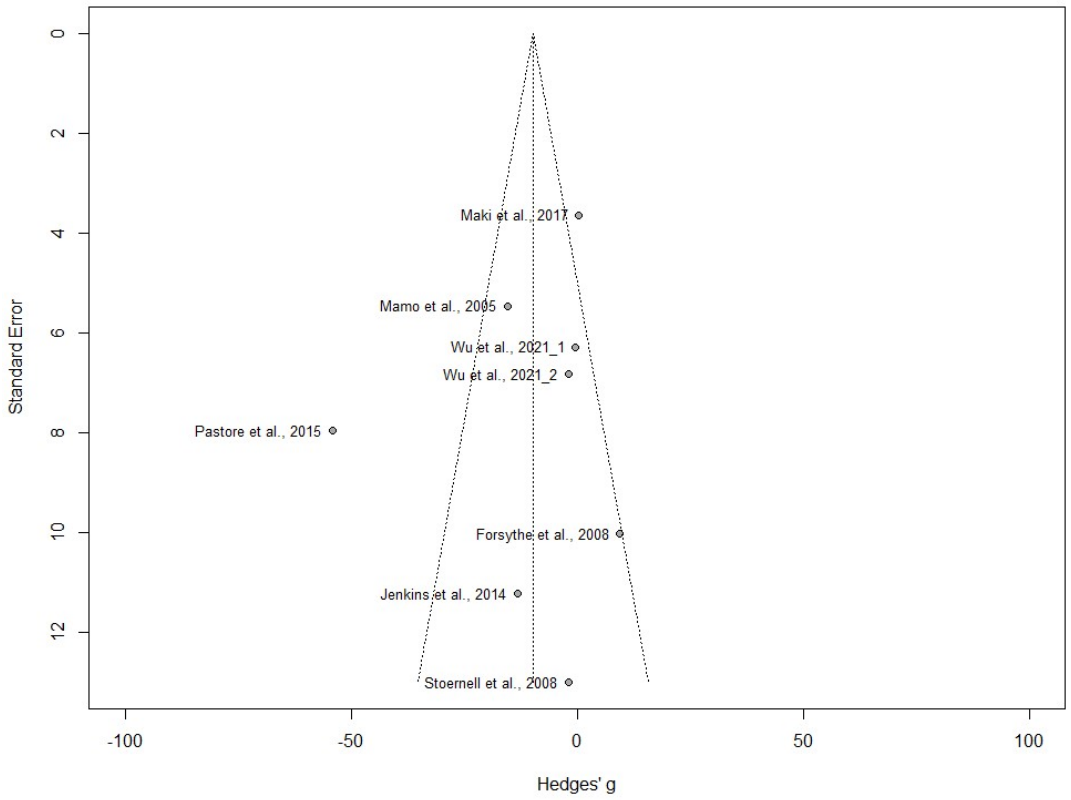
B) Triglycerides



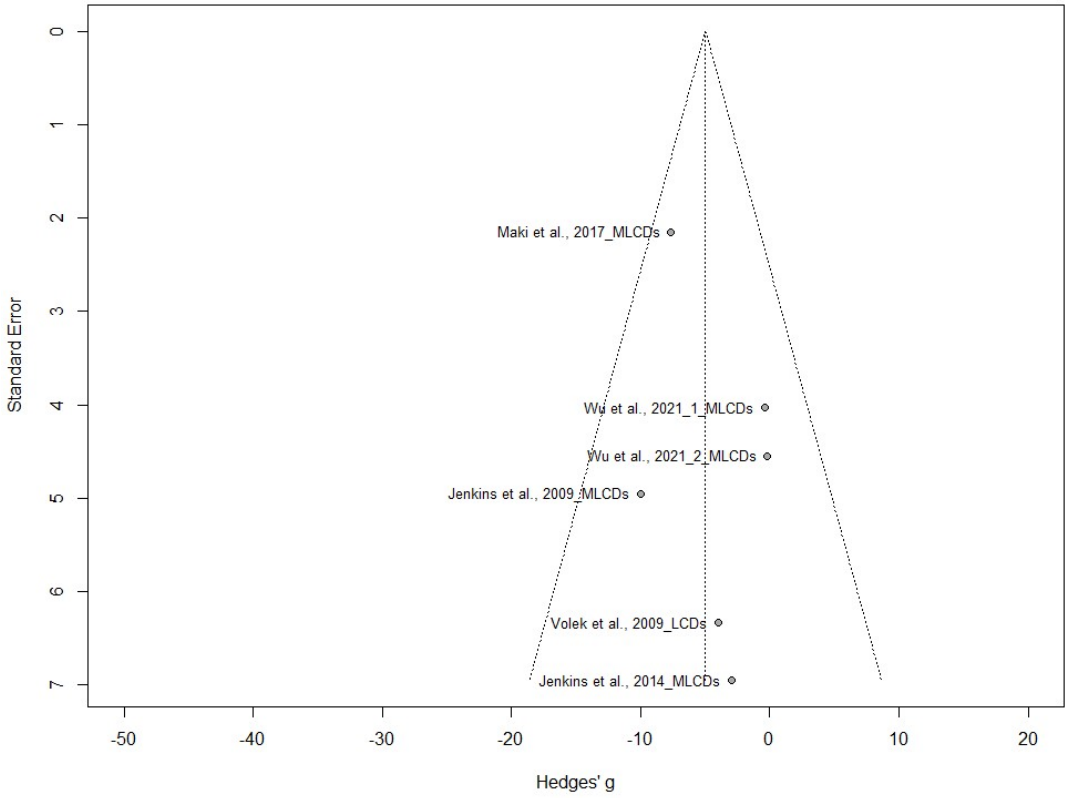
C) HDL-C


Maki et al., 2017
Mamo et al., 2005
Forsythe et al., 2008
Wu et al., 2021_1
Jenkins et al., 2014
Stoernell et al., 2008
Pastore et al., 2015_2
Standard Error
Hedges' g
0
1
2
3
4
5
6
7
-20
-10
0
10
20

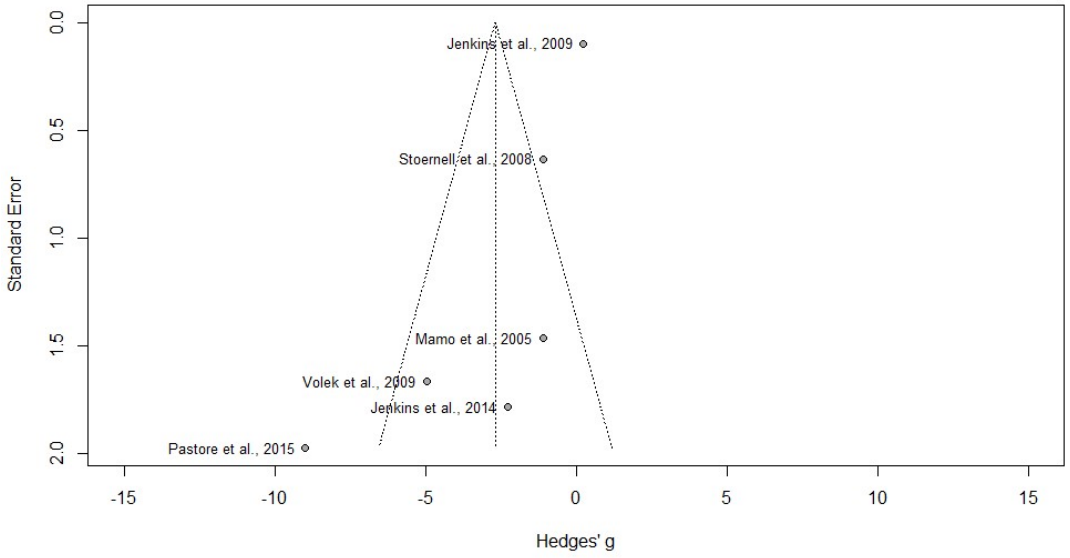
D) LDL-C


Maki et al., 2017
Mamo et al., 2005
Wu et al., 2021_1
Wu et al., 2021_2
Pastore et al., 2015
Forsythe et al., 2008
Jenkins et al., 2014
Stoernell et al., 2008
Standard Error
Hedges' g
0
2
4
6
8
10
12
-100
-50
0
50
100

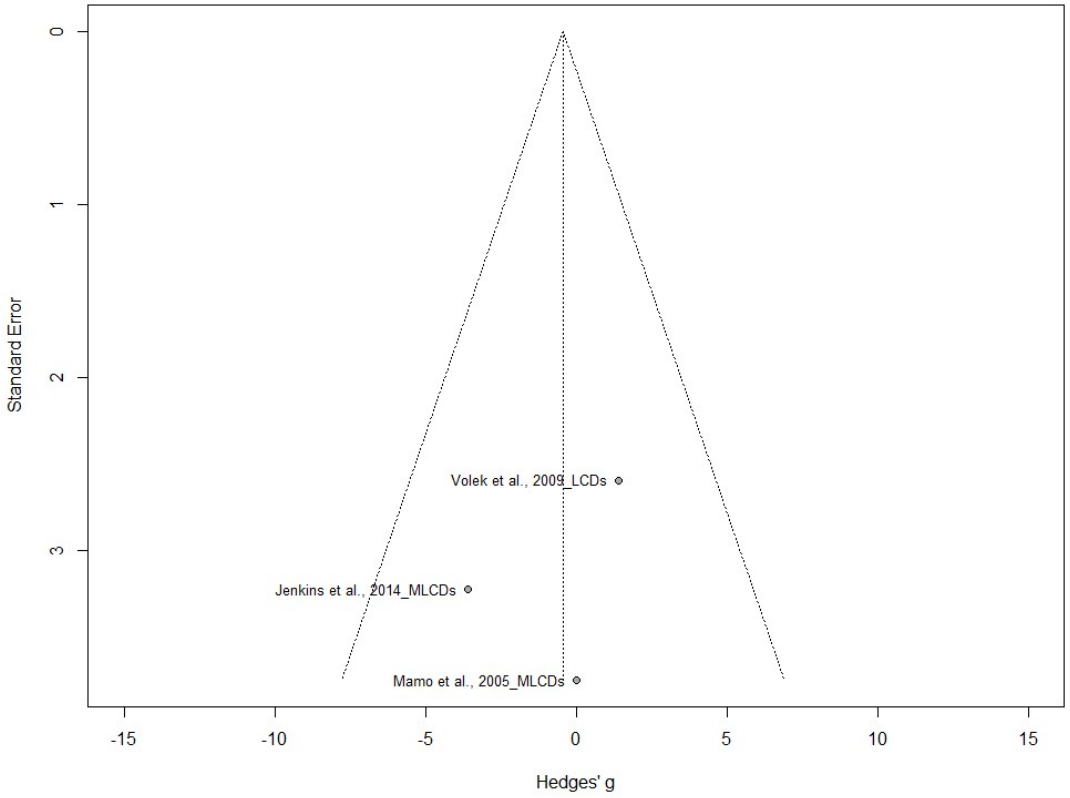
E) ApoB



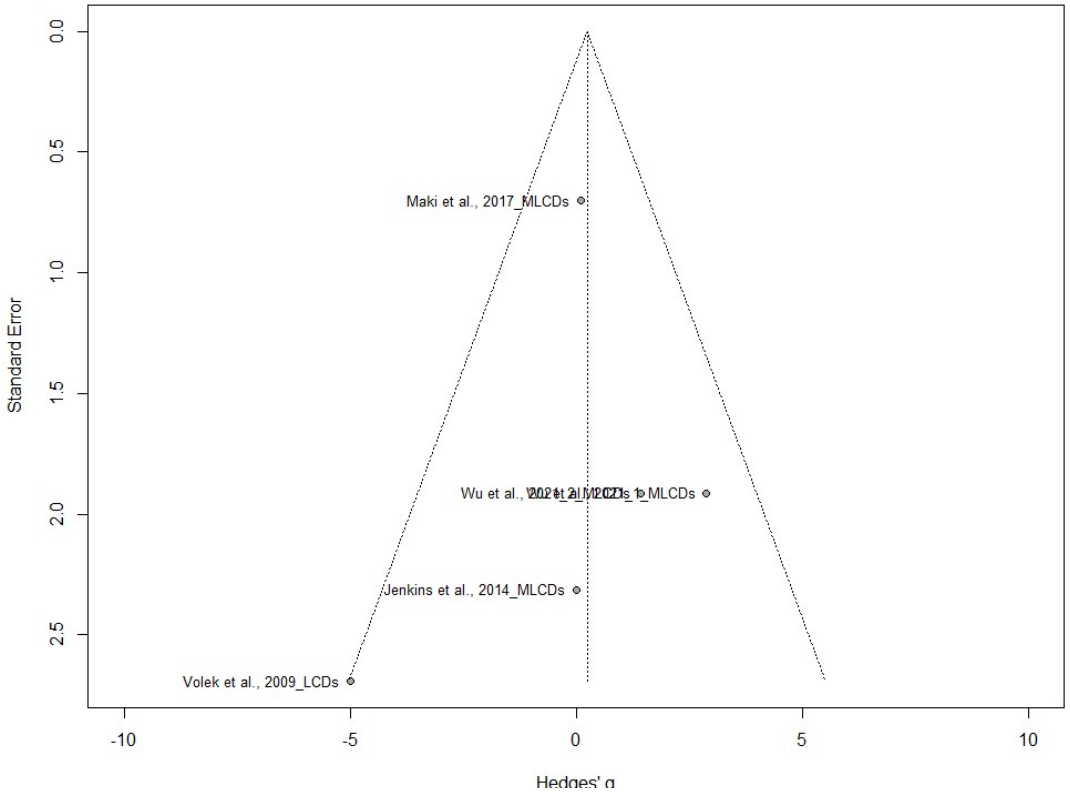
F) Body weight change%



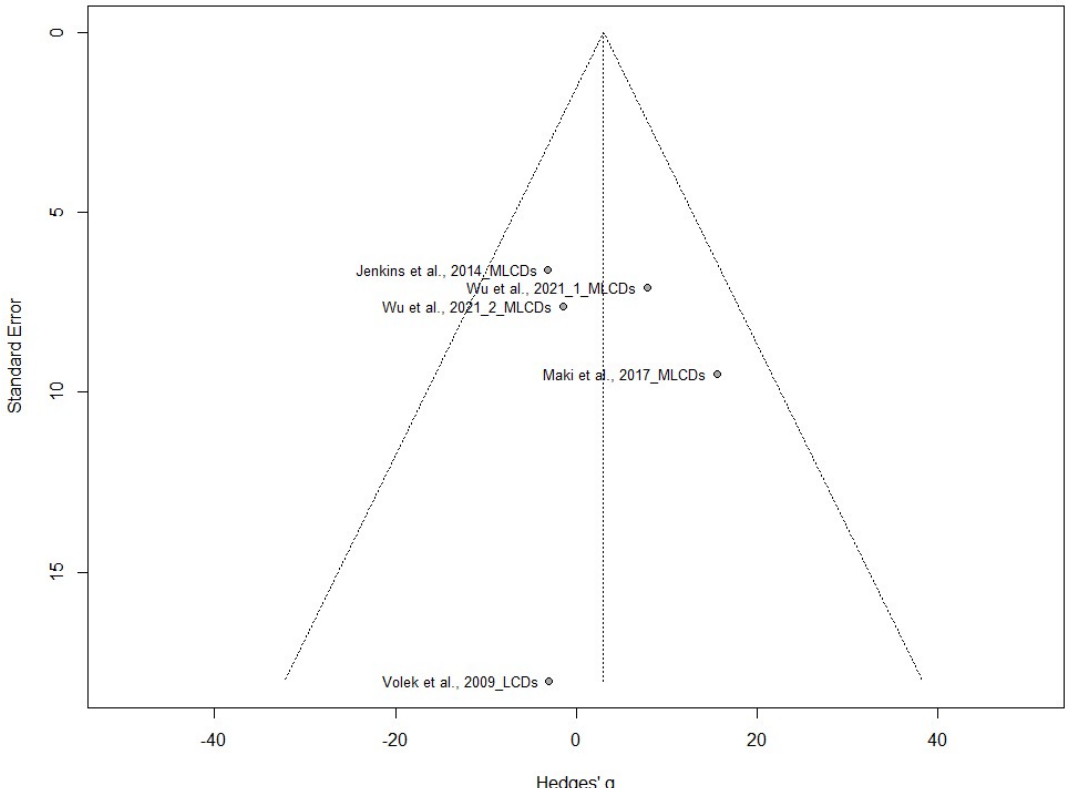
G) Body fat%



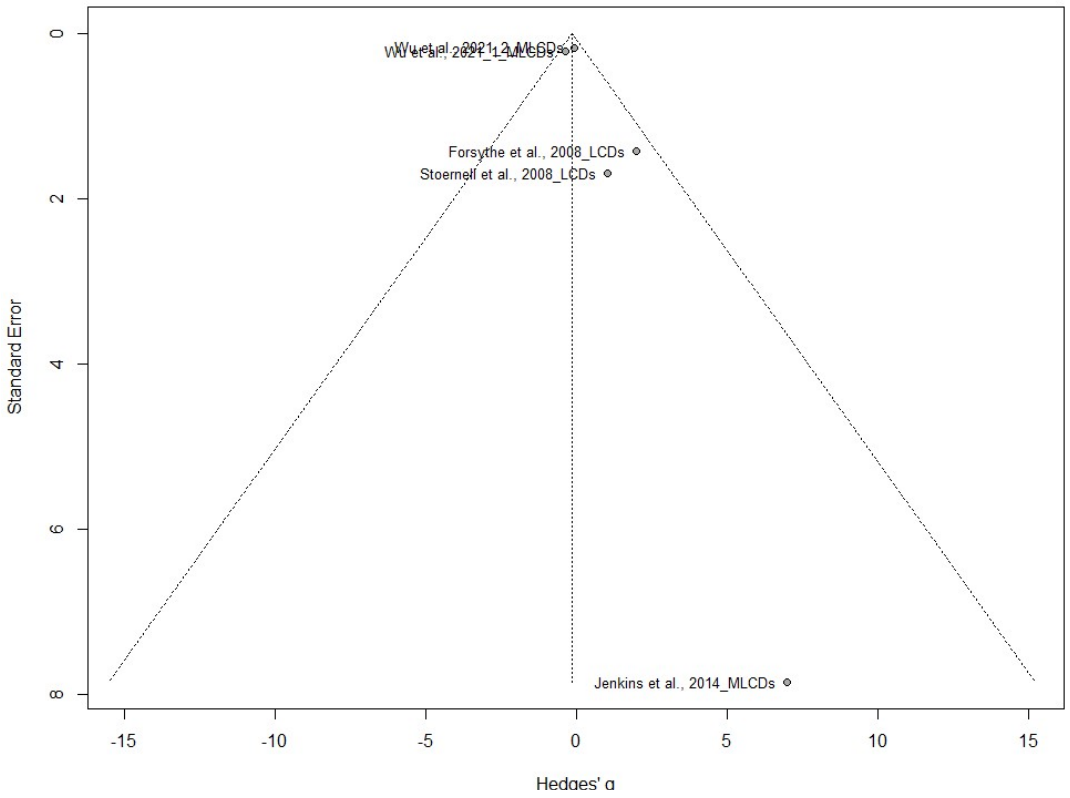
H) Fasting glucose



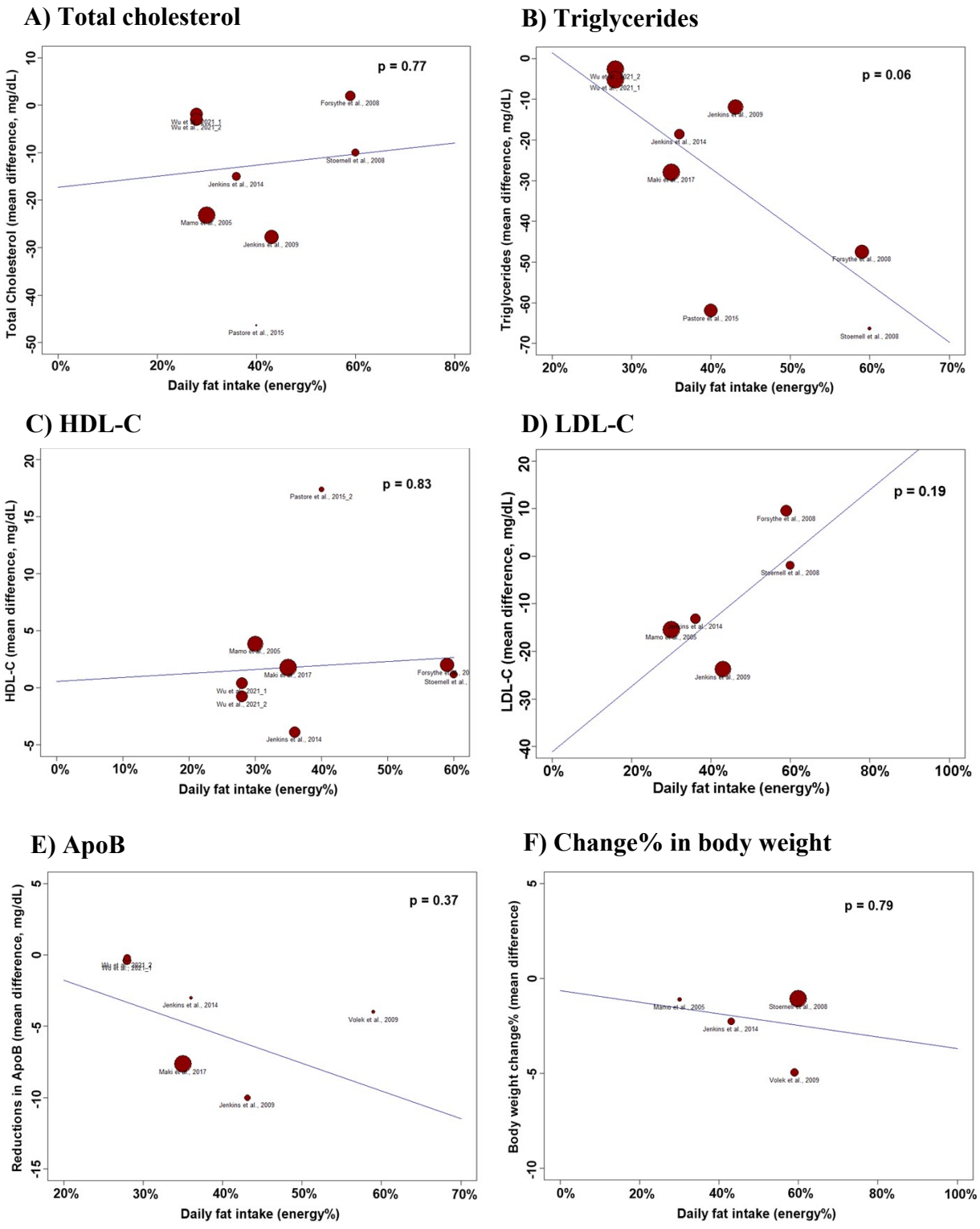
I) Fasting insulin



J) high-sensitivity C-Reactive Protein (hs-CRP)

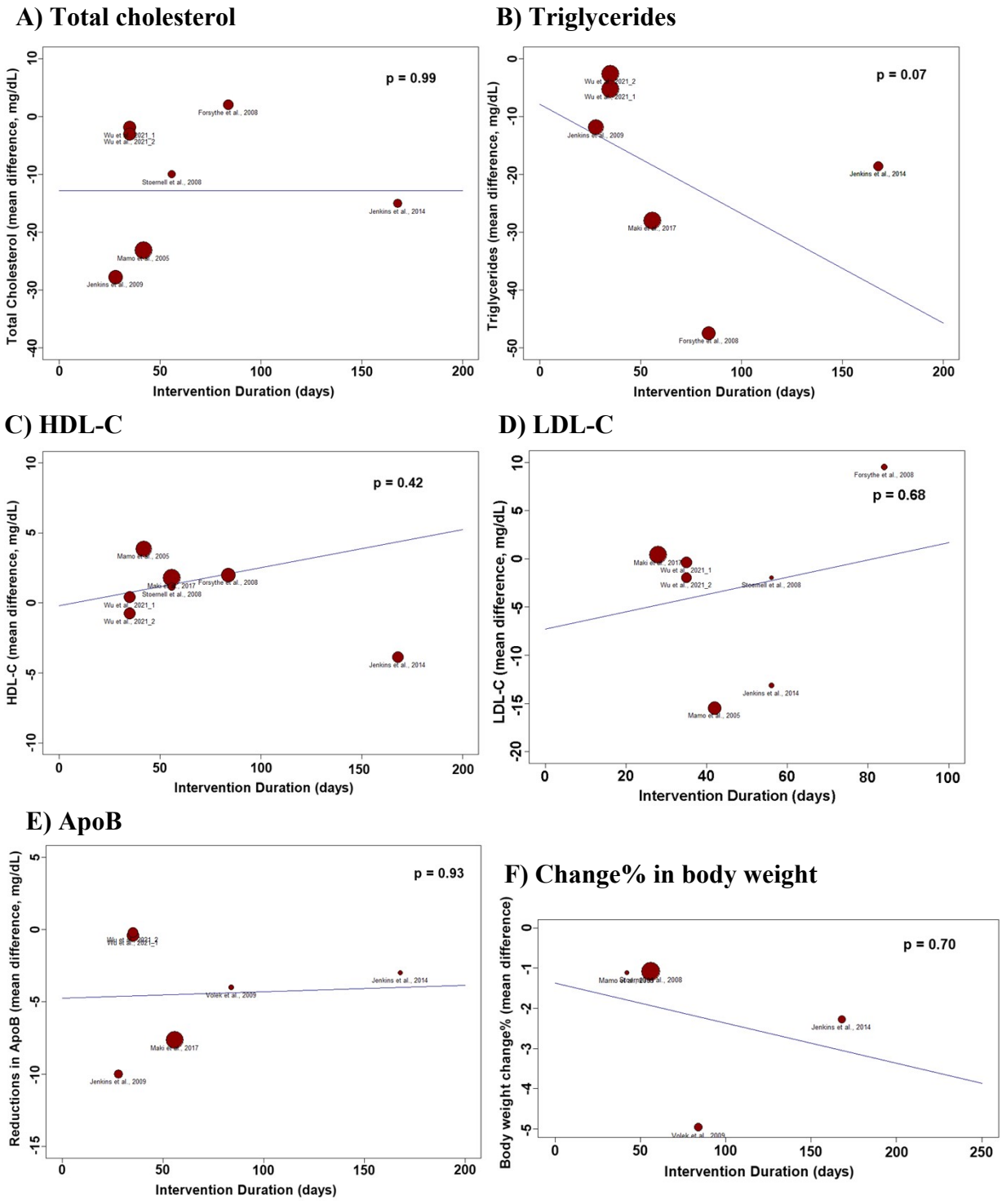


Supplemental Fig.9 Funnel plots used for detecting publication bias in the comparison between carbohydrate-restricted diets and normal carbohydrate diets regarding their effects on lipid profiles, body weight, body fat%, glucose parameters, and high-sensitivity C-Reactive Protein (hs-CRP) in individuals with dyslipidemia. A) total cholesterol; B) triglycerides; C) HDL-C; D) LDL-C; E) ApoB; F) change% in body weight; G) body fat%; H) fasting glucose; I) fasting insulin; J) high-sensitivity C-Reactive Protein (hs-CRP). The Hedges' g values are plotted on the x-axis against standard errors on the y-axis. In the absence of publication bias, the plotted points should form a funnel shape.
Abbreviations: ApoB: Apolipoprotein B; HDL-C: High-Density Lipoprotein Cholesterol; LDL-C: Low-Density Lipoprotein Cholesterol; MLCDs: Moderate-Low Carbohydrate Diets; LCDs: Low Carbohydrate Diets.



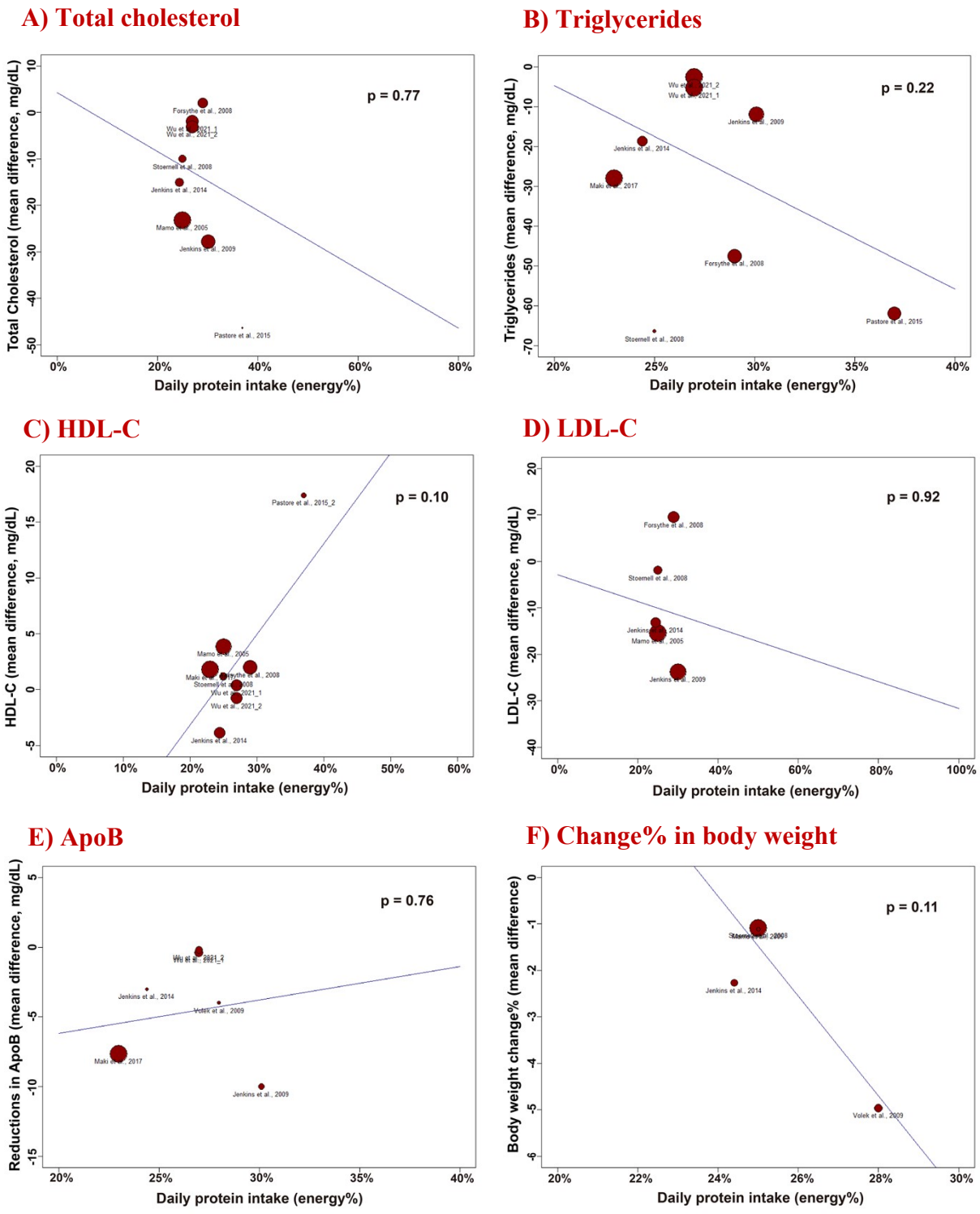
Supplemental Fig 10. Meta-regression plots illustrating the association of mean difference in changes in metabolic parameters at the end of intervention with daily fat intake (energy%) across included RCTs for meta-analysis. A) Total cholesterol; **B)** Triglycerides; **C)** HDL-C; D) LDL-C; **E)** ApoB; **F)** Change% in body weight.

Abbreviations: ApoB: Apolipoprotein B; HDL-C: High-Density Lipoprotein Cholesterol; LDL-C: Low-Density Lipoprotein Cholesterol; RCTs: Randomized Controlled Trials.



Supplemental Fig 11. Meta-regression plots illustrating the association of mean difference in changes in metabolic parameters at the end of intervention with intervention days across included RCTs for meta-analysis. A) Total cholesterol; **B)** Triglycerides; **C)** HDL-C; **D)** LDL-C; **E)** ApoB; **F)** Change% in body weight.

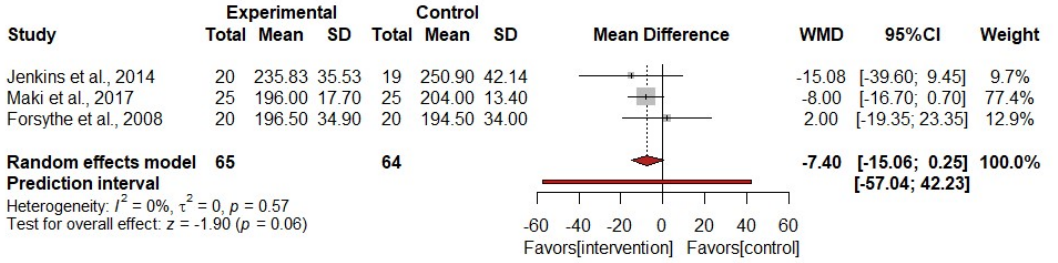
Abbreviations: ApoB: Apolipoprotein B; HDL-C: High-Density Lipoprotein Cholesterol; LDL-C: Low-Density Lipoprotein Cholesterol; RCTs: Randomized Controlled Trials.



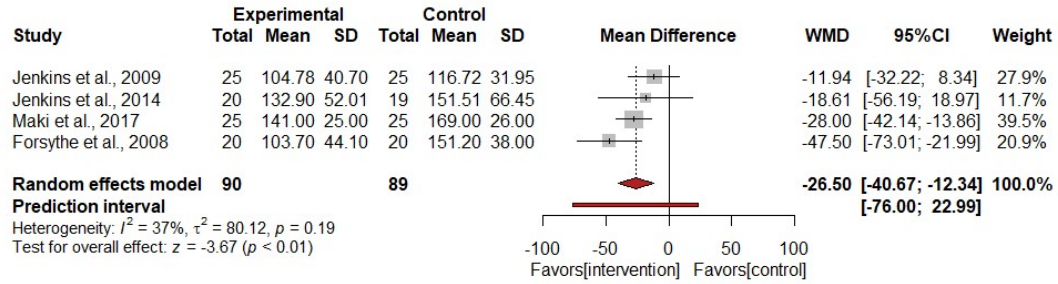
Supplemental Fig.12 Meta-regression plots illustrating the association of mean difference in changes in metabolic parameters at the end of intervention with daily protein intake (energy%) across included RCTs for meta-analysis. A) Total cholesterol; **B)** Triglycerides; **C)** HDL-C; D) LDL-C; **E)** ApoB; **F)** Change% in body weight.

Abbreviations: ApoB: Apolipoprotein B; HDL-C: High-Density Lipoprotein Cholesterol; LDL-C: Low-Density Lipoprotein Cholesterol; RCTs: Randomized Controlled Trials.

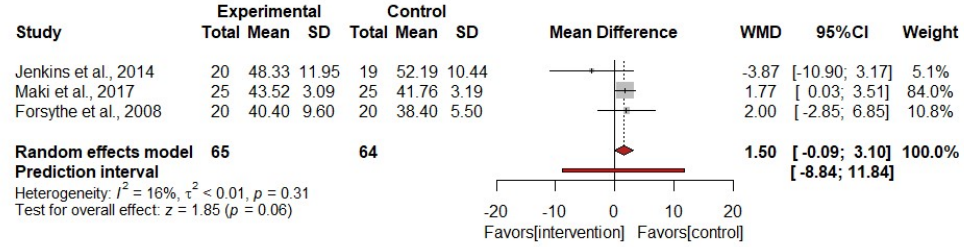
A) Total cholesterol adjusted based on leave-one-out approach



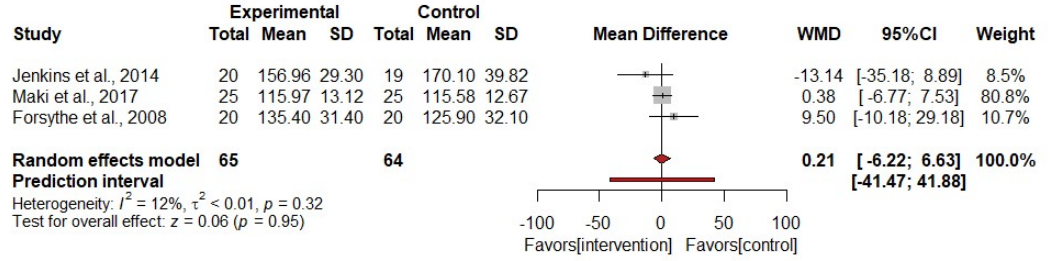
B) Triglycerides



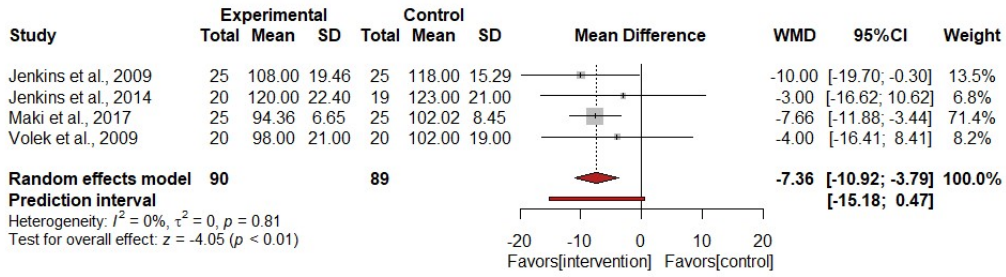
C) HDL-C



D) LDL-C adjusted based on leave-one-out approach



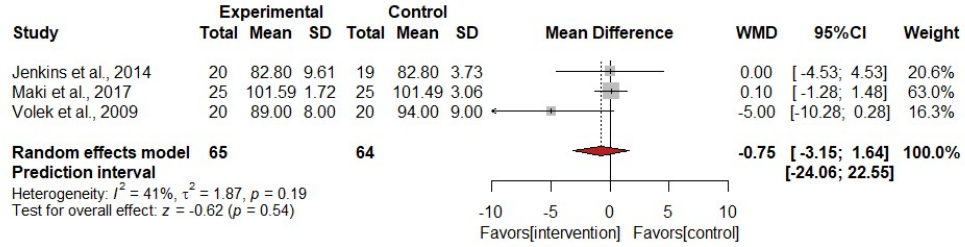
E) ApoB



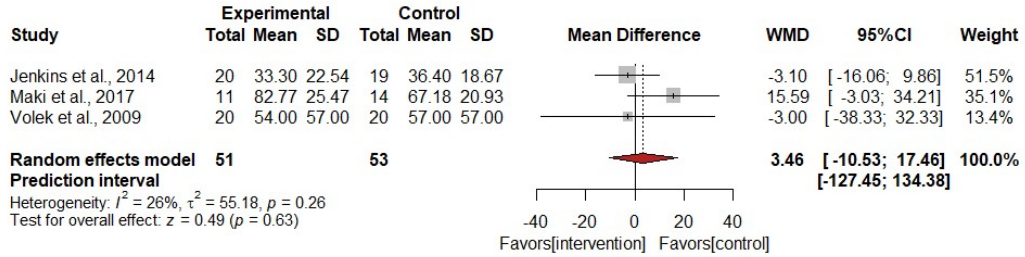
Supplemental Fig.13 Impact of carbohydrate-restricted diets on lipid profiles in dyslipidemic individuals with overweight and obesity. Examining the effect of carbohydrate-restricted diets on profiles at intervention conclusion compared to normal carbohydrate diets in dyslipidemic individuals with overweight and obesity across all included RCTs. Random effects model was employed based on the DerSimonian and Laird (DL) method. A) Total cholesterol; B) Triglycerides; C) HDL-C; D) LDL-C; E) ApoB.

WMD (Weighted Mean Difference) reveals the percentage mean difference at intervention conclusion between experimental and control groups. Data points denote mean differences, and horizontal error bars show 95% confidence intervals. Shaded areas reflect study weights in the random-effects meta-analysis. The vertical dashed line marks the pooled point estimate, while the solid black line represents the null hypothesis (MD=0). Red diamonds signify subgroup and overall effects, accompanied by a red solid line indicating the prediction interval. Abbreviation: HDL-C: High-Density Lipoprotein Cholesterol; LDL-C: Low-Density Lipoprotein Cholesterol; ApoB: Apolipoprotein B; RCTs: Randomized Controlled Trials.

A) Fasting glucose



B) Fasting insulin



Supplemental Fig.14 Impact of carbohydrate-restricted diets on glucose parameters in dyslipidemic individuals with overweight and obesity. Examining the effect of carbohydrate-restricted diets on glucose parameters at intervention conclusion compared to normal carbohydrate diets in dyslipidemic individuals with overweight and obesity across all included RCTs. Random effects model was employed based on the DerSimonian and Laird (DL) method. A) Fasting glucose; B) Fasting insulin.

WMD (Weighted Mean Difference) reveals the percentage mean difference at intervention conclusion between experimental and control groups. Data points denote mean differences, and horizontal error bars show 95% confidence intervals. Shaded areas reflect study weights in the random-effects meta-analysis. The vertical dashed line marks the pooled point estimate, while the solid black line represents the null hypothesis (MD=0). Red diamonds signify subgroup and overall effects, accompanied by a red solid line indicating the prediction interval. Abbreviation: RCTs: Randomized Controlled Trials.