SUPPLEMENTARY MATERIAL

Table S1. Search strategy.

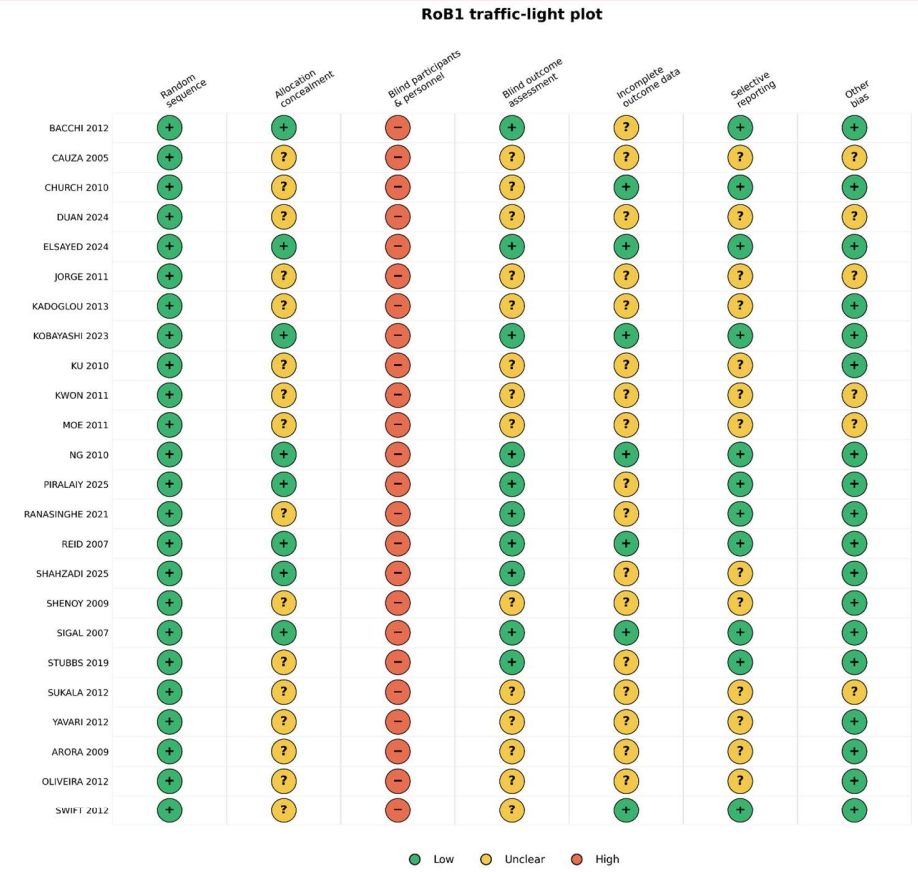
#	Database	Algorithm	
1	PubMed	((diabetes mellitus[Title/Abstract]) OR ("diabet*"[Title/Abstract]) (type 2 diabetes[Title/Abstract])) OR (T2DM[Title/Abstract]) OR (noninsulin-dependent diabetes mellitus[Title/Abstract])) OR (glycaemic control[Title/Abstract])) OR (glycemic control[Title/Abstract])) OR (glucose control[Title/Abstract])) OR (glycosylated haemoglobin[Title/Abstract])) OR (glycated haemoglobin[Title/Abstract])) OR (HbA1c[Title/Abstract])) OR (insulin sensitivity[Title/Abstract])) AND ("obes*"[Title/Abstract]) AND (((((training[Title/Abstract]) OR (exercise[Title/Abstract]))	3, 477 results
2	Scopus	TITLE-ABS(diabetes mellitus) OR TITLE-ABS(type 2 diabetes) OR TITLE-ABS(T2D) OR TITLE-ABS(noninsulin-dependent diabetes mellitus) OR TITLE-ABS(glycaemic control) OR TITLE-ABS(glycemic control) OR TITLE-ABS(glucose control) OR TITLE-ABS(glycosylated haemoglobin) OR TITLE-ABS(glycated haemoglobin) OR TITLE-ABS(HbA1c) OR TITLE-ABS(insulin sensitivity) AND TITLE-ABS(obese)OR TITLE-ABS(obesity) AND TITLE-ABS(training)OR TITLE-ABS(exercise)	7, 456
3	Google Scholar	allintitle (diabetes mellitus OR type 2 diabetes OR T2D OR noninsulin-dependent diabetes mellitus OR glycaemic control OR glycemic control OR glucose control OR glycosylated haemoglobin OR glycated haemoglobin OR HbA1c OR insulin sensitivity) (obese OR obesity) (training OR exercise)	48
4	Cochrane Library	(diabetes mellitus OR type 2 diabetes OR T2D OR noninsulin-dependent diabetes mellitus OR glycaemic control OR glycemic control OR glucose control OR glycosylated haemoglobin OR glycated haemoglobin OR HbA1c OR insulin sensitivity) (obese OR obesity) (training OR exercise) in Title Abstract Keyword - (Word variations have been searched)	2871
5	Web of Science	((AB = (diabetes mellitus)) OR AB = (type 2 diabetes)) OR AB = (T2D)) OR AB = (noninsulin-dependent diabetes mellitus)) OR AB = (glycaemic control)) OR AB = (glycemic control)) OR AB = (glucose control)) OR AB = (glycosylated haemoglobin)) OR AB = (glycated haemoglobin)) OR AB = (HbA1c)) OR AB = (insulin sensitivity) ((((AB = (obese)) OR AB = (obesity)) ((((AB = (training)) OR AB = (exercise))	6322
6	Science Direct	(diabetes mellitus OR type 2 diabetes OR T2D OR noninsulin-dependent diabetes mellitus OR glycaemic control OR glycemic control OR glucose control OR glycosylated haemoglobin OR glycated haemoglobin OR HbA1c OR insulin sensitivity) (obese OR obesity) (training OR exercise)	4, 933
		Total	25, 107

Table S2. Excluded studies with reasons.

Study	Reason for exclusion
1. (Li et al., 2024)	Mixed intervention
2. (Cox et al., 2024)	Mixed intervention
3. (Gajanand et al., 2024)	Mixed intervention
4. (Wormgoor et al., 2018)	Mixed intervention
5. (Balducci et al., 2012)	Mixed intervention
6. (Cox et al., 2024)	Mixed intervention
7. (Mendes et al., 2019)	Acute effect
8. (Correia et al., 2023)	The outcome of interest was not reported
9. (Riahy, 2024)	The outcome of interest was not reported
10. (Su et al., 2024)	Unclear data
11. (Hua et al., 2020)	Reported on exercise plus dietary intervention

Table S3. **The summary of effect size across all outcomes.**

Outcome	Studies (N)	Participants (N)	Standard Mean Difference (SMD)	95% CI Lower Limit	95% CI Upper Limit
BW	9	390	-1.55	-4.84	1.75
BMI	15	682	-0.42	-0.93	0.09
WC	8	440	0.50	-0.87	1.87
HC	1	26	0.75	-4.19	5.69
WHR	6	192	0.02	-0.01	0.05
BF	10	613	0.34	0.10	0.57
FFM	4	395	-0.86	-1.46	-0.26
HDL-C	10	382	2.35	-0.06	4.76
LDL-C	9	363	0.12	-0.28	0.51
TC	12	446	0.12	-0.34	0.59
TG	11	406	-0.77	-2.47	0.93
FBG	16	674	-0.89	-1.62	-0.16
HbA1c	20	1002	-0.09	-0.27	0.09
FI	6	221	-0.35	-1.67	0.98
HOMA-IR	3	92	-0.58	-1.87	0.71
SBP	13	509	2.04	-0.46	4.55
DBP	13	509	-0.02	-1.57	1.52
RHR	3	158	1.87	-4.53	8.26
CRF	11	419	1.78	0.38	3.18



Risk of bias summary

Study	A	B	C	D	E	F	G
ARORA 2009	?	?	−	?	+	?	?
BACCHI 2012	+	+	+	+	+	+	+
CAUZA 2005	?	?	+	+	?	?	?
CHURCH 2010	+	+	+	+	+	+	+
DUAN 2024	?	?	+	+	+	?	?
ELSAYED 2024	?	?	+	+	+	?	?
JORGE 2011	+	+	+	+	+	+	+
KADOGLOU 2013	+	+	+	+	?	+	?
KOBAYASHI 2023	+	+	+	+	+	+	+
KU 2010	+	+	?	+	+	+	?
KWON 2011	?	?	?	+	?	?	?
MOE 2011	+	+	+	+	+	?	?
NG 2010	+	+	?	+	?	+	?
OLIVEIRA 2012	?	?	?	?	+	?	?
PIRALAIY 2025	?	?	+	+	+	?	?
RANASINGHE 2021	+	+	+	+	?	+	?
REID 2007	+	+	+	+	?	+	?
SHAHZADI 2025	?	?	+	+	+	?	?
SHENOY 2009	?	?	+	+	+	?	?
SIGAL 2007	+	+	+	+	+	+	+
STUBBS 2019	?	?	+	+	?	?	?
SUKALA 2012	+	+	?	+	−	?	−
SWIFT 2012	?	?	?	?	?	?	?
YAVARI 2012	?	?	?	?	?	?	?

Low risk (+) Unclear risk (?) High risk (−)

A Random sequence generation (selection bias)
B Allocation concealment (selection bias)
C Blinding of participants and personnel (performance bias)
D Blinding of outcome assessment (detection bias)
E Incomplete outcome data (attrition bias)
F Selective reporting (reporting bias)
G Other bias

Figure S1. **Risk of bias assessment results.**

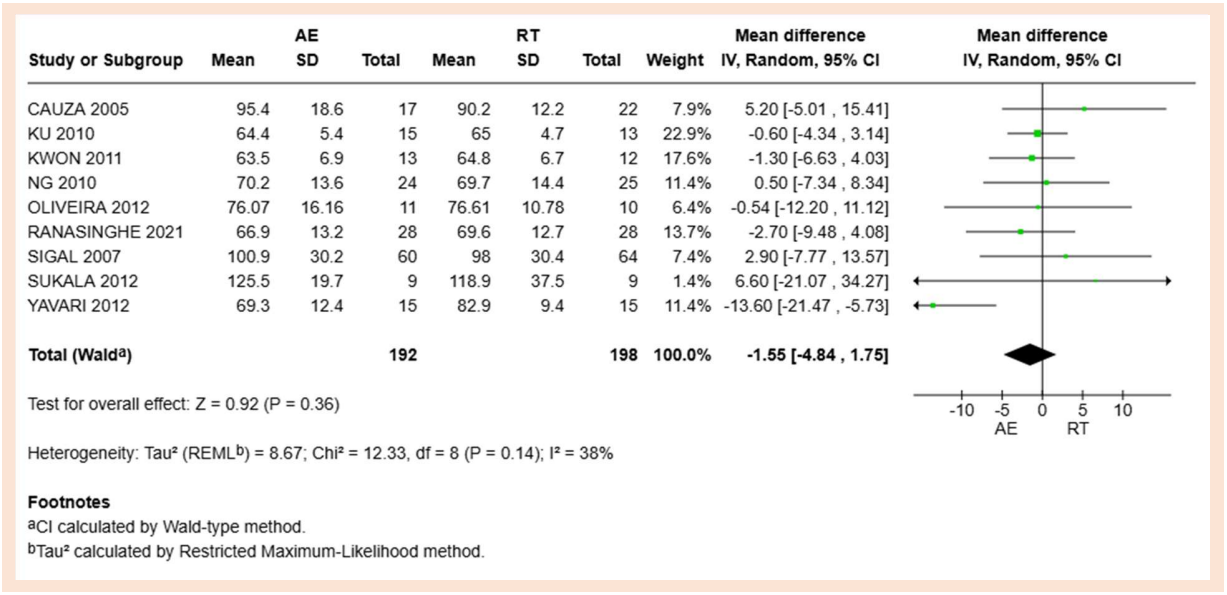


Figure S2a. **Effects of AE and RT on BW.**

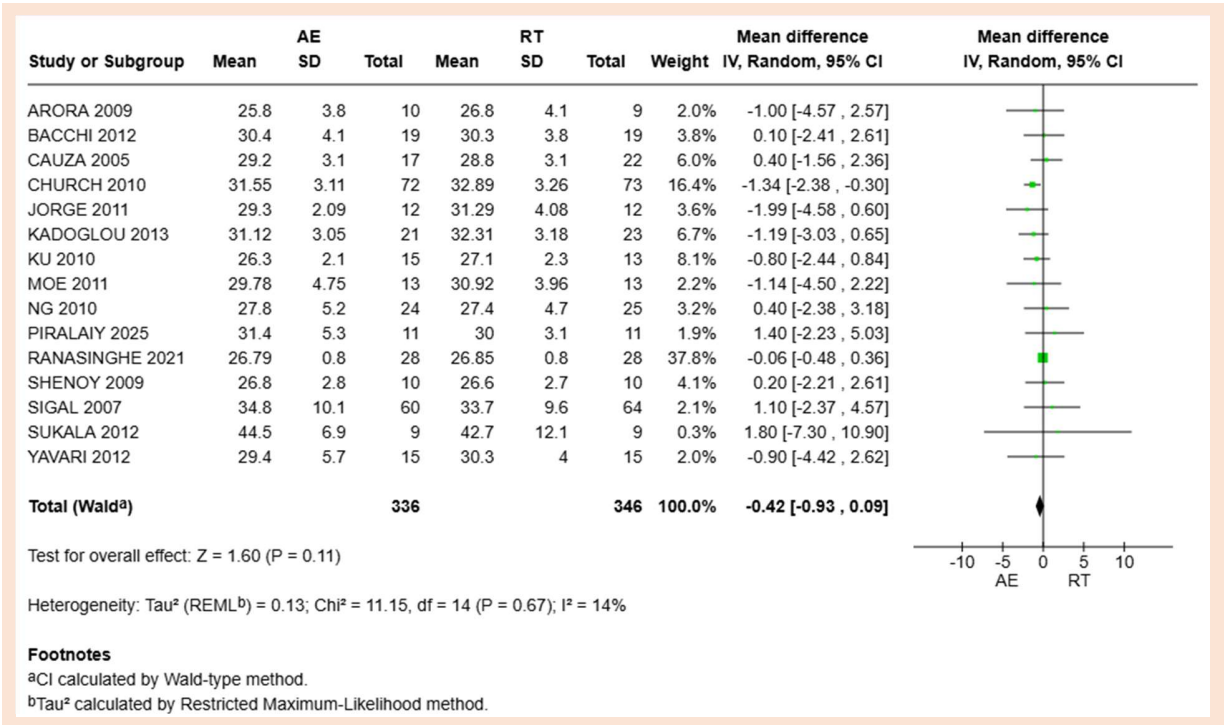
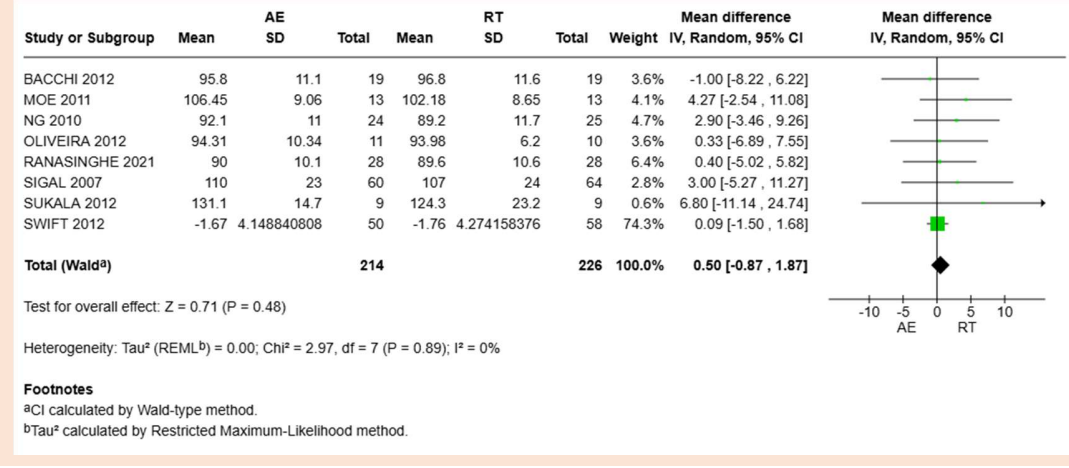


Figure S2b. **Effects of AE and RT on BMI.**



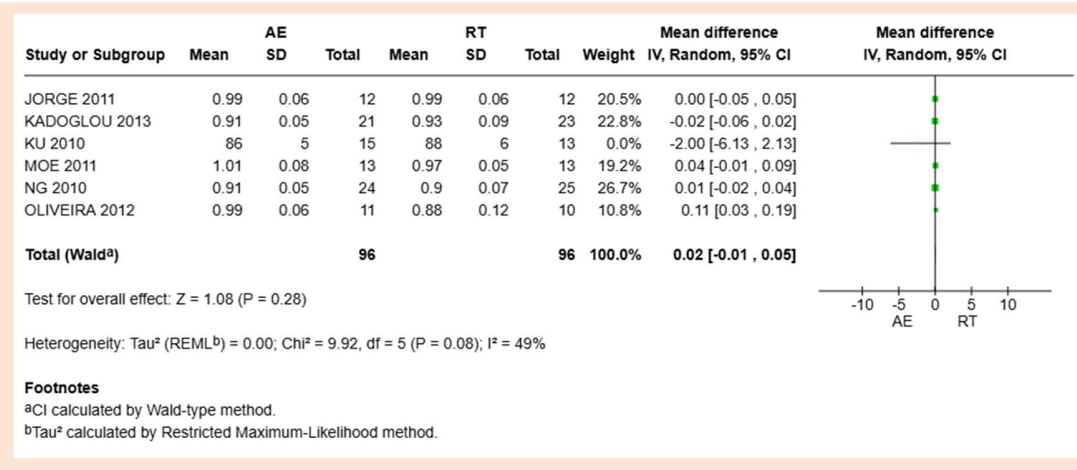
Study or Subgroup	AE Mean	AE SD	AE Total	RT Mean	RT SD	RT Total	Weight	Mean difference IV, Random, 95% CI
BACCHI 2012	95.8	11.1	19	96.8	11.6	19	3.6%	-1.00 [-8.22 , 6.22]
MOE 2011	106.45	9.06	13	102.18	8.65	13	4.1%	4.27 [-2.54 , 11.08]
NG 2010	92.1	11	24	89.2	11.7	25	4.7%	2.90 [-3.46 , 9.26]
OLIVEIRA 2012	94.31	10.34	11	93.98	6.2	10	3.6%	0.33 [-6.89 , 7.55]
RANASINGHE 2021	90	10.1	28	89.6	10.6	28	6.4%	0.40 [-5.02 , 5.82]
SIGAL 2007	110	23	60	107	24	64	2.8%	3.00 [-5.27 , 11.27]
SUKALA 2012	131.1	14.7	9	124.3	23.2	9	0.6%	6.80 [-11.14 , 24.74]
SWIFT 2012	-1.67	4.148840808	50	-1.76	4.274158376	58	74.3%	0.09 [-1.50 , 1.68]
Total (Wald[a])			**214**			**226**	**100.0%**	**0.50 [-0.87 , 1.87]**

Test for overall effect: Z = 0.71 (P = 0.48)

Heterogeneity: Tau² (REML[b]) = 0.00; Chi² = 2.97, df = 7 (P = 0.89); I² = 0%

Footnotes
[a]CI calculated by Wald-type method.
[b]Tau² calculated by Restricted Maximum-Likelihood method.

Figure S2c. **Effects of AE and RT on WC.**



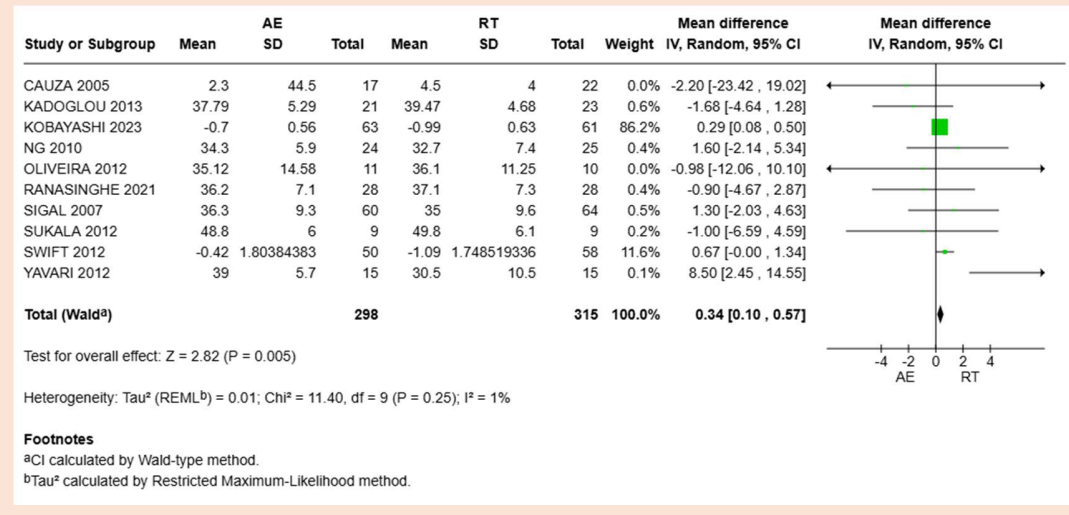
Study or Subgroup	AE Mean	AE SD	AE Total	RT Mean	RT SD	RT Total	Weight	Mean difference IV, Random, 95% CI
JORGE 2011	0.99	0.06	12	0.99	0.06	12	20.5%	0.00 [-0.05 , 0.05]
KADOGLOU 2013	0.91	0.05	21	0.93	0.09	23	22.8%	-0.02 [-0.06 , 0.02]
KU 2010	86	5	15	88	6	13	0.0%	-2.00 [-6.13 , 2.13]
MOE 2011	1.01	0.08	13	0.97	0.05	13	19.2%	0.04 [-0.01 , 0.09]
NG 2010	0.91	0.05	24	0.9	0.07	25	26.7%	0.01 [-0.02 , 0.04]
OLIVEIRA 2012	0.99	0.06	11	0.88	0.12	10	10.8%	0.11 [0.03 , 0.19]
Total (Wald[a])			**96**			**96**	**100.0%**	**0.02 [-0.01 , 0.05]**

Test for overall effect: Z = 1.08 (P = 0.28)

Heterogeneity: Tau² (REML[b]) = 0.00; Chi² = 9.92, df = 5 (P = 0.08); I² = 49%

Footnotes
[a]CI calculated by Wald-type method.
[b]Tau² calculated by Restricted Maximum-Likelihood method.

Figure S2d. **Effects of AE and RT on WHR.**



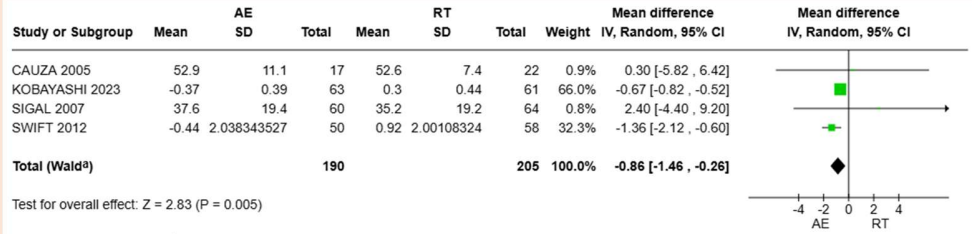
Study or Subgroup	AE Mean	AE SD	AE Total	RT Mean	RT SD	RT Total	Weight	Mean difference IV, Random, 95% CI
CAUZA 2005	2.3	44.5	17	4.5	4	22	0.0%	-2.20 [-23.42 , 19.02]
KADOGLOU 2013	37.79	5.29	21	39.47	4.68	23	0.6%	-1.68 [-4.64 , 1.28]
KOBAYASHI 2023	-0.7	0.56	63	-0.99	0.63	61	86.2%	0.29 [0.08 , 0.50]
NG 2010	34.3	5.9	24	32.7	7.4	25	0.4%	1.60 [-2.14 , 5.34]
OLIVEIRA 2012	35.12	14.58	11	36.1	11.25	10	0.0%	-0.98 [-12.06 , 10.10]
RANASINGHE 2021	36.2	7.1	28	37.1	7.3	28	0.4%	-0.90 [-4.67 , 2.87]
SIGAL 2007	36.3	9.3	60	35	9.6	64	0.5%	1.30 [-2.03 , 4.63]
SUKALA 2012	48.8	6	9	49.8	6.1	9	0.2%	-1.00 [-6.59 , 4.59]
SWIFT 2012	-0.42	1.80384383	50	-1.09	1.748519336	58	11.6%	0.67 [-0.00 , 1.34]
YAVARI 2012	39	5.7	15	30.5	10.5	15	0.1%	8.50 [2.45 , 14.55]
Total (Wald[a])			**298**			**315**	**100.0%**	**0.34 [0.10 , 0.57]**

Test for overall effect: Z = 2.82 (P = 0.005)

Heterogeneity: Tau² (REML[b]) = 0.01; Chi² = 11.40, df = 9 (P = 0.25); I² = 1%

Footnotes
[a]CI calculated by Wald-type method.
[b]Tau² calculated by Restricted Maximum-Likelihood method.

Figure S2e. **Effects of AE and RT on BF.**



Study or Subgroup	AE Mean	AE SD	AE Total	RT Mean	RT SD	RT Total	Weight	Mean difference IV, Random, 95% CI
CAUZA 2005	52.9	11.1	17	52.6	7.4	22	0.9%	0.30 [-5.82 , 6.42]
KOBAYASHI 2023	-0.37	0.39	63	0.3	0.44	61	66.0%	-0.67 [-0.82 , -0.52]
SIGAL 2007	37.6	19.4	60	35.2	19.2	64	0.8%	2.40 [-4.40 , 9.20]
SWIFT 2012	-0.44	2.038343527	50	0.92	2.00108324	58	32.3%	-1.36 [-2.12 , -0.60]
Total (Wald[a])			**190**			**205**	**100.0%**	**-0.86 [-1.46 , -0.26]**

Test for overall effect: Z = 2.83 (P = 0.005)

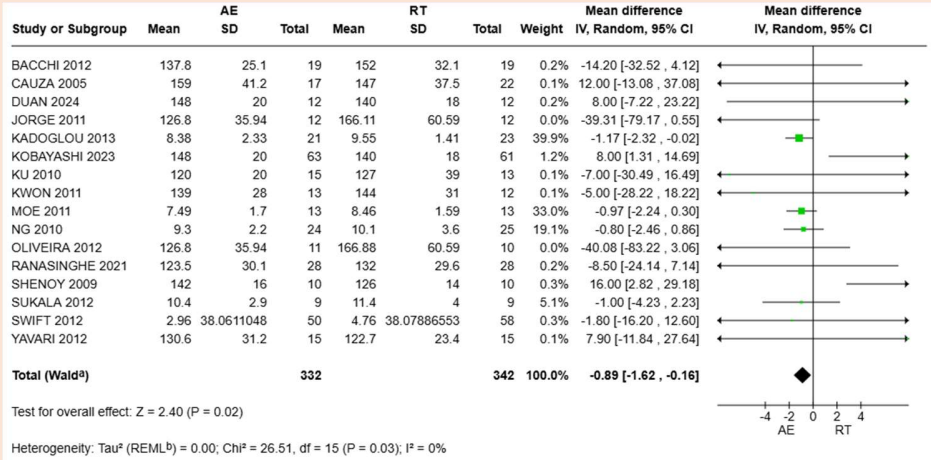
Heterogeneity: Tau² (REML[b]) = 0.13; Chi² = 3.92, df = 3 (P = 0.27); I² = 37%

Footnotes

[a]CI calculated by Wald-type method.

[b]Tau² calculated by Restricted Maximum-Likelihood method.

Figure S2f. Effects of AE and RT on FFM.



Study or Subgroup	AE Mean	AE SD	AE Total	RT Mean	RT SD	RT Total	Weight	Mean difference IV, Random, 95% CI
BACCHI 2012	137.8	25.1	19	152	32.1	19	0.2%	-14.20 [-32.52 , 4.12]
CAUZA 2005	159	41.2	17	147	37.5	22	0.1%	12.00 [-13.08 , 37.08]
DUAN 2024	148	20	12	140	18	12	0.2%	8.00 [-7.22 , 23.22]
JORGE 2011	126.8	35.94	12	166.11	60.59	12	0.0%	-39.31 [-79.17 , 0.55]
KADOGLOU 2013	8.38	2.33	21	9.55	1.41	23	39.9%	-1.17 [-2.32 , -0.02]
KOBAYASHI 2023	148	20	63	140	18	61	1.2%	8.00 [1.31 , 14.69]
KU 2010	120	20	15	127	39	13	0.1%	-7.00 [-30.49 , 16.49]
KWON 2011	139	28	13	144	31	12	0.1%	-5.00 [-28.22 , 18.22]
MOE 2011	7.49	1.7	13	8.46	1.59	13	33.0%	-0.97 [-2.24 , 0.30]
NG 2010	9.3	2.2	24	10.1	3.6	25	19.1%	-0.80 [-2.46 , 0.86]
OLIVEIRA 2012	126.8	35.94	11	166.88	60.59	10	0.0%	-40.08 [-83.22 , 3.06]
RANASINGHE 2021	123.5	30.1	28	132	29.6	28	0.2%	-8.50 [-24.14 , 7.14]
SHENOY 2009	142	16	10	126	14	10	0.3%	16.00 [2.82 , 29.18]
SUKALA 2012	10.4	2.9	9	11.4	4	9	5.1%	-1.00 [-4.23 , 2.23]
SWIFT 2012	2.96	38.0611048	50	4.76	38.07886553	58	0.3%	-1.80 [-16.20 , 12.60]
YAVARI 2012	130.6	31.2	15	122.7	23.4	15	0.1%	7.90 [-11.84 , 27.64]
Total (Wald[a])			**332**			**342**	**100.0%**	**-0.89 [-1.62 , -0.16]**

Test for overall effect: Z = 2.40 (P = 0.02)

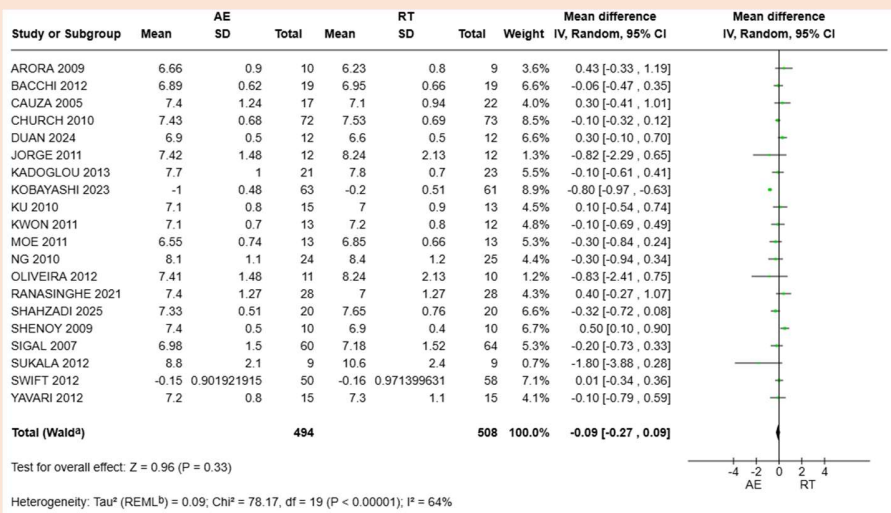
Heterogeneity: Tau² (REML[b]) = 0.00; Chi² = 26.51, df = 15 (P = 0.03); I² = 0%

Footnotes

[a]CI calculated by Wald-type method.

[b]Tau² calculated by Restricted Maximum-Likelihood method.

Figure S2g. Effects of AE and RT on FBG.



Study or Subgroup	AE Mean	AE SD	AE Total	RT Mean	RT SD	RT Total	Weight	Mean difference IV, Random, 95% CI
ARORA 2009	6.66	0.9	10	6.23	0.8	9	3.6%	0.43 [-0.33 , 1.19]
BACCHI 2012	6.89	0.62	19	6.95	0.66	19	6.6%	-0.06 [-0.47 , 0.35]
CAUZA 2005	7.4	1.24	17	7.1	0.94	22	4.0%	0.30 [-0.41 , 1.01]
CHURCH 2010	7.43	0.68	72	7.53	0.69	73	8.5%	-0.10 [-0.32 , 0.12]
DUAN 2024	6.9	0.5	12	6.6	0.5	12	6.6%	0.30 [-0.10 , 0.70]
JORGE 2011	7.42	1.48	12	8.24	2.13	12	1.3%	-0.82 [-2.29 , 0.65]
KADOGLOU 2013	7.7	1	21	7.8	0.7	23	5.5%	-0.10 [-0.61 , 0.41]
KOBAYASHI 2023	-1	0.48	63	-0.2	0.51	61	8.9%	-0.80 [-0.97 , -0.63]
KU 2010	7.1	0.8	15	7	0.9	13	4.5%	0.10 [-0.54 , 0.74]
KWON 2011	7.1	0.7	13	7.2	0.8	12	4.8%	-0.10 [-0.69 , 0.49]
MOE 2011	6.55	0.74	13	6.85	0.66	13	5.3%	-0.30 [-0.84 , 0.24]
NG 2010	8.1	1.1	24	8.4	1.2	25	4.4%	-0.30 [-0.94 , 0.34]
OLIVEIRA 2012	7.41	1.48	11	8.24	2.13	10	1.2%	-0.83 [-2.41 , 0.75]
RANASINGHE 2021	7.4	1.27	28	7	1.27	28	4.3%	0.40 [-0.27 , 1.07]
SHAHZADI 2025	7.33	0.51	20	7.65	0.76	20	6.6%	-0.32 [-0.72 , 0.08]
SHENOY 2009	7.4	0.5	10	6.9	0.4	10	6.7%	0.50 [0.10 , 0.90]
SIGAL 2007	6.98	1.5	60	7.18	1.52	64	5.3%	-0.20 [-0.73 , 0.33]
SUKALA 2012	8.8	2.1	9	10.6	2.4	9	0.7%	-1.80 [-3.88 , 0.28]
SWIFT 2012	-0.15	0.901921915	50	-0.16	0.971399631	58	7.1%	0.01 [-0.34 , 0.36]
YAVARI 2012	7.2	0.8	15	7.3	1.1	15	4.1%	-0.10 [-0.79 , 0.59]
Total (Wald[a])			**494**			**508**	**100.0%**	**-0.09 [-0.27 , 0.09]**

Test for overall effect: Z = 0.96 (P = 0.33)

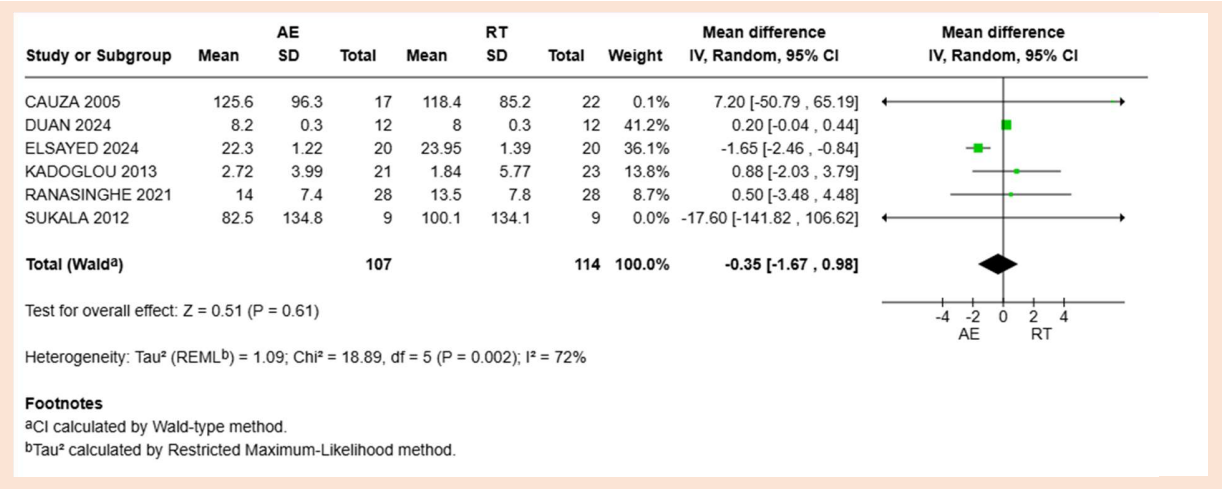
Heterogeneity: Tau² (REML[b]) = 0.09; Chi² = 78.17, df = 19 (P < 0.00001); I² = 64%

Footnotes

[a]CI calculated by Wald-type method.

[b]Tau² calculated by Restricted Maximum-Likelihood method.

Figure S2h. Effects of AE and RT on HbA1c.



Study or Subgroup	AE Mean	AE SD	AE Total	RT Mean	RT SD	RT Total	Weight	Mean difference IV, Random, 95% CI
CAUZA 2005	125.6	96.3	17	118.4	85.2	22	0.1%	7.20 [-50.79 , 65.19]
DUAN 2024	8.2	0.3	12	8	0.3	12	41.2%	0.20 [-0.04 , 0.44]
ELSAYED 2024	22.3	1.22	20	23.95	1.39	20	36.1%	-1.65 [-2.46 , -0.84]
KADOGLOU 2013	2.72	3.99	21	1.84	5.77	23	13.8%	0.88 [-2.03 , 3.79]
RANASINGHE 2021	14	7.4	28	13.5	7.8	28	8.7%	0.50 [-3.48 , 4.48]
SUKALA 2012	82.5	134.8	9	100.1	134.1	9	0.0%	-17.60 [-141.82 , 106.62]
Total (Wald[a])			**107**			**114**	**100.0%**	**-0.35 [-1.67 , 0.98]**

Mean difference IV, Random, 95% CI

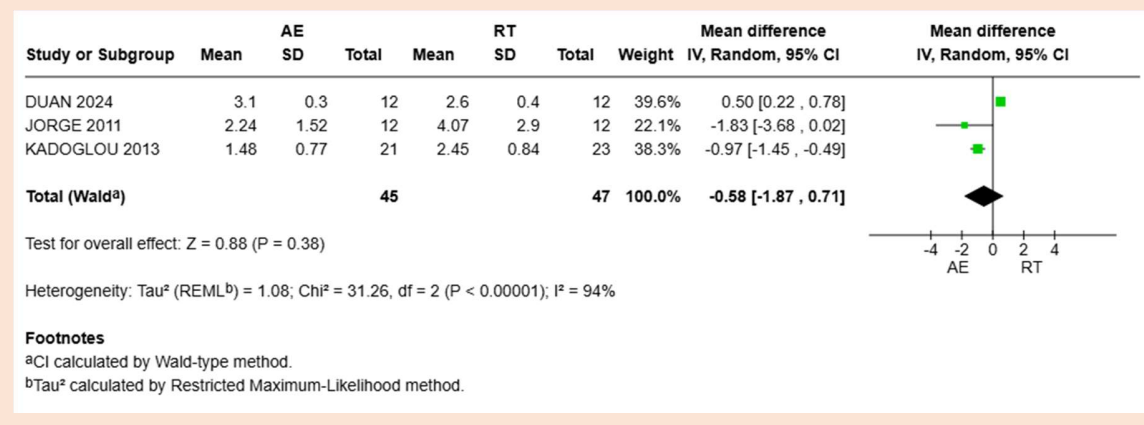
-4 -2 0 2 4
AE RT

Test for overall effect: Z = 0.51 (P = 0.61)

Heterogeneity: Tau² (REML[b]) = 1.09; Chi² = 18.89, df = 5 (P = 0.002); I² = 72%

Footnotes
[a]CI calculated by Wald-type method.
[b]Tau² calculated by Restricted Maximum-Likelihood method.

Figure S2i. **Effects of AE and RT on FI.**



Study or Subgroup	AE Mean	AE SD	AE Total	RT Mean	RT SD	RT Total	Weight	Mean difference IV, Random, 95% CI
DUAN 2024	3.1	0.3	12	2.6	0.4	12	39.6%	0.50 [0.22 , 0.78]
JORGE 2011	2.24	1.52	12	4.07	2.9	12	22.1%	-1.83 [-3.68 , 0.02]
KADOGLOU 2013	1.48	0.77	21	2.45	0.84	23	38.3%	-0.97 [-1.45 , -0.49]
Total (Wald[a])			**45**			**47**	**100.0%**	**-0.58 [-1.87 , 0.71]**

Mean difference IV, Random, 95% CI

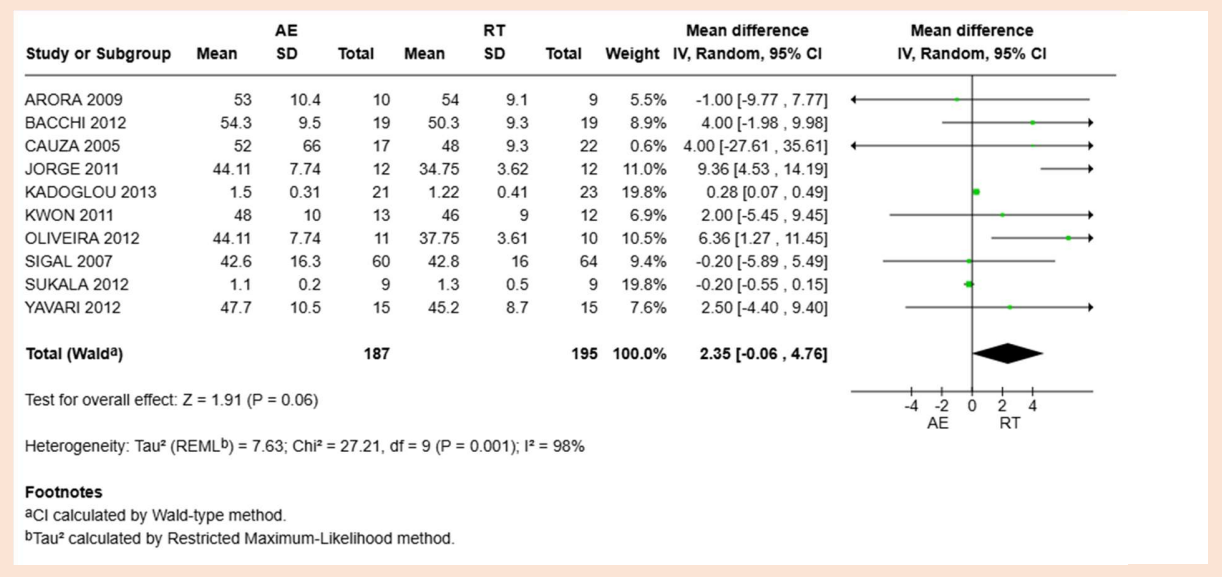
-4 -2 0 2 4
AE RT

Test for overall effect: Z = 0.88 (P = 0.38)

Heterogeneity: Tau² (REML[b]) = 1.08; Chi² = 31.26, df = 2 (P < 0.00001); I² = 94%

Footnotes
[a]CI calculated by Wald-type method.
[b]Tau² calculated by Restricted Maximum-Likelihood method.

Figure S2j. **Effects of AE and RT on HOMA-IR.**



Study or Subgroup	AE Mean	AE SD	AE Total	RT Mean	RT SD	RT Total	Weight	Mean difference IV, Random, 95% CI
ARORA 2009	53	10.4	10	54	9.1	9	5.5%	-1.00 [-9.77 , 7.77]
BACCHI 2012	54.3	9.5	19	50.3	9.3	19	8.9%	4.00 [-1.98 , 9.98]
CAUZA 2005	52	66	17	48	9.3	22	0.6%	4.00 [-27.61 , 35.61]
JORGE 2011	44.11	7.74	12	34.75	3.62	12	11.0%	9.36 [4.53 , 14.19]
KADOGLOU 2013	1.5	0.31	21	1.22	0.41	23	19.8%	0.28 [0.07 , 0.49]
KWON 2011	48	10	13	46	9	12	6.9%	2.00 [-5.45 , 9.45]
OLIVEIRA 2012	44.11	7.74	11	37.75	3.61	10	10.5%	6.36 [1.27 , 11.45]
SIGAL 2007	42.6	16.3	60	42.8	16	64	9.4%	-0.20 [-5.89 , 5.49]
SUKALA 2012	1.1	0.2	9	1.3	0.5	9	19.8%	-0.20 [-0.55 , 0.15]
YAVARI 2012	47.7	10.5	15	45.2	8.7	15	7.6%	2.50 [-4.40 , 9.40]
Total (Wald[a])			**187**			**195**	**100.0%**	**2.35 [-0.06 , 4.76]**

Mean difference IV, Random, 95% CI

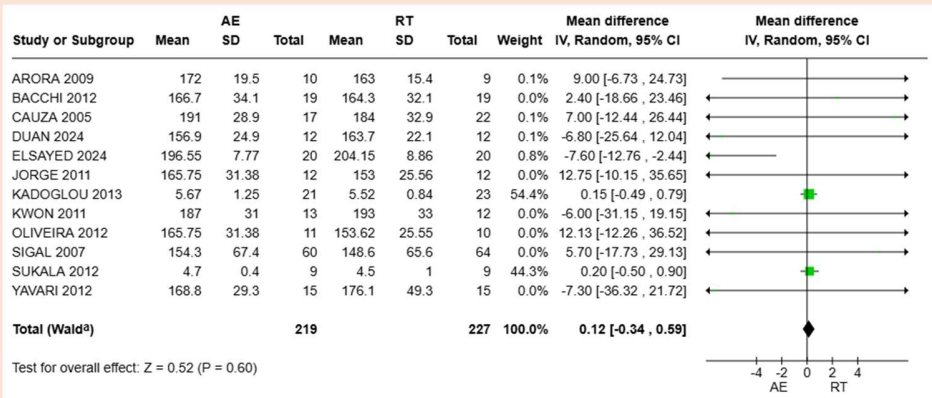
-4 -2 0 2 4
AE RT

Test for overall effect: Z = 1.91 (P = 0.06)

Heterogeneity: Tau² (REML[b]) = 7.63; Chi² = 27.21, df = 9 (P = 0.001); I² = 98%

Footnotes
[a]CI calculated by Wald-type method.
[b]Tau² calculated by Restricted Maximum-Likelihood method.

Figure S2k. **Effects of AE and RT on HDL-C.**



Study or Subgroup	AE Mean	AE SD	AE Total	RT Mean	RT SD	RT Total	Weight	Mean difference IV, Random, 95% CI
ARORA 2009	172	19.5	10	163	15.4	9	0.1%	9.00 [-6.73 , 24.73]
BACCHI 2012	166.7	34.1	19	164.3	32.1	19	0.0%	2.40 [-18.66 , 23.46]
CAUZA 2005	191	28.9	17	184	32.9	22	0.1%	7.00 [-12.44 , 26.44]
DUAN 2024	156.9	24.9	12	163.7	22.1	12	0.1%	-6.80 [-25.64 , 12.04]
ELSAYED 2024	196.55	7.77	20	204.15	8.86	20	0.8%	-7.60 [-12.76 , -2.44]
JORGE 2011	165.75	31.38	12	153	25.56	12	0.0%	12.75 [-10.15 , 35.65]
KADOGLOU 2013	5.67	1.25	21	5.52	0.84	23	54.4%	0.15 [-0.49 , 0.79]
KWON 2011	187	31	13	193	33	12	0.0%	-6.00 [-31.15 , 19.15]
OLIVEIRA 2012	165.75	31.38	11	153.62	25.55	10	0.0%	12.13 [-12.26 , 36.52]
SIGAL 2007	154.3	67.4	60	148.6	65.6	64	0.0%	5.70 [-17.73 , 29.13]
SUKALA 2012	4.7	0.4	9	4.5	1	9	44.3%	0.20 [-0.50 , 0.90]
YAVARI 2012	168.8	29.3	15	176.1	49.3	15	0.0%	-7.30 [-36.32 , 21.72]
Total (Wald[a])			**219**			**227**	**100.0%**	**0.12 [-0.34 , 0.59]**

Test for overall effect: Z = 0.52 (P = 0.60)

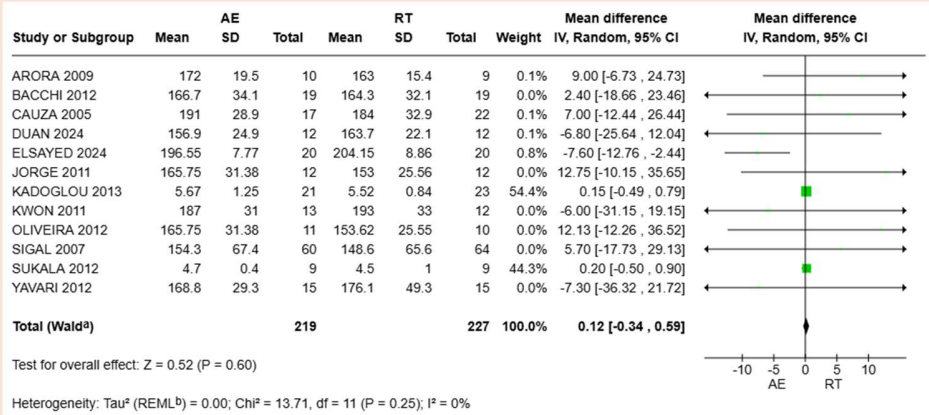
Heterogeneity: Tau² (REML[b]) = 0.00; Chi² = 13.71, df = 11 (P = 0.25); I² = 0%

Footnotes

[a]CI calculated by Wald-type method.

[b]Tau² calculated by Restricted Maximum-Likelihood method.

Figure S2l. Effects of AE and RT on LDL-C.



Study or Subgroup	AE Mean	AE SD	AE Total	RT Mean	RT SD	RT Total	Weight	Mean difference IV, Random, 95% CI
ARORA 2009	172	19.5	10	163	15.4	9	0.1%	9.00 [-6.73 , 24.73]
BACCHI 2012	166.7	34.1	19	164.3	32.1	19	0.0%	2.40 [-18.66 , 23.46]
CAUZA 2005	191	28.9	17	184	32.9	22	0.1%	7.00 [-12.44 , 26.44]
DUAN 2024	156.9	24.9	12	163.7	22.1	12	0.1%	-6.80 [-25.64 , 12.04]
ELSAYED 2024	196.55	7.77	20	204.15	8.86	20	0.8%	-7.60 [-12.76 , -2.44]
JORGE 2011	165.75	31.38	12	153	25.56	12	0.0%	12.75 [-10.15 , 35.65]
KADOGLOU 2013	5.67	1.25	21	5.52	0.84	23	54.4%	0.15 [-0.49 , 0.79]
KWON 2011	187	31	13	193	33	12	0.0%	-6.00 [-31.15 , 19.15]
OLIVEIRA 2012	165.75	31.38	11	153.62	25.55	10	0.0%	12.13 [-12.26 , 36.52]
SIGAL 2007	154.3	67.4	60	148.6	65.6	64	0.0%	5.70 [-17.73 , 29.13]
SUKALA 2012	4.7	0.4	9	4.5	1	9	44.3%	0.20 [-0.50 , 0.90]
YAVARI 2012	168.8	29.3	15	176.1	49.3	15	0.0%	-7.30 [-36.32 , 21.72]
Total (Wald[a])			**219**			**227**	**100.0%**	**0.12 [-0.34 , 0.59]**

Test for overall effect: Z = 0.52 (P = 0.60)

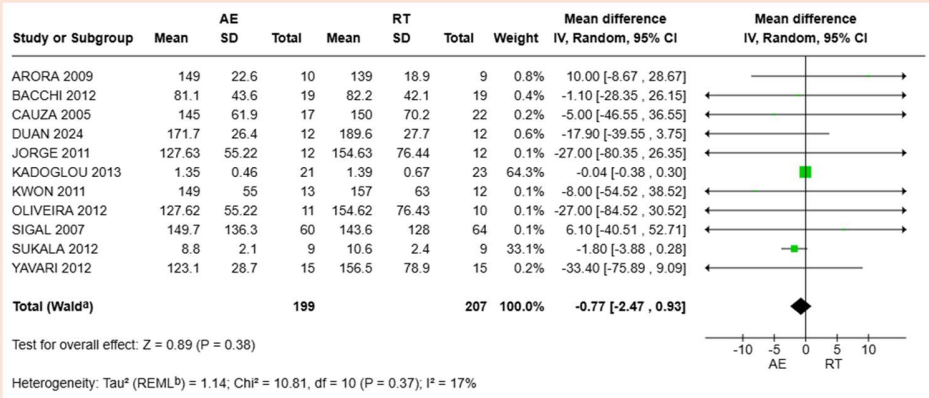
Heterogeneity: Tau² (REML[b]) = 0.00; Chi² = 13.71, df = 11 (P = 0.25); I² = 0%

Footnotes

[a]CI calculated by Wald-type method.

[b]Tau² calculated by Restricted Maximum-Likelihood method.

Figure S2m. Effects of AE and RT on TC.



Study or Subgroup	AE Mean	AE SD	AE Total	RT Mean	RT SD	RT Total	Weight	Mean difference IV, Random, 95% CI
ARORA 2009	149	22.6	10	139	18.9	9	0.8%	10.00 [-8.67 , 28.67]
BACCHI 2012	81.1	43.6	19	82.2	42.1	19	0.4%	-1.10 [-28.35 , 26.15]
CAUZA 2005	145	61.9	17	150	70.2	22	0.2%	-5.00 [-46.55 , 36.55]
DUAN 2024	171.7	26.4	12	189.6	27.7	12	0.6%	-17.90 [-39.55 , 3.75]
JORGE 2011	127.63	55.22	12	154.63	76.44	12	0.1%	-27.00 [-80.35 , 26.35]
KADOGLOU 2013	1.35	0.46	21	1.39	0.67	23	64.3%	-0.04 [-0.38 , 0.30]
KWON 2011	149	55	13	157	63	12	0.1%	-8.00 [-54.52 , 38.52]
OLIVEIRA 2012	127.62	55.22	11	154.62	76.43	10	0.1%	-27.00 [-84.52 , 30.52]
SIGAL 2007	149.7	136.3	60	143.6	128	64	0.1%	6.10 [-40.51 , 52.71]
SUKALA 2012	8.8	2.1	9	10.6	2.4	9	33.1%	-1.80 [-3.88 , 0.28]
YAVARI 2012	123.1	28.7	15	156.5	78.9	15	0.2%	-33.40 [-75.89 , 9.09]
Total (Wald[a])			**199**			**207**	**100.0%**	**-0.77 [-2.47 , 0.93]**

Test for overall effect: Z = 0.89 (P = 0.38)

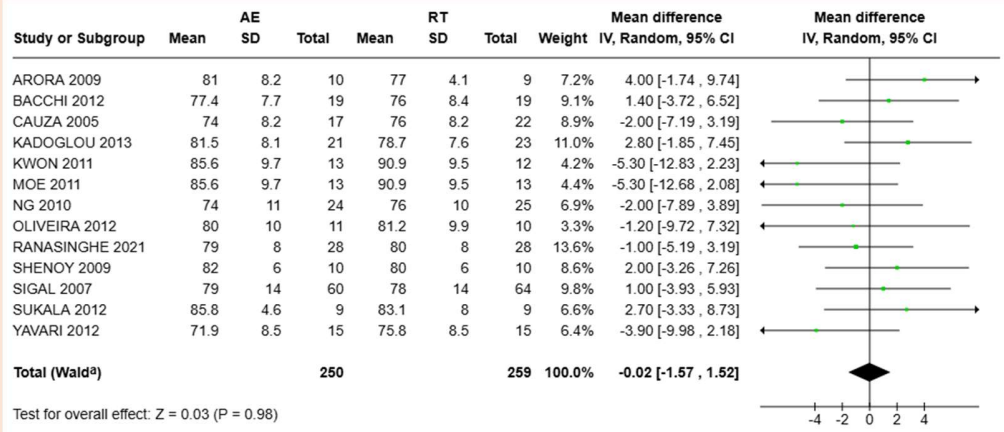
Heterogeneity: Tau² (REML[b]) = 1.14; Chi² = 10.81, df = 10 (P = 0.37); I² = 17%

Footnotes

[a]CI calculated by Wald-type method.

[b]Tau² calculated by Restricted Maximum-Likelihood method.

Figure S2n. Effects of AE and RT on TG.



Study or Subgroup	AE Mean	AE SD	AE Total	RT Mean	RT SD	RT Total	Weight	Mean difference IV, Random, 95% CI
ARORA 2009	81	8.2	10	77	4.1	9	7.2%	4.00 [-1.74 , 9.74]
BACCHI 2012	77.4	7.7	19	76	8.4	19	9.1%	1.40 [-3.72 , 6.52]
CAUZA 2005	74	8.2	17	76	8.2	22	8.9%	-2.00 [-7.19 , 3.19]
KADOGLOU 2013	81.5	8.1	21	78.7	7.6	23	11.0%	2.80 [-1.85 , 7.45]
KWON 2011	85.6	9.7	13	90.9	9.5	12	4.2%	-5.30 [-12.83 , 2.23]
MOE 2011	85.6	9.7	13	90.9	9.5	13	4.4%	-5.30 [-12.68 , 2.08]
NG 2010	74	11	24	76	10	25	6.9%	-2.00 [-7.89 , 3.89]
OLIVEIRA 2012	80	10	11	81.2	9.9	10	3.3%	-1.20 [-9.72 , 7.32]
RANASINGHE 2021	79	8	28	80	8	28	13.6%	-1.00 [-5.19 , 3.19]
SHENOY 2009	82	6	10	80	6	10	8.6%	2.00 [-3.26 , 7.26]
SIGAL 2007	79	14	60	78	14	64	9.8%	1.00 [-3.93 , 5.93]
SUKALA 2012	85.8	4.6	9	83.1	8	9	6.6%	2.70 [-3.33 , 8.73]
YAVARI 2012	71.9	8.5	15	75.8	8.5	15	6.4%	-3.90 [-9.98 , 2.18]
Total (Wald[a])			**250**			**259**	**100.0%**	**-0.02 [-1.57 , 1.52]**

Test for overall effect: Z = 0.03 (P = 0.98)

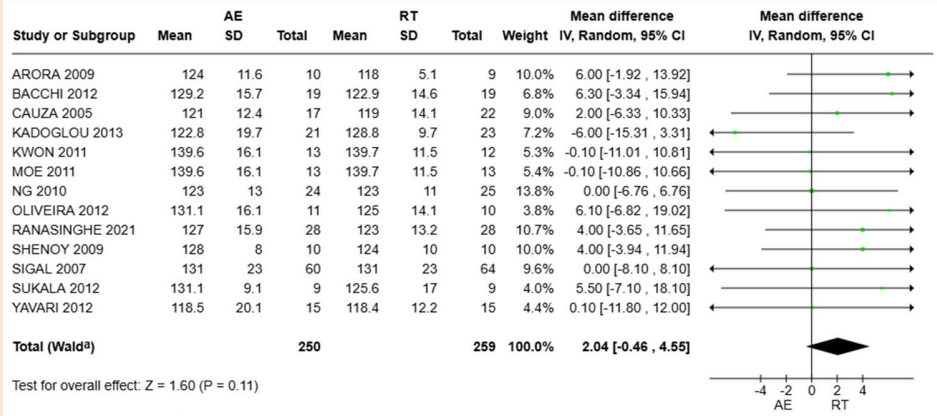
Heterogeneity: Tau² (REML[b]) = 0.00; Chi² = 11.79, df = 12 (P = 0.46); I² = 0%

Footnotes

[a]CI calculated by Wald-type method.

[b]Tau² calculated by Restricted Maximum-Likelihood method.

Figure S2o. Effects of AE and RT on DBP.



Study or Subgroup	AE Mean	AE SD	AE Total	RT Mean	RT SD	RT Total	Weight	Mean difference IV, Random, 95% CI
ARORA 2009	124	11.6	10	118	5.1	9	10.0%	6.00 [-1.92 , 13.92]
BACCHI 2012	129.2	15.7	19	122.9	14.6	19	6.8%	6.30 [-3.34 , 15.94]
CAUZA 2005	121	12.4	17	119	14.1	22	9.0%	2.00 [-6.33 , 10.33]
KADOGLOU 2013	122.8	19.7	21	128.8	9.7	23	7.2%	-6.00 [-15.31 , 3.31]
KWON 2011	139.6	16.1	13	139.7	11.5	12	5.3%	-0.10 [-11.01 , 10.81]
MOE 2011	139.6	16.1	13	139.7	11.5	13	5.4%	-0.10 [-10.86 , 10.66]
NG 2010	123	13	24	123	11	25	13.8%	0.00 [-6.76 , 6.76]
OLIVEIRA 2012	131.1	16.1	11	125	14.1	10	3.8%	6.10 [-6.82 , 19.02]
RANASINGHE 2021	127	15.9	28	123	13.2	28	10.7%	4.00 [-3.65 , 11.65]
SHENOY 2009	128	8	10	124	10	10	10.0%	4.00 [-3.94 , 11.94]
SIGAL 2007	131	23	60	131	23	64	9.6%	0.00 [-8.10 , 8.10]
SUKALA 2012	131.1	9.1	9	125.6	17	9	4.0%	5.50 [-7.10 , 18.10]
YAVARI 2012	118.5	20.1	15	118.4	12.2	15	4.4%	0.10 [-11.80 , 12.00]
Total (Wald[a])			**250**			**259**	**100.0%**	**2.04 [-0.46 , 4.55]**

Test for overall effect: Z = 1.60 (P = 0.11)

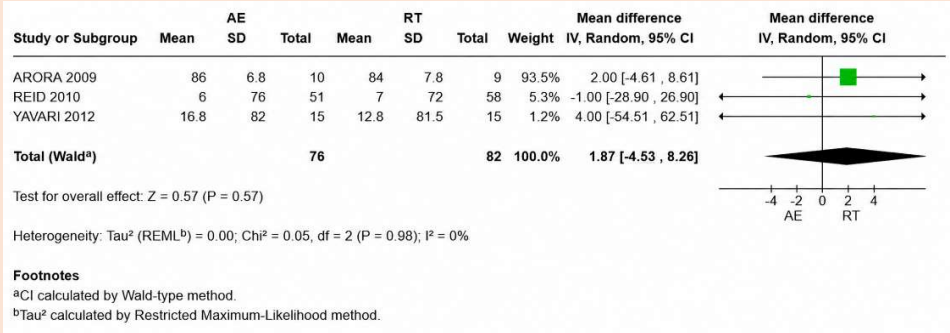
Heterogeneity: Tau² (REML[b]) = 0.00; Chi² = 6.72, df = 12 (P = 0.88); I² = 0%

Footnotes

[a]CI calculated by Wald-type method.

[b]Tau² calculated by Restricted Maximum-Likelihood method.

Figure S2p. Effects of AE and RT on SBP.



Study or Subgroup	AE Mean	AE SD	AE Total	RT Mean	RT SD	RT Total	Weight	Mean difference IV, Random, 95% CI
ARORA 2009	86	6.8	10	84	7.8	9	93.5%	2.00 [-4.61 , 8.61]
REID 2010	6	76	51	7	72	58	5.3%	-1.00 [-28.90 , 26.90]
YAVARI 2012	16.8	82	15	12.8	81.5	15	1.2%	4.00 [-54.51 , 62.51]
Total (Wald[a])			**76**			**82**	**100.0%**	**1.87 [-4.53 , 8.26]**

Test for overall effect: Z = 0.57 (P = 0.57)

Heterogeneity: Tau² (REML[b]) = 0.00; Chi² = 0.05, df = 2 (P = 0.98); I² = 0%

Footnotes

[a]CI calculated by Wald-type method.

[b]Tau² calculated by Restricted Maximum-Likelihood method.

Figure S2r. Effects of AE and RT on RHR.

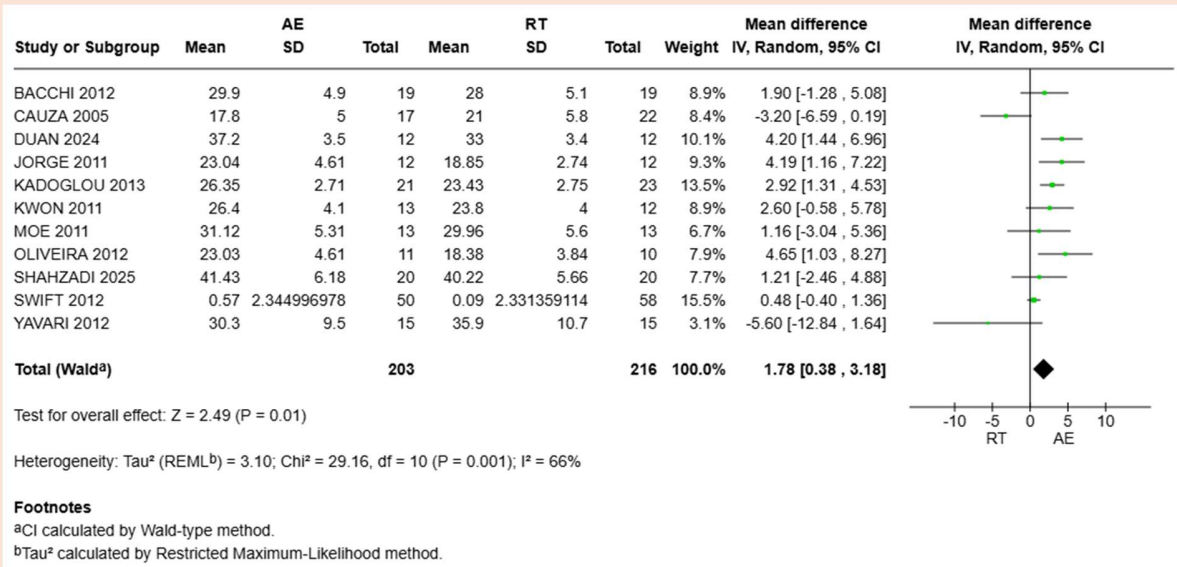


Figure S2s. Effects of AE and RT on CRF.

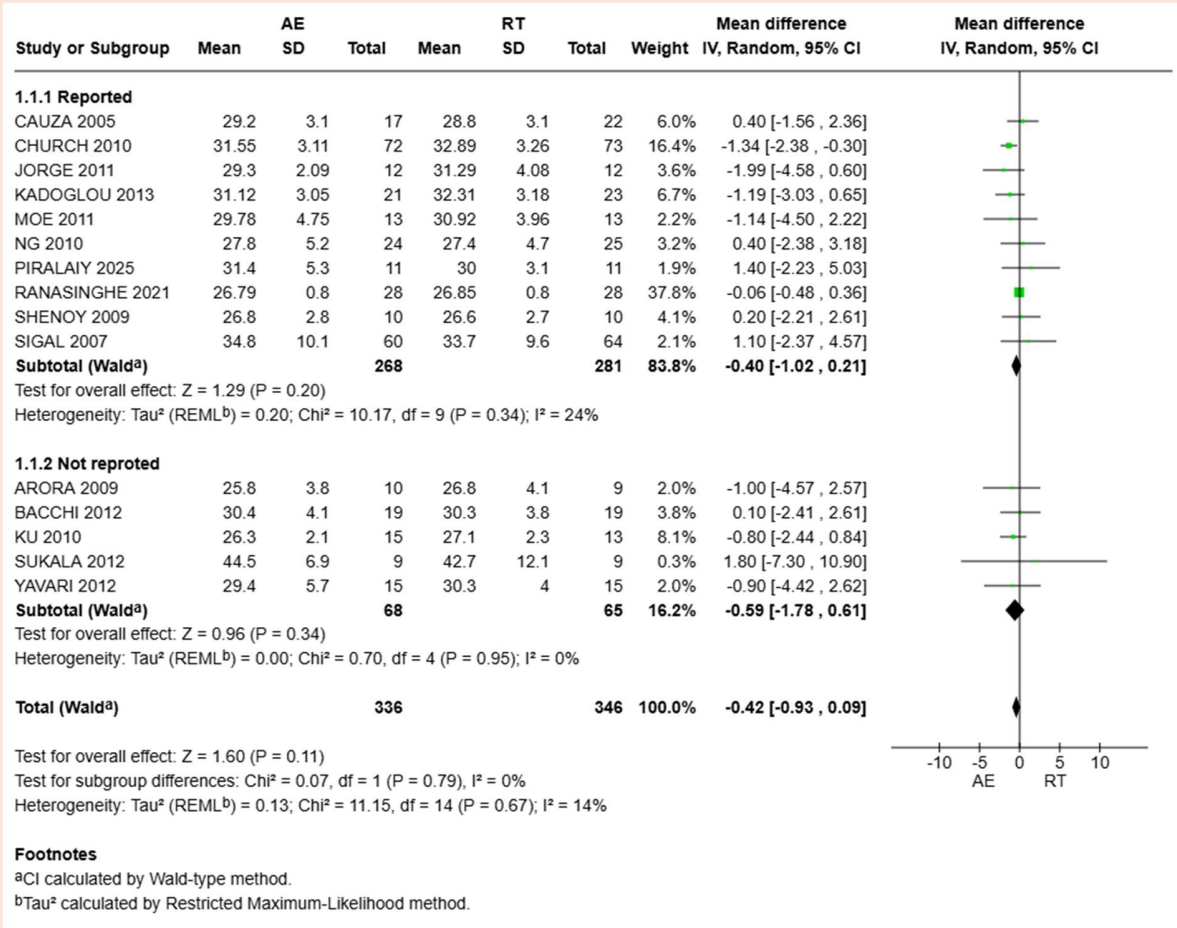


Figure S3. Forest plots of subgroup analyses based on the comorbidities (reported or not) and intervention's duration (≤12 weeks vs. >12 weeks).

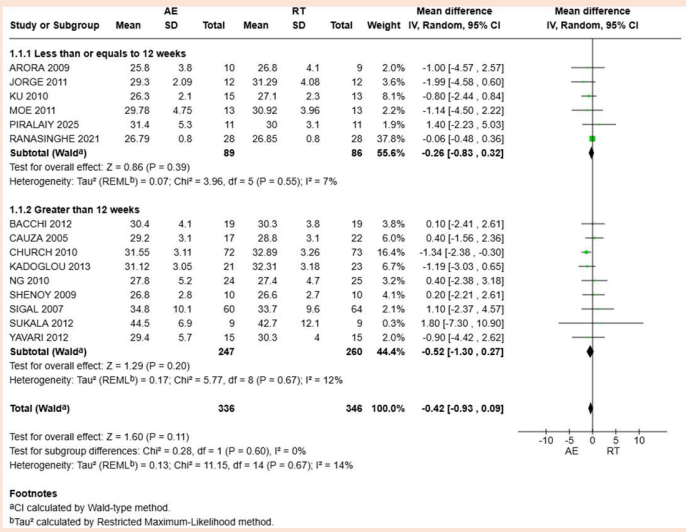


Figure S3a. Effects of AE and RT on BMI with subgroup analyses.

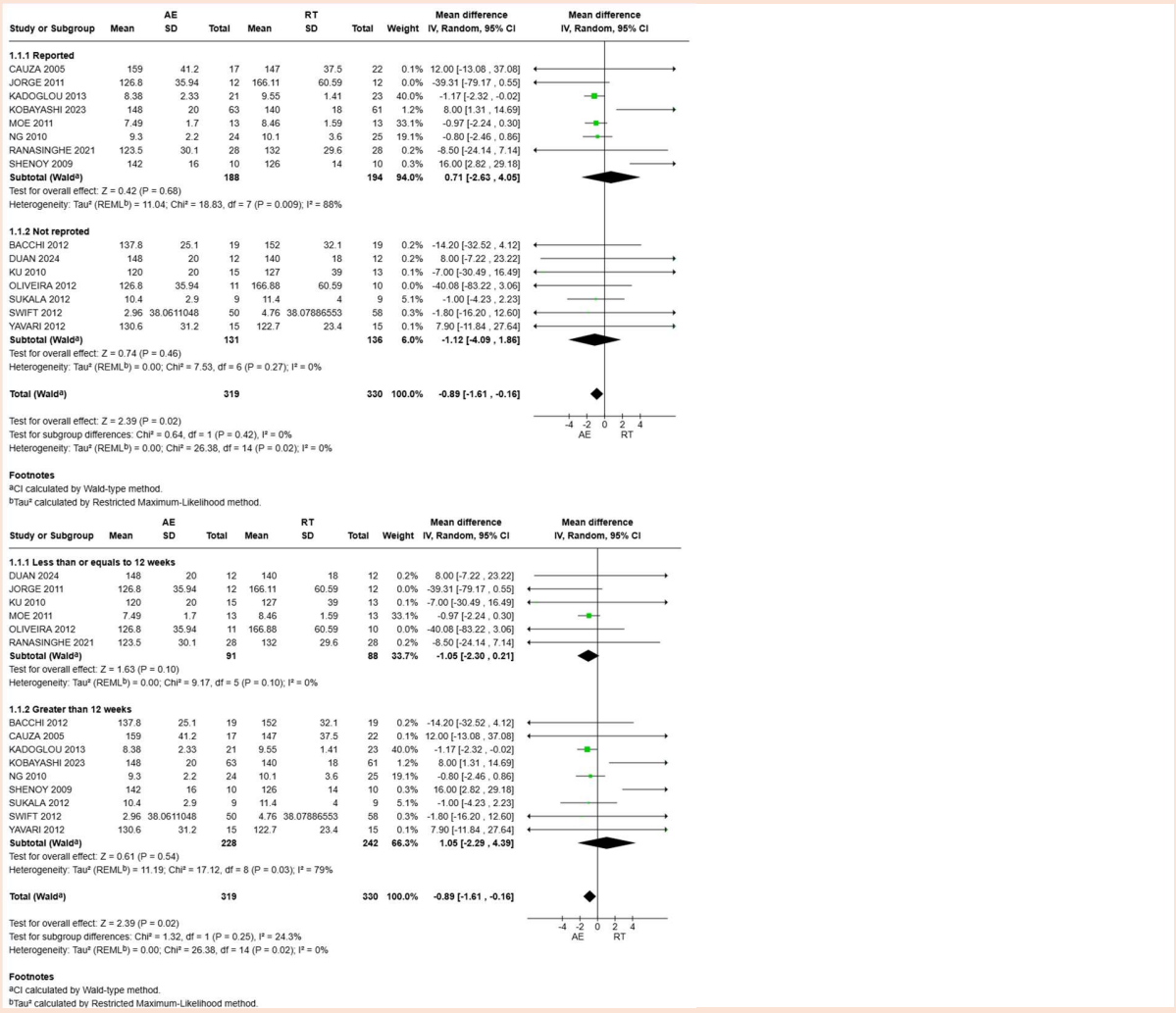


Figure S3b. Effects of AE and RT on FBG with subgroup analyses.

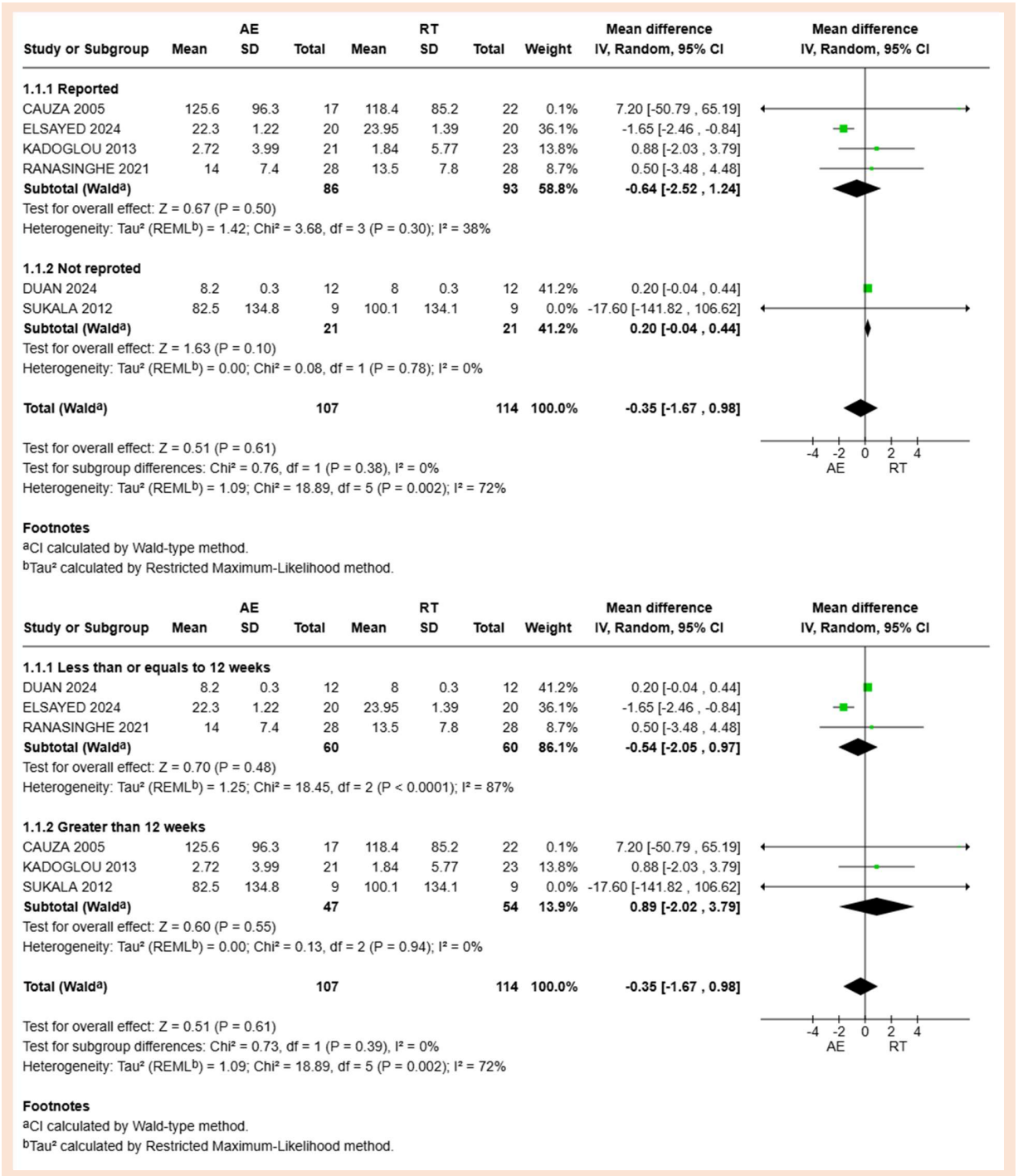


Figure S3c. Effects of AE and RT on FI with subgroup analyses.

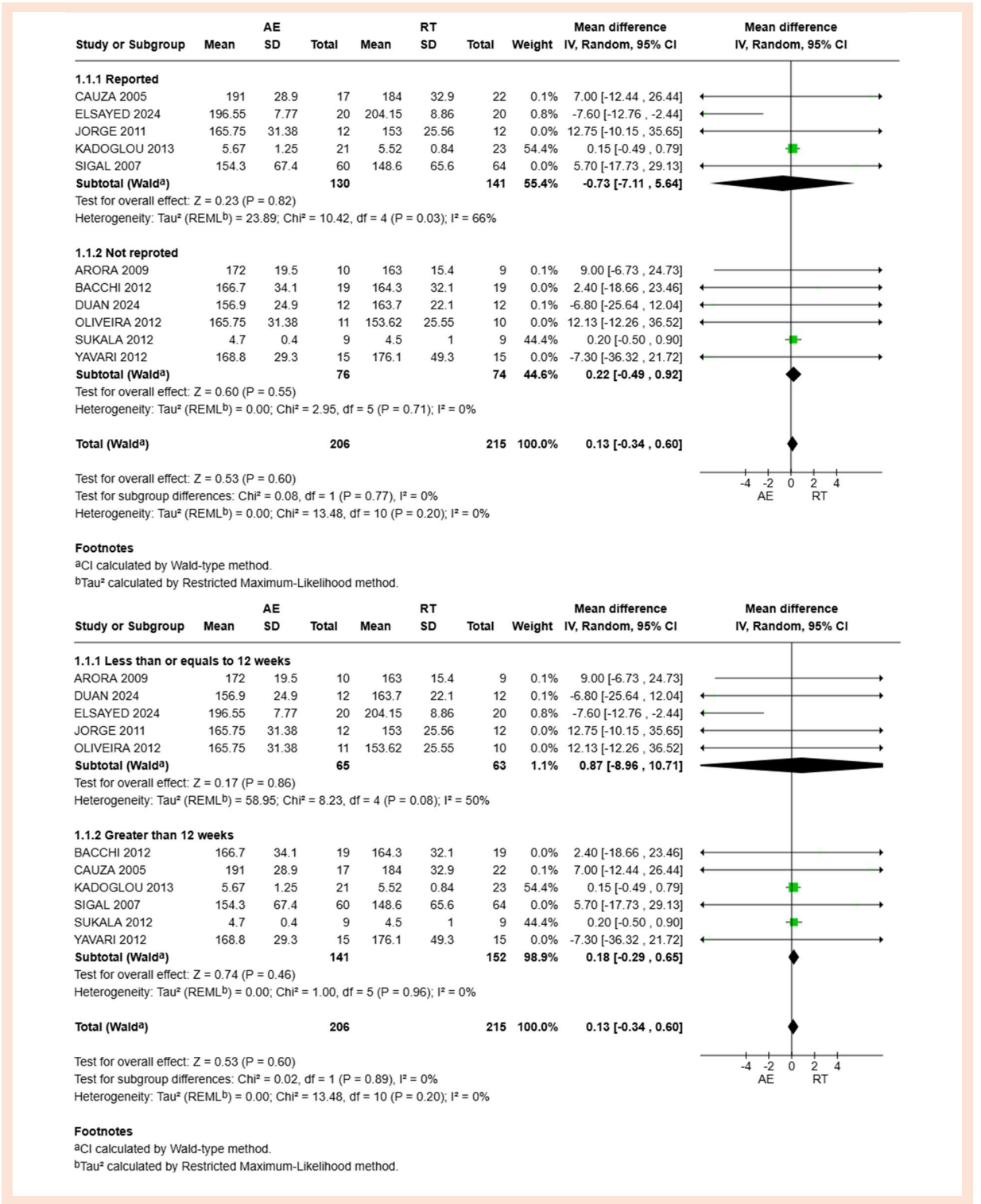


Figure S3d. Effects of AE and RT on TC with subgroup analyses.

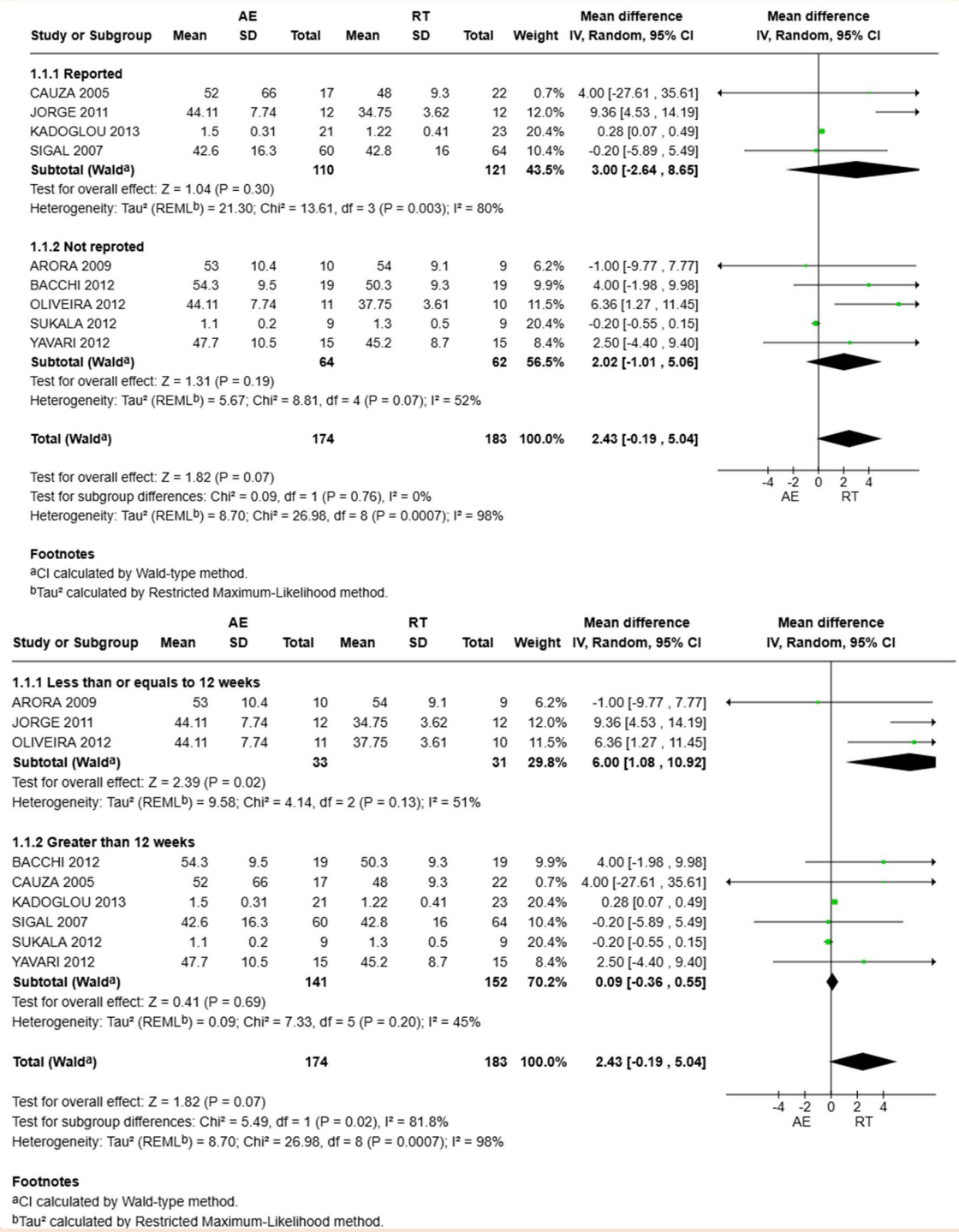
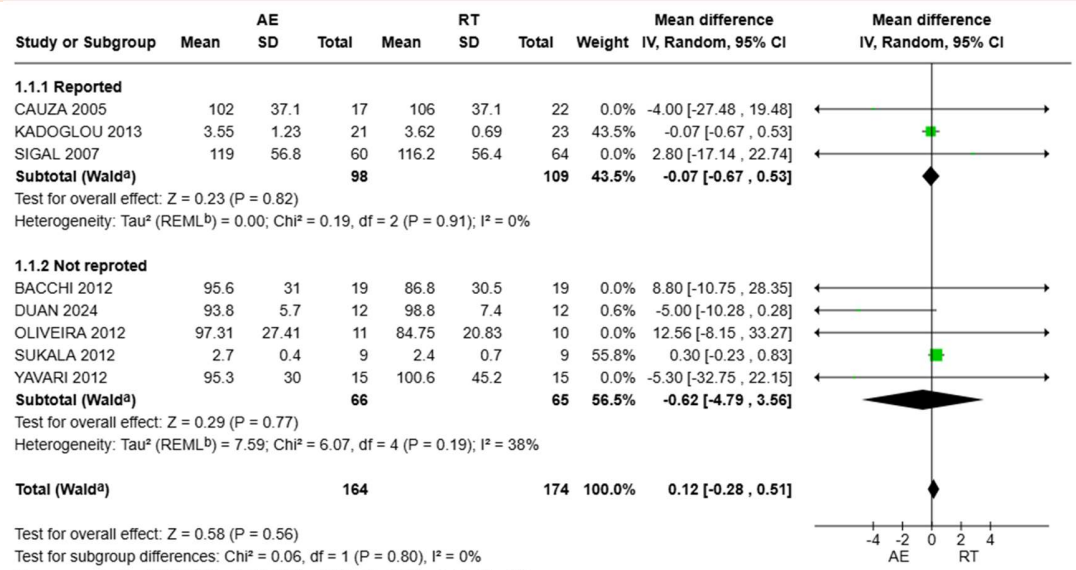


Figure S3e. Effects of AE and RT on HDL-C with subgroup analyses.



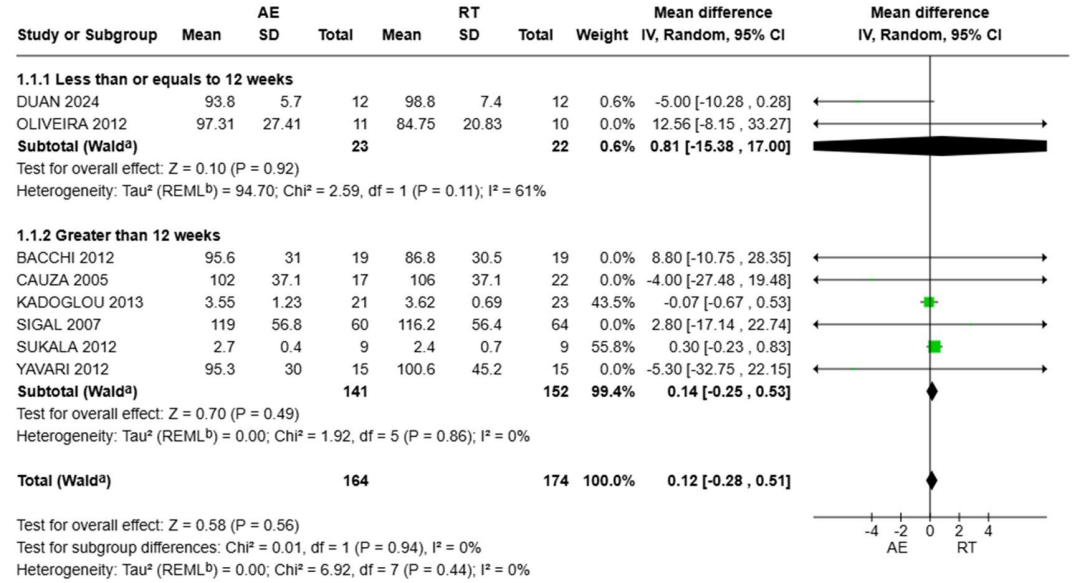


Figure S3f. Effects of AE and RT on LDL-C with subgroup analyses.

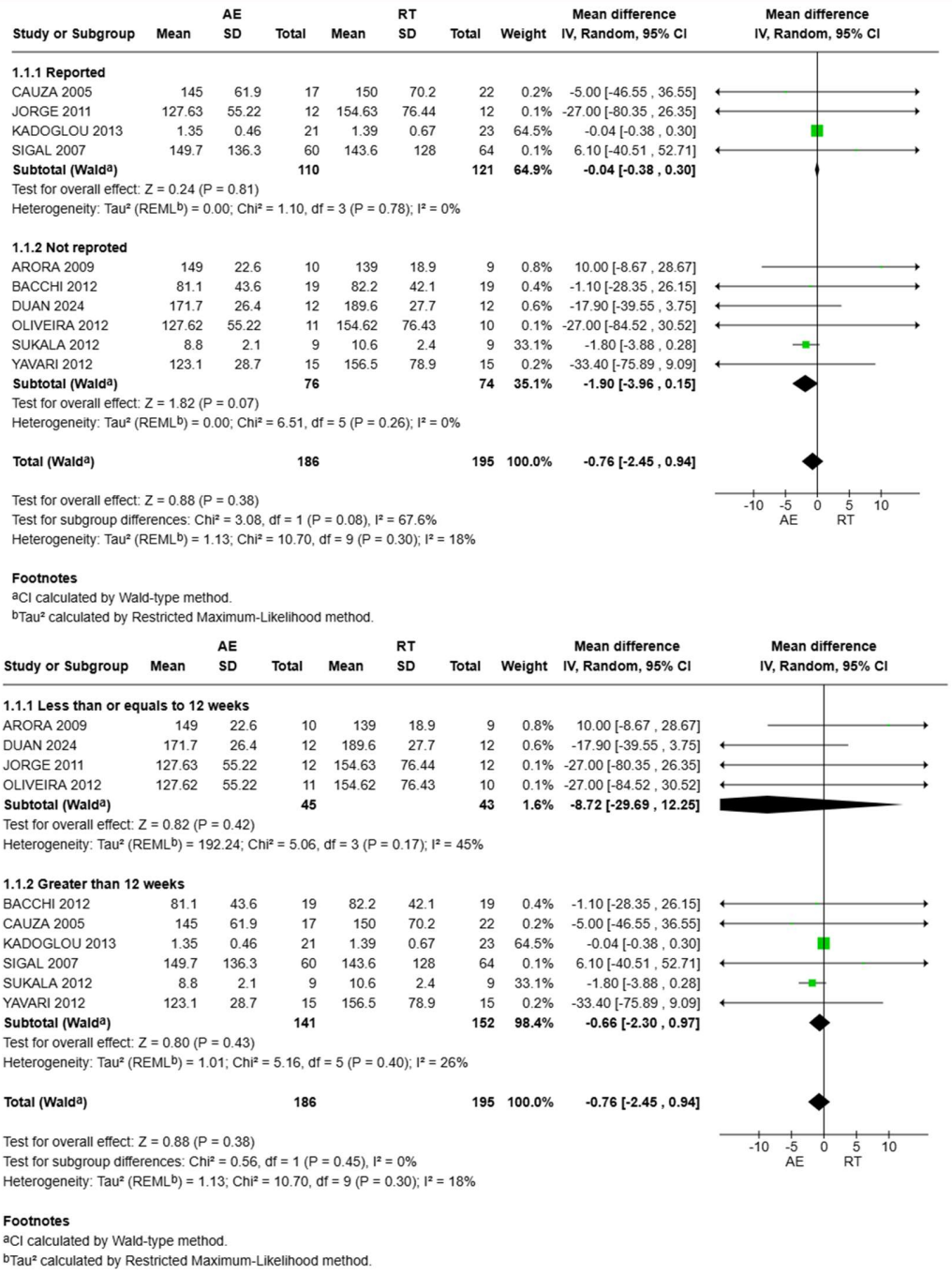


Figure S3g. Effects of AE and RT on TG with subgroup analyses.

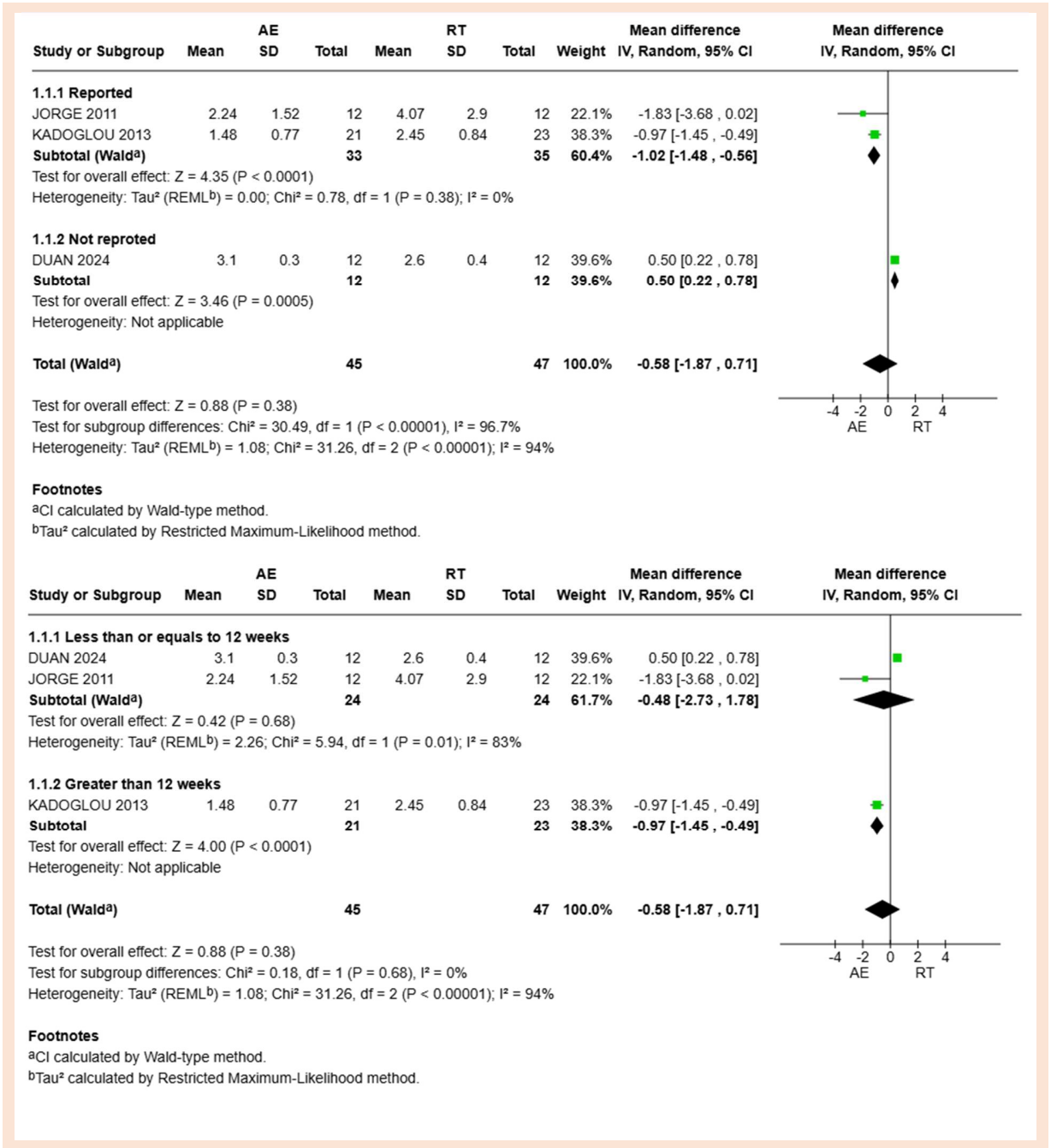
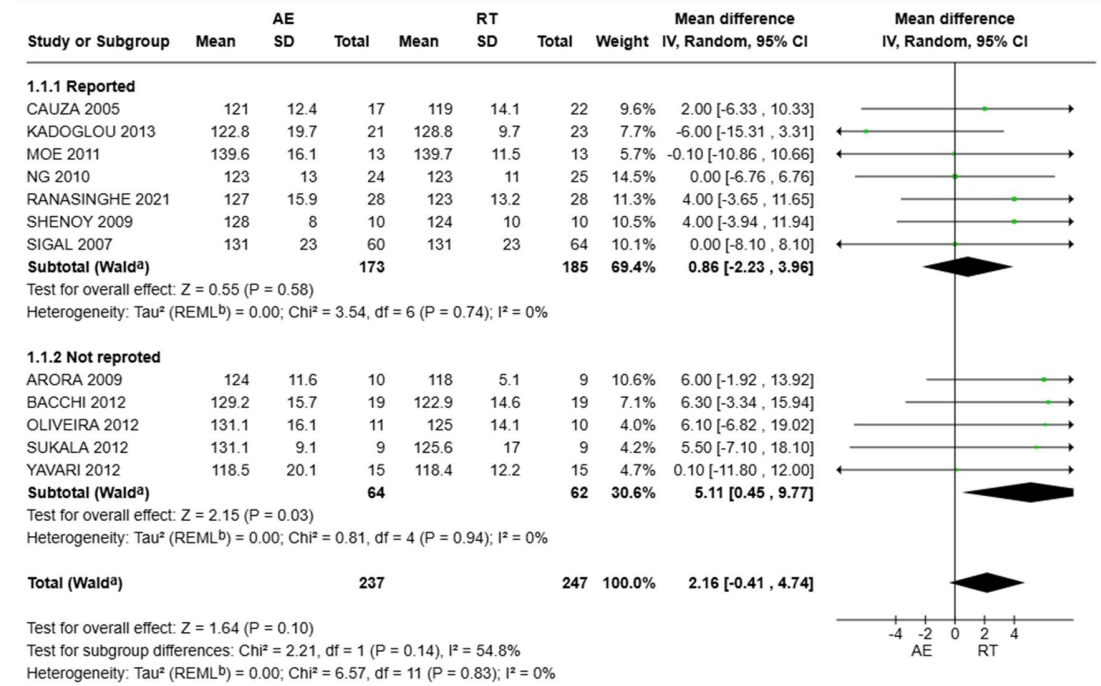


Figure S3h. Effects of AE and RT on HOMA-IR with subgroup analyses.



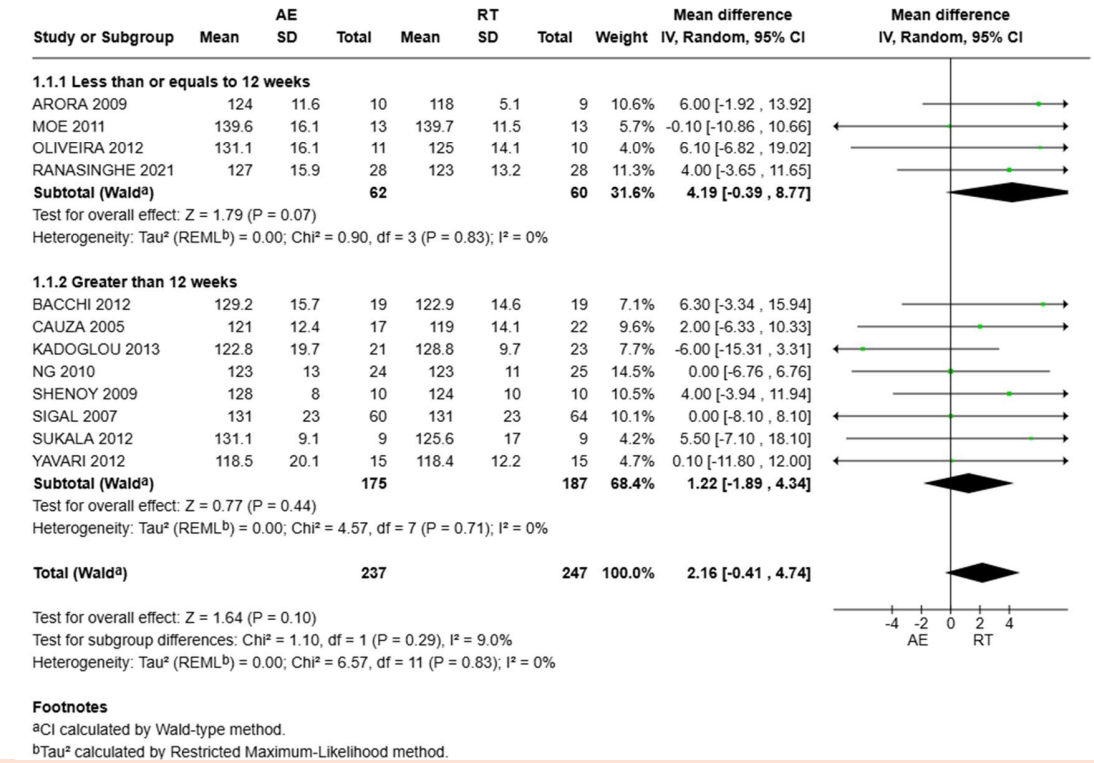


Figure S3i. Effects of AE and RT on SBP with subgroup analyses.

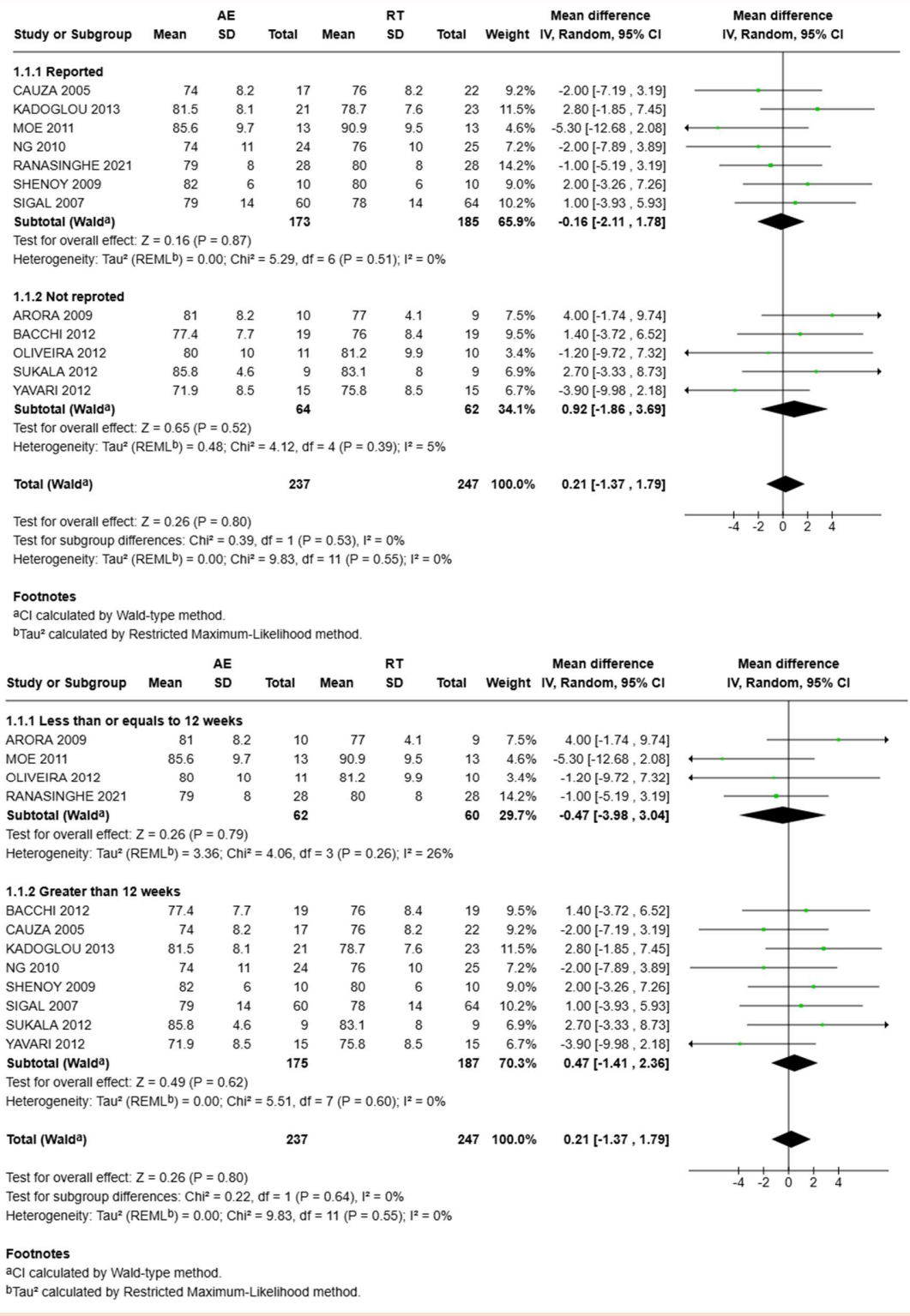
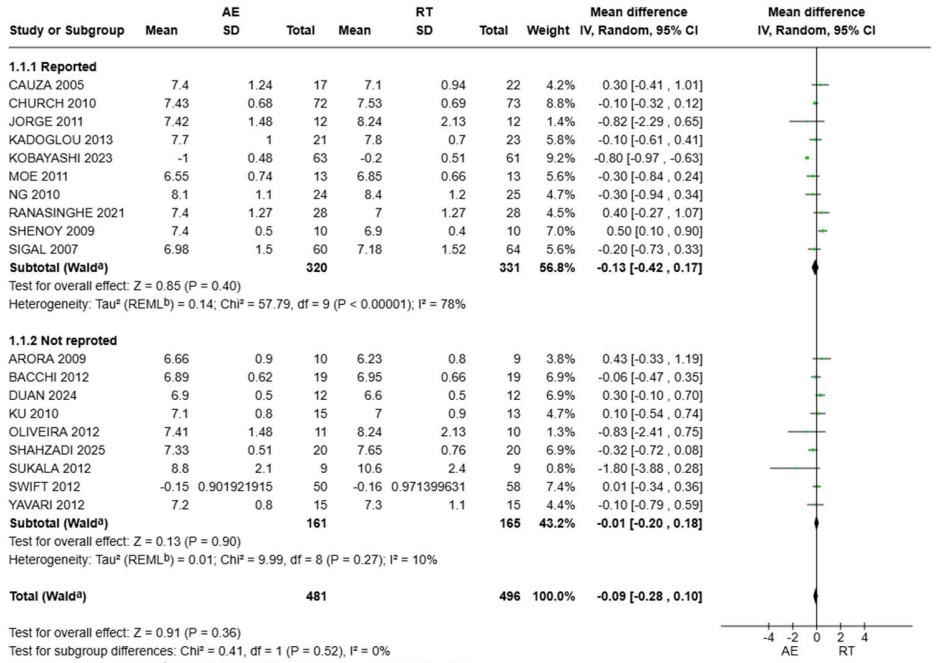


Figure S3j. Effects of AE and RT on DBP with subgroup analyses.



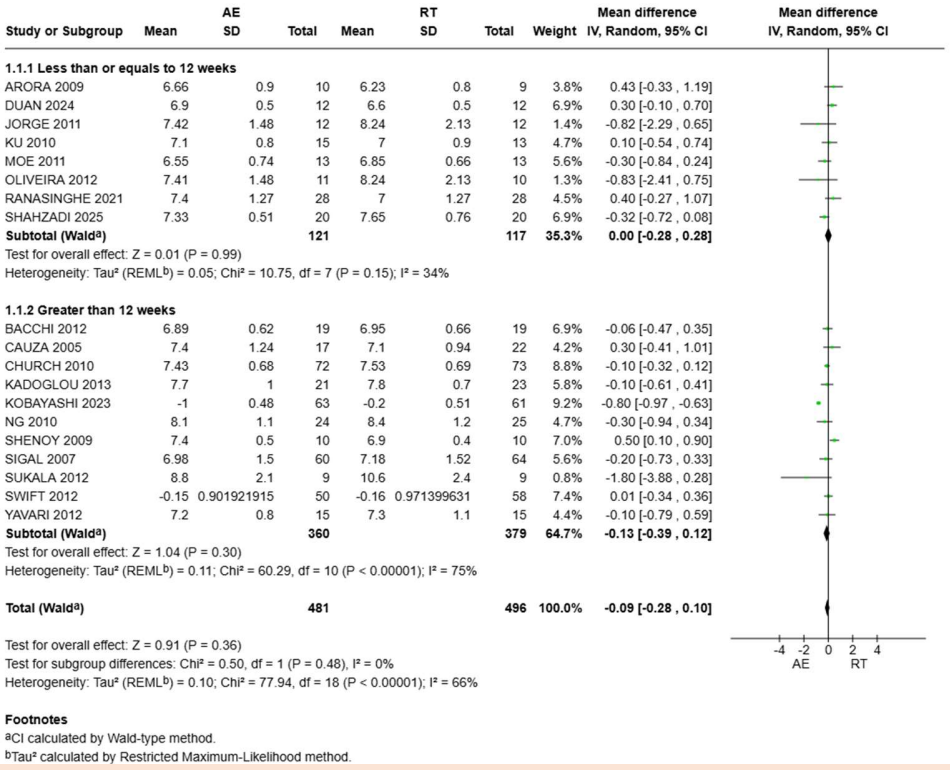


Figure S3k. Effects of AE and RT on HbA1c with subgroup analyses.

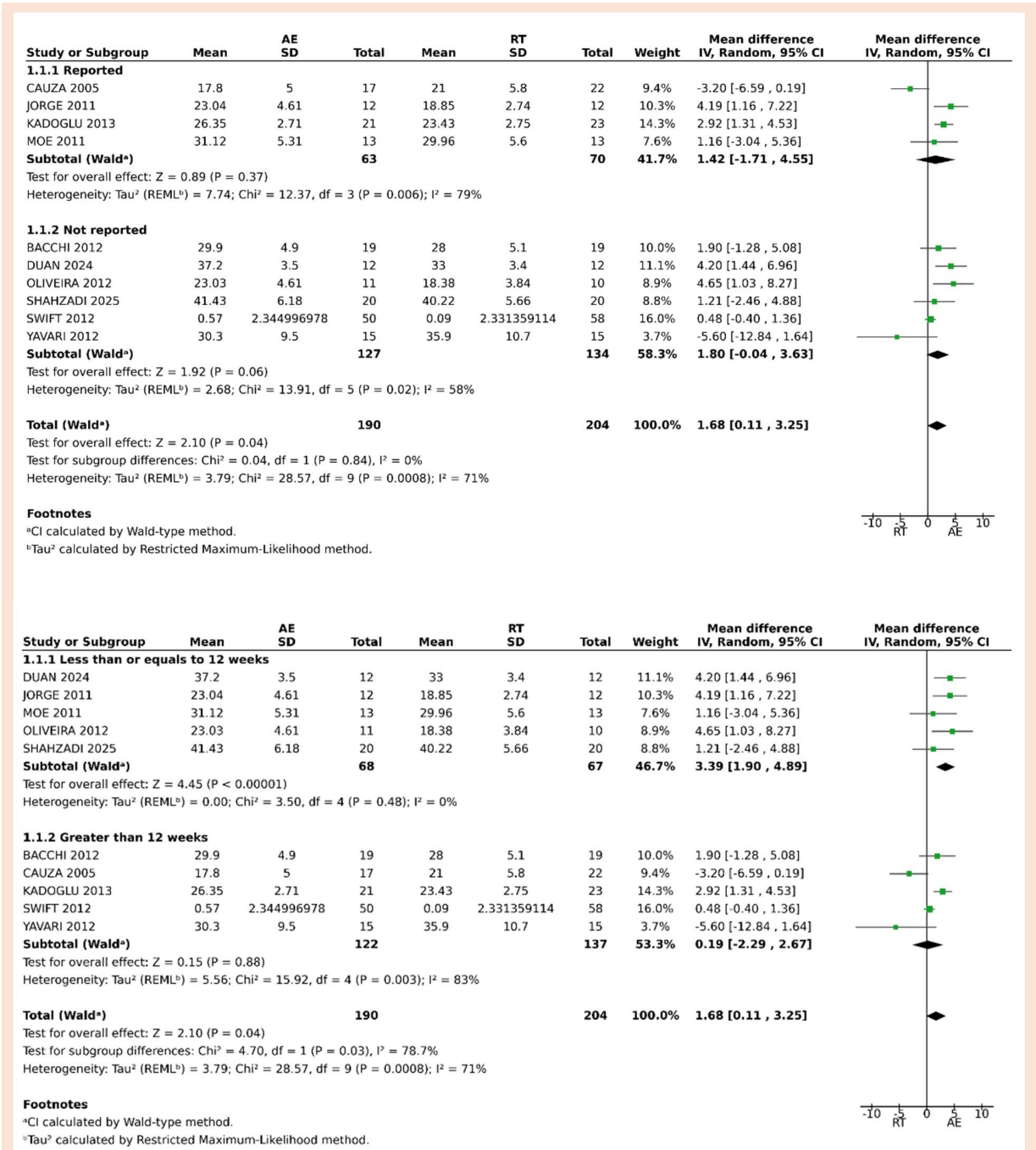


Figure S3l. Effects of AE and RT on CRF with subgroup analyses.

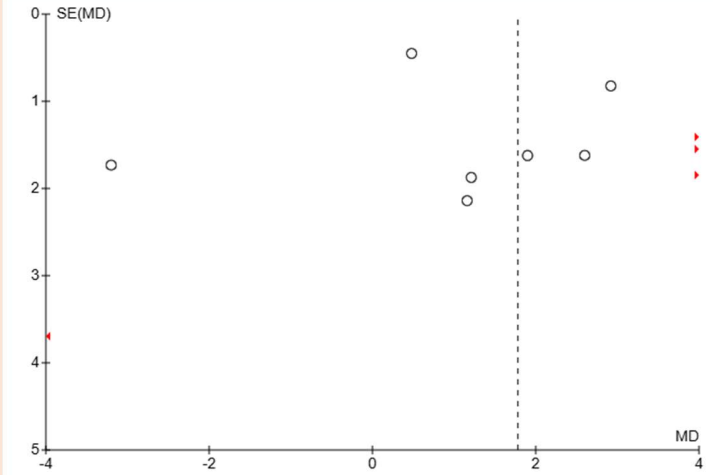


Figure S4a. **Funnel plot graphics for VO2max.**

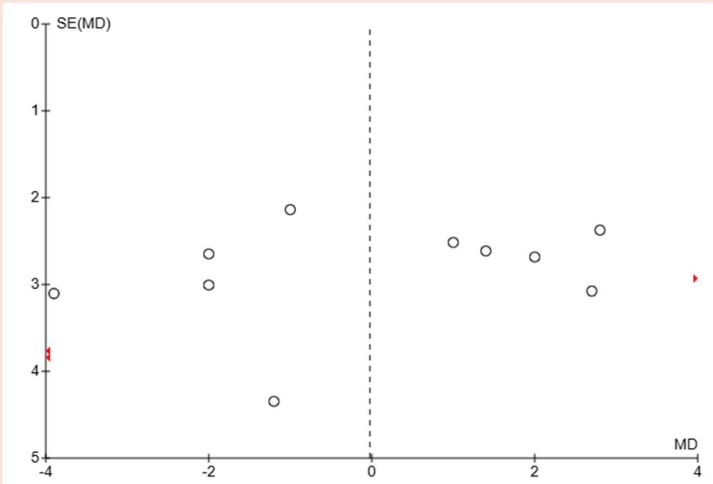


Figure S4b. **Funnel plot graphics for DBP.**

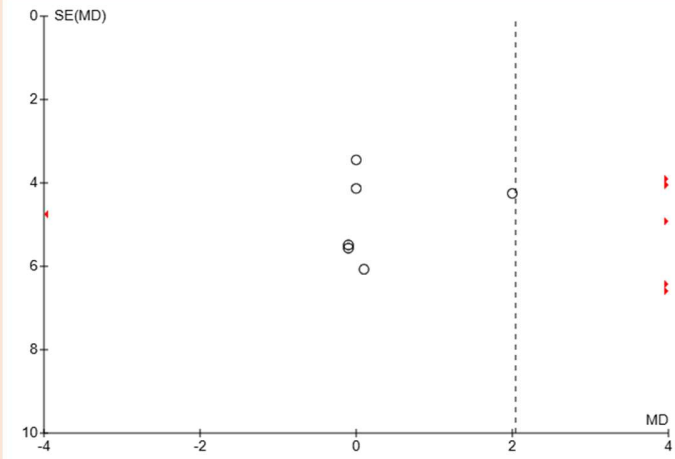


Figure S4c. **Funnel plot graphics for SBP.**

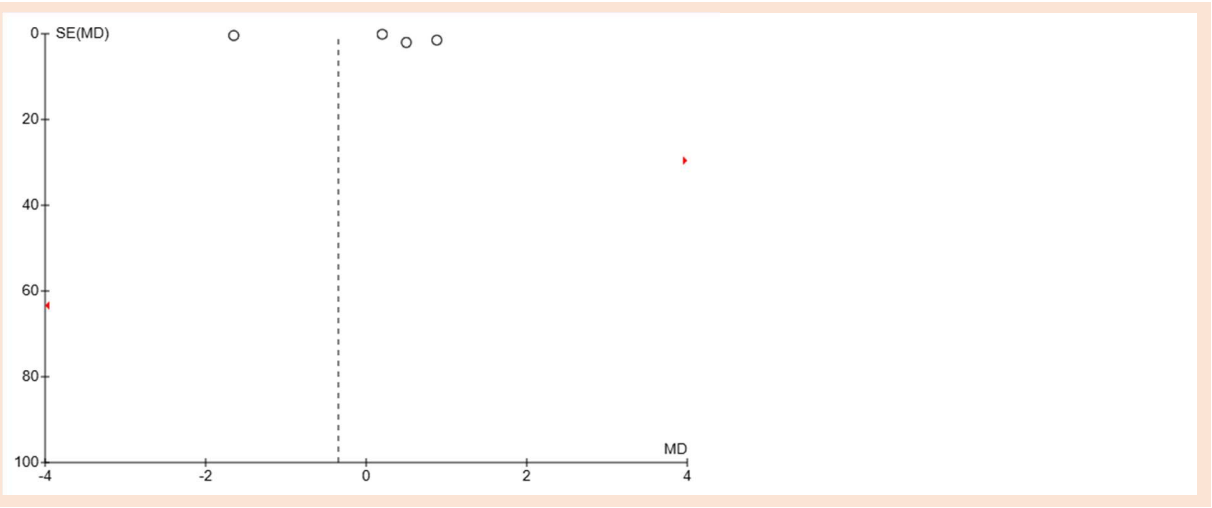


Figure S4d. **Funnel plot graphics for FI.**

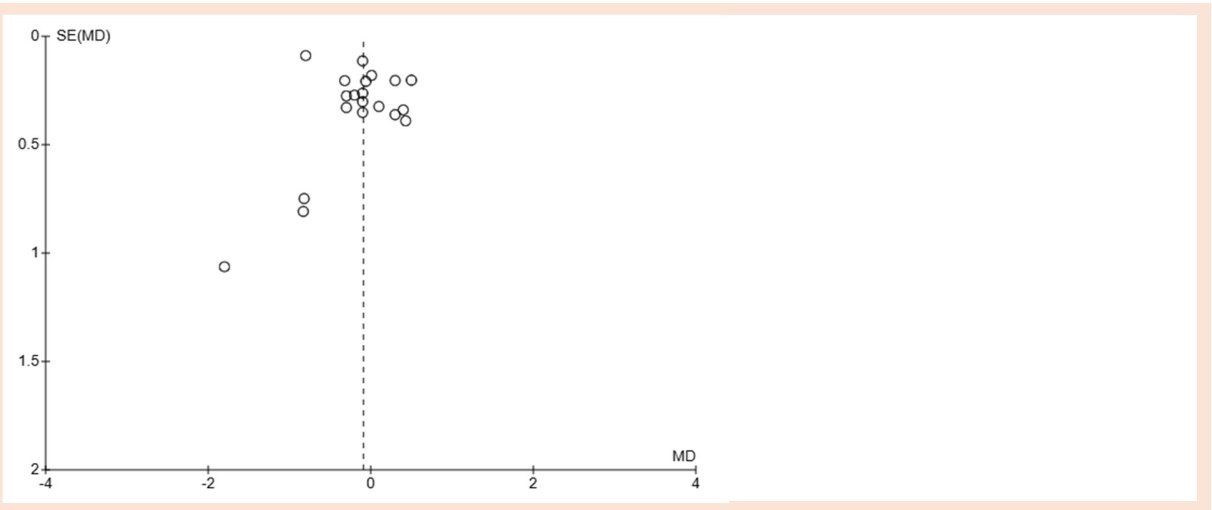


Figure S4e. **Funnel plot graphics for HbA1c.**

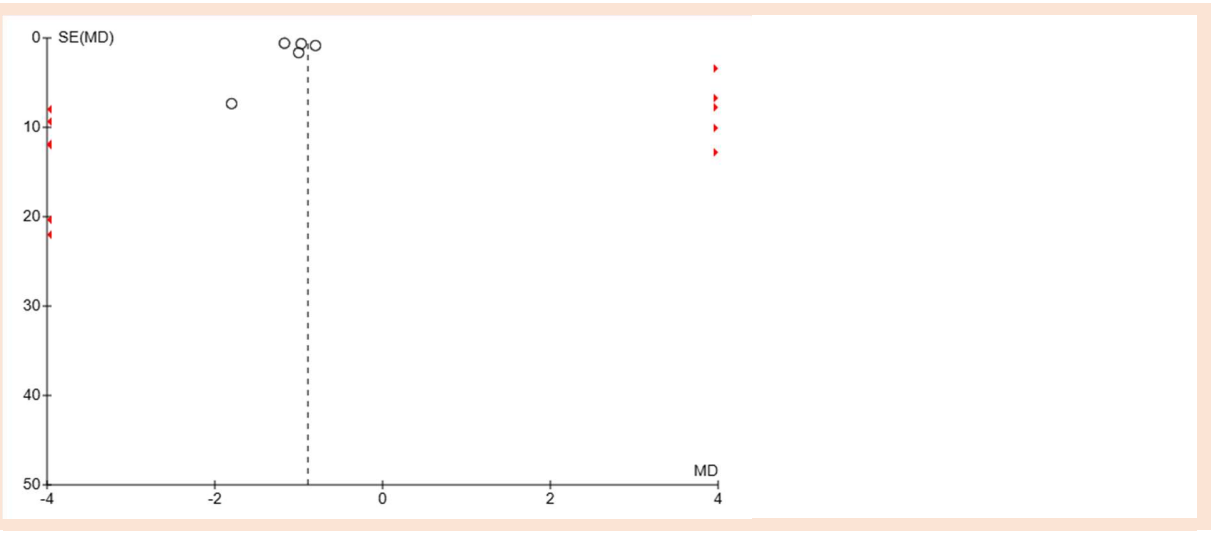


Figure S4f. **Funnel plot graphics for FBG.**

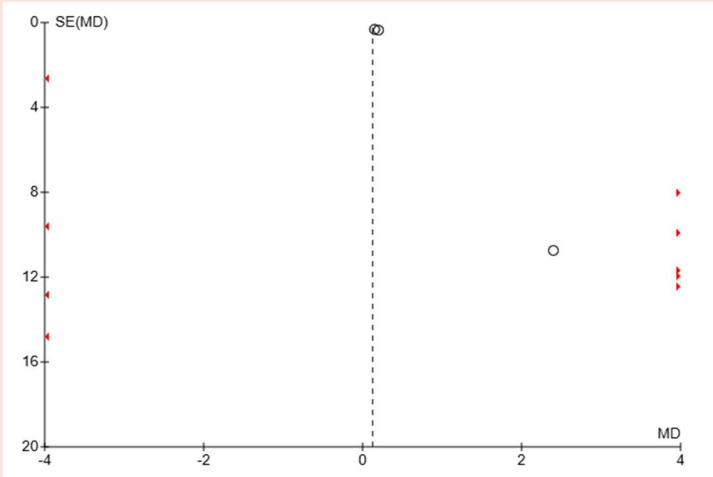


Figure S4g. **Funnel plot graphics for TC.**

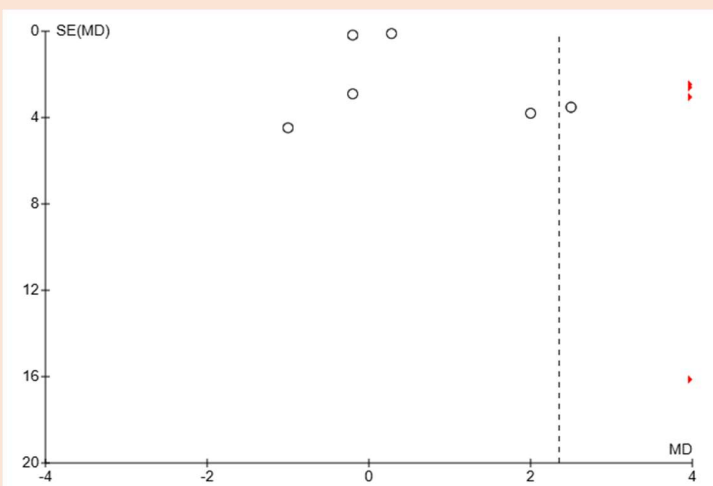


Figure S4h. **Funnel plot graphics for HDL-C.**

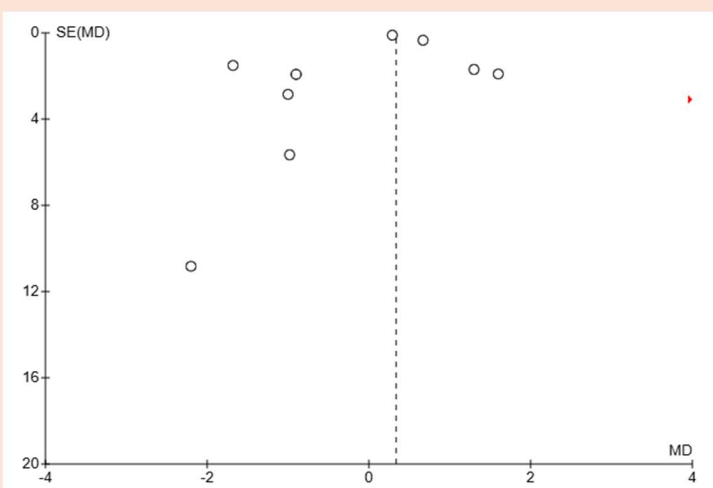


Figure S4i. Funnel plot graphics for BF.

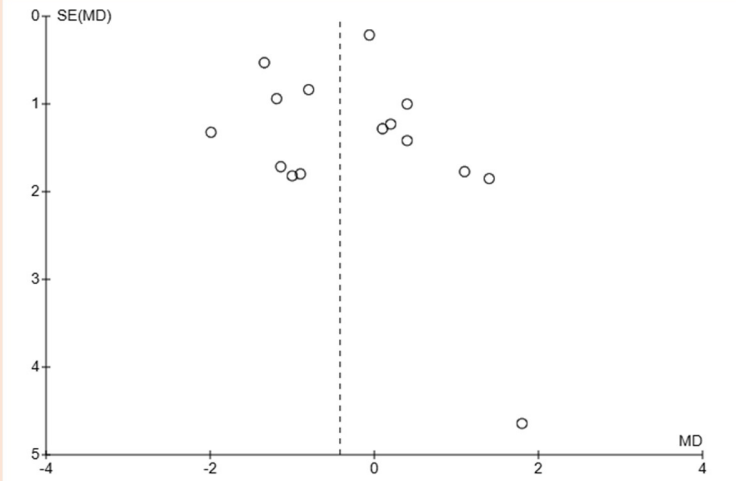


Figure S4k. Funnel plot graphics for BMI.

Footnotes

a. Downgraded one level for risk of bias.
b. Downgraded one level for inconsistency.
c. Downgraded two levels for very serious inconsistency.

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